JIPM - TPM®
Sample Format

Sample Formats for the12 Steps of TPM

Compiled by Japan Institute of Plant Maintenance

Japan Institute of Plant Maintenance (www.jipm.or.jp)

How to Use This Manual

This manual consists of 22 chapters, as shown in Table 1.

On the first page of each chapter, there is an outline table of contents of work flow and the forms used to perform those operations. (Figure 1)

The numbers in the upper right hand corner of the forms in the body, such as 1 | 1-1 (Figure 2), indicate major category as shown in Figure 1, intermediate category, and form number, respectively.

In addition, the numbers in the blancket [numbers inside ( )] to the right of work flow subcategories correspond to form numbers.

Using the table of contents to find necessary forms, you can copy and arrange forms to meet your needs.

Table 1 Title of Each Chapter

Chapter	Title (Major Category)
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3	Establishment of a TPM Promotion Organization and Formal Organization Model
4	Setting the Basic Policy and Goals of TPM
5	Creating a TPM Master Plan
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7.3	Keikaku Hozen (Planned Maintenance)
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B	TPM PR Activities
C	Three Jewels of Autonomous Maintenance
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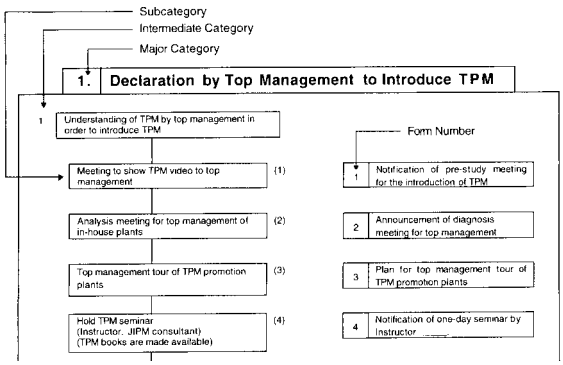
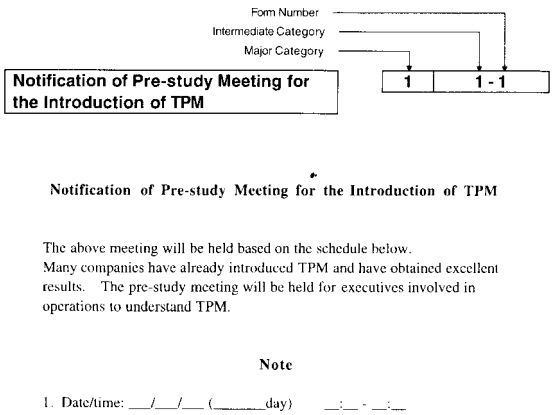


Figure 2 Example of Forms



TPM Sample Formt
Sample Formats for the
12 Steps of TPM

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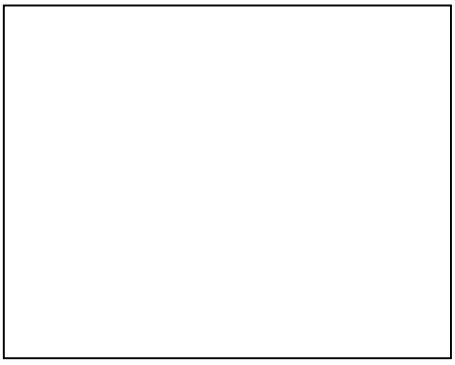
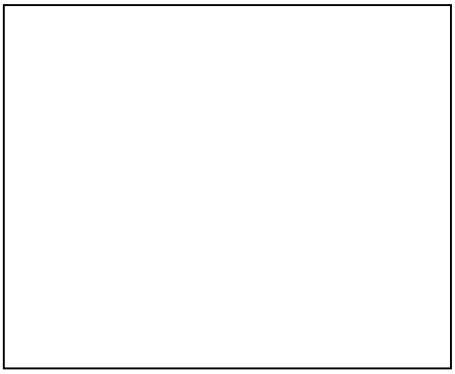


1. Declaration by Top Management to Introduce TPM



1. Declaration by Top Management to Introduce TPM

1

Understanding of TPM by top management in order to introduce TPM

Meeting to show TPM video to top management (1)

Analysis meeting for top management of in-house plants (2)

Top management tour of TPM promotion plants (3)

Hold TPM seminar
(Instructor: JIPM consultant)
(TPM books are made available) (4)

Participation in the TPM College public courses (5)
Executive course
Manager's course

1	Notification of pre-study meeting for the introduction of TPM
2	Announcement of diagnosis meeting for top management
3	Plan for top management tour of TPM promotion plants
4	Notification of one-day seminar by Instructor _____.
5	Announcement of TPM College courses

(1) Announcement of TPM College courses

(2) Schedule of TPM College courses

2

Declaration by top management to introduce TPM

Resolution by Board of Directors to introduce TPM (6)

Establish Promotion Office to prepare for the promotion of TPM (7)

Announcement of resolution by Board of Directors (8)

Publish the declaration of top management in the company newsletter.

6	TPM introduction plan
7	Establishment of a committee to prepare for the introduction of TPM (internal notification)
8	TPM declaration (published example)

Notification of Pre-study Meeting for the Introduction of TPM

The meeting will be held on the date below.
Many companies have already introduced TPM and have obtained excellent results. The pre-study meeting will be held for executives involved in operations to understand TPM.

Note

1. Date/time: ___/___/___ (_____day) __:__ - __:__

2. Attendees: President, Vice Presidents, Senior Managing Directors, Managing Directors and Directors

3. Schedule:

10:00 - 10:10	Opening remarks by President
10:10 - 10:35	Outline of TPM (video)
10:40 - 11:10	Easy to Understand TPM (video)
11:15 - 12:00	Open discussion
12:00 - 13:00	Lunch, close of meeting

Announcement of Diagnosis Meeting for Top Management

1	1 - 2

To: _____ Date: __/__/__

Announcement of Diagnosis Meeting for Top Management

The above meeting will be held on the date below.
As you know, TPM is scheduled to be implemented as a part of TQC starting in ___/___. This diagnosis meeting for top management will be an opportunity to understand the need for introducing TPM.

Note

1. Date/time: __/__/__ (_____day) __:__ - __:__

2. Attendees: President, Vice Presidents, Senior Managing Directors, Managing Directors and Division Directors

3. Schedule:

Time	Department
__:__ - __:__	
__:__ - __:__	
__:__ - __:__	
__:__ - __:__	
__:__ - __:__	
__:__ - __:__	
__:__ - __:__	

4. Other

(1) Explanation of each line to be given by the Section Chief in charge or Assistant Department Manager.

(2) The explanation should last 15 minutes followed by 10 minutes of discussion.

Plan for Top Management TPM Plant Tour

	Who	When	Where	What (Survey items)	Remarks
First group	President Senior Managing Director (person in charge of personnel) Engineering Division Director Operations Department Director TQC Promotion Department Manager Facilities Department Maintenance Section Manager (Total: 6 persons)	/	Fujikoshi	1. Position of corporate management 2. TPM introduction requirements 3. Organization and operations for TPM introduction 4. TPM implementation and the promotion departments 5. Cooperation with the union 6. Methods of analysis 7. Effectiveness of TPM	* Video on TPM • Basics of TPM • 12 steps of TPM * Textbooks • Series on how to advance autonomous maintenance • Series on how to advance individual improvement • 1984 lecture series (Fujikoshi edition)
Second group	Vice President Managing Director Operations Department Director Production Department Manager and Assistant Manager Production Engineering Department Manager Quality Control Department Manager Personnel Department Manager Machine Tools Department Manager Union Executive Committee Members TQC Promotion Section Manager (Total: 29 persons)	/	Fujikoshi	1. TPM concepts • Basic approach to small groups and autonomous maintenance • TPM goals • Approach to individual improvement • Basic approach to quality maintenance 2. TPM promotion system • Organizing small groups • TPM education and training system 3. Specific implementation • 8 steps to the implementation of autonomous maintenance • Progress of TPM education and training • Individual improvement steps • Procedure to implement quality maintenance 4. Effectiveness of TPM	* TPM study meeting (4 hours) • What is TPM? • How to advance autonomous maintenance • How to advance individual improvement (Fujikoshi edition) * Video on TPM (1 hour) • Basics of TPM • 12 steps of TPM

Notification of One-day Seminar by Instructor _____	1	1 - 4

To: _____ Date: __/__/__

One-day Seminar by Instructor_____

The above meeting will be held as described below. Your participation is kindly requested.
As you know, TQC Promotion Division and Engineering Division are presently leading the promotion of TPM (Total Productive Maintenance).
This seminar will be an opportunity for attendees to deepen their understanding of TPM.

Note

1. Date/time: __/__/__ (_____day)
   14:00 - 16:30 (Please be seated by 13:45)

2. Location: Employees' Club, Main Training Room

3. Target Participants: Directors
   Department Managers, Assistant Department Managers and Section Managers serving in the Operations Department or Engineering Division

4. Lecturer: _____, TPM Lecturer
   Consultant, Japan Institute of Plant Maintenance

5. Topic: "Approach to TPM and How to Advance It"

The following is requested of participants

1. Please note on the attachment whether you will attend and whether you wish to purchase the reference books. Please contact TQC Promotion Division by __/__ (_____day).
2. All Department Managers are requested to schedule a meeting in their own department after the seminar in order to report on the seminar.

Announcement of TPM College Courses

	Executive Course	Manager's Course
Purpose	To provide education to executives on the pre-introductory phase and the initial phase introduction of TPM. Participants will master the essence of TPM and the framework of procedures to implement TPM. Participants will also understand the role of top management in implementing TPM, and pursue that role to open up new avenues for the company in order to cope with future changes in the business environment.	For those in management positions who are materially responsible for implementing TPM in the pre-introductory phase and during its operation. Participants will learn specific ways to advance the 8 pillars of TPM, and will widen their vision through mutual study with participants from other companies.
Items covered	1. Survey of TPM 2. Specific implementation for pursuing production system efficiency to the utmost 3. Overview of TPM implementation program 4. TPM introduction strategy <group study> 5. Announcement of group study 6. Establishment of a system to prepare for the introduction of TPM: Steps 1 ~ 5 7. From TPM kickoff to establishment: Steps 6 ~ 12	1. Survey of TPM 2. Approach to individual improvement and how to advance it 3. Problems with and measures for TPM implementation <group study> 4. How to advance autonomous maintenance 5. Establishment of a planned maintenance system 6. PM analysis (exercises) 7. Skill upgrading of operation/maintenance departments 8. Approach to initial-phase control and how to advance it 9. Quality maintenance 10. Role of managers in TPM implementation <group study> 11. Establishment of a system to manage safety, health and environment 12. Establishment of efficiency improvement systems for administrative/indirect departments 13. Total implementation of TPM and raising of its level
Participants	Top management at the level of Director and up Plant Manager and department Manager level	Section Managers and Subsection Managers
Capacity	30 persons	36 persons
Course length	2 days with 1 overnight stay	Two sessions, each 3 days with 2 overnight stays (total of 2 units; 6 days in all)
Participation fee	150,000 yen (regular members) 160,000 yen (non-members)	340,000 yen (regular members) 370,000 yen (non-members)

	Site Leaders' Course	TPM Instructor Training Course (All Japan Federation of Management Organizations, Certification No. 89)
Purpose	For those in the leader ranks who will become the on-site key people before introducing TPM and during its operation. Participants will master: (1) What is TPM, (2) Countermeasures for the 16 major losses that can impede equipment efficiency, (3) Approach to achieving zero failures, and (4) How to advance autonomous maintenance. Participants will also understand their role as leaders.	For those involved with education and guidance of in-house TPM. Through practical guidance work, creation of instructor guides, tests and follow up seminars, participants will master specific guidance methods needed as TPM instructors when implementing in-house TPM.
Items studied	1. What is TPM? 2. Improvement of equipment efficiency 3. Challenge to achieve zero failures 4. How to advance autonomous maintenance 5. How to advance individual improvement 6. Conditions required as on-site leaders <group study> 7. Design, maintenance and operation systems	Focusing on study items of the TPM College Site Leaders' Course 1. Teaching: Lectures by instructors 2. VTR: Viewing reference videos 3. Creating instructor guides (creating programs for giving lectures) 4. Practice: <Each participant actually gives a lecture> 5. Evaluation: Pointing out problems in the practice lecture, and giving guidance 6. Testing: <Written tests and interviews> 7. Mental attitude of the TPM instructor
Participants	Production site manager [line supervisor] , group managers, foremen, supervisors and site leaders	Those scheduled to become in-house TPM instructors <limited to those who have completed the TPM College Manager's Course or Equipment Manager's Training Course>
Capacity	40 persons	5 persons
Course length	2 days with 1 overnight stay	4 days with 3 overnight stays
Participation fee	100,000 yen (regular members) 110,000 yen (non-members)	500,000 yen (regular members) <cost of instructional teaching materials is separate> 580,000 yen (non-members)

* The participation fee for each course includes the cost for texts, meals and accommodation (consumption tax is separate).
(All instructors are JIPM directors or consultants. Please refer to the individual pamphlets for details.)

Announcement of TPM College Courses

1	1 - 5 - (2)

Schedule of TPM College Courses

Executive Course

	Time	Items
Day 1	10 : 40	**<Opening>** **1. TPM Overview** 1.1 Necessity for a strict corporate environment and TPM 1.2 The current state of TPM popularity 1.3 The essence of TPM
	12 : 30	1.4 An example of TPM effectiveness
	13 : 30	**2. Specific implementation of TPM for pursuing an efficient production system to the utmost.** 2.1 Approach to overall improvement of efficiency of the production system. 2.2 The relationship between losses and overall efficiency in batch production and lot production. - Case Study I - 2.3 Relationship between losses and overall efficiency in continuous production. 2.4 Measures to eliminate chronic losses: PM Analysis 2.5 Measures to achieve zero failures **3. Overview of TPM implementation program** - Case Study II -
	17 : 30	
	19 : 00	**4. Strategy to introduce TPM: Group study** "Measures to cope with problems in implementing TPM" • Group discussion
	22 :00	

	Time	Items
Day 2	8 : 30	• Group Announcements and Group Discussion **5. Establishing a system to prepare for the introduction of TPM.** Steps 1 - 5
	12 : 00	
	13 : 00	**6. From the kick-off until the establishment of TPM** Step 6: TPM kick-off Step 7: Creation of a system to improve production efficiency 7.1 Individual improvement 7.2 Autonomous maintenance 7.3 Planned maintenance 7.4 Training to upgrade skills in operation and maintenance Step 8: Establishment of a system for the initial-phase control of new products and new equipment. Step 9: Establishment of a system for quality maintenance Step 10: Establishment of a system to improve the efficiency of administrative and indirect departments. Step 11: Establishment of a system to control safety, health and environment Step 12: Total implementation of TPM and raising of its level
	16 : 00	**<Closing>**

(The actual program may differ somewhat.)

Manager's Course

Unit 1

Time	Day 1	Day 2	Day 3
8 : 30		Breakfast	Breakfast
10 : 00	<Self-introduction of participants> 1. TPM Overview	3. Approach to individual improvement and methods to advance it	<Group Study (1) Announcement of Results> 4. Methods to advance autonomous maintenance
12 : 30	Lunch	Lunch	Lunch
13 : 30	2. The structure of losses and an approach to improving efficiency <Practicum (1)> "Calculating overall efficiency of equipment"	<Practicum (2)> "PM Analysis"	<Summary of Unit I> End (15:30)
18 : 00			
19 : 00	Social meeting	Dinner <Group Study (1)> "Problems in implementing TPM, and countermeasures"	
20 : 00			
22 : 00			

Unit 2

Time	Day 1	Day 2	Day 3
8 : 30		Breakfast	Breakfast
10 : 30	5. Creating a system of planned maintenance	<Group Study (2) Announcement of Results> 7. Approach to initial-phase control, and methods to advance it	<Group Study (3) Announcement of Results> 9. Methods to advance TPM activities in administrative and indirect departments
12 : 30	Lunch	Lunch	Lunch
13 : 30	6. Training to upgrade skills in operation and maintenance	8. Approach to quality maintenance, and methods to advance it • Announcement of TPM promotion example through the award for distinguished TPM workplace	10. Establishing a system to control safety, health and environment 11. Total implementation of TPM and raising its level <Summary and presentation of completion certificates> Closing Remarks (15:00)
18 : 00			
19 : 00	Dinner <Group Study {2}> "Study of examples of applying PM analysis to equipment of each company"	Dinner <Group Study (3)> "The role of managers in implementing TPM"	
22 : 00			

TPM Introduction Plan

Basic Concept of Management

To contribute to society by satisfying the needs of customers in the market and by providing products and services that can be used continuously.

Basic Concept of TPM

To reform a company by reforming its people and facilities.

Basic Policies of TPM

(1) As a part of TQC, TPM is an equipment improvement activity.

(2) With the participation of everyone from top management to line operators, TPM aims to maximize overall efficiency of equipment.

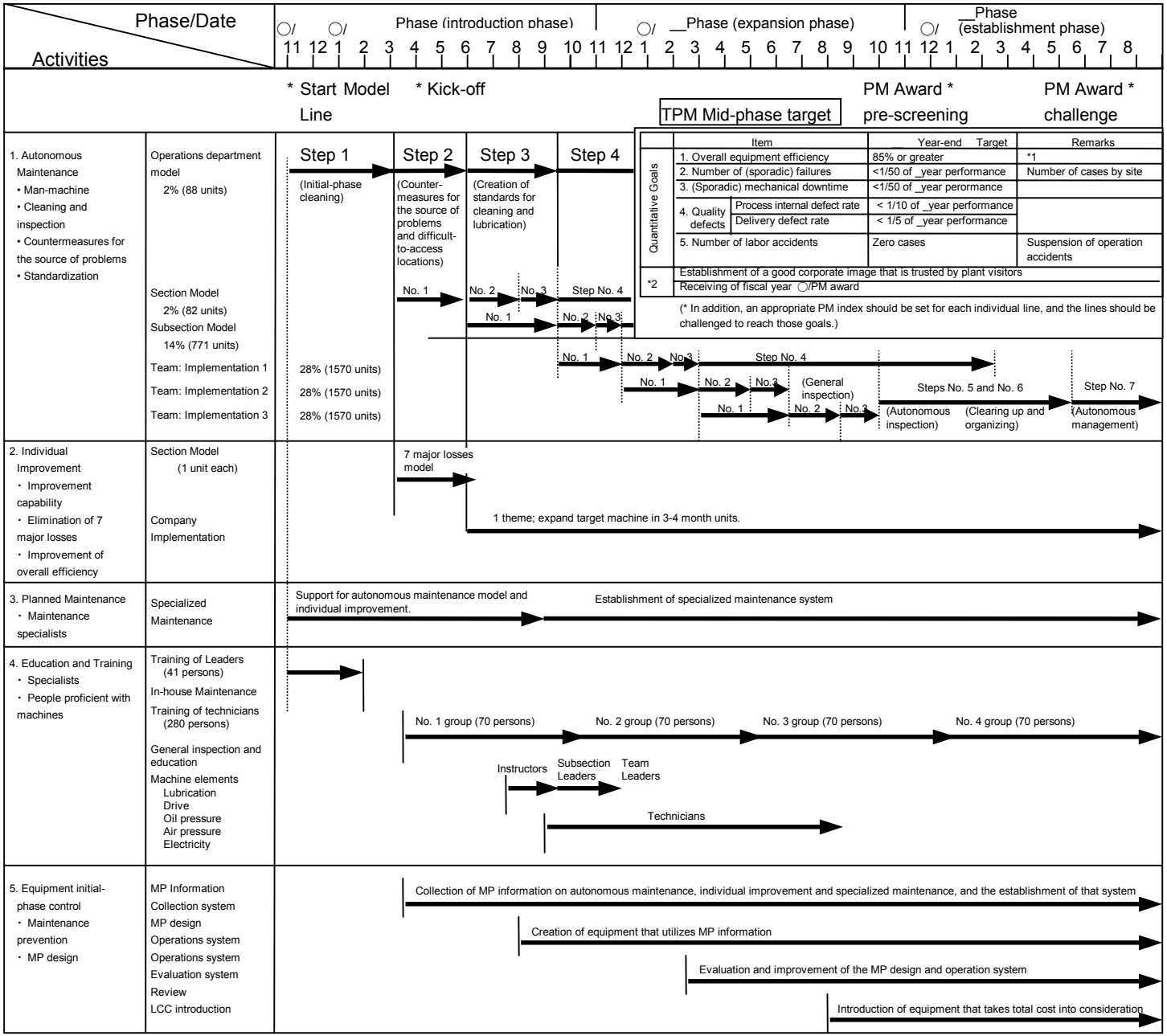
(3) TPM raises reliability and maintainability of equipment, creates quality with equipment and improves productivity.

(4) TPM strives to cultivate human resources that can cope with the advancement of equipment.

(5) Through autonomous maintenance, TPM creates a workplace that is safe, bright and invigorating.

*1 Availability x performance rate x quality products rate

*2 Qualitative Goals



Establishment of a Committee to Prepare for Introduction of TPM (Internal Notification)	1	2 - 7

Date:_____

Corporate Personnel No. __ -12

To: Department Managers, Assistant Department Managers and Section Managers

From: President

Establishment of a Committee to Prepare for the Introduction of TPM

This is notify you that a committee to prepare for the introduction of TPM has been established as follows.

Note

1. Name of committee: "Committee to prepare for introduction of TPM"

2. Organization:

Committee Chairperson:	Executive Director and Manager of TPM Promotion Division
Committee Vice Chairperson:	Managing Director and Manager of Operations Department A
Committee Vice Chairperson:	Director and Manager of Operations Department B
Committee Vice Chairperson:	Director and Manager of Operations Department C
Promotion Office:	Promotion Department Manager of TPM Promotion Office
Promotion Office:	Section Manager of Promotion Department, TPM Promotion Office
Promotion Office:	Supervisor A, Promotion Department, TPM Promotion Office
Promotion Office:	Supervisor B, Promotion Department, TPM Promotion Office

3. Date: October 16, ____

TPM Declaration

President _____

Based on the principle of making this company a "superior company that will survive into the 21st century," I have aimed to create a management that respects people and activates management resources.

In the past 3 years, we have implemented the "_____ Challenge" and have made "Customers are First" and "Total Elimination of Waste" our mottos. In this manner, we have striven to strengthen and reform the company. Regrettably, I cannot say that we have reached the anticipated targets.

Presently, the world is literally abuzz with change and these great changes are taking place on a worldwide scale. In every field of endeavor, we are now confronting a borderless world.

If this company is to survive into the 21st century, it is essential that we create a company with the strength to flexibly cope with these powerful changes in the environment.

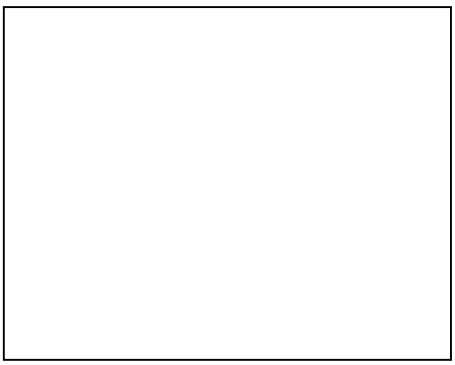
Regrettably, this company is presently stuck in its dependence on production levels. There has been no radical reform and we will not be able to survive the coming era of tumultuous changes.

To radically reform this company, the implementation of a comprehensive policy is necessary. As a company with the mission of producing products, this policy should include strengthening of our technological prowess, radically reducing costs and expanding into new fields of business. In this regard, we will tenaciously carry out a three-year plan starting with the new fiscal year. Ultimately, however, each and every member of this company will play a role in the plan from his or her respective standpoint. Taking action with a mind to break through the status quo will form the foundation and engine of this plan.

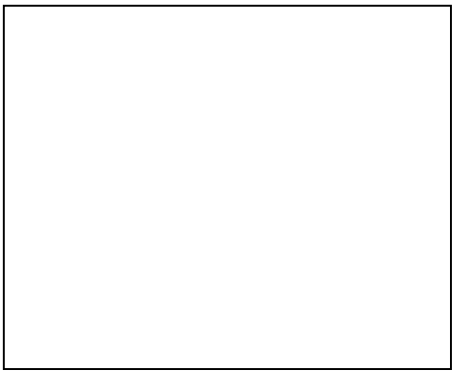
I have made the decision to introduce TPM because it will extend our capabilities through work, and will radically reform the company through the creation of a bright and cheerful workplace that manifests something worth working and living for.

I hereby declare it a basic policy of this company to introduce and implement TPM.

__/__/__



2. Education and Campaign to Introduce TPM



2. Education and Campaign to Introduce TPM

1 Education to Introduce TPM

- TPM College in-house courses
  - Executive course
  - (including union directors)
  - Manager's course
  - TPM Instructor's course
  - Site Leader's course — (1)
- Education disseminated to site leaders by TPM instructors — (2) (3)
- In-house and outside seminars — (4)
- Participation in tour of TPM promotion plant — (4)

1	TPM College in-house course plan
2	TPM dissemination education plan
3	TPM site leader's training course text
4	Target participants for in-house and outside seminars, and plant tour

2 Campaign

- Post JIPM's TPM poster and slogan in the workplace
- Post in-house solicitation for TPM poster and slogan — (5)
- Solicitation and distribution of emblem — (6)
- Publish TPM related items in the company newsletter, TPM News — (7)
  - TPM promotion plan
  - Explanation of main TPM terms
  - TPM recommended books

5	Solicitation for poster and slogan (solicitation requirements)
6	Solicitation requirements (solicitation of design of TPM emblem)
7	Example of publishing in company newsletter (from monthly magazine *Diesel*)

TPM College In-house Course Plan

1. **Purpose:** As you know, our company has made the decision to introduce TPM. In order to deepen everyone's knowledge of TPM, TPM introductory education will be given by employee level as described below, with the goal of imparting a common language and raising everyone's aspirations to make TPM a success.

2. **Overview**

Course Name	Participants	Schedule	Goals	Name Details	Capacity
Executive Course	Executive at the level of Department Manager or higher	2 days with 1 overnight stay	To understand the essence of TPM and to understand the role of top management in each step of the program to implement TPM	• TPM overview • 12 steps to implementation of TPM • 8 pillars of TPM implementation • Role of top management in TPM implementation	30 persons
Manager's Course	Section Manager and Subsection Manager level	2 sessions, each 3 days with 2 overnights	To understand the essence of TPM and to master specific methods to advance, as person in charge of TPM promotion, the necessary 8 pillars of TPM	• TPM overview and implementation steps • Methods to advance improvement of equipment efficiency • Approach to and methods to advance zero failures • Approach to and methods to advance autonomous maintenance • Approach to and methods to advance planned maintenance • Initial-phase control of equipment • Approach to and methods to advance quality maintenance	36 persons
TPM Instructor's Course	Section Managers and Subsection Managers who have completed specified courses	4 days with 3 overnight stays	To acquire qualification as an in-house instructor of "TPM Site Leader's Course"	• Summary explanation of site leader's course • Education and practice for above course • Creation of personal instructor's guide for above course	6 persons
Site Leader's Course	Workplace Group Manager and Leader level	3 days with 2 overnight stays	Master specific methods to advance TPM in order to implement TPM as the Site Leader	• What is TPM? • Improvement of equipment efficiency • Challenge to achieve zero failures • Methods to advance autonomous maintenance (1, 2, 3) • PM analysis • Pursuing equipment "as it should be"	40 persons

3. **Schedule:**
   1. TPM Executive Course __/__/__ - __/__/__ Training Center
   2. TPM Manager's Course __/__/__ - __/__/__ Training Center
   3. TPM Site Leader's Course __/__/__ - __/__/__ Training Center

4. **Instructor:** JIPM TPM Consultant _____

Division

TPM Dissemination Education Plan

Date Prepared: __/__/__

Instructor In Charge	Attendees				Schedule/Progress Status														Location
					Session														
	Department and Section Managers	Subsection Manager	Team Leader	Acting Team Leader	1	h	2	h	3	h	4	h	5	h	6	h	7	h	8	h	

TPM Site Leader's Training Course Text

Table of Contents

Japan Institute of Plant Maintenance

TPM College

Participants in In-house and Outside Seminars and Plant Tours (__/__-__/__)

Items			Sponsor	Units	Number of Persons	Participants	__/__	Month: ____
Outside	TPM College courses	1. TPM Executive Course	JIPM	2 days with 1 overnight stay	23 persons	Department Manager and Assistant Department Manager of Manufacturing, Production Engineering and Engineering Divisions	23 24 ● ●	
		2. TPM Executive Course	JIPM	2 days with 1 overnight stay	32 persons	Operations Department Manager and Operations Department Assistant Manager		
		3. TPM Manager's Course	JIPM	2or 3 days with 1 or 2 o/n stays,	29 persons	Section and Subsection Managers of Manufacturing, Production Engineering and Engineering Divisions		22 23 ● ●
		4. TPM Manager's Course	JIPM	Same as above	29 persons	Same as above		24 25 ● ●
		5. TPM instructor's training course	JIPM	4 days with 3 overnigh stays	12 persons	Same as above		
		6. TPM instructor's training course	JIPM	Same as above	13 persons	Same as above		
	7. TPM leaders basic course		JIPM	1 day	1 person	Promotion Office (Division)		15 ●
	8. Maintenance Foreman course		JIPM	6 days	1 person	Maintenance Section staff		22 23 24 ● ● ●
	9. Equipment managers training course		JIPM	4 days x 6 months	2 persons	Promotion Office (Division)		22 23 24 25 ● ● ● ●
	10. TPM seminar for Site Leaders		JIPM	2 days	4 persons	Maintenance Section staff and Promotion Office (Division)		
	11. Seminar on methods to advance autonomous maintenance		General research lab	1 day	2 persons	Promotion Office (Operations Department) and Promotion Office (Division)		5 ●
	12. Quality maintenance (individual improvement) practice course		Fujikoshi	4 days with 3 overnight stays + 1d	1 person	Promotion Offices (Division)		15 16 17 18 ● ● ● ●
	13. Basic course on equipment maintenance practice		JIPM	4 months	41 persons	Maintenance Section staff and Subsection Manager		
	Maintenance Section staff	14. __ Co., __ Department Manager	Promotion Offices (Division)	2 times	210 persons	Subsection Managers and higher in the operations department and engineering division	28 ●	
		15. 16. Lecture meeting for the fiscal 19 award	JIPM	1 day	3 persons	Maintenance Section staff and Promotion Offices (Division)		
		fordistinguished TPM workplace	JIPM	1 day	1 person	Steering Committee Chairperson		
	Plant tour	17. __ Co., __ Plant	Promotion Offices (Division)	Half-day	1 person	Promotion Offices (Division)		
		18. __ Co., __ Plant	Promotion Offices (Division)	Half-day	17 persons	PromotionOffices Manager (Operations Department) and staff		
		19. __ Co., __ Plant	Promotion Offices (Division)	Half-day	7 persons	Maintenance Section Manager, Subsection Manager and staff		
		20. __ Co., __ Plant	JIPM	1 day	1 person	PromotionOffices (Division)		
		21. __ Co., __ Plant	JIPM	1 day	1 person	PromotionOffices (Division)		
		22. __ Co., __ Plant	JIPM	1 day	1 person	Maintenance Section and Subsection Managers		
In-house	1. TPM Workplace Leaders Training Course		Promotion Offices (Operations Department)	16 h	514 persons	Subsection and Team Leaders of Operations Department and Division		
	2. TPM Workplace Leaders Training Course		Personnel section	2 h	37 persons	Assistant Team Leaders of Operations Department and Engineering Division		
		3. Meeting for Subsection Managers	Meeting for Subsection Managers	2.5 h	115 persons	Officers, Subsection Manager Consultants and Subsection Managers	15 ●	
		4. Meeting for Team Leader	Promotion Offices (Division)	2.5 h	358 persons	All Team Leaders	21 22 23 ● ● ●	5 ●
		5. Meeting for __	Meeting for __	1.5 h	125 persons	__ members		

Participants in In-house and Outside Seminars and Plant Tours

2

1 - 4

__/__/__

To all concerned

TPM Promotion Office Manager

____

Poster and Slogan

Attendant with this company's TPM kick-off, a TPM poster and slogan are being solicited.
Entries will be judged impartially and the winner will receive a commendation and a prize. The details of this solicitation are listed below.

Note

1. Deadline: Must arrive by __/__/__ (_____ day)

2. Application Route

Individual
↓
Collect at each section or department
↓
Send to TPM Promotion Office

3. Requirements

(1) Poster

(1) Use A2 (42 cm W x 59 cm H) paper. The paper quality and number of colors can be selected freely. Photographs can also be used.
(2) Use this company's TPM slogan, "_____" in the design.
(3) All applicants will be presented with a prize.

(2) Slogan

(1) Distinguished work (10 points) and excellent work (20 points) will be presented with a prize.
(2) As much as possible, please refrain from terms particular to this company; instead, use commonly understood wording.
(3) Forms will be distributed separately.

Distribution	To each Department Manager In the Operations Department and Engineering Division, however, distribute to all persons at the rank of Section Manager (Supervisor) or higher

* Please circulate.

Design of TPM Emblem

To: Promotion Office (Operations Department)

Solicitation Guidelines

TPM Emblem Design

This is a solicitation for an emblem design that would match the image of "TPM." Your kind cooperation is requested.

<How to Apply>

- Deadline: __/__/__ (_____ day) Sharp
- Send to: TPM Promotion Office
- Solicitation paper: Please use size A4 [letter-size] paper as much as possible.
- Conditions: Incorporate the letters "TPM" into the design.
- Write your name and assigned section on the back side of the paper.

Example

Example of Publication in Company Newsletter (from the monthly *Diesel*)

Let's apply our full abilities to reach "88.8" and win a PM award!

As I have mentioned before, DPM was introduced in this company on the first of this month. I should like to discuss the forthcoming schedule in this regard.
DPM will be promoted from various angles: individual improvement, autonomous maintenance, specialized maintenance, education and training, and initial-phase equipment control. Leaving the details aside for now, allow me to give a broad view of events.
For the next four months starting from this month, the DPM first step will be taken for a model line or model machine.
As listed in the Glossary, the term "first step" means "initial-phase cleaning." That is to say,

Special Edition

On to DPM!

Here's how we define DPM

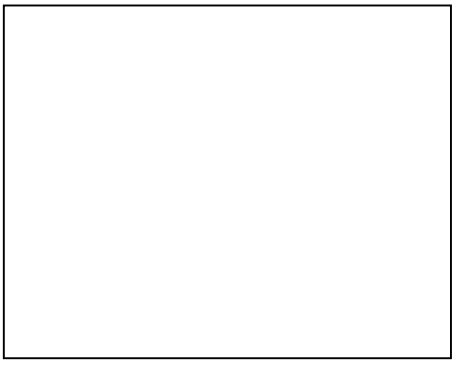
Let's take the definition of DPM as our starting point. As defined in the Glossary, DPM is a DKKC version of TPM. Therefore, we need to know what TPM is. According to the Japan Institute of Plant Maintenance (refer to Glossary), TPM:
(1) maximizes **EQUIPMENT EFFICIENCY** (overall efficiency improvement),
(2) establishes a total system for PM that covers the **LIFESPAN OF EQUIPMENT**,
(3) spans **ALL DEPARTMENTS** including equipment planning departments, equipment utilization departments and equipment maintenance departments,
(4) involves the participation of all members of the company, from **TOP MANAGEMENT** to **LINE WORKERS**, and
(5) manages motivation, namely by promoting PM through the autonomous activities of **SMALL GROUPS**.

In short, TPM "is an activity whereby everyone, not just a few, endeavors to maximize the capabilities of equipment." Further, maximizing the capability of equipment doesn't mean wasting money on equipment maintenance. Rather, it means bringing out the best performance of equipment and maintaining that performance while minimizing expenses to do so. This will enable us to improve overall efficiency.
The following 5 pillars summarize specific methods to implement TPM:
(1) Individual improvement to improve the efficiency of equipment
(2) Establishment of an autonomous maintenance system for workers
This doesn't mean calling a maintenance worker when the equipment fails.
(3) Establishment of a planned maintenance system in the maintenance departments
Maintenance should be planned in a methodical way, without dependence on machine disassembly, maintenance or inspection.
(4) Establishment of a technical education system for technicians and maintenance workers
(5) Establishment of an initial-phase production control system
Equipment should be designed to require as little maintenance as possible, and to start up as quickly as possible.
The above points define what DPM is. There are some difficult points in these expressions but

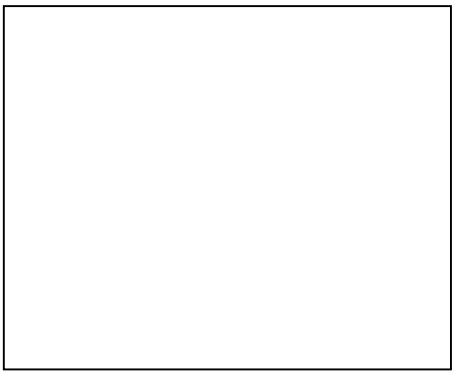
The ABCs of TPM Terminology

PM (Productive Maintenance)
Refers to the most economical maintenance that raises the productivity of equipment. Techniques include PM (Preventative Maintenance), BM (Breakdown Maintenance), CM (Corrective Maintenance) and MP (Maintenance Prevention).
PM (Preventative Maintenance)
Refers to maintenance that takes measures so that equipment does not fail.
BM (Breakdown Maintenance)
Refers to a maintenance method that performs repairs after a stoppage failure, or after performance has dropped to an adverse level.
CM (Corrective Maintenance)
Refers to a maintenance method that corrects the shape and materials of equipment.
MP (Maintenance Prevention)
Refers to an activity that incorporates maintenance data and new technologies in the planning and construction of new equipment, and that reduces maintenance costs and deterioration losses.
TPM (Total Productive Maintenance)
Refers to PM (Productive Maintenance) with the participation of all members of the company.
DPM
Refers to this company's version of TPM. In the same manners as DQC, the "D" in "DPM" refers to Diesel equipment, Doing and Development.

Note: DPM is the name of a TPM activity developed by Diesel Kiki (currently called Diesel).



3. Establishment of a TPM Promotion Organization and Pilot Model



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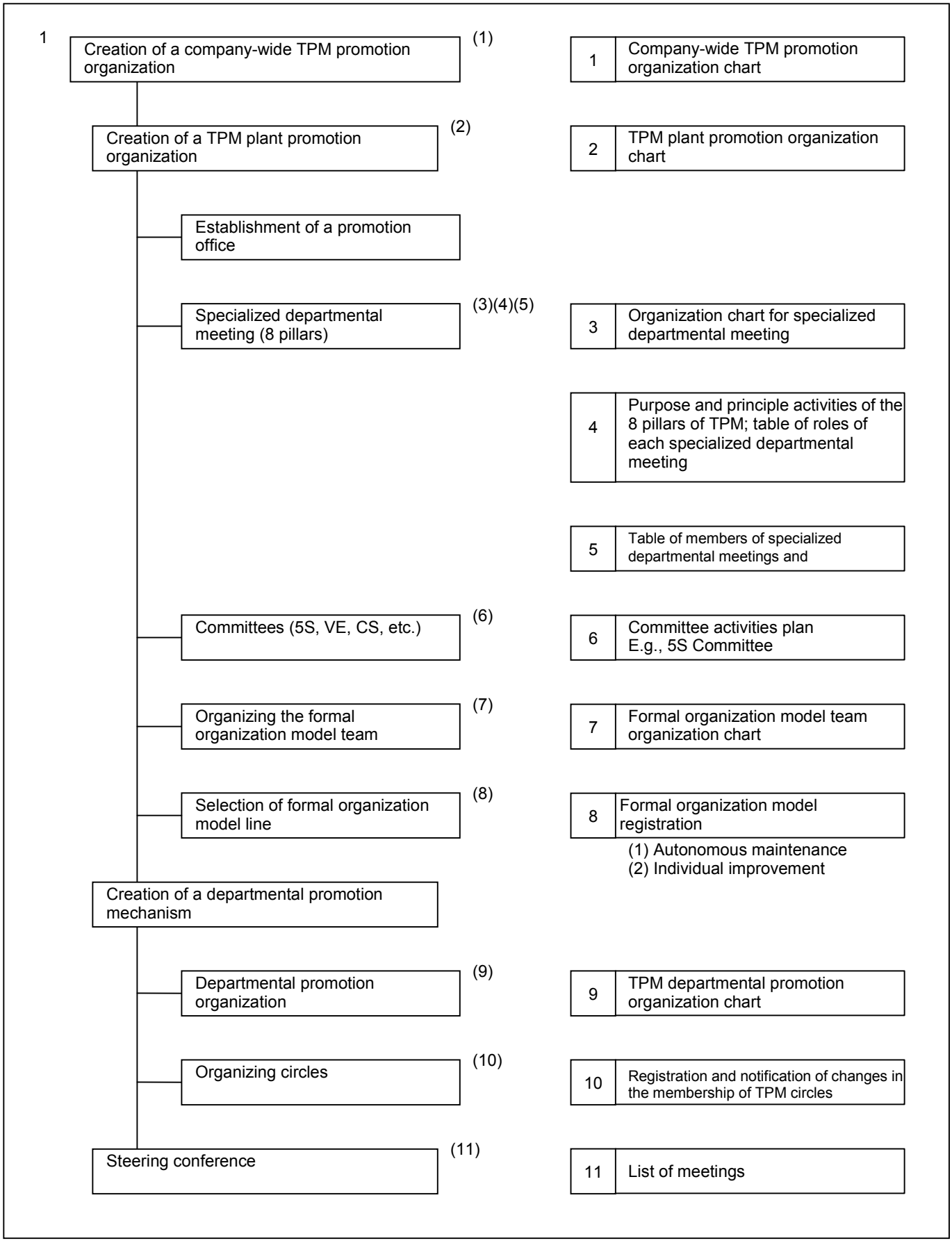
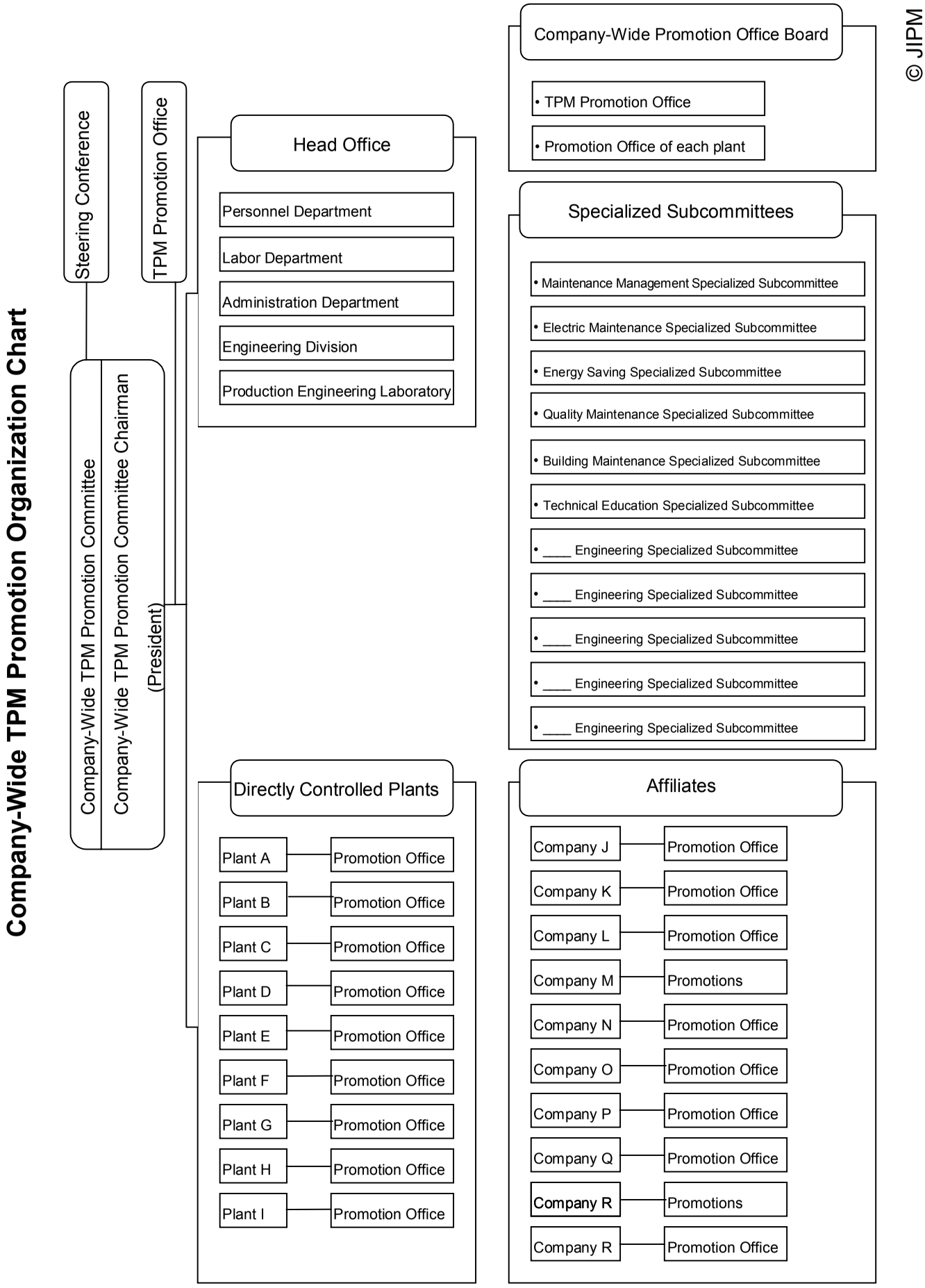
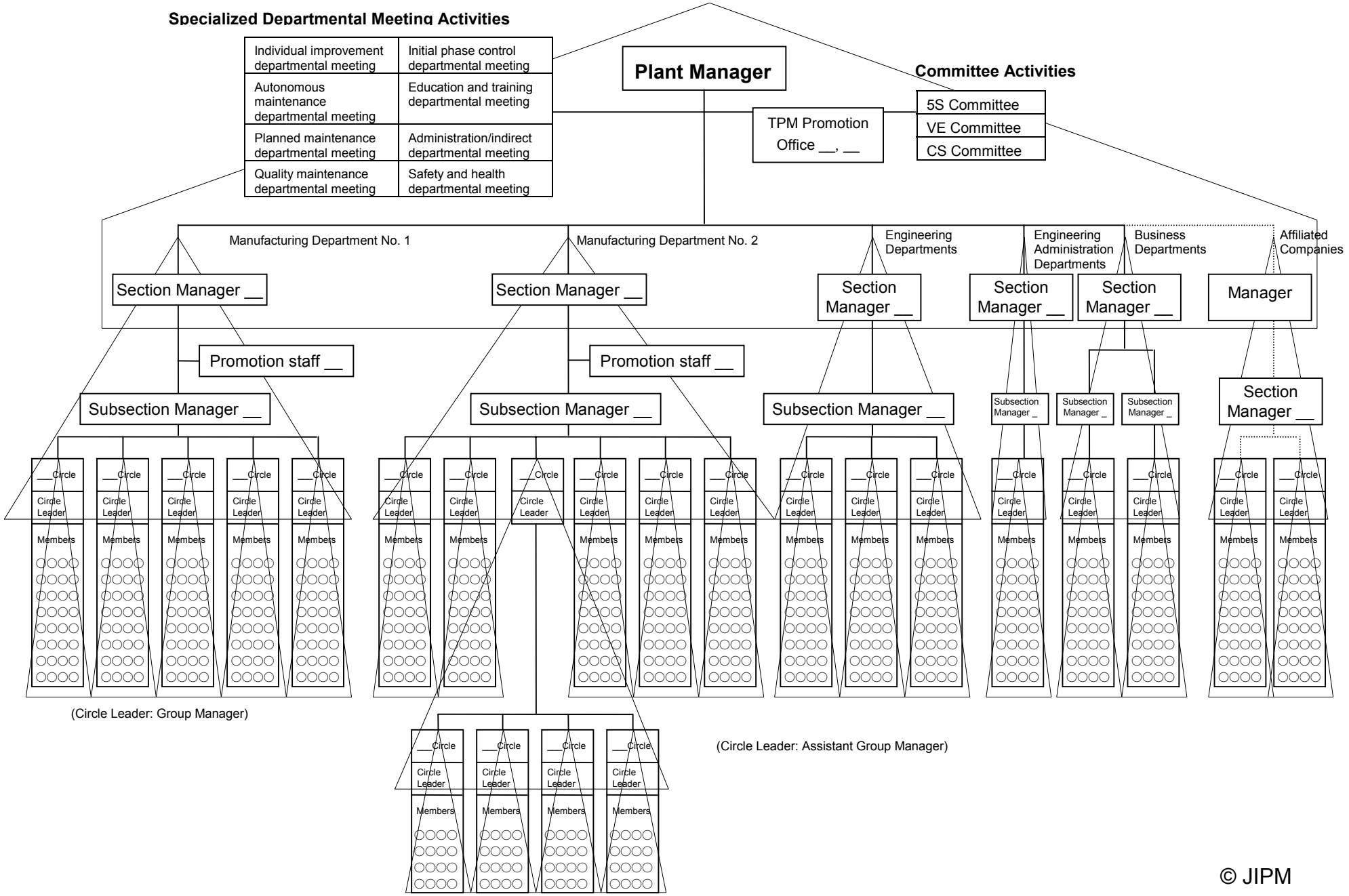


Company-Wide TPM Promotion Organization Chart

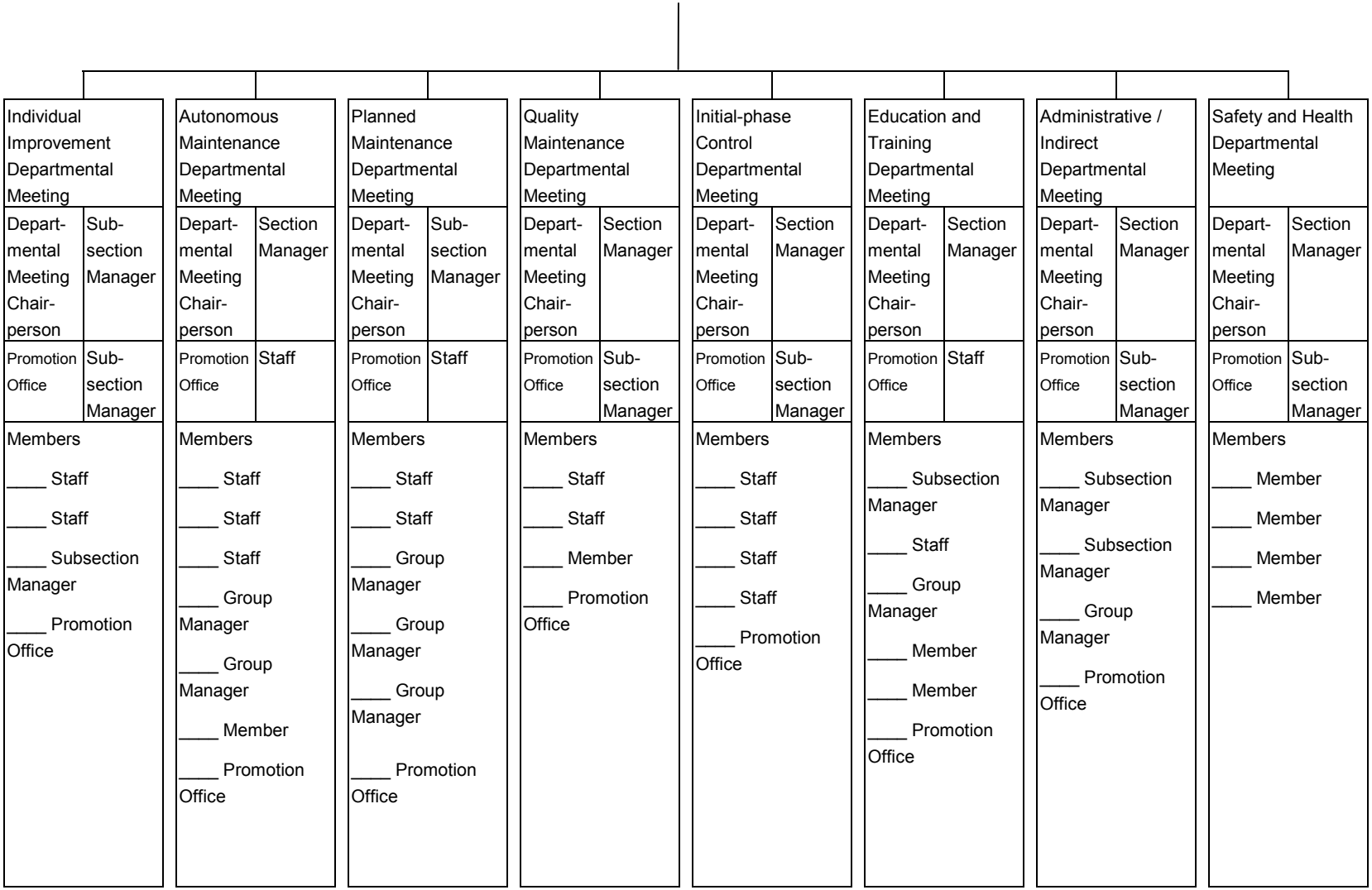
3	1 - 1



TPM Plant Promotion Organization Chart



Sub-comittee Departmental Meetings Organization Chart



Sub-comittee Departmental Meetings Organization Chart

3

1 - 3

Purpose and Main Activities of the 8 Pillars of TPM

	Purpose	Members	Activities
Individual Improvement	* Realize zero losses of all types, such as failure losses and defect losses * Demonstrate ultimate production efficiency improvement	* Staff * Line Leader	• Understanding the 16 major losses • Calculating and setting goals for overall equipment efficiency, productivity and production subsidiary resources • Implementation of PM analysis • Thorough pursuit of equipment and production "as it should be"
Autonomous Maintenance	* Training of operators proficient in equipment * Protecting one's own equipment by one's self	* Operator * Line Leader	• Implementation of 7 steps 1. Initial clean-up 2. Countermeasures for the source of problems and measures for difficult-to-access locations 3. Creation of tentative autonomous maintenance standards 4. General inspection 5. Autonomous inspection 6. Standardization 7. All-out goals management
Planned Maintenance	* Improving efficiency of maintenance departments to prevent the 8 major losses	* Maintenance department staff * Leader * Maintenance workers	• Daily measures • Periodic maintenance • Preventative maintenance • Extending life-span • Spare parts management • Failure analysis and prevention of reoccurrence
Quality maintenance	* Achieve zero defects by supporting and maintaining equipment conditions	* Quality assurance staff * Production engineering staff * Line Group Manager	• Verify quality characteristics standards; understand defect phenomena and performance • Investigating the conditions for building in quality, unit processes and raw materials, equipment and methods • Investigating, analyzing and improving the conditions of malfunctions • Setting 3M conditions; setting standard values for inspection • Creation of standards that can be followed; trend management
Initial-Phase Control of Products and Equipment	* Reducing product development and prototyping time * Reducing the development, design and fabrication time of equipment * Improving 1-shot start-up stability of products and equipment	* Research and development staff * Production engineering staff * Maintenance staff	• Setting development and design goals • Ease of production • Ease of QA implementation • Ease of use • Ease of maintenance • Reliability } Reflect in MP design • Investigate LCC • Design: release drawing Production: Identify problems in the prototype, trial run and initial-phase mass production control stages
Administrative /Indirect	* Achieve zero function losses * Creation of efficient offices * Implementation of service support functions for production departments	* Leaders and members of administration/indirect departments	• Autonomous maintenance activities 1. Initial clean-up (personal space) 2. Work inventory 3. Countermeasures for problems 4. Standardization 5. Promotion of autonomous management activities of work • Individual improvement through project activities (1) Shortening of settlement schedule (2) Improvement of distribution (3) Improvement of purchasing and subcontracting (4) Reform of production control system
Education and Training	* Establishment of technical education for operations and maintenance workers	* Operators * Maintenance workers	• Basic process of maintenance • Tightening nuts and bolts • Aligning keys • Maintenance of bearings • Maintenance of conductive parts • Prevention of leaks • Maintenance of oil pressure and air pressure equipment • Maintenance of electrical control equipment
Safety and Health	* Achievement and support of zero failures * Realization of a healthy and invigorating workplace that gives meaning to work	* Safety, health and environment managers and specialized committee members * Staff specializing in safety and health	• Measures to improve equipment safety • Measures to improve work safety • Improvement of work environment (noise, vibration and odors) • Measures to prevent pollution • Creation of healthy employees • Promotion of invigorating activites

Table of Members of Sub-committee Meetings

◎ = Departmental Meeting Chairperson　⊙ = Committee Chairperson　○ = Departmental Meeting Promotion Office　☐ = Committee Promotion Office　☆ Female

Department / TPM Promotion Office	Departmental Meeting Chairperson	Promotion Office	Manufacturing Department No. 1	Manufacturing Department No. 2	Engineering Department	Engineering Administration Department	Business Department	Research Department	TPM Promotion Office
Individual Improvement Departmental Meeting	Sub-M	Sub-M	Staff	◎ Sub-M ○ Sub-M	Staff	Sub-M	Sub-M	—	○ ○
Autonomous Maintenance Departmental Meeting	SM	Staff	◎ SM ○ Staff	Staff	Group Manager ☆ Member	Staff	—	—	○ ○
Planned Maintenance Departmental Meeting	Sub-M	Staff	—	—	◎ Sub-M ○ Staff and Group Manager	—	—	—	○ ○
Initial-Phase Control Departmental Meeting	SM	Sub-M	—	—	◎ SM ○ Sub-M	—	—	—	○ ○
Quality Maintenance Departmental Meeting	SM	Sub-M	Staff	Staff	Member	◎ SM ○ Sub-M	—	—	
Education and Training Departmental Meeting	SM	Staff	Sub-M	Group Manager	Member	◎ SM ○ Staff	Member	—	○ ○
Administrative/Indirect Departmental Meeting	SM	Sub-M	—	Group Manager	—	Leader	◎ SM ○ Sub-M	—	○ ○
Safety and Health Departmental Meeting	SM	Sub-M	Member	◎ SM	○ Sub-M	Member	☆ Member	Member	—
5S Committee	SM	Sub-M	Staff	Group Manager	Staff	☆ Member	⊙ SM ☐ Sub-M	Member	○ ○
VE Committee	SM	Sub-M	⊙ SM Staff	☐ Sub-M	Member	Sub-M	Staff	Staff	—
CS Committee	SM	Sub-M	Staff	Group Manager	Staff	☆ Member	⊙ SM ☐ Sub-M	Member	○ ○

* SM = Section Manager　Sub-M = Subsection Manager

Committee Activity Plan / Example: 5S Committee

Activity details	Year	Year ____	Year ____	Year ____	Year ____
	Purpose	Motivate employees	Implement planned 5S activity (be certain to forward to PDCA)		Support establishment activity
	Target	BM (__._ points)	Committee diagnosis (__. points or greater)		Support activities of __ points
1. Public education activities * Activities promotion, campaign		Posters	Public relations newsletter (once per quarter)		5S Day
2. Education and training activities		5S video education			
3. Promotional activities		• Poster contest	• Personal space 5S campaign		• Filing campaign
			• Creation of various standards	Creation of guide for tentative standards and full-fledged standards	
4. Promotion conference * Draft of events * Creation of progress control mechanism		Regular meeting twice a month		Regular meeting once a month	
5. Establishment activity				Tentative standard → evaluation → full standardization	
6. New conceptualization and implementation					The road to 100 points
					New implementation

Committee Activity Plan / Example: 5S Committee

3

1 - 6

Pilot Organization Model Team Organization Chart

Purpose

Teams A and B: Create an example of implementing the autonomous maintenance activity step, and carry out horizontal implementation in circles.

Team C: Create steps for the utility (steam line) autonomous maintenance activity, and carry out horizontal implementation in circles.

Team D: Create an example for the step to implement work efficiency improvement, and carry out horizontal implementation in circles.

Formal Organization Team

Formal Organization Team A	
Team Leader	Section Manager _____
Members	Plant Manager _____
	Subsection Manager _____
	Subsection Manager _____
	Staff _____
	Staff _____
	Staff _____
	Group Manager _____
	Group Manager _____

Formal Organization Team B	
Team Leader	Section Manager _____
Members	Subsection Manager _____
	Subsection Manager _____
	Staff _____
	Staff _____
	Staff _____
	Group Manager _____
	Group Manager _____

Formal Organization Team C	
Team Leader	Section Manager _____
Members	Subsection Manager _____
	Subsection Manager _____
	Subsection Manager _____
	Staff _____
	Staff _____
	Group Manager _____
	Group Manager _____

Formal Organization Team D	
Team Leader	Section Manager _____
Members	Subsection Manager _____
	Subsection Manager _____
	Subsection Manager _____
	Staff _____
	Staff _____
	Staff _____

Pilot Model Registration (Autonomous Maintenance)

Date: __/__/__

Department Manager	Section Manager	Promotion Office

1. Installation location of model

Division				
Operations Department	Department	Section	Team	Line

2. Model description

Equipment name	Control No.	Reason for selection and problem to be overcome for each equipment	Purpose of activity	Benchmark item (Set target values and record them quantitatively)
		There are many machines of the same model, and horizontal implementation is easy to carry out	To create an activity that involves the operator	Quantity of dispersed filings [particles] in the machine vicinity should be under 2.5 g/day.

* (Leave blank) → Registration code:

Pilot Model Organization Registration (individual improvement)

3	1 - 8 - (2)

Date prepared: __/__/__

Equipment Registration for Individual Improvement

Registration code:

Partially revised 3/24/87

__th time

Department Manager	Section Manager	Subsection Manager	Promotion Office

1. Installation location of relevant machine

Division
Operations Department Department Section (Line name: _____)

2. Equipment name and control number

Equipment name	(Control No.)

3. Main topic of improvement (circle number)

1. Zero failures
2. Setup and adjustment losses
3. Minor stoppage and idling losses
4. Speed losses
5. Production defect losses
6. Start-up and yield losses

4. Current problems (clearly state 7 major losses and other losses)

5. Improvement goals (quantify concretely as much as possible)

6. Predicted effect of improvement

7. Implementation schedule

__/__	Month: ____	Month: ____	Month: ____

8. Principal persons in charge

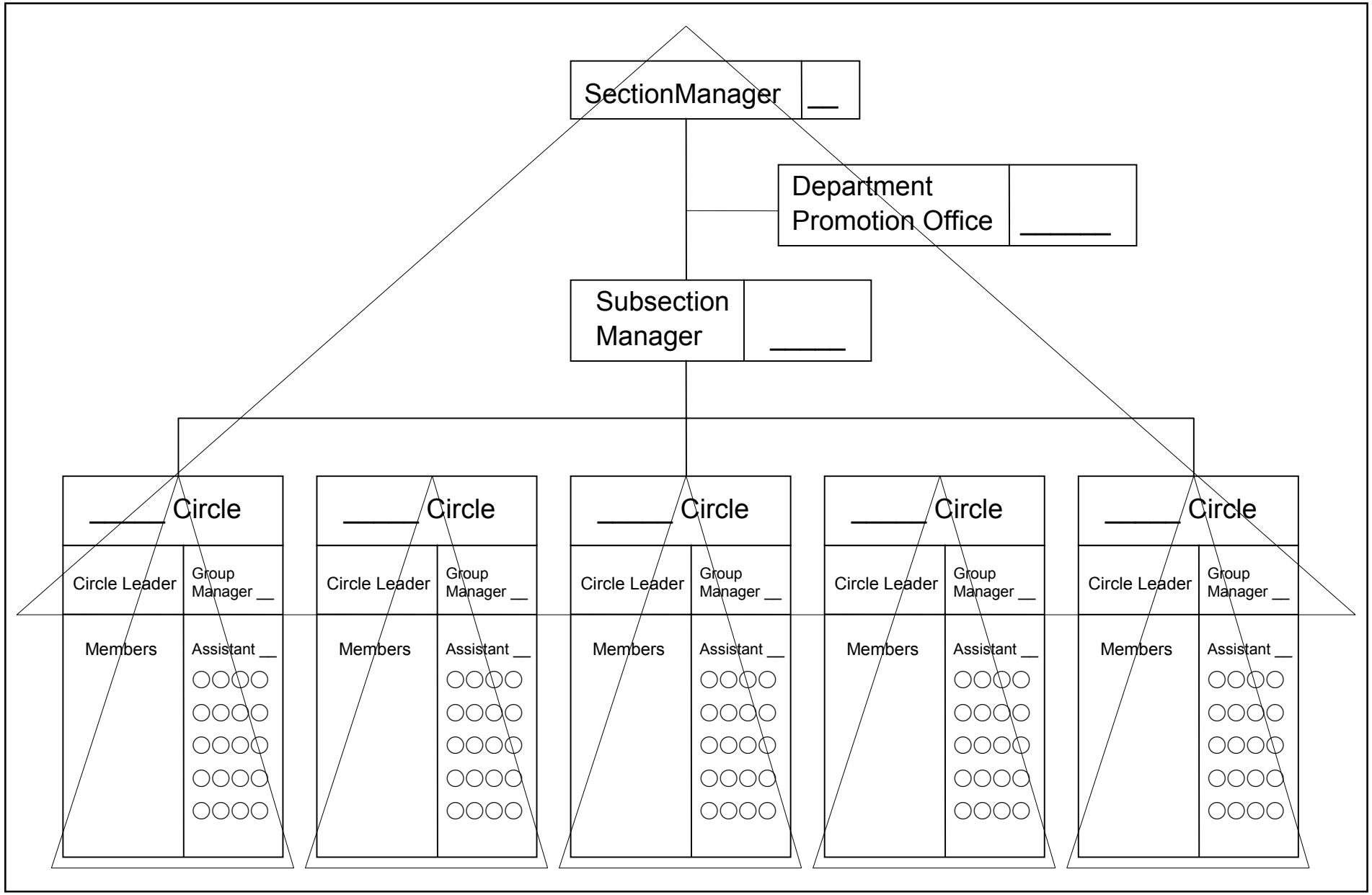
Leader	Sub-leader	Member

* Registration code is set by the Promotion Office (Division)

Original: Retain at Promotion Office (in the Operations Department).

Copy: Retain at Promotion Office (at the Division).

TPM Department Promotion Organization Chart



TPM Circle Members Registration/Notification of Change

3	1 - 10

Circle Leader --> Department Promotion Office
--> Department Manager
(Retention) Promotion Office <.....
Prepared __/__/__

Promotion Office	Depart-ment Manager	Department Committee Chairperson	Circle Leader

TPM Circle Members Registration/Notification of Change

Department	___Department	Circle Name	___ Circle	Total number of members	___persons

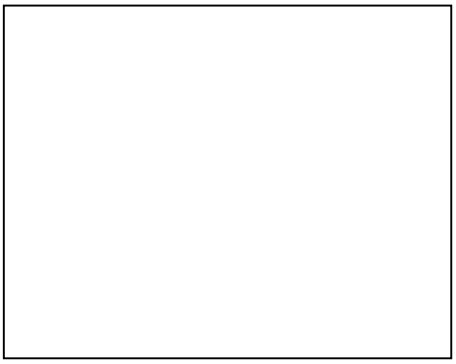
		Name
1	Circle Leader	
2	Assistant Circle Leader	
3	Member	
4	Member	
5	Member	
6	Member	
7	Member	
8	Member	
9	Member	
10	Member	
11	Member	
12	Member	
13	Member	
14	Member	

List of Meetings

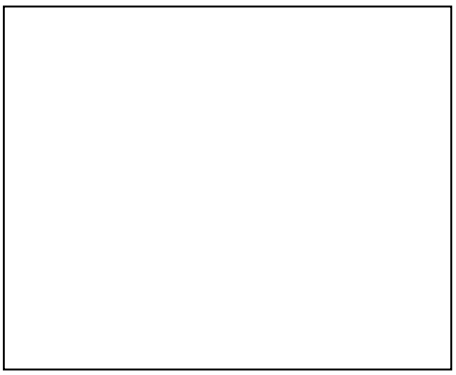
● Member ○ Observer

Classification / Position / Meeting	PM	SM	SuM	GM	M	DMC/CC	DM/CPO	DM/CM	Meeting Frequency	Role
Overall Activities										
(1) Executive meeting	●	●							Once/week	Study/decide general issues related to the "_____ Strategy."
(2) Group leaders' meeting	●	●	●						4 times/year	Study issues common to each department.
(3) Group managers' meeting	●	●	●	●					As appropriate	Study issues set by and information transmitted from higher up.
(4) Circle leaders' meeting	○	○	○	●	○	●			Once/2 months	Promote sharing of issues confronting circle leaders.
(5) Total Plant Meeting	●	●	●	●	●				2 times/year	Inform everyone in the plant about important items of concern to all.
Departmental Meeting Activities										
(1) Departmental meeting chairpersons' meeting	●	●				●	●		Once/month	Share and study issues concerning departmental activities and specialized departmental activities.
(2) Specialized departmental meeting's meeting						●	●	●	As appropriate	Study various issues to promote specialized departmental meeting activities.
Committee Activities										
5S Committee VE Committee CS Committee						●	●	●	Once/month	Study various issues to promote committee activities.
Departmental Activities										
(1)Departmental meeting		●	●	●					1 time/week	Study issues related to departmental promotion.
(2) Circle meeting				●	●				1 time/week	Transmit details of the departmental meeting to the members, and study issues related to group promotion.

PM: Plant Manager
SM: Section Manager
SuM: Subsection Manager
GM: Group Manager
M: Member
DMC/CC: Departmental Meeting Chairperson / Committee Chairperson
DM/CPO: Departmental Meeting / Committee Promotion Office
DM/CM: Departmental Meeting / Committee Member



4. Setting the Basic Policy and Goals of TPM



4. Setting the Basic Policy and Goals of TPM

1	Setting Company-Wide Basic Policy and Goals	(1) (2)	1	Table of Members Organized to Ensure Common Understanding
	Understanding of External Environment		2	Implementation and Diagnosis of Policy
	Understanding of Internal Environment			
	Determination of Basic Policy			
2	Determination of the Basic Policy and Goals of the Plant	(3) (4) (5)	3	Background to and Purpose of Introducing TPM (Plant)
	Understanding of External Environment		4	Policy and Goals of TPM (Plant) (1) (2)
	Understanding of Internal Environment		5	The Shift from DPM Activity to ZPM Activity
	Determination of Basic Policy			
3	Determination of Activity Slogan	(6)	6	Solicitation Requirements for TPM Activities Slogan
	Solicitation of Slogan			
	Primary and Secondary Selection			
	Final Determination of Slogan			
4	Creation of Activity Priorities and Activity Policy Implementation Diagram			
	Creation of Activity Policy Implementation Diagram	(7)	7	Activity Policy Implementation Diagram
	Creation of Goals Implementation Diagram	(8)	8	Goals Implementation Diagram
	Determination of Priority Items for Each Departmental Meeting	(9)	9	Critical Tasks and Target Values by Activity
5	Organizing Basic Approaches to Setting Targets	(10)	10	Basic Approach to Setting Targets

Table of Members Organized to Ensure Common Understanding

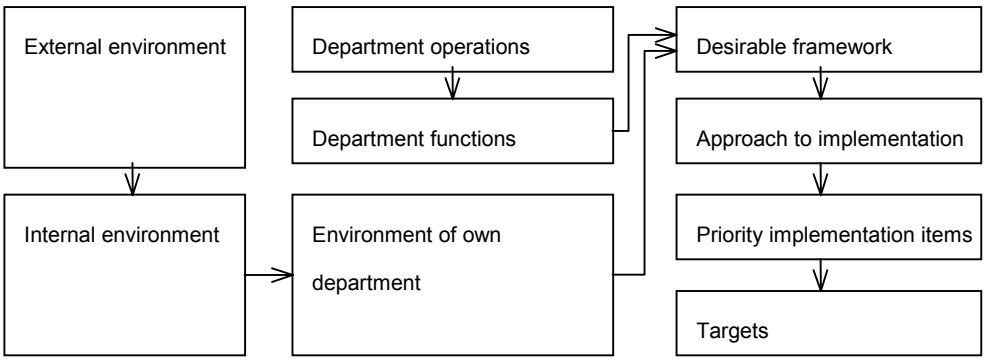
4	1 - 1

Purpose

To clearly state the pursuit of TPM in basic management policies and in medium-term and long-term management plans, to incorporate TPM targets in the annual targets, and to promote TPM as a part of policy management and target management.

Implementation Items

- To clearly state the pursuit of TPM in basic management policy and in the medium-term and long-term management plans.
- To clarify the desirable framework (3-5 years) at each organizational level, to set approaches, priorities and targets for implementation (8 pillars of TPM), and to obtain the consensus of the company.



Members are organized in order to ensure the above common understanding. The following table is an example of organizing members on the departmental and sectional levels.

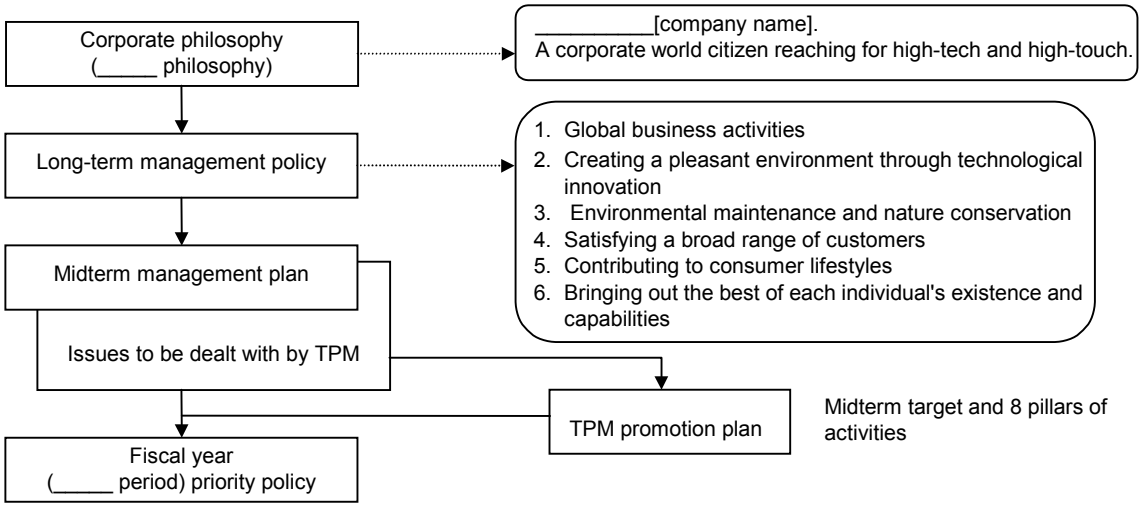
Table of Members Organized to Ensure a Common Understanding (Example)

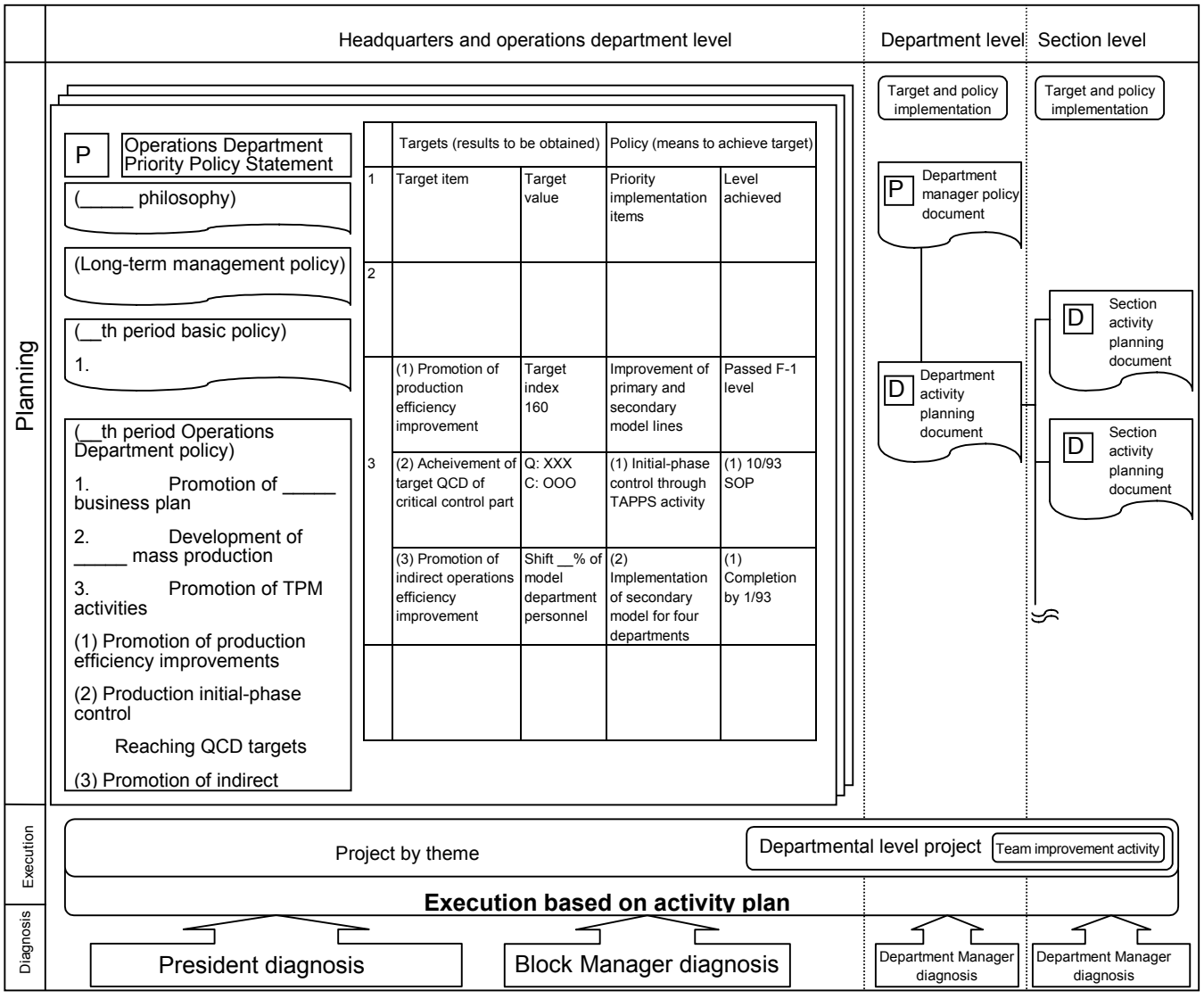
<Department Manager and Section Manager Levels>

Group	Leader	Members		
A	Machine Tools Department Manager _____	No. 1 Manufacturing Section Manager _____	No. 2 Casting Section Manager _____	Equipment Design Project Manager _____
		Production Engineering Department Project Manager _____	Union Chief Secretary _____	
B	Production Engineering Department Project Manager _____	Plant Manager _____	No. 4 Manufacturing Section Manager _____	No. 1 Casting Section Manager _____
		Equipment Design Project Manager _____	Union Assistant Secretary _____	
C	Assistant Plant Manager _____	No. 1 Manufacturing Department Manager _____	No. 5 Manufacturing Section Manager _____	Labor Project Manager _____
		Equipment Design Project Manager _____	Quality Assurance Department Project Manager _____	
D	TPM Leader _____	No. 2 Manufacturing Department Manager _____	Production Control Department Manager _____	No. 3 Manufacturing Section Manager _____
		Cost Control Project Manager _____	Planning Section Manager _____	
E	No. 2 Manufacturing Section Manager _____	No. 3 Manufacturing Department Manager _____	Operations Department Manager _____	Inspection Section Manager _____
		Planning Section Manager _____	Manufacturing Department Project Manager _____	

Implementation and Diagnosis of Policy

After the new enterprise [reorganization] declaration was made (October, 19__), this company hammered out a new corporate philosophy and a long-term management policy. These were further broken down into a midterm management plan and a fiscal year policy, implemented as specific activity plans, and managed in accordance with policy control mechanisms. TPM activities are positioned as important pillars for the im

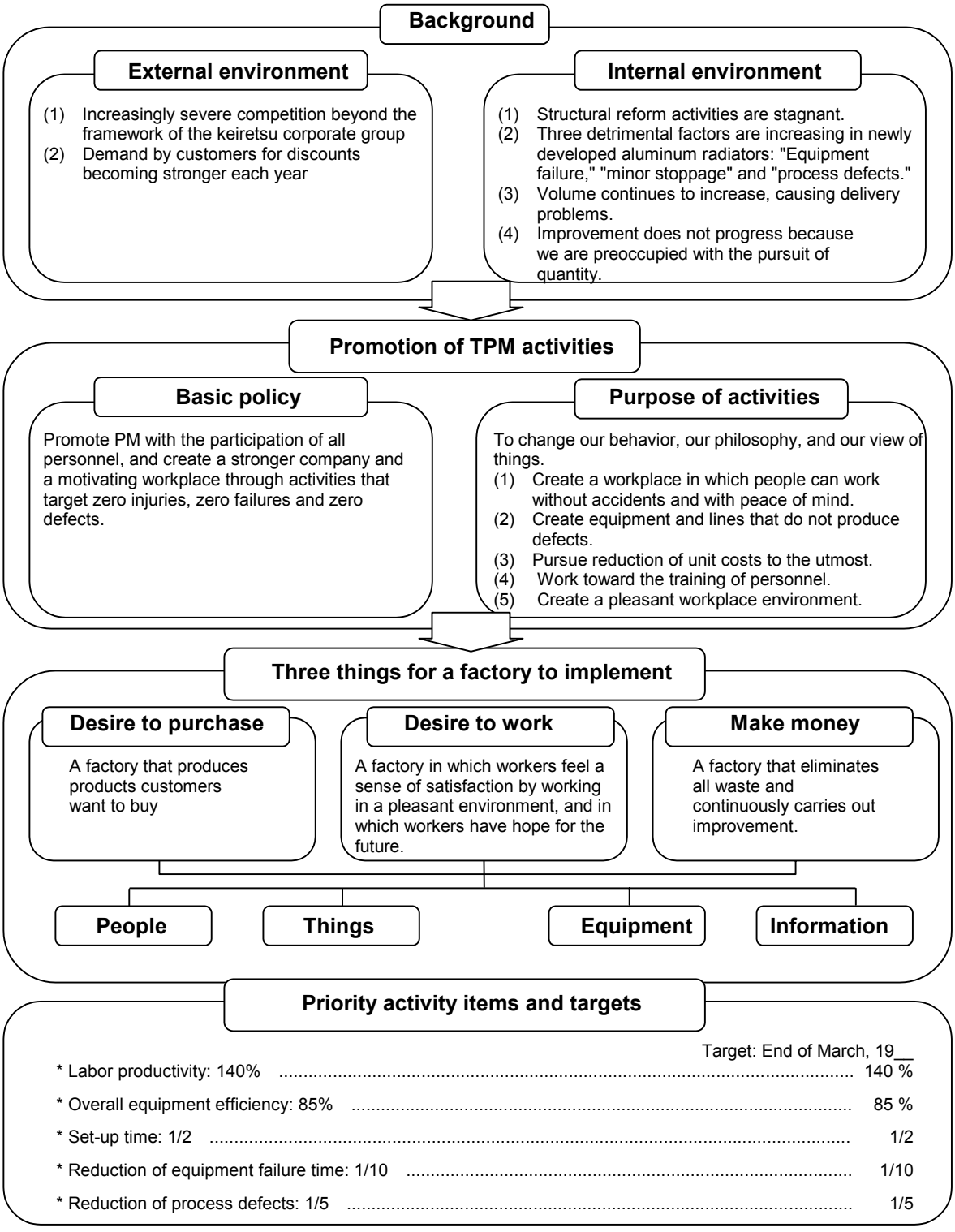




Background and Purpose of Introducing TPM (Plant)

4	2 - 3

Background to and Purpose of Introducing TPM



Policy and Goals of TPM

Background

External environment

- Increasing deterioration of domestic markets
- Worsening of the export environment (strengthening of the yen currency and localization of production overseas)
- Rapid development of the level of technology
  Shedding of old technology
  (new materials and new products)

Internal environment

- Worsening of sales and profitability
  (1) Demand from manufacturers to reduce unit costs
  (2) Trend toward worsening of exchange rate losses (direct deliverables)
- Diversification and advancement of quality and functions, and dramatic reduction in unit costs
- Loss of domestic production due to overseas production

Needs of management

- Promotion of reform through company-wide implementation of TPM
- Increase competitiveness for current products and cultivate new product groups through the maximal pursuit of the target quality.
- Promote product development and development of processing techniques that lead the market.
- Promote autonomy of overseas offices and improve profitability.
- Establish an optimal production system, and promote the creation of products that are high in quality and low in cost.
- Pursue target profit through the promotion of sales expansion and overall reduction in unit costs.

Basic policy and targets

Basic policy

Through the participation of all personnel in PM, create lines that achieve "zero injuries, zero defects, zero failures, zero set-up and zero minor stoppage losses." Strive to improve the efficiency of equipment and people, reduce unit costs, and create a stronger company and a motivating workplace.

Purpose of activities

To change people, to change equipment, and to realize a factory that yields high earnings and is bright and easy to work in.

Creation of a "spirited" plant

Specific targets

Assembly workplace

- Creation of lines easy on employees (Standard work procedures that anyone can perform in the same manner.)

(1) Zero injuries
(2) Zero defects
(3) Zero failures
(4) Zero set-up
(5) Zero minor stoppages

Equipment workplace

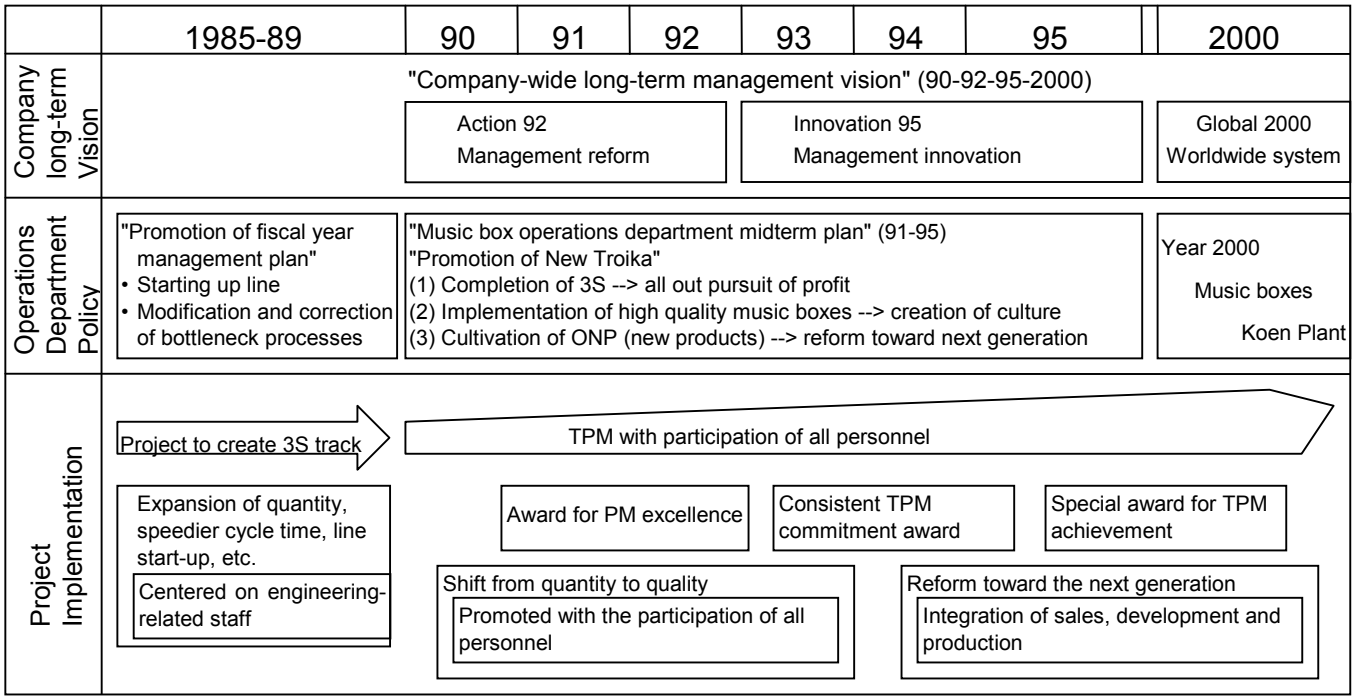
- Improvement of overall equipment efficiency (Overall equipment efficiency of 85% or greater)

(1) Number of accidents requiring suspension of operations: 0 (20 million hours)
(2) Labor productivity: 150%
(3) Overall equipment efficiency: 85% or more
(4) Equipment failure time: 1/10 or less
Number of cases: 1/10 or fewer
(5) Set up time: 1/3 or less
(6) Delivery defect rate: 1/5 or less
(7) Minor stoppage time: 0
Number of cases: 0
(8) Reduction of disposal cost: 1/3 or less
(9) Improvement suggestions: 100 suggestions/person or more
(10) Attainment of skilled technician status: 65 persons or more

3SPM Policy and Targets

In order to bring about "leeway and abundance," this company issued a company-wide long-term management vision statement in April 1990. In line with this plan, this Operations Department has formulated the "New Troika" midterm plan. Taking "challenge and creation" as our philosophy of action, we have resolved to introduce TPM with the cooperation of all personnel of the company and with the aim to shift from quantity to quality.

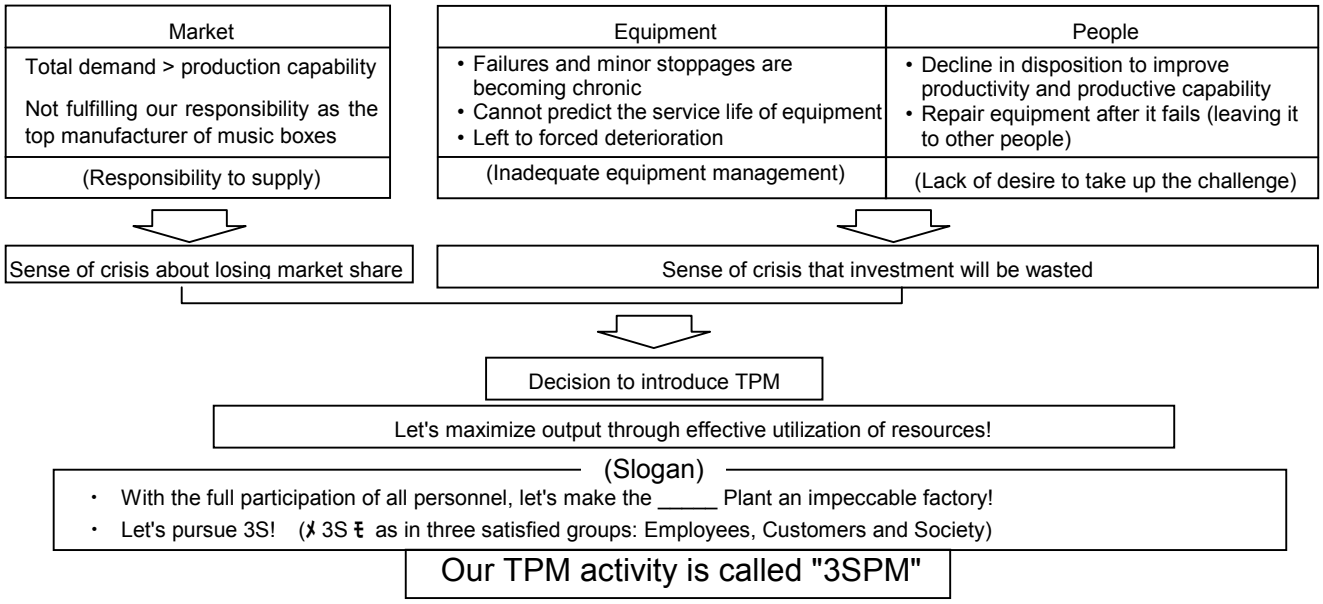
Relationship between TPM and Company/Operations Department Policies



Policy and targets of TPM activities

TPM activities aim to create a plant best suited for the workers, customers and society (of the region).

Background to the introduction of TPM



Note: The TPM activity of Sankyo Seiki Mfg. Co., Ltd. is referred to as 3SPM.

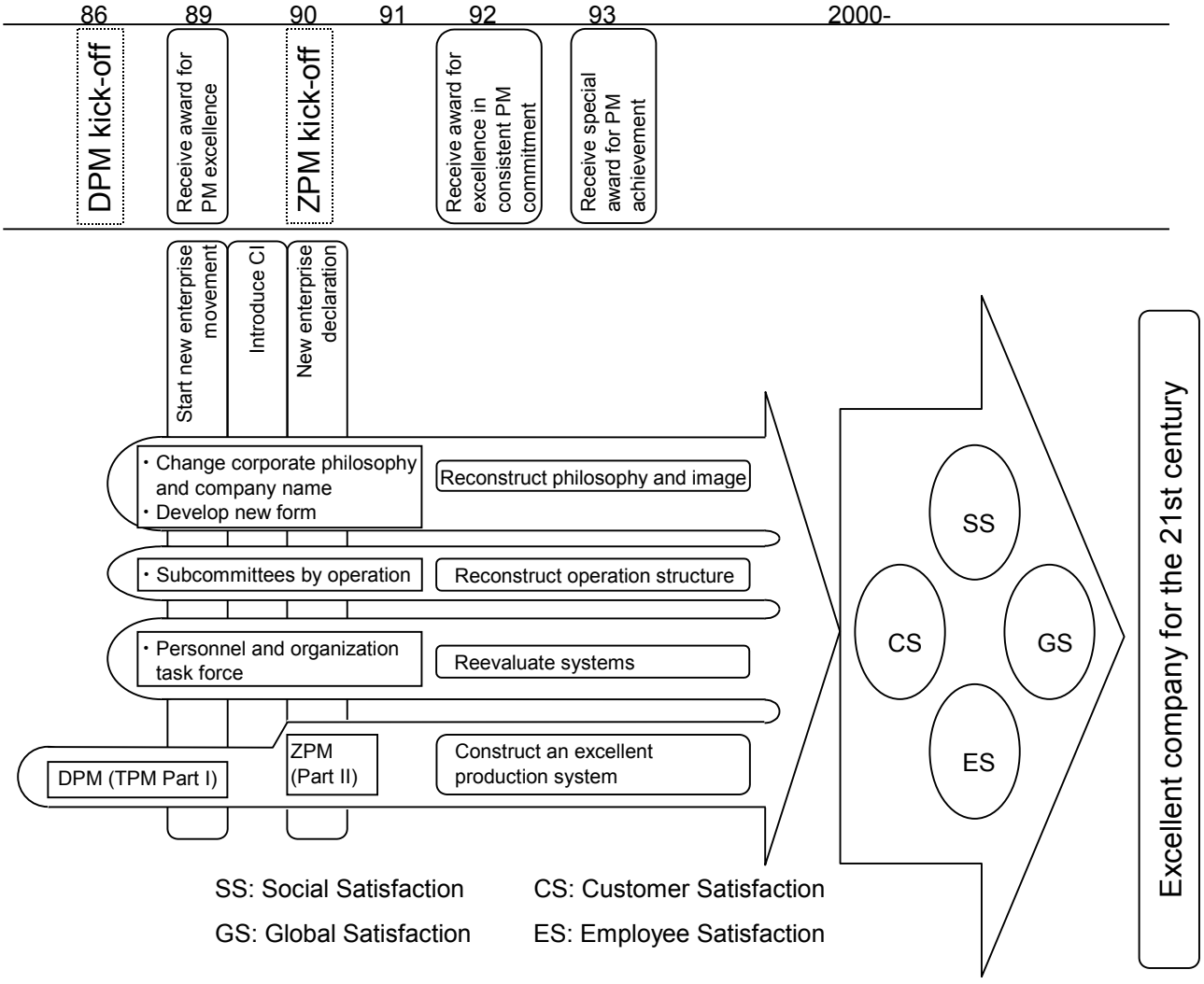
The Shift from DPM Activity to ZPM Activity

ZPM activity is a "company-wide reform activity" that forms the core of the new enterprise movement

This company started DPM activities (TPM Part I) in 1986 and received the award for PM excellence in fiscal 1989.

The Production Division, comprised of the Business Operations Department and Engineering Headquarters, has carried out DPM activities and achieved great results.

The year 1989 marks the 50th anniversary of the founding of this company. Looking forward to the next 50 years, it is urgent that we make reforms to realize our corporate vision in the 21st century. Against this backdrop, we have given the name "new enterprise movement" to all activities engaged in this reform, starting with CI. In this connection, the company issued the New Enterprise Declaration in October 1990. On the same day and at the same venue, ZPM activities (TPM Part II) were started as the core activity of the new enterprise movement.



Note: The TPM activity of Diesel Equipment is referred to as DPM. The TPM activity of the subsequently renamed company, Zexel, is referred to as ZPM.

__/__/__
TPM Promotion Office

To: Sections and Offices

TPM Activity Slogan Solicitation

With the participation of all company personnel, TPM activities will finally start on __/__ . In order to implement this activity enjoyably and with hope for the future, we ask everyone to rise to the challenge and contribute your ideas for a slogan.

Information:

1. The slogan should:
   (1) Concisely express the objective
   (2) Incorporate ideas about activities
   (3) Express everyone's dream
   Please feel free to express other concepts in your slogan.
   Example
   "Let's create a dream factory for the 21st century through TPM!"

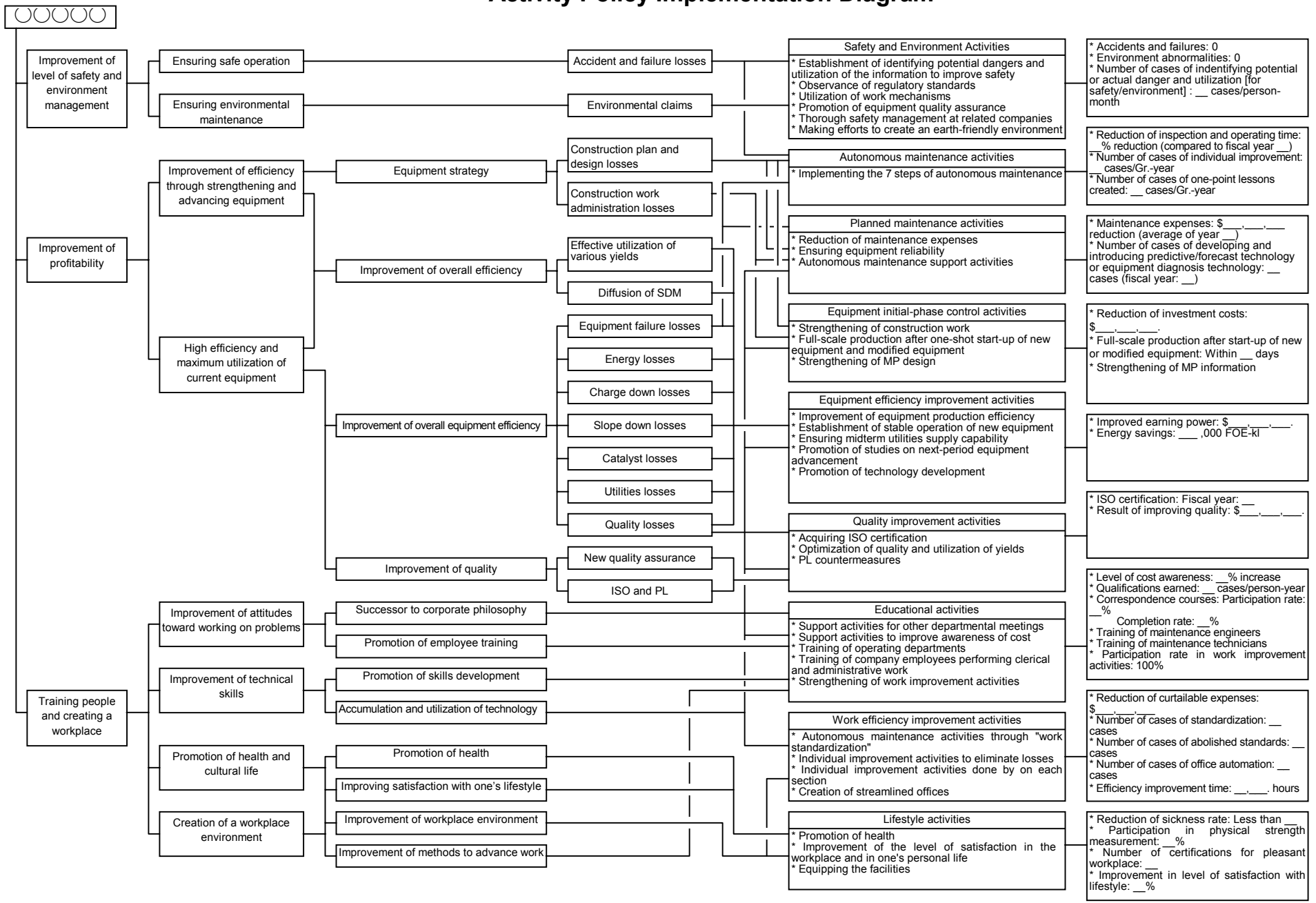
2. Deadline: __/__ (_____day)

3. Submit to: TPM Promotion Office

4. Judging: One person will be selected from each departmental meeting for the screening committee. The primary judging will reduce entries to 10 slogans, and then all personnel will participate and cast their ballot in the secondary judging. Subsequently, the TPM Promotion Committee will make a decision.
   Election ballots will be distributed separately to each section.

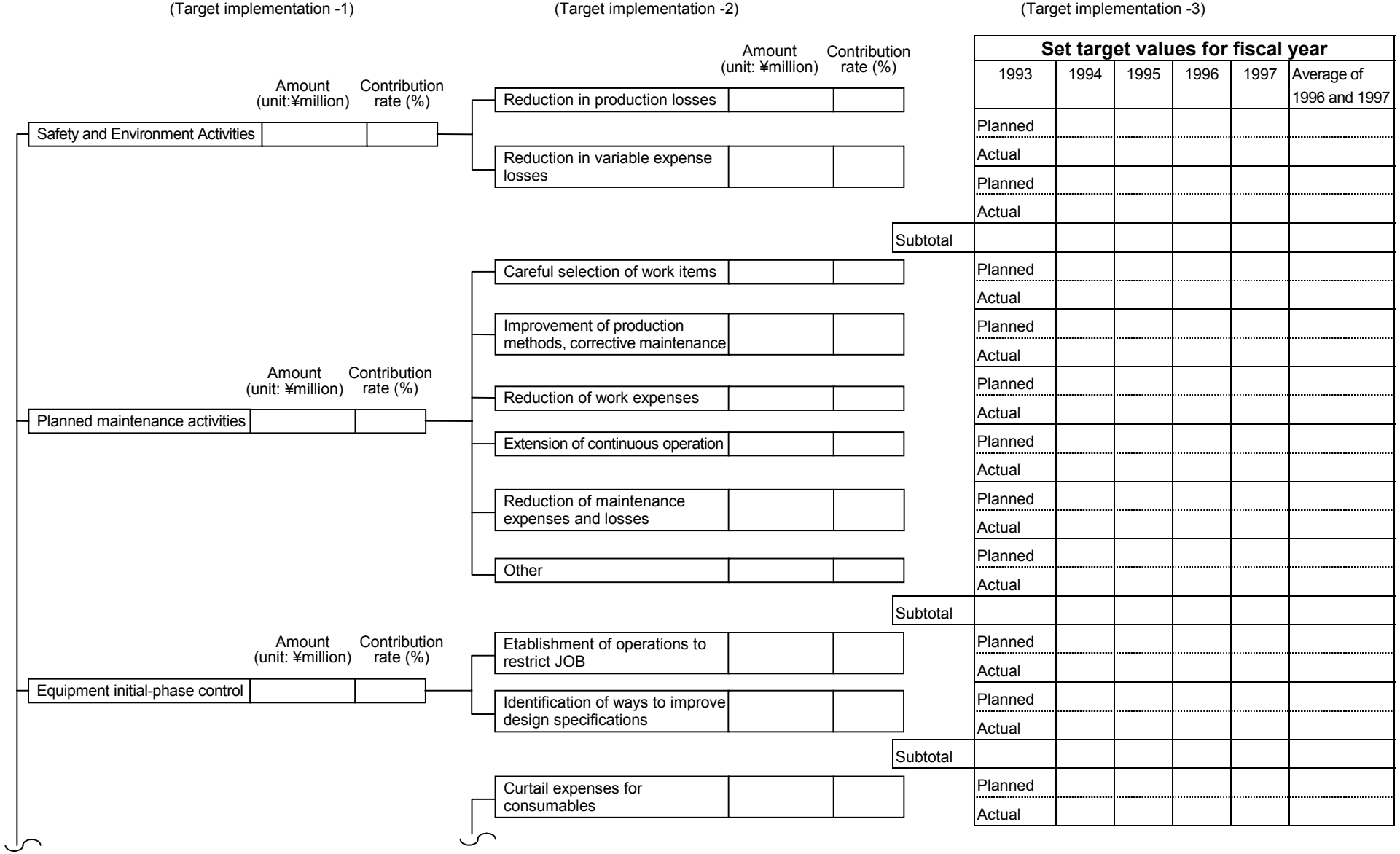
5. Other
   Commendations will be given at the kick-off ceremony. Further, a prize will be given to the winner.

Activity Policy Implementation Diagram



Target Development Diagram

The benchmark is zero _____ by the year __, and the target is the average___ in the year __.



Critical Tasks and Target Values by Activity

Activity Name	Critical Task	Target Value
Safety and Environment Activities	• Establishment of identification of potential dangers and utilization [for safety/environment] • Observance of regulatory standards • Utilization of work mechanisms • Making efforts to create an earth-friendly environment	• Accidents and failures: 0 • Environment abnormalities: 0 • Number of cases of idenfication of potential or actual danger and and utilization [for safety/environment]:__ cases /person-month
Autonomous maintenance activities	• Implementing the 7 steps of autonomous maintenance	• Reduction of implementation and operation time: __% reduction (compared to fiscal year __) • Number of cases of individual improvement: __ cases/Gr.-year
Planned maintenance activities	• Reduction of maintenance expenses • Ensuring equipment reliability • Autonomous maintenance support activities	• Maintenance expenses reduction: ¥___,___,___. reduction (year: __) • Number of cases of developing and introducing predictive technology or equipment diagnosis technology: __ cases (fiscal year: __)
Equipment initial-phase control activities	• Strengthening of construction operations • Full-scale production after start-up of newly added equipment and modified equipment • Perfection of MP design	• Reduction of investment costs: ¥___,___,___ • Full-scale production after start-up of newly added equipment or modified equipment: Within __ days • Strengthening of MP information
Equipment efficiency improvement activities	• Improvement of equipment production efficiency • Construction of new equipment and establishment of stable operations	• Improvement in earning power: ¥___,___,___. • Energy savings: __,000 FOE-kl
Quality improvement activities	• Acquiring ISO certification • Quality optimization activities	• ISO certification: Fiscal year: __ • Result of improving quality: ¥___,___,___.
Educational activities	• Support activities for other departmental meetings • Support activities to improve awareness of cost • Maintenance technology, and training of technicians • Training of company employees performing clerical and administrative work	• Level of cost awareness: __% increase • Training of maintenance engineers: __ persons or more • Training of maintenance technicians: __ persons or more • Qualifications earned: __ cases/person-year __ • Correspondence courses: Participation rate: __% • Completion rate: __%
Work efficiency improvement activities	• Autonomous maintenance activities through "work standardization" • Individual improvement activities to eliminate losses • Creation of streamlined offices	• Number of cases of standardization: __ cases • Number of cases of computerization (Office Automation): __ cases • Number of cases of abolished standards: __ cases • Efficiency improvement time: ___,___. hours • Reduction of expenses: ¥___,___,___.

Basic Approaches to Setting Targets

(1) Targets shall be set from the following three viewpoints in order to attain the goal of becoming the country's most profitable factory:
   1) Quantitative target values that directly affect profits (indicate only by amount)
   2) Quantitative target values that indirectly affect profit (time, man-hours and number of suggestions)
   3) Qualitative targets (descriptive wording and indices)

(2) The benchmark shall be fiscal year '__, and the target fiscal year shall be '__. Further, targets shall be set for each fiscal year so that progress can monitored along the way.

(3) The basis for setting target values in 1):

☐ Target value: Profit stated as ¥__million improvement (compared to fiscal year '__)

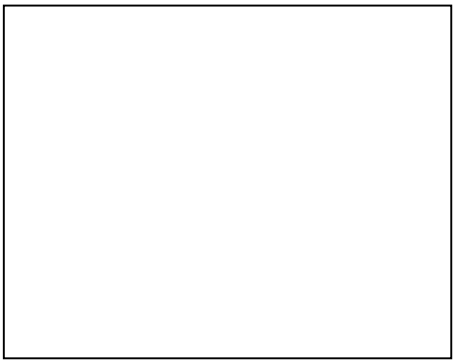
☐ Basis:
- As a result of comparing other companies for fiscal year '__, _____ Plant, which is the most profitable plant, will be set as our current target.
- Aiming to catch up to and surpass _____ Plant in terms of absolute amount of profit.
  Fiscal '__ average earnings comparison: ¥___,___,___.
  Future profit increase at _____ Plant: ¥___,___,___. (data based on fiscal year '__ management plan)

Accordingly, we are aiming to increase profits by ¥___,___,___.in order to catch up and surpass these figures.

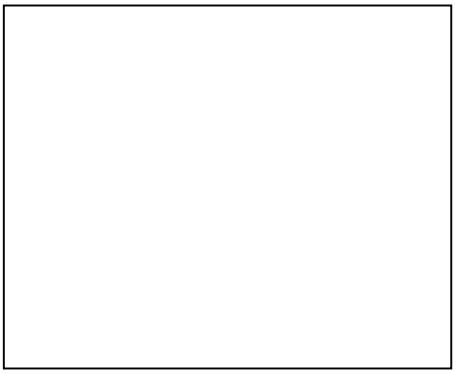
(4) Target values for each of the following items shall be set in order to increase profits by ¥___,___,___.

- Additional production amount: ¥___,___,___.
  - Breakdown
    - Equipment investment related: ¥___,___,___.
    - Operation improvements related: ¥___,___,___.
    - Individual improvement related: ¥___,___,___.
    - Quality improvement related: ¥___,___,___.
- Maintenance expense: ¥___,___,___.
- Reduction of problems/malfunctions: ¥___,___,___.
- Variable expenses: ¥___,___,___.
- Other fixed expenses: ¥___,___,___.
- Increased depreciation and amortization expenses, etc.: -¥___,___,___.

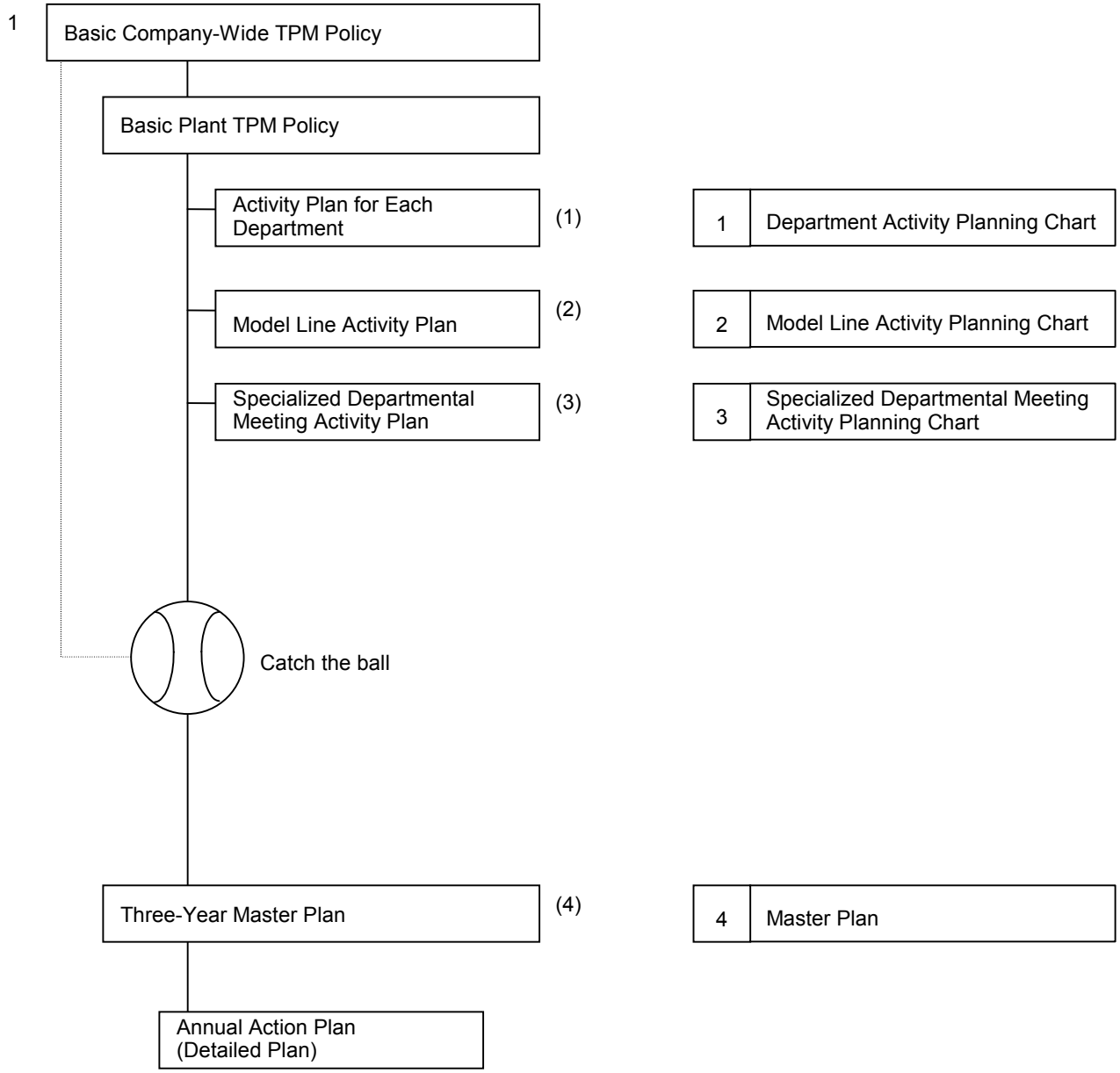
→ **Target: ¥___,___,___**



5. TPM Master Plan

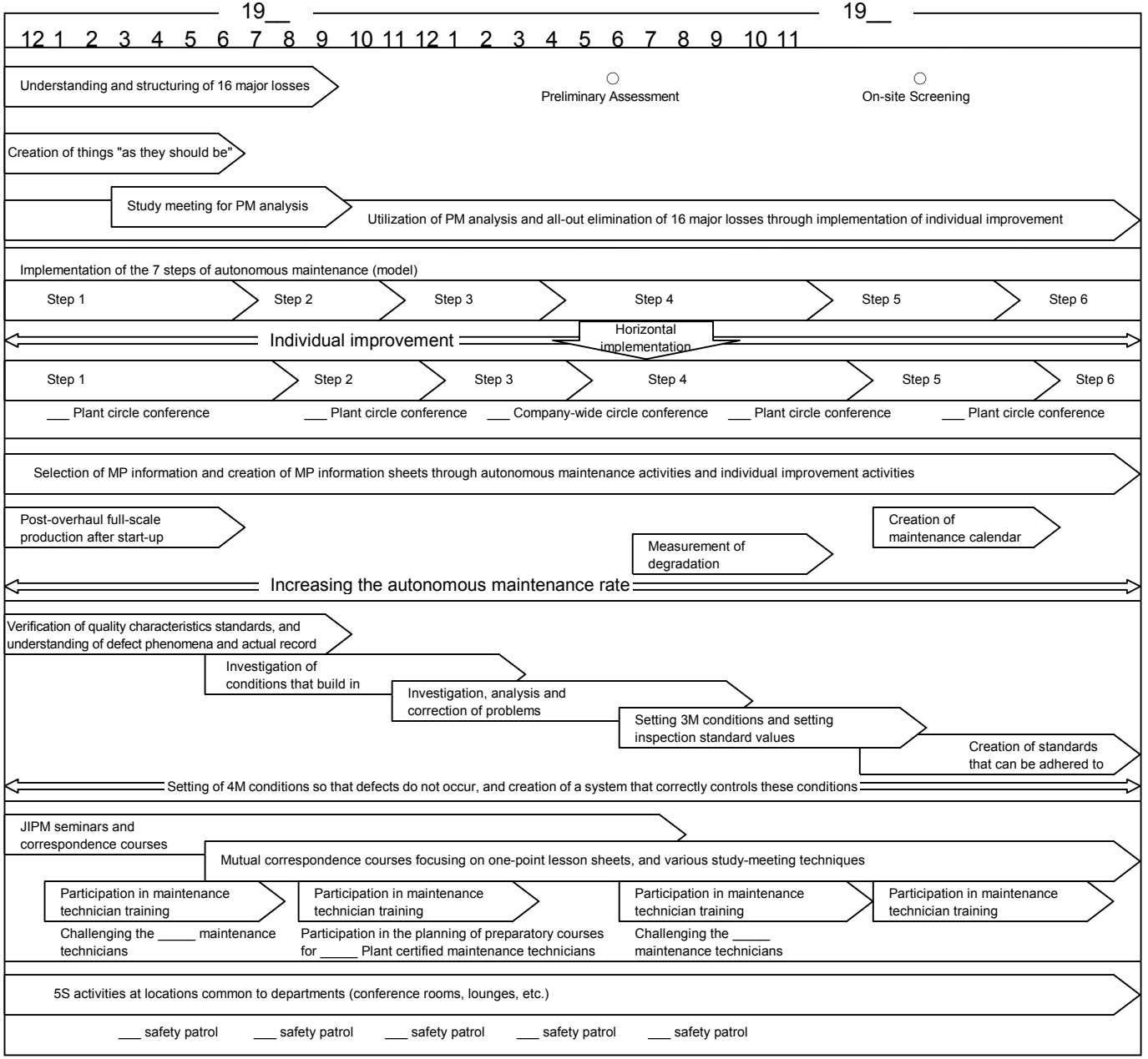


5. TPM Master Plan



___ Department Activity Plan

Specialized activity	Department implementation (goal)
Individual improvement activity	* Realization of zero losses in all areas such as failures, defects, etc. • Understanding of 16 major losses • Implementation of overall efficiency improvement * Pursuit of maximum productive efficiency • Implementation of PM analysis • All-out pursuit of things "as they should be"
Autonomous maintenance activity	* Training of operators proficient with equipment • Implementation of autonomous maintenance step *Establish system in which individuals take care of their own equipment
Planned maintenance activity	* Selection of MP information * Mastering maintenance skills • Autonomous maintenance rate • Maintenance calendar • Measurement of degradation
Quality maintenance activity	* Establishment of a control system and creation of conditions so that defects do not occur
Educational activity	* Comprehension of operations and maintenance skills education/training • Acquisition of maintenance skills • Acquisition of operations skills • Acquisition and practice of TPM techniques
Safety and health activity	* Achievement of zero accidents • Implementation of periodic safety patrols * Implementation of a spirited workplace that is healthy and motivating

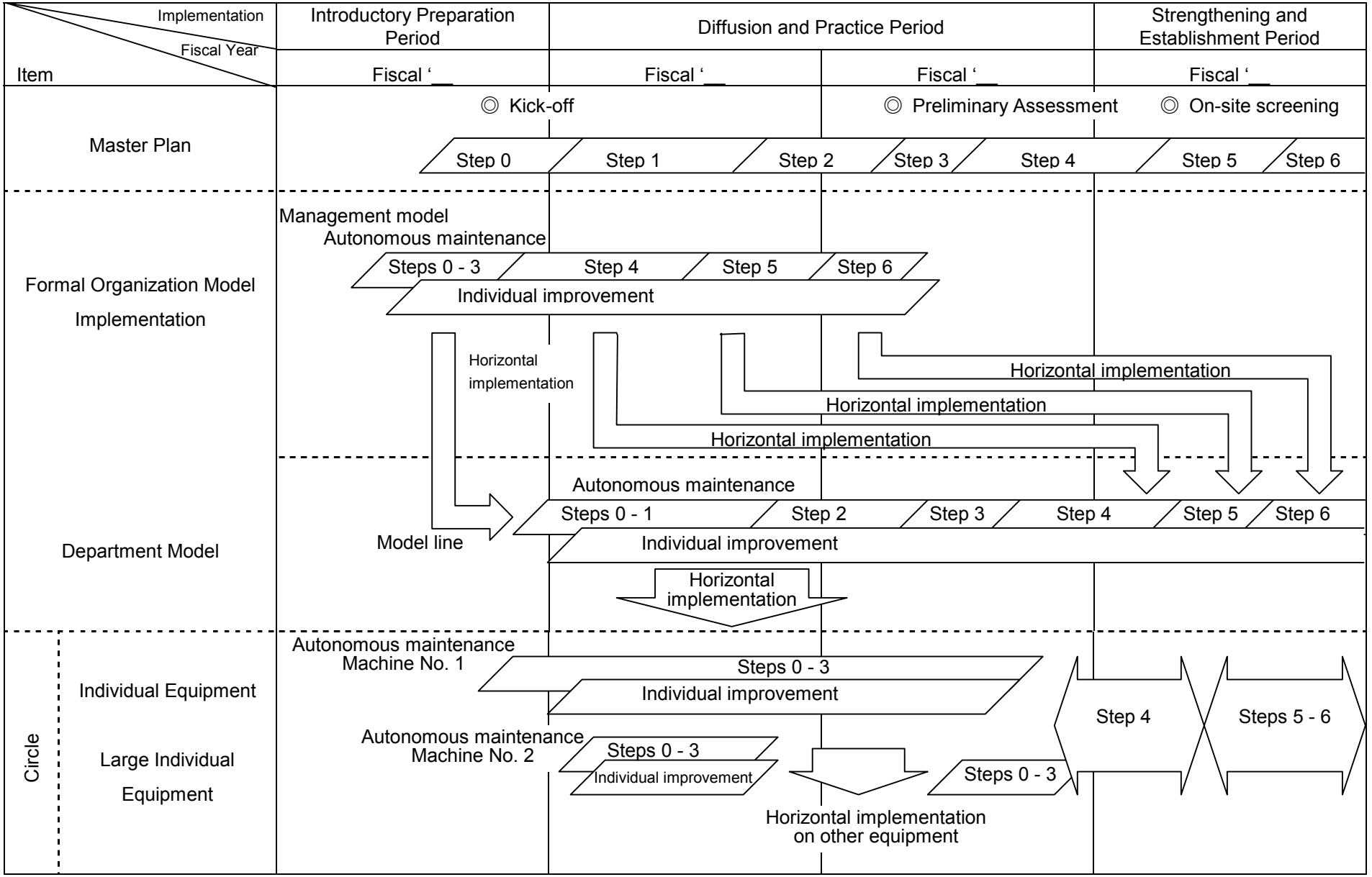


Department Activity Plan

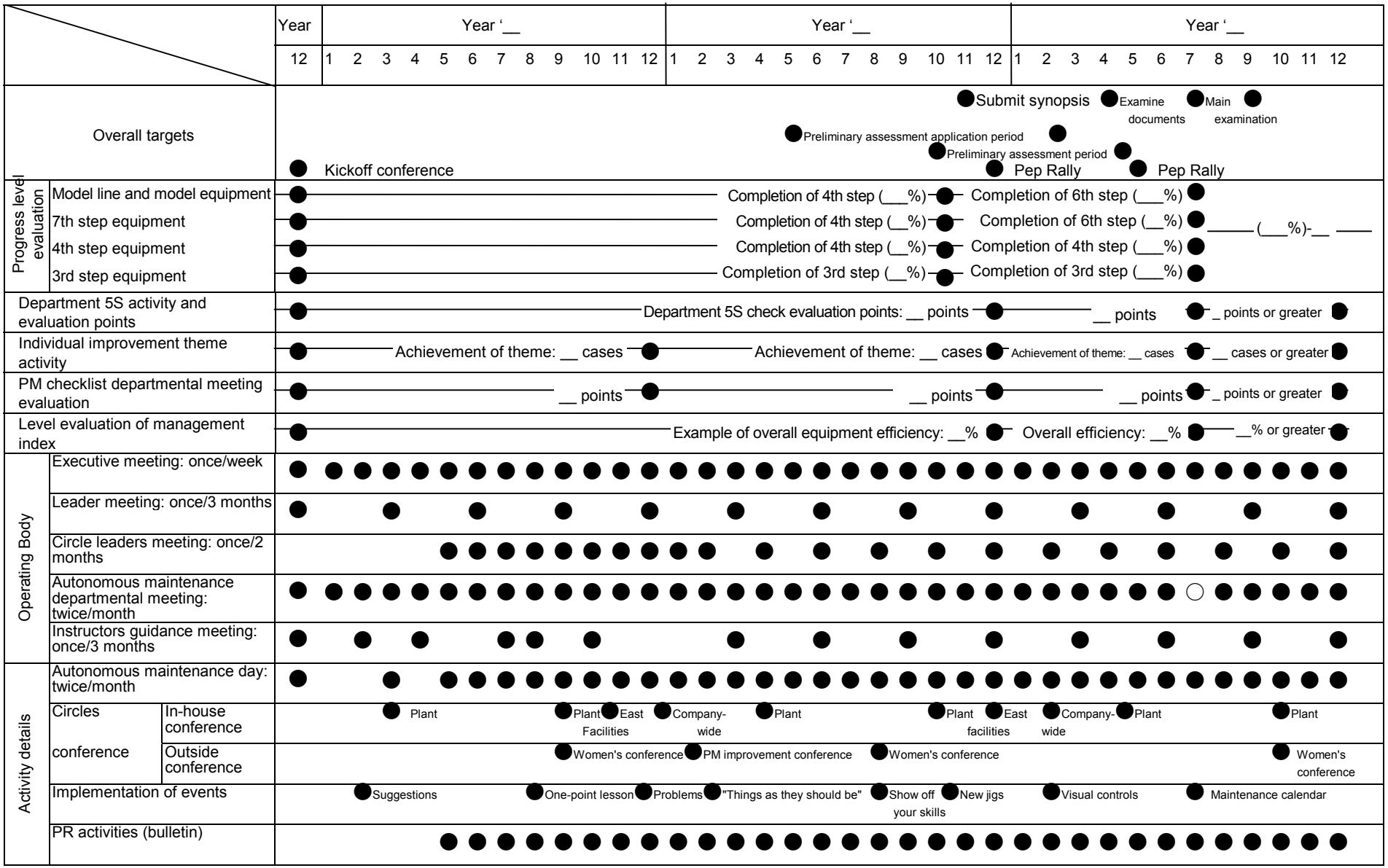
5

1 - 1

Model Line Activities Plan



Sub-committee Meeting Activity Plan (Example of Autonomous Maintenance Departmental Meeting)



Sub-committee Meeting Activity Plan

5

1 - 3

Master Plan

5	1 - 4

Master Plan

Activity \ Year / Purpose	'__	'__	'__	'__	'__
	Introduction Preparation	Practice Period		Strengthening Period	Establishment Period

Planned Maintenance

Organize a promotion organization and overlapping small group organization, and establish a Promotion Office

○ Preliminary Assessment

◎Receive award for PM excellence

Set the policy implementation, goals, slogan and results targets

Formulate the master plan

Individual Improvement Activity (elimination of losses)

- 1.5-fold overall efficiency plan
- Organize improvement teams
- Select improvement themes
- Improvement activity (model screening --> horizontal implementation)

Autonomous Maintenance Activity (elimination of 4 faults)

- Step 1 | Step 2 | Step 3 | Step 4 | Steps 5 and 6
- Implementation of step 7
- General inspection correspondence course
- Interest-generating activities (TPM news, activities board contest, activities presentation meetings, etc.)

Planned Maintenance Activity (zero failures)

- Create planned maintenance system
- Development of major classifications, periodic maintenance and predictive maintenance
- Lubrication and spare parts systems (model screening --> horizontal implementation)
- Activity to achieve zero equipment failures (model screening --> horizontal

Quality Maintenance Activity (zero defects)

(Model advancement)

Matrix | 3M analysis | Table of problem countermeasures | FMEA and PM analysis | Countermeasures | Improvement and standardization

(Horizontal implementation)

Matrix | 3M analysis | Table of problem countermeasures | FMEA and PM analysis | Countermeasures | Improvement and standardization

Initial-phase Control Activity (full-scale production after start-up)

Product

- Create initial-phase control system → Trial run → Implementation
- Accumulate and utilize data
- Create initial-phase control system → Trial run → Implementation
- Trial run
- Collect and accumulate MP

Education and Training Activity (training employees to be proficient in equipment and work)

- Create an education system
- Create an individual skills development system
- Maintenance skills training

Administrative/Indirect Activity

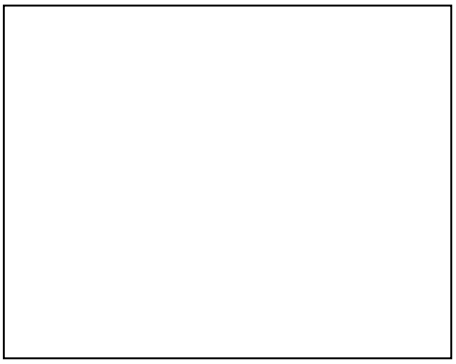
- Step 1 | Step 2 | Step 3 | Step 4 | Step 5
- Work improvement Step 5
- Implement warehouse and storage space Step 4
- Accounts settlement-related clerical work efficiency improvement
- Production control system improvement
- Spirited 5S activity

Safety and Health Activity

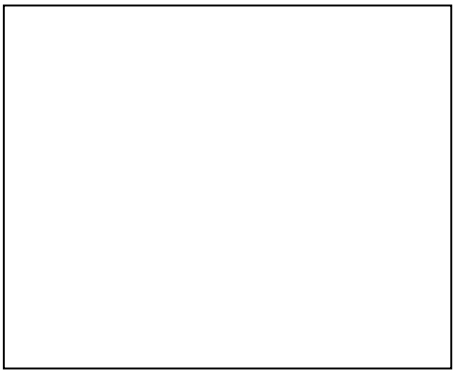
- Support for autonomous maintenance activity safety
- General safety inspection manual
- General safety inspection
- Daily safety administration activity

Preparation for introduction (introduction declaration of __/__/__)

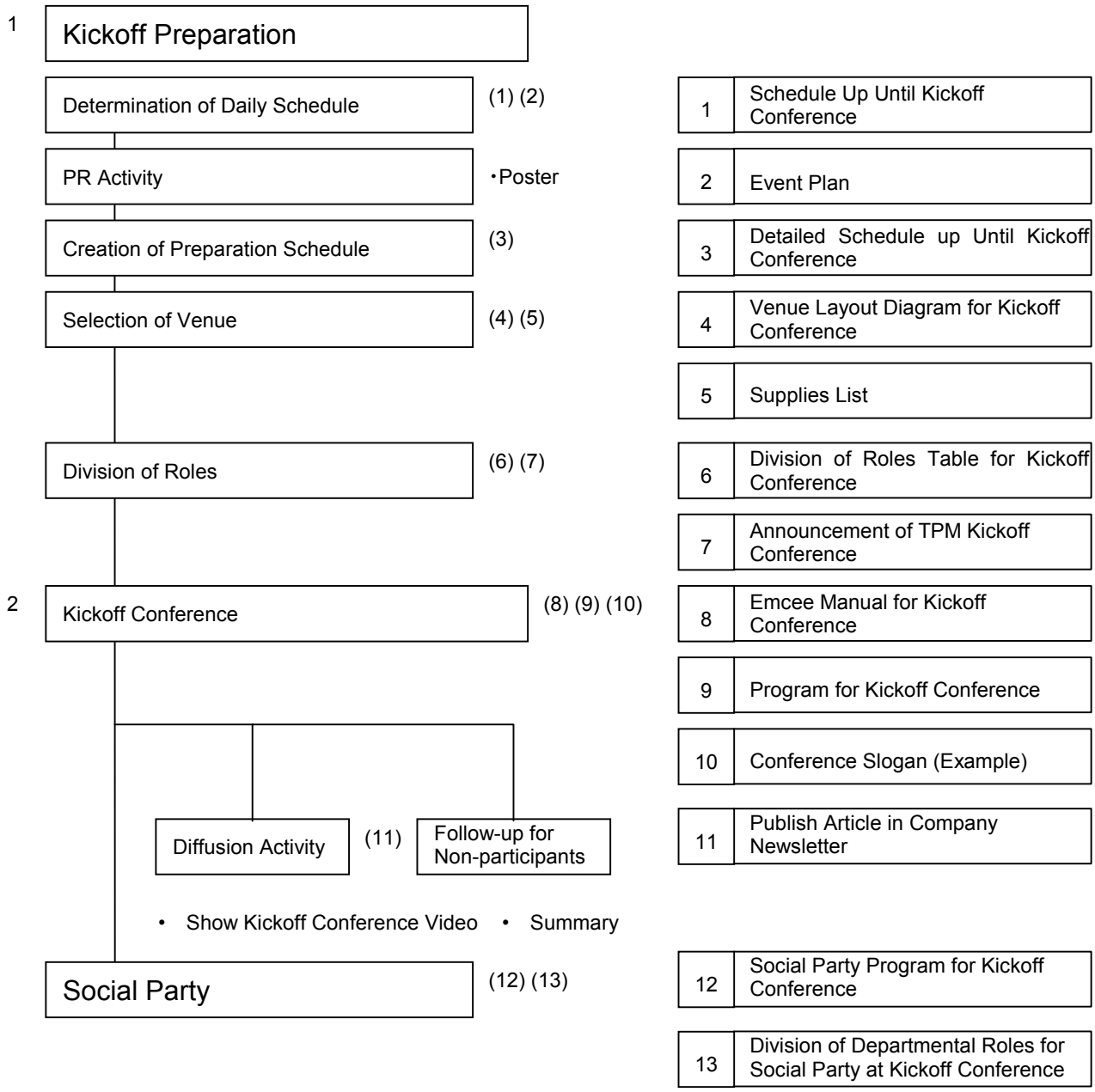
TPM kickoff (__/__/__)



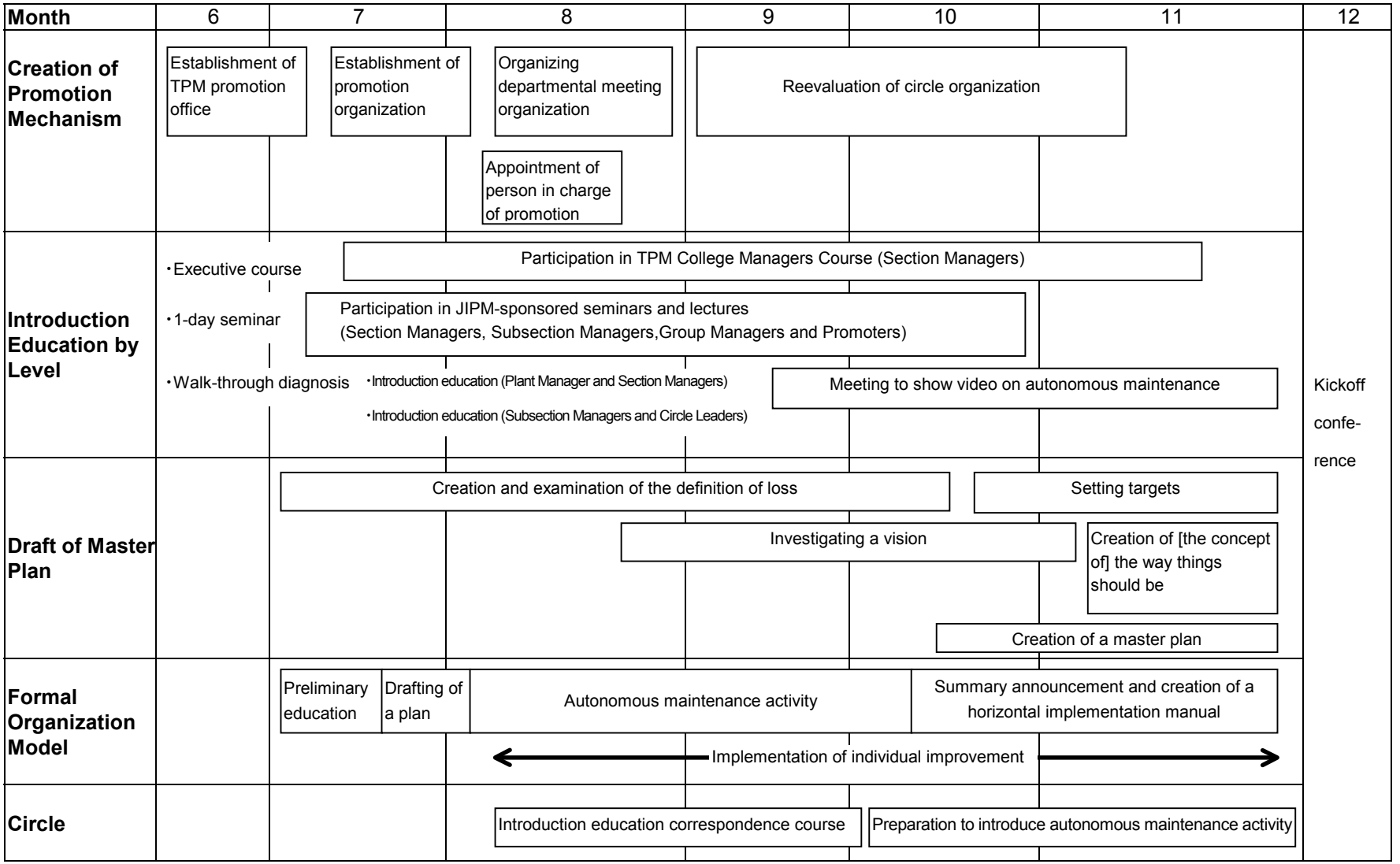
6. TPM Kickoff and PR



6. TPM Kickoff and PR



Schedule Up Until Kickoff Conference



Route for plan approval: Person-in-charge → Subsection Manager→ Section Manager → Plant Manager

Route for report approval: Person-in-charge → Subsection Manager → Section Manager → Plant Manager

Event Plan

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Date Created: __/__/19__

Event name	TPM kickoff conference and party
Date and time	__/__/19__ Kickoff conference: __:__ - __:__ Party: __:__ - __:__
Venue	Cafeteria
Person in charge of planning	Section Manager _____
Planning budget	¥_____ (Budget code: ___-__)

Planning Details

(1) Purpose

- To inform everyone of the declaration to introduce TPM, the policy goals and activity plans, and to verify in front of everyone the decision to pursue TPM to the end.
- To introduce an example of implementing a formal organization model activity, and to have everyone recognize the importance of autonomous maintenance activities.

(2) Refer to attached document (next page) for detailed schedule.

(3) Guests

JIPM officials Mr. _____ and Mr. _____

Six cooperative companies (_____ Transport, _____ Construction and _____ Electric, etc.)

(Decision Approval)

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Implementation Status

(1) Participants

- Guests: JIPM officials Mr. _____ and Mr. _____, and six cooperative companies
- Top Management: Executive Director, Managing Director and Plant Manager
- 233 employees

(2) Implementation status

We have thoroughly informed all employees, through the TPM kickoff conference, of the policy target and activity plan of the TPM activities.

(3) Expenses

¥ __,___. (Venue preparations and refreshments)

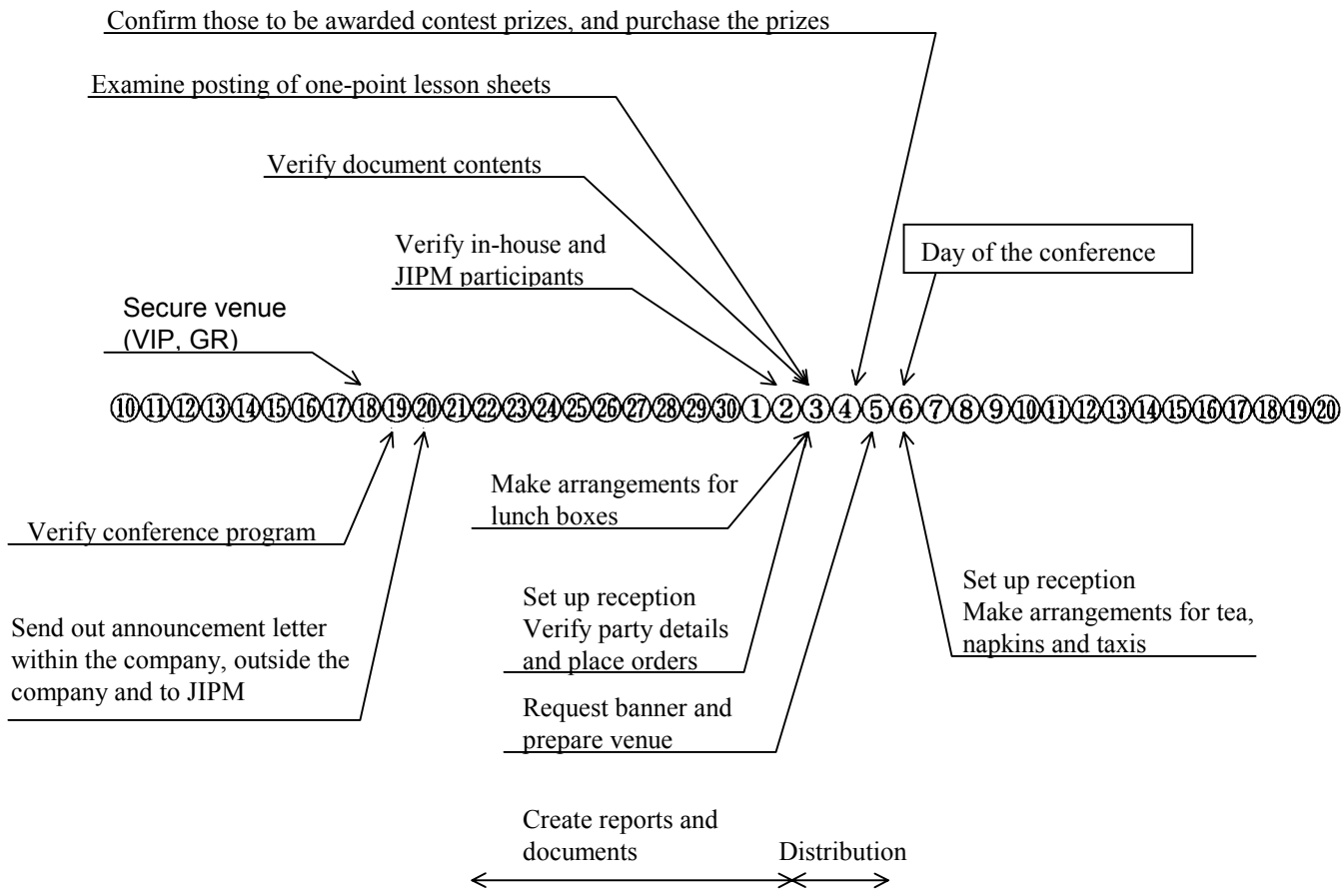
(Report Approval)

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Detailed Schedule Up Until Kickoff Meeting

6	1 - 3

Detailed Schedule Up Until Kickoff Meeting



Division of Roles at Kickoff Conference

Venue

- Planning and operations: The autonomous maintenance departmental meeting and the Promotion Office should consider a plan to liven up the conference.
- Venue preparations: Starting from 1:00 PM on the day before the event

  Person in charge: Departmental meeting [members] of each department, promoters and the Promotion Office
- General Emcee: Subsection Manager _____
- Follower microphone: Promotion Office
- Clean-up Starting from 9:00 on __/__

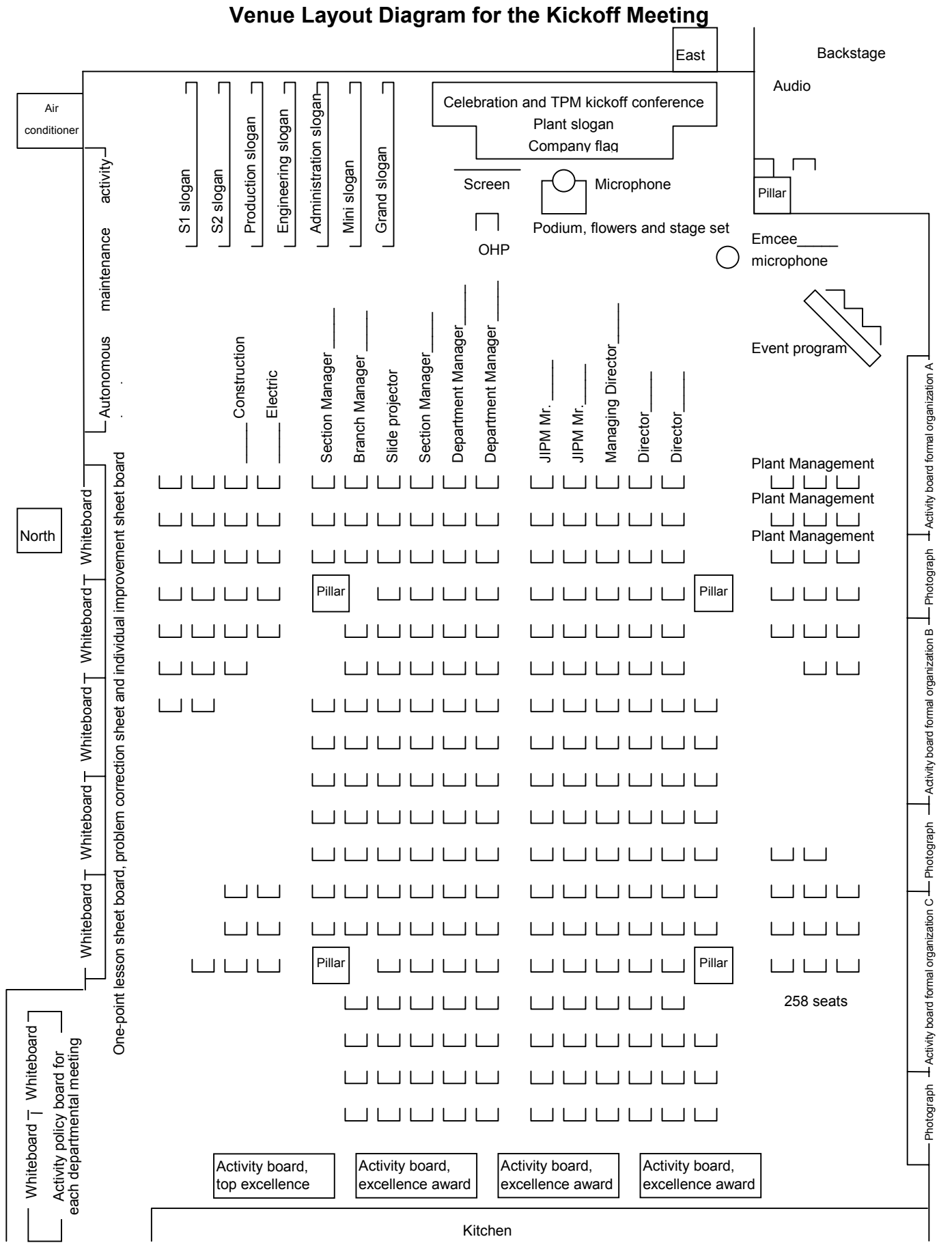
  Person-in-charge: All Group Managers and the Promotion Office

Party Venue

- General Emcee: _____
- Venue preparations: Starting from 3:00 PM on the day before the event
  Person-in-charge: Departmental meeting [members] of each department, promoters and the Promotion Office
- Planning and Operations: The autonomous maintenance departmental meeting [members] and the Promotion Office should consider a plan that livens up the conference.
- Clean-up: Everyone cleans up on that day.

Venue Layout Diagram for the Kickoff Meeting

6	1 - 4



Supplies List

No.	Supply Item Name	Qty.	Storage Location	Person-in-charge	Remarks
1	Banner (TPM kickoff conference)	1	Create a new one	_____	Record slogan
2	Company flag	1	Warehouse No. 2	_____	Install the day before
3	TPM flag	1	Warehouse No. 2	_____	Install the day before
4	Conference slogan for each department	7	Create new ones (300 x 2500)	_____	Decided by the department
5	Stage	6	Cafeteria	_____	Install the day before
6	Podium	1	Cafeteria	_____	Install the day before
7	Broadcast equipment	1 set	Cafeteria broadcast equipment	_____	
8	Guest seat placards	14	Create new ones (A-4)	_____	List of guests
9	Event program	1	Create a new one	_____	
10	Table	1	Meeting room	_____	For person to expedite the proceedings
11	Activity board for each circle	8	Each circle brings its own	_____	Excellent activity boards
12	Whiteboard	9	Rental	_____	
13	Chairs	258	Cafeteria	_____	
14	Flowers	1	Place order with _____ Flower Shop	_____	
15	Lunch boxes for that day (guests and employees)	260	_____ Cafeteria	_____	
16	Video camcorder	1	Warehouse No. 2	_____	
17	Camera	2	Warehouse No. 2	_____	
18	Cassette tape	1	Warehouse No. 2	_____	
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					

Division of Roles for Kickoff Meeting

No.	Role	Persons	Section-in-charge	Person-in-charge
1	Conference Committee Chairperson	1		
2	Conference Operations Committee Members	6		____, ____, ____, ____, ____, ____
3	Emcee (Proceedings)	1		
4	Timekeeper	1		
5	Assistant (Female)	1		
6	Person in charge of broadcasting	1		
7	Person in charge of lighting	2		
8	Person in charge of wireless microphone	2		
9	Person in charge of venue preparations			Department in charge of operations
10	Person in charge of creation of signs/banners	2		
11	Person in charge of lunch	1		
12	Person in charge of reception desk	2		
13	Person in charge of cameras	1		
14	Create program			
15	Create letter of announcement		Promotion Office	
16	Prepare consumables (thumbtacks and cellophane tape)		Promotion Office	
17	Prepare examination chart (binder and writing implements)		Promotion Office	
18	Prepare party	6		Conference Operations Committee
19				
20				
21				
22				
23				
24				
25				
26				
27				

Announcement of TPM Kickoff Meeting

__/__/20__
_____ Plant

The _____ Plant TPM Kickoff Meeting will be held as follows:

1. Date and time: __/__ ( ) __:__ - __:__

2. Venue: Cafeteria

3. Guests: Executive Directors, Managing Directors, Other Plant Managers, Other Plant Promoters
   Employees: All
   Cooperative companies: _____ Transport, _____ Construction and _____ Electric

4. Conference Program
   (1) Emcee opening remarks
   (2) Guest introduction
   (3) Explanation of schedule
   (4) Opening remarks
   (5) Plant Manager remarks and declaration of resolution
   (6) Director _____ remarks
   (7) Announcement of congratulatory messages [telegrams] and messages of encouragement
   (8) Explanation of promotion plan from each department
   (9) Activity plan from each departmental meeting and statement of resolution
   (10) Report on results of formal organization model activity
   Team A, Team B and cooperative company teams
   (12) Japan Institute of Plant Maintenance, remarks by Mr. _____
   (13) Overall review, Managing Director _____
   (14) Contest prize
   (15) Closing remarks
   Party (Room _____)

Those who wish to participate should contact the _____ Plant TPM Promotion Office.

Manual for the Kickoff Meeting

Kickoff Conference (for Emcee)	
1. Opening remarks	I hereby open the _____ Plant's TPM-_____ Strategy Kickoff Conference. As you may have already noticed, the flag of the _____ Plant TPM-____ Strategy Kickoff Conference has been completed and is hanging in the front. The symbol on the flag, selected from a large number of entries, was contributed by Mr./Ms. _____ from Engineering. It was designed with the idea that we should all combine our strengths and work toward the goals of the _____ strategy, (_____) as we approach the plant's __th anniversary. I would like to introduce Mr./Ms. _____ of Engineering. Let's give him/her a round of applause.
2. Guest introduction	I would like to introduce our guests who have taken time out of their busy schedules to attend this conference. (Participants from outside the company) (1) Japan Institute of Plant Maintenance, Director and General Manager of the TPM General Research and Technology Division Headquarters, Mr. _____ (2) Japan Institute of Plant Maintenance, TPM General Research and Technology Division Headquarters Consultant, Mr. _____ (3) ___ Transport, K.K., Branch Manager ___ (20 persons under him) (4) ___ Electric Engineering, Branch Manager ____ (5) ___ Construction, Ltd.: Executive Director ____ Introduction of participants from within the company (1) Director: Executive Director _____ (2) Director: Managing Director _____ (3) ____ Department: Department Manager _____ (4) ____ Department: Two people including Department Manager _____ (5) Two people including Section Manager _____ from ____ Plant (6) Section Manager _____ from _____ Plant
3. Schedule (Explanation)	I would like to explain today's schedule (explained using the program).
4. Opening remarks	I would like to ask Section Manager ____, general person in charge of the TPM Promotion Office, to open this conference.
5. Remarks	I would like to ask the Plant Manager to give his remarks and the declaration of the resolution to introduce TPM.
6. Remarks	Manager _____: I would like to request remarks from Director ____
7. Announcement of messages of congratulations and encouragement	Congratulatory message: Japan Institute of Plant Maintenance, Executive Director (Mr. _____) Messages of encouragement: President _____ Branch Manager _____
8. Promotion plan and declaration of resolution from each department	The promotion plan and declaration of resolution to implement TPM from each department. (1) _____ Department (Section Manager _____) (2) _____ Department (Section Manager _____) (3) _____ Department (Section Manager _____) (4) _____ Department (Section Manager _____) (5) _____ Department (Section Manager _____)
9. Promotion plan and declaration of resolution for each specialized activity	Promotion plan for each specialized departmental meeting. (1) Individual improvement activity, Departmental Meeting Chairperson: Subsection Manager _____ (2) Autonomous maintenance activity, Departmental Meeting Chairperson: Section Manager _____ (3) Planned maintenance departmental meeting activity, Departmental Meeting Chairperson: Subsection Manager_____ (4) Quality maintenance departmental meeting activity, Departmental Meeting Chairperson: Section Manager _____ (5) Initial-phase control activity, Committee Chairperson: Section Manager _____ (6) Education and training activity, Departmental Meeting Chairperson: Section Manager _____ (7) Administration/indirect department activity, Departmental Meeting Chairperson: Section Manager _____ (8) Safety and health activity, Departmental Meeting Chairperson: Section Manager

Manual for Kickoff Meeting (Continued)

6	2 - 8 - (2)

10. Declaration of resolution by employees' representatives	Employee Representative remarks: _____ Construction, ____ Branch Committee Chairperson (_____)
11. Break	• 15 minute break. Smoking is permitted on the roof. • Making use of the break time, I would like you to look at each group's activity board, problem discovery and correction sheet, and one-point lesson sheets. I would like to speak on these activities shortly.
12. Report on results of formal organization model activity	Report on results of pilot organization model activity. (This team was organized on __/__; it has passed Step 2 and is presently engaged in Step 3 activities.)
	(1) Team A Team A has 9 members under the Plant Manager and has engaged in activities using as its theme the _____ crusher in the _____ 1 Subsection model line. I would like to request the Team Leader, Section Manager _____, to present a report on the results of the activities of Team A.
	(2) Team B Team B has 8 members under Section Manager _____ and has engaged in activities using as its theme the uncaser of Line _____ in the bottling machine model line. I would like to request the Team Leader, Section Manager _____, to present a report on the results of the activities of Team B.
	(3) Next is the _____ team of 8 members under General Manager _____. This team is active on Line ___ of the bottling model line in the formal organization model of _____ Transport cooperative company. I would like to ask the team leader, _____, to present a report on the results of the team's activities.
	Thank you. I ask that each of you join together to participate in a formal organization model activity. As we approach the __th anniversary of the founding of this company in two years, please take up the challenge to win an award for TPM excellence. To the Section Managers and members of the cooperative company who were announced earlier in the program, I encourage you in your endeavor to pass Step 3 and ask each member of these teams to become a "model" for implementing these activities.
13. Remarks by JIPM official, Mr. ___	I would now like to ask Mr. _____ to give his/her remarks and evaluation.
14. Remarks by Managing Director ____	I would like to ask Managing Director _____ to give his/her overall evaluation.
15. Contest prize	I would like to turn the conference over to Mr./Ms. _____ of the Promotion Office. Introduce circle prizewinner --> Plant Manager presents prize.
16. Back to emcee	Return the microphone to the emcee.
17. Close of meeting	I would like to ask Section Manager _____ to bring the conference to a close. Thank you for your kind attention during this long conference. A party will now be held in Room ___ and everyone is requested to move to that location.

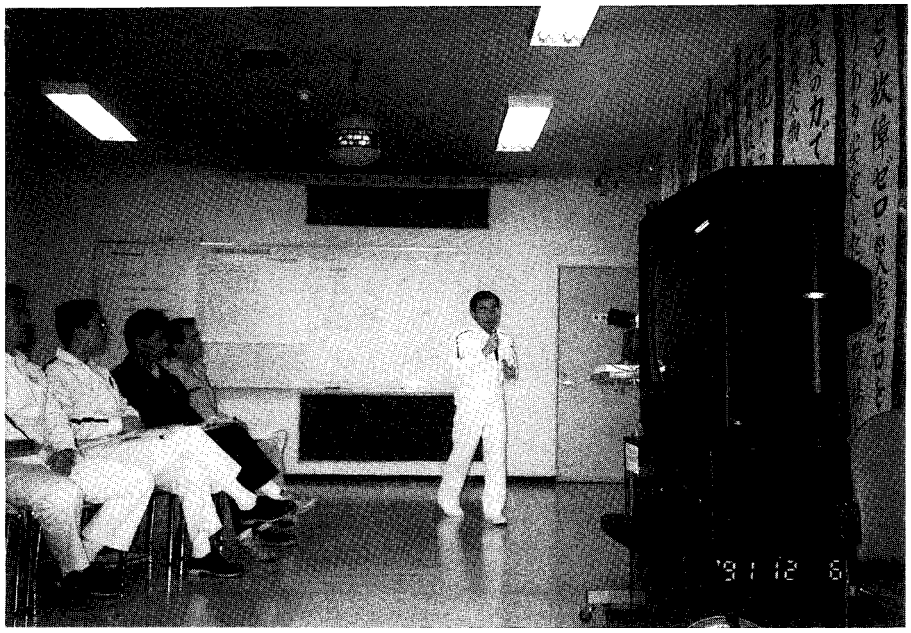
Kickoff Meeting Program

1. Date: __/__/19__ (_____day)
2. Time: __:__ - __:__
3. Venue: Cafeteria

Time	Details	Person-in-charge
13:05	Assembly time	
13:10	1. Start meeting (1) Introduce Japan Institute of Plant Maintenance guests (2) Introduce guests from inside and outside the company (3) Explain the schedule	Emcee
13:15	2. Declare start of meeting	Section Manager _____
13:16	3. Opening remarks and declaration of resolution by Plant Manager (1) Overview of ____ strategy (2) Declaration of resolution to take up the challenge to win an award for TPM excellence	Plant Manager
13:30	4. Opening remarks by Director ____	
13:40	5. Promotion plan and declaration of resolution by each department (Five minutes each for the five departments)	Section Manager from each department
14:05	6. Promotion plan of each specialized departmental meeting (Five minutes each for the six departments)	Departmental Meeting Chairperson
14:35	7. Declaration of resolution by Employee Representative	Labor Union Chairperson
14:40	<Break>	
14:55	8. Report on results of formal organization model activity (Team A, Team B and cooperative company teams)	Team Leaders
15:55	9. Remarks and evaluation by JIPM official, Mr. ____	
16:10	10. Overall evaluation by Executive Director ____	
16:20	11. Various contest prizes	TPM Promotion Office
16:30	12. Declaration of close of meeting	Section Manager ____
16:35	Party in Room ___ (1) Remarks by Director ____ (2) Remarks by JIPM official, Mr. ____	All personnel
17:30	End	

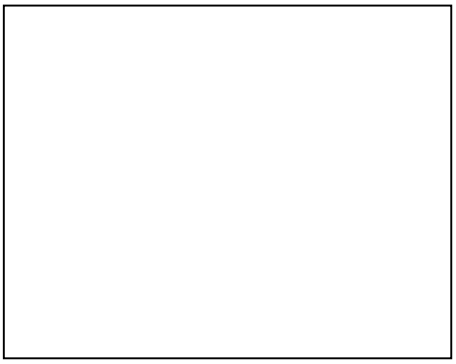
Slogan

1. _____ Department
   "Let's reform our equipment and minds to create salable and profitable products."
2. _____ Department
   "Let's create a comfortable, stable and cheerful workplace with zero accidents, zero defects and zero failures."
3. _____ Department
   "Let's all work together to increase equipment reliability and create a plant strong on quality (people, products and earnings)."
4. _____ Department
   "Let's reduce problem losses through the Sangen principle, and improve quality and equipment reliability."
5. _____ Department
   "Let's improve productivity through value information that supports the workplace."
6. _____ Department
   "Let's all use our inventiveness to prevent the deterioration of equipment."
7. Cooperative company
   "Let's all get on the TPM train and improve reliability."

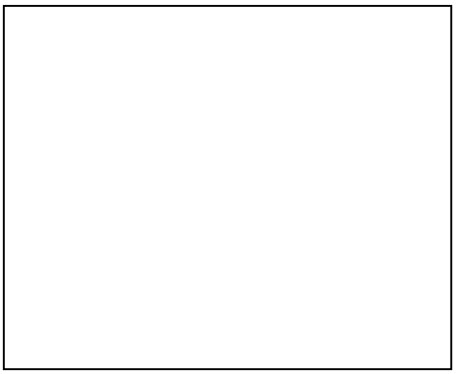


The Department Representative reads each slogan aloud to all personnel.

Photographs Published In- Company Newsletter



7・1. Kobetsu Kaizen (Individual Improvement)



7・1 Individual Improvement

1 Ten Step Implementation of Individual Improvement

Step 1: Select Model Equipment, Line and Process	(1)(2)	1	Overall Equipment Efficiency and Effective Process Duration Calculations Sheet
		2	Man-Machine Chart
Step 2: Organize Project Teams	(3)	3	Example of Organizing a Project Team
Step 3: Understand Present Losses	(4)(5)(6)	4	Definition of 16 Major Losses
		5	Loss Analysis Checklist
		6	Example of Loss Analysis of ____ Process
Step 4: Set Improvement Themes and Targets	(7)(8)	7	Example of Setting Targets (List of Themes for Individual Improvement)
		8	Example of Setting Level Evaluation (Evaluating the Level of Overall Equipment Efficiency)
Step 5: Draft Improvement Plan	(9)(10)	9	Creating a Master Plan (For Individual Improvement)
		10	Example of Individual Improvement Planning Chart
Step 6: Perform Analysis and Draft and Evaluate Countermeasures	(11)(12) (13)(14) (15)(16) (17)(18) (19)(20)	11	Example of Form for "Why-Why" Analysis
		12	5W Image Analysis Sheet (1) Understanding the Overall Status (2) 5W Image Analysis
		13	Step-by-Step Implementation of PM Analysis
		14	Examples of PM Analysis
		15	Steps for Reducing Setup and Adjustment Losses
		16	Steps for Reducing Cutting Blade Replacement Losses
		17	Steps for Reducing Startup Losses
		18	Steps for Reducing Minor Stoppage Losses
		19	Steps for Reducing Speed Losses
		20	Steps for Reducing Defect Losses
Step 7: Implement Improvement	(21)	21	Improvement Sheets (TPM Improvement Sheet, MP Information Sheet)
Step 8: Confirm Results	(22)	22	Results Graph Example
Step 9: Take Measures to Prevent Recurrence	(23)(24) (25)(26) (27)	23	QC Process Chart
		24	Standards Documents (1) Work Standards Sheet (2) PM Standards
		25	Individual Improvement Results Table
		26	Theme Resolution Summary Format
		27	Highly Successful Improvement
Step 10: Horizontal Replication	(28)	28	Horizontal Replication Map (Individual Improvement)

Overall Equipment Efficiency (OEE) and Effective Process Duration Calculations Sheet (1)

If,

A: Actual working time of one shift =

B: Scheduled down time of one shift =

C: Loading time of one shift = *A* - *B* =

D: Stoppage loss time of one shift =

E: Operating time of one shift = *C* - *D* =

G: Number of units processed in one shift =

H: Quality products rate =

I: Standard cycle time =

J: Actual cycle time =

then,

F: Actual processing time = J x G =

T = Availability = $\frac{E}{C}$ x 100 =

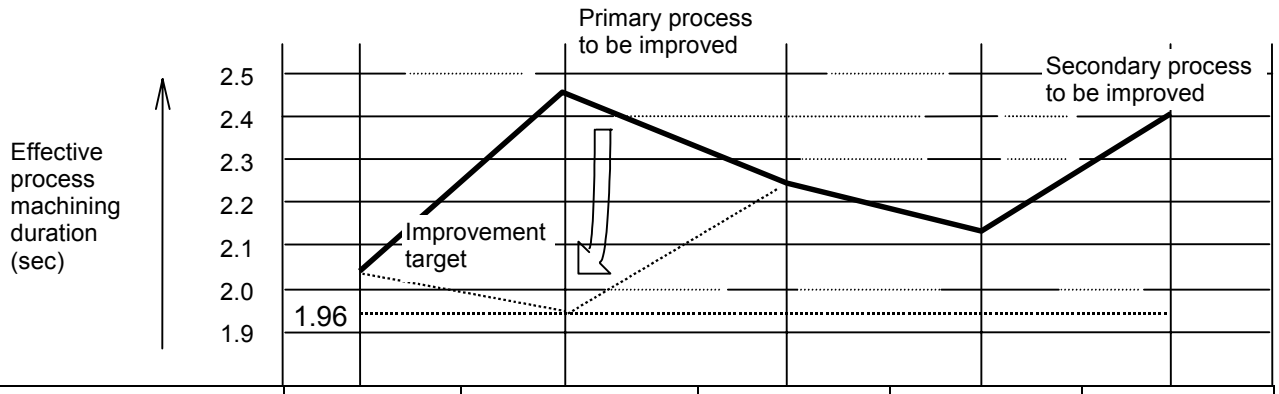
M = Speed operating rate = $\frac{I}{J}$ x 100 =

N = Net operating rate = $\frac{F}{E}$ x 100 =

L = Performance rate = *M* x *N* x 100 =

Overall equipment efficiency = *T* x *L* x *H* x 100 =

Overall Equipment Efficiency and Effective Process Duration Calculations Sheet (2)



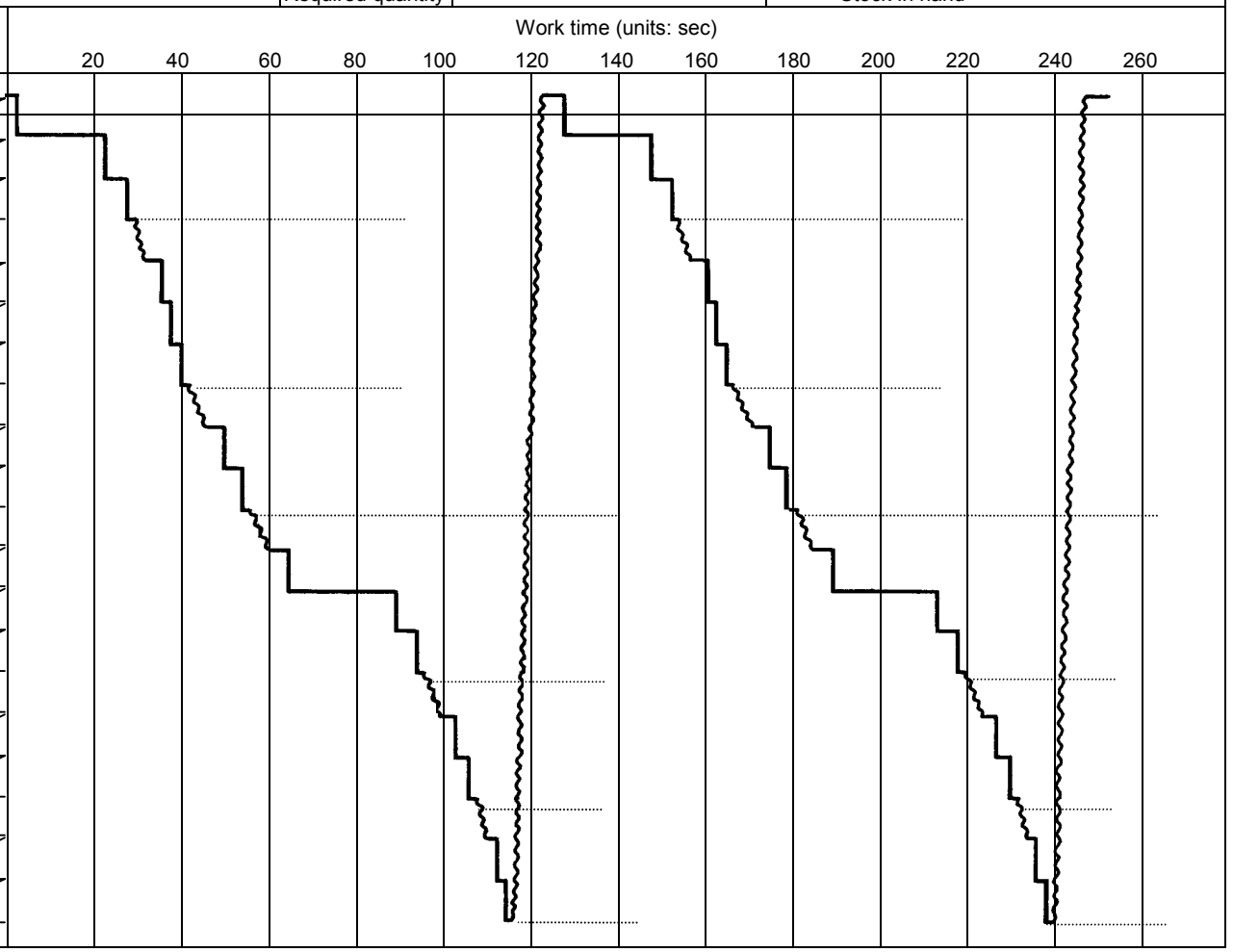
Bottleneck ranking		5		1		3		4		2
Effective process machining duration (sec)		2.03		2.46		2.25		2.11		2.28
Overall equipment efficiency (%)		73.9		67.7		74.0		75.8		65.9
Quality product rate (%)		99.5		99.8		98.8		99.0		99.6
Performance rate (%)	Speed operating rate (%)	80.3	88.2	76.0	90.4 (100)	79.9	83.3	80.3	85.7	71.3	73.8
	Net operating rate (%)		91.0	(Over 95)	84.1 (Over 95)		95.9		93.7		96.7
Availability (%)		92.5		89.2		93.7		95.3		92.6
Process standard cycle time (sec)		1.5		1.67		1.67		1.6		1.5
Actual cycle time (sec)		6.8		16.6		6.0		5.6		6.1
Standard cycle time (sec)		6.0		15.0		5.0		4.8		4.5
Quantity of equipment (units)		4		9		3		3		3
Process name		A		B		C		D		E

Effective process machining duration (sec) = Process standard cycle time $\div \frac{\text{overall equipment efficiency}}{100}$

Figures in ( ) are improvement targets.

Section/Subsection	**Man-Machine Chart**	Date prepared	Cycle time	Manual work Automatic feed Walking Stock in hand
Line		Daily production Required quantity		

Work sequence	Process name	Work name	Time		Walking
			Manual	Feed	
1	A	Remove work	5		
		Measure	20		
		Attach work	5		
		Switch ON	2	60	2
2	B	Inspect	4		
		Remove work	2		
		Attach work	2		
		Switch ON	2	45	4
3	C	Remove work	4		
		Attach work	4		
		Switch ON	2	85	3
4	D	Remove work	5		
		Measure	24		
		Attach work	5		
		Switch ON	2	40	3
5	E	Remove work	3		
		Attach work	3		
		Switch ON	2	20	2
6	F	Remove work	2		
		Attach work	2		
		Switch ON	2	30	8



Man-Machine Chart

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Example of Organizing a Project Team

- A project team is led by a manager of the area under his jurisdiction (Department Manager for a department model, and Section Manager for a section model). Staff from Engineering, Production Engineering, Design and Production are added to the team and responsibility for work is allocated by loss. Further, a project team should register with the TPM Promotion Office and announce itself officially. The following shows an example of organizing a project team.

Section Model

Classification	Assigned Area	Title	Remarks
Leader	Manufacturing Department No. __, Manufacturing Section No. __	Section Manager __	Section Manager of the model line
Members	Manufacturing Department No. __, Manufacturing Section No. __	Subsection Manager __	Manufacturing Department staff
	Manufacturing Department No. __, Manufacturing Section No. __	Supervisor __ (Assistant to Section Manager)	
	Manufacturing Department No. __	Supervisor __ (Assistant to Department Manager)	
	Manufacturing Department No. __	Department Member __ (Assistant to Department Manager)	
	Production Engineering Department	Chief Engineer _____	Engineering Department Staff
	Production Engineering Department	Department Member _____	
	Machine Tools Department, person in charge of equipment design	Supervisor _____	
	Machine Tools Department, person in charge of equipment design	Department Member _____	
	Quality Assurance Department	Chief _____	

Definition of 16 Major Losses

(1) Seven major losses that impede overall equipment efficiency

(1)	Failure losses	Losses due to failures. Types of failures include sporadic function-stopping failures, and function-reduction failures in which the function of the equipment drops below normal levels.
(2)	Setup and adjustment losses	Stoppage losses that accompany setup changeovers.
(3)	Cutting blade change losses	Stoppage losses caused by changing the cutting blade due to breakage, or caused by changing the cutting blade when the service life of the grinding stone, cutter or bite has been reached.
(4)	Start-up losses	When starting production, the losses that arise until equipment start-up, running-in and production processing conditions stabilize.
(5)	Minor stoppage and idling losses	Losses that occur when the equipment temporarily stops or idles due to sensor actuation or jamming of the work. The equipment will operate normally through simple measures (removal of the work and resetting).
(6)	Speed losses	Losses due to actual operating speed falling below the designed speed of the equipment.
(7)	Defect and rework losses	Losses due to defects and reworking.

(2) Losses that impede equipment loading time

(8)	Shutdown (SD) losses	Losses that arise from planned equipment stoppages at the production planning level in order to perform periodic inspection and statutory inspection.

(3) Five major losses that impede worker efficiency

(9)	Management losses	Waiting losses that are caused by management, such as waiting for materials, waiting for a dolly, waiting for tools, waiting for instructions, waiting for repair of breakdowns, etc.
(10)	Motion losses	Man-hour losses arising from differences in skills involved in setup and adjustment work, cutting blade change work, etc.
(11)	Line organization losses	Idle time losses when waiting for multiple processes or multiple platforms.
(12)	Distribution losses	Distribution man-hour losses due to transport of materials, products (processed products) and dollies.
(13)	Measurement and adjustment losses	Work losses from frequent measurement and adjustment in order to prevent the occurrence and outflow of quality defects.

(4) Three major losses that impede efficient use of production subsidiary resources

(14)	Energy losses	Losses due to ineffective utilization of input energy (electric, gas, fuel oil, etc.) in processing.
(15)	Die, jig and tool losses	Financial losses (expenses incurred in production, regrinding, renitriding, etc.) which occur with production or repairs of dies, jigs and tools due to aging beyond service life or breakage.
(16)	Yield losses	Material losses due to differences in the weight of the input materials and the weight of the quality products.

Loss Analysis Checklist

Process	_____ Section, _____ Subsection, _____ Line, _____ Process	Equipment No.	○○-○○○
Date checked	__/__/__ Shift __	Operator	○○○○

Item		Description						
Planned stoppage (time: minutes)	Morning meeting	5						
	Planned maintenance							
	Total	5						
Machine stoppage (time: minutes)	Stoppage No.	1	2	3	4	5	6	Total
	Failures	20						20
	Setup and adjustment	15						15
	Cutting blade change	5	5					10
	Start-up							
	Other	Waiting for material 5						5
	Total							50
Minor stoppage (number of stops)	Materials Supply Department	𝍸 // 12						
	Processing Department	/ 1						
	Materials Collection Department	𝍸 // 7						
	Total	20						
Processing speed (seconds/cycle)	10:00 AM measurement	0.68						
	15:00 PM measurement	0.71						
Quality check (number of checks)	Exclude check at setup	/// 3						
Remarks	• Record the time required for each item • When recording only the number of times, record as follows: 𝍸							

Example of Loss Analysis of Process | **7 • 1** | **1 - 6**

Example of Loss Analysis of ____ Process

		(A)	(B)			(C)	(D)					(E)	(F)	(T)	(G)	(H)	(I)	(J)	(L)	(M)	(N)	(X)	(Y)	(Z)
BM		Working time (min)	Planned stoppage			Loading time (min)	Stoppage loss time					Operating time (min)	Actual processing time (min)	Availability (%)	Quantity processed (units)	Quality product rate (%)	Standard cycle time min/unit	Measured cycle time min/unit	Performance rate (%)	Speed differential (%)	Net operating rate [continuity] (%)	Number of minor stoppages (incidents)	Effective process duration (min)	Overall equipment efficiency
			(a) Morning meeting (min)	(b) Planned maintenance (min)	Total (min)	*A - B*	Failure (min)	Setup and adjustment (min)	Cutting blade change (min)	Other (min)	Total (min)	*C - D*	*J x G*	$\frac{E}{C}$ x 100					*M x N*	$\frac{I}{J}$	$\frac{F}{E}$		$\frac{I}{Z}$ (min)	*T x L x H*
Process	○○	900	10	30	40	860	20	30	15	5	70	790	700	91.9	1000	97	0.5	0.7	63.2	71.4	88.6	40	0.89	56.3
Total																								
Target																								
Process																								
Total																								
Target																								

Remarks

Example of Setting Targets (List of Themes for Kobetsu Kaizen)

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Example of Setting Targets (List of Themes for Kobetsu Kaizen)

Status column: Starting (yellow), Completed (blue), Target reached (red)

Leader name	(Equipment-name)	Major theme				Medium theme					Minor theme								Level of achievement	Future schedule
		Case name	BM	Actual Results (6/91)	Target	Item	BM	Actual Results	Target	Effectiveness	Loss item	BM	Actual Results	Target	Progress				Actual results/Target (%)	
							(%)	(%)	(%)	Actual Perform-ance/BM					Person-in-charge	Schedule		Status		
																Start	Completion			
	N-LINE (P-1016, P-1014) model	Improvement in overall equipment efficiency (%)	22.0	30.4	76.0	Availability	60.1	66.7	79.7	1.11	Setup losses (min * incidents)	30*48	38*46	10*60	○	91/9	91/11	Completed	○	
											Tool and adjustment losses (min)	0	70	0	○	91/8	91/11			
											Machine failure losses (min * incidents)	1560	58*10	50*2	○		91/11	Starting	○	
											Transportation time losses (min)	100	55	100	○	91/8	91/11			
											Other losses (min)	0	158	0	○	91/8	91/11			
						Performance rate					Minor stoppage losses (min)	2952	2886	147	○		91/11	Starting	○	
		Overall CT (sec)	9.09	6.56	2.63		36.7	45.7	95.3	1.24	Cycle time reduction (sec)	2.00	2.00	2.00						
						Quality product rate	100.0	99.8	100.0	1.00	Defect and reworking losses (sheets)	20	155	0	○	91/9	91/11			
		Improvement in productivity (sheets/man-hours) (persons) (sheets/month)	396.0 0.8 51241	548.7 0.8 72795	1368.0 0.4 90000	Labor saved (persons/ shift)	2.0	2.0	1.5	1.00	Renovation of work supply equipment				○	88/4	92/3	Starting	○	
	N500T (P-1014)	Im-provement in overall equipment efficiency (%)	29.1	36.2	60.0	Availability	80.9	91.2	91.4	1.13	Setup losses (min * incidents)	21*20	26*20	10*40	○		91/3	Completed	○	
											Tool and adjustment losses (min)	0	0	0	○					
											Machine failure losses (min * incidents)	480	94*3	0	○					
											Transportation time losses (min)	55	46	0	○					
											Other losses (min)	0	95	0	○					
						Performance rate					Minor stoppage losses (min)	2590	1805	1450	○					
							36.0	39.8	65.7	1.11	Cycle time reduction (sec)	4.50	4.50	4.50						
		Overall CT (sec)	15.46	12.41	7.50	Quality product rate	100.0	99.9	100.0	1.00	Defect and reworking losses (sheets)	6	44	0	○					
		Improvement in productivity (sheets/man-hours) (persons) (sheets/month)	232.9 0.5 19403	290.1 1.1 51131	480.0 0.5 37000	Labor saved (persons/ shift)	1.0	1.0	1.0	1.00										

<Section personnel>				
Section Manager		1	1	1
Subsection Manager		1	1	1
Press Supervisor		20	25	15
Quenching Supervisor		5	5	2
Service Room Supervisor		0	0	3
Setup Supervisor		0	0	0
Section total		27	32	22
<Productivity>				
Production quantity	(sheets/month)	213618	261144	280000
Loading time	(hours/month)	4072.1	4328.5	2975.2
Personnel productivity	(sheets/man-hours)	52.5	60.3	94.1
Ratio		1.0	1.2	1.8

Example of Setting Level Evaluation
(Evaluating the Level of Overall Equipment Efficiency)

Area of loss \ Level		Level 1	Level 2	Level 3	Level 4
1.	Failure losses	(1) Mixture of sporadic and chronic failures (2) BM > PM (3) Large failure losses (4) Autonomous maintenance system not yet set up (5) Wide variation in part service life (6) Weak points of equipment are unknown	(1) Random failures (2) PM BM (3) Large failure losses (4) An autonomous maintenance system is being set up (5) Estimate service life of parts (6) Weak points of equipment stand out in bold relief (7) CM is implemented for the above	(1) Establish a TBM system (2) PM > BM (3) Failure losses under 1% (4) Activities of the autonomous maintenance system in high gear (5) Extension of service life of parts	(1) Establishment of a CBM system (2) PM (3) Failure losses 0.1% or under (4) Autonomous maintenance system is supported and improved (5) Prediction of service life of parts (6) Promotion of design that incorporates reliability and maintainability
2.	Setup losses	(1) No control over setup, which is left to the worker (2) Setup is disorganized, with large variations in setup time	(1) Creation of work procedures (separation of external setup and internal setup, and relevant procedures) (2) Variation in setup time (3) Clarification of next issue	(1) Investigation of changing items from internal setup over to external setup (2) The adjustment mechanism and handling thereof are well understood	(1) Optimal conditions are maintained, and singled out. (2) One-shot quality products through elimination of adjustment
3.	Speed losses	(1) Equipment specifications are unclear. (2) Speed is not set by product type or by machine.	(1) Problems related to speed losses are analyzed intensively. • Mechanical problems • Quality problems (2) Speed is set and maintained by product type (temporary standard). (3) Small variation in speed	(1) Improve and test the items at left. (2) Speed is set by product type, and problem points are clarified along with the causal relationship with respect to the accuracy of equipment, jigs and tools. • Relationship between quality characteristics and accuracy of each part (3) Small speed losses	(1) Equipment operates according to specifications, and operates even faster than specifications due to equipment improvements. (2) Speed is set and maintained by product type (final standard). (3) Zero speed losses.
4.	Minor stoppage losses	(1) Size of minor stoppage losses remains unnoticed (left to the operators). (2) Disorganized state due to variation in affected parts and frequency.	(1) Quantification of minor stoppages in progress • Frequency of and locations where losses occur • Size of losses (2) Classification of the phenomena, clarification of the affected mechanisms and implementation of trial and error countermeasures in progress	(1) Minor stoppages are analyzed intensively and countermeasures are taken to restore favorable conditions.	(1) Zero minor stoppages (unmanned operation is possible)
5.	Defect losses	(1) Chronic defects are neglected (2) Various countermeasures are taken, but the situation does not improve.	(1) Quantification of chronic defects in progress • Nature and frequency of defects • Size of losses (2) Classification of the phenomena, clarification of the affected mechanisms and implementation of countermeasures in progress	(1) Chronic defects are analyzed intensively and countermeasures are taken to restore favorable conditions. (2) Investigation of in-process detection when defects occur.	(1) Defect losses are 0.1% or under.

Master Plan (For Kobetsu Kaizen)

Item to be implemented \ Month and year	Preparation period (19__)		First year (19__)		Second year (19__)		Third year (19__)		Fourth year (19__)	
	4 - 9	10 - 3	4 - 9	10 - 3	4- 9	10 - 3	4 - 9	10 - 3	4 - 9	10 - 3
1. Section model line										
(1) Organize team		Organize			Reevaluate					
(2) Set theme		Set			Set					
(3) Improvement activity			First model line			Second model			Maturing of the model	
2. Project theme										
(1) Organize team		Organize								
(2) Set theme		Set								
(3) Improvement activity (1 theme/6 months)			Theme 1	Theme 2	Theme 3	Theme 4	Theme 5	Theme 6	Theme 7	Theme 8
3. Horizontal replication of results										
(1) Creation of a mechanism		Mechanism								
(2) Horizontal replication activity				Model comes first → Horizontal replication						

Master Plan (For Kobetsu Kaizen)

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Example of Kobetsu Kaizen Planning Chart

Line, process, equipment and work name			Major theme				Medium theme				Minor theme				Promotion plan			Progress	Achievement rate (%)
Area	Name	Qty.	Case name	BM	Target	Status	Case name	BM	Target	Status	Case name (loss name)	BM	Target	Status	Person-in-charge	Started	Com-pleted		
	__ Manu-facturing Line	1	Im-provement of overall equipment efficiency				Improve availability				Failure losses	Cases/month hours/month							
											Setup and adjustment losses	Incidents/day minutes/ incident							
											Cutting blade change losses	Incidents/day minutes /incident							
											Startup losses	Incidents/day minutes /incident							
											Other losses	Incidents/day minutes/ incident							
							Improve performanc e rate				Minor stoppage and idling losses	Incidents/day minutes/ incident							
											Speed losses	Tact time (min)							
							Improve quality product rate				Process defects and reworking	Units/month (%)							
			Reduce unit re-quirements				Improve raw material yield				Cutting losses								
							Reduce cutting blade unit re-quirement				Cutting blade expense losses								
							Energy saving				Waste heat losses								
			Improve personnel pro-ductivity	Units/ person	”	”	Overall performanc e rate	%	”	”	Operation monitoring losses	Hours/shift	”	”					
				(persons)	”	”					Distribution losses	Hours/shift	”	”					
				(units/ month)	”	”					Introduction of automation losses	Hours/shift							

↑
Work involved with model equipment and model products is treated as one item.

Example of Kobetsu Kaizen Planning Chart

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Example of Form for "Why-Why" Analysis

Start

Line	*****	Date and Time of Incident	__/__/__ (_____day)	Stop Time	
Equipment Name		Recovery Date and Time	__/__/__ (_____day)	Failure Area	Random Reoccurrence

Phenomena (Sketch)	Inspection Item	Results	Pass/Fail	Measures
Incident status (picture) Sketch the phenomenon just as it is. As much as possible, avoid making conjectures or using your imagination in the drawing.	Investigate the problems/malfunctions at locations where failures occur List all investigation items.	Make a drawing of the results. A photograph can also be used. Further, store broken parts. Study the investigation results by records, the actual work site and actual equipment.	X OK X X X	Quickly restore the machine. Make a drawing of what was done to restore the machine, and include a description of any stopgap measures taken. Study the functions and structure of the locations where failures occurred. Person who implemented measures

Finding the cause		Why 1 (cause of results of examination)	Why 2 (cause of Why 1)	Why 3 (cause of Why 2)	Why 4 (cause of Why 3)	Why 5 (cause of Why 4)
	Equipment, part name	Draw the "why" about the failed examination results	If there are 2 causes, draw both			
	Person					

Prevention of Recurrence	(Scheduled/Completed/)			Item	Area	Description	Person-in-charge	Scheduled	Completed
	Take countermeasures for equipment and personnel	Discovery Method	Consider a discovery method which allows abnormality/normality to be seen at a glance	One-point lesson	Necessary/ unnecessary				
				Reflect in standards	Necessary/ unnecessary				
				Horizontal replication of measures	Necessary/ unnecessary				

Section Manager's Comments	Subsection Manager's Comments	Work Manager's Comments	Tag
Goal		Boss' Comments	Present Not present

Example of Form for "Why-Why" Analysis

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5W Image Analysis Sheet (Understanding of Overall Status)

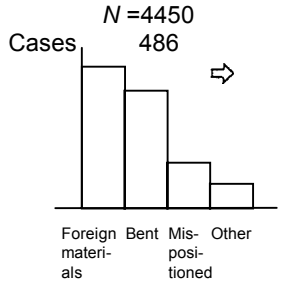
Date __ / __ / __	Approved by	Checked by	Prepared by	Circle members

Process Name, Equipment Name	Receiver robot	Problem	Bent material

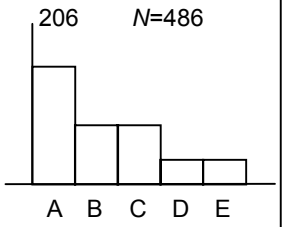
(1. Problem status)

(1) From macro to micro, by layer

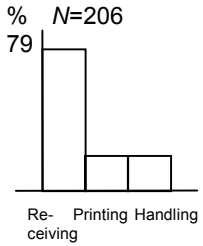
(1) By defect item



(2) By bent defective material



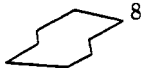
(3) By cause of bent defective material "A"



(4) Classification of bend type

- Acute angle bend

- Obtuse angle bend



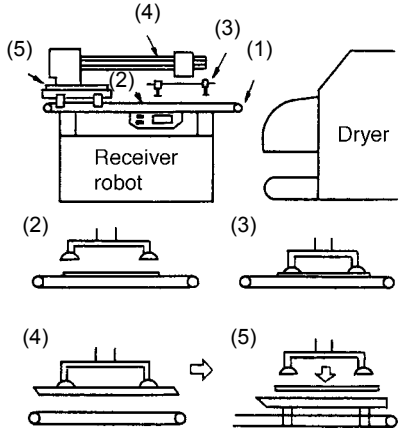
(2) Features, prerequisites, etc.

- Bend defects occur frequently with material "A"
- Problem occurs frequently in the area of the receiver equipment

(2. Mechanism diagram)

Entire machine

Problem location

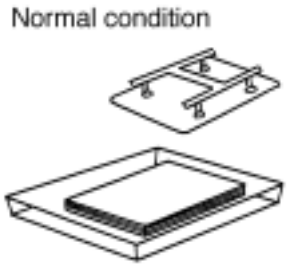


(3. Principle of processing and operation)

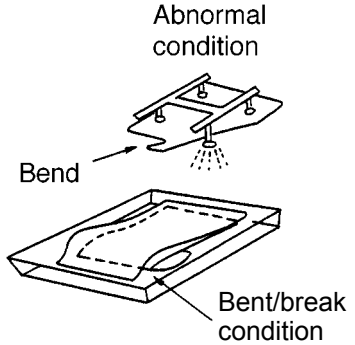
(1) After coming out of the dryer, material is scooped up by the guide plate.
(2) Material placed on the conveyer is stopped at a fixed position by a sensor.
(3) An arm is lowered and the material is sucked up by vacuum.
(4) The arm is raised with the material held by vacuum, and the arm moves sideways.
(5) The material is released over a case and the material drops into the case.

(4. General Rule/"The way it should be")

(1) There should be no dirt on or misalignment of the sensor.
(2) Air pressure should be steady.
(3) The pad should be horizontal/vertical.
(4) There should be no play in the cylinder.
(5) There should be no variation in the conveyor speed.



(5. Problem phenomenon)



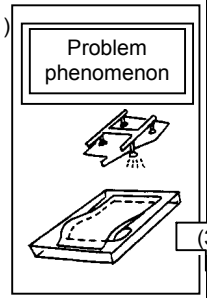
Related Units	• Dryer

5W Image Analysis

Approved by	Checked by	Prepared by

Circle Name	Process Name	Equipment Name	Theme	BM Target	Start - Finish		Self Evaluation
		Receiver robot	Reduction of material bending and defects due to the receiver machine	__/__ - __/__	9/9	10/15	

(1) Problem phenomenon

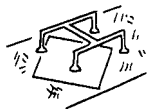
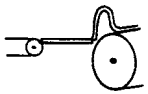
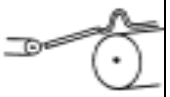
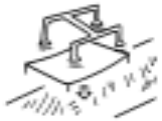
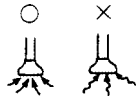
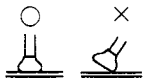


(2) Method of analysis

(1) If general rule is not clear, clarify while analyzing W1-W5.

(2) If general rule is clear, verify the rule with W1 and then proceed through W5.

(3) Legend
○ = Stop
× = Proceed
△ = Both directions

Unit Level		Sub-unit Level		Level of part, material, method, etc.					
Possible factors, verification		Possible factors, verification		Possible factors, verification		Possible factors, verification		Possible factors, verification	
W-1	Check	W-2	Check	W-3	Check	W-4	Check	W-5	Check
Material cannot be grabbed 	×	Sensor timing is off 	○	Material bent from the start 	○				
		Material is turned 	×	Material stuck in a conveyor joint 	×	Thickness of plate with a height differential 	×	Differences in thickness of material	(1) ×
Material cannot be grabbed continuously 	×	Weak suction power 	×	Air leakage 	×	Pad does not adhere to material 	×	Pad is misshapen	(2) ×
		Incomplete suction 	×	Arm mispositioned 	×	Screws loosen due to vibration 	×	Small contact surface area	(3) ×

(4) List of problem points and attachments

(5) Temporary countermeasures

(6) Permanent countermeasures

(1) Attach an air blower

(2) Change the pad shape and the material

(3) Change the shape of the mounting

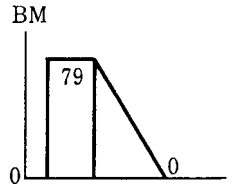
(7) Measures to prevent further recurrence; Standardization

(1) Add an inspection item for the air blower flow

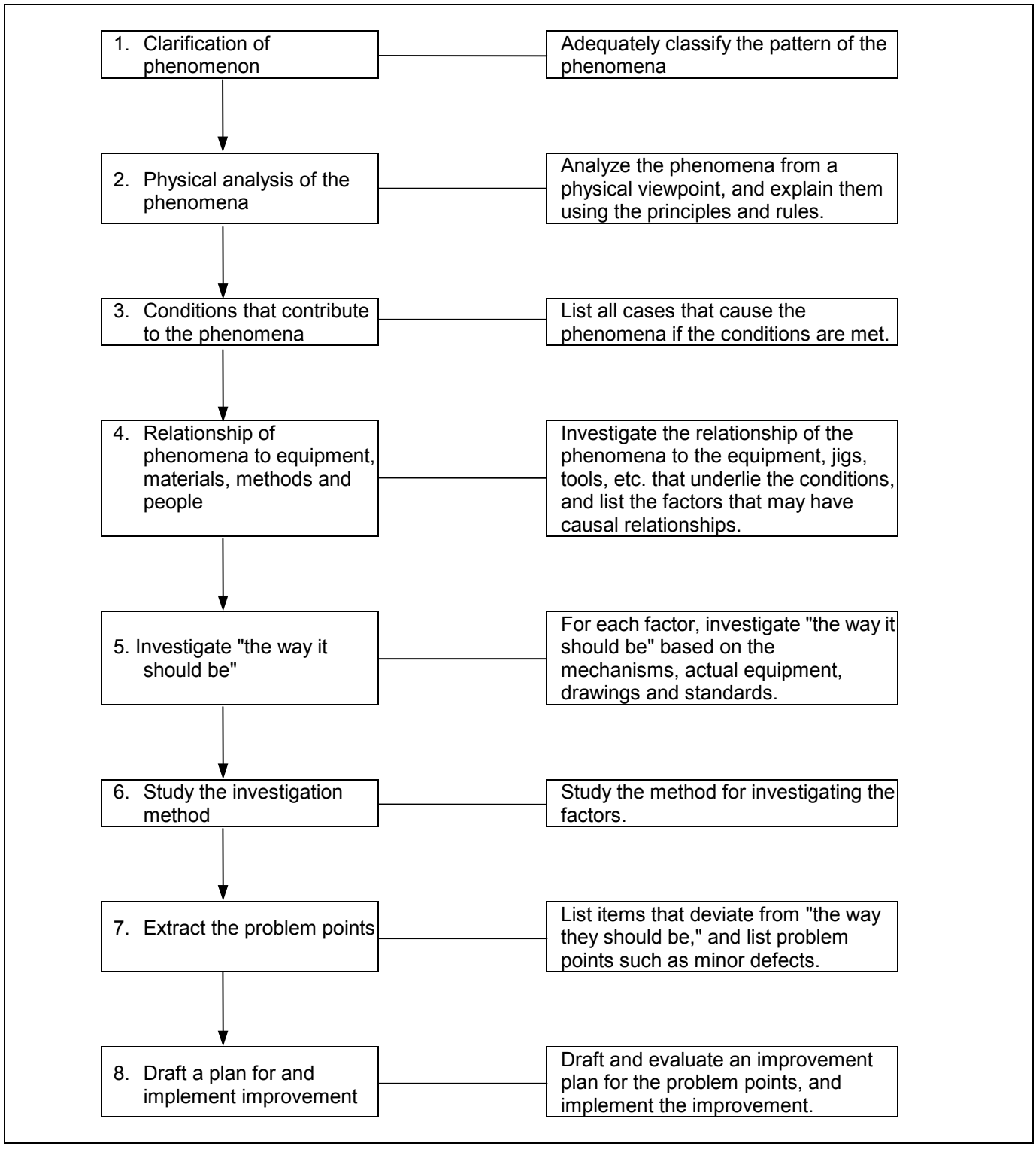
(2) Establish an inspection standard

(3) Establish an inspection standard

(8) Results



Step-by-Step Implementation of PM Analysis



Examples of PM Analysis

Case 1. Countermeasures for minor stoppage of automatic assembler			
Phenomena	Physical Viewpoint	Contributing Conditions	Relationship to Equipment and Materials
1. Stoppage due to actuation of detector Defective suction of vacuum nozzle	Decrease in suction power	1. Deformation of workpiece itself 2. Faulty operation of vacuum system 3. Air suctioned from the contact surface 4. Center misaligned	1-1 Deformation of work 1-2 Work dimensions too large or small 2-1 Low vacuum level 2-2 Variation in vacuum level 2-3 Timing error 3-1 Suction nozzle worn down 3-2 Workpiece feed jig worn down 3-3 Workpiece misaligned for feed jig 3-4 Faulty contact 4-1 Center of suction nozzle and feed jig misaligned 4-2 Play in suction nozzle 4-3 Mispositioning due to vibration (resonance)

Case 2: Countermeasures for overturned batteries				
Plant	Phenomena	Physical Viewpoint	Contributing Conditions	Relationship to Equipment, Materials, Jigs and Tools
2. Dry cell plant	Battery overturns on rotary table	Battery loses balance when center of gravity changes due to external conditions (shock, abrasion, vibration and other conditions)	1. Conditions that cause abrasion • Contact surface between rotary table and workpiece • Caused by the workpiece itself (deformation of bottom surface, extraneous material stuck to bottom surface) 2. Conditions that cause vibration • Caused by the rotary table itself (undulation, motion) • Rotary table making contact with peripheral guide 3. Conditions that cause shock • Height differential between conveyer and rotating table • Rotary table and	Omitted 2-1 Table surface condition 2-2 Table flatness 2-3 Table motion 2-4 Variation in table rotation 2-5 Shape, position and angle of guide 2-6 Surface condition of guide 2-7 Condition of contact between table and guide

Steps for Reducing Setup and Adjustment Losses

Step 1	Analysis of setup changeover work	(1) Work method and procedure (2) Time (3) Adjustment method and contents (4) Effectiveness of each work (5) ABC analysis
Step 2	Setting of benchmark and target	
Step 3	Investigation of preparatory items	(1) Type and quantity of necessary parts (2) What are the necessary jigs and tools? (3) What is the repair status of jigs and dies? (4) What about needed work platforms? (5) Storage location for removed jigs and dies (6) Elimination of "searching" (7) Thorough implementation of 5S (order, arrangement, cleaning, standardizing and discipline)
Step 4	Division of internal setup and external setup	(1) Work name of external setup and the relevant procedure (2) Investigation of effectiveness of work (3) Investigation of effectiveness of work method (4) Reevaluation of work procedure (5) Reevaluation of division of work
Step 5	Switching from internal setup to external setup	(1) Creation of presets (2) Sharing jigs and creation of one-touch setups (3) Elimination of adjustment (transfer to external setup) (4) Adoption of intermediate jigs
Step 6	Reduction of internal setup time	(1) Investigate methods to make setup items permanently affixed (2) Implementation of parallel work (3) Reevaluation of optimal number of personnel, and investigation of division of work
Step 7	Elimination of adjustments	(1) Clarification of purpose of adjustment (2) Investigation of cause of adjustment (3) Analysis of effectiveness of adjustment (4) Implementation of one-shot setup with acceptable quality
Step 8	Dealing with unavoidable adjustment	(1) Quantification (2) Proceduralization (3) Improvement of skills
Step 9	Standardization of setup changeover work	
Step 10	Operator education and training	

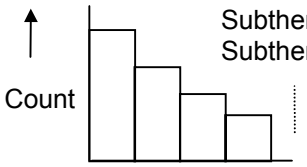
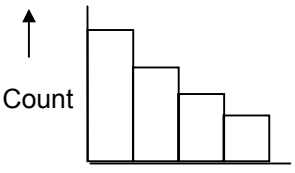
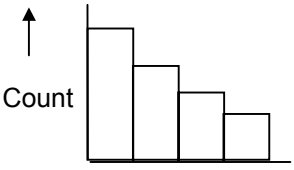
Steps for Reducing Cutting Blade Change Losses

Step 1	Investigation of actual conditions	(1) Current replacement standard, and variation of that standard (2) Investigation of friction of cutting blade (relationship between number of cuts and amount of friction) (3) Chipping and breakage of the cutting blade, and frequency thereof (4) Method of attaching the cutting blade, and positional accuracy of the holder (5) Relationship between the amount of cutting blade friction and surface roughness (6) Cost of cutting blade
Step 2	Setting of benchmark and target	
Step 3	Reduction of deviation in service life (1) Investigation of current cutting conditions	(1) Cutting speed and depth-of-cut feed speed (2) Comparison of cutting standard and current conditions (3) Cutting blade shape, material and chips (4) Shape of chip breaker
Step 4	Reduction of deviation in service life (2) Investigation of positional accuracy of equipment and jig	(1) Affixing method (fastening torque, and mating of surfaces) (2) Investigation of dynamic and static accuracy (3) Dynamic rigidity of arbor holder
Step 5	Extension of service life Approach from the perspective of characteristic technology	(1) Material and shape of cutting blade (2) Disposal of coolant, and investigation of that method (3) Investigation of chip breaker (4) Changing of process sequence (5) Reevaluation (experiment) of cutting sequence
Step 6	Prediction of service life (1) (Approach from perspective of vibration analysis) Raise average value of cutting blade service life	(1) Raw waveform (2) Frequency analysis (3) Investigation of vibration of peripheral devices (4) Calculation of rotational frequency, and its peak value (5) Other rotating parts (frequencies of motor and transmission, and their peak values) (6) Check change in vibration value due to change in cutting conditions (7) Measure fixed frequency (8) Investigate rotational frequency and fixed frequency for the current cutting condition, and resonance with other rotating parts (9) Investigate the cutting condition that minimizes vibration
Step 7	Prediction of service life (2) (Approach from the perspective of electrical current technology) Prediction of cutting blade service life	(1) Rating and load factor of motor (2) Relationship between the number of cuts and an increase in the electrical current (3) Relationship between the number of cuts and the amount of effective electrical power
Step 8	Understanding of effectiveness	(1) Understanding of service life through experimentation (2) Presence of chipping (3) Relationship between number of cuts and amount of friction (4) Relationship between number of cuts, amount of friction, and surface roughness (5) Correlation between vibration value and quality characteristics (6) Evaluation of cutting blade cost
Step 9	Standardization	
Step 10	Operator education and training	

Steps for Reducing Start-up Losses

Step 1	Implementation of investigation of actual conditions (Time series data of start-up)	(1) Deviation in workpiece dimensions (unadjusted pieces starting from morning start-up) (2) Time until the cycle time stabilizes (3) Idling time (4) Count of dimensional adjustments and corrections (5) Breakage of tools (6) Cp value (7) Reworking of defects
Step 2	Setting of benchmark and target	
Step 3	Investigation of hydraulic oil and lubricating oil	(1) Type of oil (viscosity) (2) Feed pressure and temperature of lubricating oil (3) Degree of contamination (4) Relationship between oil temperature and cycle time
Step 4	Investigation of related equipment areas	(1) Components and their materials (2) Lubrication system (sliding surfaces) (3) Investigation of parts accuracy
Step 5	Investigation of areas that experience thermal displacement	(1) Affected areas (2) Set dial gauge at end of work day Check change in dimensions when starting up in the morning
Step 6	Measurement of amount of thermal displacement	(1) Investigate measurement methods (type of attached sensor and measurement position) (2) Change in oil temperature of hydraulic oil and lubricating oil (3) Creation of a thermal displacement curve (change in amount of displacement of main shaft, table and spindle oil with respect to time)
Step 7	Tentative countermeasures	(1) Standardization of idling time corresponding to stabilization of thermal displacement (2) Programmed automation of compensation
Step 8	Basic countermeasures	(1) Measures for restoration [to normal] (2) Repetition of trial-and-error based experiments • Management of lubrication pressure and temperature • Type of hydraulic fluid (3) Improvement of methods to minimize thermal displacement • Investigation of material surface • Cooling of problem areas
Step 9	Standardization	
Step 10	Operator education and training	

Steps for Reducing Minor Stoppage Losses

Step 1	Collection of data on minor stoppages	(1) Utilization of a minor stoppage counter
Step 2	Setting of minor stoppage benchmark (current value) and target value	(1) Net operating rate (continuous) (%) • Minor stoppage MTBF (minutes) • Minor stoppage MTBF (cycles) • Minor stoppage count/shift
Step 3	Perform Pareto analysis, and determine subthemes	 Subtheme target is zero If target is reached, verify consistency with achieving target of theme
Step 4	Creation of control graph	(1) Creation of total control graph (Monthly results statistics) + (Daily control graph) (2) Creation of subtheme graph (Monthly results statistics) + (Daily control graph)
Step 5	Analyze current state of subthemes	Classify through observation of phenomena  (1) Analyze phenomena in its completed state (classify by the condition immediately after the minor stoppage occurs) (2) Analyze phenomena in its in-progress state (Analyze the process leading up to the minor stoppage for each mode of the phenomenon in its completed state)  • Understanding of mechanism and structure of equipment • Understanding of processing conditions * Understanding based on principles and rules of processing points * Implementation of PM analysis for each phenomenon in its in-progress state * Analysis of change in physical quantities for each phenomenon in its in-progress state
Step 6	Analyze factors	
Step 7	Investigate factors	(1) Extract problems
Step 8	Carry out improvement	(1) Carry out improvement for discovered problems
Step 9	Verify effectiveness	
Step 10	Take measures to prevent recurrence	(1) Implementation and education/training for periodic inspections, autonomous maintenance and work standards

Steps for Reducing Speed Losses

Step 1	Investigate balance of capabilities of each process Effective process duration = $\frac{\text{standard CT}}{\text{overall efficiency}}$ (CT: Cycle time)	(1) Compare the time required for one cycle for each process (2) Cycle time taking into consideration impediment factors such as failures, minor stoppages, setup and others (divide cycle time by overall equipment efficiency) (3) Clarify the top three bottlenecks in processes
Step 2	Setting of benchmark and target	
Step 3	Establishment of processing conditions (temporary standard)	
Step 4	Actual measurement of cycle diagram	(1) Measurement of cycle time for each operation (2) Measurement of fast feed and slow feed (3) Consider a method of measurement so that the cycle can be understood with a single-digit number. (4) Make a comparison with the cycle diagram at the design stage
Step 5	List the problem points if speed has increased	(1) List the problem points if the speed has increased from before • Occurrence of minor stoppages • Occurrence of defects • Worsening of Cp value
Step 6	Reduction of cycle time (1) Minimize air cut and idle time	(1) Reduction of air cut time (2) Clearly establish whether there is any idle time between processes (3) Investigate effectiveness of operation (4) Investigate combination tools (5) Draft a method to reduce idle time (e.g., gap eliminator)
Step 7	Reduction of cycle time (2) Reevaluate processing conditions (temporary standards) Investigate speeding up of operation time	(1) Use a video recorder to measure work volume, and investigate the possibility of reducing time requirements (2) Possibility of reducing time requirements through vibration measurement (3) Investigation of Cp value (4) Investigation of chip service life (5) Reinvestigation of cutting process sequence (6) Reinvestigation of cutting conditions (7) Investigation of thermal capacity and comparison with theoretical value (8) Reinvestigation of optimal conditions (9) Investigation of possibility of parallel work
Step 8	List problems points if speed has increased ("mock" failure test)	(1) List problem points if cycle time has decreased or the rotational speed has increased Cp value Defect phenomena Mechanical problem phenomena (part service life shortens) (Occurrence of local vibration or breakage) (2) Repetition of trial-and-error based experiments
Step 9	Check equipment accuracy and increase part service life	(1) Measurement of equipment static accuracy (2) Investigate measures to increase part service life
Step 10	Perform PM analysis on remaining problem points	
Step 11	Draft a plan and implement improvement	
Step 12	Setting of processing conditions (final standards) and operator education and training	

Steps for Reducing Defect Losses

Quantification of phenomena	Step 1	Analysis of quality bottlenecks	(1) Analysis of lines with quality bottlenecks (2) Analysis of processes with quality bottlenecks (3) Analysis of quality bottleneck phenomena (4) Selection of model type (5) Setting of subthemes
	Step 2	Clarification of defect phenomena	(1) Classify defect phenomena (2) Define defect phenomena (simple sketch)
	Step 3	Quantification of defect phenomena	(1) Quantify not only the discarded pieces, but also the reworked pieces (2) Quantify all increases or decreases in degree of defectiveness.
Science of phenomena	Step 4	Analysis of defect phenomena	(1) Pareto analysis (2) Second order analysis, third order analysis and fourth order analysis (by level classification)
	Step 5	Preparation for analysis of phenomena	(1) Outline of equipment for process (simple sketch) (2) Principles of processing in the process (simple sketch)
	Step 6	Analysis of phenomena	(1) Perform check based on QC process sheet (2) Comparative research (quality product vs. defective product, good equipment vs. bad equipment, etc.) (3) Clarify the mechanism (4) Apply the principles and rules of physics and chemistry (5) PM analysis
Discovery and improvement of problem points	Step 7	Pursuit of things "as they should be"	(1) Standard value (allowable value)of equipment, jigs and tools, and material → eliminate gray zone (ambiguity management) (E.g., management of friction limit by means of marked line) (2) Pursuit of better conditions (3) Making variable factors into constant or semi-constant factors
	Step 8	Discovery of minor defects, and improvement plan	(1) Discovery of problem points → Classification and organization of 6 phases 1) Extraction and improvement of minor defects by means of cleaning and inspection 2) Improvement of hydraulic, pneumatic, lubrication and gas systems 3) Improvement of static accuracy of mechanism 4) Improvement of dynamic accuracy of mechanism 5) Improvement of electrical equipment control system 6) Reevaluation of processing conditions (2) Draft an improvement plan
	Step 9	Implement and record improvement	(1) Keep an improvement record (2) Keep replacement parts
	Step 10	Verify and follow up on results	(1) Check progress through daily statistics (daily control graphs) (2) Weekly meeting
Implementation of processes to achieve zero defects, and taking measures to prevent recurrence	Step 11	Implement system to achieve zero bottleneck defect phenomena	
	Step 12	Implement system process to achieve zero defects	
	Step 13	Management of hardware conditions	(1) Maintenance of equipment, jigs and tools and materials "as they should be" (2) Management of conditions through PM standards
	Step 14	Management of soft [i.e. human-related] conditions	(1) Standardization of methods (setup changeover, processing conditions, and measurement methods) (2) Establishment of 5S
	Step 15	Improve efficiency of conditions management	
	Step 16	Operator education and training	

Improvement Sheet (TPM Improvement Sheet and MP Information Sheet)

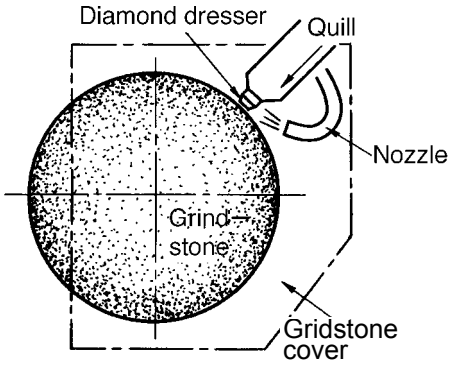
7 • 1	1 - 21

TPM Improvement Sheet and MP Information Sheet

Classification No. ○○○○○-○○	Promotion Office Control No. __

_____ Section _____ Subsection	Equipment Name	Grinder	Theme	Dressing point coolant	Section Control No.
_____ Line _____ Process	Serial No.	○○-○○		Management by means of flow meter	○○-○○○

Problem points before improvement



• The diamond dresser gets scorched, causing abnormal friction

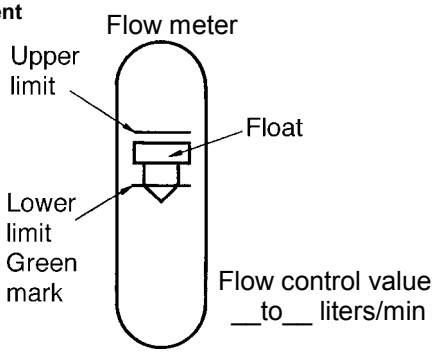
⇩

Shape defect and oversize defect occurs

Cause

• Inadequate flow of coolant --- discharge flow is unknown
• Coolant nozzle is clogged --- difficult to check inside the grindstone cover

After improvement



• Install the flow meter so that the coolant flow can be verified during dressing
• The coolant flow is managed using the values __-__ liters/min

Effectiveness

(1) Prevention of abnormal friction of dresser → extension of service life

(2) Reduction of shape defects and dimension defects

Horizontal replication

Circle one: Required Not required
To be horizontally replicated at:
Remaining 5 units at __ Section __ Subsection, and remaining 1 unit at __ Section __ Subsection

MP Information

Circle one: Required Not required
(Distribute to machine tooling if required)

Filled in by Machine Tools De-partment			Comments	Chief Engineer	Person-in-charge
	•Drawing to be revised				
	•Drawing revised (standardized)	○			
	•Drawing to be revised after verification of tests				
	•Incorporate in new equipment				
	•				

Purpose classification	Process classification	System classification	Subject classification	Verification by Machine Tools Department	MP sheet registration no.
○○○	○○○	○○○	○○○	◎ To be implemented • Not to be implemented	○○○-○○

Issuance

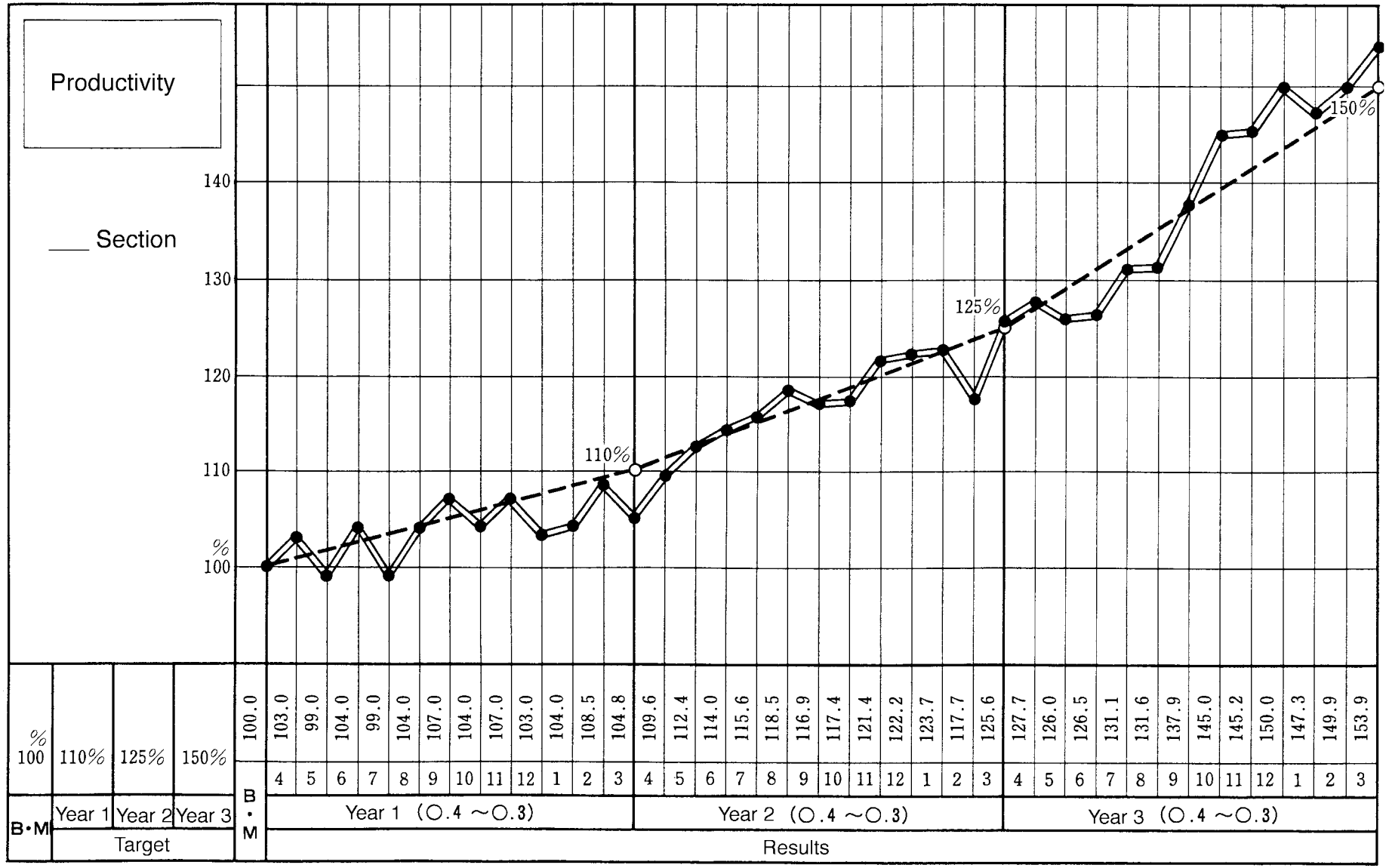
__ Section →TPM Promotion Office → Person-in-charge of equipment in Machine Tools Department
→ Other section ( )
→ Other plant ( )

Feed-back →Person-in-charge of equipment at Machine Tools Department → __ Section

Improvement suggestion

Suggestion prize Improvement prize __ Grade	Sec-tion Manag-er	Sub-section Manager	Issuer
Effectiveness __			
No.			

Results Graph Example



% 100	110%	125%	150%	100.0	103.0	99.0	104.0	99.0	104.0	107.0	104.0	107.0	103.0	104.0	108.5	104.8	109.6	112.4	114.0	115.6	118.5	116.9	117.4	121.4	122.2	123.7	117.7	125.6	127.7	126.0	126.5	131.1	131.6	137.9	145.0	145.2	150.0	147.3	149.9	153.9
				B・M	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
B・M	Year 1	Year 2	Year 3		Year 1 (O.4 ～O.3)												Year 2 (O.4 ～O.3)												Year 3 (O.4 ～O.3)											
	Target				Results																																			

No.		Page	

QC Process Chart

Model		Established	__/__/__	Version		Department Manager		Chief Engineer		Person-in-charge	

Process No.	Process Name	Machine/ Equipment	Control Item	Control Standard	Control Method					Measure-ment Tool	Record		Remarks
					Initial Piece		Periodic						
					Sampling method, number of samples	Measured by / Con-trolled by	Interval	Sampling method, number of samples	Measured by / Con-trolled by		Person-in-charge	Method	

Code	Date	Revised Items	Person-in-charge	Code	Date	Revised Items	Person-in-charge
	__/__/__				__/__/__		
	__/__/__				__/__/__		
	__/__/__				__/__/__		
	__/__/__				__/__/__		
	__/__/__				__/__/__		

Use the following codes in the column for the measurer and controller

Classification / Position	Manufacturing Division	Inspection Division
Foreman	○	●
Worker	△	▲
Section Member	□	■

Prepared: __/__/__

Work Standards Sheet	Process		No.	

No.	Key Point of Work	Control Standard	Control Method

Safety	Processing Conditions	
	Equipment	
	Jig and Measuring Tools	
	Cutting Tools and Grindstones	
	Cutting and Grinding Conditions	

Revision History				Section Manager	Subsection Manager
	△	△	△		
	△	△	△		
	△	△	△		
	△	△	△		

PM Standards Sheet

Section	Subsection	Line	Process	Equipment Name and Serial No.	Classification No.	—
					Reference No.	—

Sketch

○Inspection and cleaning ▽Oiling □Retightening

Inspection, Cleaning and Oiling	Procedure No.	Location	Judgment Criteria	Method (required tools)	Time (min)	Period Days	Period Weeks	Period Months	Person-in-charge

Log

Revision Symbol	Day/Mo./Yr.	Description	Approval: Machine Tools Section	Approval: Section Manager	Prepared by
		Newly created			

Retightening	Procedure No.	Retightening Location	Method (tools)	Time (min)	Period Weeks	Period Months	Period Years	Person-in-charge

Procedure seal is orange for daily, blue for weekly and white for monthly.

Kobetsu Kaizen Results Table	7・1	1 25

Example of Kobetsu Kaizen Results Table for _____ Section

No.	Sub-section	Process	Theme Name	16 Major Losses			Improvement Implementation Description	Amount ofresults $__/month	Improvemet time period
				Equipment	Per-sonnel	Production Subsidiary Resources			
1	1	○○○○	Countermeasures for minor stoppage of cutout part	Minor stoppage			• Arrow feed → suction pad method	○○	○/○
2	↑	○○○○	Waiting for 2 units of __ equipment		Motion losses		• Automation of material collection and supply	○○	○/○
3	↑	○○○○	Improvement of jig control efficiency	Start-up losses			• Introduction of packet master	○○	○/○
4	↑	○○○○	Automation of __ cutout		Motion losses		• Development of automatic cutout equipment	○○	○/○
5	↑	○○○○	Improvement of __ efficiency	Setup losses			• Change of layout	○○	○/○
6	↑	○○○○	Improvement of maintenance work efficiency	Start-up losses			• Utilization of filter	○○	○/○
7	2	○○○○	Elimination of __ changeover work		Motion losses		• Development of an automatic machine	○○	○/○
8	↑	○○○○	Reutilization of oil			Process losses	• Introduction of an A-0 filter	○○	○/○
9	↑	○○○○	Countermeasures for minor stoppage of material supply part	Minor stoppage losses			• Handle type → lever type	○○	○/○
10	↑	○○○○	Reduction in C/T (1)	Speed losses			• Minimization of air cut and idle time	○○	○/○
11	↑	○○○○	Reduction of C/T (2)	Speed losses			• Reevaluation of processing conditions	○○	○/○
12	↑	○○○○	Improvement of setup work	Setup losses			• Implementation of one-touch setup	○○	○/○
13									
14									
15									
16									
17									
18									
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21									
22									
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30									
31									

Theme Resolution Summary Format

Case example classification

Loss classification

1. Theme

Prepared __/__/__

Checked by | Prepared by

2. Reason for selection of theme

3. Improvement target

4. Outline of equipment and processes

5. Understanding of current conditions

6. Main contents of improvement

7. Results

8. Measures taken to prevent recurrence

9. Horizontal replication plan

10. Future issues

Highly Successful Improvement	7 • 1	1 - 27

Reception No.	Registration No.

Highly Successful Improvement

_____ Subsection _____ Section __/__/__

Name

_____ Model _____ Machine Materials supply finger

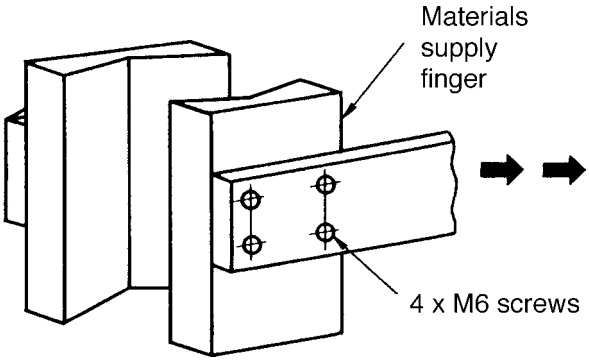
Subject process and equipment

_____ machine

Improvement invented by:

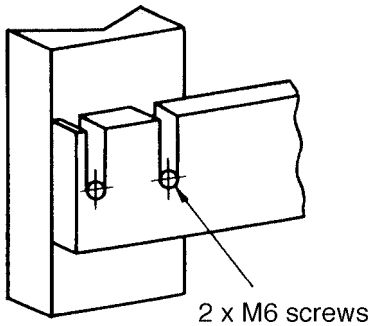
Efficacy and sketch

<Before improvement>



Remove and replace 4 bolts in 2 locations that hold the materials supply finger

<After improvement>



Created a slot in 2 locations for 2 bolts

Materials supply finger replacement time
__ min/replacement → __ sec/replacement

Examples of Horizontal Replication of Kobetsu Kaizen

Minor theme: Reduction of setup changeover time

No.	Implementation Item \ Serial No.	1	2	3 Model	4	5	6	7	8	9
1	Changed suspending the die to external setup by switching to a two chain hoist.	●	●	●	●	⊘	○	⊘	○	⊘
2	Preheat the machine	●	●	●	●	●	●	⊘	●	●
3	Platform for setting the die	○								

⊘ : Not relevant

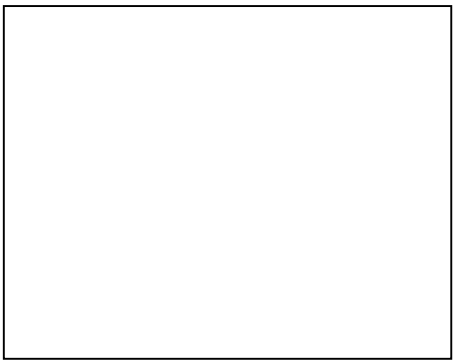
○ : Implementation planned

● : Implemented

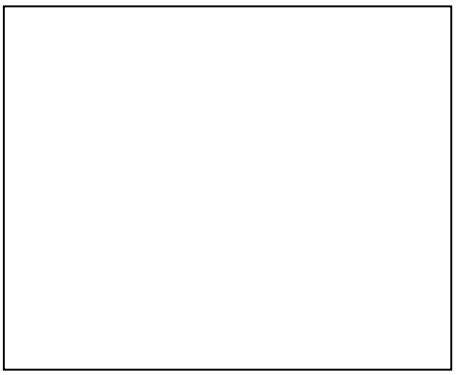
Horizontal Replication Map (Kobetsu Kaizen)

7 • 1

1 - 28



7・2 Jishu Hozen (Autonomous Maintenance)



7•2 Autonomous Maintenance

1 Autonomous Maintenance Implementation Steps

- 7 Steps to Autonomous Maintenance (1)
- 7 Steps for the Equipment Industry (2)
- Implementation of Steps by Division (3)(4)
  - Assembly Division
  - Warehouse Division
  - Distribution Division
  - Inspection Division

1	Example of Steps to Implement Autonomous Maintenance
2	Implementation Table of 7 Steps for the Equipment Industry
3	Implementation Table of 7 Steps for the Assembly Division
4	Implementation Table of 4 Steps for the Warehouse and Distribution Divisions

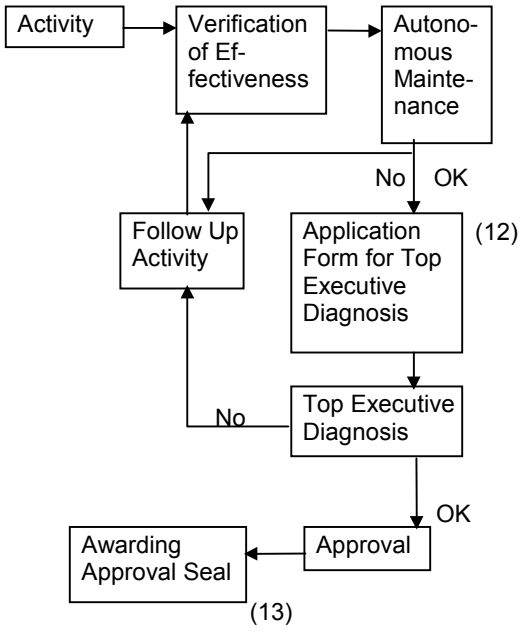
2 Creation of a Promotion Plan for Autonomous Maintenance

- Promotion Plan
- Autonomous Maintenance Education (5)(6)
- Selection of Model Machine (7)
- Model Machine Registration (8)(9)

5	Creation of an Autonomous Maintenance Master Plan
6	Education Schedule (1) Autonomous Maintenance Education Curriculum (2) Autonomous Maintenance Introduction Education Schedule
7	Model Equipment Selection Standards
8	List of Autonomous Maintenance Registered Machines (Machines on Which the Autonomous Maintenance Step Is to Be Implemented)
9	Board for Displaying Registered Machines and Managing Progress of Steps

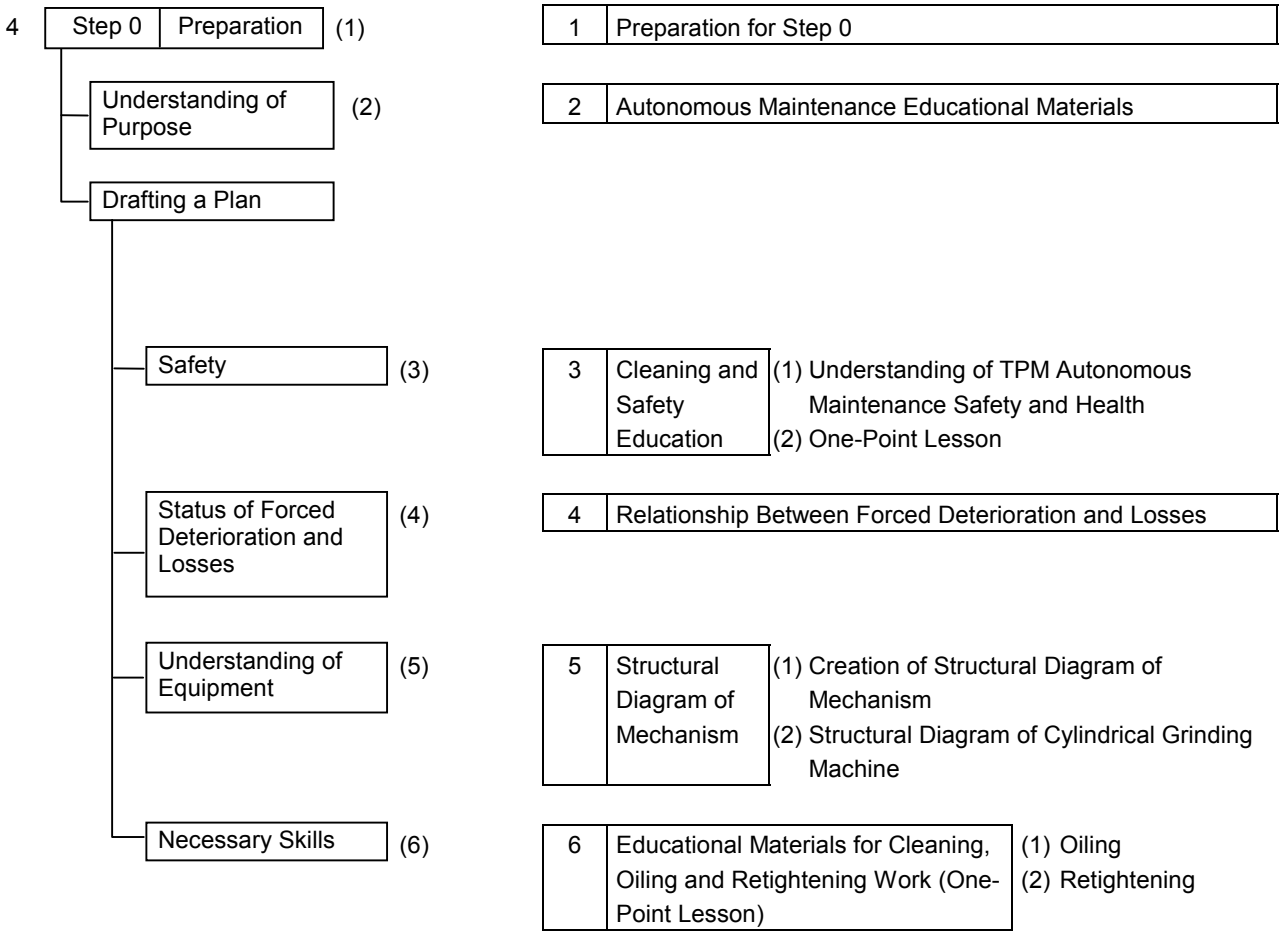
3 Autonomous Maintenance Diagnosis System (10)

10	Autonomous Maintenance Diagnosis Chart



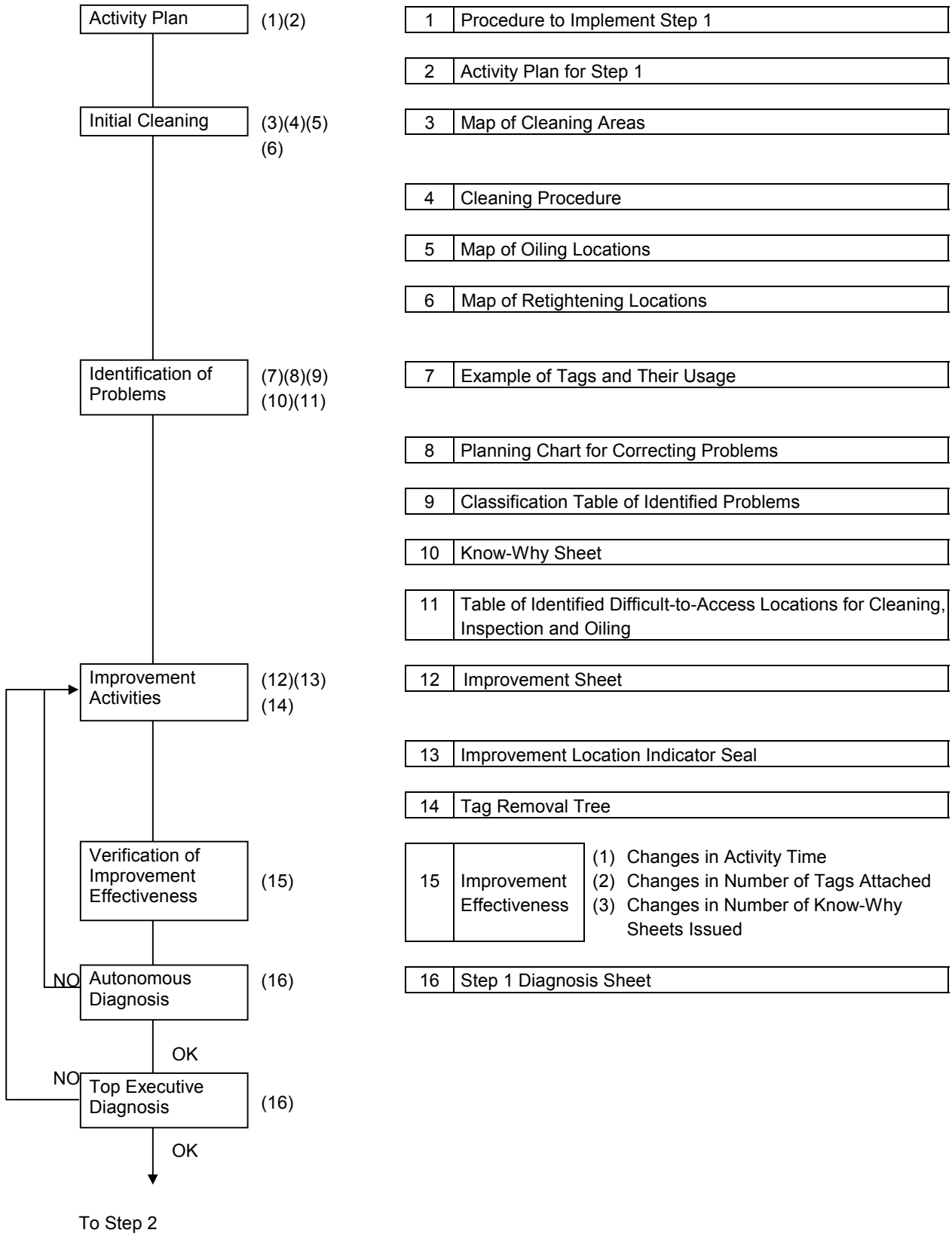
11	Step Diagnosis Sheet (Step 1)
12	Application Form for Top Executive Diagnosis
13	Passed Seal

7•2 Autonomous Maintenance



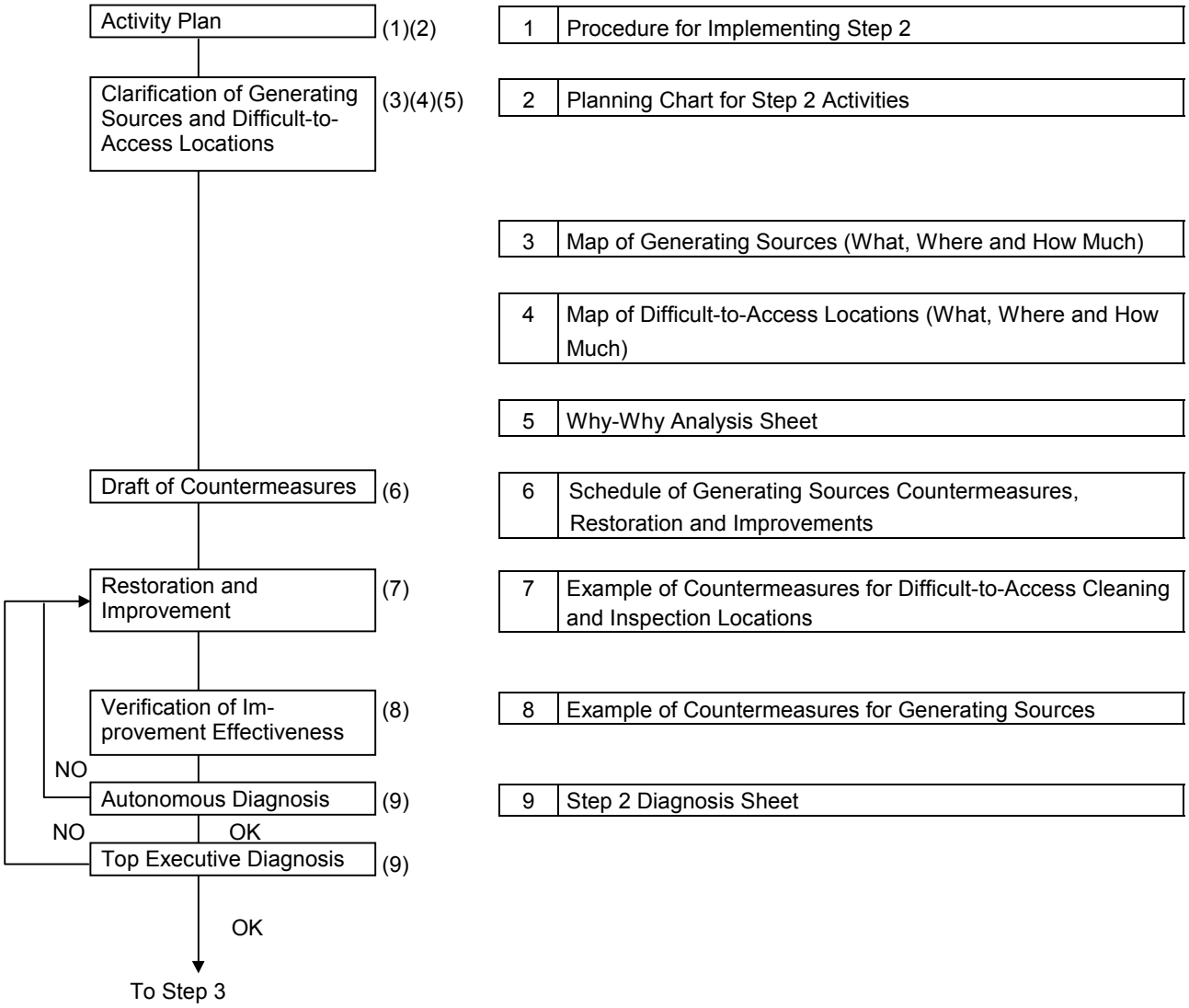
7•2 Autonomous Maintenance

5 Step 1: Initial Cleaning (Cleaning and Inspection)



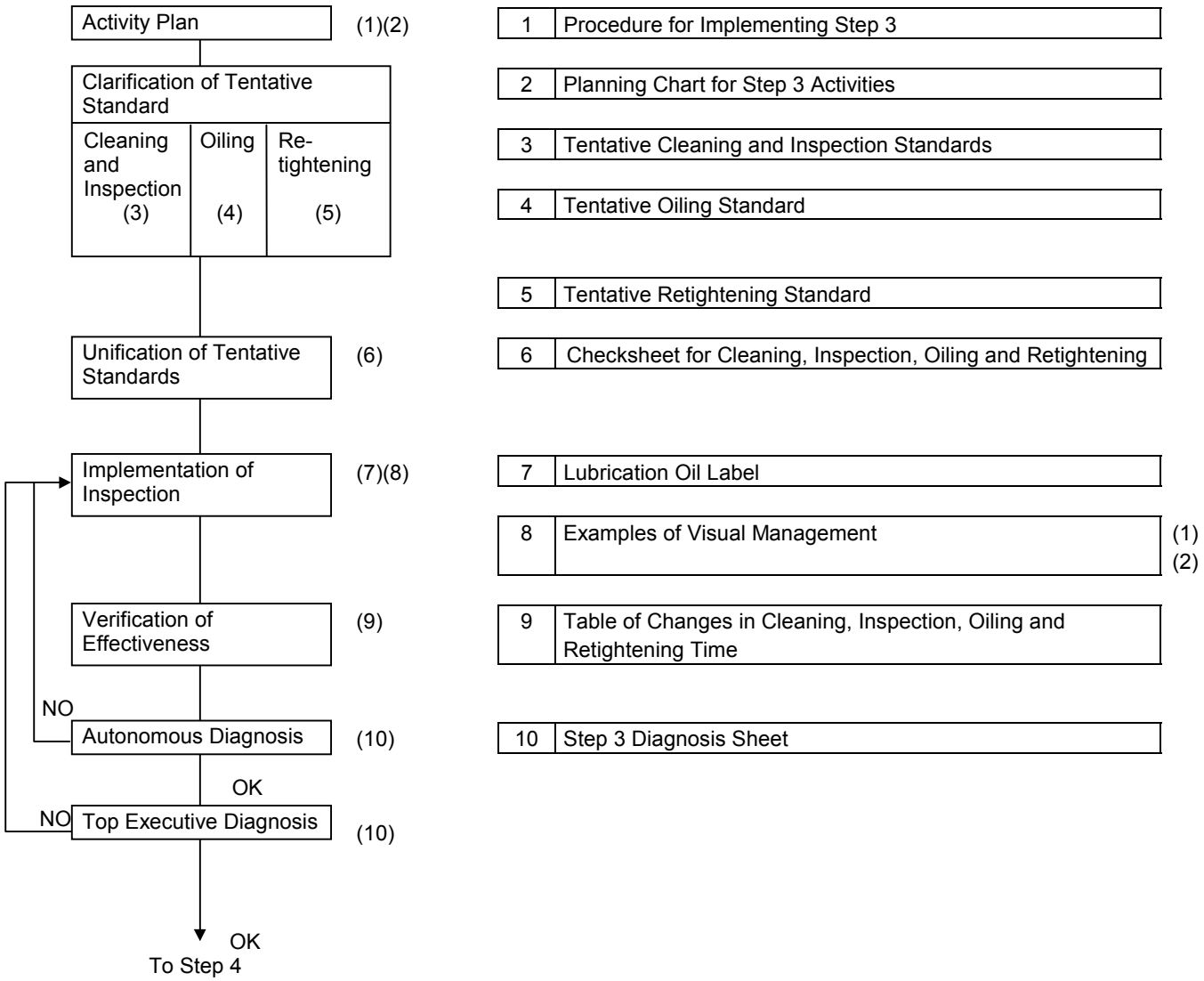
1	Procedure to Implement Step 1
2	Activity Plan for Step 1
3	Map of Cleaning Areas
4	Cleaning Procedure
5	Map of Oiling Locations
6	Map of Retightening Locations
7	Example of Tags and Their Usage
8	Planning Chart for Correcting Problems
9	Classification Table of Identified Problems
10	Know-Why Sheet
11	Table of Identified Difficult-to-Access Locations for Cleaning, Inspection and Oiling
12	Improvement Sheet
13	Improvement Location Indicator Seal
14	Tag Removal Tree
15	Improvement Effectiveness (1) Changes in Activity Time (2) Changes in Number of Tags Attached (3) Changes in Number of Know-Why Sheets Issued
16	Step 1 Diagnosis Sheet

6 Step 2: Countermeasures for Generating Sources and Difficult-to-Access Locations

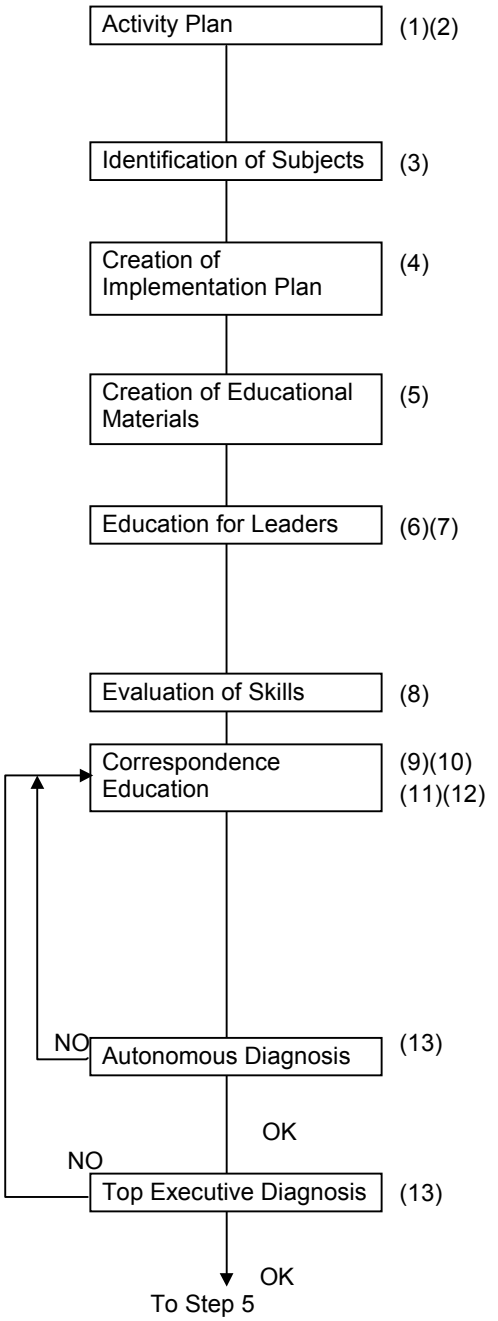


7•2 Autonomous Maintenance

7 Step 3: Creation of a Tentative Autonomous Maintenance Standard



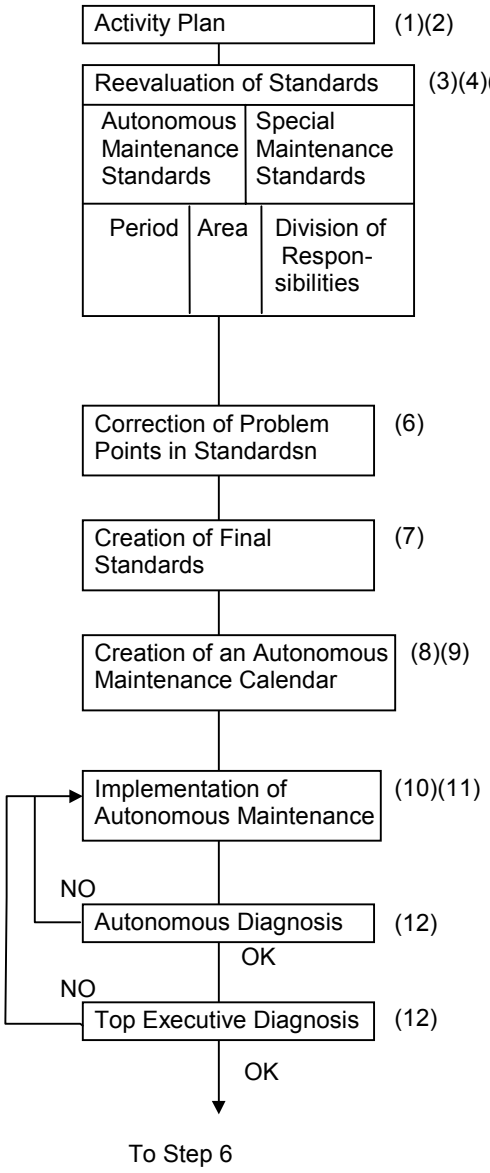
8 Step 4: General Inspection



1	Procedure for Implementing Step 4
2	Planning Chart for Step 4 Activities
3	Identification of Subjects (Analysis of Machining Work and Implementation of General Inspection)
4	Planning Chart for Implementation
5	Example of Educational Materials (1) Pneumatic System (2) Filter (3) Textbook
6	Education Schedule
7	Verification of Level of Understanding
8	Correspondence Education Schedule
9	General Inspection Checksheet
10	Schedule for General Inspection and Correction of Problems
11	General Inspection and Improvement Sheet
12	List for General Inspection and Correction of Problems
13	Step 4 Diagnosis Sheet (1) Lubrication (2) Hydraulic and Pneumatic (3) Drive (4) Electric (5) Nuts and Bolts

7•2 Autonomous Maintenance

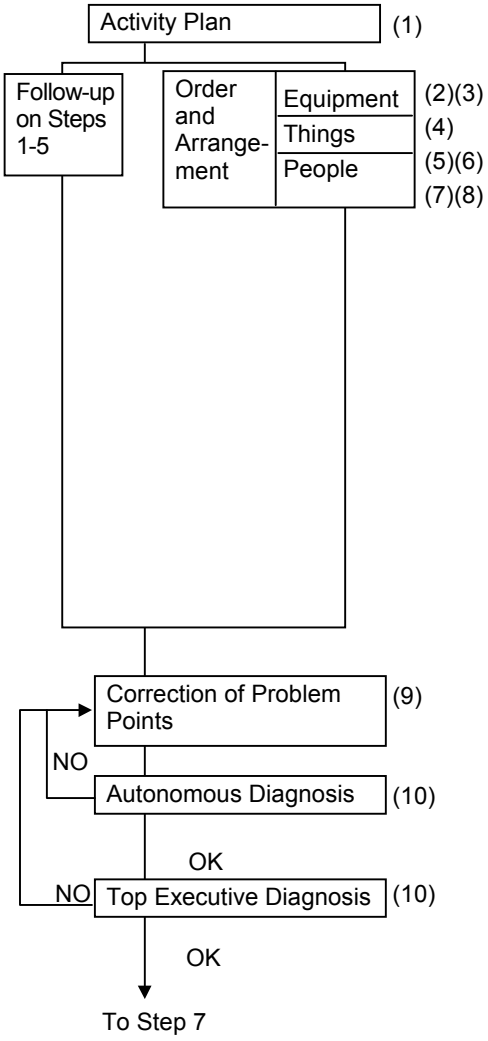
9 Step 5: Autonomous Inspection (Standardization of Cleaning, Inspection and Oiling)



1	Procedure for Implementing Step 5
2	Planning Chart for Step 5 Activities
3	List for Evaluation of Cleaning, Inspection and Oiling Standards
4	Example of Reevaluating General Inspection Standards (Before Improvement and After Improvement) (1) Before Improvement (2) After Improvement
5	Example of Reevaluating Equipment Maintenance Standards
6	List of Problem Points Identified and Improvements
7	Final Cleaning, Inspection and Oiling Standards
8	Annual Maintenance Calendar
9	Maintenance Calendar (Monthly)
10	Checksheet for Autonomous Inspection
11	Checksheet for Autonomous Inspection Skills
12	Step 5 Diagnosis Sheet

7•2 Autonomous Maintenance

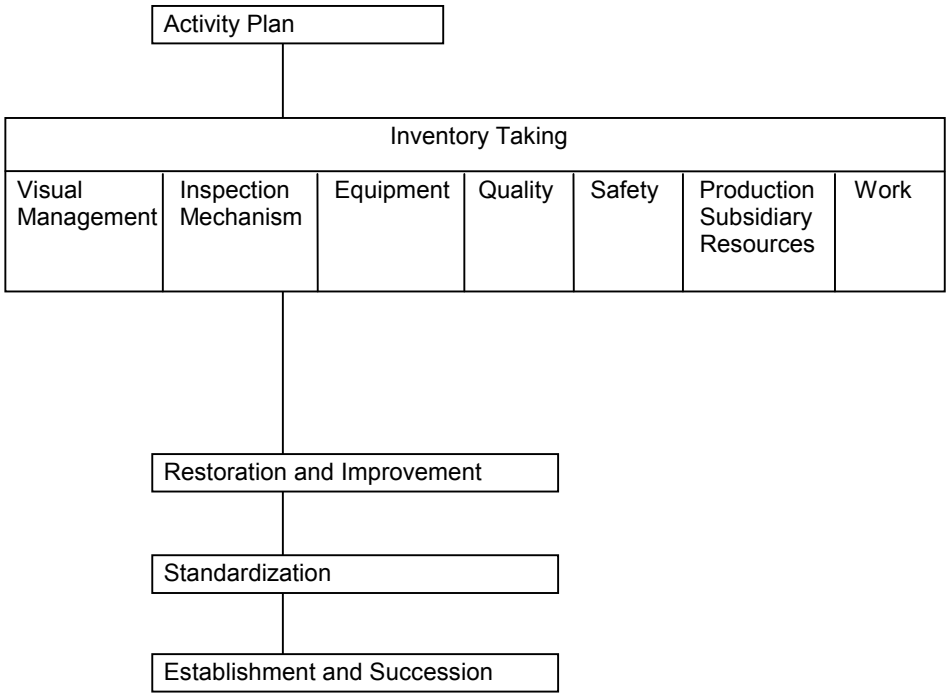
10 Step 6: Standardization (Order and Arrangement)



1	Planning Chart for Step 6 Activities
2	Autonomous Inspection Control Chart x [bar] - R
3	Flowchart of Measures for Equipment Abnormalities
4	Diagram of Layout for Storage of Materials, Products and Work-in-Progress
5	Diagram of Layout for Storage of Jigs and Tools
6	Diagram of Layout for Storage of Spare Parts, Fixtures and Others
7	Textbooks for Operation Skills
8	Evaluation Table for Operation Skills
9	List for Correction of Problem Points
10	Step 6 Diagnosis Sheet

7•2 Autonomous Maintenance

11 Step 7: Thorough Implementation of Autonomous Management



Example of Steps to Implement Jishu Hozen (AM)

Step	Name	Activity details
1	Initial cleaning (cleaning and inspection)	Complete elimination of waste and dirt, focusing on the equipment main body, implementation of lubrication and retightening, discovery of equipment problems and the restoration thereof
2	Countermeasures for generating sources and difficult-to-access locations	Prevent causes and scattering of waste and dirt, improve difficult-to-access locations for cleaning, lubrication, retightening and inspection, and reduce the time required for these activities
3	Creation of tentative autonomous maintenance standards	Formulate behavioral standards so that cleaning, lubrication, retightening and inspection can be steadily maintained in a short period of time (need to indicate the time limit which can be used daily and periodically)
4	General inspection	Education on inspection skills through the inspection manual, and the identification and restoration of minor equipment defects through implementation of general inspection
5	Autonomous inspection	Creation of cleaning, lubrication and inspection standards that can be efficiently and steadily maintained, and the creation and implementation of autonomous inspection checksheets
6	Standardization	Standardization of the various on-site management items, and complete systematization of support management • On-site distribution standards • Standardization of data records • Standardization of die, jig and tool management • Standardization of process quality assurance, etc.
7	Thorough implementation of autonomous management	Implementation of the company policies and goals, constant implementation of improvement activities, steady recording of MTB analysis, and improvement of equipment through analyzing the records

Implementation Table of 7 Steps for the Jishu Hozen (AM) Process Industry

Step	Name	Activity details	Purpose from the equipment perspective (on-site diagnosis points)
1	Initial cleaning (cleaning and inspection)	• Complete elimination of waste and dirt focusing on the equipment main body • Identification of problems such as defects, generating sources, difficult-to-access locations and quality defect sources • Removal of unnecessary and non-emergency parts, and simplification of equipment	• Eliminate environmental stress due to waste and dirt, and prevention of forced deterioration • Eliminate waste and dirt, improve the quality of inspection and repair, and reduce the associated time required • Establish basic conditions • Make potential defects tangible, identify them and take countermeasures
2	Counter-measures for generating sources and difficult-to-access locations	• Prevention of sources and scattering of waste and dirt, improvement of difficult-to-access locations for cleaning, inspection, lubrication, retightening and operation, and reduction of the time required for various operations	• Eliminate the generation and adherence of waste and dirt, and improve the characteristic reliability of equipment • Improve maintainability through the improvement of cleaning, inspection and oiling • Create equipment that does not require manual labor
3	Creation of cleaning and inspection standards	• Create behavioral standards so that cleaning, lubrication and retightening can be steadily maintained in a short period of time • Improve inspection work efficiency by introducing visual management	• Support the 3 elements of cleaning, lubrication and retightening, which are the basic conditions of equipment maintenance (activities to prevent deterioration) • Perform correct inspection by visual management of machine names and the proper range of gauges
4	Equipment general inspection	• Implement inspection skills education through inspection manuals • Realize the equipment "as it should be" by implementing general inspections of standalone equipment • Make improvements so that the equipment is easy to inspect, and thoroughly implement visual management	• Perform a general inspection by education subjects like bolts, nuts and transmission equipment, restore deteriorated items, and improve reliability • Implement visual management of machine names, V belt specifications and oil type and quantity, appropriate ranges of gauges, valve open/close status, rotational direction and thermal tape, so that anyone can perform inspection
5	Process general inspection	• Implement education on process performance, operation and adjustment methods, and measures taken when a failure occurs, train operators to make them more proficient in processes, and improve operation reliability • Prevent overlapping and omitted inspections by compiling tentative cleaning and inspection standards for each equipment into periodic inspection and replacement standards by process and area	• Improve the stability and safety of the overall processes through proper operation • Expand and devise means for visual management of items, such as piping contents and direction of flow, to improve the accuracy of process inspection • Improve the operationality of equipment
6	Systematiza-tion of autonomous maintenance	• Clarify the system flow and standards, and ensure safety and quality maintenance so that autonomous maintenance is steadily implemented • Improve setup and reduce the inventory of work-in-progress • Establish an autonomous management system for on-site distribution, spare parts, tools, work-in-progress, products and materials	• Establish a quality maintenance system to clarify the relationship between quality and equipment • Reevaluate and improve the layout of facilities and equipment • Standardization of maintenance and control of caddies, spare parts, tools, work-in-progress, products, materials, passageways and cleaning tools, and thorough implementation of visual management at all sites
7	Thorough implementa-tion of autonomous management	• Implement activities in line with the policies and goals of the company and plant, make improvements routine, eliminate waste from the workplace, and reduce costs • Steadily maintain maintenance records like MTBF, analyze these records, and further advance improvement of equipment	• Improve the equipment through analysis of various data, and improve process reliability, safety, maintainability, quality and operationality • Clarify the weak points of equipment based on the data, perform critical improvements and increase both the service life of equipment and the frequency of inspection

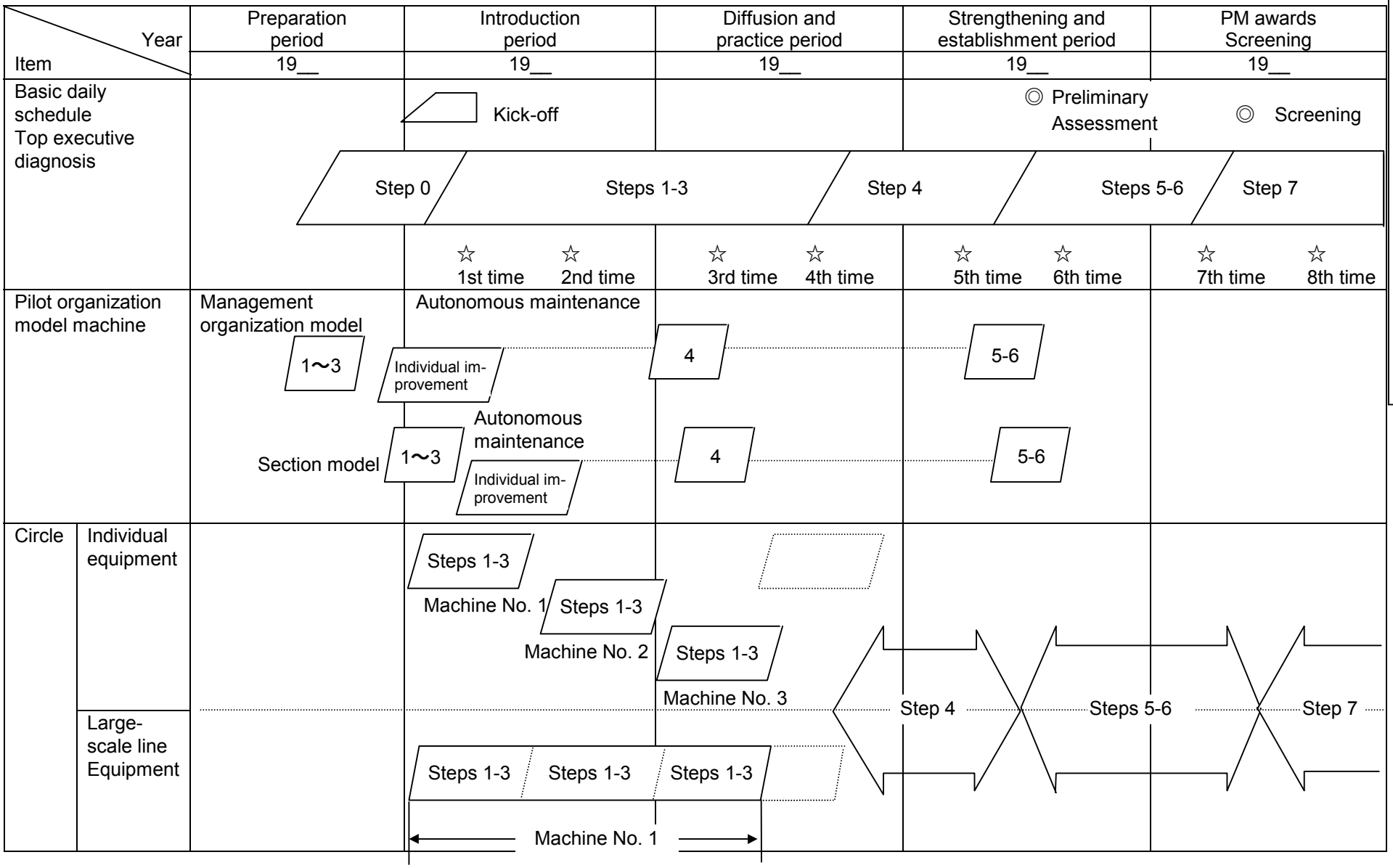
Implementation Table of 7 Steps for Jishu Hozen (AM) Assembly Division

Step	Name	Activity Details	Purpose	Guidance and Promotion
1	Initial cleaning (cleaning and inspection)	• Complete removal of unnecessary articles, chiefly from the work area • Ordering an arrangement of jigs, tools and parts to be used • Elimination of waste and dirt from the work area	• In the process of one's own ordering and arrangement of the work area, consider how the work area "should be" • Recognize the importance of 5S	• Guidance on deciding what articles are unnecessary, the approach to ordering, and the importance of 5S • Creation of a diagnosis sheet • Concerning operations and the division of responsibilities
2	Counter-measures for generating sources and difficult-to-access locations	• Implementation of countermeasures for the sources of unnecessary articles	• Pursuit of easy visibility and ease of action through ordering and arrangement • Consider what the generating sources are when viewed from the 5S that impede the quality of product assembly	• Increasing awareness of problems • Approaches to process improvement and methods to advance it • Implementation of and devising of visual management
3	Creation of tentative autonomous maintenance standards	• Creation of behavioral standards in which order, arrangement, standardizing and cleaning can be steadily maintained in a short period of time • Devising and improvement of ease of inspection and visual management	• Consider ways to thoroughly implement methods and rules that support the processes established in Steps 1 and 2, and set standards	• Promote making firm decisions on one's own and promote awareness on the roles that must be strictly observed • Methods used to create standards • Prevention of incorrect and missing parts
4	General inspection	• Understanding of knowledge and skills through inspection manuals • Identification and restoration of minor defects through general inspection • Creation of tentative autonomous inspection standards	• Understanding of the structure and function of products • Understanding of quality assurance rules • Clarification of tools, jigs, measuring instruments and FP "as they should be" in order to ensure quality characteristics based on the required quality of products	• Preparation and creation of education and training materials for general inspection • Drafting of an education and training schedule • Implementation of leader education • Follow-up on education and training • Creation of inspection manuals
5	Autonomous inspection	• Improve inspection efficiency through a general reevaluation of tentative autonomous maintenance standards, tentative autonomous inspection standards and daily management items • Devising and thorough implementation of visual management • Creation and implementation of an autonomous inspection checksheet and an autonomous inspection calendar	• Understanding the necessity of autonomous management • Understanding the purpose of daily management items	• Education on the necessity of autonomous management • Guidance on approaches to improving inspection efficiency • Guidance on how to decide the level of management needed for daily management items
6	Standardiza-tion	• Education of multi-skilled workers so that quality and quantity do not vary even if the workers change • Creation of work standards	• Clarification of work standards "as they should be" based on the purpose of the work • Improvement of visibility, making the work easier to perform and elimination of strain, variance and waste so that standards can be steadily maintained	• Creation of a plan for education and training of multi-skilled workers • Guidance on an IE way of looking at things • Revision of management standards and thorough implementation of management
7	Thorough implementa-tion of autonomous management	• Implementation of company policies and goals and making improvement activities routine	• Raising awareness of goals through the regular meeting of autonomous work study groups	• Active participation in process design DR, and guidance on suggestions

Implementation Table of 4 Steps for the Warehouse and Distribution Divisions

Step	Name	Activity Details	Purpose		Guidance and promotion
			Equipment	Personnel	
1	Initial cleaning	• Elimination of waste, dust and dirt • Correction of problems (play, strain, protrusions, etc.) • Ordering of surroundings • Removal of unnecessary articles • Observance of white line standards • Ordering and arrangement of how things are and how they're put away	• Complete elimination of unnecessary things • Creation of a bright and clean environment	• Recognition of the necessity of cleaning • Cultivating an understanding of and an eye for order and arrangement • Promoting awareness of the observance of rules	• Pointing out and providing guidance on priority cleaning locations • Guidance on the necessity of cleaning
2	Countermea-sures for dirt Countermea-sures for things difficult to clean (improvemen t phase)	• Improvement to prevent contamination of inventory by waste, dust and dirt • Countermeasures for deterioration (antirust and protection of internal parts) • Countermeasures for difficult-to-access locations (instant removal) • Anti-earthquake measures (to prevent things from falling, sliding or toppling) • Measures for difficult-to-clean items • Management by color • Devising and improvements to facilitate inventory management and to promote visual management	• Countermeasures for dirt and maintenance of quality • Creation of conditions that facilitate access and inventory management • Improvement of safety • Facilitating cleaning and making a clean environment routine	• Learn inspection skills • Energize personnel through improvement activities • Make decisions and observe them strictly on one's own	• Approaches to improvement and methods to advance it • Guidance on implementing and devising visual management • Investigation and clarification of inventory management "as it should be"
3	Ordering and arrangement (standardiza-tion phase)	• Creation and implementation of cleaning standards • Creation and implementation of inventory standards (practice exercise on visual management) • Creation and implementation of checksheets	• Reevaluation and improvement of equipment and environment • Establishment of effective inventory management • Making things "as they should be" from the perspective of inventory cost and functions • Creating and improving inventory management standards	• Improvement of management technology • Expanding the range of autonomous management • Thorough implementation of visual management	• Guidance on technology for standardization • Setting and thorough implementation of management standards • Guidance on how to view and analyze data
4	Thorough implementa-tion of autonomous management	• Implementation of company policies and goals, and making improvement activities routine • Reevaluating cleaning standards and inventory standards, and promoting efficiency	• Improving functionality through data analysis • Improving equipment efficiency	• Mastering technologies for recording, analyzing and improving data • Raising awareness of goals, and maintaining an awareness about inventory costs	• Guidance on technology for improvement • Pursuing effective inventory management "as it should be"

Jishu Hozen (AM) Master Plan



Jishu Hozen (AM) Education Curriculum

No.	Main Item	Time	Sub-item
1	What is autonomous maintenance?		1. Protecting one's own equipment on one's own 2. Becoming an operator proficient with equipment
2	Approaches to autonomous maintenance		1. Basic approaches • Approaches to implementation of steps
3	Role of operations and maintenance in autonomous maintenance		1. Role of operations and maintenance 2. Classification of maintenance and how to divide up roles 3. Activities of Operations Division 4. Activities of Maintenance Division
4	How to advance the implementation of autonomous maintenance		1. How to advance the implementation of the autonomous maintenance steps • Step 0 • Step 1 • Step 2 • Step 3 • Step 4 • Step 5 • Step 6 • Step 7 2. Autonomous maintenance diagnosis
5	How to formulate an autonomous maintenance master plan and how to set goals		1. Basic schedule 2. Setting the pilot organization model machine 3. A pattern of implementing steps by equipment machine number 4. Implementation by equipment type 5. How to set goals
6	Verification test		

Jishu Hozen (AM) Introduction Education Schedule

Creation date: __/__/__ TPM Promotion Office

No.	Main Item	Sub-Item	Instructor	Time	Schedule

Model Equipment Selection Standards

__/__/__

Circle			Department			
Category	No.	Item	Evaluation score			Evaluation guide
Production aspect (PD)	1	Average level of operation	4	2	1	80% or greater: 4 60% or less: 1
	2	Presence of a spare or alternative machine, and the ease of switching over to that machine	4	2	1	None, or requires a large amount of time to switch over: 4 Present, and easy to switch over: 1
	3	Effect that a failure has on other equipment	4	2	1	Effects a large amount of equipment inside the plant: 4 Has nearly no effect on other equipment: 1
	4	Failure frequency (MTBF)	4	2	1	4 times a month or greater: 4 1 time per day or less: 1
	5	Downtime for repairing failure (MTTR)	4	2	1	Average of 1 time per day or greater: 4 Average of 1 time per 2 hours or fewer: 1
Quality (Q)	6	Effect on product quality assurance	4	2	1	Large effect: 4 Almost no effect: 1
	7	Amount lost from average drop in quality per failure incident	4	2	1	100,000 yen or greater: 4 10,000 yen or less: 1
Cost (C)	8	Amount lost in energy, materials and labor expenses due to failures	4	2	1	100,000 yen or greater: 4 Less than 10,000 yen: 1
	9	Extent of overall repair costs	4	2	1	Monthly average of 400,000 yen or greater: 4 100,000 yen or less: 1
Safety (S)	10	Risk that failure will cause injury or illness	4	2	1	Quite large risk: 4 Virtually no risk: 1
	11	Risk that failure will cause pollution	4	2	1	Quite large risk: 4 Virtually no risk: 1
General evaluation						Grade: A B C

* Use the points in the score column for evaluation, and use no other points
* General evaluation standard 26 points or greater: Rank A (greater than 60% of maximum)
  18 points or greater: Rank B (40 - 60% of maximum)
  17 points or less: Rank C (under 40% of maximum)
* The model machine selected should be an "A" rank machine, and should have a sufficient level of replicability in other machines.

List of Jishu Hozen (AM) Registered Machines

Depart-ment	Section	Registered machine		Progress									
		Model name	Date installed	1st	2nd	3rd	4th	5th	6th	7th (1)	(2)	(3)	(4)

List of Jishu Hozen (AM) Registered Machines (Machines on Which the Autonomous Maintenance Step is to be Implemented)

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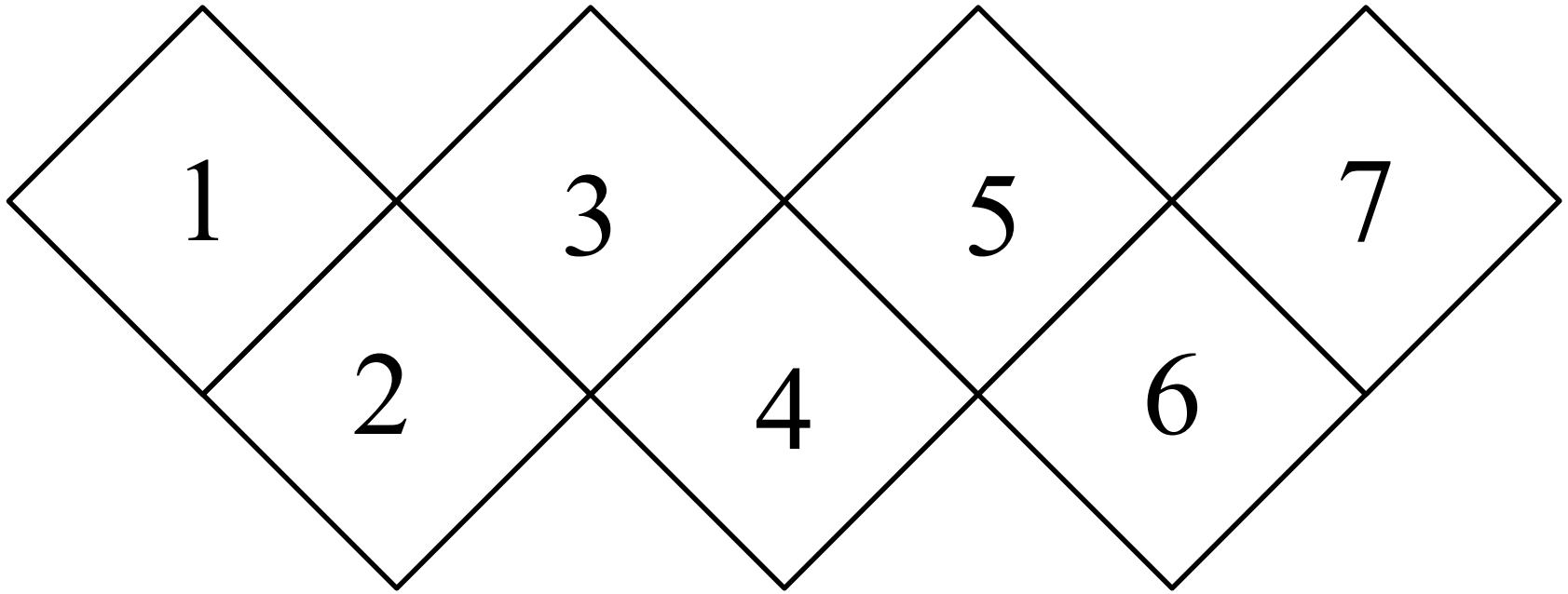
2 - 8

TPM

Implementation of Jishu Hozen (AM) Steps

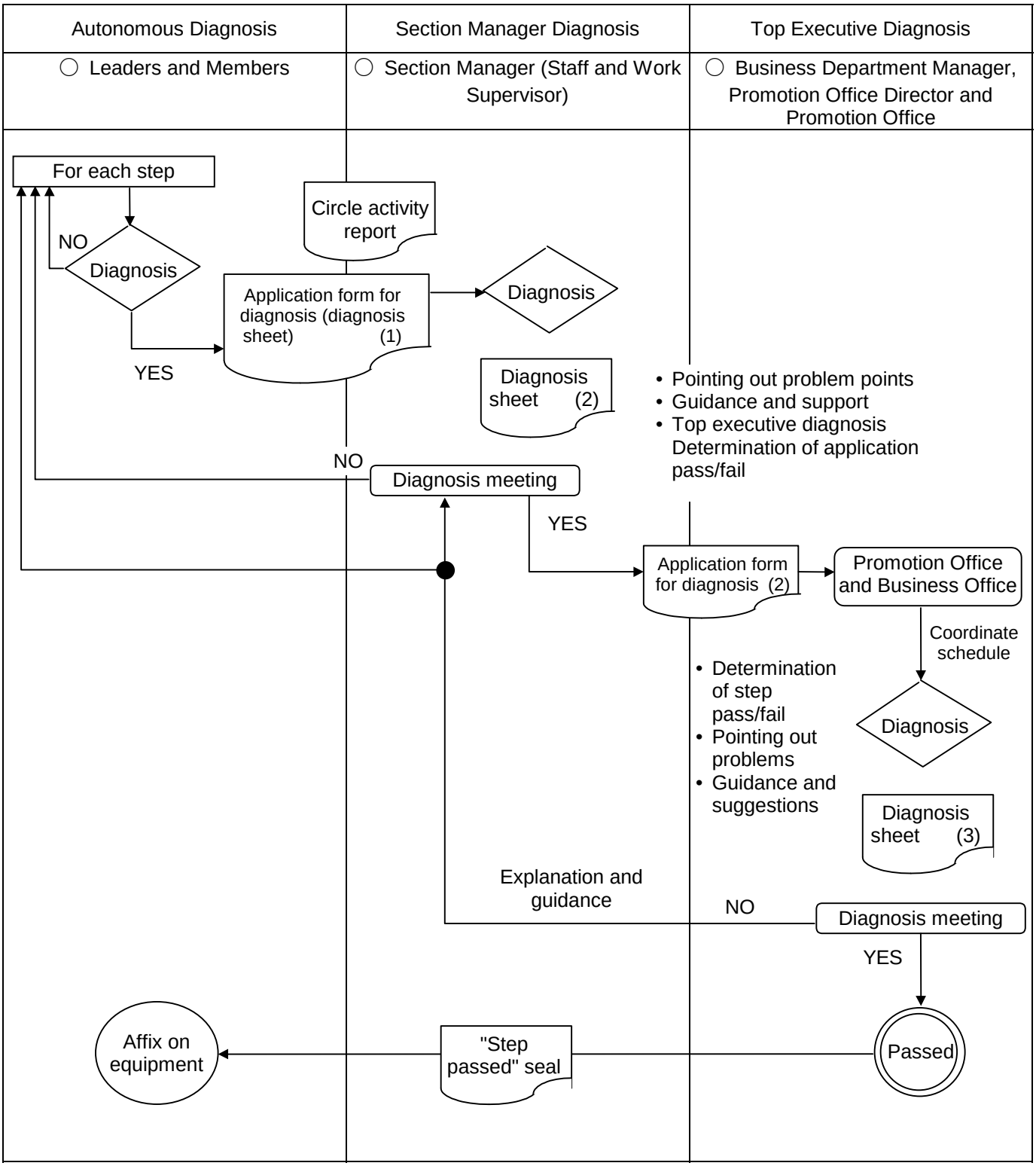
Target Machine: ____



Board for Displaying Registered Machines and Managing Progress of Steps

Jishu Hozen (AM) Diagnosis Flow Chart	7 • 2	3 - 10

Jishu Hozen (AM) Diagnosis Flow Chart



Step Diagnosis Sheet (Step 1)

7 • 2	3 - 11

Application Form for Autonomous Maintenance Diagnosis

Autonomous Maintenance Diagnosis Sheet

Step 1: Initial Cleaning (Equipment)

Diagnosis	Autonomous	Section Manager	Top Executive

Section/Team name	
Equipment No.	
Desired diagnosis date	__/__/__
Diagnosis date and time	__/__/__ __:__ - __:__
Diagnosed by	

Application date	Section Manager	Leader

__ points	Pass	Fail

Level passed (level points in table below + evaluation score)

Sum of (level points in items 1-5) + evaluation score (item 6)

Autonomous	Section Manager	Top Executive
90 points or more	85 points or more	80 points or more

Diagnosis item	Points of diagnosis	Bad	Poor	Fair	Somewhat good	Good	Sugges-tions
		1 point	2 points	3 points	4 points	5 points	
1. Cleaning of machine main body	• Are waste, dust, oil contamination and scraps at acceptable levels, and are work and tools in good condition? (Jig parts, chuck parts, sliding parts, chute parts, frame, bed , piping, wiring parts, etc.)						
	• Are looseness, play, vibration, wear and heat generation at acceptable levels? (Bolts, nuts, jig parts, rotating parts, sliding parts, chutes, etc.)						
2. Cleaning of auxiliary equipment • Circulatory systems such as oil, pneumatic and water • Electrical control • Other	• Are waste, dust, oil contamination, adherence of foreign matter, etc. at acceptable levels? (Cylinders, solenoids, 3-point sets, motors, limit switches, belts, proximity switches, photoelectric tubes, inside and outside control boxes, measuring equipment, etc.)						
	• Are looseness, play, vibration, wear, whining noise, and heat generation at acceptable levels? (Motors, solenoids, fastening plate of limit switches, relays, wiring, bolts, nuts, etc.)						
3. Lubrication conditions	• Are waste, dust and oil contamination at acceptable levels? (Lubricator, oil cup, measuring gauges, cover of oil spout, lubrication piping, etc.)						
	• Are oil quantity, drip quantity, looseness, play, and vibration at acceptable levels? (Contamination of the oil itself, deterioration, piping joints, valves, speed controls, oil temperature, etc.)						
4. Status of cleaning machine vicinity	• Are ordering of tools, gauges, and spare parts in good condition? • Are indicators, such as covers, name plates and labels, in good condition? • Are unneeded parts and necessary products and parts in good condition?						
	• Are quality products and defective products separated? • Are passageways secured? • Is there any scattering of dust from other equipment?						
5. Counter-measures for difficult-to-clean locations, and generating sources	• Is there a future plan to create a list for generating sources and difficult-to-access cleaning locations for waste, dust and oil leakage?						
	• Have improvements been made for covers and cleaning tools? • Are there items to be inspected while cleaning? • Are cleaning locations divided up and apportioned?						
6. Status of TPM efforts	• Do all personnel understand TPM and participate in activities?	Evaluation score	10 points	20 points	30 points	40 points	50 points	
		Diagnosis						

Evaluation level			1 point (10 points)	2 points (20 points)	3 points (30 points)	4 points (40 points)	5 points (50 points)
	1〜5	Equip-ment	Almost completely un-implemented	Implemented insofar as can be seen	Implemented as far as specified locations, such as sliding parts and chutes	Implemented even for parts that cannot be seen	Cleaning and inspection are thoroughly implemented, and proceeding with difficult-to-access locations
	6	Per-son-nel	All personnel are indifferent	Only those in maintenance and management are active	Operators are active only in some simple areas	Being implemented by nearly all operators	Division of roles is clear and well implemented

Application Form for Top Executive Diagnosis	7 • 2	3 - 12

TPM

Application Form for Top Executive Diagnosis of Jishu Hozen (AM) (Step No. __)

Section Manager	Subsection Manager	Circle Leader

__/__/__

Applying department: _____ Circle _____ Subsection
_____ Section _____ Department

Target equipment: __

Since the Autonomous Maintenance Step No. __ activities are proceeding as shown below, I would like to apply for a top executive diagnosis.

1. Status of activities (progress, details, results, policies, etc.)

2. Autonomous diagnosis results

Date implemented: __/__/__ Section Manager comments:
Diagnosis evaluation: __ points
Diagnosed by:

3. Desired diagnosis date and time
__/__/__ __:__ - __:__

4. Top executive diagnosis date (decision)
__/__/__ __:__ -__:__

5. Application route

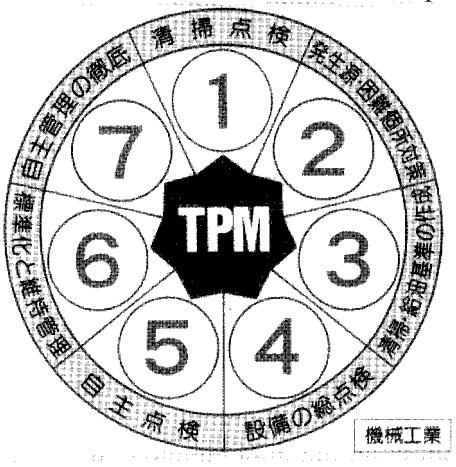
Promotion Office Manager	Promotion Office Receptionist

Circle Leader → Subsection Manager → Section Manager → Department Manager → TPM Promotion Office (Reception) (Coordinates diagnosis schedule)

Contact regarding diagnosis date

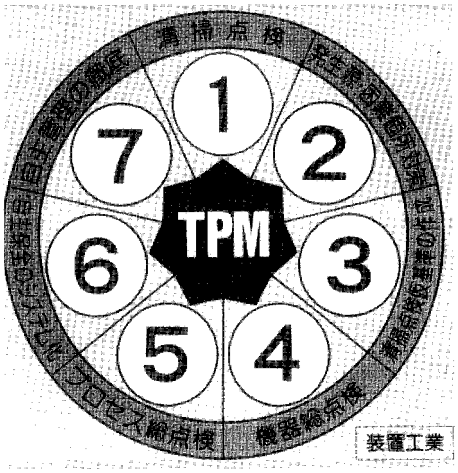
Jishu Hozen (AM) Passed Diagnosis Seal

Chart of Autonomous Maintenance Steps



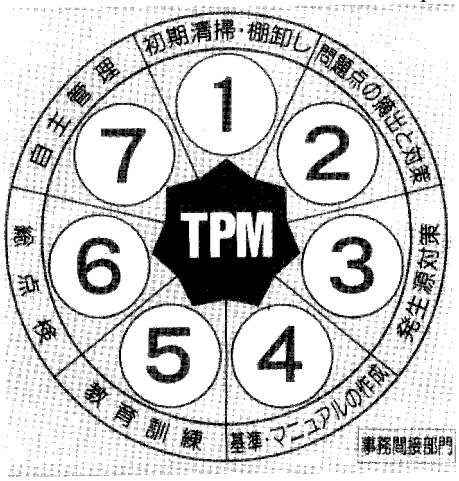
For the machine industry

Chart of Autonomous Maintenance Steps



For the equipment industry

Chart of Autonomous Maintenance Steps



For the machine industry/for the equipment industry

For Administrative/Indirect Divisions

- Usage method

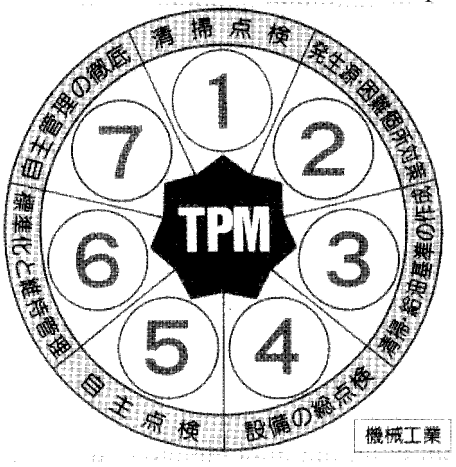
  Utilize these step charts in the course of implementing autonomous maintenance so that the level of progress of each equipment or line can be seen at a glance.

  Affix the "activity in progress" seal on the steps that are currently in progress. When the step has passed a diagnosis, write the date on the "passed" seal and affix the seal on the step. Further, affix the "activity in progress" seal on the next step at that time.

  - The printed set of "activity in progress" seals includes steps "4-1 - 4-6" ("6-1 - 6-6" are used for administrative/indirect divisions).

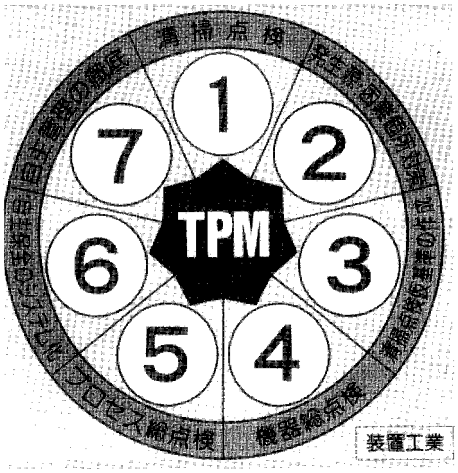
Jishu Hozen (AM) Passed Diagnosis Seal

Chart of Autonomous Maintenance Steps



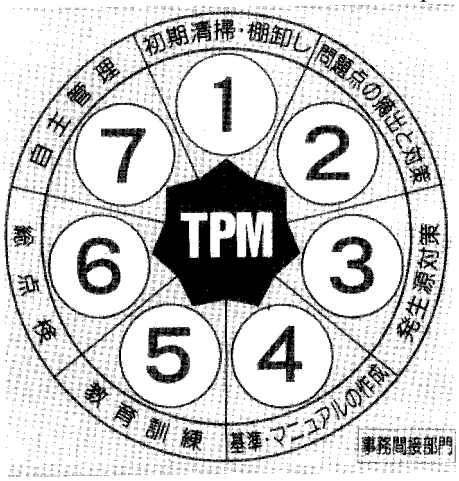
For the machine industry

Chart of Autonomous Maintenance Steps



For the equipment industry

Chart of Autonomous Maintenance Steps



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Preparation (Step 0)

1. Understanding of purpose
(1) Why will we implement autonomous maintenance?
(2) Why do we establish the basic conditions?
(3) On-site observation of equipment in one's charge

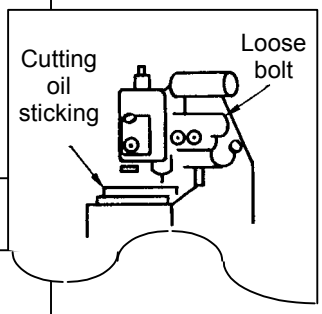
Implementation of meetings
- Circle Members
- Circle Leader
- Managers and Supervisors

2. Drafting of a plan

(1) Safety
- In connection with initial cleaning, create a list predicting things such as injuries and accidents (electrical shock, residual air pressure, roughness from detergent, dirt entering the eyes, fallen objects, etc.)
- Safety education and countermeasures for unsafe conditions, and prediction of unsafe conditions

(2) Status of forced deterioration and losses
- Why does forced deterioration occur?
- What kind of losses are generated when forced deterioration occurs?
- Investigate the conditions that cause defects, failures and minor stoppages?

(3) Understanding the equipment
- Draw a simple illustration of the equipment mechanism.
- Learn the functions of the mechanism.
- Consider what kind of problems would occur if there is dirt, the oil runs out or if a bolt is loose.



(4) Required skills
- Cleaning: Methods to skillfully remove dirt, and methods to find defects
- Oiling: Purpose, type, method, quantity and period
- Retightening: Purpose, proper tightening method, and how to use tools.

What is Jishu Hozen (AM) ?

Increasing advancement and complexity of equipment
Corporate expansion

↓

Division of maintenance functions
- Operations Division: Production — I make things, you fix them
- Maintenance Division: Maintenance

↓

Basic conditions lacking (cleaning, oiling and retightening)

↓

Deterioration is left as is and is worsening; insufficient sensitivity to problems

↓

Problems arise and equipment efficiency declines
Vicious cycle in which losses beget other losses

Changing our approach

Taking care of one's own equipment on one's own → Training personnel proficient on equipment

Prevent deterioration	Discover and measure deterioration	Restore and correct deterioration
Provision of basic conditions (cleaning, oiling and retightening)	Daily inspection Discovery of latent defects mainly through inspection using the five senses	Measures for problems
Correct operation by the operator		Minor provisions (simple parts replacement and stop gap measures)
Correct machine operation and set-up	Early discovery and rapid countermeasures for problems	Support for sporadic repairs
Recording of problem data		

Elimination of artificial forced deterioration
Discovery of problems connected with the cause
⇒ Prevention of problems beforehand

Improvement of productivity | Active workplace

Understanding TPM Jishu Hozen (AM) Safety and Health

Date Created: __/__
Special Committee for Safety, Health and Environment

1. Preparations

(1) Prepare implements (tools, ladders, stepladders, etc.) and protective gear (safety goggles, etc.) needed for the day, and verify that there are no problem products.

2. Enforcement of TBM-KY

(1) Verify the physical condition of all members (those in poor physical condition should not be made to work at heights).
(2) Perform a role call and verify that everyone is dressed properly and wearing protective gear.
(3) Practice KY in advance for the work of the day.

(TBM: Tool Box Meeting)

3. Understanding of safety by the nature of the work

Description of the work	Description of the risk	Countermeasures
Start of work	(1) The risk of something getting "pinched" or "entangled" due to some unforeseen motion caused by misoperation or contact with the control equipment (2) Risk of electric shock	1) Cut the main power and hang a sign indicating "Don't Turn Switch On!" * Decide who will hold the key switches for equipment with such switches, and have that person hold the keys. 2) Tighten the stoppers for the air, water, etc. * For pressurized lines, release residual pressure * Use a cross tie to provide support at locations where there is a risk of falling.
Working at heights	(1) Risk of crashing or slipping down (2) Risk caused by flying or falling objects	1) Wear a helmet. 2) Use a ladder or stepladder. * Set the ladder at an angle of about 75° and have a co-worker support the ladder * When using the stepladder, be sure to lock the hinged fastener to the stepladder, and do not stand on the top step 3) Secure your footing when working at heights 1) It is strictly prohibited to throw things up or down * Transport tools and other items up and down in a carrier bag 2) It is prohibited to work underneath someone who is working at heights 3) Take countermeasures where there is a risk of objects falling * Support with cross ties and immobilize with chain blocks
Joint work	(1) Risk of accident to co-worker due to arbitrary judgment of an individual (2) Risk of "pinching" or "entanglement" of co-worker when starting equipment or machines	1) When moving or transporting objects or when starting equipment or machines (including trial runs), ensure safety by always calling out, giving signals and making confirmation * In particular, be sure to clarify beforehand the division of responsibilities and the work position of each individual when performing distributed work on large-scale equipment, and be sure to perform a role call of all workers when starting equipment
Attaching and removing safety covers (including safety devices)	(1) Recurrence of past accidents due to the removal of a safety cover or due to a localized decline in functionality of a cover (the same goes for safety devices)	1) It is prohibited to leave a safety cover off or to leave safety equipment detached. Be sure to restore such safeguards and confirm their functioning. 2) Pay special attention to countermeasures taken for past accidents caused by localized reduction in the functionality of safety covers, and determine the pros and cons based on consultation with "Safety and Health." * Particular attention is required for equipment for which statutes and regulations apply.

Cleaning and Safety Education (Continued)

Description of the work	Description of the risk	Countermeasures
Usage of air	(1) Air blows chips and dust about, which enters the eyes of nearby workers Note: Blowing dust away by air dirties the surrounding area and can have the opposite effect by leading to failures in critical parts.	1) Blowing dust away with air is prohibited. * Use a hand broom or vacuum cleaner to clean chips and dust.
Usage of hand tools	(1) Accidents occur due to the substitution of tools Example A chisel is substituted for a file, the chisel breaks and a fragment impales the worker's eye.	1) Do not substitute tools. Use tools suited to the purpose of the task. 2) Do not use defective tools, such as worn or deformed tools.
Handling of organic solvents and chemicals such as acids and bases	(1) Contact with the skin causes burns or dermatitis (2) May cause blindness if it enters the eye	1) Wear protective gear when working with these substances (protective surfaces, rubber gloves, rubber boots and rubber cap) * Use a gas mask, as needed, when working inside a tank.
Handling of heavy objects	(1) Lumbago and slipped disk (2) Risk of dropping a heavy load when lifting or moving it.	1) Lift heavy objects using proper posture. * Lower your back, insert your hands under the load, grasp firmly and lift the load using your back as the center of gravity and keeping the load close to your back. Reference Male: 25 kg Female: 15 kg 2 Objects greater than 25 kg should be handled by 2 workers, and a dolly should be used to move the object.
Welding and fusing work	(1) Risk of accident due to mishandling (2) Risk of fire in the work area where oil is used	1) Welding and fusing work is prohibited to those without qualifications. 2) Do not approach while welding and fusing work is in progress. 1) Be sure to prepare a fire extinguisher in the vicinity where oil is used.
Handling of sheering and bending machines (held by person in charge of forging	(1) Accidents occur due to mishandling	1) Usage by unauthorized persons is prohibited. * Usage of shearing and bending machines, held by the person in charge of forging in the Machine Tools Department, is limited to authorized persons.
Improvement of control equipment	(1) Risk of misoperation when starting equipment or machines	1) Consult with the person in charge of electricity, and request that they improve critical machine parts and high voltage locations.
Transport by forklift	(1) Accidents occur due to operation by unqualified persons (2) Risk of striking someone during lift work, overturning while running, or collapsing of the load	1) Operation by persons other than qualified persons (wearing badge on left arm) is prohibited. 1) Drive safely and be careful of co-workers and other workers in the surrounding area. 2) Do not make contact with or lean against the load of the lift. 3) It is strictly prohibited to transport persons or lift them to a height with the lift.
Painting work	(1) Risk of solvent poisoning due to work performed in a sealed room.	1) Open the windows and doors in the room to ventilate while performing the work.
Trial operation	(1) Risk of "pinching" or "entanglement" of co-workers (2) Trouble caused by mislaid tools	1) Be sure to give a signal and check with your co-worker when starting equipment or machines for joint work. 1) Verify that there are no mislaid tools when starting equipment and machines.
Industrial waste	Note: Waste processing companies cannot take back industrial waste unless it is properly sorted.	1) Sort waste products (waste, scraps, oil, sludge, etc.) and transport them to the specified waste disposal site.

Cleaning and Safety Education

7 • 2	4 - 3 - (2)

Equipment name		One-Point Lesson			
Division					
Major Classification	**Autonomous Maintenance**	Work step	**Step 0**	Basic work	**Initial cleaning**

Work procedure	Requirements	Key point/Why

Attire when performing initial cleaning

(1) Wear a hat
- Prevents injury to the head
- Prevents soiling one's hair

* Wear a helmet as needed

(2) Safety goggles

(3) Mask

* Wear as needed

(4) Wear protective gloves

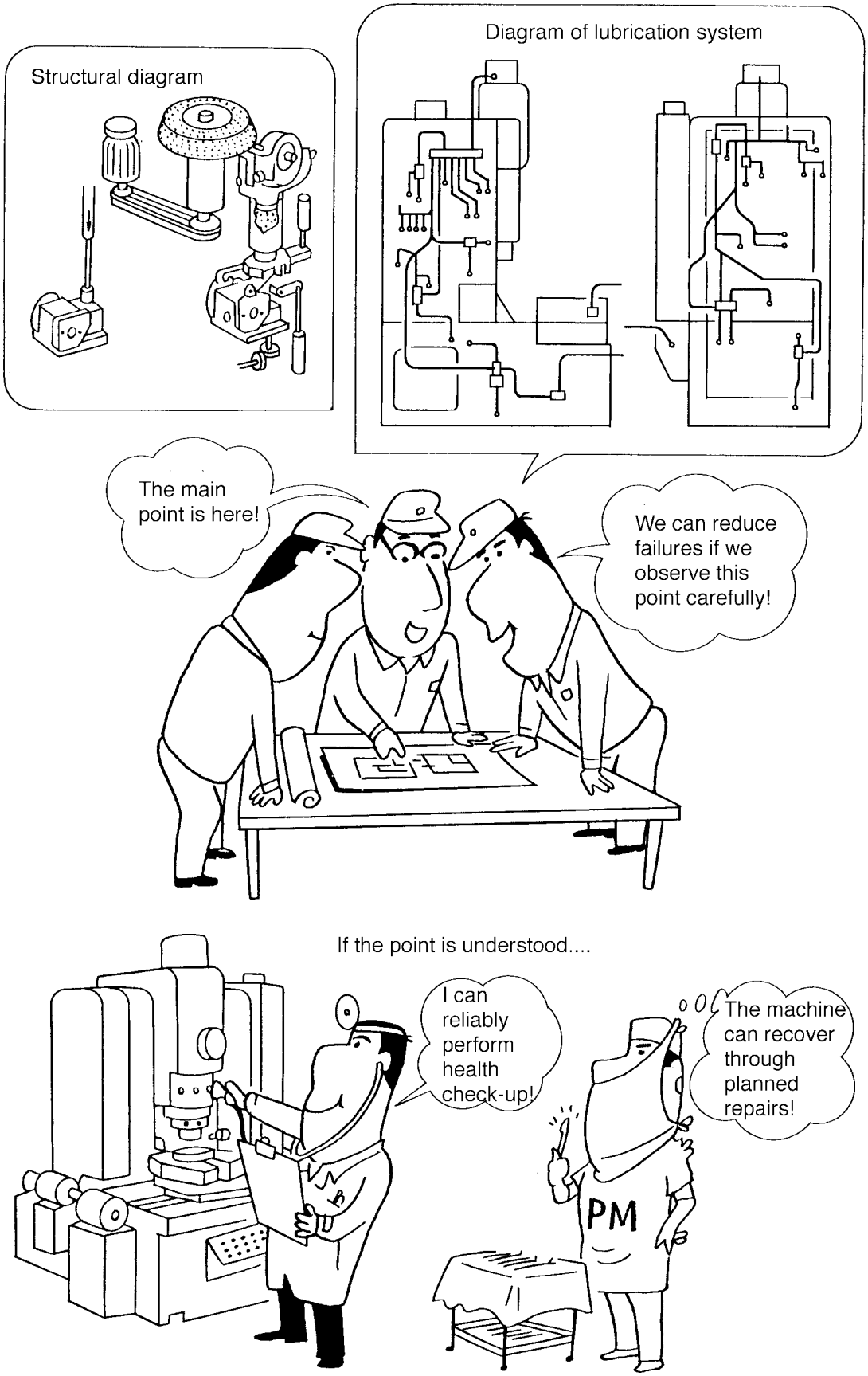
(5) Wear prescribed shoes
- Worn-out heals are prohibited
- Wear safety shoes in accordance with your assigned post

Education record		Section Manager	Created by	Creation date	Standard amount of time	Level
					__ minutes	Beginner Intermediate Advanced

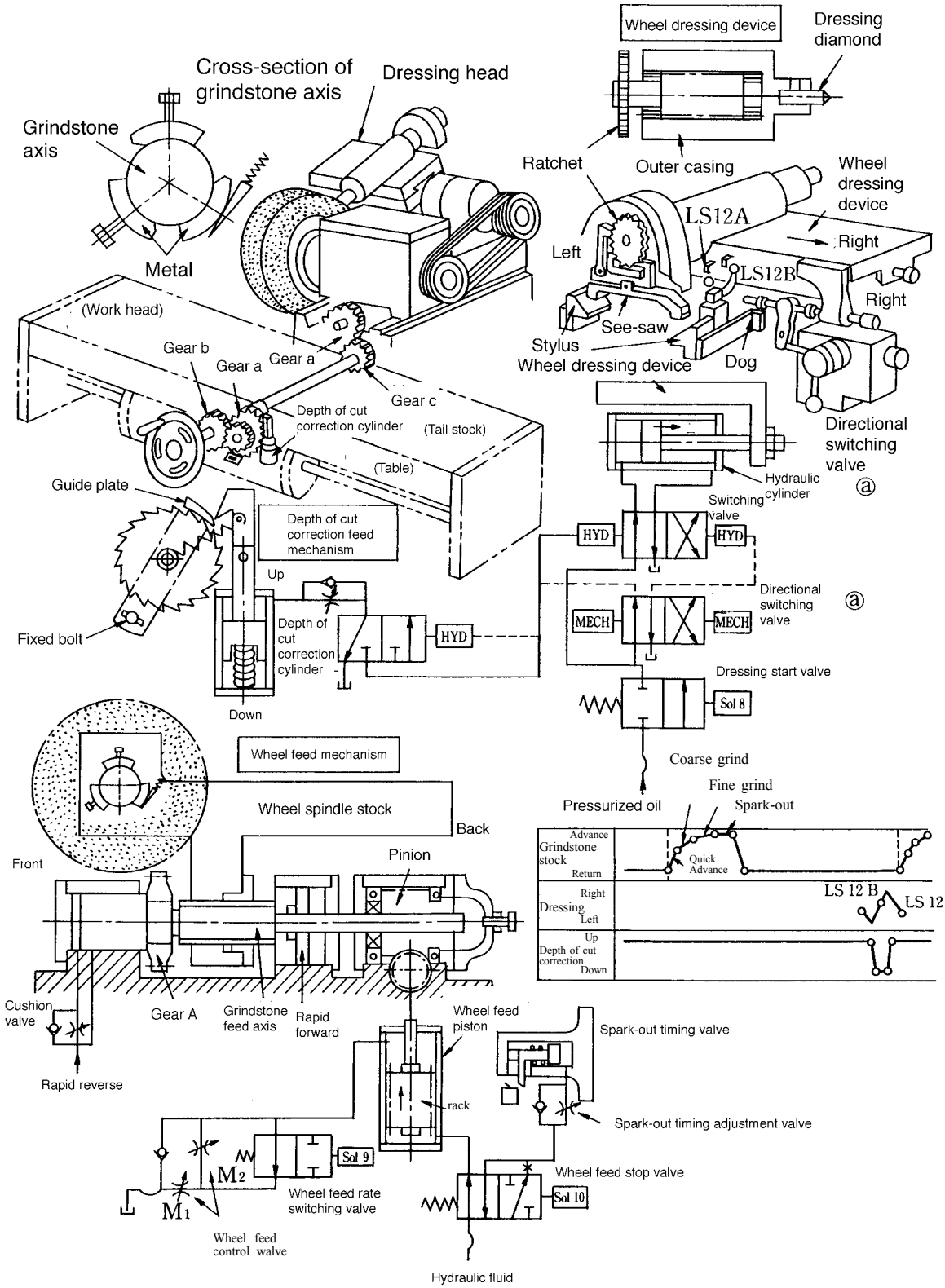
Example of Forced Deterioration Due to Inadequate Cleaning

(1)	Cause of failure	Contamination by dirt or fallen matter in rotating parts, sliding parts, air and oil pressure systems, electrical control systems, sensors, etc. causes a drop in accuracy, misoperation or a failure due to wear, jamming, resistance, poor electrical conductivity, etc.
(2)	Cause of quality defects	Direct contamination by foreign matter in products and misoperation of equipment results in quality defects.
(3)	Cause of forced deterioration	Waste and dirt makes it difficult to inspect for looseness, cracks, play and out-of-oil conditions, resulting in forced deterioration.
(4)	Cause of speed losses	Dirt increases frictional resistance and sliding resistance resulting in speed losses such as decreased performance and idling.

Creation of Structural Diagram of Mechanism



Structural Diagram of Cylindrical Grinder



Educational Materials for Cleaning, Oiling and Retightening Work (One-Point Lesson)	7 • 2	4- 6 - (1)

One-Point Lesson

Lubrication, grinding and cutting fluids	Classification No.:	A102-03
Theme: **What is correct oiling?**	Intermediate classification:	Oil lubrication
	Minor classification:	Control and maintenance

To eliminate lubrication defects, the correct oiling method:

- ■ .....uses the appropriate lubricating oil
- ■ .....is performed at appropriate periods, such as when supplementing oil or making replacements
- ■ .....applies only the standard amount of oil
- ■ .....is performed with the proper lubrication method.

Know-Why

Appropriate oil
→ Performance is maintained by oiling with a lubrication oil suited to the machine.

Know-Why

Appropriate time
→ When the oil supply level falls below the lower limit, air is sucked in, causing a loss of oil film on lubricated parts and resulting in abnormal wear.

Know-Why

Appropriate quantity
→ If excessive, an excessive amount of lubricating oil is mixed in, causing the oil temperature to rise and foam to appear. As a result, deterioration advances, causing a drop in viscosity and lubrication defects.
→ If inadequate, an oil film cannot be formed on lubricating surfaces, causing galling and seizing, which leads to mounting expenses for parts replacement.

Know-Why

Appropriate method
→ Maintains performance through oiling with lubricating oil suited to the machine.

Date implemented	/	/	/	/	/	/	/	/	/	/
Who (Person in charge of training)										
To whom (Person who received training)										
Evaluation after implementation	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2

Evaluation 1. Understands but cannot perform the work 2. Can perform the work to some extent
3. Can perform the work with confidence 4. Can teach others

Educational Materials for Cleaning, Oiling and Retightening Work (One-Point Lesson)	7 • 2	4- 6 - (2)

One-Point Lesson

Nuts and bolts	Classification No.:	A400-04	
Theme: **Torquing and Retightening**	Intermediate classification:	Basics of nuts and bolts	
	Minor classification:	Basics	

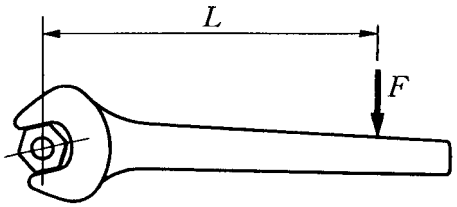
Appropriate tightening is:

- Using both bolts and products within elastic limits
- Not exceeding the yield point even if an external force, such as vibration or shock, is applied.
- Using adequate tightening force to avoid loosening

Retightening is:

- Retightening bolts loosened by vibration or shock so that the bolt is returned to its original tightness; retightening is not tightening beyond the original torque.

Torque



Torque $T^{kg \cdot cm} = F^{kg} \times L^{cm}$

Standard torque table

Bolt		Standard torque (kg-cm)	
Type	Diameter	Normal bolt	High-tension bolt
Metal coarse screw thread	6mm	64	130
	8	135	280
	10	280	560
	12	490	1000
	14	800	1600
	16	1200	2500
	20	2400	4900
Whitworth coarse screw thread	3/8	230	420
	7/16	370	770
	1/2	550	1150
	9/16	820	1600
	5/8	1140	2300
	3/4	2000	4300
	4/8	3300	6900

Date implemented	/	/	/	/	/	/	/	/	/	/
Who (Person in charge of training)										
To whom (Person who received training)										
Evaluation after implementation	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2	4 1 / 3 2

Evaluation 1. Understands but cannot perform the work 2. Can perform the work to some extent
3. Can perform the work with confidence 4. Can teach others

Procedure to Implement Step 1: "Initial Cleaning"

* The purpose of Step 1 is to understand the relationship between equipment defects and forced deterioration, and to master the concept of "cleaning is inspection."

Preparation for initial cleaning

1. Obtaining consensus of activities, dividing roles, and sharing of goals and purposes
2. Scheduling of activities (in monthly, weekly and daily units)
3. Taking pictures of the actual situation before cleaning
4. Preparation of safety tools, cleaning tools, cleaning agents, tags, problem lists, etc.
5. Implementation of safety one-point lessons (how to turn the power off, how to tighten plugs, how to release residual pressure and how to work at heights)
6. Implementation of one-point lessons such as "what are problems" and "what are key points of management (equipment and machine parts)" → (treating problems with equipment seriously)
7. Understanding and recognizing management key points through one-point lessons on the structure and functions of equipment
8. Observation of a pilot organization model machine: All personnel recognize the level needed to receive a "passed" qualification

Implementation of initial cleaning

1. First carry out safety measures
2. Implement "exterior cleaning" and "cleaning of machine parts" for the equipment main body and auxiliary equipment. (There are many cases where countermeasures for generating sources and countermeasures for scattering proceed together.)
3. Identification and tagging of equipment problems (record in problem list)
4. Provision of basic conditions for overall equipment (correcting problems, improvement, oiling, and retightening)
5. Find the key points (machine parts) of management (illustrate in tentative cleaning standards)
6. Provide those basic conditions so that the key points of management can develop → Establish conditions in which functional problems can be seen
7. Trial run: Adequately verify safety
8. Cleaning and finishing up of equipment surroundings

Measurement of effectiveness

1. Correction of problems and effectiveness of improvement: As much as possible, use a "quantitative measurement"
2. Taking pictures after cleaning: As a rule, take photos of fixed points
3. Measurement of cleaning time: How long did it take?
4. Understanding of cleaning period: What is the cleaning frequency needed to maintain cleanliness?
5. Understanding of cleaning locations: What location should be cleaned daily?
6. Identification of difficult-to-access cleaning and inspection locations ---- Record in the list for generating sources and difficult-to-access locations (identification of issues for Step 2)
7. Identification of generating sources ----
8. Identification of physical latent defects in the key points of management (record in the list of difficult-to-access locations)

Circle meetings

1. Number of problems identified and understanding details thereof
2. Investigation of countermeasures (restoration and improvement) for problems
3. Consider requesting other departments to take countermeasures for problems, and share know-how (one-point)
4. Sharing know-how through case examples of countermeasures for problems (one-point)
5. Raising the level for providing basic conditions (investigation of improvement) (Safer, more comfortably, more simply, in a shorter period of time, etc.)
6. Determination of next activity schedule, activity details and things to prepare
7. Creation of an activity report, and recording performance on the activity board

Preventing future recurrence

1. Creation of basic "tentative cleaning standards" and a basic "cleaning system diagram"
2. Training of behavior based on tentative standards
3. Implementation of autonomous diagnosis: On an equipment and circle unit basis
4. Implementation of tentative step diagnosis: On an equipment unit basis
5. Implementation of final step diagnosis: On a circle unit basis

Advance to Step 2

Tentative diagnosis of all equipment
Final diagnosis on a circle unit basis — Advance after passing the diagnosis

Activity Plan for Step 1

		_____ Circle _____ Section _____ Department
Purpose		
Activity item		Date
1	Initial cleaning	
2	Identification of minor defects	
3	Improvement activities	
4	Verification of improvement effectiveness	
5	Autonomous diagnosis	
6	Top executive diagnosis	

Map of Cleaning Area

_____ Circle _____ Section _____ Department

Illustration	Area	Person-in-charge	Remarks

Cleaning Procedure

Created: __/__/__ _____ Circle _____ Section _____ Department

Machine name:							
Illustration	No.	Part	Standard	Method	Tool	Person-in-charge	Time

Cleaning points (illustration or photo)				
(1)	(2)	(3)	(4)	(5)

Map of Oiling Locations

_____ Circle _____ Section _____ Department

Model: __			Machine No. __
General view			
Oiling points (illustration or photo)			
(1)	(2)	(3)	(4)

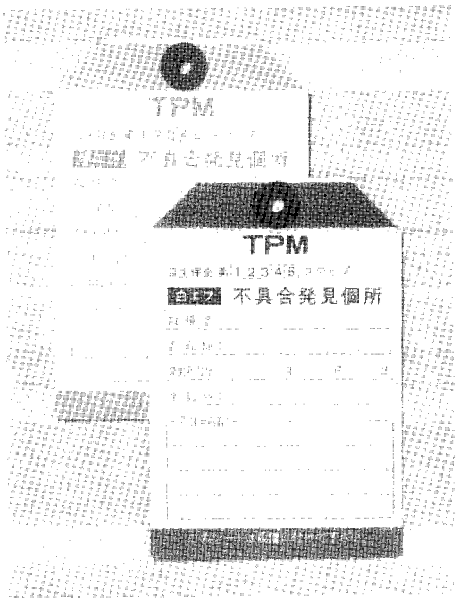
Map of Retightening Locations

_____ Circle _____ Section _____ Department

Model: __			Machine No. __
General view			
Retightening locations (illustration or photo)			
(1)	(2)	(3)	(4)

Example of Tags and Usage

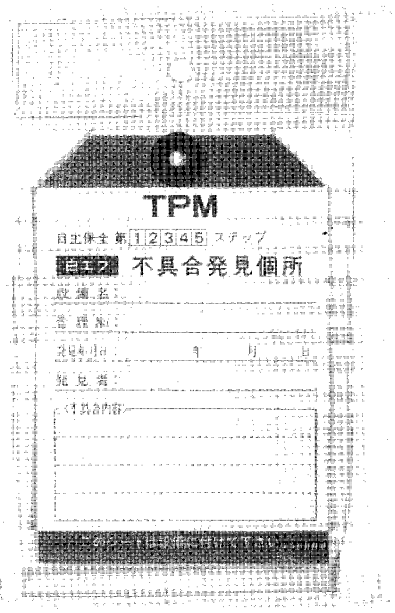
Red tags and white tags



● Usage method

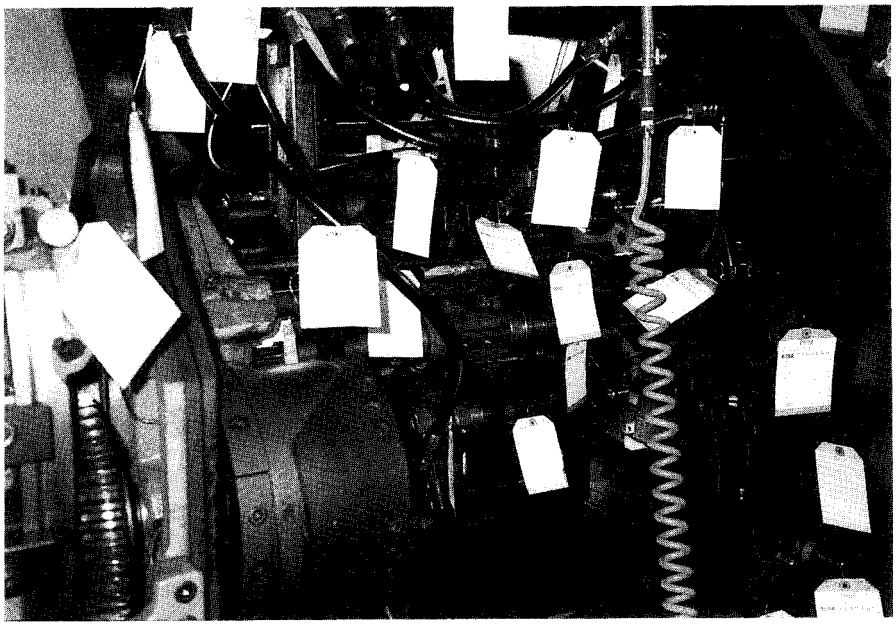
In autonomous maintenance steps 1-5, the operator inspects his/her own equipment and attaches tags to locations where problems were discovered. A white tag is used for locations where repairs can be made on one's own and a red tag is used when it is necessary to request repairs to specialized maintenance staff. Since the tags are in duplicate, tear off one copy after recording the details and keep it as one's own copy.

Case for inserting tags



● Usage method

Use the tag case when attaching tags outside or at locations where water or oil may splash. The bottom of the case has a resealable closure, making it easy to insert and remove tags as well as to reuse the case.



Example of usage

Planning Chart for Improving Slight Defects

Machine name: _____ Section _____ Department

Part	No.	Details of minor defect	Countermeasure		Schedule (month)						Completion
				Person-in-charge							
Illustration or photo											

Classification Table of Identified Slight Defects

Machine name: _____ Section _____ Department

Part	Details of minor defect		Identification		Improvements and countermeasures		Scheduled completion date	Completion date	Improvement results	Relationship to 7 major losses							Area			Improvement sheet	
	Identification symbol	◎: Can be processed during operation ○: Processed during change-over △: Processed when the line is stopped	Month/day	Identified by	◎: Handled in the circle ○: Make request to maintenance staff △: Make request to engineering staff Person-in-charge	Details				Failure losses	Cutting blade replacement losses	Set-up and adjustment losses	Start-up losses	Minor stoppage losses	Speed losses	Defect and reworking losses	Generating source	Difficult-to-access cleaning location	Difficult-to-access oiling location	Issuance No.	Person-in-charge

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Classification Table of Identified Slight Defects

Registration No. __

Know-Why Sheet

Case name				Identified by	
Circle name	Date created	Created by	Section Manager	Subsection Manager	Circle Leader
	__/__/__				

What kind of defect is it?	What will happen if left as is?
Why did this occur?	**What countermeasures will you take?**

Horizontal replication	Circulate	→	→	→	→	→	→	→	→
	Verification seal								
Record of education	__/__	/	/	/	/	/	/	/	/
	Name								

Table of Identified Difficult-to-Access Locations for Cleaning, Inspection and Oiling

Machine name: _____ Section _____ Department

No.	Area			Description of difficulty	Reason for difficulty	Countermeasures		When will it be done by (month)?					
	Cleaning	Inspection	Oiling			Description	Person-in-charge	Month	Month	Month	Month	Month	Month

Improvement Sheet

1. Autonomous maintenance
2. Individual improvement
3. Quality maintenance
4. Other

No.

Created: __/__/__

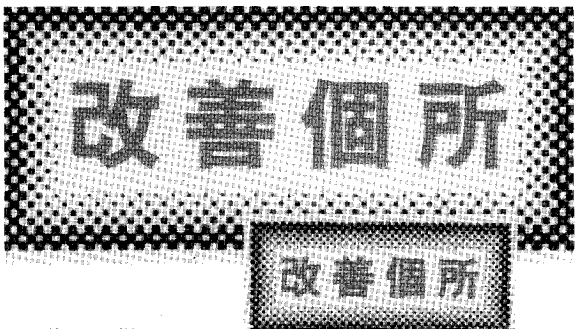
Case name			
Purpose of improvement			
Target machine	_____ Subsection _____ Section Machine No. __		
Suggested by		Estimated expenses	
Scheduled implementation date	__/__/__	Scheduled to be implemented by	
Completion date	__/__/__	Implemented by	

(Before improvement)	(Illustration)

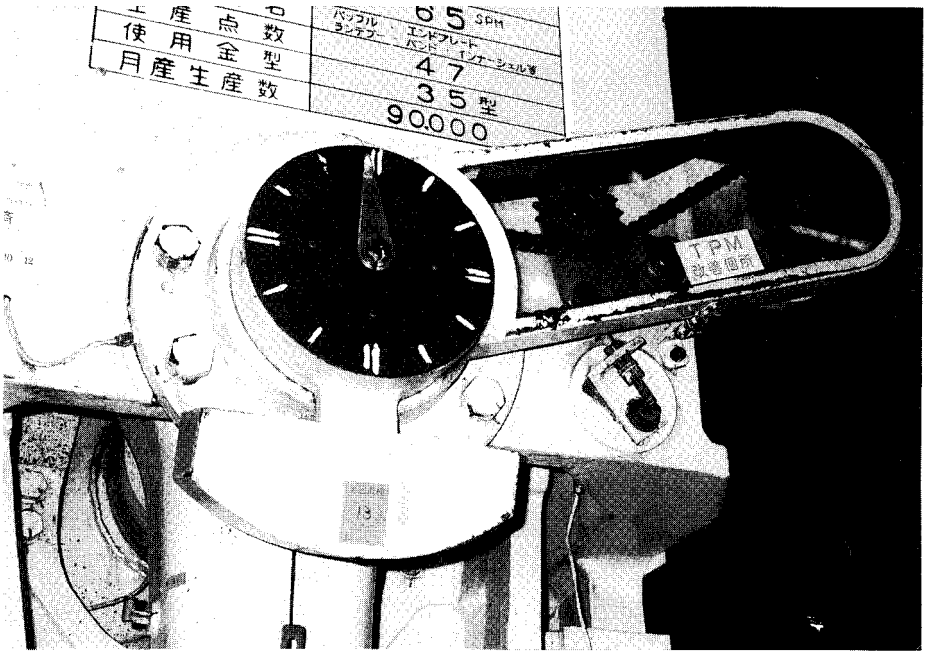
(After improvement)	(Illustration)

(Effectiveness, and policies after improvement)

Improvement Location Seal

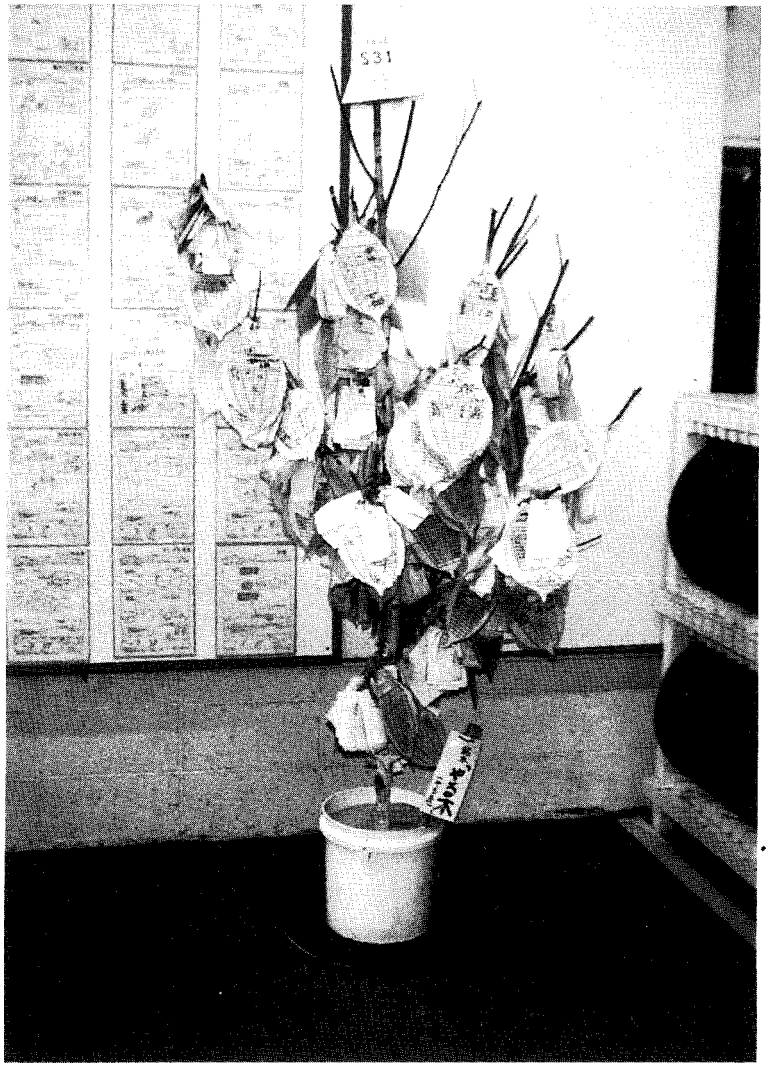


- Improvement location seal
  (Top: Large; Bottom: Small)



Usage example

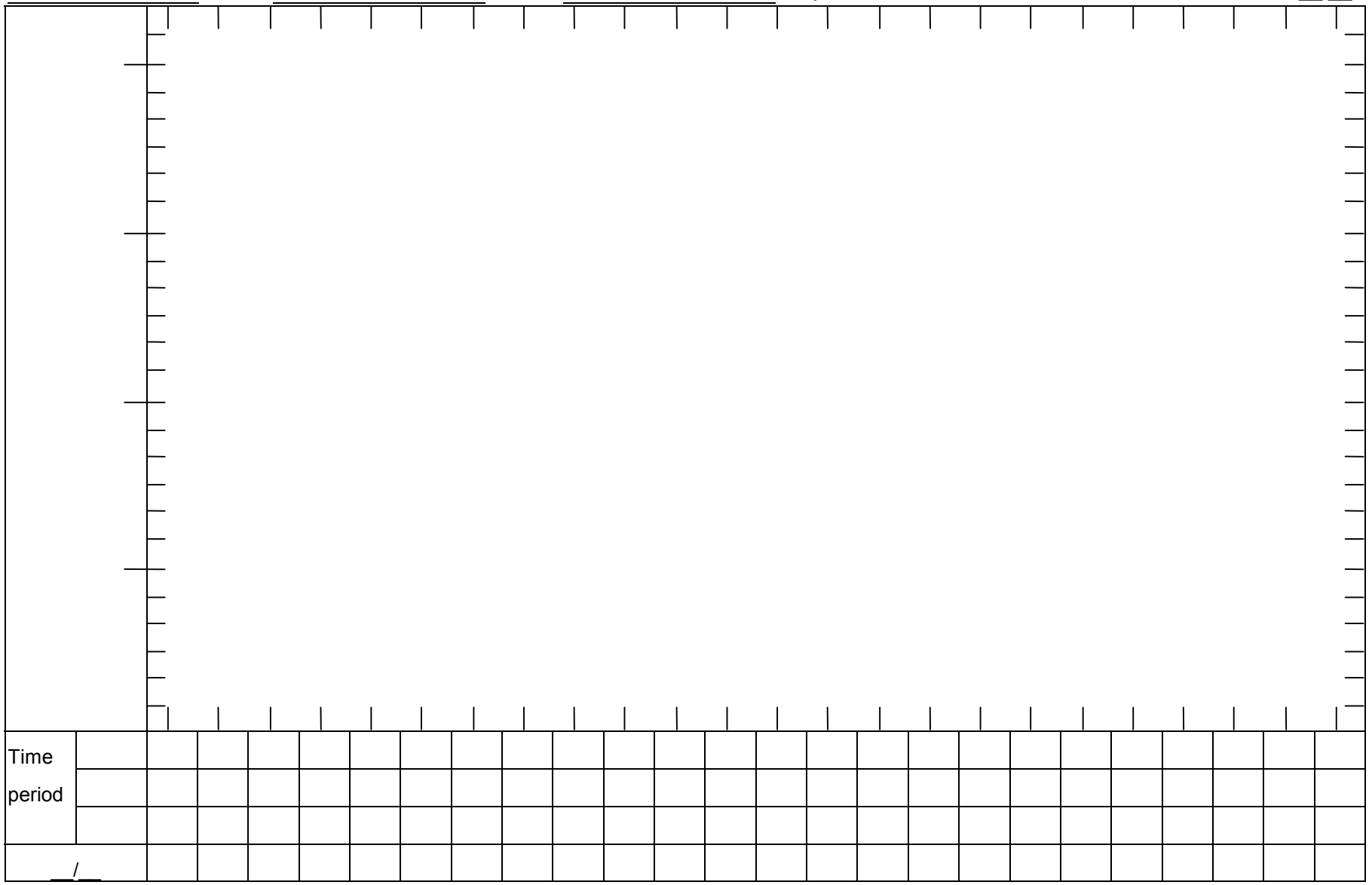
Tag Removal Tree



Actual example

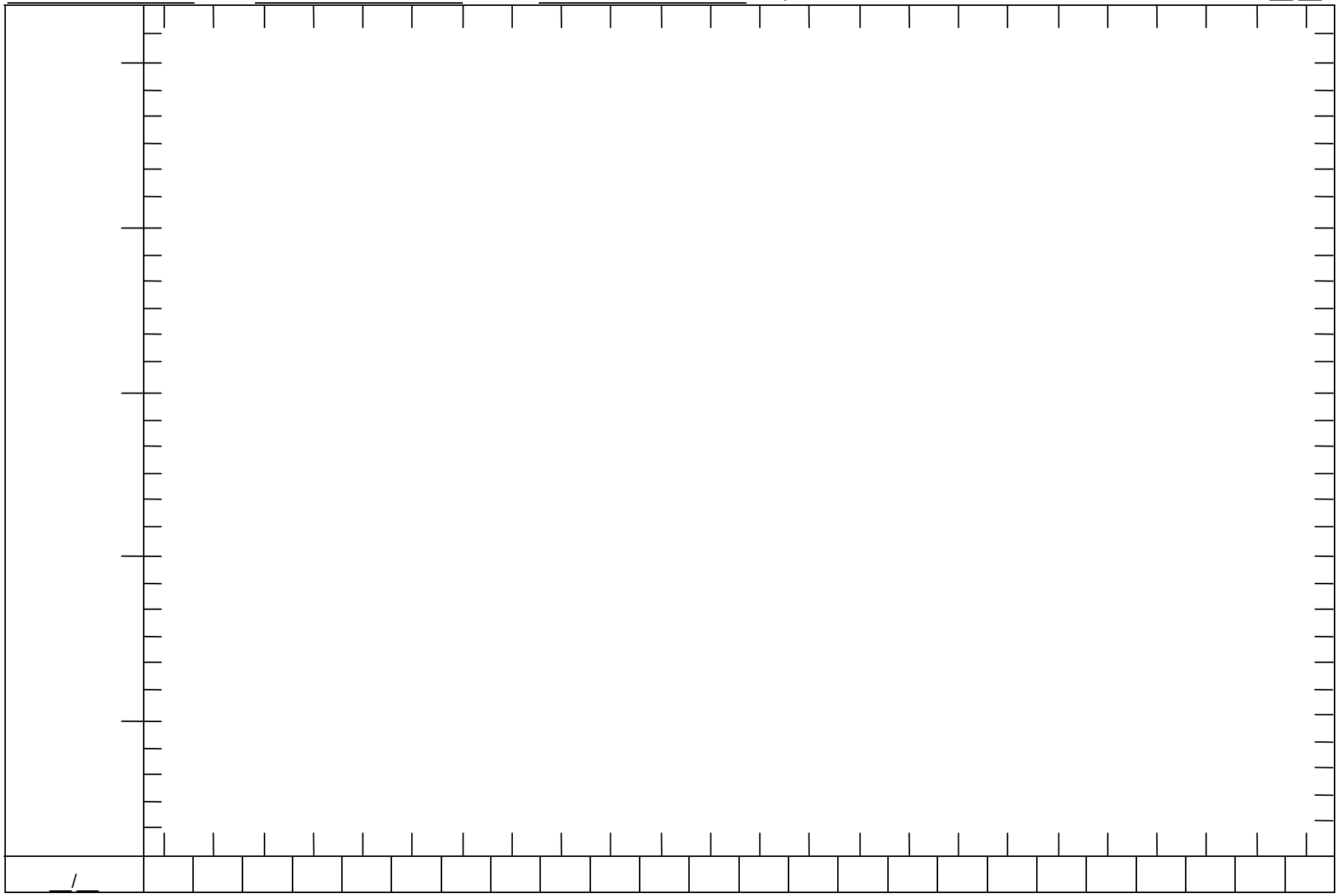
Autonomous Maintenance Step 1: Changes in Activity Time

Circle _____ Section _____ Department _____ __/__



Autonomous Maintenance Step 1: Changes in the Number of Tags Attached

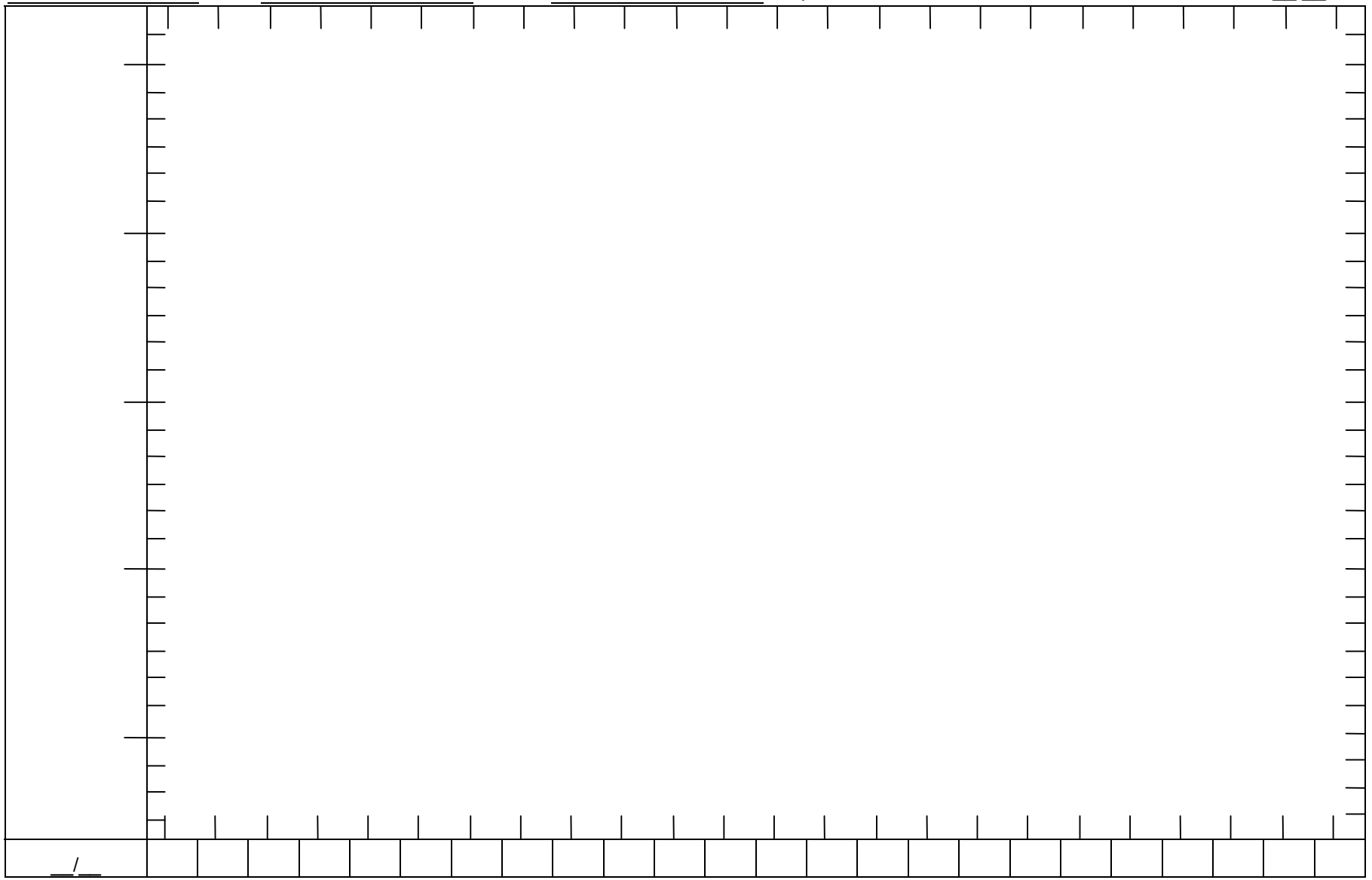
Circle _____ Section _____ Department _____ __/__



__/__

Autonomous Maintenance Step 1: Changes in the Number of Know-Why Sheets Issued

_____ Circle _____ Section _____ Department __/__



__/__

Step 1 Diagnosis Sheet

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Subsection Section **TPM autonomous maintenance Step 1**

Department **Initial cleaning diagnosis sheet**

Target equipment:

Diagnosis date: __/__/__

Diagnosed by

General inspection
__/100 points

Pass / Try again — 80 points or more

	Viewpoint / Area	Diagnosis points and items cited: Look, touch, listen, smell — Is cleaning being done so that things can be inspected? Chemicals, waste, dust, rust, mist, paper scraps, scales, glass shards, metal scraps	Breakage, wear, deformation, defects, play and dirtying of parts	Are there any defects in the positioning or attachment of parts or loosening of nuts and bolts?	Not oiled Inadequate oiling Amount of oiling unknown Not visible No level indicator	Are difficult-to-access cleaning and oiling locations made tangible?	Evaluation points: Are problems uncovered and countermeasures completed?	Problems exhaustively uncovered but counter-measures not yet completed	Problems not yet completely uncovered	Problems continue to arise	Not attempting to find problems
Have you exhaustively uncoveredproblem points from a functional viewpoint?Have you corrected those that can be dealt with?	The machine surroundings are: Floor, wall, pillar, inside a pit, curtain, ceiling ( )						7	5 / 6	3 / 4	2	0
	The machine exterior is: Frame, piping, wiring, etc. ( )						9	7 / 8	4 / 6	2 / 3	0
	The machine interior is: Mechanical, optical, sensors ( )						15	11 / 13	5 / 7	2 / 3	0
	Peripheral equipment includes: ( )						8	6 / 7	4 / 5	2	0
	Spare parts, consumables, jigs and tools, measuring instruments ( )						6	4	2	1	0
	Control panel, electrical system, motor, pump ( )						7	4 / 6	2 / 3	1	0
	(Comments) __/52 Points										

	Item		Guidance items	Evaluation level and evaluation points				
Are counter-measures being taken for the generating sources of waste, dirt, rust and leakage?	Are the sources that generate dirt, leakage (oil, chemicals and air), waste, and dust understood?			Understands completely and keeps records	Understands for the most part	Only half understands	Does not understand many parts	Has almost no understanding
				5	4	3	2	0
	Are the amounts of leakage (supplemental amounts) and falling dust understood?			Understands completely and keeps records	Understands for the most part	Only half understands	Does not understand many parts	Has almost no understanding
				4	3	2	1	0
	Are efforts being made to take counter-measures for generating sources?	Taking measures on one's own		Fundamental measures are completed	Temporary measures are completed	Partial measures are completed	Created plan for counter-measures	Almost no work done at all
				5	4	3	2	0
		Requesting others		Plan for counter-measures is clear	Drafting of plan together with others in progress		Separated items to be requested to others	Almost no work done at all
				3	2		1	0
Are counter-measures being take to prevent splashing and to prevent the introduction of waste?	•Are measures being taken to prevent splashing of chemicals, mist, oil and water? •Are measures being devised for materials, attire, writing implements and paper?	Taking measures on one's own		Completed counter-measures with good ideas	Completed partial counter-measures	Gathering ideas	Isn't coming up with good ideas	In a disposition to give up
				4	3	2	1	0
		Requesting others		Plan for counter-measures is clear	Drafting of plan together with others in progress		Separated items to be requested to others	Almost no work done at all
				3	2		1	0

What is the status of visual autonomous maintenance activities?

(Comments) __/ 24 points

Item \ Evaluation standard	Visually understood	Created a report	Data collection in progress	Discussions have started	Not started at all
(1) Are the number of problem points understood and their relationship to the 7 major losses understood?	5	4	3	2	0
(2) Is the effectiveness of autonomous maintenance grasped in a visual form (failure losses, minor stoppage losses, speed losses, and set-up and adjustment losses)	5	4	3	2	0
(3) Are review meetings held and do all members understand the problem points of that day?	5	4	3	2	0
(4) Are suggestions for improvements being made?	4	3	2	1	0
(5) Are future methods to advance the process systematic? (Motivating slogans and future autonomous maintenance plan)	5	4	3	2	0

(Comments) __/ 24 points

Procedure for Implementing Step 2

* Step 2 eliminates the "sources" of forced deterioration, and implements mechanisms that keep this activity to a short period of time.

Preparation of countermeasures for generating sources and difficult-to-access locations

1. Obtaining consensus of activity, dividing roles, and sharing of goals and purposes
2. Scheduling of activities (in monthly, weekly and daily units)
3. Taking pictures of the actual situation before cleaning
4. Preparation of materials and tools for improvement (cardboard, gum tape, etc.)
5. Preparation of tags, list of generating sources and difficult-to-access locations, etc.
6. One-point lessons on "What are generating sources and difficult-to-access locations?" and "What are the physical latent defects of management key points?" (Use this textbook)
7. Training of skills on "Making things"
8. Implementation of one-point lessons on the structure and functions of equipment from the viewpoint of management key points.
9. Observation of a pilot organization model machine: Understanding the approach to improvement
10. Sharing of "improvement as it should be": Recognizing expense vs. effect

↓

Implementation of countermeasures for generating sources and difficult-to-access locations

1. First carry out safety measures
2. Identification of generating sources and difficult-to-access locations: Ongoing since Step 1
3. Identification of physically latent defects of management key points (difficult-to-manage functions)
4. Countermeasures for generating sources and difficult-to-access locations: Don't terminate countermeasures in the first phase of improvement!
5. Create the foundation for visual management of management key points (make visible the countermeasures for physically latent defects with respect to functional parts) --> "make transparent" and "make visible"
6. Implement "countermeasures for splashing": Start with a "cardboard strategy"!
   Stop → Enclose → Receive → Collect → Make easy to process → Visible
7. Compare the standard for passing Step 2 with the current level (make activity issues tangible)

↓

Measurement of effects

1. Effect before and after improvement: "Quantitative measurement" (the calculation standard is important)
2. Check variance of improvement cost vs. effect (evaluation results)
3. Take a photo after improvement: Take successive photos of each stage of improvement
4. Understanding the number of cleaning, inspection and oiling locations, and the required times and periods
5. Understanding the number of equipment management locations of management key points, and the required times and periods
6. Comparison of the standard for passing Step 2 with the current level (make activity issues tangible)

↓

Circle meetings

1. Understanding the number of generating sources and difficult-to-access locations, and the details thereof
2. Investigation of countermeasures and methods for generating sources and difficult-to-access locations: Analysis of causes is important! (Share the results)
3. Creating an example of taking a photo after improvement (know-how through a one-point lesson)
4. Consider making requests to other departments for improvements: Let's make improvements together!
5. Suggestions for ideas to visualize physically latent defects (locations with difficult-to-manage functions)
6. Determination of next activity schedule, activity details and things to prepare
7. Creation of an activity report and recording the results on the activity board

↓

Preventing future reoccurrence

1. Creation of tentative cleaning and inspection standards (standards evolved since the Step 1 tentative standards)
2. Training of behavior based on the tentative cleaning and inspection standards
3. Implementation of "visual schemes" for improvement locations ("Beige" strategy, etc.)
4. Step 3: Things needing further improvement
5. Implementation of autonomous maintenance: On an equipment unit and circle unit basis
6. Implementation of a tentative step diagnosis: On an equipment unit basis
7. Implementation of the final step diagnosis: On a circle unit basis

↓

Proceed to Step 3

Tentative diagnosis of all equipment
Final diagnosis on a circle unit basis — Advance after passing the diagnosis

Planning Chart for Step 2 Activities

		Circle Section Department
Purpose		
Activity item		Date
1	Clarification of generating sources and difficult-to-access locations	
2	Drafting of countermeasures	
3	Restoration and improvement	
4	Verification of improvement results	
5	Autonomous diagnosis	
6	Top executive diagnosis	

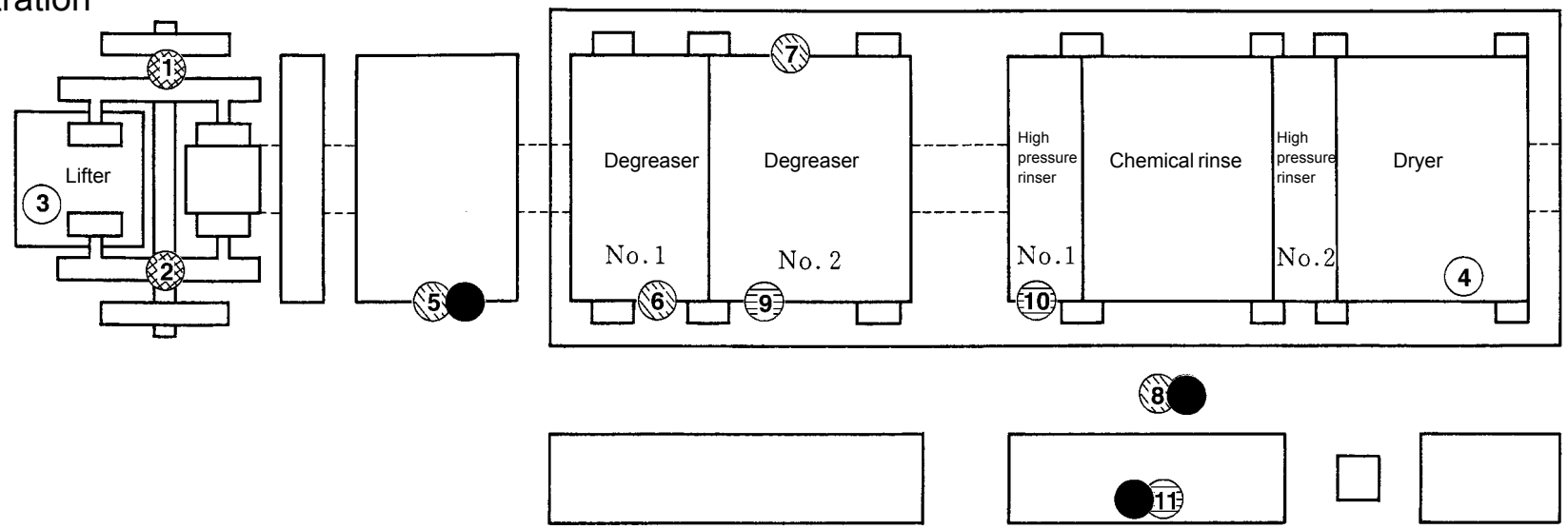
Map of Generating Sources

Circle Section Department

Dirt Oil leakage Countermeasures completed

Air leakage Water leakage

Illustration



No.	Part	Details
1	Loader	Oil leakage in bearing
2	Loader	Oil leakage in bearing
3	Lifter	Air leakage in air cylinder unit
4	Dryer unit	Air leakage in air knife pipe joint
5	Conveyor	Sprang from degreaser vat

No.	Part	Details
6	Degreaser vat No. 1	Dirt due to fluid leakage
7	Degreaser vat No. 1	Dirt due to fluid leakage
8	Passageway	Dirt due to water leakage from the sink
9	Degreaser vat No. 2	Leakage of coolant
10	High pressure rinser No. 1	Leakage of water from the packing unit

No.	Part	Details
11	Sink	Water leakage from the piping joint

Map of Generating Sources (What, Where and How Much)

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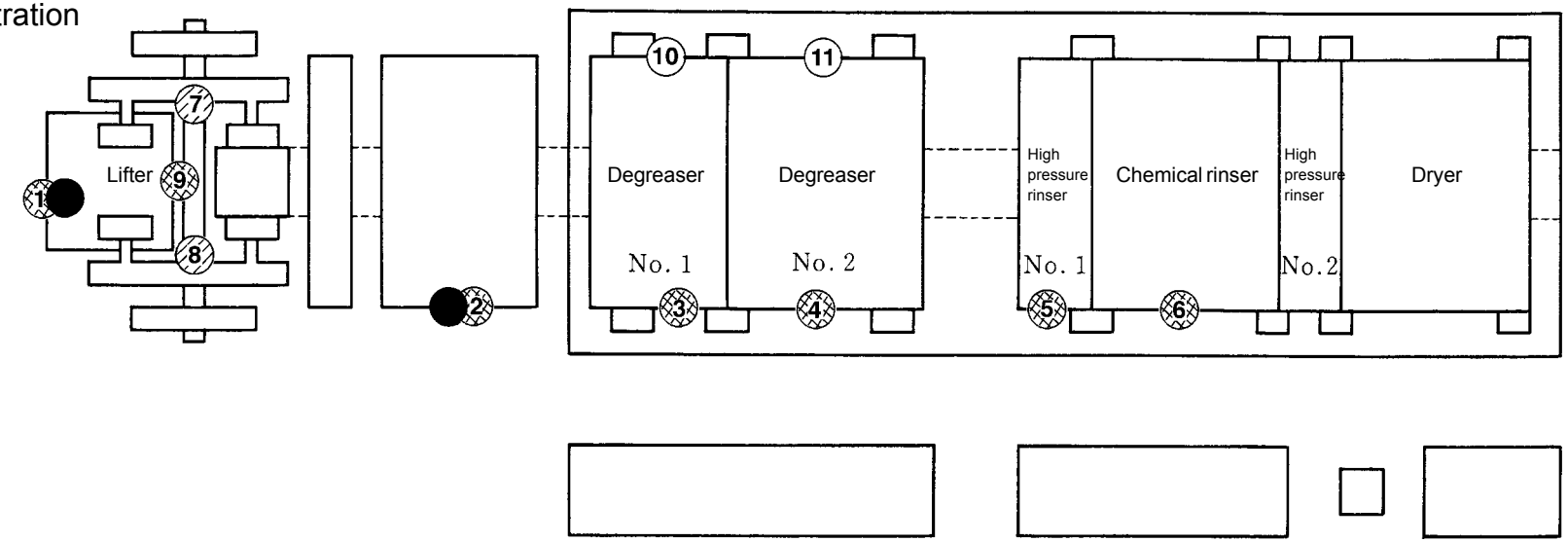
Map of Difficult-to-Access Cleaning, Inspection and Oiling Locations

Circle _____ Subsection _____ Section _____

Department _____ Machine name: __ No. __

Cleaning Oiling Inspection Countermeasures completed

Illustration



No.	Part	Details
1	Lifter	Cleaner does not fit underneath lifter
2	Conveyor	Cannot clean because of cover
3	Degreaser tank No. 1	Cannot clean because cleaning tools do not fit under the tank
4	Degreaser tank No. 2	
5	High pressure rinser No. 1	

No.	Part	Details
6	Chemical rinser	Same as Nos. 3-5
7	Loader bearing	Difficult to lubricate because grease inlet is on the inside
8	Loader bearing	
9	Loader shaft	Difficult to see inside during operation; cannot inspect because it is dangerous
10	Degreaser tank No. 1	

No.	Part	Details
11	Degreaser vat No. 2	Same as Nos. 9-10

Map of Difficult-to-Access Locations (What, Where and How Much)

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Why-Why Analysis Sheet

Why-Why Analysis Sheet

Section Manager	Subsection Manager	Circle Leader	Created by

Date created: __/__/__ Circle Section Department

Phenomenon	Description of analysis					Improvement points
	Why	Why	Why	Why	Why	

Planning Chart for Generating Sources Countermeasures, Improvements and Restoration

Schedule of Generating Source Counter-measures, Improvements and Restoration

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_____ Circle _____ Section

Machine name:

Map No.	Leakage			Dirt	Generating source					Details	Details of counter-measures	Person-in-charge			Classification				Schedule						
	Air	Oil	Water		Process itself	Post process	Ma-chining related	Equip-ment	Brought in			Within the sec-tion	Engi-neer-ing	Sup-plier	Elimi-nation	Reduc-tion	Range	Local	Month —	Month —	Month —	Month —	Month —	Month —	Com-pletion

Example of Countermeasures for Difficult-to-Access Cleaning and Inspection Locations	7 • 2	6 - 7

Improvement Sheet

1. Autonomous maintenance
2. Individual improvement
3. Quality maintenance
4. Other

No.

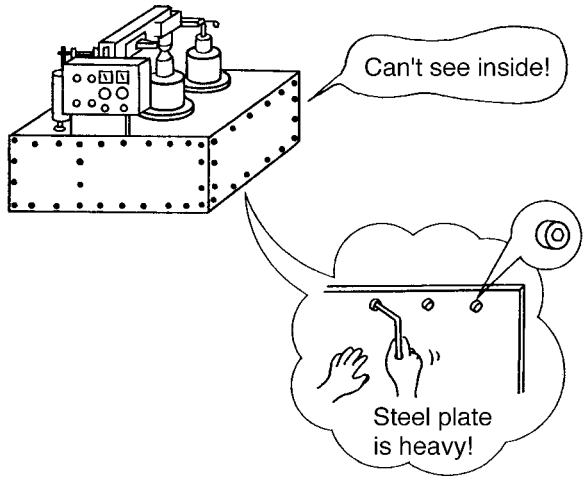
Created: __/__/__

Case name	Countermeasures for difficult-to-access cleaning locations in the __ line feeder unit		
Purpose of improvement	Reduction in cleaning time		
Target machine	Section	Subsection	Machine No. __
Suggested by		Estimated expenses	10,000 yen
Scheduled implementation date	__/__/__	Scheduled to be implemented by	
Completion date	__/__/__	Implemented by	

(Before improvement)

1. There are 100 bolts holding the cover, and these cannot be removed without a hex wrench.
2. Since removing the cover occupies 80% of the cleaning time,
3. An excessive amount of time is required, and cleaning is not performed very often.
4. Since the cover is made of a steel plate, it requires two persons to remove it.

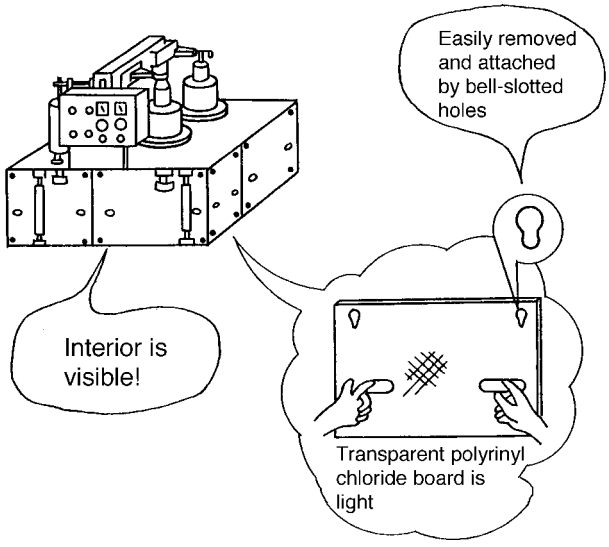
(Illustration)



(After improvement)

1. Changed the steel plate to a transparent polyvinyl chloride plate, and made it easy for one person to remove it by dividing the plate into multiple plates.
2. Change the plate mounting method to bell-slotted holes, making it easy to attach and remove.
3. Since the inside of the equipment is visible, the cleaning time is more readily decided.

(Illustration)



(Effectiveness, and policies after improvement)

Cleaning time: Greatly reduced from 40 minutes to 7 minutes

Cover removal: Reduced the number of persons needed for removal from 2 persons to 1 person

Example of Countermeasures for Generating Sources

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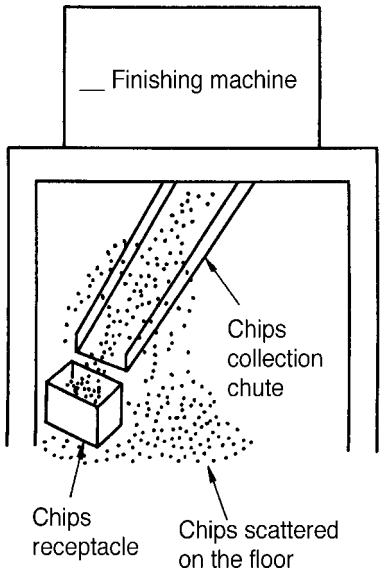
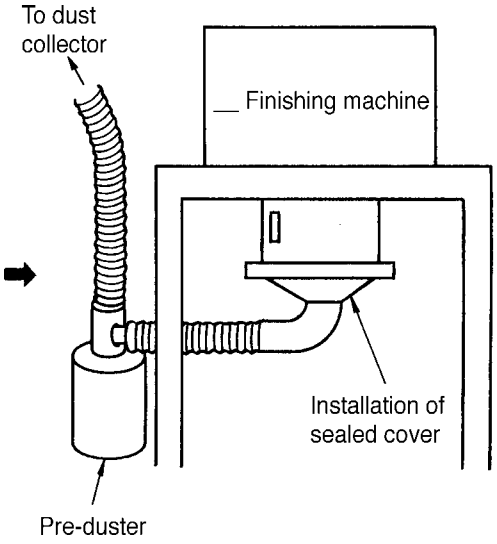
Report on Results of Circle Theme Improvements (Autonomous Maintenance)	Registration No.	

Circle __ Section __Subsection Leader: __

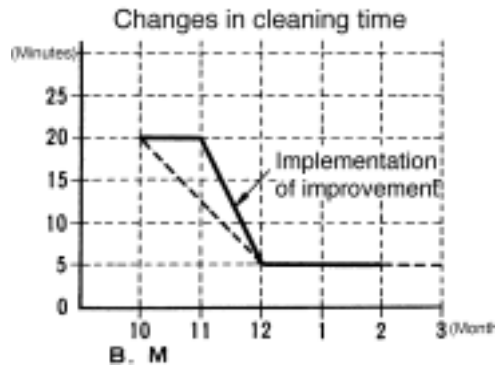
Theme: Reduction in cleaning time for __ finishing machine Serial No.: __-__

Reason for selection	**BM Goal**
Chips were funneled through a chute and scattered on the floor, causing excessive time for cleaning. Cleaning time was reduced by means of a cover to prevent scattering of the chips.	20 min/day → 5 min/day Period: 11/25/19__ - 12/26/19__

Before improvement	**After improvement**
	

Results of reduction in losses	5 hr/month	Effective amount	11,500 yen/month

Purging of 18 evils * Circle improvements that were made	1. Scattering of filings (4) Scattering of chips 7. Scattering of dust 10. Leakage of air 13. Leakage of water 16. Abnormal sounds	2. Leakage of rasaito 5. Leakage of cutting water 8. Leakage of hot solvent 11. Leakage of mist 14. Leakage of fluids for surface finishing, etc. 17. Abnormal heat	3. Leakage of grinding water 6. Scattering of casting sand 9. Leakage of oil 12. Leakage of odors 15. Omitted work 18. Abnormal vibration

Graph of results	**Prevention of future recurrences**	**Leader's comments**
	Standardization: 1 case Issuance of improvement sheet: 5 cases Creation of one-point lesson sheet: 5 cases	It was extremely difficult to make a cover in the limited time of the activity, but we were able to eliminate the scattering of chips on the floor with the cooperation of all members.

Received at TPM Promotion Office	Department Manager	Section Manager	Subsection Manager

Step 2 Diagnosis Sheet

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Subsection Section

Department

Target equipment:

Step 2 of TPM Autonomous Maintenance
Diagnosis Sheet for Countermeasures for Generating Sources and Difficult-to-Access Locations

Diagnosis date: __/__/__

Diagnosed by

Total points
__/100 points

Pass — 80 points or more

Try again

	Diagnosis points		Cited items	Evaluation points				
Are the conditions for passing Step 1 being maintained?	Is the level from Step 1 being maintained?			8 Even cleaner than when passed	7 Established in daily activities	6 The level when passed is being maintained	4 Passably clean	0 Slipped back to former condition
	Are they changing their viewpoint and uncovering problems?			8 Changing their viewpoint and uncovering many problems rapidly	7	6 Uncovering problems a little at a time	4	0 Uncovering almost no problems at all
	(Comments)							/16
Progress of counter-measures for generating sources	Countermeasures for generating sources of leaks, rust, dirt and waste	Are the respective generating sources being revealed?		4 Completely revealed	3 For the most part	2 About half	1 Less than half	0 Not revealed at all
		Are the respective amounts generated understood?		4 Completely understood	3 For the most part	2 About half	1 Less than half	0 Not understood at all
		Are the respective generating sources understood?		4 Completely understood	3 For the most part	2 About half	1 Less than half	0 Not understood at all
		Are measures that can be taken within the section being taken, and are results being obtained?		4 Results are clearly being obtained	3 Tentative results are being obtained	2 Countermeasures are completed, but results are not yet obtained	1 Countermeasures are in progress	0 Countermeasures are not being taken
		What about problems for which countermeasures were requested to other departments, and are results being obtained?		4 Request completed and results are being obtained	3 Execution in progress	2 Request in progress	1 Drafting of plan for countermeasures in progress	0 Not yet started
		(Comments)						/20
	Prevention of scattering and counter-measures ifor ntroducing waste	Have the generating sources for scattering (chemicals, mist, oil, water, etc.) been made tangible?		4 Completely made tangible	3 For the most part	2 About half	1 Less than half	0 Not made tangible at all
		Is the amount of scattering and the amount of waste introduced understood?		4 Completely understood	3 For the most part	2 About half	1 Less than half	0 Not understood at all
		Are the sources of scattering and introducing waste understood?		4 Completely understood	3 For the most part	2 About half	1 Less than half	0 Not understood at all
		Are countermeasures that can be taken within the section being taken, and are results being obtained?		4 Results are clearly being obtained	3 Tentative results are being obtained	2 Countermeasures are completed but results are not yet obtained	1 Countermeasures are in progress	0 Countermeasures are not being taken
		What is the status of problems for which requests were made to other departments, and are results being obtained?		4 Request completed but results not yet obtained	3 Request completed	2 Request in progress	1 Drafting of plan for countermeasures in progress	0 Not yet started
		(Comments)						/20

	Diagnosis points	Cited items	Evaluation points				
What is the status of counter-measures for difficult-to-access cleaning and oiling locations?	Have the difficult-to-access cleaning and oiling locations been revealed?		4 Have been completely revealed	3 For the most part	2 About half	1 Less than half	0 Not yet
	Are countermeasures being taken to make the machine vicinity easy to clean?		4 Countermeasures completed	3 For the most part	2 About half	1 Less than half	0 Not yet
	Are measures being taken to make the machine interior easy to clean?		4 Countermeasures completed	3 For the most part	2 About half	1 Less than half	0 Not yet
	Do piping and wiring get in the way of cleaning?		4 Countermeasures completed	3 For the most part	2 Countermeasures in progress	1 In planning	0 Not yet started
	Are efforts being made to increase the interval of cleaning and oiling?		4 Effectiveness is recognized	4 Some ef-fectiveness	2 In progress	1 Under consideration	0 Not yet started
	Are efforts being made to reduce the time for cleaning and oiling?		4 Greatly reduced	3 Reduced	2 Reduced somewhat	1 In planning	0 Not yet started
	Are measures that can be taken within the section being taken?		4 Countermeasures completed	3 For the most part	2 About half	1 Less than half	0 Not yet
	What about the problems for which countermeasures were requested to other departments?		4 Countermeasures completed	3 Request completed	2 Request in progress	1 Drafting of plan for countermeasures in progress	0 Not yet started
	Have preparations been made for Step 3 (creation of cleaning and oiling standards)?		3 Preparation completed	2 For the most part	1 Preparation in progress	0 Not yet started	
	(Comments)						/35
Status of autonomous activities	Have the themes been subdivided, and are the subdivided themes being pursued with specific numerical values?		3 Adequately subdivided and clarified	2 Satisfactory	1 Some parts not adequately pursued	0 Not subdivided	
	Are the results of PDCA in a form that can be understood?		3 Indicated in a manner than is easy to understand	2 Normal	1 Difficult to understand	0 Not indicated	
	Are the schedule and results of meetings indicated?		3 Indicated in a manner than is easy to under-stand	2 Normal	1 Difficult to under-stand	0 Not indicated	
	(Comments)						/9

Procedure for Implementing Step 3: "Creation of Tentative Autonomous Maintenance Standards"

* Step 3 establishes rules so that equipment conditions that do not cause forced deterioration can be maintained in a short period of time.

Preparation for Step 3 activities

- ♦ Improving the efficiency of cleaning and inspection
1. Preparation of improvements to more easily clean and inspect parts that dirty easily, and to more easily manage machine parts
2. Recognizing the difference between the level for passing Step 3 and the present level (revealing the issues)
3. Preparation of tentative autonomous maintenance standards and checklists
* Items other than those listed above need to be prepared, the same as for previous steps.
- ♦ General inspection of "lubrication" (in principle, this is performed in Step 4)
1. Leader education for lubrication management (education through manuals)
2. Education for circle members on lubrication management (correspondence education: One-point lessons)
3. Recognition of general inspection activity requirements
4. Creating a schedule of activities (on a monthly, weekly and daily basis)
5. Preparation of general inspection sheets and disassembly inspection tools for lubrication oil and lubrication equipment
6. Provision of an oil station
7. Making the oil types uniform — Implemented by supporting person
8. Observation of pilot organization model machine: Understanding of object of activity
9. One-point lessons on management key points related to lubrication oil and equipment

Implementation of Step 3 activities

- ♦ Improving the efficiency of cleaning and inspection → need to raise the level of visualizing key management points
- ♦ General inspection of "lubrication"
1. General inspection of lubrication oil — Investigation and analysis of the deterioration of oil types used, and changing oil; Changing the oil where the wrong oil type is used
2. General inspection of lubrication equipment — Inventory taking of lubrication equipment and locations to be oiled; Identification and countermeasures for problems and minor defects; Check the discharge quantity and destination
3. Improving the efficiency of oiling — Reducing the oiling frequency, and making the oil types uniform; Adoption of a central oiling system, and adoption of oilless equipment and parts
4. Creation of criteria and color coding for lubrication oil and equipment problems
   - Visual management
     - Revealing key management points (functional parts)
     - Visualizing key management points (functional parts)
     - Creation of criteria and color coding to distinguish normal from abnormal
       (It is important to create standards for basic conditions and for conditions that are used)

Measurement of effectiveness

- ♦ Improving the efficiency of cleaning and inspection: Measure the effectiveness visually, the same as in the previous step
- ♦ General inspection of "lubrication"
1. General inspection of lubrication oil — Quantity consumed and conditions of deterioration→ Set the oiling period; Oil temperature and coolant conditions → Understanding the appropriate temperature
2. General inspection of lubrication equipment problems — Effectiveness before and after countermeasures taken for machine (E.g., oil leakage, status of wear in functional units, etc.)
3. Improving the efficiency of oiling — Effect of oiling time and frequency→ Creation of MP system and engineering sheets
4. Visual management — Understanding the effects of visualization and color coding

Circle meetings

- ♦ Improving the efficiency of cleaning and inspection — Implemented the same as in the previous step
- ♦ General inspection of "lubrication"

* It is necessary for specialized maintenance personnel to provide guidance and tentatively divide roles for maintenance work functions

Preventing future recurrence

1. Creation of a lubrication system diagram, and training of behavior based on lubrication inspection standards
2. Verify lubrication and inspection skills (test of level of understanding)
3. Creation of tentative autonomous maintenance standards (standards evolved since the Step 2 tentative standards + lubrication technology)
4. Insertion of tentative rules in the tentative autonomous maintenance standards to prevent problems with key management points
5. Training of behavior based on the tentative autonomous maintenance standards
6. Establishment of issues for Step 4: Items that require further improvement
7. Implementation of autonomous diagnoses → Tentative step diagnosis → Final step diagnosis

Advance to Step 4

Tentative diagnosis of all equipment
Final diagnosis on a circle unit basis — Advance after passing the diagnosis

Planning Chart for Step 3 Activities

		Circle _____ Section _____ Department _____
Purpose		
Activity item		Date
1	Clarification of tentative standards	
2	Unification of tentative standards	
3	Implementation of inspection	
4	Verification of effectiveness	
5	Autonomous diagnosis	
6	Top executive diagnosis	

Tentative Cleaning and Inspection Standards

Illustration of cleaning and inspection	Machine name:	Section Manager	Subsection Manager	Circle Leader	Created by
Date created: __/__/__					
Created by: Circle Section Departmen					

No.	Location	Implemented by	Standard	Method	Frequency			Time	Clarification of purpose
					Daily	Weekly	Monthly		

Tentative Oiling Standard

Illustration of cleaning and inspection	Machine name:	Section Manager	Subsection Manager	Circle Leader	Created by
Date created: __/__/__					
Created by: Circle	Section	Departmen			

No.	Location	Implemented by	Standard	Method	Frequency				Time	Clarification of purpose
					Daily	Weekly	Monthly	Other		

Tentative Retightening Standards

(Date created: __/__/__)

Section Manager	Subsection Manager	Line Leader	Created by

_____ Headquarters/Business Department
_____ Line _____ Section _____ Department
Machine name:_____ Control No.:_____

Illustration of location to be retightened	Name of retightening location	Retightening standard	Point	Retightening tools	Retightening time (min per retightening)	Frequency of retightening			
						Daily	Weekly	10-days	Monthly

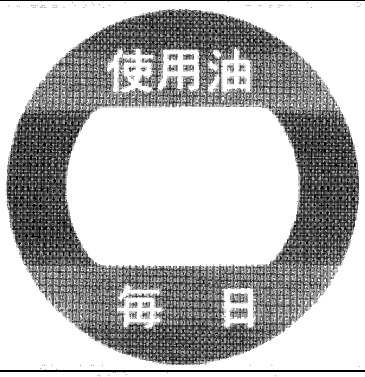
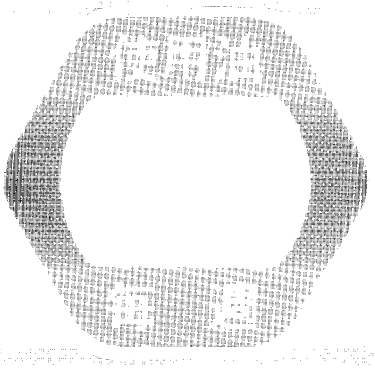
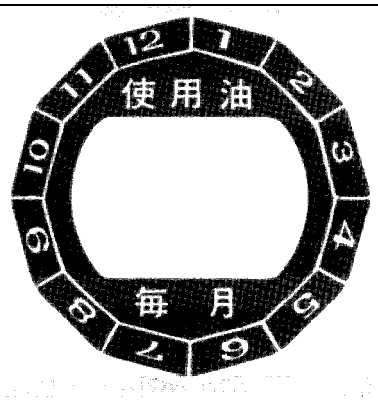
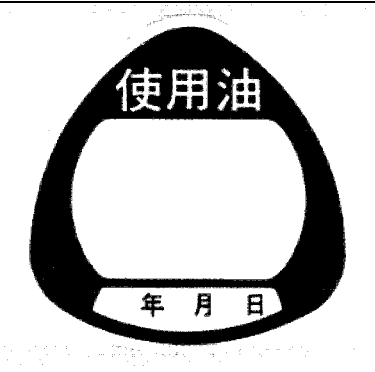
Checksheet for Cleaning, Inspection, Oiling and Retightening

Machine name:

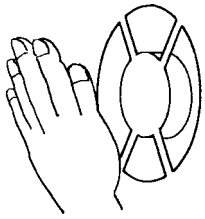
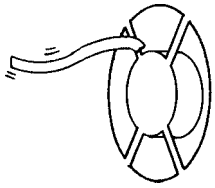
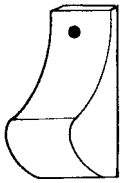
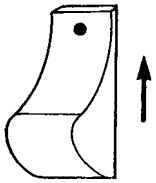
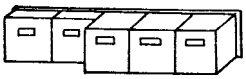
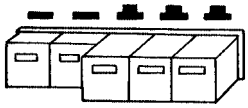
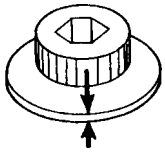
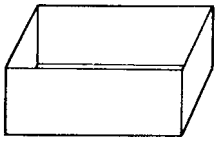
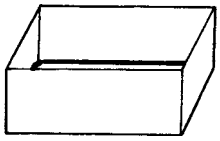
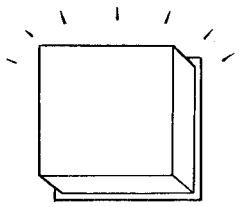
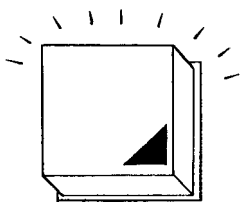
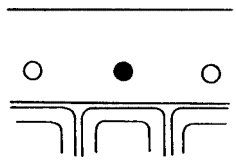
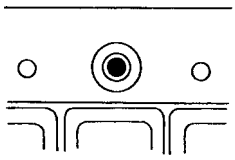
_____ Circle _____ Section _____ Department

No.	Location	Standard	Frequency			Checked on date/month																				
			Daily	Weekly	Monthly																					
* The No. and the location should agree with the standard			Inspected by																							
* Cleaning and inspection methods should be carried out in accordance with standards			Seal of approval																							

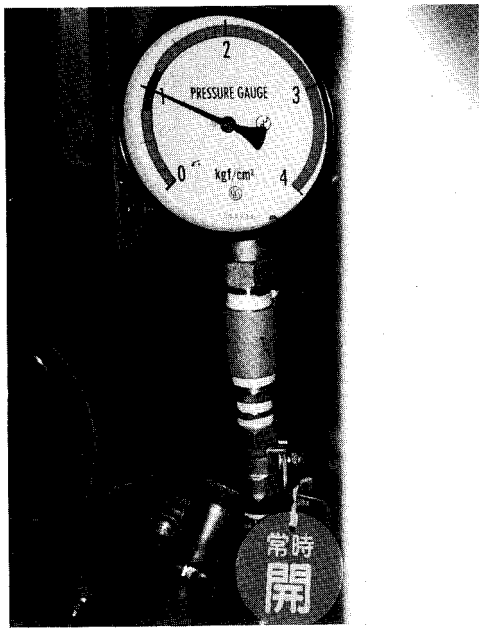
Lubrication Oil Label

Oil label and frequency		
Daily (red)		Record the oil type name Example 1 Lubrication oil, operating oil, grease, etc. Example 2 Grease bearing oil, compressor oil, lubrication oil for sliding guide surface, turbine oil, etc. Example 3 Directly record the product name, number, etc. Size Large: 100 mm dia. Medium: 50 mm dia. Small: 25 mm dia. Ultra small: 12.5 mm dia. Material • Oil resistant and solvent resistant Other • The circumference of the large and medium sized monthly labels are perforated, and designed to be torn off. Devise ways to use these labels in every workplace.
Weekly (orange)		
Monthly (Green)		
Other (Blue)		

Example of Visual Management

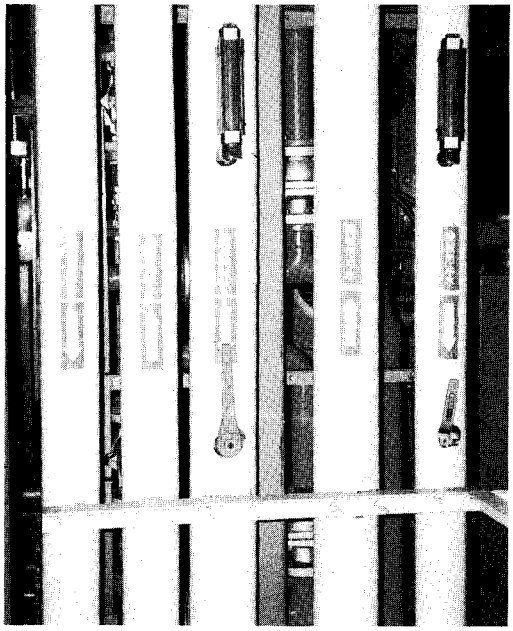
1	Before improvement	After improvement	5	Before improvement	After improvement
					
	Operation of the cooling fan was verified using one's hands to check the airflow of the fan.	Visual management was achieved by attaching a streamer to the airflow inlet.		There was no on/off position indicator for the switch.	Visual management was achieved by using an arrow indicator for the on/off position.
2	Before improvement	After improvement	6	Before improvement	After improvement
					
	The prescribed pressure was managed by observing the gradations on the meter.	Visual management was achieved by coloring the meter so that the operator can check whether the needle is in the green zone.		There were no on/off position indicators for the buttons.	Visual management was achieved by affixing on/off indicators.
3	Before improvement	After improvement	7	Before improvement	After improvement
					
	Looseness of the attaching screw was verified by using a hex bolt to retighten it.	Visual management was achieved by inscribing matching marks when the attaching screws were tightened.		The residual amount of stock was known only when stock ran out.	Visual management was achieved by inscribing a remainder warning mark inside the case.
4	Before improvement	After improvement	6	Before improvement	After improvement
					
	The button lamp could not be managed because it had no lamp ON indicator.	Visual management was achieved by placing a lamp ON indicator mark in the corner of the button.		The lamp could not be managed because it had no lamp ON indicator.	Visual management was achieved by inscribing a lamp ON indicator mark around the lamp.

Example of Visual Management

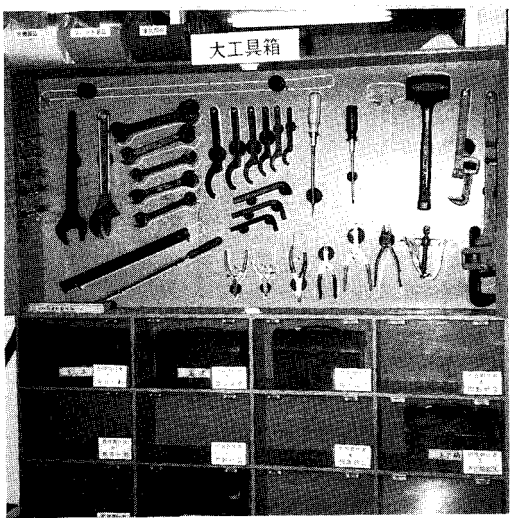


(1) Pressure indicator:
Color-code the meter so that the permissible range of the meter can be seen at a glance if the pressure deviates from the normal.

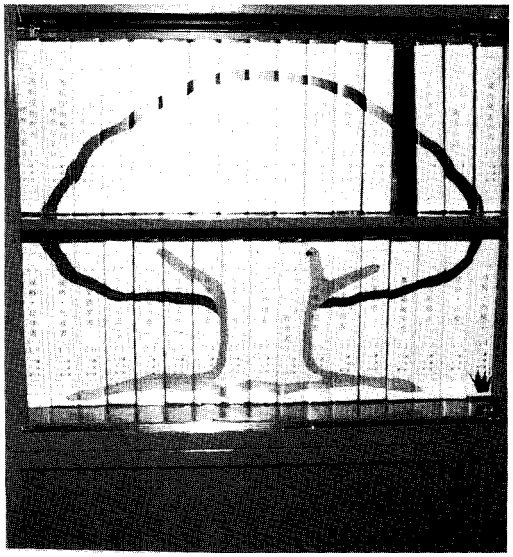
(2) Valve open/close indicator:
On valves for which it is difficult to know whether it is open or closed, hang an indicator tag so that the open/close status can be seen at a glance.



(3) Flow direction indicator for fluids:
Facilitate operation by clarifying the type and direction of fluids flowing inside pipes.



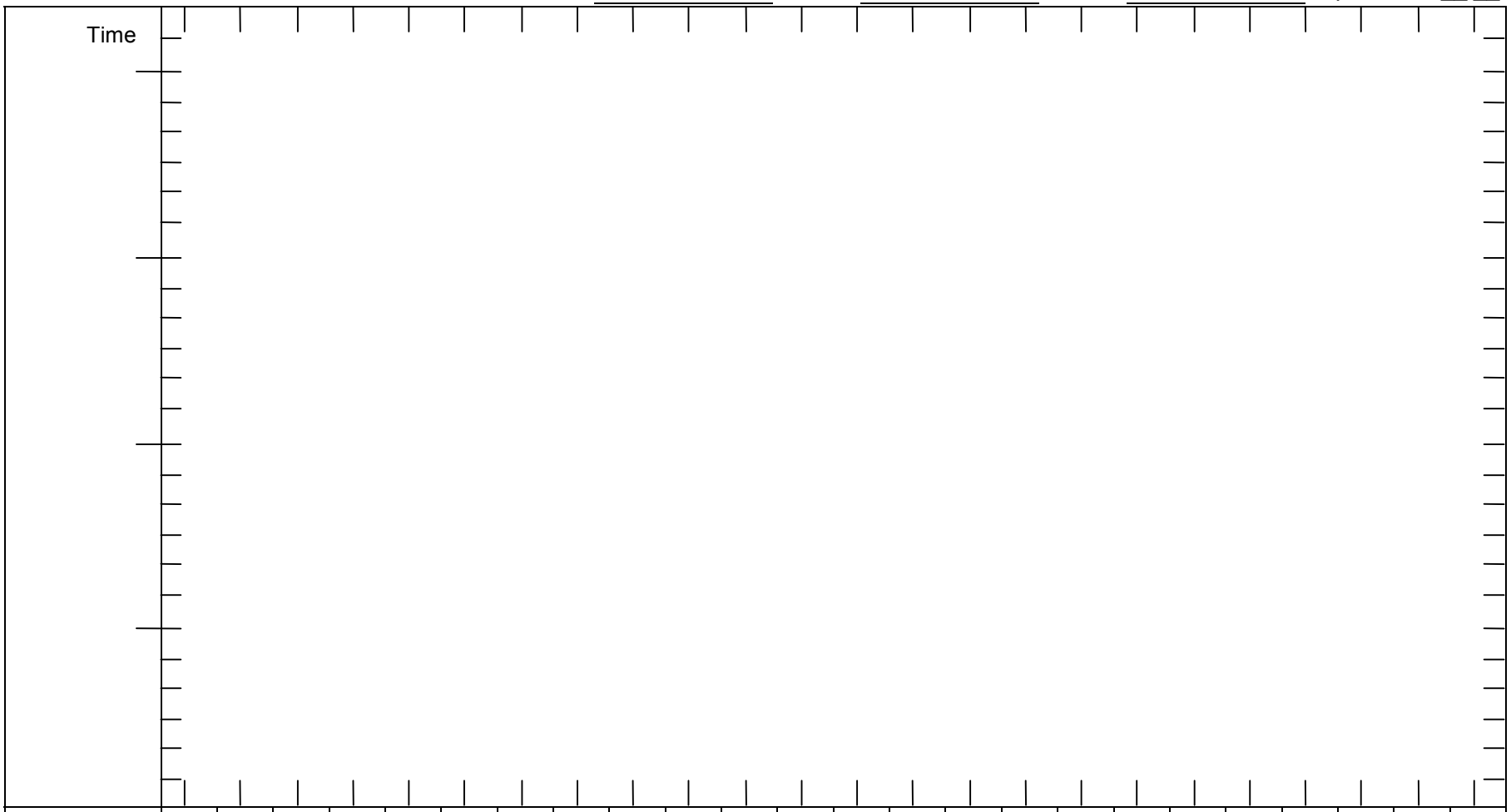
(4) Use clear labeling on the tool shed:
Clearly label each tool in the tool shed so that you can tell at a glance where each tool is, and make labels so that the usage status and location where each tool should be returned are clear.



(5) File placement indicator: Clearly indicate the placement of the file by drawing a picture across the spines of the entire set of files.

Autonomous Maintenance Step 3:
Table of Changes in Cleaning, Inspection, Oiling and Retightening Times

_____ Circle _____ Section _____ Department __/__



Step 3 Diagnosis Sheet

7 • 2	7 - 10

Subsection Section **TPM Autonomous Maintenance Step 3**

Department **Diagnosis Sheet for Creating Cleaning and Oiling Standards**

Target equipment:

Diagnosis date: __/__/__

Diagnosed by

Total points	Pass / Try again	80 points or greater
__/100 points		

Step 1

Maintenance and improvement of conditions when initial cleaning step was passed

Purpose: Provision of base conditions

Diagnosis points	Evaluation points				
Are clean conditions being maintained?	5 Cleaner than when passed	4 Maintained as when passed	3 Passably	2 Below the level when passed	1 Dirty
Is "cleaning is inspection" being observed, and are problems being identified?	5 Being identified	4 Cleaning is inspection	3 Could do better	2 Marking time	1 Regressing
Are workers identifying problems with greater detail, and is the next step after improving the skill of members understood?	5 Skills improved remarkably	4 Skills improved	3 Greater detail	2 No change in details	1 Lesser detail
(Comments)					/15

Step 2

Status of follow-up on generating sources, difficult-to-access cleaning and oiling locations, and counter-measures

Purpose: Improve reliability and maintainability

Diagnosis points	Evaluation points				
Are improvements being made to oiling, and are these improvements leading to increased maintainability?	5 Maintainability is improved	4 Could do better	3 Oiling improved	2 Not yet	1 No improvement
Are plans being drafted again for those items which did not achieve adequate results from the countermeasures?	5 Meticulously planned	4 Plan drafted	3 Drafting of plan in progress	2 Drafting of plan scheduled	1 Not yet started
Are further measures needed? (Are any omissions in the counter-measures?)	4 No blind spots	3 Almost completely unneeded	2 Could do better	1 Not yet	0 Greatly needed
(Comments)					/14

Details of cleaning and inspection standards

Purpose: Maintenance and control of cleaning an d inspection

Diagnosis points		Evaluation points			
Where? / Who?	Has the range of the division of oil responsibilities been decided?	4 Firmly decided	3 Decided	2 Passably	1 Not decided
By what method?	Are the methods and tools for cleaning and inspection decided?	4 Firmly decided	3 Decided	2 Passably	1 Not decided
When? / How much?	Are the period and time for cleaning and inspection set appro-priately?	4 Set appropriately	3 Could do better	2 Not yet	1 Not decided
What?	Is the object of cleaning and inspection clarified?	4 Clarified	3 Could do better	2 Not yet	1 Unclear
Is the cleaning status recorded on checksheets, and is this conscientiously observed?		4 Observance of this procedure can be seen visually	3 Could do better	2 Procedure is observed, but not clearly	1 Not recorded
(Comments)					/20

Details of oiling standard

Purpose: Maintenance and control of oiling

Diagnosis points		Evaluation points		
Where? / Who?	Has the range of the division of oil responsibilities been decided?	3 Firmly decided	2 Passably	1 Not decided
By what method?	Are the oiling methods and tools decided, and in a fixed location (5S of the storage location)?	3 In a fixed position	2 Passably	1 Not decided
When? / How much?	Are the period and time set appropriately?	3 Firmly decided	2 Passably	1 Not decided
What?	Are the type and quantity of oil decided?	3 Decided	2 Passably	1 Not yet decided
	Is the object of oiling clarified?	3 Clarified	2 Passably	1 Unclear
relevant equipment	clean, is the oil easy to see, and is the oiler functioning normally?	3 Functioning normally	2 Passably	1 Not functioning normally
	Is the automatic oiling equipment functioning normally?			
	Are the grease cap and oil cap functioning normally?			
Have all systems been checked to verify that the oiling equipment is functioning to the maximum level?		3 Verified	2 For the most part	1 Not yet started
Is the oiling inlet dirty? Also, are means being devised to prevent it from being dirtied?		3 Good	2 Passably	1 Dirty
Is a checksheet used to keep records, and is this done conscientiously?		3 Observance of this procedure can be seen visually	2 Passably	1 Not clear whether procedure is being observed
(Comments)				/27

Status of autonomous maintenance activities

Purpose: Development of autonomous maintenance

Diagnosis points		Evaluation points			
Activity board and meetings	Are the overall schedule and the current month schedule clearly defined?	4 Clearly defined	3 Passably	2 Could do better	1 Unclear
	Is a record documenting losses being kept so that problems can be reduced?	4 Conscientiously recorded	3 Passably	2 Could do better	1 Not recorded
	Are the results of countermeasures made apparent?	4 Made easy to understand	3 Passably	2 Could do better	1 Not displayed
	Are standards created in meetings, and is the importance of observing these standards thoroughly communicated?	4 Thoroughly	3 Passably	2 Could do better	1 Not thoroughly
	Is care taken so that all personnel know the number of improvement suggestions and their implementation?	4 Easy to understand	3 Passably	2 Could do better	1 Difficult to understand
	Are instructions and activities between members and managers firmly executed?	4 Firmly executed	3 Passably	2 Could do better	1 Not yet
(Comments)					/24

Procedure for Implementing Step 4: "General Inspection"

* Step 4 identifies and takes countermeasures for problems (minor defects) related to the structure and functioning of equipment, as well as problems deduced logically, and implements "the equipment as it should be" (as a rule, implemented as a substep).

Implementation of general inspection by subject: 1-2 months/subject

Preparation for general inspection and education

1. Identification of general inspection items (lubrication, tightening, pneumatics, hydraulics, drive, electrical, measuring equipment, etc.)
2. Preparation of educational materials for education and training (manuals, cut-out models, assembly demo machines, videos, etc.)
3. Daily schedule for education and training (education for Leaders and Managers)
4. Training of Instructors (Maintenance, Engineering, TPM Promotion Office, etc.)

Implementation of general inspection education

1. Implement education for Leaders and Managers (education through manuals)
2. Prepare correspondence courses for Circle Members. ← Managed by Leaders and Managers
3. Correspondence courses for Circle Members (one-point lessons) ← Managed by Leaders and Managers

Implementation of general inspection

1. Identify minor defects and attach tags (keep a record in the problem list used since Step 1).
2. Create a countermeasures plan and countermeasures proposal (restoration and improvement) for minor defects (one's own assigned area working together with other assigned areas).
3. Devise means to improve the efficiency of cleaning and inspection, and draft an improvement plan.
4. Reveal key management points (functional parts). (For those items already identified in Step 1, dig further and identify additional items).

Restoration and improvement of minor defects

1. Restore and improve identified minor defects (one's own assigned area working together with other assigned areas).
2. Implement improvements to make cleaning and inspection more efficient.
3. Provide the basic conditions for management key points that have been revealed.
4. Increase the degree of visualization of physically latent defects for management key points (reinforce the contents of countermeasures taken in Step 2).
5. Create standards (standardization of basic conditions and conditions used) for determining problems in management key points, and create a color code scheme → Visual management
6. Measure the effectiveness of restoration, improvements, improved efficiency, visualization, color coding, etc. → Reflect these measurements when setting the periods for cleaning and inspection
7. Create MP information for a case example of improvement and increased efficiency → Create engineering sheets.

Preventing future recurrence

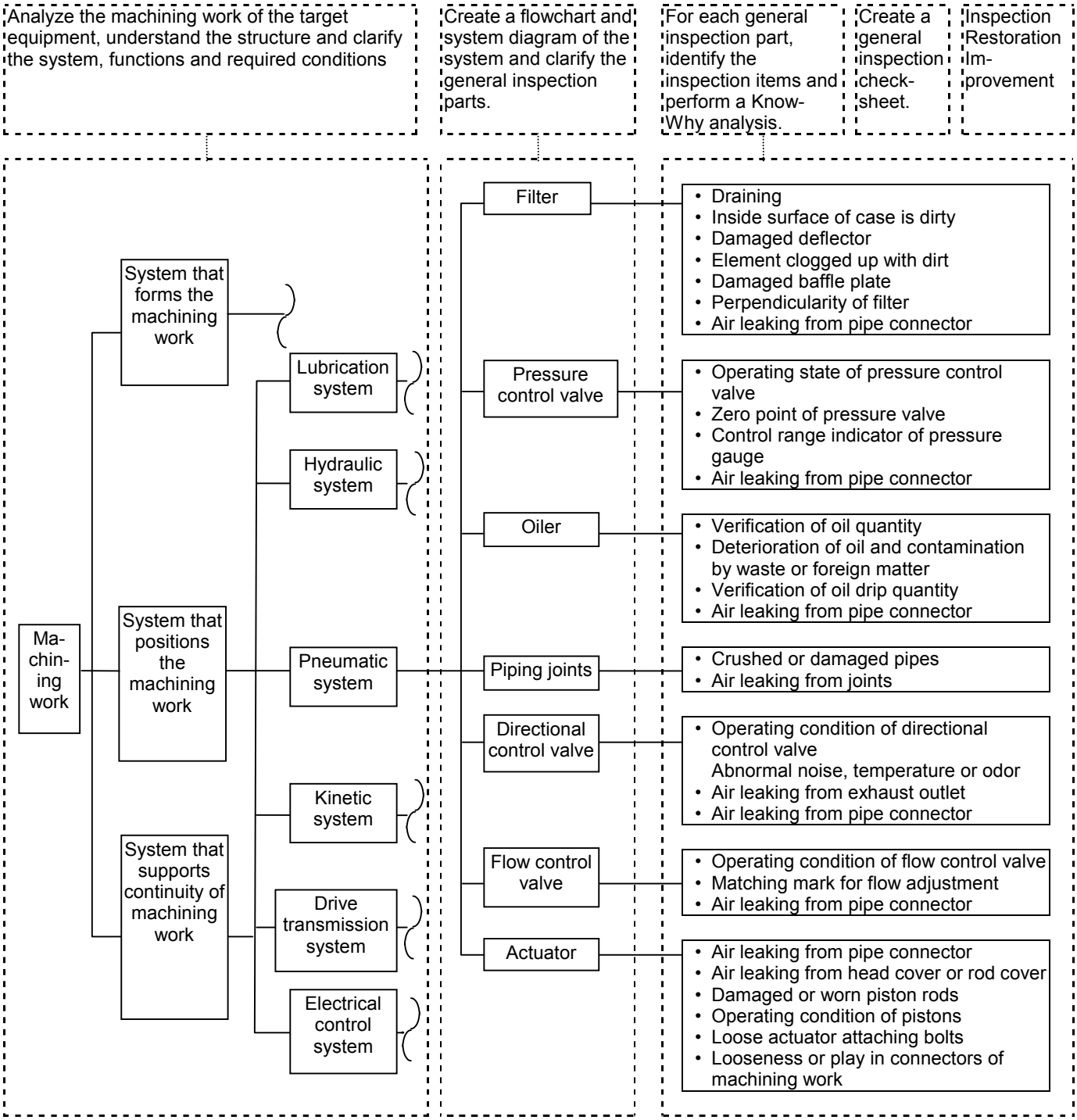
1. Create tentative standards for general inspection by subject. Insert into the tentative standards the tentative rules (basic conditions and the standard for determining problems with conditions in use) for preventing problems in management key . points
2. Training and observance of behavior based on tentative standards.
3. Check the inspection skills for general inspection by subject (test of level of understanding)
4. Implement autonomous diagnoses and tentative diagnoses of general inspection by subject.
5. Implement step diagnoses of general inspection by subject (substep diagnoses).

Advance to Step 5 — Advance after passing all general inspection items.

Planning Chart for Step 4 Activities

		Circle	Section	Department
Purpose				
Activity item	Date			
1	Identification of subject			
2	Creation of implementation plan			
3	Creation of educational materials			
4	Education of leaders			
5	Evaluation of skills			
6	Correspondence education			
7	Implementation of general inspection			
8	Autonomous diagnosis			
9	Top Executive diagnosis			

Case Example of Implementing General Inspection: Pneumatic System



Planning Chart for Implementation of Autonomous Maintenance Step 4

				Group education			OJT education			
	Inspection education by subject	Purpose	Correspondence education by recipient	Classroom work	Practical work	Check level of understanding	Autonomous diagnosis (general inspection)	Restoration and improvement	Diagnosis	Pass
I	Basic approach to general inspection of equipment Oil lubrication system Grease lubrication system Cutting fluid system	• To understand what machining work is, and why defects and equipment losses occur. • The oil lubrication, grease lubrication and cutting oil systems help the rotating and sliding parts move smoothly, and improve the efficiency of the machine. However, quality defects and equipment losses arise if there is a problem with areas such as lubrication oil, grease, cutting oil or pumps. • Therefore, we will learn the methods and know-how concerning general inspection points for each area.	Education for Department Managers and Section Managers Education for Leaders	(3 hours) Fundamentals • Explain using one-point sheets Inspection points and methods • Explain using videos and textbooks	(3.5 hours) Experience and training using a cut-out model and a prototype	(1.5 hours) Implementation of checks How to create general inspection sheets • Explain using one-point sheets	Model equipment Creation and inspection of general inspection checksheets Verification of safety observance items Attaching tags	Restoration and improvement Verification using checksheets Removing tags	Verification by Promotion Office	Stick on the compli-ance certifi-cate emblem
			Education of operators	Horizontal replication						
II	Hydraulic and pneumatic systems	• The purpose of the hydraulic system is to smooth the machining of work in linear and rotating operations by means of oil pressure. However, quality defects and equipment losses arise if there is a problem with the operation oil tank or pressure control valve in the hydraulic system. • The purpose of the pneumatic system is to smooth the movement of the machining work by means of air pressure. However, quality defects and equipment losses arise if there is a problem in areas such as the air pressure source, pressure control valve, oiler or actuator in this system. • Therefore, we will learn the methods and know-how concerning general inspection points for each area.	Education for Department Managers and Section Managers Education for Leaders	Fundamentals • Explain using one-point sheets Inspection points and methods • Explain using videos and textbooks	Experience and training using a cut-out model and a prototype	Implementation of checks How to create general inspection sheets • Explain using one-point sheets	Model equipment Creation and inspection of general inspection checksheets Verification of safety compliance items Attaching tags	Improvement Verification using checksheets Removing tags	Verification by Promotion Office	Stick on the compli-ance certifi-cate emblem
			Education of operators	Horizontal replication						
III	Drive, transmission and kinetic systems	• The purpose of this system is to mechanically transmit energy, convert that energy into motion, and to continuously machine the work. However, quality defects and equipment losses arise if there is a problem in areas such as the motor, belts, gears or gear converters in this system. • Therefore, we will learn the methods and know-how concerning general inspection points for each area.	Education for Department Managers and Section Managers Education for Leaders	Fundamentals • Explain using one-point sheets Inspection points and methods Explain using videos and textbooks	Experience and training using a cut-out model and a prototype	Implementation of checks How to create general inspection sheets • Explain using one-point sheets	Model equipment Creation and inspection of general inspection checksheets Verification of safety compliance items Attaching tags	Improvement Verification using checksheets Removing tags	Verification by Promotion Office	Stick on the compli-ance certifi-cate emblem
			Education for operators	Horizontal replication						
IV	Electrical control systems	• The purpose of this system is to maintain the relationships among the form position and continuity of the machining work, and to transform the required amount of electrical energy to the required location at the required time. However, quality defects and equipment losses arise if there is a problem in areas of this system. • Therefore, we will learn the methods and know-how concerning general inspection points for each area	Education for Department Managers and Section Managers Education for Leaders	Fundamentals • Explain using one-point sheets Inspection points and methods Explain using videos and textbooks	Experience and training using a cut-out model and a prototype	Implementation of checks How to create general inspection sheets Explain using one-point sheets	Model equipment Creation and inspection of general inspection checksheets Verification of safety compliance items Attaching tags	Improvement Verification using checksheets Removing tags	Verification by Promotion Office	Stick on the compli-ance certifi-cate emblem
			Education for operators	Horizontal implementation						
IV	Fasteners and equipment main body	• The purpose of fasteners is to ensure the reliable operation of the various systems by securing various parts in a balanced way to the main body. The equipment main body is the reference plane and source of rigidity that balances the continuity of machining. However, quality defects and equipment losses arise if there is a problem in areas of this system. • Therefore, we will learn the methods and know-how concerning general inspection points for each area.	Education for Department Managers and Section Managers Education for Leaders	Fundamentals • Explain using one-point sheets Inspection points and methods Explain using videos and textbooks	Experience and training using a cut-out model and a prototype	Implementation of checks How to create general inspection sheets Explain using one-point sheets	Model equipment Creation and inspection of general inspection checksheets Verification of safety compliance items Attaching tags	Improvement Verification using checksheets Removing tags	Verification by Promotion Office	Stick on the compli-ance certifi-cate emblem
			Education for operators	Horizontal replication						

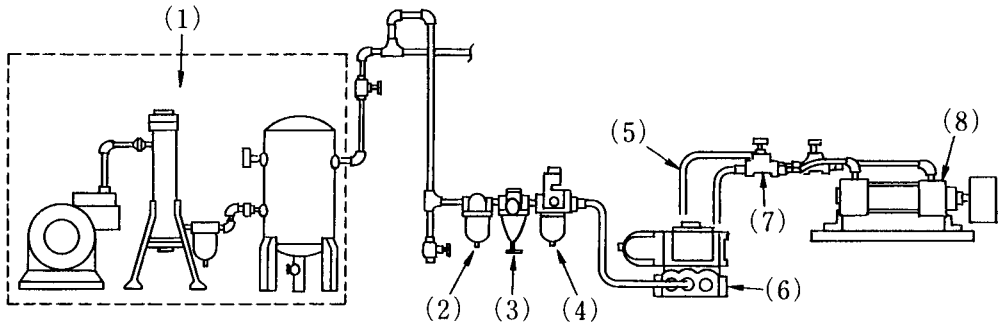
Note: Each subject is performed on a monthly basis.

Educational Materials for Autonomous Maintenance Step 4

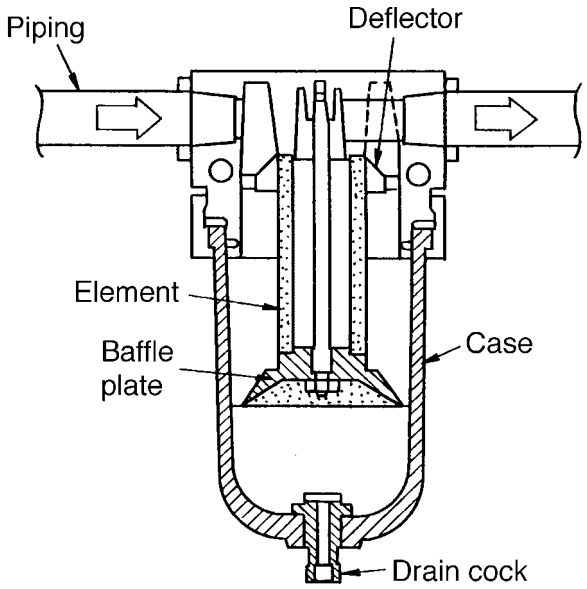
Flowchart of pneumatic system

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Air pressure source system	→ Filter	→ Pressure control valve	→ Oiler	→ Piping and joints	→ Directional control valve	→ Flow control valve	→ Actuator

System diagram of pneumatic system



■ Pneumatic system general inspection parts
(1) Air pressure source system
(2) Filter
(3) Pressure control valve
(4) Oiler
(5) Piping and joints
(6) Directional control valve
(7) Flow control valve
(8) Actuator

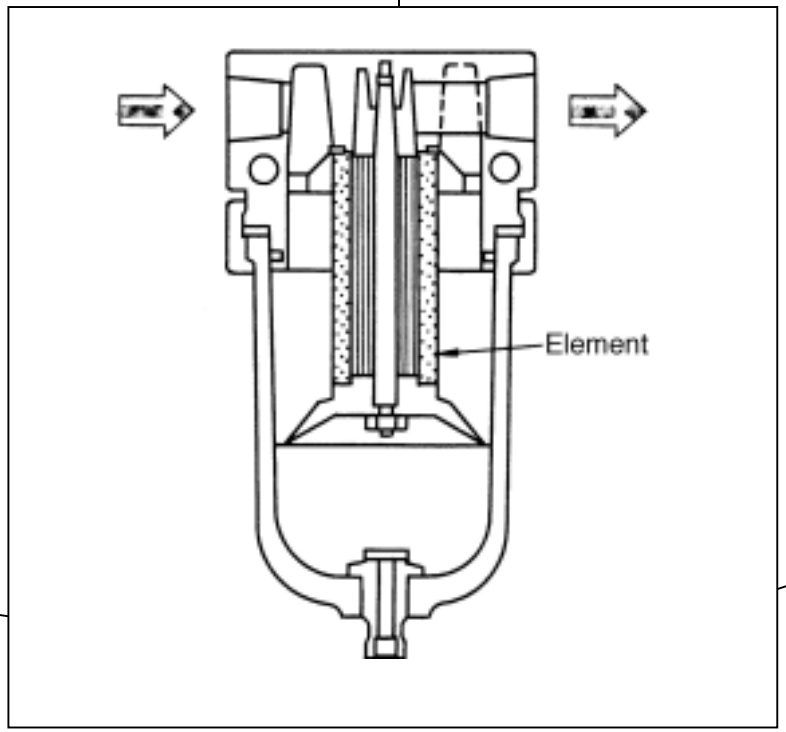


■ Filter general inspection items
(1) Draining
(2) Dirt on inside surface of case
(3) Damaged deflector
(4) Dirty and clogged up element
(5) Damaged baffle plate
(6) Perpendicularity of filter
(7) Air leaking from piping connectors

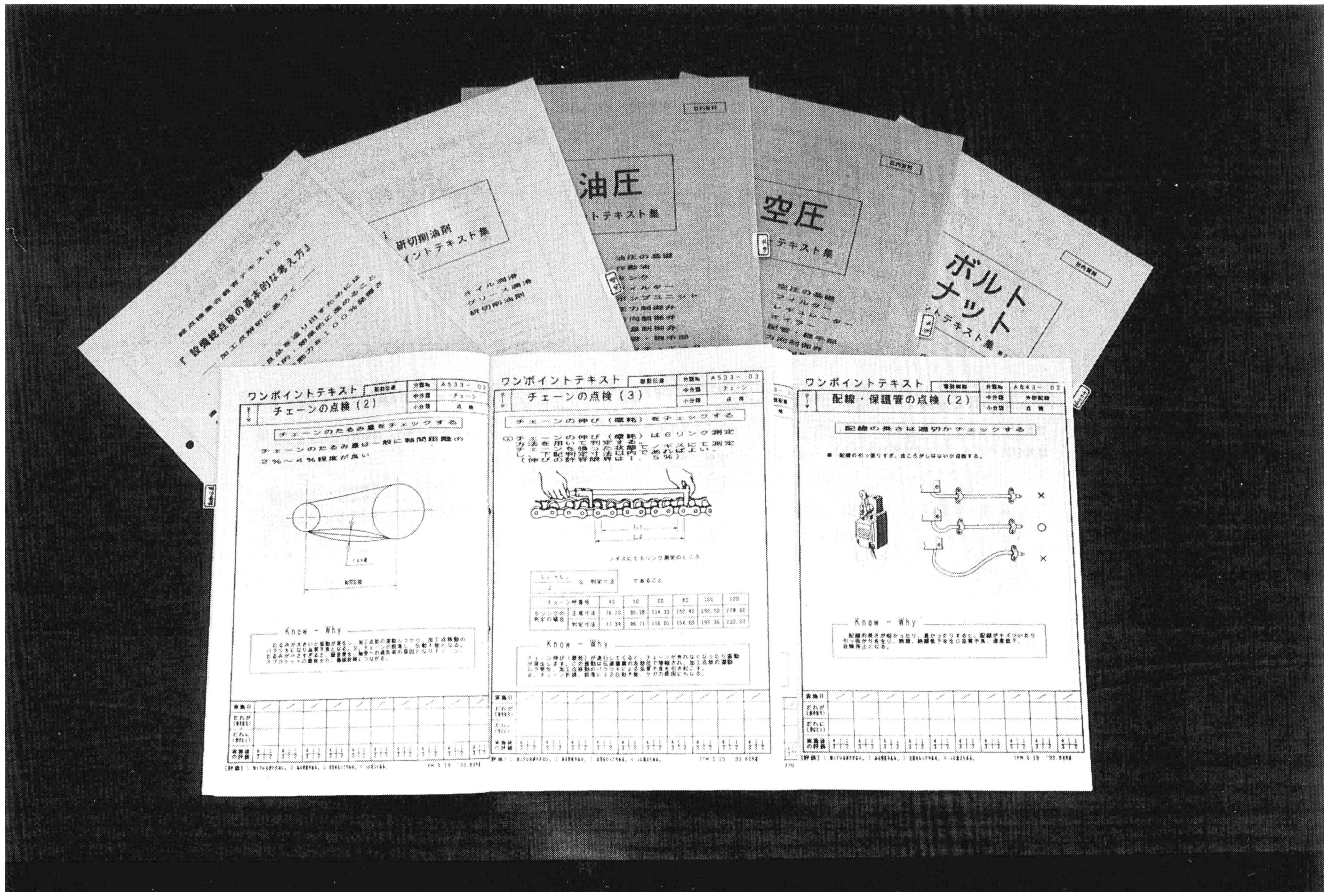
Operator Educational Materials

Part	Filter	Inspection item	Check filter element

Inspection method and criteria	Direction of improvement if "NO"	Know-Why (why is this improvement necessary?)
○ Remove the filter element and inspect for dirt and clogging	○ In the case of light dirt, clean by blowing air from the inside of the element ○ If clogged, replace with a new element	○ Element is clogged → Pressure decreases → Actuator operates unevenly → Variation in movement of machining work → Quality defects → Speed decreases → Failure stoppage → Misoperation of actuator → Failure stoppage → Contamination by waste, dust or foreign matter → Abnormal wear of directional control valve → Internal leakage → Uneven operation of actuator (Following is the same as above) → Sludge in the flow control valve → Reduced flow rate

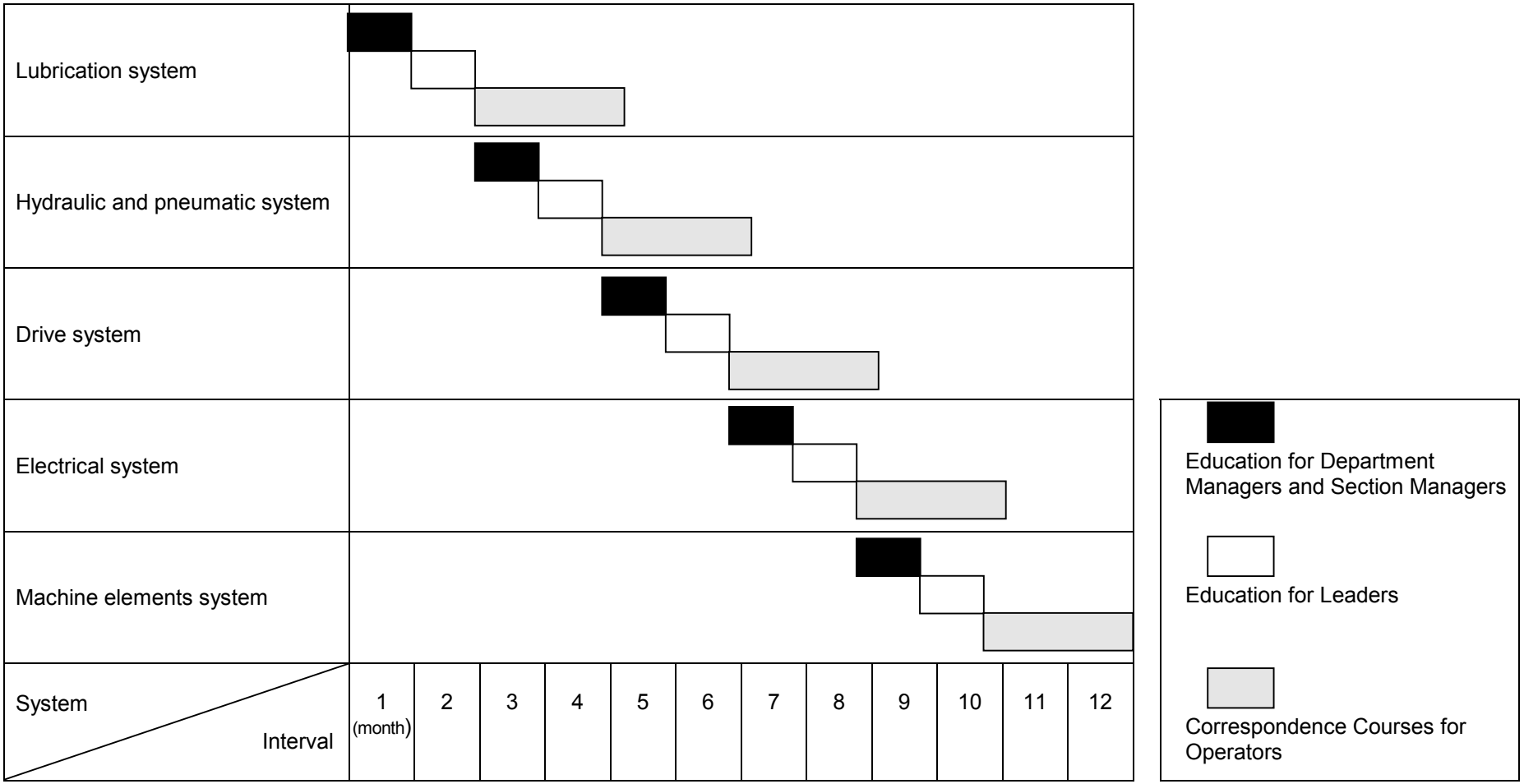


Example of Educational Materials (Textbooks)



General Inspection Education

Education Schedule



Checksheet for Level of Understanding: General Inspection of Grease and Lubrication Systems

Assigned area	
Name	

(Problem) Read the following text carefully, make one selection from the choices enclosed by braces { } that fits in the space enclosed by parentheses ( ), and write that choice in the parentheses.

(1) Depending on the type, lubrication location and operating conditions of the machine to be lubricated, there are various types of lubrication fluids. However, these types can be largely divided into three categories: Liquid lubricants, ( ), and solid lubricants.

{semi-liquid lubricants / semi-solid lubricants}

(2) Grease comprises a thickening agent, a base oil and a ( ). This grease preserves ( ) because the thickening agent, which is fibrous and has a ( ) structure, incorporates oil.

{lubrication oil / semi-solid / mesh / additive agent}

(3) General inspection of grease

- Examine the ( ) indicated on the new oil can, and verify whether it is the same as that prescribed by the machine ( ).
  {manufacturer name / oil type / specifications}
- ( ) the grease which has been pumped and check whether it has been contaminated by waste, dust or ( ). If there is a problem, inspect all ( ).

{part / sample / equipment / foreign matter}

- By steadily performing general inspection of the grease, one can prevent overheating and ( ) on lubricated parts, as well as oil leaks and ( ) that arise from those problems.

{waste and dust / loss of oil film / abnormal wear}

Correspondence Education Schedule

Section Manager	Subsection Manager	Circle Leader

_____ Circle _____ Section _____ Department

Contents of correspondence education		OJT or OFF-JT	Instructor	Attendees	Education schedule															
Subject	Time required			Name	Daily schedule	Attendance	Daily schedule	Attendance	Daily schedule	Attendance	Daily schedule	Attendance	Daily schedule	Attendance	Daily schedule	Attendance	Daily schedule	Attendance	Daily schedule	Attendance

Grease Lubrication System	Part	Grease

General Inspection Checksheet

Inspection item	Inspection method and criteria	Inspection results	Improvement details	Classification of factors		
				Fixed	Semi-fixed	Variable
(1) Check the oil type.	○ Examine the oil type indicated on the new oil can, and verify whether it is the same as that prescribed by the machine specifications.					
(2) Check that the grease is not contaminated by waste, dust or foreign matter.	○ Sample the grease which has been pumped and use a measuring instrument to check for the presence of contaminants.					
(3) Check that the grease is not contaminated by moisture.	○ Visually inspect the grease sample to check for white turbidity.					
(4) Check that the grease is not contaminated by air bubbles.	○ Visually inspect the grease to check for air bubbles and white turbidity.					

Schedule for General Inspection and Correction of Problems

Created by:

Circle	Section	Department	Machine name:

No.	Part	Nature of problem	Nature of improvement	Factor			Inspection subject						Schedule	Person-in-Charge
				Fixed	Semi-fixed	Variable	Nuts and bolts	Lubri-cation	Drive	Elec-trical	Pneu-matic	Hy-draulic		

General Inspection Checksheet

Date : __/__/__

Case name			
Purpose of improvement			
Target machine	Circle	Section	Department Machine No. __
Part		Classification	
Suggested by	__/__/__	Scheduled to be implemented by	
Completion date	__/__/__	Implemented by	

(Before improvement)	(Illustration)

(After improvement)	(Illustration)

(Effectiveness, and policies after improvement)

List for General Inspection and Correction of Defects

__________ Circle __________ Section __________ Department

No.	Description of problem				Countermeasures		Effectiveness	
	Classification			Description	Description of improvement	Person-in-charge	Description	Effectiveness
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		
	○ Reduced functionality ○ Reduced quality ○ Factor fixed ○ Inspection fixed ○ Inspection time	Part				Measures taken within section		→
		Location				Measures taken at other sections		
		Loss				Other		

Step 4 Diagnosis Sheet

7 • 2	8 - 13 - (1)

Application Form for Autonomous Maintenance Diagnosis
Autonomous Maintenance Diagnosis Sheet

Step 4-1: General Inspection (Lubrication)

Diagnosis	Autonomous	Section Manager	Top Executive

Section / Team name	
Assembly line to be diagnosed	
Desired diagnosis date	__/__/__
Diagnosis date and time	__/__/__ __:__ - __:__
Diagnosed by	

Application date	Section Manager	Leader

__ points	Pass	Fail

Pass level
Sum of (Level points in items 1 - 6)

Autono-mous	Section Manager	Top Executive
90 points or more	85 points or more	80 points or more

Diagnosis Item	Points of diagnosis	Bad	Poor	Fair	Somewhat good	Good	Sugges-tions
		20 point	40 points	60 points	80 points	100 points	
Maintenance and control	(Are operation and maintenance being performed for Steps 1 - 3?) • Are countermeasures for generating sources being adequately maintained? • Are the improvement conditions satisfactory for countermeasures for difficult-to-access cleaning locations? • Have cleaning and oiling standards been completed, and are they being utilized accordingly?						
		1 point	2 points	3 points	4 points	5 points	
1. Skills education	• Are Leaders and Circle Members actively creating one-point textbooks and raising their level of skill?						
	• Have all members mastered general inspection skills?						
2. General inspection	• Are the items of education steadily being inspected						
	• Are problem locations being identified through inspection?						
	• Are countermeasures being taken for locations where problems were identified?						
3. Safety	• Are minor defects related to safety being identified, and are countermeasures being taken?						
4. Site Diagnosis (Lubrication)	• Are labels properly stuck to oiling locations, and are means being devised to enable oiling without omissions?						
	• Is the correct oil type being used?						
	• Is the amount of oiling appropriate?						
	• Is there any oil deterioration?						
	• Are oil pipes clogged or damaged?						
	• Is the oil to be supplied always available?						
	• Are oilers and oil lubricators managed by oil type?						
	• Check for oiler and nipple damage and check for any adhering waste or dust.						
	• Is the oiler station managed by oil type? Is it always covered? Is there any adhering waste or dust? Is it in the proper position?						
5. Tentative autonomous standards inspection	• Have tentative inspection standards been prepared?						
	• Have improvements been made to reduce the number of inspection items?						
	• Have improvements been made to make inspection easier?						
	• Are the inspection methods and period appropriate?						
	• Are means being devised so that inspection is performed steadily, and without omissions?						

Step 4 Diagnosis Sheet

7 • 2	8 - 13 - (2)

Application Form for Autonomous Maintenance Diagnosis
Autonomous Maintenance Diagnosis Sheet

Step 4-2: General Inspection
(Hydraulic and pneumatic)

Diagnosis	Autonomous	Section Manager	Top Executive

Section / Team name	
Assembly line to be diagnosed	
Desired diagnosis date	__/__/__
Diagnosis date and time	__/__/__ __:__ - __:__
Diagnosed by	

Application date	Section Manager	Leader

__ points	Pass	Fail

Pass level
Sum of (Level points in items 1 - 6)

Autono-mous	Section Manager	Top Executive
90 points or more	85 points or more	80 points or more

Diagnosis Item	Points of diagnosis	Bad	Poor	Fair	Somewhat good	Good	Sugges-tions
		20 point	40 points	60 points	80 points	100 points	
Maintenance and control	(Are operation and maintenance being performed for Steps 1 - 3?) • Are countermeasures for generating sources being adequately maintained? • Are the improvement conditions satisfactory for countermeasures for difficult-to-access cleaning locations? • Have cleaning and oiling standards been completed, and are they being utilized accordingly?						
		1 point	2 points	3 points	4 points	5 points	
1. Skills education	• Are Leaders and Circle Members actively creating one-point textbooks and raising their level of skill?						
	• Have all members mastered general inspection skills?						
2. General inspection	• Are the items of education steadily being inspected						
	• Are problem locations being identified through inspection?						
	• Are countermeasures being taken for locations where problems were identified?						
3. Safety	• Are minor defects related to safety being identified, and are countermeasures being taken?						
4. Site Diagnosis (Hydraulic and pneumatic) (Including water)	• Check for leaks and bleeding from pipes and equipment						
	• Is the equipment dustproof?						
	• Check for abnormal noise or vibration in the pump motor. Check for sounds at the beat frequency and abnormal odors in the switching valve, solenoid, etc.						
	• Check the oil quantity and temperature of the oil pressure unit.						
	• Are the air 3-point sets being used correctly (oil quantity, filter dirt, etc.)?						
	• Check the hose mounting condition, and check for any vibration, dirt and breakage.						
	• Are the pipes lying on the ground where they should not be? Are they properly maintained?						
	• Are the pipes easy to inspect and maintain?						
	• Is the pressure gauge normal (indicator is appropriate and easy to see)?						
5. Tentative autonomous standards inspection	• Have tentative inspection standards been prepared?						
	• Have improvements been made to reduce the number of inspection items?						
	• Have improvements been made to make inspection easier?						
	• Are the inspection methods and period appropriate?						
	• Are means being devised so that inspection is performed steadily, and without omissions?						

Step 4 Diagnosis Sheet

7 • 2	8 - 13 - (3)

Application Form for Autonomous Maintenance Diagnosis
Autonomous Maintenance Diagnosis Sheet

Step 4-3: General Inspection (Drive)

Diagnosis	Autonomous	Section Manager	Top Executive

Section /Team name	
Assembly line to be diagnosed	
Desired diagnosis date	__/__/__
Diagnosis date and time	__/__/__ __:__ - __:__
Diagnosed by	

Application date	Section Manager	Leader

__ points	Pass	Fail

Pass level
Sum of (Level points in items 1 - 6)

Autono-mous	Section Manager	Top Executive
90 points or more	85 points or more	80 points or more

Diagnosis Item	Points of diagnosis	Bad	Poor	Fair	Somewhat good	Good	Sugges-tions
		20 point	40 points	60 points	80 points	100 points	
Maintenance and control	(Are operation and maintenance being performed for Steps 1 - 3?) • Are countermeasures for generating sources being adequately maintained? • Are the improvement conditions satisfactory for countermeasures for difficult-to-access cleaning locations? • Have cleaning and oiling standards been completed, and are they being utilized accordingly?						
		1 point	2 points	3 points	4 points	5 points	
1. Skills education	• Are Leaders and Circle Members actively creating one-point textbooks and raising their level of skill?						
	• Have all members mastered general inspection skills?						
2. General inspection	• Are the items of education steadily being inspected						
	• Are problem locations being identified through inspection?						
	• Are countermeasures being taken for locations where problems were identified?						
3. Safety	• Are minor defects related to safety being identified, and are countermeasures being taken?						
4. Site Diagnosis (Drive)	• Check for wear and deterioration of the V-belt. Check for wear and misalignment of the pulley.						
	• Is the tension of the V-belt appropriate?						
	• Are the direction of rotation and the dimensions of the belt in use managed visually in the V-belt cover?						
	• Is an adequate amount of lubricating oil reaching the area between the pin and bushings of the chain?						
	• Check for elongation and misalignment of the chain. Check for interlocking of the sprocket due to wear.						
	• Check for overheating, vibration and noise in the bearing due to bending of the shaft, eccentricity, loosening of the locking bolts, depletion of oil, etc.						
	• Check for play (looseness of bolts) in the shaft, keys and couplings.						
	• Check for abnormal noise in the gears, reduction gears, etc.						
	• Is oiling of the gears and reduction gears appropriate, and is any heat being generated?						
5. Tentative autonomous standards inspection	• Have tentative inspection standards been prepared?						
	• Have improvements been made to reduce the number of inspection items?						
	• Have improvements been made to make inspection easier?						
	• Are the inspection methods and period appropriate?						
	• Are means being devised so that inspection is performed steadily, and without omissions?						

Step 4 Diagnosis Sheet

7 • 2	8 - 13 - (4)

Application Form for Autonomous Maintenance Diagnosis
Autonomous Maintenance Diagnosis Sheet

Step 4-4: General Inspection (Electrical)

Diagnosis	Autonomous	Section Manager	Top Executive

Section /Team name	
Assembly line to be diagnosed	
Desired diagnosis date	__/__/__
Diagnosis date and time	__/__/__ __:__ - __:__
Diagnosed by	

Application date	Section Manager	Leader

__ points	Pass	Fail

Pass level
Sum of (Level points in items 1 - 6)

Autono-mous	Section Manager	Top Executive
90 points or more	85 points or more	80 points or more

Diagnosis Item	Points of diagnosis	Bad	Poor	Fair	Somewhat good	Good	Sugges-tions
		20 point	40 points	60 points	80 points	100 points	
Maintenance and control	(Are operation and maintenance being performed for Steps 1 - 3?) • Are countermeasures for generating sources being adequately maintained? • Are the improvement conditions satisfactory for countermeasures for difficult-to-access cleaning locations? • Have cleaning and oiling standards been completed, and are they being utilized accordingly?						
		1 point	2 points	3 points	4 points	5 points	
1. Skills education	• Are Leaders and Circle Members actively creating one-point textbooks and raising their level of skill?						
	• Have all members mastered general inspection skills?						
2. General inspection	• Are the items of education steadily being inspected						
	• Are problem locations being identified through inspection?						
	• Are countermeasures being taken for locations where problems were identified?						
3. Safety	• Are minor defects related to safety being identified, and are countermeasures being taken?						
4. Site Diagnosis (Electrical)	• Are indicator plates attached to the electrical distribution, control and operation panels?						
	• Is the temperature of the electrical distribution, control and operation panels high?						
	• Are the electrical distribution, control and operation panels dirty (water, oil and waste)?						
	• Check for dirt and damage in the cover packing and filters of the electrical distribution, control and operation panels.						
	• Check for abnormalities (overheating, damage, unstable wiring) in the wiring and connections.						
	• Check for overheating, abnormal noise and vibration in the motors.						
	• Are sensors properly installed (position, contact and looseness)?						
	• Is the sensor dirty (water, oil and waste)?						
	• Check for sensor breakage. Check the mounting condition of the lead wires. Are measures being taken to prevent breakage?						
5. Tentative autonomous standards inspection	• Have tentative inspection standards been prepared?						
	• Have improvements been made to reduce the number of inspection items?						
	• Have improvements been made to make inspection easier?						
	• Are the inspection methods and period appropriate?						
	• Are means being devised so that inspection is performed steadily, and without omissions?						

Step 4 Diagnosis Sheet

7 • 2	8 - 13 - (5)

Application Form for Autonomous Maintenance Diagnosis
Autonomous Maintenance Diagnosis Sheet

Step 4-5: General Inspection
(Nuts and bolts)

Diagnosis	Autonomous	Section Manager	Top Executive

Section /Team name	
Assembly line to be diagnosed	
Desired diagnosis date	__/__/__
Diagnosis date and time	__/__/__ __:__ - __:__
Diagnosed by	

Application date	Section Manager	Leader

__ points	Pass	Fail

Pass level
Sum of (Level points in items 1 - 6)

Autono-mous	Section Manager	Top Executive
90 points or more	85 points or more	80 points or more

Diagnosis Item	Points of diagnosis	Bad	Poor	Fair	Somewhat good	Good	Sugges-tions
		20 point	40 points	60 points	80 points	100 points	
Maintenance and control	(Are operation and maintenance being performed for Steps 1 - 3?) • Are countermeasures for generating sources being adequately maintained? • Are the improvement conditions satisfactory for countermeasures for difficult-to-access cleaning locations? • Have cleaning and oiling standards been completed, and are they being utilized accordingly?						
		1 point	2 points	3 points	4 points	5 points	
1. Skills education	• Are Leaders and Circle Members actively creating one-point textbooks and raising their level of skill?						
	• Have all members mastered general inspection skills?						
2. General inspection	• Are the items of education steadily being inspected						
	• Are problem locations being identified through inspection?						
	• Are countermeasures being taken for locations where problems were identified?						
3. Safety	• Are minor defects related to safety being identified, and are countermeasures being taken?						
4. Site Diagnosis (Nuts and bolts)	• Check for looseness of nuts and bolts.						
	• Check for defects and breakage of nuts and bolts.						
	• Are measures being taken to lock nuts and bolts where needed?						
	• Are plain washers being used in slots?						
	• Are the lengths of bolts appropriate?						
	• Are matching marks inscribed on nuts and bolts subject to vibration?						
	• Are uniform bolts, nuts and washers being used in the same mounting locations?						
	• Are jigs and tools, such as spanners, organized in easy-to-use positions (indicated positions)?						
	• Are means being devised and improvements being made to make nuts and bolts in frequently used locations easy to attach and remove?						
5. Tentative autonomous standards inspection	• Have tentative inspection standards been prepared?						
	• Have improvements been made to reduce the number of inspection items?						
	• Have improvements been made to make inspection easier?						
	• Are the inspection methods and period appropriate?						
	• Are means being devised so that inspection is performed steadily, and without omissions?						

Procedure for Implementing Step 5: "Autonomous Inspection"

In Step 5, we learn about integrated equipment, and enable the maintenance of equipment "as it should be" within the standard time allotted per day.

Preparation for autonomous inspection

- ♦ Autonomous study
1. Selection of a pilot study model machine: From the viewpoint of "my machine!"
2. Selection of study theme (study of functional conditions from the viewpoint of preventing failures and defects)
3. Collection of reference materials and creation of study aids (one-point lessons and "don'ts")

- ♦ Autonomous inspection
1. Division of maintenance work functions
2. Creation of an annual maintenance calendar and maintenance levels (inspection, examination, replacement and disassembly)
   (First, list all necessary items without considering the division of maintenance roles)
3. Consolidation and reevaluation of the tentative standards created in Steps 3 and 4 (specialized maintenance personnel should take a leading role).
4. Identification of the control conditions of the "system causing the problem," based on past failures and the log of defects.
5. If cleaning, oiling and retightening work does not fit in the daily standard time allotted, identify areas that can be improved, and identify ways for increasing the level of visual management of management key points.

Implementation of autonomous inspection

- ♦ Autonomous study
1. Sharing of knowledge about equipment functions ("motion" and "function") through study materials.
2. Understanding weak points from the viewpoint of "motion" and "function" and setting inspection points.

- ♦ Autonomous inspection
1. Organization and consolidation of inspection items, inspection period, time requirements and division of roles
2. Creation of autonomous inspection standards → Including standardization of the prevention of problems
3. Operation and trial inspection based on autonomous inspection standards→ Reevaluation of standards
4. Improving efficiency in cases where cleaning, inspection, oiling and retightening work will not fit within the standard time allotted per day
5. Improving inspection efficiency for management key points
6. Improving the accuracy of criteria used to identify problems

   (5 and 6: Implementation of visual management)
7. Creation, utilization and reevaluation of the annual maintenance calendar and checksheets

Measurement of effectiveness

- ♦ Autonomous study: Test of level of understanding, meetings to announce results, etc.
- ♦ Autonomous inspection
1. Changes in the time needed for cleaning, inspection, oiling and retightening
2. Changes in the inspection time for management key points (functional parts)
3. Understanding the difference between the daily standard time and the actual required time (making ways to improve performance tangible)
4. Evaluating the reliability of criteria for determining problems (trend management) --- "motion" and "function"

Circle meetings

- ♦ Autonomous study: Sharing knowledge about the man-machine weak points (motion and function)
- ♦ Autonomous inspection
1. Organizing issues related to improving the efficiency of cleaning and inspection, and formulation of ideas to make improvements
2. Develop proposals to increase the accuracy of the criteria for judging problems (basic conditions and conditions used)
3. Changing over people's thinking from "management by praying for divine intervention" to "management by action."
4. Sharing the preparation and summarization of autonomous inspection standards

Preventing future recurrence

- ♦ Autonomous study→ Check the degree to which the material studied is reflected in the autonomous inspection standards
- ♦ Autonomous inspection
1. Creation of autonomous inspection standards, and training of behavior
   Establishment of activities to prevent problems
2. Verification of the level of implementation of the annual maintenance calendar and checksheets
3. "Disclosure and demonstration" of cleaning, oiling and retightening → Measurement of time and verification of compliance
4. Implementation of autonomous diagnoses → Tentative step diagnoses → Final step diagnoses

Advance to Step 5

Tentative diagnosis of all equipment
Final diagnosis on a circle unit basis
→ Advance after passing the diagnosis

Planning Chart for Step 5 Activities

		_____ Department _____ Section _____ Circle
Purpose		
Activity item		Date
1	Reevaluation of standards	
2	Correction of problems in the standards	
3	Creation of final standards	
4	Creation of an autonomous maintenance calendar	
5	Implementation of autonomous maintenance	
6	Autonomous diagnoses	
7	Top Executive diagnoses	

List for Evaluation of Cleaning, Inspection and Oiling Standards

Circle _____ Section _____ Department

Assigned area	Name of standard	Date created	Date revised	Part	Location	Aspect of improvement					Revision
						Time	Period	Division of roles	Method	Other	Description, time, etc.

Cleaning, Inspection and Oiling Standards

Date created: __/__/__

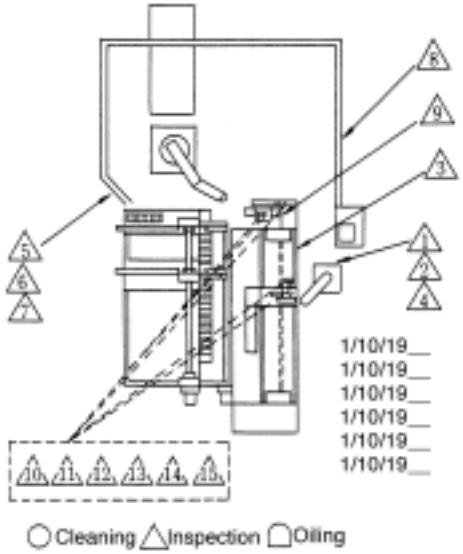
Area assigned: Manufacturing Section 2, __ Circle

Section Manager	Subsection Manager	Group Manager	Created by

Machine name: NC Bender, No. 7 Control No.: NF-01

In order to "take care of my equipment on my own," I will clean my equipment on my own as follows.

Person in charge of cleaning the equipment	

Illustration	No.	Classification	Cleaning, oiling and inspection location	Criteria	Method of implementation	Tools used	Time required	Period			Timespan for implementing cleaning, inspection and oiling
								Daily	Weekly	Monthly	
	△1	Inspection	Main power supply	Beeps	Press the power key	Screen display	10 sec.	○			Daily 08:30 -
	△2	Inspection	Hydraulic pump ON	Spinning motor emits sound	Press hydraulic key	Hearing	10 sec.	○			Daily 08:30 -
	△3	Inspection	Hydraulic main pressure	40kgf/cm^2	Check with pressure ON	Seeing	5 sec.	○			Daily 08:30 -
	△4	Inspection	Operation panel	Check manual switch	Check in manual operation mode	Seeing	5 sec.	○			Daily 08:30 -
	△5	Inspection	NC side air pressure	4kgf/cm^2	Check with air ON	Seeing	25 sec.	○			Daily 08:30 -
	△6	Inspection	Supply side air pressure	5kgf/cm^2	Check with air ON	Seeing	5 sec.	○			Daily 08:30 -
	△7	Inspection	3-point set vicinity	No air leaking	Check with air ON	Seeing	3 sec.	○			Daily 08:30 -
	△8	Inspection	Emergency stop by means of safety door	Machine stops Indicator lamp lights (red)	Open door. Machine stops 3 sec. later.	Seeing	15 sec.	○			Daily 08:30 -
	△9	Inspection	Work verification sensor	Verify that lamp lights on amplifier unit	Inspect when starting with a dummy rod	Seeing	10 sec.	○			Daily 08:30 -
	△10	Inspection	Verify operation of bender drive unit	No abnormal motion	Verify while in continuous operation	Seeing	10 sec.	○			When in operation
	△11	Inspection	Verification of compaction operation	No abnormal motion	Verify while in continuous operation	Seeing	10 sec.	○			When in operation
	△12	Inspection	Verification of pressure operation	No abnormal motion	Verify while in continuous operation	Seeing	10 sec.	○			When in operation
	△13	Inspection	Verification of chuck unit operation	No abnormal motion	Verify while in continuous operation	Seeing	10 sec.	○			When in operation
	△14	Inspection	Verification of touch sensor unit operation	No abnormal motion	Verify while in continuous operation	Seeing	10 sec.	○			When in operation
	△15	Inspection	Verification of carriage vertical operation	No abnormal motion	Verify while in continuous operation	Seeing	10 sec.	○			When in operation

Cleaning, Inspection and Oiling Standards

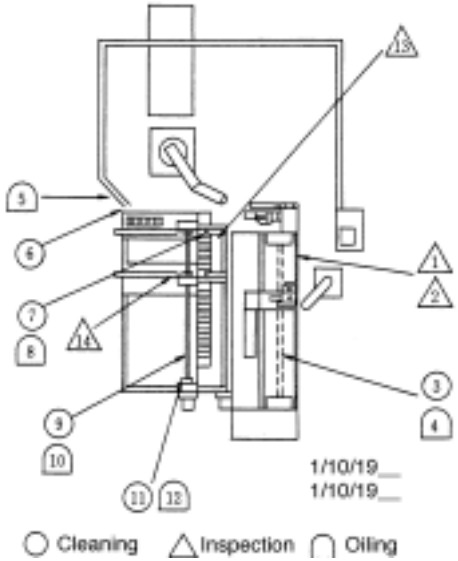
Date created: __/__/__

Area assigned: Manufacturing Section 2, __ Circle

Section Manager	Subsection Manager	Group Manager	Created by

Machine name: NC Bender, No. 7 Control No.: NF-01

In order to "take care of my equipment on my own," I will clean my equipment on my own as follows. | Person in charge of cleaning the equipment |

Illustration	No.	Classification	Cleaning, oiling and inspection location	Criteria	Method of implementation	Tools used	Time required	Period			Timespan for implementing cleaning, inspection and oiling
								Daily	Weekly	Monthly	
	△1	Inspection	Oil temperature gauge	Normal temperature: 30 - 50 deg.	Verify after 1 hour of operation	Seeing	3 sec.		○		Daily 17:00 -
	△2	Inspection	Oil quantity gauge	H-L range	Verify after 1 hour of operation	Seeing	3 sec.		○		(Thursday)
	③	Cleaning	Feed chain	No aluminum powder, sagging or depletion of oil	Wipe off dirt	Waste cloth	20 sec.		○		(Thursday)
	④	Oiling	Feed chain	No foreign matter or depletion of oil	Pour oil up to inside the links	Oil type No. 13	20 sec.		○		(Thursday)
	⑤	Oiling	3-point set oil quantity	H-L range	Pour up to H	Oil type No. 1	20 sec.		○		(Thursday)
	⑥	Cleaning	Exhaust cleaner	No waste oil in the pan	Recover waste oil		20 sec.		○		(Thursday)
	⑦	Cleaning	Supply arm hand	No aluminum powder or foreign matter	Wipe dirt away	Waste cloth	20 sec.		○		(Thursday)
	⑧	Oiling	Supply arm hand	No depletion of oil	Spray evenly on sliding surfaces	Oil type No. 10	20 sec.		○		(Thursday)
	⑨	Cleaning	Spline shaft	No rust or flaws	Wipe dirt away	Waste cloth			○		(Thursday)
	⑩	Oiling	Spline shaft	No depletion of oil	Spray entire shaft unit	Oil type No. 13			○		(Thursday)
	⑪	Cleaning	Ball screw	No waste on screw unit or wiper unit	Wipe dirt away	Waste cloth			○		(Thursday)
	⑫	Oiling	Ball screw	No depletion of oil	Spray entire screw unit	Oil type No. 13			○		(Thursday)
	△13	Inspection	Sensor for detecting presence of work	No looseness of locking screws	Inspect during cleaning	Seeing			○		Inspect during cleaning
	△14	Inspection	Hopper unit sensor	No looseness of locking screws	Inspect during cleaning	Seeing			○		Inspect during cleaning

Example of Reevaluating General Inspection Standards: {2} After Improvement

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9 - 4 - (2)

Equipment Maintenance Standards

Example of Reevaluating Equipment Maintenance Standards

Equipment No.: PHO4	PHO4
Equipment name: BF3	Target unit: Rolling former

__ Inc. __ Plant __ Maintenance Section

Date of last revision: __/__/__
Date created: __/__/__

Target part	Inspection items		Inspection method	Criteria	Period	Method		Person-in-charge	
						In operation	When stopped	Autonomous maintenance	Specialized maintenance
Power chuck Revised 11/1/19__ Supplemented 7/13/19__	(1)	Wear in master jaw slide unit (3 units/set)	Use specialized measuring tools based on separate attachment and inspection standards	All 3 master jaws within 0.18 mm	1/3M		○		○
	(2)	Wear in the chuck pawl for attaching the roller roll (3 units/set)	↑	All 3 chuck pawls within 0.10 mm	1/3M		○		○
	(3)	Wear in the shaft for attaching the roller roll (3 units/set)	↑ Use a blade micrometer	All 3 shafts within 0.05 mm	Check visually at setup time		○	○	
					Measure once every 3 months		○		○
	(4)	Deformation of the chuck pawl shaft hole (3 units/set)	Measure the internal diameter of the hole with a cylinder gauge	All 3 chuck pawls within 8.2 mm dia.	1/3M		○		○
	(5)	Play when the spindle is rotating	Use a dial gauge to measure the play in the radial and thrust directions	Radial direction: Within 0.02 mm Thrust direction: Within 0.02 mm	1/6M		○		○
	(6)	End stopper for setting roll diameter	Use a dial gauge to measure circularity when the chuck is fully open	±0.05 mm	1/3M		○		○
	(7)	Looseness or breakage of the end stopper attaching bolts (3 units/set)	Visual inspection and retightening	No looseness or breakage	At start-up		○	○	
	(8)	Looseness or breakage of the roller roll attaching bolts (3 units/set)	Visual inspection and retightening	No looseness or breakage	At start-up		○	○	
	(9)	Looseness or breakage of the power chuck attaching bolts	Visual inspection and retightening	No looseness or breakage	At start-up		○	○	
	(10)	Oiling condition of the master jaw	Visual inspection (oil once a month)	No loss of oil film	Oil once a month		○	○	
					Visual inspection once every 3 months		○		○
	(11)	Oil leaking from the hydraulic piping	Visual inspection	No oil leakage	1/D	○		○	
Roller unit motor	(1)	Operating condition	Visual inspection and inspection for odors and noise	No abnormal noise or odor	During operation	○		○	
	(2)	Looseness of attaching base	Retighten using specialized tools	No looseness or breakage of bolts	1/M		○		○
	(3)	Loose or missing V-pulley keys	Visually check matching marks	No misalignment of or missing keys	Once a day when starting operation		○	○	
	(4)	Wear in the V-pulley groove	Visual inspection	No cracks or light in the groove	1/3M		○		○
	(5)	Wear in the V-belt	Visual inspection	No twisting or slipping during operation	1/D	○		○	
	(6)	Tension of the V-belt	Verify the matching marks of the tension bolts	No misalignment of matching marks	1/D	○		○	
			Visually check operation	No twisting or slipping of the V-belt		○		○	

List for Identification and Correction of Problem Points

Autonomous Maintenance Step 5 _____ Department _____ Section _____ Circle

No.	Classification of standard				Date created	Problem point (What, who and how)	Nature of improvement (What will be done?)	Effectiveness (What will change and how will it change?)
	Cleaning	Inspec-tion	Oiling	Mainte-nance				

Final Cleaning, Inspection and Oiling Standards

Machine name:	Section Manager	Subsection Manager	Circle Leader	Created by

Date created: __/__/__ Assigned area: Circle Section Department

No.	Location	Implemented by	Standard	Method	Period			Time	Clarification of purpose	Procedure No.
					Day	Week	Month			

19__ _____ Department _____ Section	**JishuHozen(AM)** **Annual Maintenance Calendar**	Machine name:	Engineering Division		Manufacturing Division		
			Manager	Subsection Manager	Section Manager	Subsection Manager	Person-in-charge

Part	Maintenance classification	Details of maintenance	Part name	MTBF	Date of installation	1	2	3	4	5	6	7	8	9	10	11	12

__/__

Department

Section

Autonomous Maintenance Calendar (Month/Week/Day)

Machine name:

Engineering Division		Manufacturing Division		
Section Manager	Subsection Manager	Section Manager	Subsection Manager	Person-in-charge

Part	Classification	Details of maintenance	During operation	While stopped	Person-in-charge	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Checksheet for Autonomous Inspection (Cleaning, Oiling and Inspection)

__/__			Period			Section Manager	Subsection Manager	Person-in-charge
Assigned area	_____ Circle _____ Section _____ Department		Daily	Weekly	Monthly			
Machine name								

Classification	No.	Item	Standard No.	Standard	Method	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

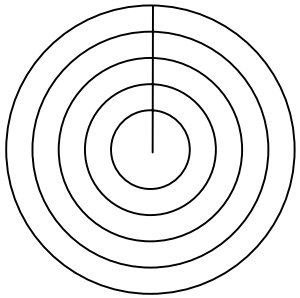
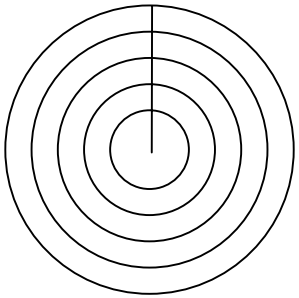
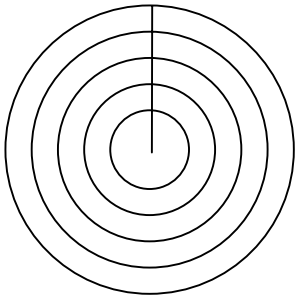
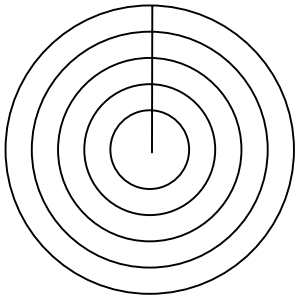
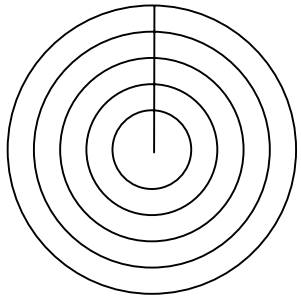
Remarks	

Checksheet for Autonomous Inspection Skills

_____ Circle _____ Section _____ Department

Section Manager	Subsection Manager	Circle Leader

Evaluation item			Evaluation level	
	A.	E.		Level 1: Understands it intellectually
	B.	F.		Level 2: Can perform autonomous inspection to some extent
	C.	G.		Level 3: Can perform autonomous inspection with confidence
	D.	H.		
	E.	I.		Level 4: Can teach others

Name	Name	Name	Name	Name
				
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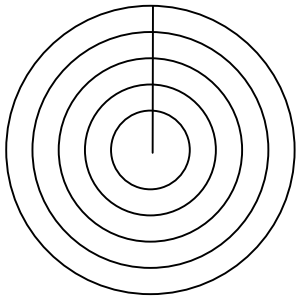	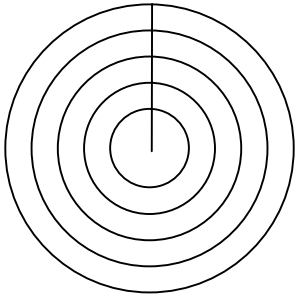	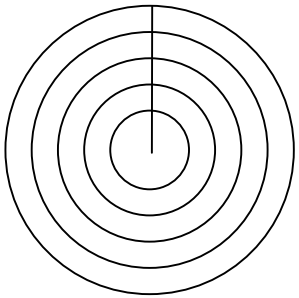	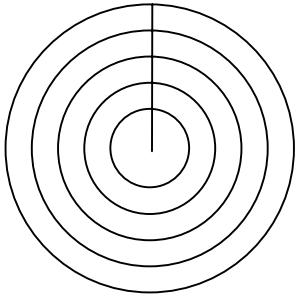	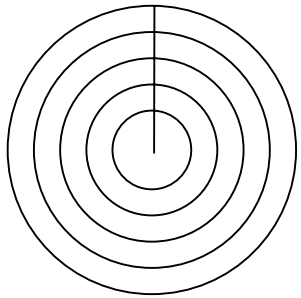

Checksheet for Autonomous Inspection Skills

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9 - 11

Step 5 Diagnosis Sheet

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Subsection Section **TPM Autonomous Maintenance Step 5**
Department **Autonomous Inspection Diagnosis Sheet**
Target equipment:

Diagnosis date: __/__/__
Diagnosed by

Total points		
__/100 points	Pass	80 points or more
	Try again	

Status of follow-up for Steps 1-4

Diagnosis points	Evaluation points					
Are the steps up until now being maintained?	6 Improved re-markably since passing steps	5 Improved somewhat since passing steps	4 Maintained as when passed	3 Passably	2 Below the level when passed	1 Level has regressed
Have improvements been made for problem points identified in previous diagnoses?	6 All have been improved	5 Most have been improved	4 Passably	3 Could do better	2 Not yet	1 No im-provement
(Comments)						/12

Details of autonomous inspection

Purpose

Through general inspections, to steadily maintain conditions that restore deterioration

Improved the efficiency of cleaning, inspection and oiling through devising means for visual inspection

Diagnosis points		Evaluation points			
Inspection items	Are necessary inspection items being omitted "for reasons of inability?"	4 No blind spots	3 No omissions for the most part	2 Could do better	1 Not yet
	Are inspection items specific to the equipment being included?	4 Included without exception	3 Included for the most part	2 Not yet	1 Not included
	Have periodic inspections been coordinated with the Engineering Section?	4 Appropriate coordination	3 Could do better	2 Not yet	1 Not coordinated
(Comments)					/12

Diagnosis points		Evaluation points			
Ease of inspection	In cases where there are many inspection items, are they divided up to make implementation easier?	4 Appropriately divided	3 Divided	2 Not yet	1 Indeterminate
	Are standards set so that the period of inspection can be observed?	4 Can be observed	3 Could do better	2 Not yet	1 Not possible
	Are means devised for "visual" management to make inspection easier to perform?	4 Means devised for visual inspection	3 Could do better	2 Not yet	1 No means devised
	Is the sequence of inspections arranged to make inspections easy to perform?	4 Appropriately sequenced	3 For the most part	2 Not yet	1 Not sequenced
	Can be performed in the allotted time?	4 Can be performed within the allotted time	3 For the most part	2 Not yet	1 Completely impossible
(Comments)					/20

Diagnosis points		Evaluation points			
Quality related items	With regard to predetermined items, (a) Is inspection incorporated for quality (Q)?	4 Well incorporated	3 Incorporated for the most part	2 Not yet	1 Not incorporated
	(b) Is the check for weighing equipment, measuring equipment, detection equipment and misoperation prevention equipment satisfactory?	4 Thorough	3 Passably	2 Could do better	1 Poor

Reevaluate the role of equipment and the role of people, and clarify what an abnormal condition is

Make improvements so that equipment has good operationality

Diagnosis points		Evaluation points			
	(c) Are proper accuracy checks of equipment and tools for checking processes being carried out?	4 Well defined	3 Defined	2 Passably	1 Not defined
(Comments)					/12

Diagnosis points		Evaluation points			
Implement-ation status of inspections	Are inspections being carried out in accordance with inspection standards, and are records being kept?	4 Thorough inspection and record keeping	3 Inspections and record keeping are being performed for the most part	2 Could do better	1 No record keeping
	Are improvements being made for problem points identified as a result of inspections?	4 Thoroughly improved	3 Improved for the most part	2 Could do better	1 No im-provement
	Are areas of deterioration being reliably identified and handled as a result of inspection cleaning?	4 Reliably identified	3 Identified for the most part	2 Could do better	1 Not yet started
(Comments)					/12

Diagnosis points		Evaluation points			
Skill of inspection	To devise means for raising the level of inspection skills, (a) Are the weak points of inspection skills understood?	4 Well understood	3 Understood for the most part	2 Understood vaguely	1 Not understood
	(b) Are there plans for that training and education?	4 Plans are clear	3 Drafting of plans in progress	2 Drafting of plans scheduled	1 Not yet started
(Comments)					/8

Status of autonomous maintenance activities

Purpose

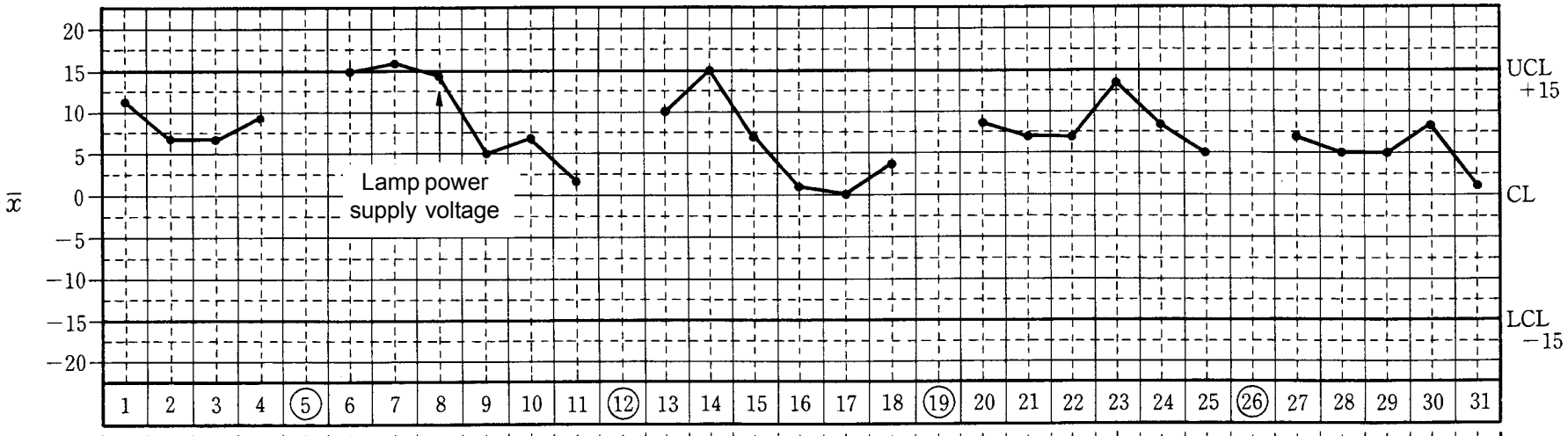
To work toward an autonomous management system through group activities

Diagnosis points	Evaluation points			
Are the number of meetings, time and level of participation in TPM group activities satisfactory?	4 Satisfactory	3 Normal	2 Could be better	1 Poor
Is it understood why inspections must be performed?	4 Clearly understood	3 Understood for the most part	2 Understood vaguely	1 Not understood
Is the importance of raising one's own level of inspection skills understood?	4 Well understood	3 Understood	2 Not yet	1 Not understood
Is there a plan to reevaluate and revise standards based on data?	4 Plan completed	3 Drafting of plan in progress	2 Drafting of plan scheduled	1 Not yet started
Do all personnel understand that this Step is the overall wind-up of autonomous inspection?	4 Understood	3 Understood for the most part	2 Not yet	1 Not understood
Is the method for checking whether inspection standards are being observed defined?	4 Well defined	3 Defined	2 Not yet	1 Not defined
(Comments)				/24

Planning Chart for Step 6 Activities

______ Circlet	______ Section	______ Departmen		
Purpose				
Activity item / Date				
1	Follow-up on Steps 1-5			
2	Order and arrangement			
3	Correction of problem points			
4	Autonomous diagnosis			
5	Top Executive Diagnosis			

Illumination [Symbol] - R Control Chart for Machine No. __



	1	2	3	4	(5)	6	7	8	9	10	11	(12)	13	14	15	16	17	18	(19)	20	21	22	23	24	25	(26)	27	28	29	30	31
N	9	9	9	9		9	9	9	9	9	9		9	9	9	9	9	9		9	9	9	9	9	9		9	9	9	9	9
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R	11	10	8	12		7	5	20	23	18	15		9	8	13	18	19	15		20	21	20	15	17	18		15	14	12	18	8
Seal of approval	○	○	○	○		○	○	○	○	○	○		○	○	○	○	○	○		○	○	○	○	○	○		○	○	○	○	○

Autonomous Inspection Control Chart x[bar]-R

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Flowchart of Measures for Equipment Problems

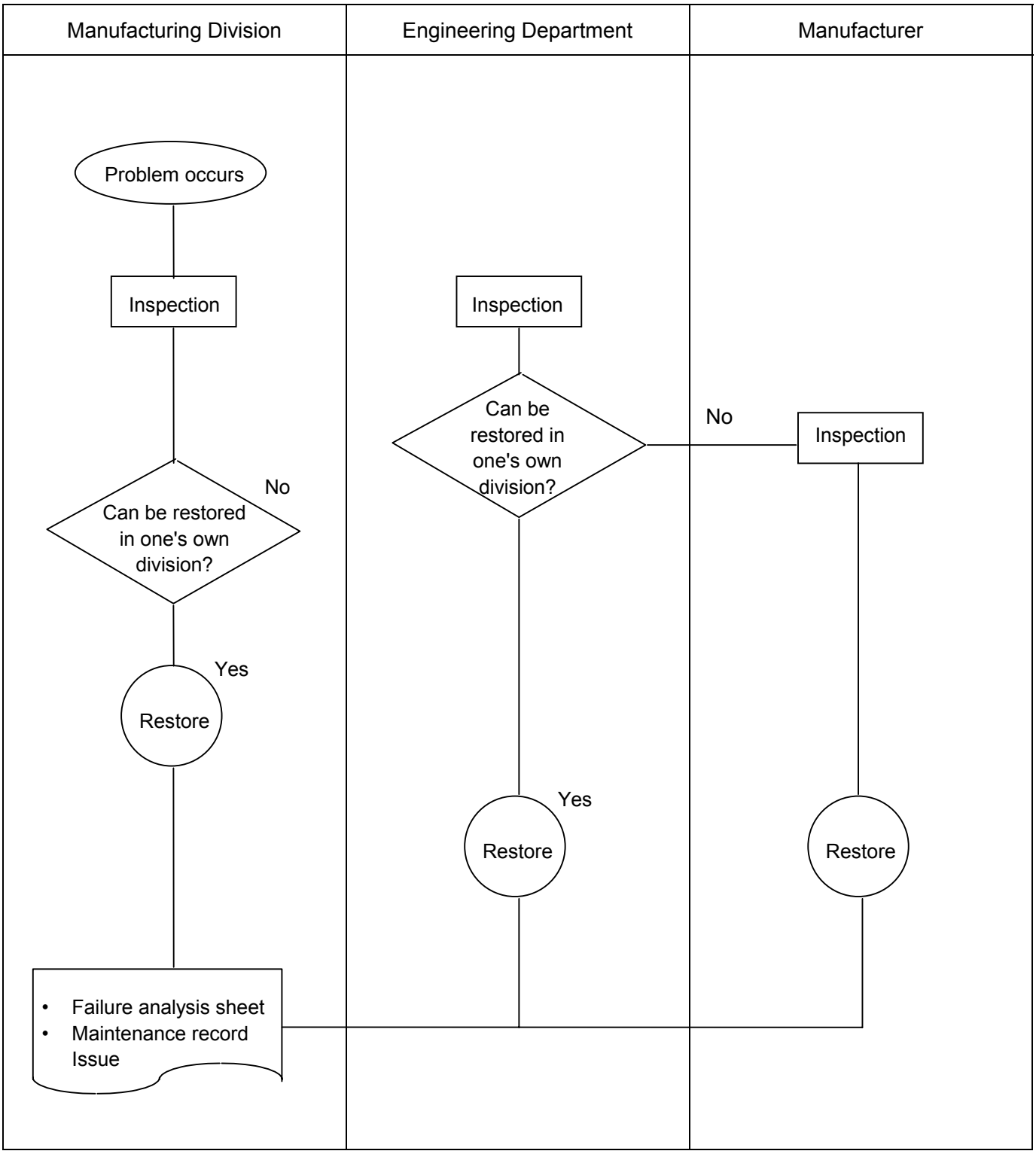

Diagram of Layout for Storage of Materials, Products and Work-in-Progress

Circlet _____ Section _____ Departmen

Classification	Layout No.	Article	Storage quantity		Person responsible for control
			Max	Min	

Layout diagram

Diagram of Layout for Storage of Materials, Products and Work-in-Progress

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Diagram of Layout for Storage of Jigs and Tools

Circle _____ Section _____ Department _____

Classification	Layout . No	Article	Usage	Qty.	Person responsible for control

Layout diagram

Standard for placement (illustration or photo)

Diagram of Layout for Storage of Jigs and Tools

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10 - 5

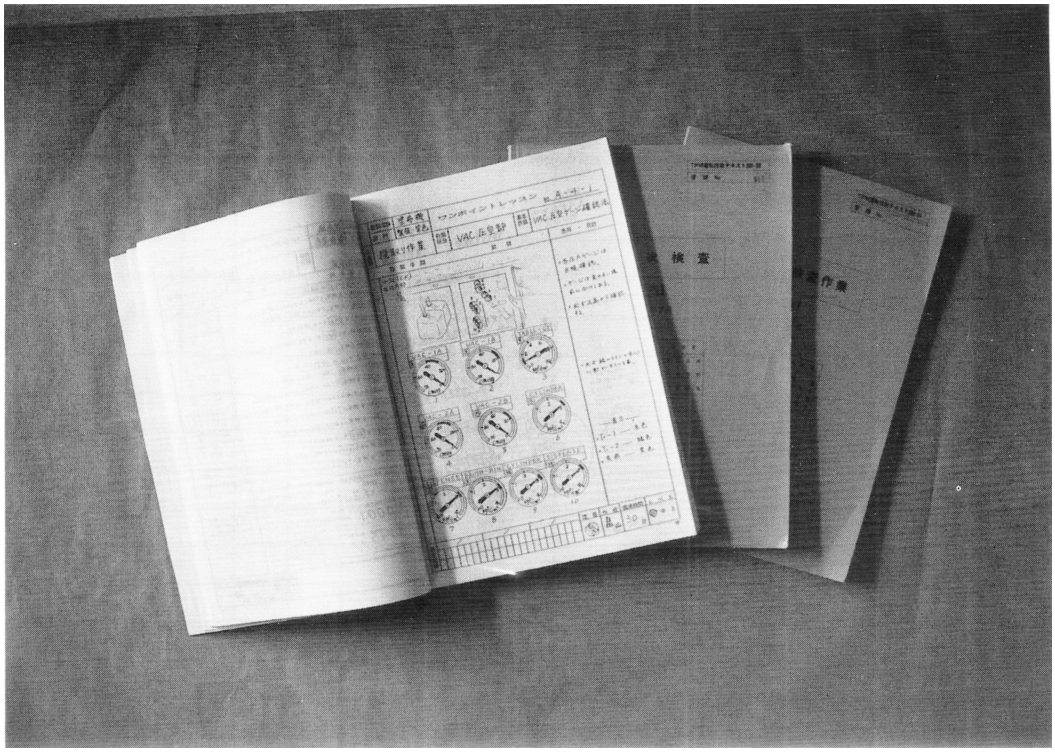
Diagram of Layout for Storage of Spare Parts, Fixtures and Others

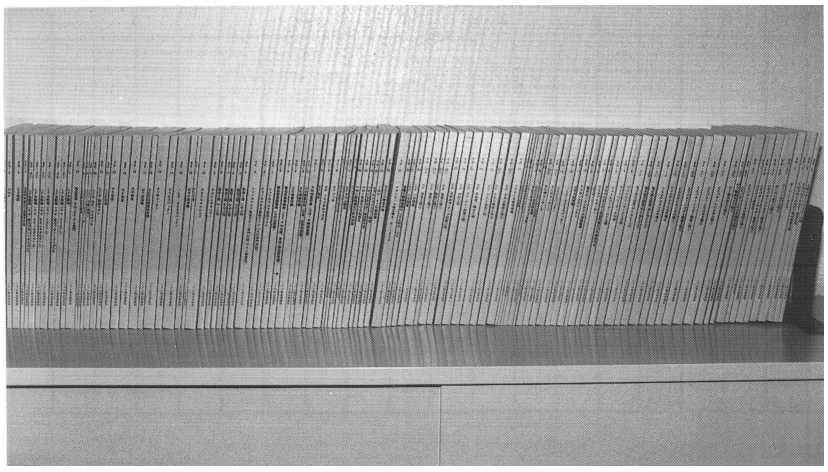
Circle _____ Section _____ Department

Classification	Layout No.	Article	Storage quantity Max	Storage quantity Min	Person responsible for control

Layout diagram

Example of Textbooks for Operation Skills



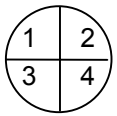


Evaluation Table for Operation Skills

Circle _____ Section _____ Department _____

Main classification	Work classification	Work item	Name / Check date																													

Evaluation standard



Level 1: Understood intellectually

Level 2: Can perform operation to some extent

Level 3: Can perform operation with confidence

Level 4: Can teach others

Evaluation Table for Operation Skills

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10 - 8

Autonomous Maintenance Step 6

List for Identification and Improvement of Problem Points

_____ Circle _____ Section _____ Department

No.	Classification			Problem point (What, where and how?)	Cause (Why did this happen?)	Nature of improvement (What will be done?)	Effectiveness (What will change and how will it change?)
	Strain	Variance	Losses				

Step 6 Diagnosis Sheet

7 • 2	10 - 10

Subsection Section **TPM Autonomous Maintenance Step 6**

Department **Order and Arrangement Diagnosis Sheet**

Target equipment:

Diagnosis date: __/__/__

Diagnosed by

Total points		
__/100 points	Pass	80 points or more
	Try again	

Maintenance and control activities

(Status of follow-up on Steps 1-5)

Diagnosis points	Evaluation points			
Are the conditions at the time of passing previous steps being maintained?	3 Improved since passing steps	2 Maintained as when passed	1 Passably	0 Below the level when passed
Have improvements and measures been taken for items cited at previous diagnoses?	3 All have been improved or are scheduled to be improved	2 Improved for the most part	1 Low rate of implementation	0 No improvement
Is autonomous maintenance being steadily implemented, and are standards being reevaluated as needed?	4 Steadily implemented and thoroughly established	3 Reevaluation could be better	2 Inadequate implementation	0 Problems with maintaining autonomous maintenance
Has the maintenance (cleaning, oiling and retightening) of basic conditions been established?	3 Established and maintained in good condition	2 Standards are being observed for the most part	1 Could do better	0 Still inadequate
Do the 5S of workplace improve?	3 Extremely good	1 Passably	1 Could do better	0 Still inadequate
(Comments)				/16

Order and arrangement "Equipment"

(Make firm decisions and steadily observe them)

[Inspection of equipment accuracy]

Diagnosis points	Evaluation points			
Are checksheets being used, and is inspection work being carried out steadily?	3 Inspection work is well understood	2 Being implemented	1 Could do better	0 Inadequately
Are quality control items incorporated in the inspection items, and does this lead to a reduction in defects?	3 Leads to good results	2 Incorporated	1 Items are understood but not incorporated	0 Items are not understood
Are equipment problems handled speedily and reliably?	3 Handled reliably	2 Passably	1 Could do better	0 Inadequately
Is visual management thoroughly implemented, and have means been devised so that anyone can determine visually whether there is a problem?	4 Thoroughly imple-mented, and anyone can determine problems	3 Can be visually determined for the most part	2 Cannot be understood without explanation	0 Not thoroughly implemented
Are the number of inspection items being reduced, and is the introduction of predictive maintenance making progress?	3 Making good progress	2 Making partial progress	1 Under consideration	0 Not making progress
Are standards set for routine checking of detection and control equipment, and are their functions being verified?	3 There are standards and they are firmly established	2 Implemented in accordance with standards for the most part	1 Could do better	0 Still inadequate
(Comments)				/19

Order and arrangement "Things"

(Are both quality and quantity "as they should be?")

Diagnosis points	Evaluation points			
Are the storage location and quantity of materials, work-in-progress, products, defective products and indirect materials clear?	3 Properly defined	2 Defined for the most part	1 Some parts need to be redone	0 Mixed up
Are means being devised for the storage location and method of storage of jigs and tools, and are they managed visually?	3 Means are being devised and management is satisfactory	2 Management is satisfactory	12 Passably	0 Inadequately
Are measuring instruments being stored so that they are easy to use and so that their accuracy can be maintained?	3 Properly stored	2 Stored in a predetermined location	1 Storage location is determined	0 Instruments are dirtied with waste, oil, etc.
Are means being devised for the storage location and method of storage for oiling equipment, and is the equipment managed visually?	3 Means are being devised and management is satisfactory	2 Management is satisfactory	1 Passably	0 Inadequately
Is the storage location of machine consumables and specific spare parts clarified, and are the point and quantity decided?ordering	3 Properly decided	2 Decided for the most part	1 Some parts need to be redone	0 Inadequately

- Continued -

[Thorough visual management]

Diagnosis points	Evaluation points			
Are things that are used infrequently managed centrally in one location?	3 Thoroughly managed	2 Basically centralized	1 Some parts remain to be centralized	0 Inadequately
Are things in a state that allow them to function adequately?	4 In good condition without any breakage or dirt	3 Passable condition	2 Could do better	0 Inadequately
(Comments)				/22

Order and arrangement "Personnel"

(Are the operator's duties clearlydefined, and are those duties being carried out?)

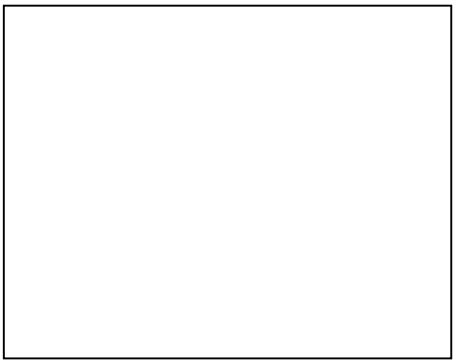
[Thorough standardization]

Diagnosis points	Evaluation points			
Are the various standards being reevaluated and properly ordered?	3 Ordered and in operation	2 Nearly completed	1 Still being reevaluated	0 Will start from now on
Have correct operation procedures, work requirements for handling, and standards for work been created?	3 Have been created and are being observed	2 Have been created for the most part	1 Working on it	0 Not created
Are education and training being conducted for priority items related to operation procedures and quality, and are skills being evaluated?	3 Systematically carried out	2 Plan is completed	1 Planning in progress	0 Not yet
Is work being performed according to standards, and is the work going well?	3 Without difficulty	2 Good for the most part	1 Could do better	0 Not yet
When failures or quality defects occur, is each case analyzed one at a time and are efforts made to prevent recurrence?	4 Properly analyzed	3 Generally analyzed	1 Could do better	0 Inadequately
Are the methods for handling problems decided, and are they observed?	3 Thoroughly decided and observed	2 Generally satisfactory	1 Partially not yet decided	0 Inadequately
Are records being properly kept, and are they organized and stored?	3 Properly implemented	2 Generally satisfactory	1 Could do better	0 Inadequately
(Comments)				/22

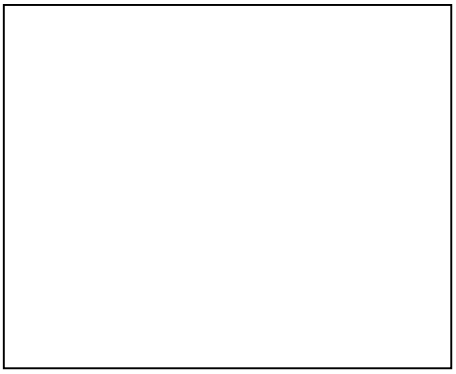
Group activities

(Are all members of the group actively participating and are results being obtained?)

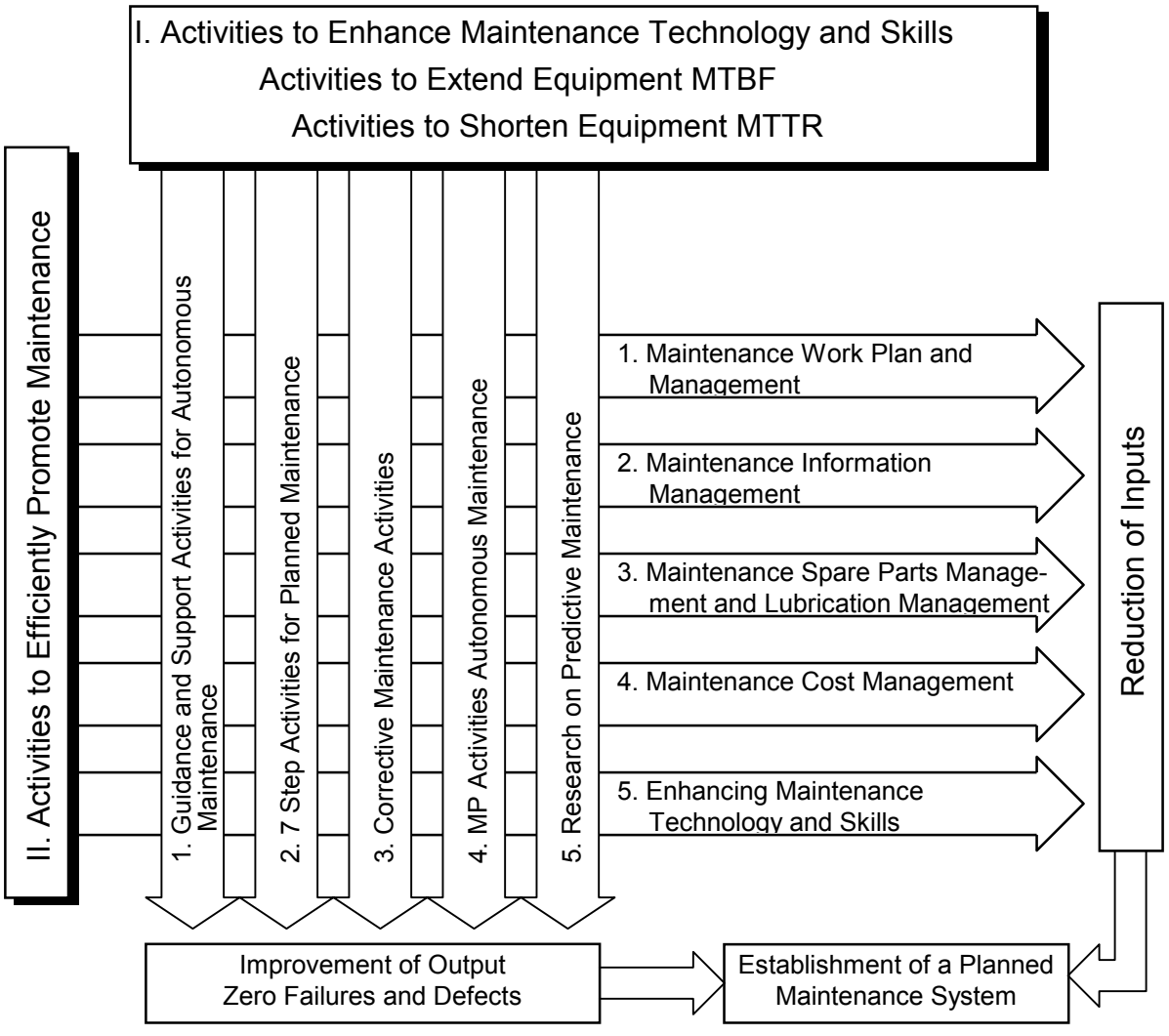
Diagnosis points	Evaluation points			
Looking at the activities board, are the activity details and results, prevention of future recurrence of problems, and future plans properly linked?	3 Contents of activities can be seen at a glance	2 Basically understood	1 Not yet linked	0 Contents are unclear
Is the focus of improvement set as a group, and are all group members involved?	3 All group members are involved and results are being obtained	2 Focus is set and efforts are underway	1 There is a focus but efforts are inadequate	0 The focus is unclear
Are meetings lively and conducted as planned?	3 Five or more times a month, and very lively	2 Three or more times a month, and lively	1 Two or fewer times a month, and could do better	0 Meetings hardly held at all
Based on the concept of "learning from failures and quality defects," are one-point lessons being written up and are countermeasures being taken?	3 Extremely good	2 Good	1 Could do better	0 Not yet
Are improvement suggestions being actively submitted, and are all members reaching their goals and improving their performance?	3 Six or more sugges-tions/person-month, and all members reaching their goals	2 Four or more suggestions/person-month, and satisfactory activity	1 Two or more suggestions/person-month, and could do better	0 Under 2 sugges-tions/person-month, and inadequate activity
Is daily management established in order to raise production efficiency?	3 Daily management is established and satisfactory	2 Handling of this is slightly weak	1 Awareness of daily management is insufficient	0 Inadequately
Do all personnel understand the meaning of 5S, and is this apparent in their behavior?	3 Extremely good	2 Good	1 Could do better	0 Inadequately
(Comments)				/21



7･3 Keikaku Hozen (Planned Maintenance)

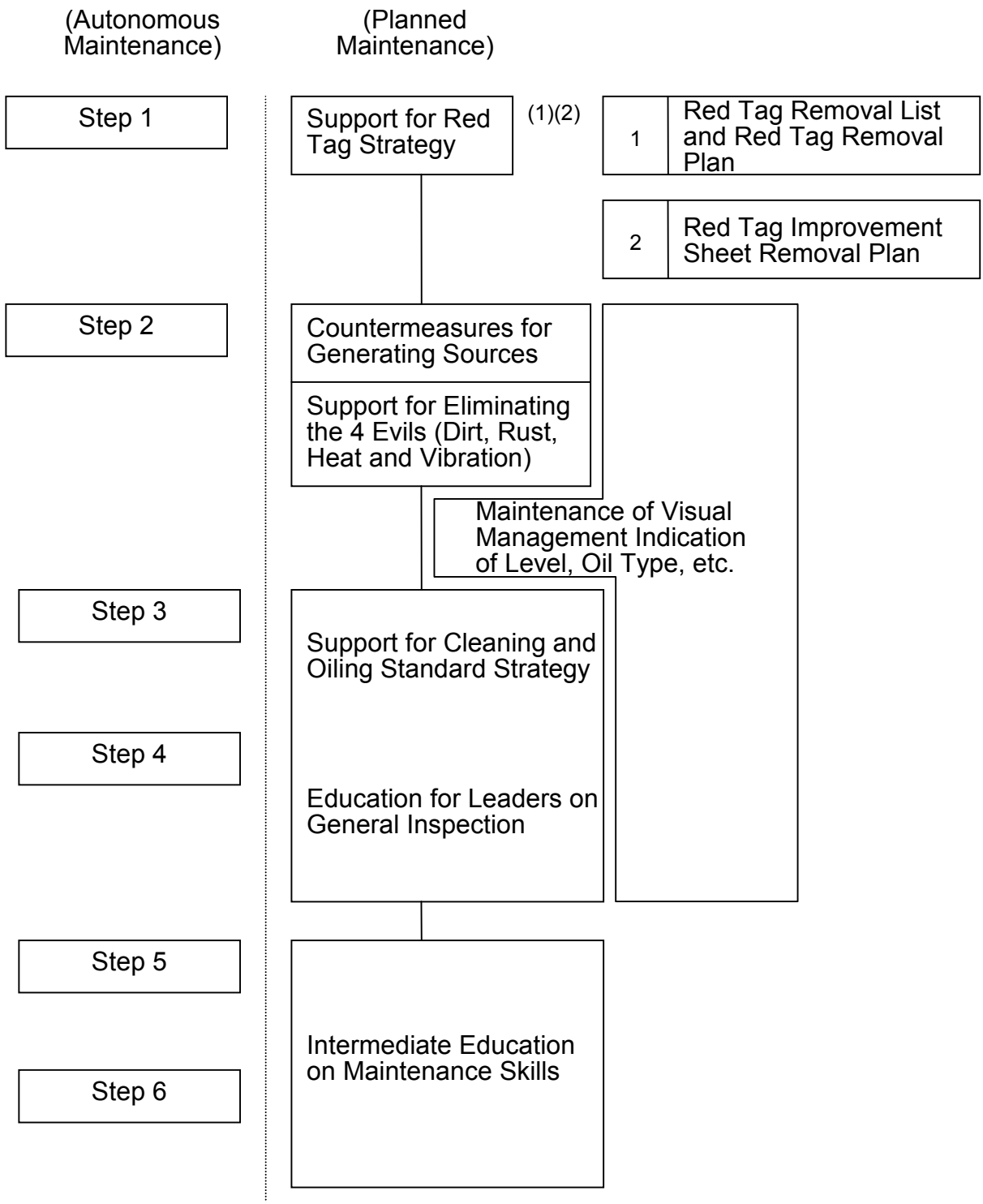


Overview of Planned Maintenance Activities



7•3 Planned Maintenance

1. Support and Guidance for Autonomous Maintenance Activities



Implementation of Planned Maintenance Phase

2. (Phase 1)
Evaluation of Equipment and Understanding Current Conditions

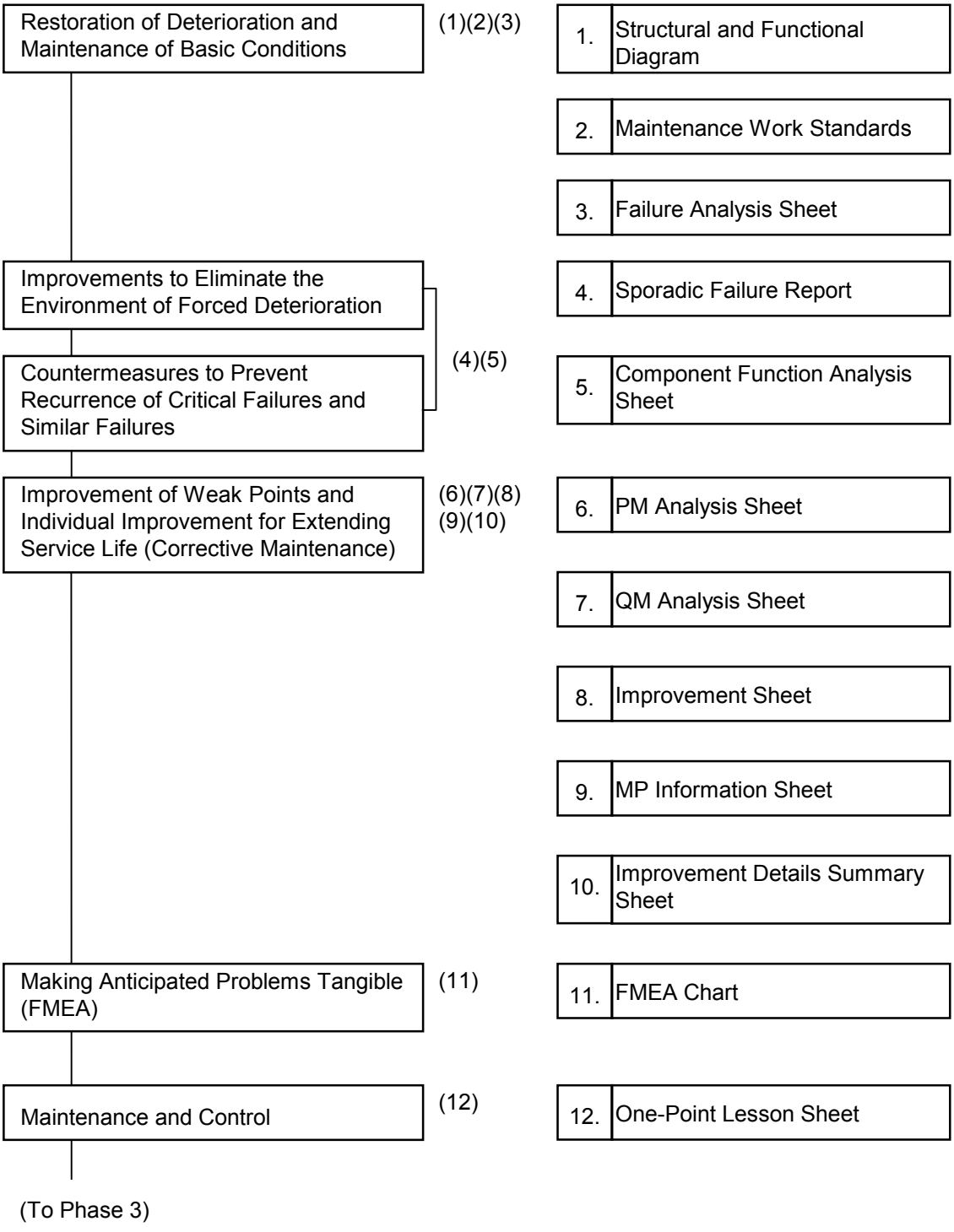
- Creation and Maintenance of an Equipment Ledger (1)
  - 1. Equipment Control Ledger
- Creation and Implementation of an Equipment Evaluation Standard
  - 1) Creation of an Evaluation Standard
  - 2) Ranking (2)
    - 2. Evaluation Chart for Ranking Equipment
- Selecting PM Equipment (3)
  - 3. Equipment Rank Display
- Understanding Current Conditions
  - ・Equipment Maintenance Record (4)
    - 4. Equipment Maintenance Record (Log)
  - ・MTBF (5)
    - 5. MTBF
  - ・Equipment Current Conditions Checklist (36)
    - 6. Equipment Current Conditions Checklist
  - ・Frequency and Intensity (7)
    - 7. Equipment Failure Frequency Evaluation Table
  - ・Process Capability Calculation Table (8)
    - 8. Process Capability Evaluation Table
  - ・MTTR (9)
    - 9. Equipment Repair Time and Frequency Evaluation Table
  - ・Maintenance Expenses
  - ⋮
- Set Maintenance Goals

(To Phase 2)

7•3 Planned Maintenance

Implementation of Planned Maintenance Phase

3. (Phase 2)
Restoration of Deterioration and Improvement of Weak Points



7・3 Planned Maintenance

Implementation of Planned Maintenance Phase

4. (Phase 3)
Creation of an Information Management System

- Construction of a Failure Data Management System (1)
  - 1. Failure Data Management System Flowchart
- Construction of an Equipment Maintenance Management System (2)(3)(4)(5)
  - 2. Equipment Maintenance Management System Flowchart
  - * Machine Log Management
    * Maintenance Management
    * Inspection Plan
    - 3. Equipment Maintenance Report
    - 4. Equipment Inspection Schedule
- Construction of an Equipment Budget Maintenance System
  - 5. Maintenance Construction Work Performance Table
- Spare Parts Management System (2)(6)(7)(8)
  - 6. Spare Parts Management System Flowchart
  - * Drawings and Documents Management
    - 7. Inventory List
    - 8. Maintenance Parts Actual Usage Record

(To Phase 4)

7•3 Planned Maintenance

Implementation of Planned Maintenance Phase

5. (Phase 4)
Creation of a Periodic Maintenance System

- Activities to Prepare for Periodic Maintenance (1)
  - Management of Spare Machines, Spare Parts, Measuring Tools, Lubrication, Drawings and Technical Documents
- Flowcharting the Periodic Maintenance Work System (2)
- Selection of Target Equipment and Locations (3)
- Formulation of a Maintenance Plan (4)
- Creation and Maintenance of Standards (5)(6)(7)(8)(9)(10)(11)(12)
- Improving the Efficiency of Periodic Maintenance, and Strengthening Management of Outsourced Construction Work (13)

(To Phase 5)

1. Periodic Maintenance Work Standard
2. Periodic Maintenance Work System Flowchart
3. Flowchart for Selecting Target Equipment and Locations
4. Periodic Maintenance Calendar
5. Material Selection Standard
6. Construction Cost Estimation Standard
7. Spare Parts Management Standard
8. Lubrication Oil Changing and Supply Management
   - (1) Oil Changing Period Chart
   - (2) Oil Replenishment and Supply Period Chart
9. Lubricant Usage Classification Table
10. Lubrication Inspection Standard
    - (1) Lubrication Inspection Standard
    - (2) Lubrication Inspection Items Table
    - (3) Lubrication Oil Maintenance Sheet
11. Work Safety Standard
12. Network Process Table
13. Periodic Maintenance Report

7•3 Planned Maintenance

Implementation of Planned Maintenance Phase

6. (Phase 5)
Creation of a Predictive Maintenance System

- Introduction of Equipment Diagnostic Technology (1)
  - 1) Training of Engineers
    ↓
    2) Introduction of Diagnostic Equipment
- Creation of a Predictive Maintenance Work System Flowchart
- Selection of Equipment and Locations Targeted for Predictive Maintenance
  - ・Predictive Maintenance Selection Flowchart
    ・List of Locations and Diagnostic Equipment (2) (3)
- Practical Training on Predictive Maintenance (4)
  - Example of Diagnosing Pump Vibration (5)
- Development of Diagnostic Equipment and Diagnostic Technology

(To Phase 6)

1. Equipment Diagnostic Manual
   (1) Positioning of Equipment Diagnostic Technology
   (2) Principle Equipment Diagnostic Technology and Its Main Functions
   (3) Purpose and Aims of Equipment Diagnostic Technology, and an Overview of the Study Course
2. Predictive Maintenance Selection Flowchart
3. List of Locations and Diagnostic Equipment
4. Equipment Diagnostic Trend Management Sheet
5. Inspection Report for Predictive Maintenance (Example of Diagnosing Pump Vibration)

7・3 Planned Maintenance

Implementation of Planned Maintenance Phase

7. (Phase 6)
Evaluation of Planned Maintenance

Evaluation of the Planned Maintenance System

- List of Maintenance Evaluation Indices (1) (2)
- Graph of Evaluation Indices

1. List of Maintenance Evaluation Indices

2. Graph of Evaluation Indices

Evaluation of Reliability Improvement

1) Number of Failures and Minor Stoppages (3)
2) MTBF (3)
3) Frequency of Failures (3)

3. Details of Measurement and Evaluation

Evaluation of Improvement in Maintainability

1) Periodic Maintenance Rate (3)
2) Preventive Maintenance Rate (3)
3) MTTR (3)

Evaluation of Cost Reductions

1) Reduction in Maintenance Costs (3)
2) Improvement in Usage Classification of Maintenance Costs (3)

(To Phase7)

Implementation of Planned Maintenance Phase

8. (Phase 7)
Establishment of Planned Maintenance

Improvement of CBM

Establishment and Improvement of a Maintenance System

Reduction of Maintenance Total Costs

9. Failure Analysis Flow

- Creation of a Failure Record
  - Collection and Organization of Data
    - Failure Record
- Organizing the Function, Construction and Proper Usage of Equipment
  - Investigation of Equipment Characteristics
    - Structural and Functional Diagram
    - One-Point Lesson
    - Inspection Standard
    - Work Standard
- Pursuit and Analysis of Causes, and Listing Inspection Items
  - Failure Analysis Sheet
  - Machining Point Analysis
  - Why-Why Analysis Sheet
  - FTA
  - FMEA
  - PM Analysis Sheet
- Inspection of Actual Situation Based on Inspection Items
  - QM Matrix
  - Component Function Analysis Sheet
- Restoration of Problem Locations
  - Improvement Sheet
  - Improvement Details Summary Sheet
- Draft of Countermeasures to Prevent Recurrence
  - MP Information Sheet
- Organization of Failure Analysis Sheets and Creation of Inspection Standards
  - Evaluation Sheet for Implementation Rate of Countermeasures for Failures
- MP Information Registration

Planning Chart: "Red Tag Removal"

Equipment _____ Month _____

List No.	Equipment name	Description	Structure: Natural deterioration	Structure: Forced deterioration	Structure: Other	Construction work implementation schedule: 1 5 10 15 20 25 30	Countermeasures completed	Deals with: OS/P&I revision	Deals with: Correction to completed drawing	Deals with: Revision of inspection and examination standards	Deals with: Improvement case example sheet	Deals with: MP information sheet	Deals with: Tentative control chart for functional support	Deals with: Improvement suggestion	Red tag removal
							☐								☐
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Red Tag Removal List and Red Tag Removal Plan

7 • 3

1 - 1

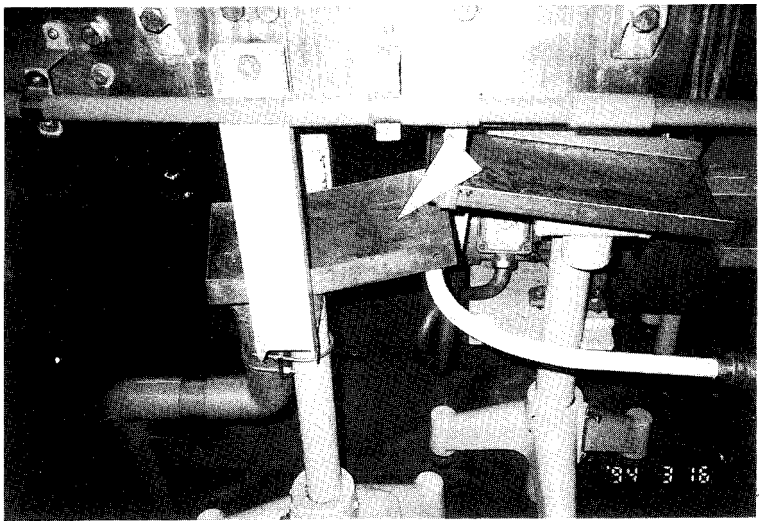
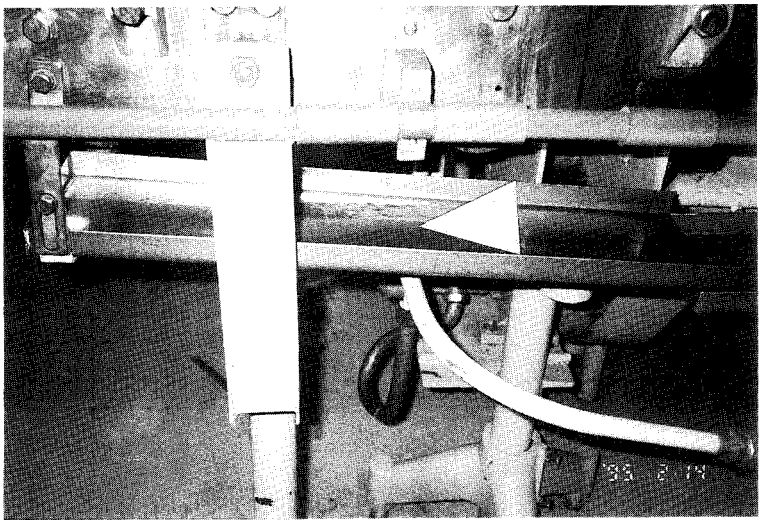
Red Tag Improvement Sheet	7 • 3	1 - 2

Problem Discovery and Improvement Sheet

Discovery No.		Improvement No.	
Department		Group/Circle name	__ Circle
Date discovered	__:__	__/__/__	

Promotion Office	Section Manager	Subsection Manager	Department Promotion	Group Manager	Created by

Equipment name	__ conveyer	Discovered by: __
State the problem (phenomenon): Water drips from the pan and pipes, dirtying the floor		

Analysis of problem location	Describe problem/improvement point (use photos and drawings to make it easy to understand)
* Why did the problem occur? (What are the main causes, aggravating causes and hidden causes?) (Record on a separate sheet of paper as needed.) • The pan and PVC pipe are not in the correct position, and water is dripping. Further, the PVC pipe sticks out into the passageway, interfering with traffic. * What will happen if the problem is left as is? (Equipment failure, product defects, quality problems, etc.) • Waste water will drip, making the floor slippery • Will become unable to perform cleaning * Resulting estimated financial loss and down time: • Increase in the cleaning frequency and cleaning time	Before Improvement 
Improvement of problem locations	After improvement
* What will be improved and how will it be improved? • Will reattach pan • Will eliminate waste water pipe (will change the waste water route) * Improvement cost and manhours __ yen __ hr, __ persons * Effect obtained by improvement • Reduction in cleaning time: __ hr • Drying of the floor prevents tipping of loads	

Equipment Management Record

Asset No.		Designed by		Installation location	Date	Subsection/line name
Equipment name		Date created				
Model		Purchased from				
Drawing No.		Purchase date				
		Purchase price (1,000 yen)				

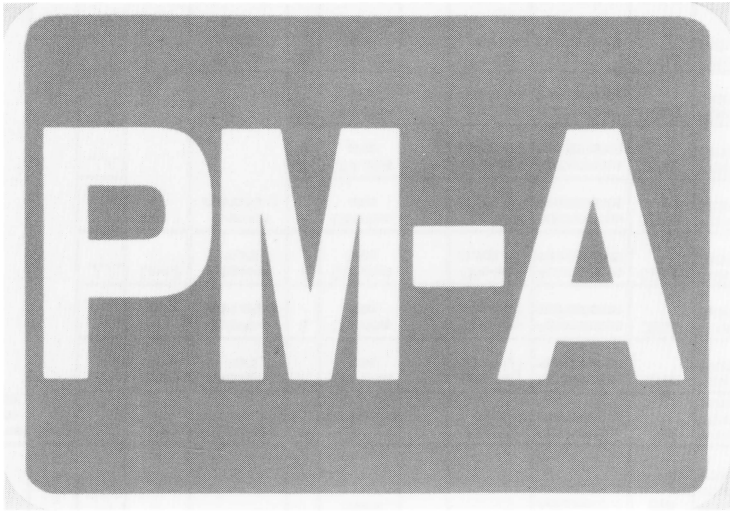
	Periodic maintenance/modifications and improvements		Amount		Main failure and repair		Amount
Date	Location	Details (in-house manhours)	(1,000 yen)	Date	Location	Details (in-house manhours)	(1,000 yen)

Evaluation Chart for Ranking Equipment (Evaluation Table for Selecting Priority Equipment)

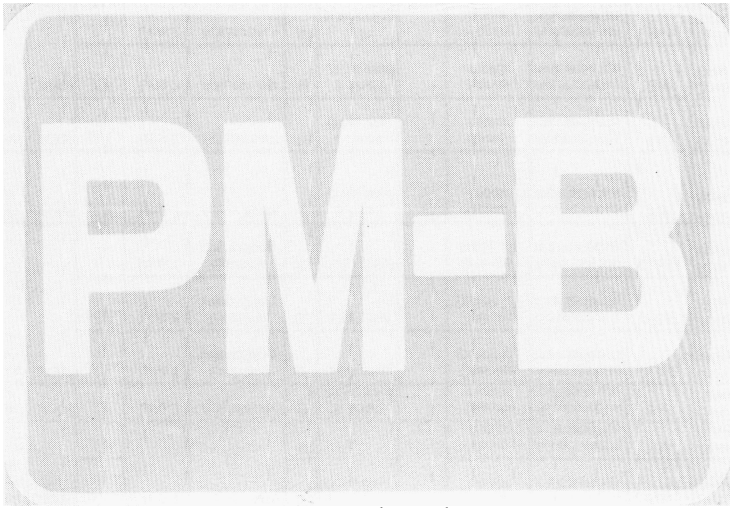
Classification		Evaluation	Equipment name / Evaluation points										
Production (PD)	1.	Average level of operation	5	4	2	1							
	2.	Availability of a spare machine or alternate machine, and the ease of switchover		4	2	1							
	3.	Impact of a failure on other equipment	5	4	2	1							
	4.	Frequency of failure		4	2	1							
	5.	Down time for repairing failures		4	2	1							
Quality (Q)	6.	Product fabrication process capability	5	4	2	1							
Cost (C)	7.	F Cost		4	2	1							
	8.	Total repair cost		4	2	1							
Safety (SM)	9.	Risk of a failure causing injury	5	4	2	1							
	10.	Risk of a failure causing pollution	5	4	2	1							
Total points													
Total evaluation													

Note Integrated line: A=41-27 B=26-18 C=17-10
General equipment: A=45-29 B=28-19 C=18-10

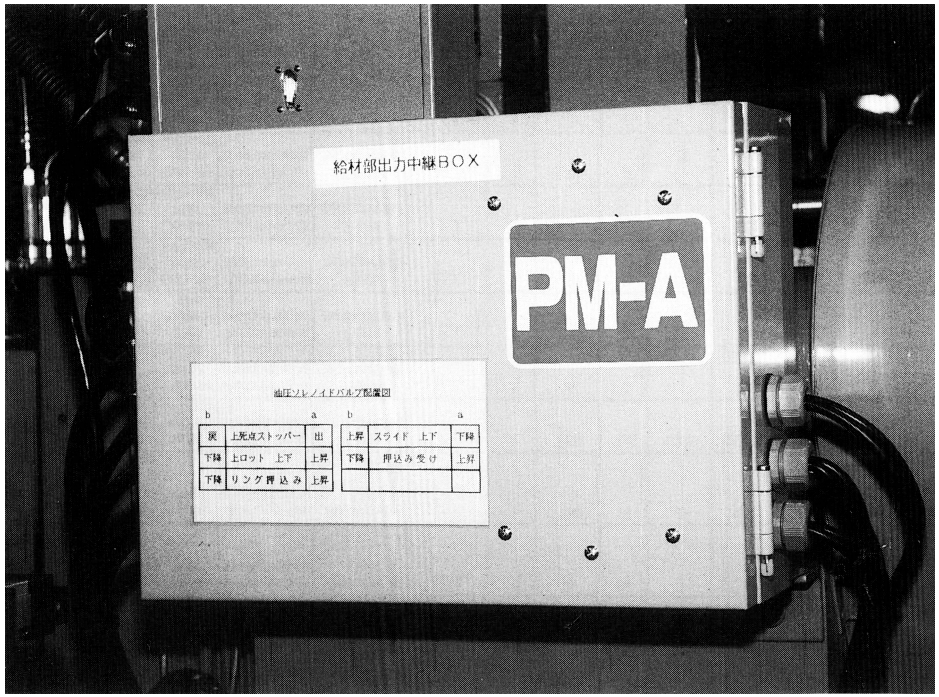
Equipment Rank Display



PM-A Rank Seal



PM-B rank seal



Example of usage

Monthly Equipment Maintenance Record

Details	Equip-ment name	Date of work	Machine No.	UT name	UT ST	Location name	Location ST	Part name	Maintenance performed by	Maintenance type	Functional configuration	Phenomenon classification	Details of phenomenon	Cause classification	Measures taken by	Replacement OH	Date of implemen-tation	Man-hours	Time required	D.T.	Parts expense	Work expense	Maintenance expense	Interval since previous maintenance	MTTR	MTBF (days)
External maintenance	0A309	_/_/_	Line 3	Adjustment	2R	θ shaft drive area		Servo-motor	Autonomous maintenance	BM	Drive Breaking	Operation problem	Cannot set home position	Other	Autonomous maintenance	Parts replacement	_/_/_	2	150	170	81000	12500	93500	19	68	844
		_/_/_			1R			Servo-motor	Autonomous maintenance	BM	Drive Breaking	Operation problem	Cannot set UT home position	Other	Autonomous maintenance	Parts replacement	_/_/_	1	150	165	81000	6250	87250	1	52	382
Adjust-ment	0A309	_/_/_	Line 3	Adjustment	1R	θ shaft drive area		Servo-motor	Autonomous maintenance	BM	Drive Breaking	Operation problem	Cannot set UT home position	Other	Autonomous maintenance	Adjust-ment OK	_/_/_	1	20	20	0	833	833	17	27	1226
External maintenance	0A309	_/_/_	Line 1	Examine interlocking	2R	DM drive		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent measurement malfunctions	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	2	2		83	83	3		242
		_/_/_	Line 2	Examine interlocking	2L	DM drive		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent measurement malfunctions	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	1	1		41	41	71	2	2388
		_/_/_	Line 1	Examine interlocking	4L	DM drive		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent measurement malfunctions	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	2	2		83	83	16		253
Adjust-ment	0A309	_/_/_	Line 3	Adjustment	3R	θ shaft drive area		Servo-motor	Autonomous maintenance	BM	Drive Breaking	Center misalignment Positional misalignment	Poor motion	Adjust-ment	Autonomous maintenance	Adjustment OK	_/_/_	1	30	15	0	1250	1250	6	30	1589
External maintenance	0A309	_/_/_	Line 3	Adjustment	1R	θ shaft drive area		Servo-motor	Autonomous maintenance	BM	Drive Breaking	Open circuit	Cannot set home position	Other	Autonomous maintenance	Parts replacement	_/_/_	2	50	120	81000	4166	85166	3	30	2361
Adjust-ment	0A309	_/_/_	Line 3	Adjustment	1R	θ shaft drive area		Servo-motor	Autonomous maintenance	BM	Drive Breaking	Other	Home becomes misaligned a little at a time	Other	Autonomous maintenance	Adjustment OK	_/_/_	2	10	30	0	833	833		10	4696
		_/_/_	Line 2	Adjustment	3R	VP positioning chuck		Floating chuck	Autonomous maintenance	BM	Manipu-lation of work	Center misalignment Positional misalignment	Frequent pitch misinterlocking	Adjust-ment	Autonomous maintenance	Adjustment OK	_/_/_	1	70	35		2916	2916	1	148	947
		_/_/_							Autonomous maintenance	BM	Manipu-lation of work	Center misalignment Positional misalignment	Frequent pitch misinterlocking	Adjust-ment	Autonomous maintenance	Adjustment OK	_/_/_	1	150	75	0	6250	6250	1	167	1182
External maintenance	0A309	_/_/_	Line 2	Adjustment	3R	VP positioning chuck		Floating chuck	Autonomous maintenance	BM	Manipu-lation of work	Fracture Breakage	Frequent pitch misinterlocking	Deterio-ration with age	Specialized maintenance	Parts replacement	_/_/_	2	250	125	6000	20833	26833	12	173	1573
		_/_/_	Line 1	Measure-ment	2L	DM drive area		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Abnormal transport	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	5	5		208	208	17	2	225
		_/_/_		Examine interlocking	1L	DM drive area		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Other	Abnormal transport of clutch lead-in	Part Assem-bly	Autonomous maintenance	Parts replacement	_/_/_	1	2	2		83	83	7		260
		_/_/_	Line 2	Measure-ment	1L	DM drive area		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent measurement malfunctions	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	3	5		125	125	44		310
		_/_/_	Line 1	Examine interlocking	2L	DM drive area		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Defective discharge of quality products	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	2	2		83	83	1		305
		_/_/_			2R	DM drive area		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Defective discharge of quality products	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	2	2		83	83	7		290
		_/_/_			2L	DM drive area		One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Defective discharge of quality products	Deterio-ration with age	Autonomous maintenance	Parts replacement	_/_/_	1	3	3		125	125	0		272
		_/_/_		Measure-ment	2L	DM drive area		Thrust bearing	Line maintenance worker	TBM	Rotation Sliding	Seizing Galling	No drive from DM	Inspect-ion Mainte-nance	Specialized maintenance	Disassembl y OH	_/_/_	2	30	90	0	2500	2500		30	8280

List of Countermeasures for Failures (MTBF Investigation Table)

Equipment name	UT name	Location name	Part name	Maintenance performed by	Maintenance classification	Functional configuration	Phenomenon classification	Details of phenomenon	Classification of cause	Countermeasures taken by	Maintenance expense	Incidence	MTTR	MTBF (days)	Countermeasures classification	Failure analysis	PM analysis	Machining work analysis	Other analysis	Revision of standard	One-point	Modification Maintenance	Horizontal replication	Implemented by	Date completed	Date evaluated	Recurrence	Degree of certainty	Reliability	Degree of establishment
OA309	Screw tightening	Driver	Circuit protec-tor				Other	All 8 screw tightening drivers do not operate	Part Assembly	Autonomous maintenance	833	1	20	1035	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Measurement	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunction	Deterioration with age	Autonomous maintenance	125	3	3	1037	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Examination of interlocking	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective measurement when examining interlocking	Deterioration with age	Autonomous maintenance	83	11	2	282	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	10	2	309	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	8	2	386	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	9	2	343	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	7	2	440	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	6	2	508	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	5	2	608	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Measurement	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunctions	Deterioration with age	Autonomous maintenance	0	4		758	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Examination of interlocking	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent measurement malfunctions	Deterioration with age	Autonomous maintenance	83	4	2	758	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Measurement	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunctions	Deterioration with age	Autonomous maintenance	125	2	3	1512	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Examination of interlocking	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunctions when examining interlocking	Deterioration with age	Line maintenance worker	0	3		1005	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Measurement	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunctions	Deterioration with age	Autonomous maintenance	0	3		1006	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Examination of interlocking	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunctions when examining interlocking	Deterioration with age	Line maintenance worker	0	1		2976	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent defective discharges due to measurement malfunctions when examining interlocking	Deterioration with age	Line maintenance worker	0	2		1488	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Measurement	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective discharges due to measurement malfunctions	Deterioration with age	Autonomous maintenance	0	2		1484	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
	Examination of interlocking	DM drive area	One-way clutch UT	Autonomous maintenance	CBM2	Rotation Sliding	Wear	Frequent defective measurements when examining interlocking	Deterioration with age	Autonomous maintenance	83	3	2	981	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●
								Frequent defective measurements when examining interlocking	Deterioration with age	Autonomous maintenance	83	1	2	2936	MTBF	AK92 0501			AK92 0501					Specialized maintenance	_/_/_	_/_/_	Yes	●	●	●

Equipment Current Conditions Checklist

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Equipment Current Conditions Checklist

Seal of approval	Seal of approval	Seal of approval

Control No.	Machine name	Performance	Manufacturer	Date of purchase	Number of years elapsed	Purchase price	Total repair costs to date	Installation location	Summary		
									Verification	Modified	Note

Equipment Failure Frequency Check-up Table

7・3	2 - 7

Machine Failure Frequency Check-up Table

Month / Control No. / Name		1	2	3	4	5	6	7	8	9	10	11	12	

Process Capability Check-up Table

Survey date _____ Drawing No. _____ Measurement point _____
Standard value _____ Part name _____ Work performed by _____
Machine No. _____ Machine name _____

Class	Class environmental value	Central value	Check	fi	Ui	$fi \cdot Ui$	$fi \cdot Ui^2$
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
		h ①		Σfi ②		Σfi・Ui③	Σfi・Ui²④

Calculations

Average value $(\bar{x}) =$ [※] $+ \frac{\boxed{③}}{\boxed{②}} \times$ [①] $=$

Standard deviation $(S) =$ [①] $+ \sqrt{\dfrac{\boxed{④} - \dfrac{\left(\boxed{③}\right)^2}{\boxed{②}}}{\left(\boxed{②} - 1\right)}} =$

Process capacity index $(Cp) = \dfrac{\text{Tolerance}}{6 \times \boxed{S}} =$

(Determination)

Class 1	1.33≦ Cp
Class 2	1.00≦Cp＜1.33
Class 3	0.67≦Cp＜1.00
Class 4	Cp＜0.67

Equipment Repair Time and Frequency Check-up Table

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Machine Repair Time and Frequency Check-upTable

No.	Time	No.	Time	No.	Time	No.	Time
1		16		31		46	
2		17		32		47	
3		18		33		48	
4		19		34		49	
5		20		35		50	
6		21		36		51	
7		22		37		52	
8		23		38		53	
9		24		39		54	
10		25		40		55	
11		26		41		56	
12		27		42		57	
13		28		43		58	
14		29		44		59	
15		30		45		60	

1. Fifty or more data values is desirable.
2. Find the maximum value (t_{max}) and the minimum value (t_{min}) of the data
3. Calculate the range R:

   $R = t_{max} - t_{min}$
4. Divide R by the approximate square root of the number of stages. Make this value be the width of the interval.

Structural and Functional Diagram

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Structural Diagram: List of Functional Parts

TPMG	Section Manager	Subsection Manager	Created by

Equipment name:

Unit name:

Part name:

Reason for selection:

(Important points of the part)

Work Procedures for Inspection, Examination, Maintenance and Adjustment

Registration No.:

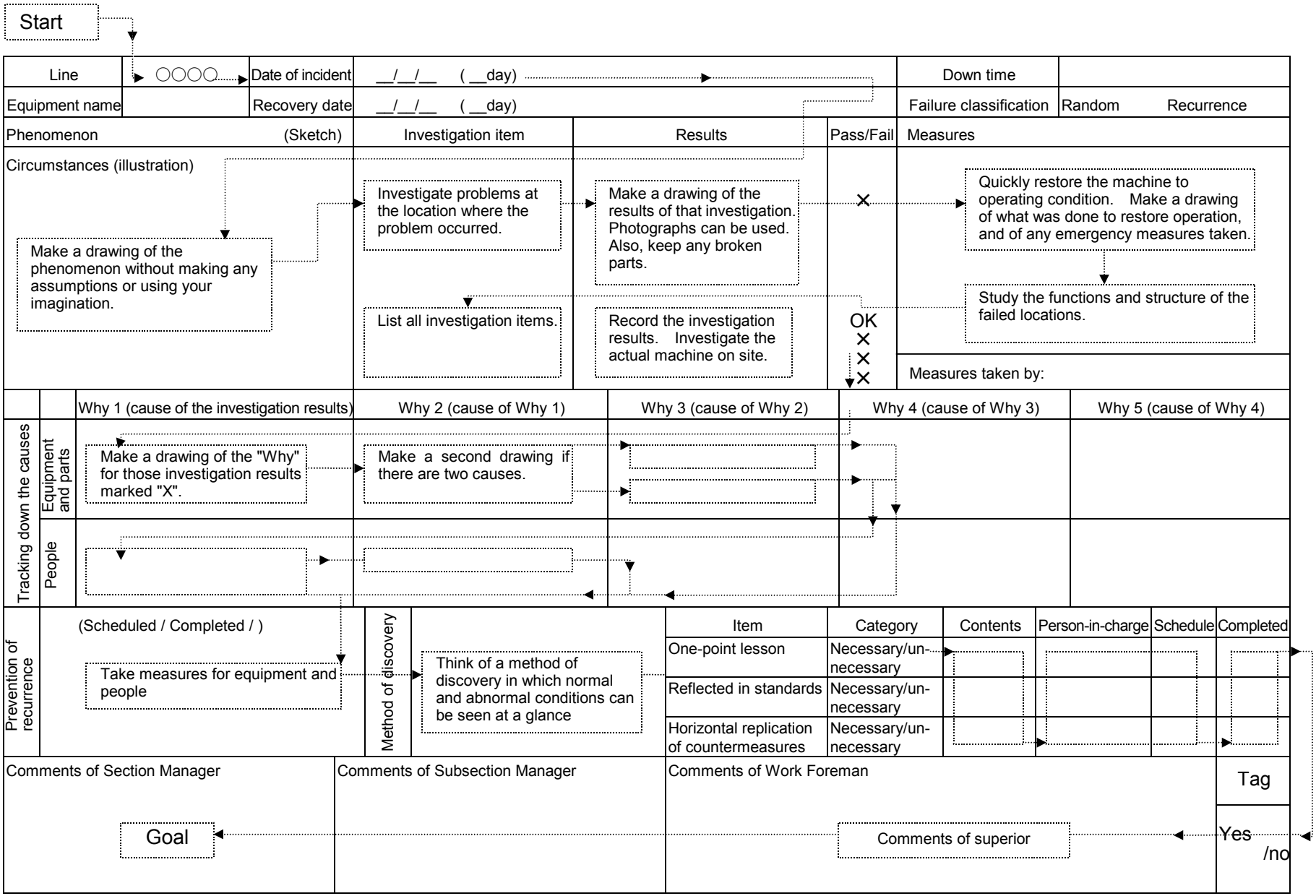
Equipment name				No.	Details	No.	Procedure	Key points and purpose	Standards/regulations
Item name									
Period		Standard time							
Date created	__/__/__	Created by							

Work tools, inspection tools, parts, etc. needed for the work

1		10	
2		11	
3		12	
4		13	
5		14	
6		15	
7		16	
8		17	
9		18	

(Remarks)

Example of Why-Why Analysis Form



Maintenance Report

(Registration No.: __)

Section Manager	Subsection Manager	In Charge

Case name:

1. Failure	2. Abnormal	3. Maintenance
A. Chronic B. Recurrence C. Random		A. Periodic B. Planned C. Unscheduled

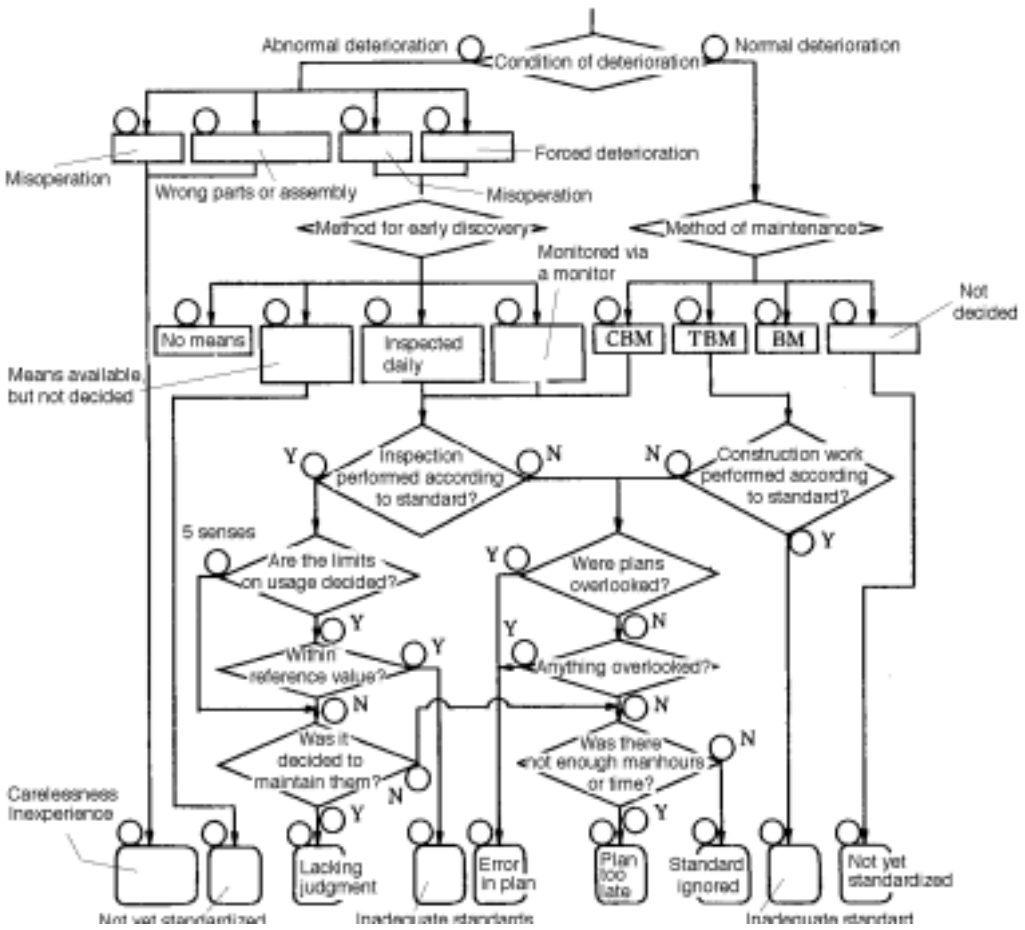
Equipment name	Rank	Machine No.	UT name	Location name	Part name
	A.B.C.				

Date of incident	__/__/__ __:__	Repair time	__ minutes	D.T	__ minutes	Man hours	__ persons	Work expense	__ yen	Parts expense	__ yen	Total	__ yen

Functional configuration	1. Hydraulic 2. Pneumatic 3. Oil and water plumbing 4. Drive and breaking 5. Transmission and conversion 6. Rotation and sliding 7. Manipulation of work 8. Positioning and cushioning 9. Frame and case 10. Affixing and tightening 11. Sensors 12. Electrical and wiring 13. Fans and blowers 14. Molds 15. Other
Phenomenon	1. Fractures and breakage 2. Bending and deformation 3. Loosening and detaching 4. Wear 5. Seizing and galling 6. Leakage and clogging 7. Rust and corrosion 8. Vibration and noise 9. Center misalignment and mispositioning 10. Heat generation and burning 11. Open circuit 12. Operation malfunction 13. Quality defect 14. Other

Details of phenomenon			Sketch
Investigation (identification of defects)	Item	Results	

Identification of problem points	Why did the condition of this product come about? (Principles and rules)	
	Personnel related What are the deficiencies of the standard?	
Prevention of recurrence		



Direct cause	1. Maintenance plan 2. Inspection and maintenance 3. Oiling and cleaning 4. Adjustment 5. Parts and assembly 6. Drive and operation 7. Deterioration with age 8. Strength and dimensions 9. Other	
Hidden causes	Technical	1. Design error 2. Inadequate improvement 3. Other
	Education	1. Not knowledgeable 2. Inexperience 3. Carelessness 4. Standards neglected 5. Other
	Management	1. Unskilled 2. Inadequate standard 3. Other
Measures	1. Emergency repairs 2. Future planned maintenance 3. Push maintenance plan forward	Replacement OH: 1. Parts replacement 2. Disassembly and OH 3. Restored by adjustment
	Countermeasures taken by	1. Specialized maintenance 2. Line maintenance worker 3. Autonomous maintenance 4. Other
Countermeasures	1. MTBF 2. MTTR 3. Minor stoppage 4. Safety 5. Quality 6. Other	

Issuance of one-point lesson		Sheet No.		Theme		In Charge		Date completed __/__/__
Revision of standard		Sheet No.		Theme		In Charge		Date completed __/__/__
Modification & maintenance	MP information	Sheet No.		Theme		In Charge		Date completed __/__/__
	Design change	Part name		Description		In Charge		Date completed __/__/__
Horizontal replication	Parts Manufacturing	Ordered			Completed	In Charge		Date completed __/__/__
	Construction work implementation	Line 1: 1-1 1-2 1-3 Line 2: 2-1 2-2 2-3 Line 3: 3-1 3-2 3-3 Subsidiary line				In Charge		Date completed __/__/__

Performance evaluation	Evaluated by	Evaluation date: __/__/__	Recurrence: Yes/no	Degree of certainty of cause: __	Reliability of improvement: __	Degree of establishment of support and control: __	Rate of implementation: __

		Date of incident	Machine No.	UTST	Unit ST	Repair time		Remarks	Sheets used in analysis	
Occurrence at same location	①								Why-why analysis	Sheet No.
	②								PM analysis	Sheet No.
	③								Machining work analysis	Sheet No.
	④									
	⑤									

Registration check of maintenance information management system data	From incident to measures	①	②	③	④	⑤	Analysis	Countermeasures completed	Evaluation

7・3　3-4

Sporadic Failure Report

Component Function Analysis Sheet

Workplace	Created by	Date created

Part name	Function	Problem when that function was lost	Extent of functional deterioration	Inspection period		Remarks
				Standard	Actuality	

PM Analysis Sheet

Theme name	Classification of 8 major losses	__/__/__	Clarification of phenomenon	Physical viewpoint (illustration)
		Prepared by		
Process name:	Equipment name:	Equipment No.:		

Causative conditions (Unit level)	Standard value	Measured value	Determination	Relationship to parts, jigs and tools, materials, methods, etc.								Item No. Measurement method (illustration)	Details of countermeasures (restoration and improvement)	Date serviced	Results		
				Primary cause (unit level)	Standard value	Measured value	Determination	Secondary value (part level)	Standard value	Measured value	Determination				Standard value	Measured value	Determination

QM Analysis Sheet

Product		Analysis date	
Workplace		Analyzed by	

M: Equipment and operation / Q: Problem phenomenon						
Part name	Degree of functional deterioration					

Improvement Sheet

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Control No.	
Date created	

Subsection Manager	Group Manager	Prepared by

Improvement Example

Theme	

Reason for selecting theme:

Before improvement	After improvement

Problem phenomena		Description of countermeasures	
		Effectiveness	

The circle should determine the contents of the improvement, draw a circle around one of the following and submit one copy.

{1} MP information --> Manufacturing Engineering Subsection (MP sheet)	{2} Needs to be taken into consideration in another line --> Subsection Manager (Group Manager)

- Let's actively submit MP information!

MP Information Sheet	7・3	3 - 9

Revised: __/__/__

MP Information and Contact Sheet

- Check those areas related to MP information, attach an Improvement Example Sheet or an Individual Improvement Sheet, and submit to the appropriate section.

Date submitted: __/__/__

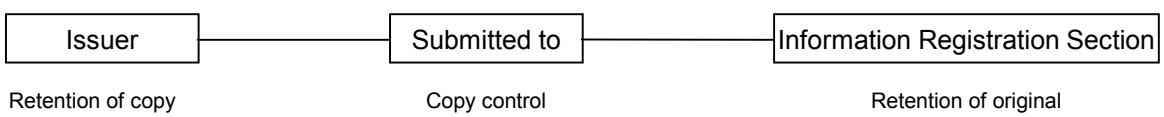
Section name			Verification	Issuance
Person-in-charge (Circle)				
Equipment		Unit		
Case name				
MP information provider column	Classification	☐Equipment ☐Supplementary materials ☐Jigs and tools ☐Work standard ☐Product ☐Die	☐QC process diagram	
	Submit to	☐ Manufacturing Engineering Subsection — Reception stamp	☐ Quality Control Section — Reception stamp	

The section that receives the sheet specifies the registration section.

Registration of information	☐ Production Engineering Section ☐ Quality Control Section ☐ Development Section ☐ Manufacturing Engineering Subsection ☐ ( )

Information Registration Section	Accepted / Rejected	Note:	Approval	Person-in-charge

- Flowchart for submitting MP Information Sheet (submitting original)



Improvement Details Summary Sheet

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Improvement Details Summary Sheet

Workplace	Date created
Work	Analyzed by

No.	Description of work	Required time (DM)		Time													Improvement proposal			
		Before improvement	After improvement														Current level	Minor investment level	Medium investment level	Ideal level

FMEA Chart

(Design and Process)

Distribute to: Quality Maintenance and Production Engineering	0: No problem 1: Minor problem 2: Problem	Reviewed by	Created by	Page /

Type:		Step	Current evaluation (1) x (2) x (3) → Total				Four points or greater requires countermeasures	Countermeasures					
Function or work	Failure mode	Assumed cause of failure	Level of incidence	Level of detection	Level of impact			Design	Process	Inspection	Specific details	In Charge	Results of countermeasures

One-Point Lesson Sheet	7 • 3	3 - 12

One-Point Lesson

Registration No.	

Posting expires: __/__/__

Theme		Volume: Basic knowledge Problem case examples Improvement case examples

Correspondence courses

Who												TPMG	Section Manager	Subsection Manager	Created by
To whom															
Evaluation of skills	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	4 1 3 2	Created by	Circle Section Subsection		
Date	/	/	/	/	/	/	/	/	/	/	/		Name: Date created: __/__/__		

* Evaluation of skills

1. Does not understand
2. Understands intellectually
3. Can perform procedure to some extent
4. Can perform procedure with confidence

Failure Data Management System Flowchart

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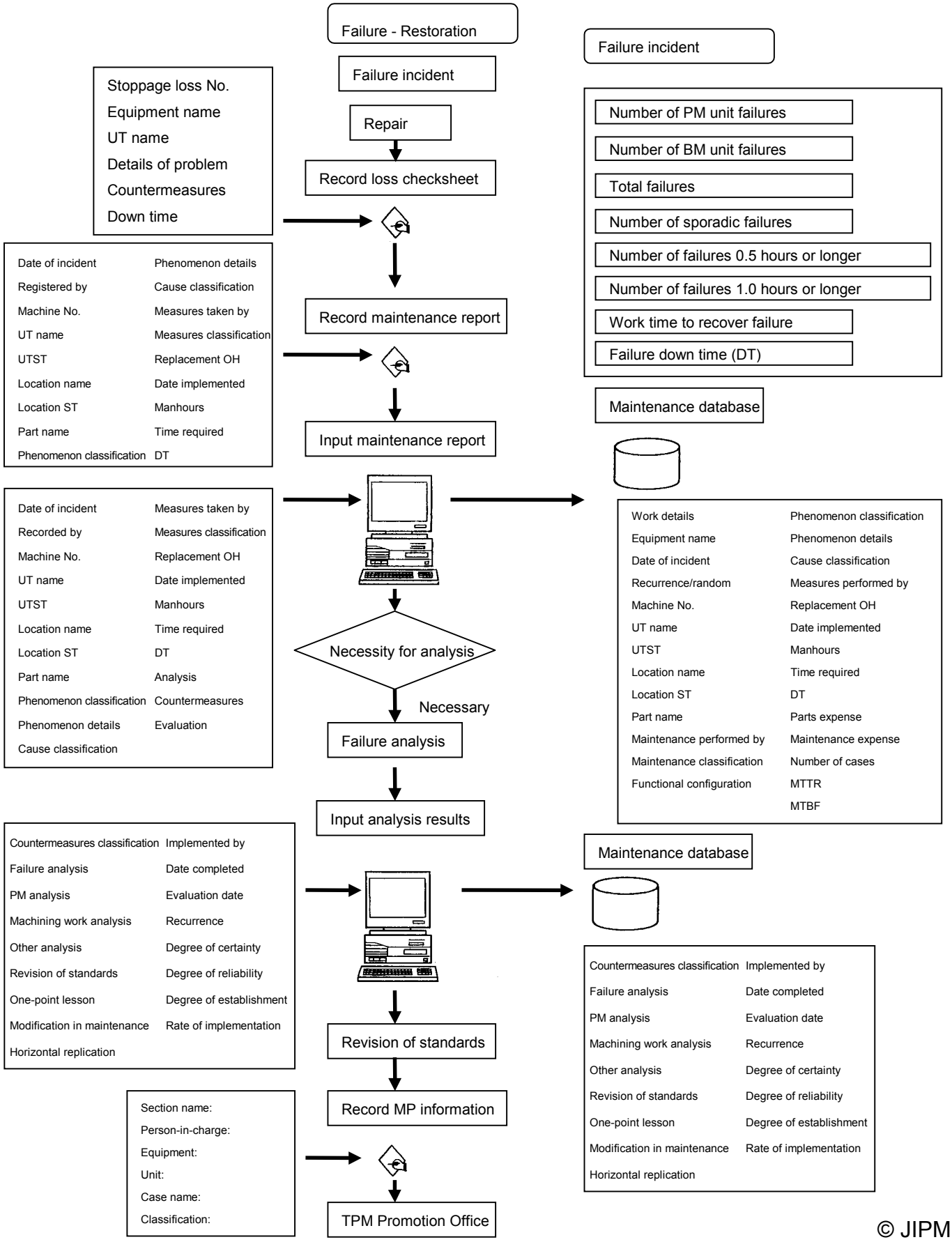
Failure Data Management System Flowchart



Equipment Maintenance Management System Flowchart

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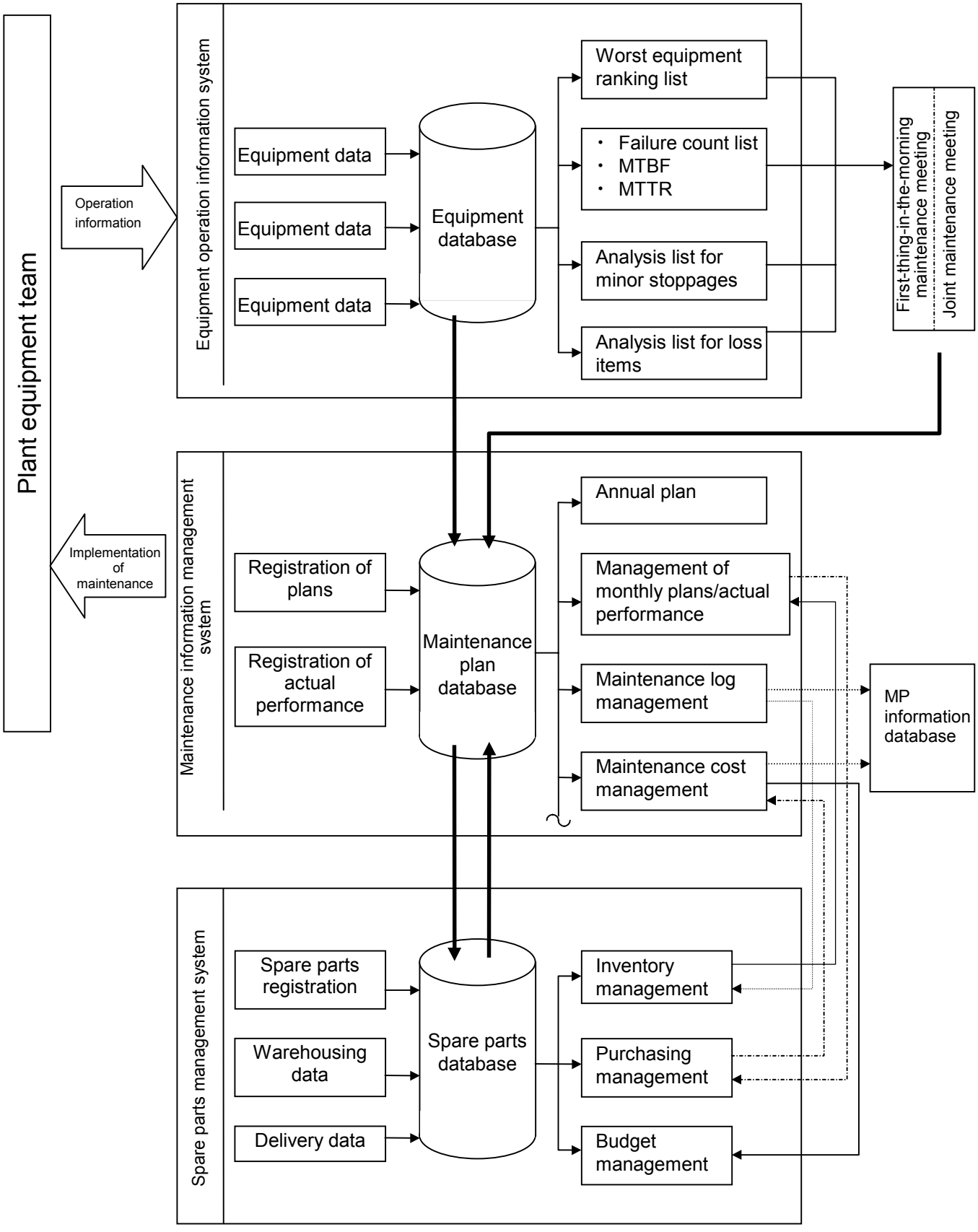
Configuration of Equipment Maintenance Management System



Equipment Maintenance Report | **7 • 3** | **4 - 3**

Maintenance Report

Equipment name: __/__

Date of incident	Registered by	Machine No.	UT name	UT ST	Location name	Location ST	Part name	Phenomenon classification	Phenomenon details	Cause classification	Measures taken by	Measures classification	Replacement OH	Date implemented	Manhours	Time required	D.T	Analysis	Counter-measures	Evaluation

Phenomenon classification			**Cause classification**		**Measures taken by**		**Measures classification**	**Replacement OH**	**Countermeasures**
1. Fracture and breakage	7. Rusting and corrosion	13. Quality defect	1. Planning error	7. Deterioration with age	1. Specialized maintenance	7. Other	1. Emergency repair	1. Parts replacement	1. MTBF
2. Bending and deformation	8. Vibration and noise	14. Other	2. Inspection and adjustment	8. Strength and dimensions	2. Line maintenance worker		2. Future plan	2. Disassembly OH	2. MTTR
3. Loosening and detachment	9. Center misalignment and mispositioning		3. Oiling and cleaning	9. Other	3. Autonomous maintenance		3. Push plan forward	3. Restored by adjustment	3. Minor stoppage
4. Wear	10. Heat generation and burning		4. Adjustment		4. Production engineering		4. Planned maintenance		4. Safety
5. Seizing and galling	11. Open circuit		5. Parts and assembly		5. Specified worker		5. Periodic maintenance		5. Quality
6. Leaking and clogging	12. Operation malfunction		6. Operation		6. Specially skilled worker		6. Modification in maintenance		6. Other

Equipment Inspection Schedule	7 • 3	4 - 4

Monthly Machine Inspection Schedule

Week (day)		Machine No.	Machine name	Assigned area	Machine No.	Machine name	Assigned area	Machine No.	Machine name	Assigned area
	Mon									
__day	Tue									
|	Wed									
__day	Thu									
	Fri									
	Sat									
	Mon									
__day	Tue									
|	Wed									
__day	Thu									
	Fri									
	Sat									
	Mon									
__day	Tue									
|	Wed									
__day	Thu									
	Fri									
	Sat									
	Mon									
__day	Tue									
|	Wed									
__day	Thu									
	Fri									
	Sat									

VP Preprocess Specialized Maintenance Schedule / Actual Performance Summary Sheet

__/__

	Item	Category	Equipment/details	Line No. 1	Machine No. 1-1	Machine No. 1-2	Machine No. 1-3	Subtotal 1	Line No. 2	Machine No. 2-1	Machine No. 2-2	Machine No. 2-3	Subtotal 2	Line No. 3	Machine No. 3-1	Machine No. 3-2	Machine No. 3-3	Subtotal 3	Subsidiary line	Total
	Number of items implemented	Inspection	VP preprocess		1	1	1	3		1	1	1	3							6
			Milling machine		3	3	3	9		3	3	3	9							18
S		Category total			4	4	4	12		4	4	4	12							24
	Number of items implemented	Inspection	Milling machine		78	60	60	198		36	60	60	156							354
S		Category total			78	60	60	198		36	60	60	156							354
M	Item total				82	64	64	210		40	64	64	168							378
	Total time required	Inspection	VP preprocess		3	3	3	9		3	3	3	9							18
			Milling machine		40	40	40	120		60	60	60	180							300
S		Category total			43	43	43	129		63	63	63	189							318
	Total time required	Inspection	Milling machine		117	102	102	321		18	198	198	414							735
S		Category total			117	102	102	321		18	198	198	414							735
M	Item total				160	145	145	450		81	261	261	603							1053
	Number of NG items	Inspection	VP preprocess		0	0	0	0		1	1	1	3							3
			Milling machine		0	0	0	0		0	0	0	0							0
S		Category total			0	0	0	0		1	1	1	3							3
	Number of NG items	Inspection	Milling machine		10	9	11	30		1	2	1	4							34
S		Category total			10	9	11	30		1	2	1	4							34
M	Item total				10	9	11	30		2	3	2	7							37
	Number of NG repairs	Inspection	VP preprocess		0	0	0	0		0	0	0	0							0
			Milling machine		0	0	0	0		0	0	0	0							0
S		Category total			0	0	0	0		0	0	0	0							0
	Number of NG repairs	Inspection	Milling machine		0	0	0	0		0	0	0	0							0
S		Category total			0	0	0	0		0	0	0	0							0
M	Item total				0	0	0	0		0	0	0	0							0

Spare Parts Management System Flowchart

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Overview of Spare Parts Management System

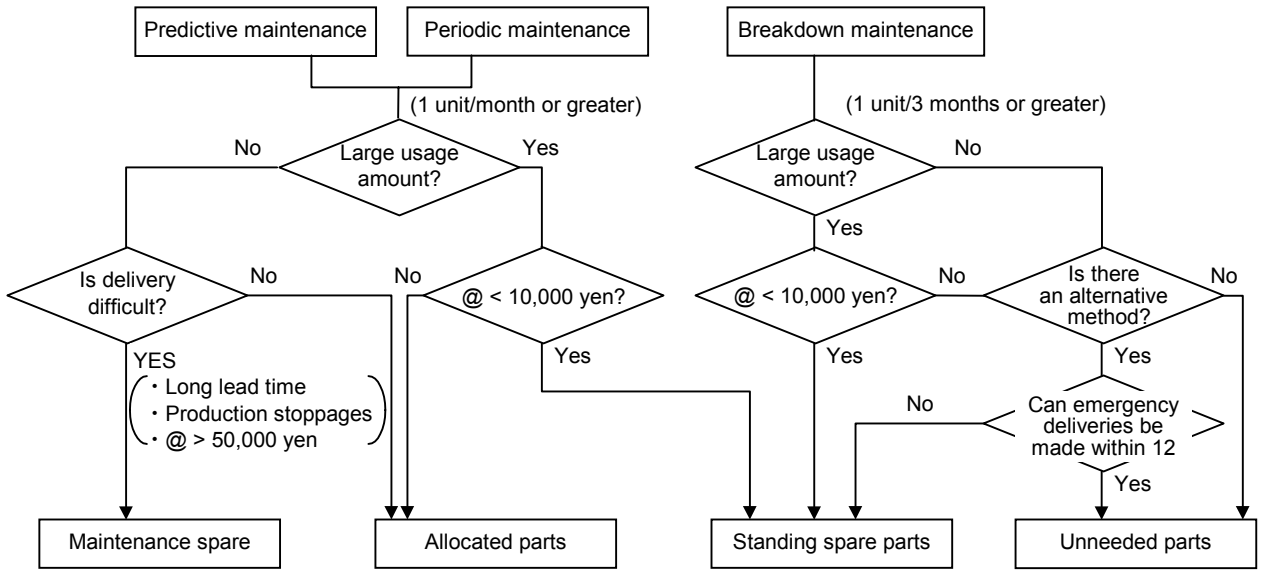
Purpose and Goal

1. To insure an appropriate inventory and avoid parts depletion
2. To construct a management system so that parts can be obtained quickly

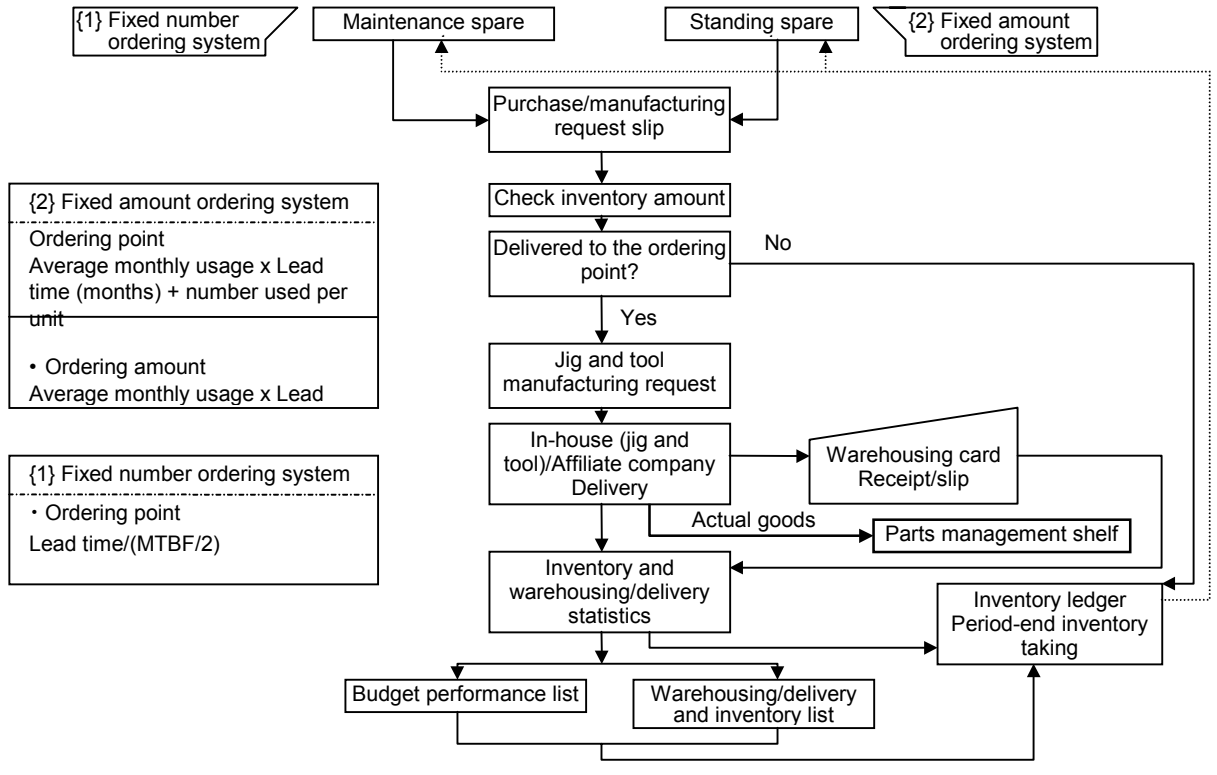
⇨ Inventory cost vs. BM value: __% reduction

Selection of spare parts and ordering method

(Approaches to the selection of spare parts based on maintenance techniques)



(Spare parts ordering system and route)



Changes in Inventory by Part (Semi-annual)

Date created: __/__/__

Process: No. 1 line - _____ Page: __

Part ID Part name Model/serial No.		October		November		December		January		February		March		**TOTAL**	
		Cases	Quantity	Cases	Quantity	Cases	Quantity	Cases	Quantity	Cases	Quantity	Cases	Quantity	Cases	Quantity
9574	Warehousing													**0**	**0**
Cap (for groove)	Delivery							**1**	**1**					**1**	**1**
	Inventory quantity								**1**						**1**
9587	Warehousing	**2**	**2**	**1**	**1**									**0**	**0**
Transport (for comb divider tool)	Delivery		**2**		**1**									**3**	**3**
	Inventory quantity														**1**
9596	Warehousing													**0**	**0**
Tool guide shaft	Delivery					**1**	**1**							**1**	**1**
	Inventory quantity						**1**								**1**
9597	Warehousing													**0**	**0**
Bushing	Delivery					**1**	**1**							**1**	**1**
(groove and tip)	Inventory quantity						**1**								**1**
9617	Warehousing													**0**	**0**
Knock-out pin A	Delivery			**1**	**2**									**1**	**2**
	Inventory quantity				**2**										**2**
9619	Warehousing													**0**	**0**
Strike pin	Delivery	**1**	**2**	**1**	**2**									**2**	**4**
	Inventory quantity		**2**		**2**										**2**
9627	Warehousing													**0**	**0**
Compression spring	Delivery	**1**	**1**					**1**	**1**					**2**	**2**
	Inventory quantity		**1**						**1**						**1**
9648	Warehousing													**1**	**0**
Strikepin	Delivery	**2**	**2**											**0**	**2**
	Inventory quantity		**2**												**2**

Chart of Charges in Actual Usage of Maintenance Parts

Maintenance

Printed as of: __/__/__

Equipment name	Unit name	Part name (model)	Manufacturer	Unit cost	October	November	December	January	February	March	Total cases	Total amount
Top feeder (1-OA-301-720-2)	4# Wheel assembly U	382 oiler shaft ( )	Jigs and tools	1,500		1	3				4	6,000
Top feeder (1-OA-301-811B)	3# Wheel assembly	458 cylinder (DAB25*25-4)	__ Co.	3,400	1						1	3,400
Top feeder (1-OA-301-)	Frame feed	1309 High rotor (PRN-10-90-90)	__ Co.	1,500						1	1	15,000
Top feeder (1-OA-301-)	4# Wheel assembly U	1383 photo switch (E3C-S10)	__ Co.	4,050				1			1	4,050
Top feeder (1-OA-301-)	Buffer discharge U	1947 proximity switch (E2E-C1C1-R)	__ Co.	3,980				1			1	3,980
Top feeder (1-OA-301-576B)	Expansion UT (OU-30)	5997 ball bushing (LM-10UU)	__ Co.	1,000		4					4	4,000
Top feeder (1-OA-301-)	3# Wheel assembly	6239 Pickup head (DP-30)	__ Co.	17,300	1					1	2	34,600
Top feeder (1-OA-301-575B)	Frame feed	6509 Pickup head (DP-1A)	__ Co.	19,800					1		1	19,800
Top feeder (1-OA-301-OU304-034B)	Buffer discharge U	7955 High rotor (PRN-20-180-90P)	__ Co.	9,350			1	1			2	18,700
Top feeder (1-OA-301-)	Frame feed	10770 Rod end (POS 6L)	__ Co.	565					1		1	565
Top feeder (1-OA-301-757B)	1# Wheel conveyor	11670 Trimetron (1S-010)	__ Co.	34,500			1				1	34,500
Top feeder (1-OA-301-)	3# Wheel assembly	11774 Quick connector (PC4-02)	__ Co.	120		1					1	120
Top feeder (1-OA-301-)	Expansion UT (OU-30)	16429 Linear block C ( )		5,000		1					1	5,000
Top feeder (1-OA-301-)	Oiler U	18037 Pen cylinder (PDAS10*45A-CS7G2)	__ Co.	3,000		1					1	3,000
Top feeder (1-OA-301-)	1# Wheel assembly	19132 Limit switch (D2MV-5-IC2)	__ Co.	99			1			1	2	198
Top feeder (1-OA-301-)	3# Wheel assembly	19377 Electromagnetic valve (VF2100-5GZ)	__ Co.	5,000						1	1	5,000
Top feeder (1-OA-301-)	Buffer discharge U	19394 Pen cylinder (PDA10*15-7)	__ Co.	3,500						1	1	3,500
Top feeder (1-OA-301-)	Frame feed	19414 Pen cylinder (PDAS10*15-7)	__ Co.	3,500						1	1	3,500
				Subtotal	20,700	13,620	48,449	17,380	20,365	44,399	-	164,913
					2	8	6	3	2	6	27	-
No. 1 wheel assembly machine (1-OA-302-912)	1# Wheel insertion unit	580 Chuck pawl ( )	Jigs and tools	11,000					3		3	33,000
No. 1 wheel assembly machine (1-OA-302-702)	1# Wheel feed unit	586 Feed plate ( )	Jigs and tools	12,000					1		1	12,000
No. 1 wheel assembly machine (1-OA-302-605)	Conveyor unit	612 Guide B ( )	Jigs and tools	3,000						1	1	3,000
No. 1 wheel assembly machine (1-OA-302-)	1# Shaft feed unit	630 Proximity switch (TL-X1E1 (M8))	__ Co.	5,600			1	1			2	11,200
No. 1 wheel assembly machine (1-OA-302-706)	1# Shaft feed unit	839 Guide A ( )	Jigs and tools	3,500				1			1	3,500
No. 1 wheel assembly machine (1-OA-302-)	1# Shaft feed unit	2683 Proximity switch (E2E-X1R5E1 (M8))	__ Co.	2,850					1		1	2,850
No. 1 wheel assembly machine (1-OA-302-)	1# G drive unit	19132 Limit switch (D2MV-5-IC2)	__ Co.	99					1		1	99
				Subtotal			5,600	9,100	47,949	3,000	-	65,649
							1	2	6	1	10	-
No. 5 wheel assembly machine (1-OA-303-126B)	Drive unit	971 Tapered roller bearing (4T-30205)	__ Co.	1.500						6	6	9,000
No. 5 wheel assembly machine (1-OA-303-316B)	Table unit	1055 Timing belt (150S8M848)	__ Co.	1,840					1		1	1,840
No. 5 wheel assembly machine (1-OA-303-317B)	Table unit	1056 Timing belt (150S8M760)	__ Co.	0					1		1	0
No. 5 wheel assembly machine (1-OA-303-365)	P&P lift unit	1081 Nozzle ( )		6,000			1				1	6,000
No. 5 wheel assembly machine (1-OA-303-370B)	P&P Rotary unit	1087 Bushing (SPB-121820)	__ Co.	842						12	12	10,104
No. 5 wheel assembly machine (1-OA-303-303)	Table unit	5815 Electromagnetic valve (VF2200-5ZB-DC24V)	__ Co.	9,150						1	1	9,150
No. 5 wheel assembly machine (1-OA-303-313B)	Table unit	7954 Bearing (6003ZZ)	__ Co.	320					2		2	640
No. 5 wheel assembly machine (1-OA-303-454B)	Drive unit	17177 Coupling (SFC-03WP-08B-09B)	__ Co.	7,950	1						1	7,950
				Subtotal	7,950		6,000		2,480	28,254	-	44,684
					1		1		4	19	25	-
Wheelbarrow attachment machine (1-OA-304-480)	Wheelbarrow attachment	1566 Pin ( )		1,600		1		2			3	4800
Wheelbarrow attachment machine (1-OA-304-490B)	Wheelbarrow attachment	1578 Pin cylinder (CJPB10-15U6)	__ Co.	0					1	2	3	0
Wheelbarrow attachment machine (1-OA-304-494B)	Chassis	1581 V ring (VR-14A)	__ Co.	232			2				2	464

Work Procedures: Inspection, Examination, Maintenance and Adjustment

Registration No.

Equipment name		Standard time		Created by	
Item name		Period		Date created	__/__/__

Illustration

Tools, measuring instruments, parts, etc. needed for the work

1		10	
2		11	
3		12	
4		13	
5		14	
6		15	
7		16	
8		17	
9		18	

No.	Details	No.	Procedure	Keypoint and purpose	Standards/regulations

(Remarks)

Periodic Maintenance Work Standard

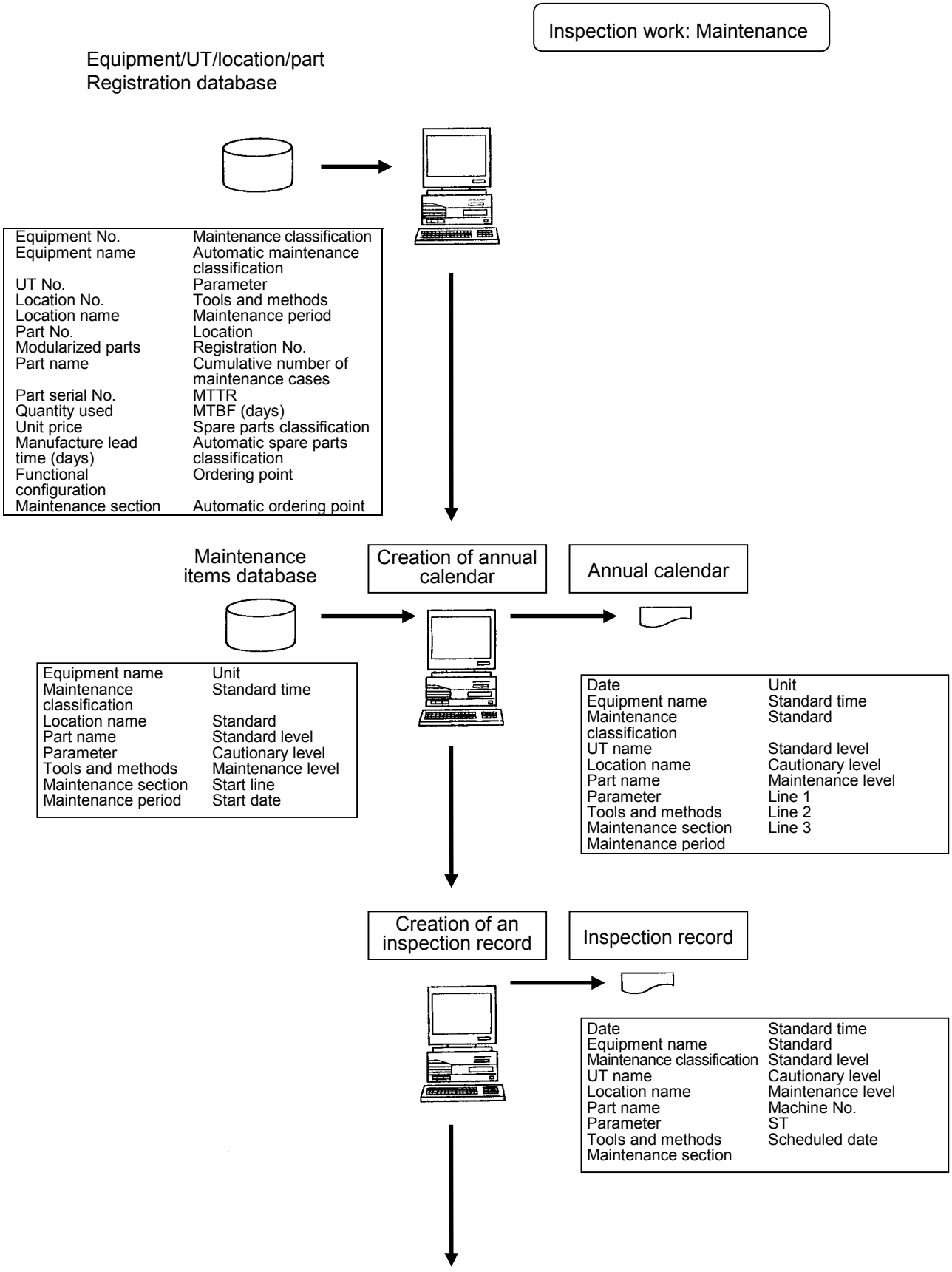
7 • 3

5 - 1

Periodic Maintenance Work System Flowchart

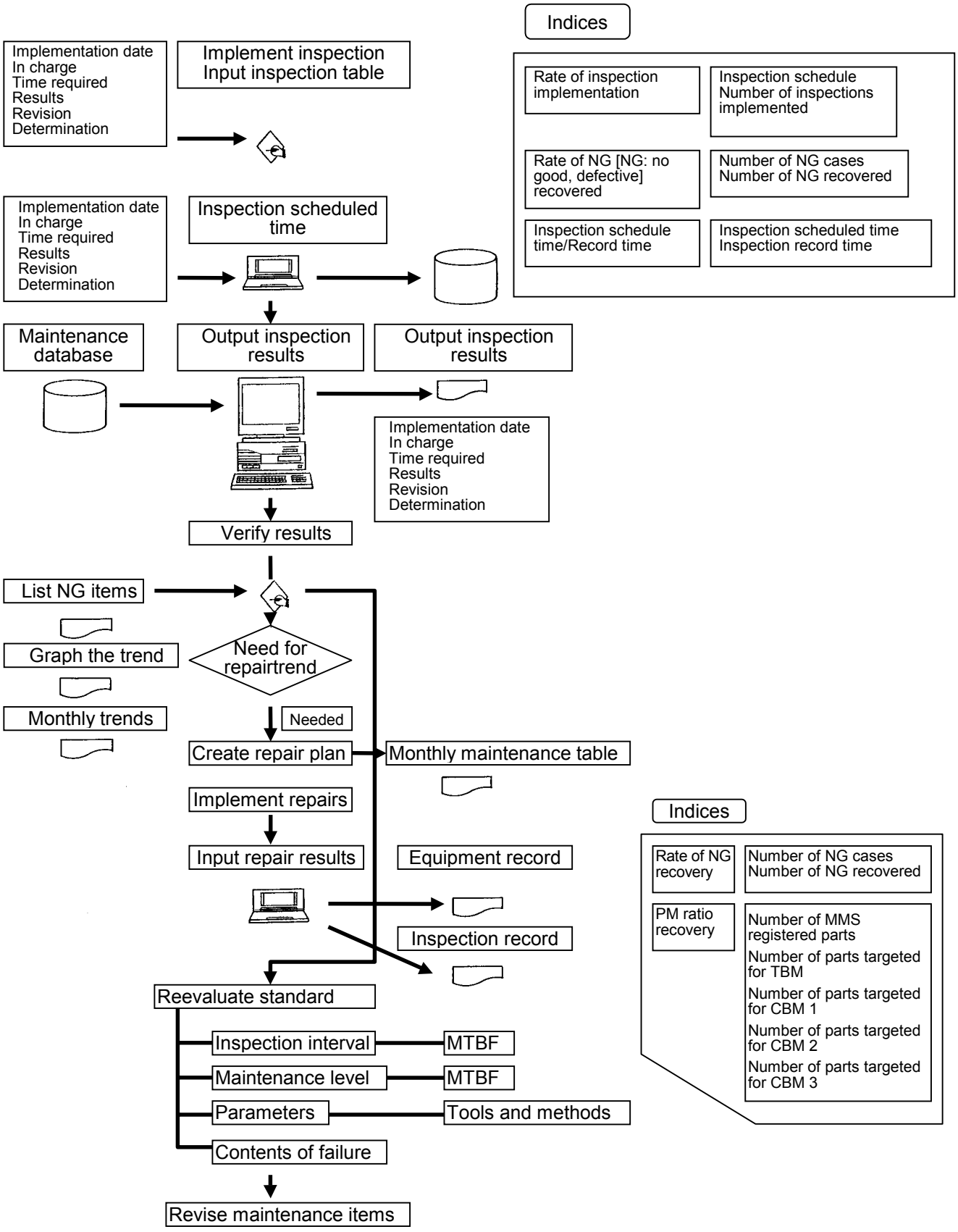
7 • 3	5 - 2 - (1)

Periodic Maintenance Work System Flowchart



Periodic Maintenance Work System Flowchart (Continued)

7 • 3	5 - 2 - (2)



Flowchart for Selecting Target Equipment and Locations

Flowchart for Selecting Target Equipment and Locations

Equipment criticality ranking

Priority equipment evaluation standard

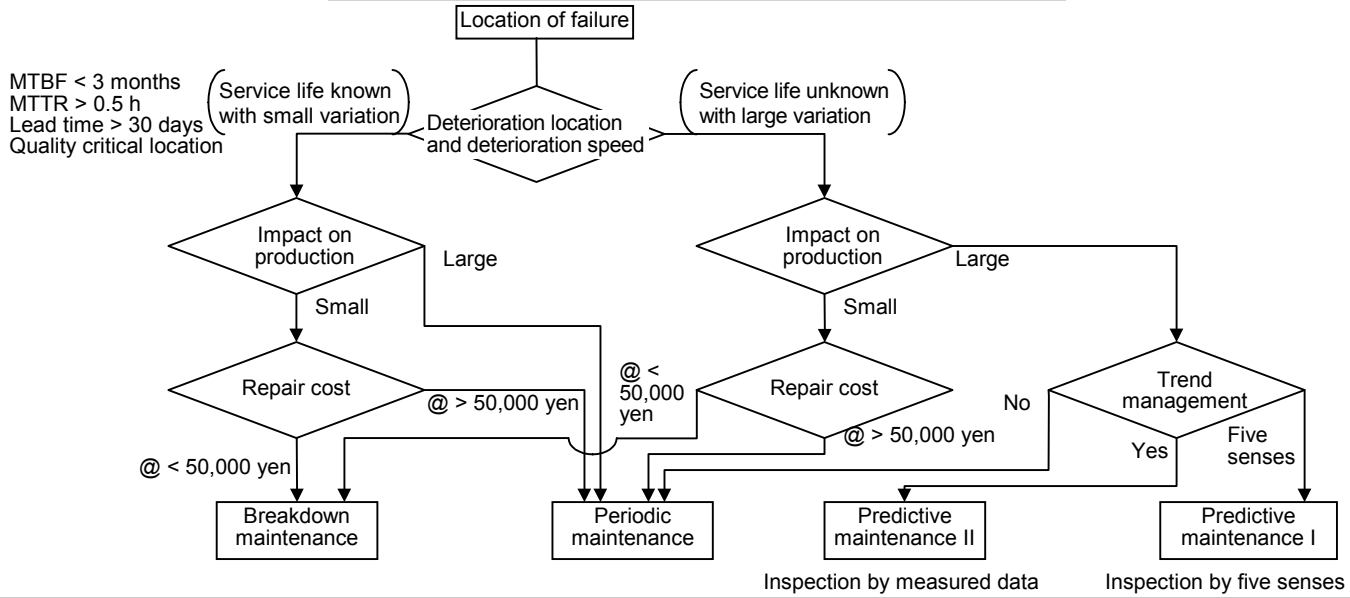
Classification	No.	Evaluation item	Evaluation point				Evaluation guideline
Production (PD)	1	Average operating capacity	5	4	2	1	90% or greater: 5, 80% or greater: 4, Less than 60%: 1
	2	Presence of a spare or alternative machine, and the ease of switching over to that machine		4	2	1	None, or requires a large amount of time to switchover: 4 Present, and easy to switchover: 1
	3	Effect that a failure has on other equipment	5	4	2	1	Affects a large amount of equipment inside the plant: 5 Has nearly no effect on other equipment: 1
	4	Failure frequency		4	2	1	10 times a month or greater: 4 Less than 3 times a month: 1
	5	Down time for repairing failures		4	2	1	Average monthly down time per case 60 minutes or greater: 4, Less than 15 minutes: 1
Quality (Q)	6	Product machining processing capability	5	4	2	1	Less than 1.0: 5, 1.0 - 1.33: 4 1.66 or greater: 1

Evaluation Table for Selecting Priority Equipment — Process name: Overall assembly

Classification	No.	Evaluation item	Evaluation point				TOP feeder	W assembler	Barrel drum attachment machine	DM attachment machine	VP attachment machine	VP mesh adjustment machine	Total finishing machine	Sampling machine
Production (PD)	1	Average operating capacity	5	4	2	1	5	5	5	5	5	5	5	2
	2	Presence of a spare or alternative machine, and the ease of switching over to that machine		4	2	1	/	/	/	/	/	/	/	/
	3	Effect that a failure has on other equipment	5	4	2	1	5	4	4	5	4	4	4	1
	4	Failure frequency		4	2	1	2	2	2	2	2	4	1	1
	10	Risk that a failure will cause pollution	5	4	2	1	1	1	1	1	1	1	1	1
Total points							20	24	24	20	23	28	20	10
General evaluation							C	B	B	C	B	A	C	C

Note: Integrated line: A=41-27 B=26-21 C=20-10
General equipment: A=45-29 B=28-19 C=18-10

Mechanism for Selecting Maintenance Method per Location



Annual Calendar: Specialized Maintenance for VP Preprocessing

Fiscal year _____

No.	Classification	Implementation unit	Equipment name	Item	Tools and methods	Section-in-charge	Period	Unit	Standard time	Number of items	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	Inspection	Line	VP preprocess	CT measurement	Measurement of 10 cycles by stopwatch	Manufacturing engineering	1	Month	15	1	○	○	○	○	○	○	○	○	○	○	○	○
2		Equipment	Press	Statutory inspection		Specialist	1	Year	120	1	○											
3			Milling machine	Transport and clamp unit inspection	Visual inspection / Pro Con./ Disassembly and measurement	Manufacturing engineering	1	Month	30	3	○	○	○	○	○	○	○	○	○	○	○	○
4				Cutter life inspection	Based on records	Manufacturing engineering	1	Month	30	6	○	○	○	○	○	○	○	○	○	○	○	○
5	Examination	Equipment	Milling machine	Measure accuracy of groove thickness	N= 50 Measure using micrometer	Manufacturing engineering	1	Month	60	5	○	○	○	○	○	○	○	○	○	○	○	○
6		UT	Milling machine	Measure spindle accuracy	Attach new arbor Measure using test indicator	Manufacturing engineering	3	Month	10	2	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
7				Measure play in LM guide	Attach new arbor Measure using test indicator	Manufacturing engineering	6	Month	10	2	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
8				Measure vibration in main shaft	When not cutting Measure using machine checker	Manufacturing engineering	0.5	Month	15	6	○	○	○	○	○	○	○	○	○	○	○	○
9	Maintenance	UT	Milling machine	Replace spindle		Manufacturing engineering	3	Year	480	1					13-6				13-6			
10				Replace lift LM guide		Manufacturing engineering	3	Year	480	1				12-5						11-1		
11				Replace lateral feed LM guide		Manufacturing engineering	5	Year	480	1				12-5						11-1		
12	Inspection	Equipment	Prescreen	Statutory inspection		Manufacturing engineering	1	Year	60	1		○										
13			Front-center tower	Annual inspection		Specialist	1	Year	480	1				○								
14	Examination	Equipment	Front-center tower	Control wind speed measurement	Hydrochloric acid bath upper center Measure using anemometer	Specialist	1	Month	10	1	○	○	○	○	○	○	○	○	○	○	○	○
15	Construction work	UT	Milling machine	Advance down cut		Manufacturing engineering				0								(1)	(2)			
16		Equipment	Heat treatment	Upgrade the quenching belt pulley		Manufacturing engineering				0					(2)			(1)				
17				Upgrade the quenching lathe		Manufacturing engineering				0			○									
18				Upgrade from the quenching furnace to tempering C/V		Manufacturing engineering				0					(2)			(2)				
19				OH from annealing to pregrinding C/V		Manufacturing engineering				0				○								
20			Press	Upgrade the scrap cutter		Manufacturing engineering				0							○					
21			Milling machine	Making spindle out of ceramic		Manufacturing engineering				0		○	○	○	○	○	○					
22				Upgrade LM guide		Manufacturing engineering				0			○		○		○		○		○	○
23			Preprocessing	Upgrade roll flow barrel		Manufacturing engineering				0			(2)									
24				Roll flow barrel OH		Manufacturing engineering				0			(2)									
25				Upgrade liquid bath		Manufacturing engineering				0					(2)							
26				Upgrade rotary barrel		Manufacturing engineering				0				○								

Material Selection Standard

Appendix: "Piping Specification"	No. Date created: __/__/__

Piping class			
Liquid used			
Rating			
Piping material			
Maximum allowable pressure		Maximum allowable temperature	
Corrosion allowance			

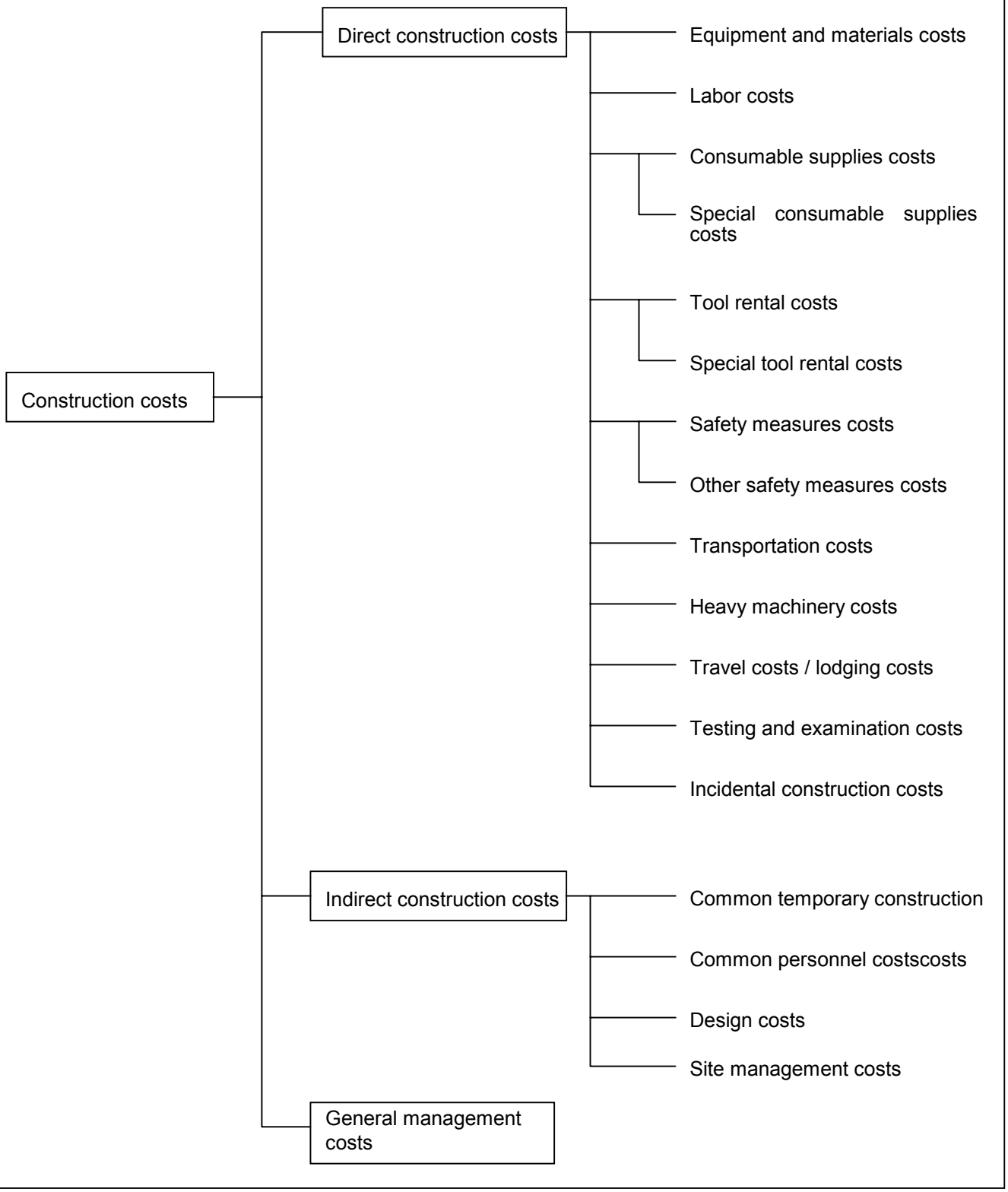
Piping material		Nominal diameter From	Nominal diameter To	Wall thickness	Class, connector type, etc.	Material
Pipe						
Flange						
Gasket						
Nuts and bolts						
Pipe connector	Elbow, reducer, T, cap Coupling Boss Swished nipple					

Construction Cost Estimation Standard	7・3	5 - 6

Maintenance Construction Cost Estimation Standard
( )

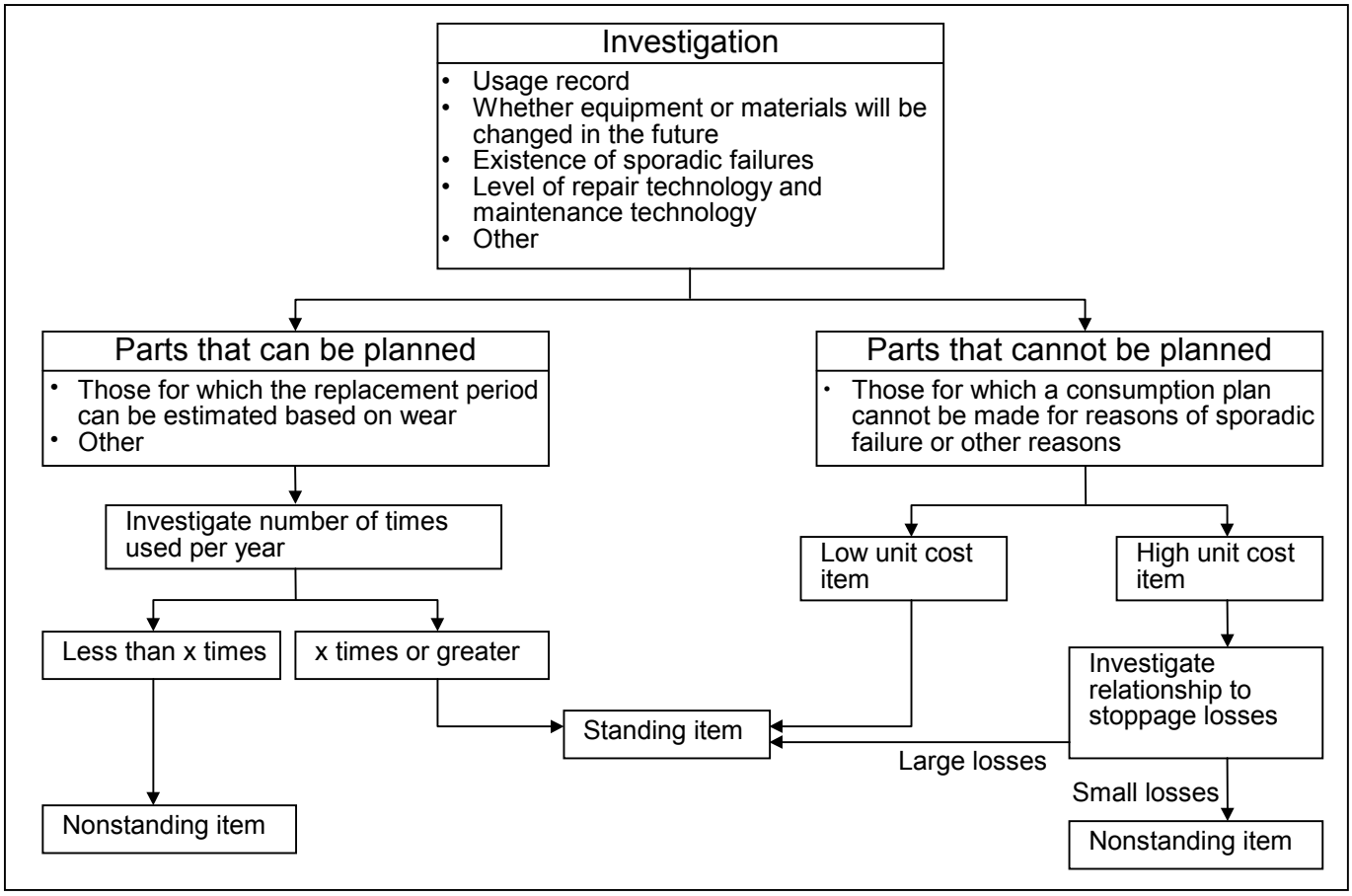
Date created: __/__
Date revised: __/__

1. Configuration of construction costs

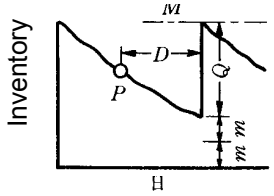
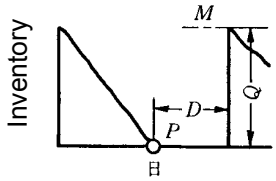
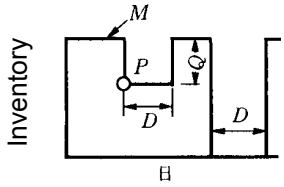


Spare Parts Management Standard

Approach to Determination of Standing Items



Consumption Type and the Standard to be Created

Type		Consumption graph	Features	Standard to be created
Quantitative type	I		Type in which inventory decreases gradually. This is applicable for items with a large number of disbursements per year, and a relatively low unit cost. Example: Nuts and bolts, packing materials, etc.	(1) Ordering point (P): Indicates the ordering period (2) Standard ordering quantity (Q): Indicates the ordering quantity (3) Maximum inventory level (M): Indicates the inventory level which would be abnormal if exceeded (M = Q + 2m)
	II		This type has decreasing inventory, the same as the one above. When replacing the part, however, there's no problem if inventory runs out during the period when the part is being purchased. Example: Certain valves	(1) Ordering point (P): Set to zero (2) Standard ordering quantity (Q): Indicates the ordering quantity
Constant type			This type has a small inventory which decreases suddenly. This is applicable for items with a small number of disbursements per year and a high unit cost. Example: Shafts, high-value metals, etc.	(1) Determine the constant (M)

P: Ordering point M: Maximum inventory level D: Purchase period Q: Ordering quantity m: Minimum inventory level

Lubrication Oil Changing and Supply Management

(1) Planning and Implementation

{1} The planning and implementation of oil changing and supply is carried out by the section in charge of equipment. This section should create a lubrication table (lubrication control book) for oil changing and supply locations, paste oil type labels on the oil spouts, and make efforts to prevent the use of incorrect oil types. Targeted equipment includes machines with dynamic components as well as equipment that requires oil changing and supply, such as measuring equipment. Oil level management should be implemented by affixing maximum level and minimum level indicators on the oil level gauge.

{2} The oil changing and supply procedure is based on the basic operation procedure.

(2) Oil Changing and Supply Period

The oil changing and supply period is based on the Table of Oil Changing Periods and the Table of Oil Replenishment and Supply Period Chart

Table of Oil Changing Periods

Target equipment	Period	Remarks
For equipment needing less than 300 liters of oil, for which there is no spare machine and for which the machine cannot be stopped during oil changing. Pumps, turbines, reduction gears, air fin coolers, governors, motors, actuators, others	2 years	However, change the lubrication oil used in a Sundyne pump every 8,000 hours of operation, even if there is a spare machine
Equipment that uses less than 300 liters of oil, and that can be stopped during oil changing	Indeterminate	When deteriorated or contaminated
Equipment that uses 300 liters or more	Indeterminate	Based on the results of characteristics testing
Coupling grease (in-service machines)	2 years	For continuously out-of-service machines and intermittently in-service machines, specify the oil changing period taking the actual running time into consideration
Sealed bearings	Indeterminate	The same as the bearing replacement period

* If deterioration or contamination of the oil is discovered during daily or periodic inspection, change the oil as necessary. However, since the service life of bearings that operate at temperatures of 70°C or higher, such as oil bath type turbine bearings, is reduced by oxidation deterioration, separately consider and set the oil changing period without regard for availability of spares.

The bearing temperature is determined by the surface temperature at the center point of the upper part of the bearing housing.

Lubrication Oil Changing and Supply Management

7・3	5 - 8 - (2)

Table of Oil Replenishment and Supply Period Chart

Target equipment	Period	Quantity
Oil lubrication locations	When oil level drops	Replenish oil to the appropriate level
Grease lubrication locations (in-service machines) (1) Motors, pumps, blowers, fans and other rotary bearings	6 months	Fill the empty space in the bearing box up to 2/3 full. *
(2) Agitators, etc. Bearings that rotate at low speeds under 150 rpm	2 years	Same as above
(3) Chains and link mechanisms Bearings of reciprocating units, such as dampers	1 year	Same as above (Use a spatula to apply grease over the entire area of the chain)
Grease lubrication locations (out-of-service machines)	2 years	Same as above

* Prepare an amount of new grease, enough so that grease overflows the outlet, and fills the space in the bearing box up to 2/3 full.

Lubricant Usage Classification Table

General product with equivalent viscosity	Target lubrication location
No. 90 turbine oil	Pumps, turbines, motors, oil bath of compressor or generator, slide bearing governor case of rolling bearing and circulating lubrication, oil filling pump diaphragm
No. 90 turbine oil	In-house power turbine bearing oil
No. 120 machine oil	Pumps, motors, oil bath of blower, sliding bearing
No. 180 turbine oil	Oil baths that run hot (68°C or higher) during operation Rolling bearing, and sliding bearing of turbine oil bath
No. 30 motor oil	HC screw compressor cooling oil
No. 60 spindle oil	Slide valve operating oil, diaphragm, oil for pressurized media
No. 30 motor oil	Reciprocating compressor, reciprocating pump clutch oil
No. 450 diesel engine oil	Step-up gear, cycloid reduction gear, worm reduction gear (lubricator, filling pump)
No. 50 motor oil	Large cyclo-reduction gear
No. 120 cylinder oil	Rotary kiln gas gear Yeungstrom main bearing Large worm reduction gear
No. 120 cylinder oil	Yeungstrom main bearing
No. 30 motor oil	Reciprocating compressor (pneumatic) internal oil
No. 50 motor oil	Reciprocating compressor (hydrocarbon) internal oil
No. 90 turbine oil	Hydraulic operating oil (loading arm)
No. 120 machine oil	Low-temperature central oiling
-	Non pressurized gear, wire rope
No. 50 motor oil	Lubricant for central oiling
-	Anti-rust agent for out-of-service machines
ATF 40cSt@40°C	One-way clutch, Sundyne pump, Oil flecks
46cSt@40°C	Omega clutch
No. 250 diesel engine oil	Diesel engine oil
No. 9 turbine oil	Rotary air compressor
Type 1 No. 2 insulating oil	Transmission
NLGI#0	Grease for central greasing
NLGI#2	Rolling bearing (under 130°C), coupling
NLGI#2	Grease for high temperature locations (under 200°C)
VG26	Gas turbine
No. 90 turbine oil	C1 loop oil (no additives)

Lubrication Inspection Standard

(1) Lubrication Inspection Classification

Lubrication inspection is based on the lubrication inspection classification table.

Lubrication inspection classification table

Classification	Target equipment	Period	Item
Daily inspection	Equipment during operation	Once a day or more frequently	Oil level Noise or vibration Heat generation Oil leakage
Periodic inspection	All equipment (including out-of-service equipment)	Once every 3 months	Items noted in the lubrication inspection items table Collect a sample of oil from each oil lubrication location, inspect the condition of the oil visually and make a determination.

{1} Inspection

Perform daily inspections and periodic inspections based on the "lubrication inspection items table."

For periodic inspections, record the inspection date and presence of any abnormalities, as well as the location, details and measures taken for any abnormalities found.

Lubrication Inspection Items Table

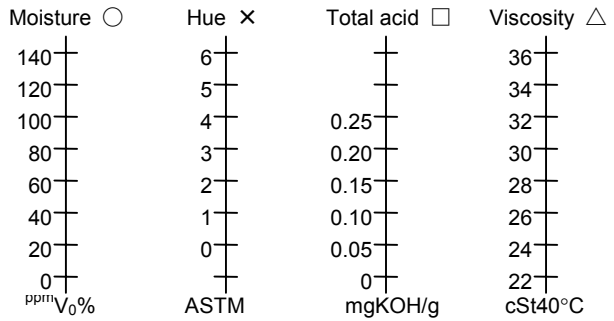
No.	Inspection contents	Judgment Criteria	Method	Classification
1	Heat generation	There should be no abnormal heat generated at lubrication locations	Touching	Daily
2	Vibration	There should be no abnormal vibration.	Touching	Daily
3	Noise	There should be no abnormal noise generated at lubrication locations.	Listening	Daily
4	Name plate	There should be an oil name indicator plate.	Visual	Daily
5	L/G mount opening color indicator	There should be a color indicator (yellow) on the oiler, L/G and mount opening	Visual	Daily
6	Oil level line	There should be an oil level line (yellow).	Visual	Daily
7	Oil leakage from oiler	There should be no leakage from the element, cover or oil seal.	Visual	Daily
8	Oiler operation	The oiler should operate normally.	Visual	Daily
9	Dirty sighting glass	There should be no breakage or dirtiness of the level gauge or bull's-eye gauge.	Visual	Daily
10	Oil seal leakage	There should be no leakage from the oil seal.	Visual	Daily
11	Gasket leakage	There should be no leakage from the gasket (mating face).	Visual	Daily
12	Dispersion of grease	There should be no dispersion of the coupling grease.	Visual	Daily
13	Filter clogging	There should be no abnormal clogging of the filter.	Visual	Daily
14	Oil depletion	The level gauge and the oil surface of the oiler should be visible.	Visual	Daily
15	Below MIN level	The indicator should be above the MIN level.	Visual	Daily
16	Above MAX level	The indicator should be below the MAX level	Visual	Daily
17	Contamination of oil in use	There should be no drain oil abnormalities, such as discoloration, moisture or metal filings.	Sampling	Periodic
18	Emulsification of oil in use	The drain oil should not be opaque or cloudy.	Sampling	Periodic
19	Rust in oil	There should be no rust in the drain oil.	Sampling	Periodic
20	Metal powder in oil	There should be no abrasion powder in the drain oil.	Sampling	Periodic
21	Contamination of foreign matter in oil	There should be no dust or dirt in the drain oil.	Sampling	Periodic
22	Water in the drain oil	There should be no water separated in the drain oil.	Sampling	Periodic
23	Discoloration of oil in use	There should be no apparent discoloration of the oil in use.	Sampling	Periodic
24	Foaming of the oil in use	When the foaming in the drain oil does not disappear immediately, there should be no abnormal foam inside the gauge.	Sampling	Periodic
25	Drip-type oiler	Oil should drip every 30 seconds	Sampling	Periodic
26	Clogging of oiler conduit	There should be no clogging	Sampling	Periodic
27	Oiler ventilation condition	Ensure that the ventilation opening (hole or cut-out) is open.	Sampling	Periodic

Lubrication Oil Maintenance Sheet

ITEM No.	Equipment name

Specifications block			
Manufacturer		Tank capacity	
Model		Pump suction/pressure	
Serial No.		Pump suction capacity	
Date manufactured			

Name of sample oil										
Sample No.										
Sample oil collection date										
Sample oil collection location										
Hue	ASTM	Less than L4								
Viscosity	cSt40°C	32±10%(28.8〜35.2)								
Total acid number	mgKOH/g	Less than 0.25								
Moisture	$^{ppm}V_0\%$	Less than 100								
Millipore filter	mg/100ml	Less than 10								
Amount of residual oxidation inhibitor	%	20 or greater								
Rotary pump residual service life	150°C	50 or greater								
	n-pentane insoluble content									
Insoluble content	Benzene insoluble content									
	Resin content									
Total base value	mgKOH/g									
		Pass/fail determination	Pass/fail	Pass/fail	Pass/fail	Pass/fail	Pass/fail	Pass/fail	Pass/fail	Pass/fail



List of Protective Articles Used by Work Type

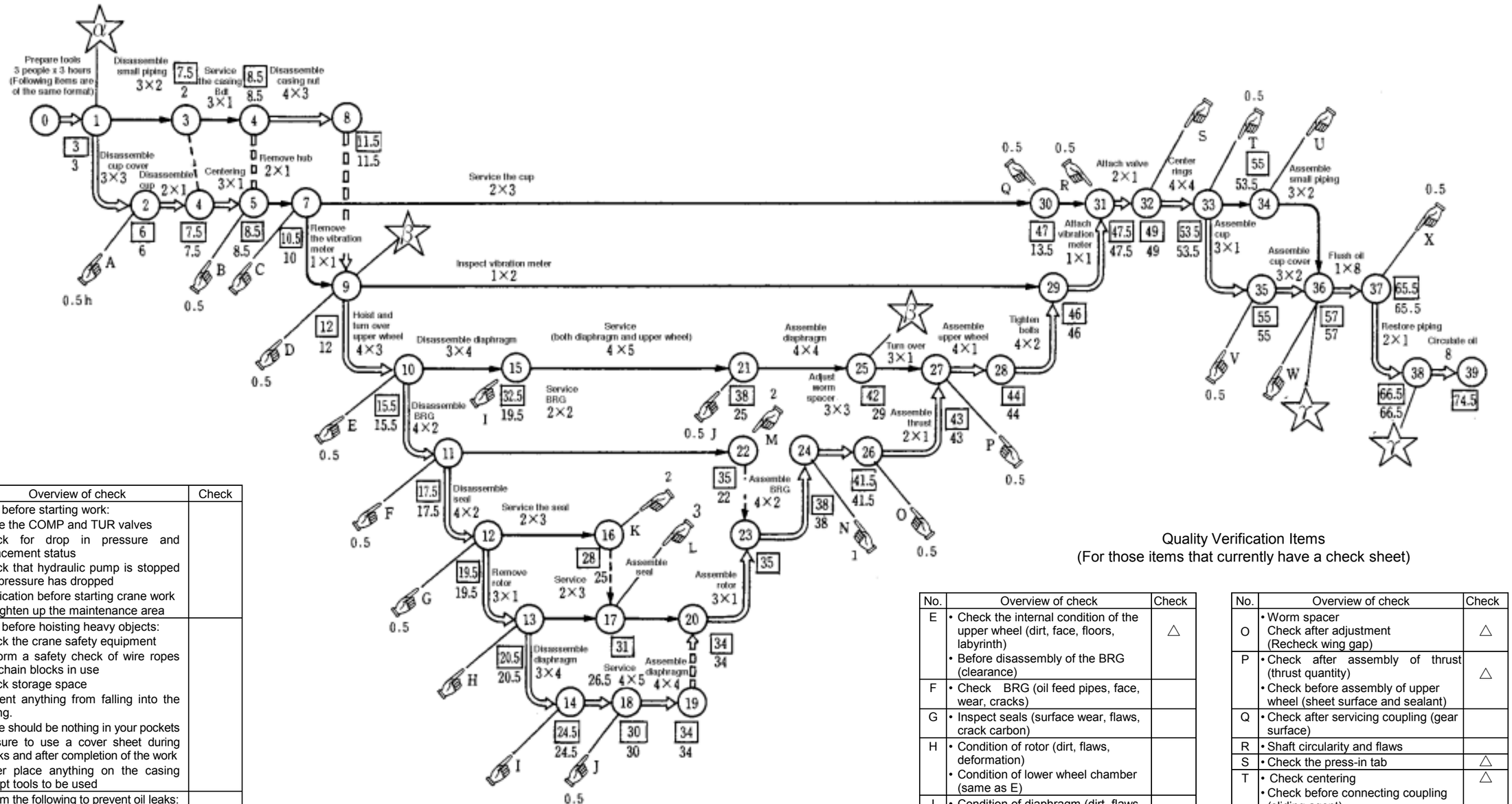
Note: items inside parenthesis specify work inside equipment such as tanks.

Name of Work \ Protective Articles	Air Inhalators				Gas Masks					Anti-dust masks	Safety Glasses						Protective Clothing		Protective Gloves				Shoes		Insulated Protective Articles					Safety belts, etc.							
	Air inhalator	Oxygen inhalator	Breathing mask [as used on airlines]	Air supply mask	For organic gases	For halogen gases	For carbon monoxide	For ammonia	For sulfuric acid/sulfurs		Safety glasses	Goggles	Safety face shield / protective face shield	Anti-dust goggles	Anti-light ray glasses	Anti-light ray face shield	Protective clothing	Protective apron	Leather gloves	Solvent-proof rubber gloves	Heat-proof gloves	Fabric gloves	Safety shoes	Rubber boots	Insulated gloves	Insulated rubber sleeves	Electricity-proof clothing / insulating mat	Insulated boots	Grounding devices / voltage detectors	Safety belts	Escape equipment such as ropes	Hanging belt	Earplugs	Life jackets	Film badges	Radiation dosimeter	Safety net
1. Cutting work at milling cutter etc.																																				
2. Grinding work at grinders etc.																																				
3. Rust removal work																																				
4. Sand blasting work																																				
5. Gas welding, fusion and heating work																																				
6. Electric welding, fusing work																																				
7. Handling of poisonous gas and vapor																																				
8. Handling of poisonous liquid																																				
9. Handling of subtances which could cause major eye injury, such as acids, alkalines, etc.																																				
10. Handling of poisonous powders or solids																																				
11. Work in which exposed to radiation																																				
12. Work involving radioactive material pollution																																				
13. Work involving dust generation																																				
14. Work under danger of oxygen deprivation																																				
15. " (inside nitrogen) see Note.																																				
16. Work under danger of falling from heights																																				
17. Work under danger of flying or falling objects																																				
18. Live wires, and work near live wires																																				
19. Power outage work																																				
20. Handling of high temperature substances																																				
21. Handling of machines																																				
22. Noise generating work																																				
23. Loading and unloading of freight trucks																																				
24. Work on water or onboard ships																																				

No.	
Prepared on:	__/__/__
Revised on:	__/__/__

Compressor Periodic Maintenance Network

(Check at point E and stop disassembly of the diaphragm if there are no problems.)



No.	Overview of check	Check
☆	Verify before starting work: • Close the COMP and TUR valves • Check for drop in pressure and replacement status • Check that hydraulic pump is stopped and pressure has dropped • Verification before starting crane work • Straighten up the maintenance area	
☆	Verify before hoisting heavy objects: • Check the crane safety equipment • Perform a safety check of wire ropes and chain blocks in use • Check storage space Prevent anything from falling into the casing. • There should be nothing in your pockets • Be sure to use a cover sheet during breaks and after completion of the work • Never place anything on the casing except tools to be used	
☆	Perform the following to prevent oil leaks: • Directly check all pipes • Request the manufacturing section to check the opening and closing and valves, and recheck • Check for missing blind flanges and plugs • Check for loosening of bolts • Check the dimensions of gaskets used, and check for installation of wrong parts	

No.	Overview of check	Check
A	• Check the position of oil supply piping (floats, dimensions, marks, motion)	△
B	• Check the condition of the couplings (face, sludge, hub press-in tab)	△
C	• Check the condition of the attachment of the vibration meter	
D	• Check the suspension of the upper wheel (levelness, center of gravity, contacting other objects)	

Quality Verification Items
(For those items that currently have a check sheet)

No.	Overview of check	Check
E	• Check the internal condition of the upper wheel (dirt, face, floors, labyrinth) • Before disassembly of the BRG (clearance)	△
F	• Check BRG (oil feed pipes, face, wear, cracks)	
G	• Inspect seals (surface wear, flaws, crack carbon)	
H	• Condition of rotor (dirt, flaws, deformation) • Condition of lower wheel chamber (same as E)	
I	• Condition of diaphragm (dirt, flaws, deformation)	
J	• Check after servicing diaphragm	
K	• Check after servicing seal	△
L	• Check after servicing rotor (rivet flaws or deformation)	
M	• Check after servicing BRG	
N	• Check after assembly of BRG (labyrinth, wing gap, clearance bearing)	△

No.	Overview of check	Check
O	• Worm spacer Check after adjustment (Recheck wing gap)	△
P	• Check after assembly of thrust (thrust quantity) • Check before assembly of upper wheel (sheet surface and sealant)	△
Q	• Check after servicing coupling (gear surface)	
R	• Shaft circularity and flaws	
S	• Check the press-in tab	△
T	• Check centering • Check before connecting coupling (sliding agent)	△
U	• Check before assembly of piping (blow)	
V	• Check after assembly of coupling (same as A)	△
W	• During assembly of cover (oil feed pipe, seal surface, gasket, seal)	
X	• Check flushing	△
Y		

Periodic Maintenance Inspection Results Summary

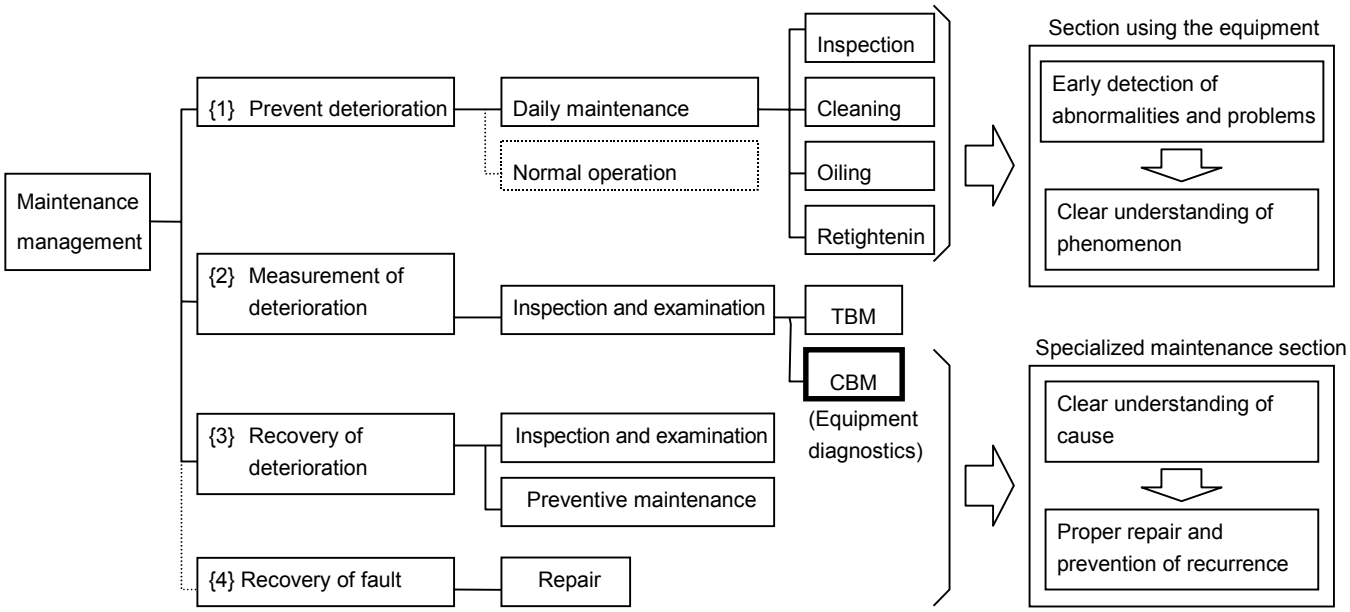
Section Manager	Subsection Manager	Person-in-charge

_____ Section __/__/__

No.	Equipment name	Inspection results	Measures	Future action	Other

Positioning of Equipment Diagnostic Technology

Positioning of Equipment Diagnostic Technology in Maintenance Management



Daily maintenance: Simple servicing of equipment and inspection of problems by the production division

Normal operation: Correct operation of equipment by the production division

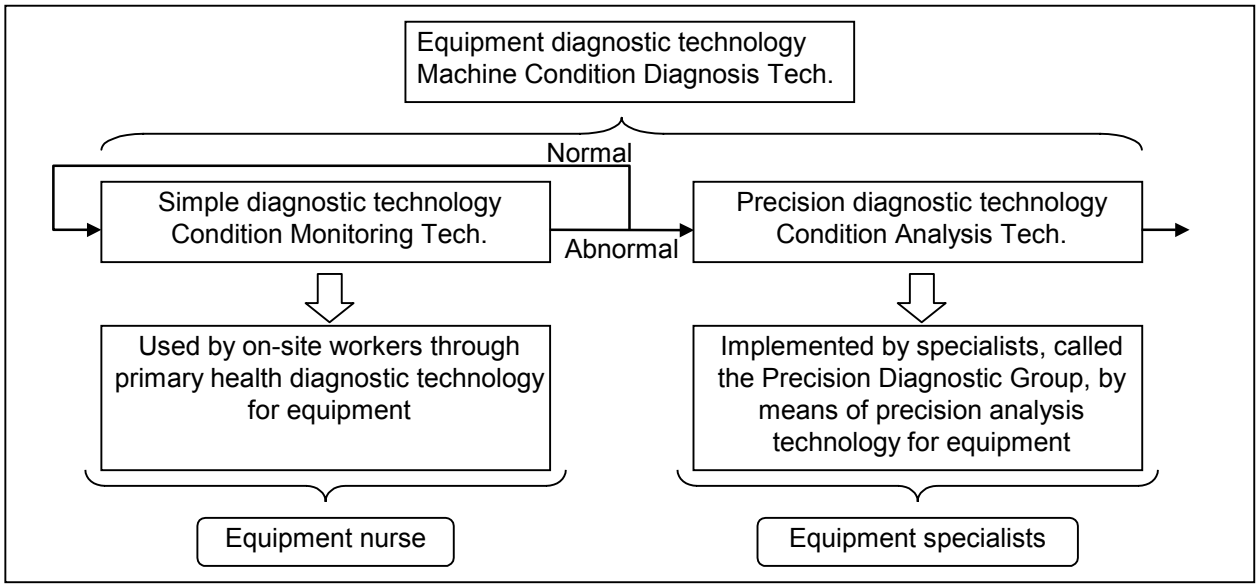
Inspection and examination: Inspection of the condition of deterioration and presence of problems, and the quantitative measurement thereof / Equipment diagnostics

Periodic maintenance: Periodic replacement, disassembly and maintenance, and verification of accuracy

Preventive maintenance: Daily maintenance, and measures for problems discovered through inspection and examination

Repair: Restoration of failed parts, and prevention of recurrence

Basic System for Equipment Diagnostic Technology

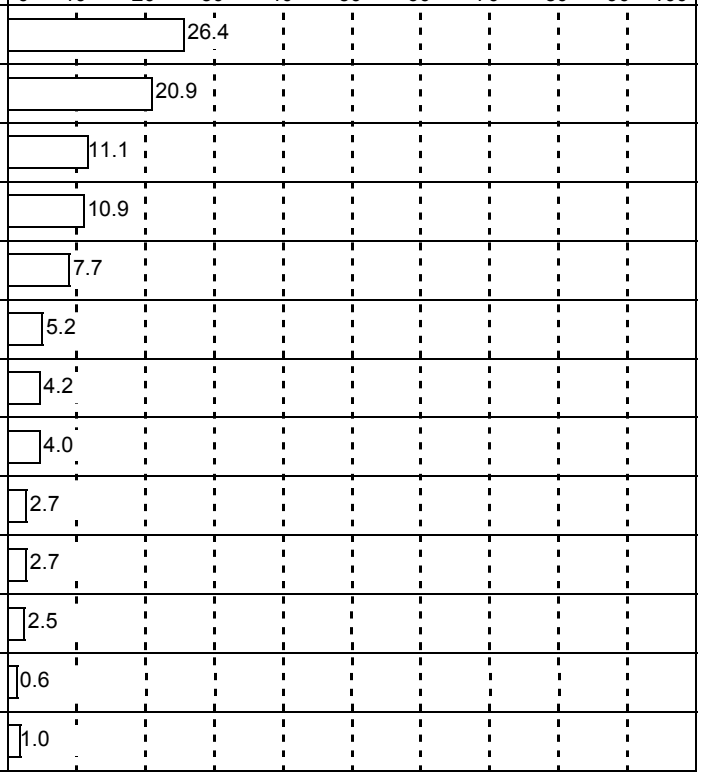


Principle Equipment Diagnostic Technology and Its Main Functions

Classification		Diagnostic technology	Simple/precision	Diagnostic equipment	Overview
Machine equipment diagnostics	Rotary machine diagnostic technology	Diagnosis of bearings, gears and rotary mechanisms	Simple	Machine checker	Diagnose any unbalance of gears, bearings and rotors caused by large machine vibration.
		• Bearing diagnostic technology • Gear diagnostic technology • Rotary mechanism diagnostic technology • Field balance technology	Precision	Rotary mechanism diagnostic equipment	Determine the degree, position and cause of deterioration of gears, bearings and rotary mechanisms by means of analyzing the vibration waveform and vibration mode.
				Machine signal measuring device	Process the vibration and pressure signals so that they are easy to analyze.
				General-purpose signal analyzer	As a method for high precision diagnostics, analyze the vibration waveform, since the frequency resolving power is extremely high. Determine the position and cause of deterioration of the bearings and gears.
	Crack diagnostic technology	Acoustic emission method	Precision	Crack monitor	Diagnose the degree and risk of crack development by detecting the sound generated when cracks develop.
	Lubrication system diagnostic technology	Ferrography Abrasion powder in oil analysis method	Precision	Ferrography analysis equipment	Determine the wear on sliding surfaces by the shape and size of abrasion powder in the lubrication oil.
Electrical equipment diagnostics	Rotary electrical machinery diagnostic technology	Insulation diagnostic technology	Simple	Super mega (direct current high voltage method)	Determine the presence of moisture absorption and pollution of the insulation material by means of changes in the insulation resistance over time.
			Precision	Automatic insulation diagnostic equipment (alternating current high voltage method)	Determine the degree of deterioration of the insulation material by the size, phase and extent of change in the current (current flowing to ground) when a high voltage alternating current is applied.
		Coil diagnostic technology	Precision	Electric coil diagnostic equipment	Determine whether there is any loosening of the coil due to the insulation material by applying a large current surge to the coil, inducing a vibration, and measuring the size and duration of the vibration, and changes in the frequency of the vibration.
		Rectification diagnostics	Precision	Rectification characteristics measurement equipment	Measure the rectification magnetic flux distribution and the contact characteristic of the brush at a neutral point, and analyze the cause of the rectification defect by comparing it with a normal case.
	Control system diagnostic technology	Motion characteristic diagnostics	Precision	Frequency characteristics measurement devise	While the control equipment is in operation, apply a signal that will not affect product quality, and measure the frequency characteristics that include the electrical system and machine system.
		Waveform diagnostics (wave memory)	Precision	Thyristor fail tracer	Automatically record and replay the waveform (principally the gate pulse) of each part when the thryistor control equipment is abnormal.
	High voltage cable diagnostic technology	Insulation diagnostics	Precision	High voltage cable insulation diagnostics equipment	Apply a high voltage direct current to the cable, and determine the presence of deterioration by the presence of time variations and size of the leakage current.
	Transformer diagnostic technology	Gas in oil analysis (gas chromatography)	Precision	Gas in oil analyzer	Determine the presence of insulation breakdown or local heating by analyzing the flammable gas component in the oil.

Purpose and Aims of Equipment Diagnostic Technology

	Reason	Component ratio (%)
{1}	Prevention of accidents	26.4
{2}	Insure and improve equipment reliability	20.9
{3}	Extend replacement period	11.1
{4}	Reduce maintenance costs	10.9
{5}	Improve productivity	7.7
{6}	Cut back inspection and maintenance	5.2
{7}	Prevent the disadvantages of production	4.2
{8}	Promote TPM activities	4.0
{9}	Improve product quality	2.7
{10}	Prevent equipment initial problems	2.7
{11}	Improve safety	2.5
{12}	Conserve resources	0.6
{13}	Other	1.0



(N = 478 cases)

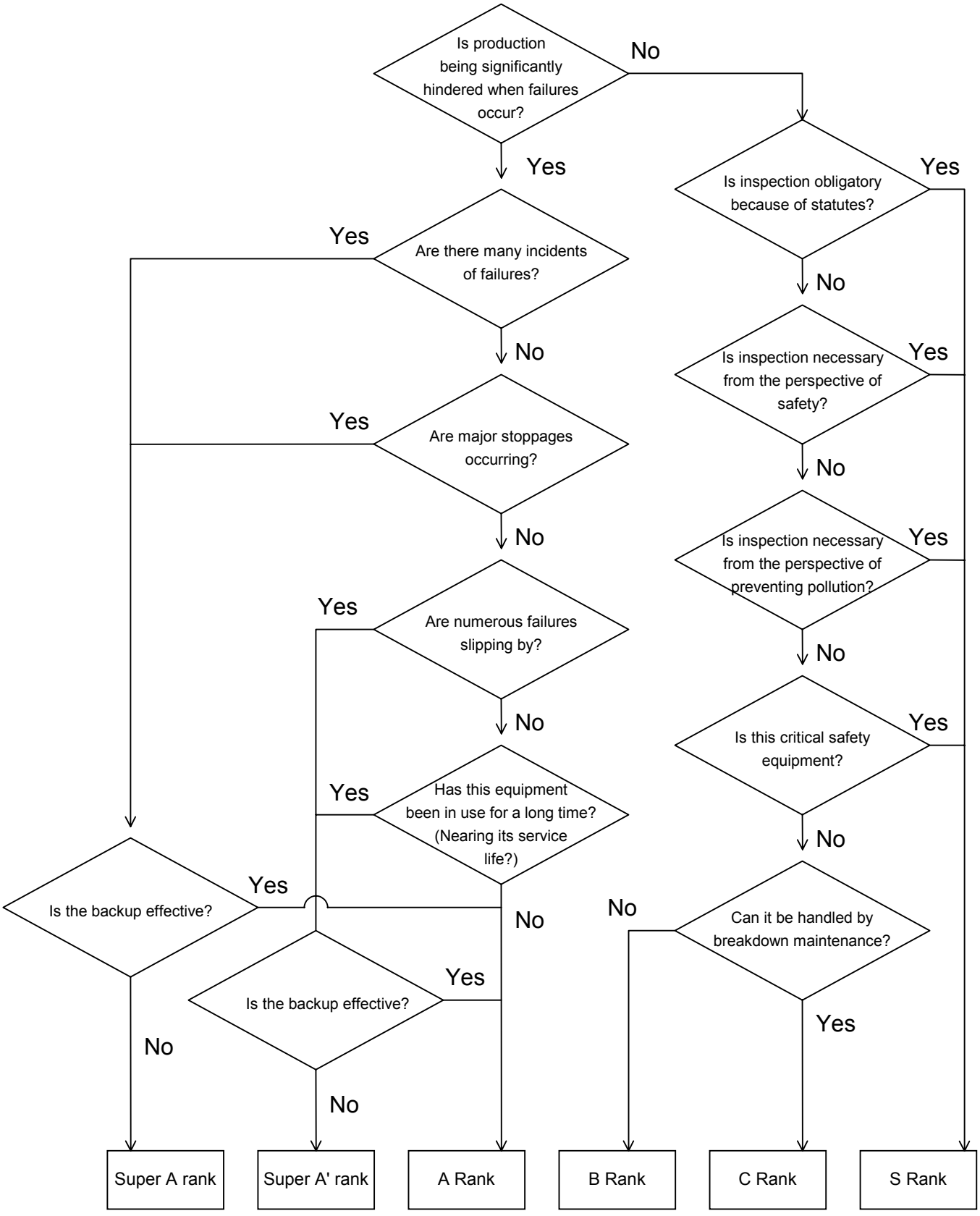
Overview of Equipment Diagnostic Technology Basic Course

- Lectures and Demonstrations -

- Program

	Details		Details
Day 1	• How to promote simple diagnostics • Vibration measurement and analysis method • How to diagnose machine elements (bearings and gears) • How to set criteria • Approach to trend management • How to promote precision diagnostics • How to diagnose rotary machines	Day 2	• Actualities of simple diagnostics • Actualities of trend management (demonstration using a simulator) • Actualities of handling FFT's • Actualities of precision diagnostics (centered on a demonstration)

Predictive Maintenance Selection Flowchart



List of Units and Diagnostic Equipment

Category	Target equipment	Unit	Diagnostic equipment	Equipment qty.
Failure prediction	Local and overall ventilation	Fan and motor bearings	Simple and precision diagnostic analyzer	511
	Press	Main motor bearing	Trend management system (vibration)	66
	Conveyor drive unit	Reduction gear	"	69
	Hydraulic press and hydraulic robot	Hydraulic pump	Pulsation (pressure sensor and FFT)	21
	Load wheel and forming	Spindle oil	Ultrasonic flaw detector	20
	Chassis multi-welder	Lifter cylinder shaft	"	6
	Air conditioner for painting equipment	Fan shaft	"	14
	Press main motor	Rotor bar breakage	FFT analyzer	50
	Air conditioner for painting equipment	Air supply fan and motor bearing	Simple online monitor (vibration)	12
	Boots for painting equipment	Air supply fan and motor bearing	Simple online monitor (vibration)	6
	CNC lathe	Main shaft	FFT analyzer or simple vibration meter	484
		Ball screw	Ammeter	484
		Main shaft motor	Insulation (motor tester)	484
	Dust collector	Fan motor bearing	Simple vibration meter and precision vibration meter	31
	Heat treatment furnace	RC fan motor bearing	Simple vibration meter and precision vibration meter Load censor	5
	Mixer	Motor reduction gear and vertical shaft	Simple vibration meter and precision vibration meter	24
	Gate cutting machine	Cutter bearing	Simple vibration meter and precision vibration meter	17
	Oscillating conveyor	Drive unit bearing	Simple vibration meter and FFT analyzer	7
	Various fans	Fan motor bearing	Simple vibration meter and precision vibration meter	34
	Automatic lubricator	Volume booster	In-house developed monitoring equipment	1
	Knockout machine	Vibrator	Simple vibration meter and FFT analyzer	2
	Six ST casting machines	Hydraulic motor and pump	Vibration monitor	4
	Belt conveyor	Reduction gear and bearing	Load sensor	1
	Overhead conveyor	Chain length measurement	Length measuring machine data logger	32
	Hydraulic pump	Pump	Flow rate meter, MD 150 SX	1
	Motor driven robot	Various shafts, bearings and reduction gear	FFT analyzer	6
	Holding furnace for casting	Inter-gutter groove	Watt meter and power factor meter	13
Failure unit discovery	Press	Crank shaft	Ultrasonic flaw detector	8
		Connecting rod		16
		Intergear connecting bolt		10
	Welding robot	Various shafts	Precision vibration meter	130
	Machine tools	Main shaft	FFT analyzer	30
	Heat treatment furnace	RC fan	Machine checker	10
	Assembly Scott conveyor	Drive follower shaft	Ultrasonic flaw detector	2
	Belt conveyor	Reduction gear and bearing	Watt meter	10
	Molding machine	Squeeze pressure	Pressure sensor, recorder and FFT analyzer	2
Optimal conditions	Press and resin forming machine	Hydraulic unit operating oil	Millipore and moisture	454
	Rod wheel forming machine	Lubrication unit lubrication oil	HIAC and total acid value ROBOT viscosity	
	Welding robot	Gun and trans. coolant	Ultrasonic flow rate meter	200
	CNC lathe	Cutting tools	FFT analyzer	235
	Heat treatment (quenching)	Quenching oil	Quenching cooling power testing machine	5
	Continuous cutting machine	Cutting condition of cutter	Load sensor	1
Extension of service life	Transport conveyor	Chain extension	Chain automatic measuring device	24
	Air conditioner for painting equipment	Air supply fan bearing	Vibration --> Automatic oil supply	8
	Internal grinding	High-speed spindle	Oil management machine	7
	CNC lathe	Operating oil and main shaft lubrication	"	484
	Grinding machine	Grindstone shaft lubrication	"	156
	Transfer machine	Gear box lubrication	"	39
	Hydraulic unit	Operating oil	Winching , Millipore, counter miter and viscosity meter Precision diagnostic machine	300
	Various fans	Compensation for unbalanced condition		When appropriate
Quality assurance	Resin forming (bumper forming machine)	Discharge pressure	Cycle logger	1
	Chassis stud bolt	Welding conditions	Cycle logger	3
	Press torque pack	Reduction gear sun gear	Ultrasonic flaw detector	20
	Machine tools	Cutting tools load detector	Electric power detector	25
			Cycle logger	2
	Pressure press	Pressure input	Load cell	2
			Cycle logger	3
	High-frequency quenching machine	Coolant flow, electric power Coil feed speed	In-house manufactured logger	1
	Frameless molding machine	Overall accuracy measurement	Various measuring instruments (standard devises and others)	3
		Slide box	Laser displacement meter and recorder	2
Safety and environment	Overhead traveling crane	Hook-type cracks	Ultrasonic flaw detector	33
	Press balancer	Cylinder rod		52
	General	Environmental noise	Noise meter	When appropriate
		Cutting tool vibration	FFT analyzer	When appropriate
	Dust collector	Filter	Manometer	31
			Total	4715

Equipment Diagnostic Trend Management Sheet

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Simple diagnostic
Trend management sheet

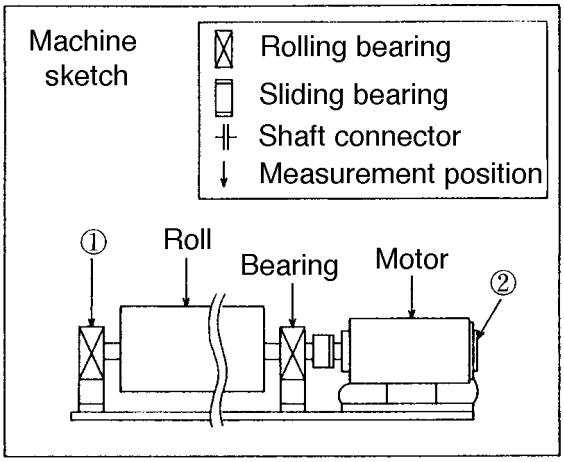
Plan code	Equipment code	Specific code

Plant name: Rolling Mill No. 2

Equipment name: Hot Run Table Roll

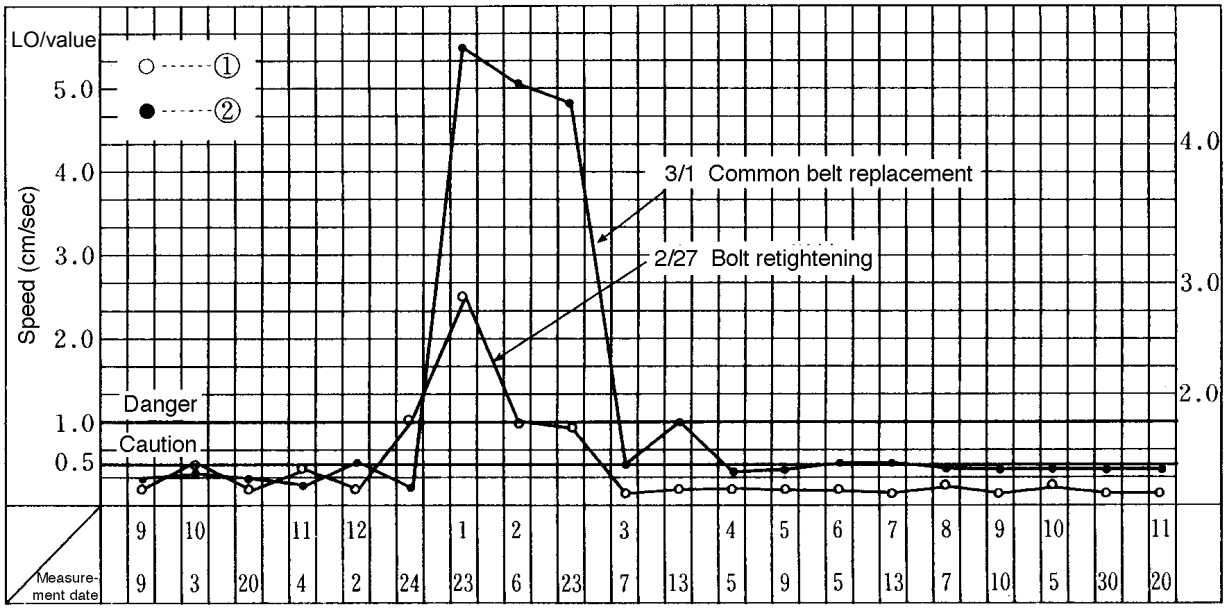
Main specification
Motor rpm: 800 rpm
Bearing type: 80 mm bearing

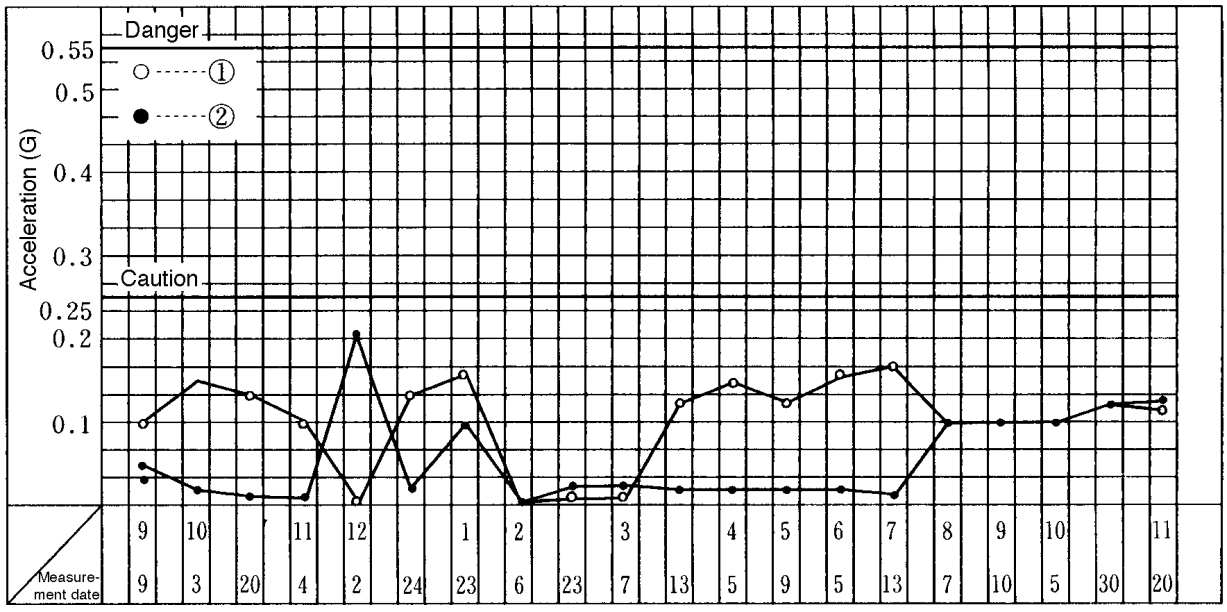
Machine sketch



Initial value Measurement conditions: Constant speed loaded operation
Upper level: Speed Lower level: Acceleration

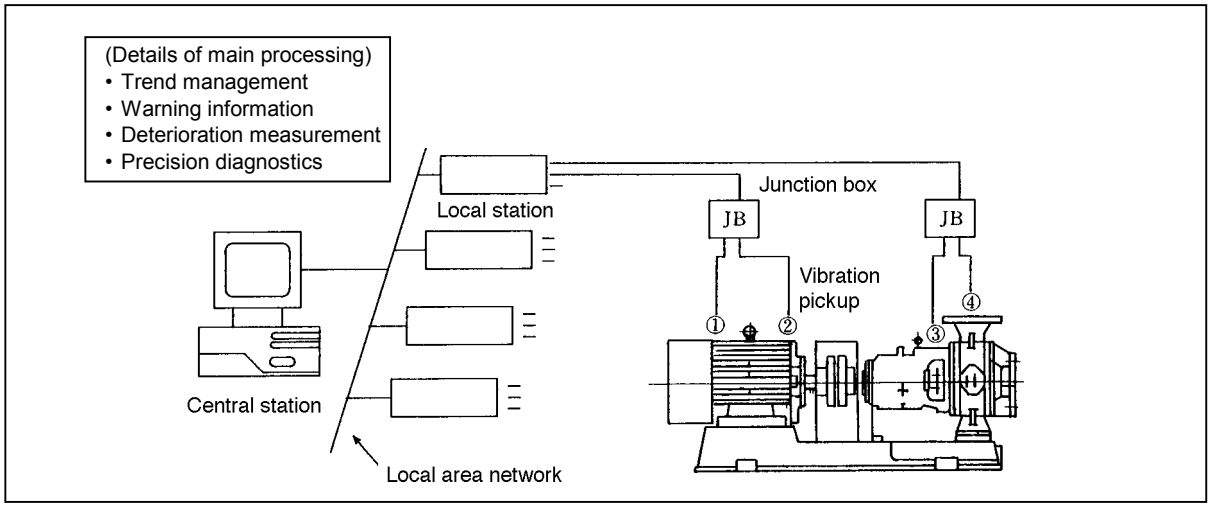
Measurement	1	2	3	4	5	6
H	- / -	- / -	- / -	- / -	- / -	- / -
V	0.2 / 0.1	0.33 / 0.05	- / -	- / -	- / -	- / -
A	- / -	- / -	- / -	- / -	- / -	- / -



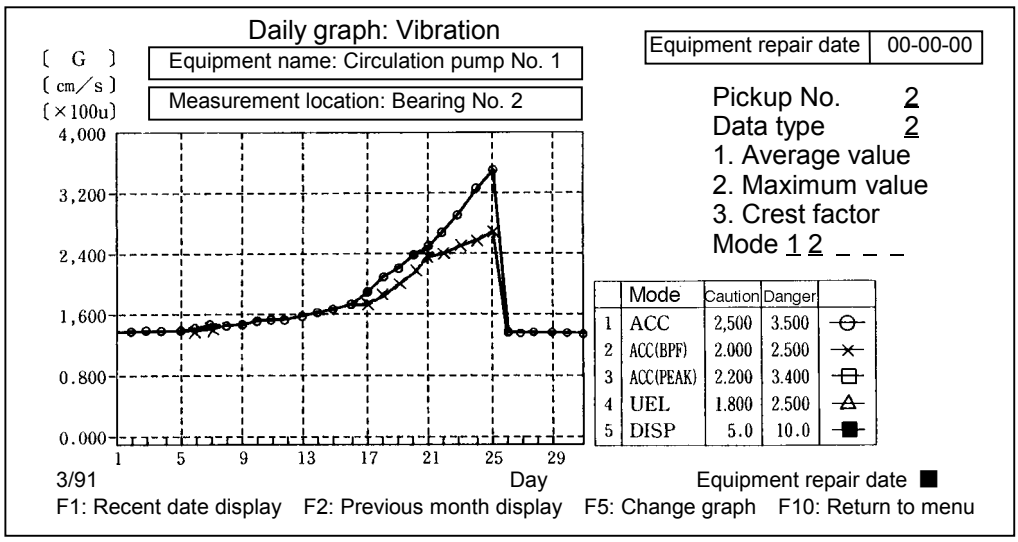


Inspection Report for Predictive Maintenance (Example of Diagnosing Pump Vibration)

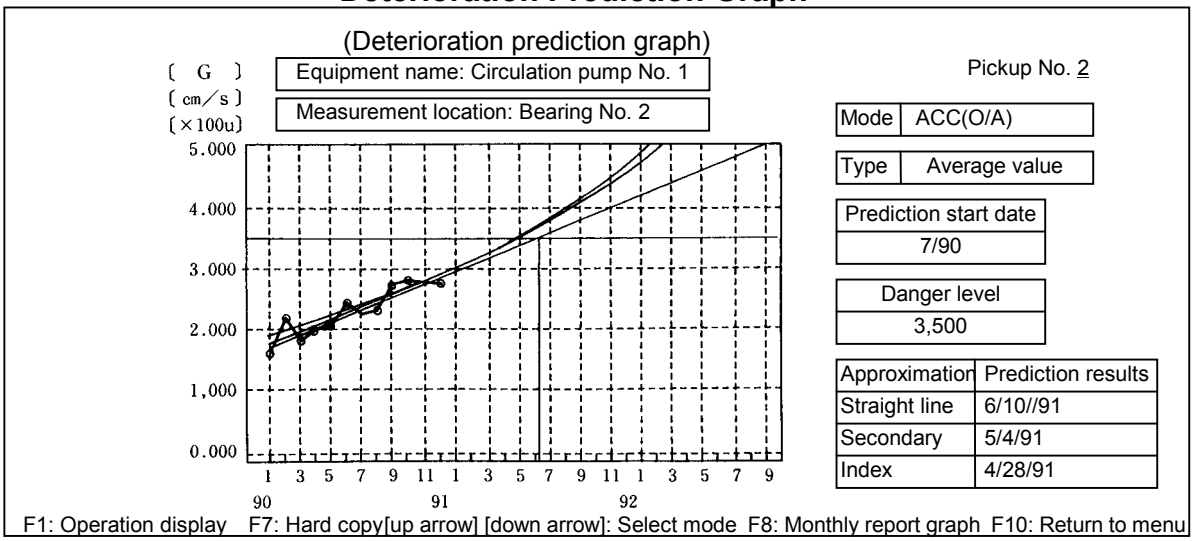
Example of Configuration for a Pump Equipment Diagnostic System



Trend Management Graph (Daily)



Deterioration Prediction Graph



List of Maintenance Evaluation Indices

No.	Item/Date	__/__	__/__	__/__	__/__	No.	Item/Date	__/__	__/__	__/__	__/__
1	Number of scheduled inspections	116	108	117		53	Availability	95.6	97.1	91	
2	Number of inspections implemented	116	108	115		54	Down time rate	0.76	0.3	0.51	
3	Inspection implementation rate	100	100	98.3		55	MTBF	120.2	1003.6	99.2	
4	Number of scheduled examinations	52	52	52		56	MTTR	28.5	90	30.6	
5	Number of examinations implemented	52	52	52		57	Number of minor stoppages	1664	1194	1385	
6	Examination implementation rate	100	100	100		58	Net operating time	57378	60014	47378	
7	Number of cases of scheduled maintenance	8	18	5		59	Net operating rate	99.4	99.7	99.5	
8	Number of cases of maintenance implemented	8	11	5		60	Standard cycle time	0.95	0.95	0.95	
9	Maintenance implementation rate	100	61.1	100		61	Actual cycle time	0.92	0.94	0.89	
10	PM implementation rate	100	96.1	98.9		62	Speed operating rate	103.3	101.1	106.7	
11	Number of NG cases	1	2	0		63	Performance operating rate	102.7	100.8	106.2	
12	Number of NGs repaired	1	2	0		64	Input quantity	3743110	3844256	3199352	
13	NG repair rate	100	100	0		65	Feed quantity	3720780	3807396	3175592	
21	Number of project themes registered	1	3	0		66	Quality product rate	99.4	99	99.3	
22	Number of project themes completed	5	0	0		67	Equipment overall efficiency	97.6	96.9	96	
23	Project theme progress rate	85	100	100		68	Equipment one hour productivity	3699	3684	3644	
24	Number of pieces of equipment acquired	0	1	0		71	Spare parts purchase cost	204890	241680	160850	
25	Number of failures analyzed	0	0	0		72	Spare parts usage cost	189960	319050	63152	
26	Number of cases of corrective maintenance	2	1	0		73	Spare parts inventory cost	1536018	1532418	1435138	
27	Number of standards and one-point lessons	3	0	0		74	Number of months of spare parts inventory	8.1	4.8	22.7	
28	Number of MP information issuances	0	0	0		75	Repair cost/unit	0.055	0.063	0.051	
31	Preventive maintenance time	3350	3830	4970		76	Modification parts purchase price	0	136695	156640	
32	Breakdown maintenance time	5080	2565	1525		77	Maintenance parts cost/unit	0.055	0.099	0.1	
33	EDPS processing time	1465	1085	3980		78	Parts inventory cost/unit	0.034	0.034	0.038	
34	Corrective maintenance time	1530	2060	2075		79	Maintenance work cost/unit	0.094	0.07	0.085	
35	Manufacturing and construction work time	490	1880	657		80	Total maintenance cost/unit	0.183	0.203	0.223	
36	Production activity time	3635	850	1635		91	Total number of pieces of equipment	15	15	14	
37	Spare parts quality control time	150	90	280		92	Number of pieces of equipment targeted for PM	12	12	12	
38	Other time	2085	3205	1830		93	Number of specialized maintenance workers	1	1	1	
41	General operating time	86400	89280	86400		94	Number of line maintenance workers	1	1	1	
42	S/D maintenance time	0	0	0		101	Number of MMS registered parts	1251	1251	1251	
43	Load time	60354	62002	52293		102	Number of parts targeted for BM	256	256	256	
44	Number of PM unit failures	0	1	0		103	Number of parts targeted for TBM	36	36	36	
45	Number of BM unit failures	8	0	8		104	Number of parts targeted for CBM1	76	76	76	
46	Number of To. failures	8	1	8		105	Number of parts targeted for CBM2	11	11	11	
47	Number of night-time failures	2	0	2		106	Number of parts targeted for CMB3	0	0	0	
48	Number of failures 0.5 hr. or longer	3	1	3		107	PM ratio	9.8	9.8	9.8	
49	Number of failures 1.0 hr. or longer	1	1	1		108	CBM ratio	70.7	70.7	70.7	
50	Work time to recover failures	228	90	245		109	Number of standing spare parts	124	124	124	
51	Down time (DT)	440	180	245		110	Number of maintenance spare parts	19	19	19	
52	Operating time	27715	60213	47604		111	Number of reserve parts	72	72	72	

Manufacturing Technology System Indices

Process (__/first half year)

Equipment overall efficiency

2nd half year | Apr | May | June | July | Aug | Sep

PM implementation rate

2nd half year | Apr | May | June | July | Aug | Sep

NG repair rate

2nd half year | Apr | May | June | July | Aug | Sep

Down time rate

2nd half year | Apr | May | June | July | Aug | Sep

MTBF (h)

2nd half year | Apr | May | June | July | Aug | Sep

MTTR (min)

2nd half year | Apr | May | June | July | Aug | Sep

Bar: Number of minor stoppages

2nd half year | Apr | May | June | July | Aug | Sep

Total maintenance cost/unit

2nd half year | Apr | May | June | July | Aug | Sep

CBM ratio

2nd half year | Apr | May | June | July | Aug | Sep

Number of projects registered and completed

Number of registrations | Number of completions

Project progress rate

Apr | May | June | July | Aug | Sep

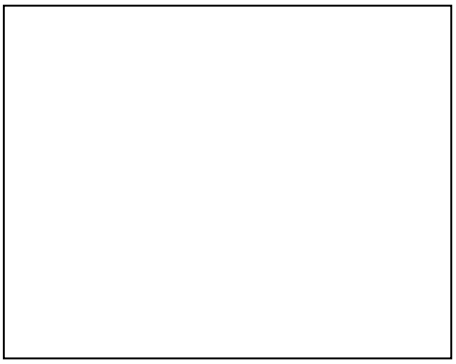
Number of cases of corrective maintenance
Bar: Monthly / Line: Accumulated

2nd half year | Apr | May | June | July | Aug | Sep

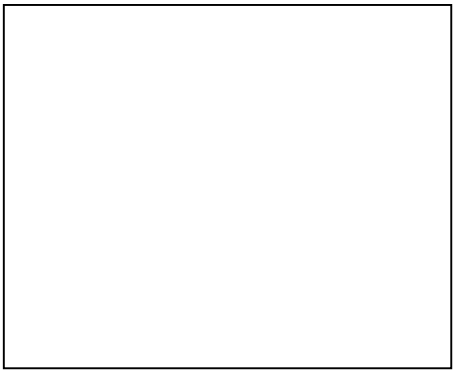
Problem points and countermeasures

Details of Measurement and Evaluation

Item	Method of calculation	Details
Number of failures and minor stoppages	Actual value	
MTBF	Total operating time / Total failure stoppages count	Mean operating time between failures
Failure frequency	(Total stoppages count / Total operating time) x 100	Failure rate per load time
Periodic maintenance rate	(Number of cases implemented / Number of planned cases) x 100	
Preventive maintenance cost ratio	((PM cost + CM cost) / (PM cost + CM cost + BM cost)) x 100	
MTTR	Total repair time / Total repair count	Average repair time
Maintenance cost reduction	Actual value	
Improvement in maintenance costs usage classification	Actual value	



7･4 Upgrading Operation and Maintenance Skills



7・4 Upgrading Operation and Maintenance Skills

1. Education System Chart (1)

1.	Education System Chart

2. Upgrading Maintenance Skills

- Maintenance Skill Trainer
- Maintenance Skill Education (2)(3)(4)
- Check Level of Understanding (5)
- Correspondence Course (6)
- Skill Evaluation (7)
- General Inspection Implementation

2.	Example of Maintenance Skills Education System
3.	Maintenance Skills Education Curriculum (Beginner)
4.	Maintenance Skills Education Schedule
5.	Check Level of Understanding (Mechanical and Electrical)
6.	Correspondence Course Schedule
7.	Maintenance Skills Evaluation Table

3. Upgrading Operation Skills

- Basic Work / Basic Knowledge
- Identification (8)
- Identification (9)(10)(11)(12)
- Check and Approve
- Operation Skills Education (12)(13)
- Skill Evaluation (14)

8.	Education Items Identification Table
9.	Mechanism Structural Diagram
10.	Machining Principle Diagram
11.	One-Point Lesson Sheet
12.	Operation Skills Textbook
13.	Operation Skills Education Schedule
14.	Operation Skills Evaluation Table

TPM Education System Chart

		General employee	Group Leader / Subsection Manager	Department Manager / Section Manager
TPM education	Introductory education	Guidance: Plant Manager Section Manager training meeting	JIPM guidance training meeting (lodging)	TPM college
	Training by theme		Leader training meetings by theme	Section Manager training meetings by theme
	Trainer education	Guidance: Trainer Introductory education, how to promote steps	JIPM guidance: Trainer training meeting Guidance: Trainer Diagnostic technology and IE techniques	
Operation Division education	Operation skills	Guidance: Group Leaders and Subsection Leaders	Guidance: Section Leaders Education on operation skills and related knowledge	
	Maintenance skills	Guidance: Group Leaders and Subsection Leaders To acquire knowledge and skills, to understand the mechanism of equipment one operates on one's own, and to be able to perform simple parts replacement and repair. One-point lesson	Guidance: Instructors (Beginner) General inspection skills education (Intermediate) Foreman maintenance skills (Advanced) Equipment maintenance basic processes	
Maintenance Division education	Basics	Guidance: Instructor Based on the equipment maintenance basic curriculum		
	Application	Guidance: Instructors Beginner: Electrical and machine maintenance	Guidance: Instructors Intermediate:	Advanced:

Example of Maintenance Skills Education System

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Example of Maintenance Skills Education System

Course	Level	Maintenance worker		Operator	
		Target skill	System	System	Target skill
Advanced	Foreman and higher	To be able to conduct equipment management activities	Equipment Manager course Maintenance Foreman course Advanced course: Equipment management / Production maintenance / Guidance of subordinates OJT	Maintenance Foreman course OJT	
Intermediate	Group Leader	To understand the maintenance system and to be able to conduct planned maintenance activities. To be able to perform repairs and restoration. To be able to carry out improvements.	Technician examination Intermediate course: Maintenance system / Examination system / Repairing failures / Improve-ment OJT	Intermediate course: Maintenance system / Examination system / Repairing failures / Improve-ment OJT	To be able to give guidance on autonomous maintenance. To be able to carry out improvements. To be able to perform minor repairs.
Beginner	General	To understand inspection points and to be able to take measures. To be able to judge normal and abnormal conditions, and to be able to take initial measures. To be able to carry out minor improvements.	Beginners' course: Machine basics / Electrical basics / System and maintenance OJT Correspondence courses		To understand inspection points and to be able to take measures. To be able to judge normal and abnormal conditions, and to be able to take initial measures. To be able to carry out minor improvements.
Basic	New employees	To be able to perform work as instructed. To understand safety standards, and to behave accordingly.	Basic course: Office work, products, manufacturing, common sense and knowledge / Handling of equipment and basics of safety		To be able to perform work as instructed. To understand safety standards and to behave accordingly.

Operator Maintenance Skills Education and Training Curriculum (Beginner's Edition)

Subject		Education and Training Item	Time	Equipment maintenance and basic process
Basic work	1.	Properly retighten nuts and bolts	2h	
	2.	Practical skills for appropriate torquing	2h	
	3.	Practical training on methods to set up locking	2h	
Drive unit	1.	Shaft handling and maintenance points	2h	
	2.	Practical training on driving, shrink fitting and sampling	2h	
	3.	Types of key matching, and their importance	2h	
	4.	Techniques of key removal	2h	
	5.	Types and standards of meshing	1h	
	6.	Breakage of gears, and maintenance	2h	
	7.	Understanding of chain transmission	1h	
	8.	Understanding of belt transmission	1h	
	9.	Transmissions and reduction gears	1h	
Lubrication	1.	Functions and types of lubrication oils	1h	
	2.	Testing for excessive and inadequate oiling	2h	
	3.	Understanding of bearing lubrication	1h	
Pneumatic	1.	Types of O-rings	1h	
	2.	Cutout model of pneumatic equipment (3-point set, cylinders, valves and piping)	3h	
Hydraulic	1.	Hydraulic valves, hydraulic cylinders and operating oil	2h	
	2.	Practical training on attaching high-pressure pipe fittings	2h	
Electrical	1.	Electricity basics and safety	2h	
	2.	Switches and control equipment materials	2h	
	3.	Motors	2h	
	4.	Measuring instruments	1h	
Total			39h	

Maintenance Skills Education Schedule (Mechanical and Electrical Maintenance)

Date created: __/__/__ TPM Operation Office

Lectures or practical training	Education contents		Instructor	Attendees		Education schedule											
	Subject	Time required		Assigned area	Name	Schedul	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance

Maintenance Skills Education Schedule

7・4

2 - 4

Check Level of Understanding

Assigned area _____

Name _____

{1} Select the noncontact detector switches from the following list:

A. Microswitch B. Photoelectric switch C. Proximity switch
D. Limit switch E. Ultrasonic switch

{2} To what factors is a thermal relay adjusted?

A. Rated power B. Rated voltage C. Starting current D. Full-load current

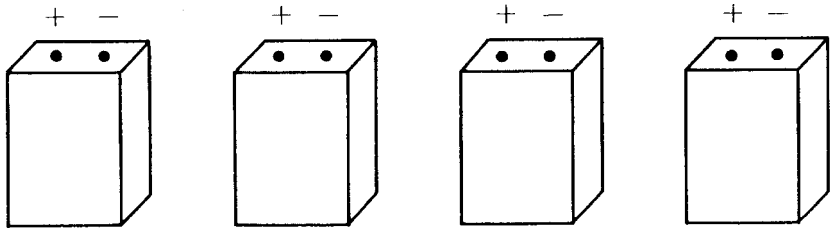
{3} Frequent reversing of a motor may cause the molded thermal relay to actuate. What is this caused by?

A. Heat generated by loosening of the terminal block
B. Heat generated due to the starting current
C. Because the electromagnetic tripping current is set too low

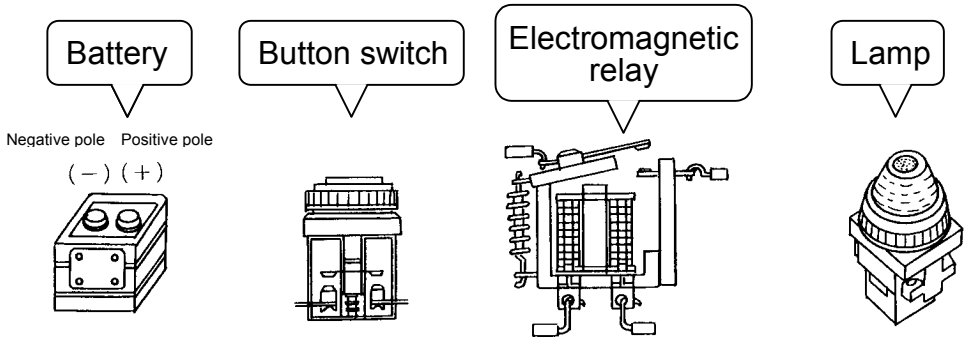
{4} Select from the following the inspection and maintenance points common to direct current motors and 3-phase induction motors.

A. Bearing management
B. Preventing deterioration of coil insulation
C. Ensuring good rectification conditions
D. Management of fixed terminals

{5} Connect the 3V batteries in the illustration below so that the starting voltage is 12V.



{6} Construct a lamp flasher circuit using the electromagnetic relay "A" contact to light the lamp when the button switch is pressed. Wire the devices in the illustration below.



Maintenance Skills Correspondence Course Schedule

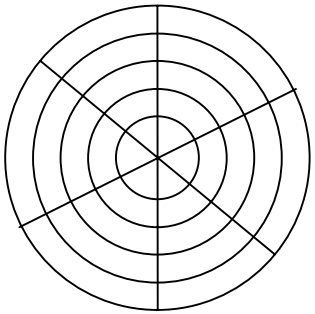
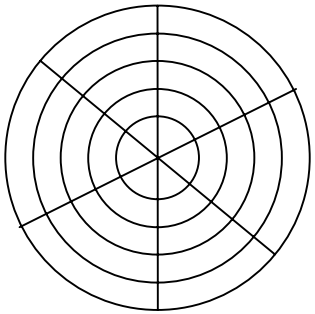
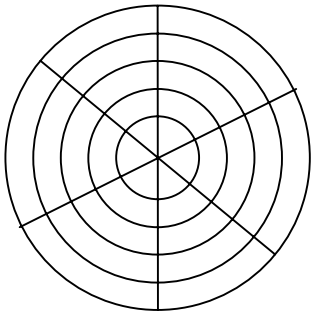
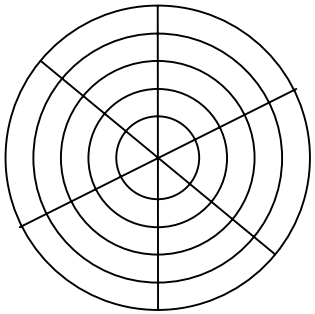
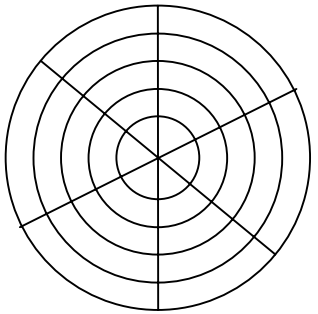
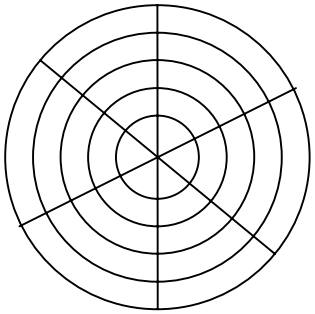
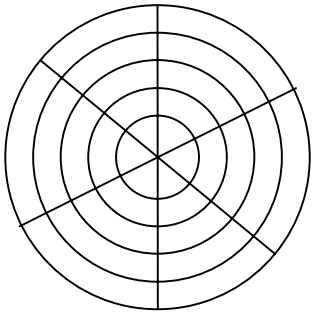
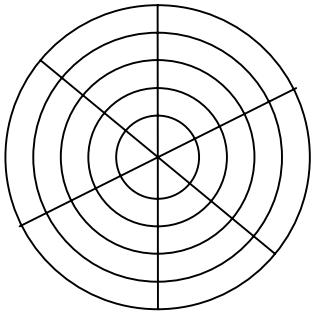
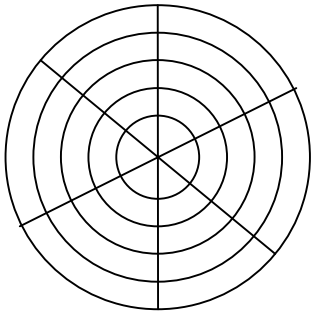
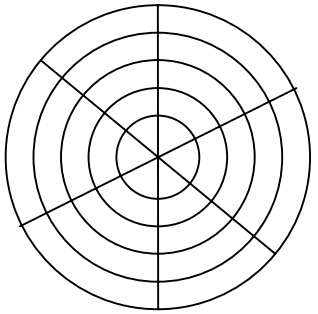
Section Manager	Subsection Manager	Circle Leader

_____ Circle _____ Section _____ Department

Correspondence course details		OJT or OFF-JT	Instructor	Attendees	Education schedule													
Subject	Time required			Name	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance	Schedule	Attendance

Maintenance Skills and Education Skills Evaluation Table (Operator)

Evaluation items				Evaluation level	
A	Basic work	D	Pneumatic	Level 1	Understands intellectually
B	Drive unit	E	Hydraulic	Level 2	Can perform work to some extent
C	Lubrication	F	Electrical	Level 3	Can perform work with confidence
				Level 4	Can teach others

Name	Name	Name	Name	Name
				
Name	Name	Name	Name	Name
				

List of Operation Skills Education Items

____ Circle ____ Section No. 1 ____ Department No. 1 Equipment name: __ - __

	Main category	Work classification	Textbook No.	Page	Person-in-charge of education		Time required
1	Materials related	1. Materials disbursement work	1A-1	5	Circle Leader		15 minutes
		2. Transport work	1A-1	6			10 minutes
		3. Cleaning work	1A-1	7			15 minutes
2	Preparation	1. Materials preparation	1A-1	9			10 minutes
		2. Work instruction sheet confirmation	1A-2	3			10 minutes
		3. Prepare a frame for inputting finished products	1A-1	15			5 minutes
3	Machine work	1. Operation preparation work	2A-1	5			20 minutes
		2. Set materials	2A-1	7			5 minutes
		3. Operation	2A-1	8~25			120 minutes
		4. Troubleshooting	2A-1	35			30 minutes
		5. Sampling verification work	2A-1	39			15 minutes

Mechanism Structural Diagram

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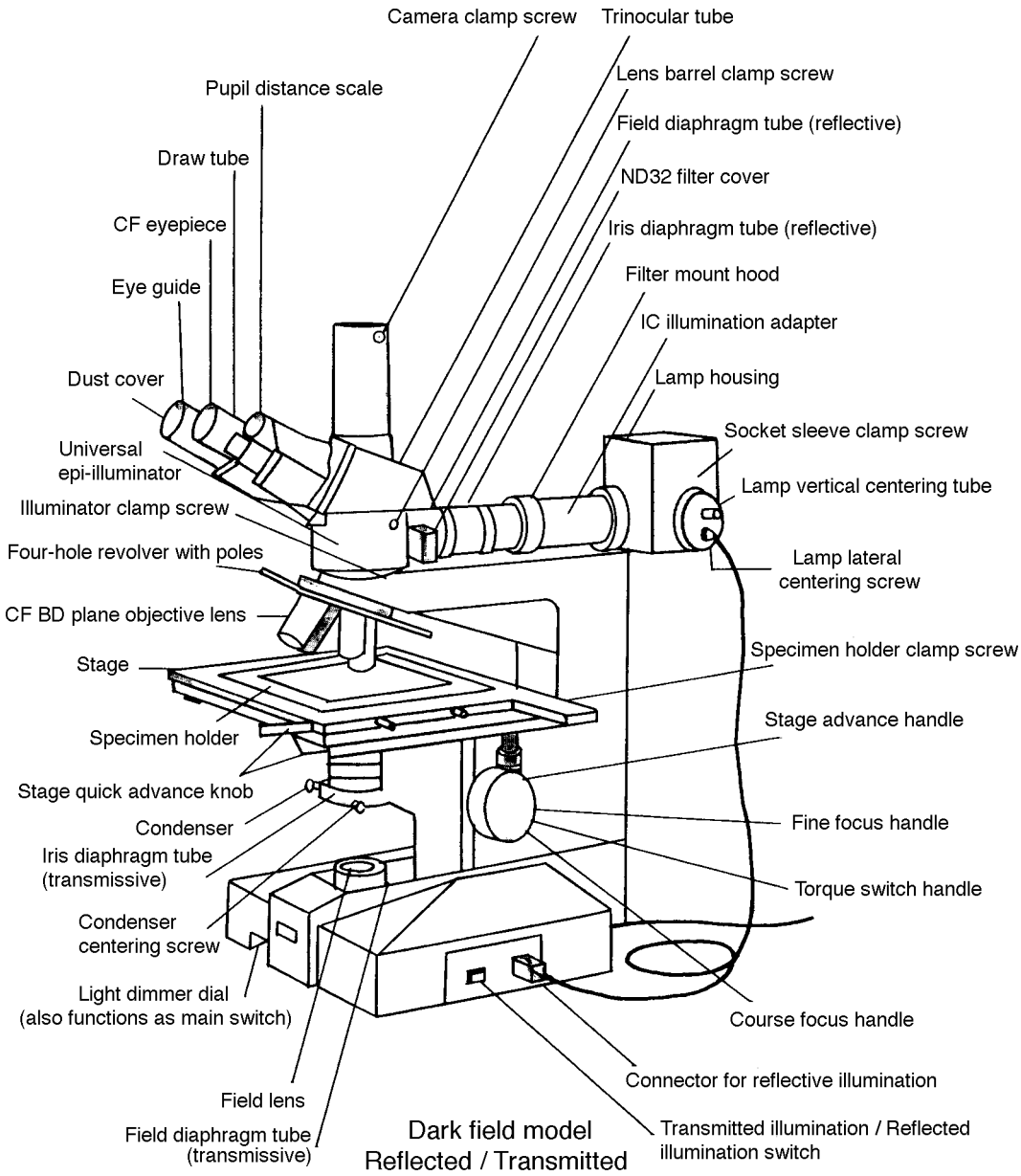
	Equipment name		One-Point Lesson
	Division		No.

Name category	Other	Work classification	Mechanism structural diagram	Basic work	Unit names

Work procedure	summary	Keypoints / Why



Dark field model
Reflected / Transmitted illumination dual-purpose model

Education record	/	/	/	Section Manager	Created by	Standard time	Level
						10 min	Beginner / Intermediate / Advanced

Machining Principle Diagram

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Equipment name		**Machining Principle Diagram**	No.
Division			

Work name:

No.	Explanation of machining	Machining principle diagram

Education record										Section Manager	Created by	Date created	Standard time	Level
													— min	Beginner Intermediate Advanced

One-Point Lesson Sheet

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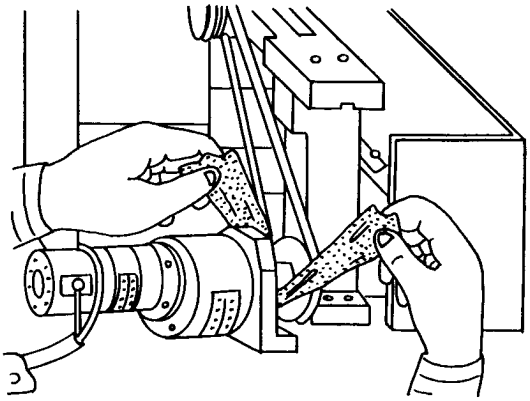
Equipment name		One-Point Lesson			
Division					No.
Main category	Start-up and finishing work	Work classification	Transport unit	Basic work	Method for cleaning loader/unloader

Work procedure	summary	Keypoints / Why

1 Motor unit

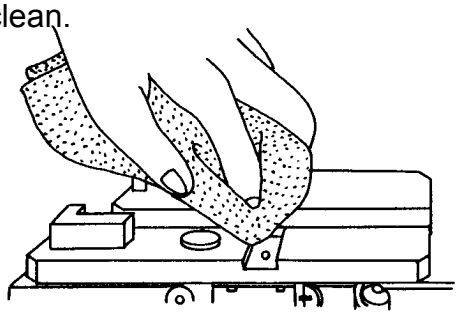
Grasp cloth firmly and wipe clean.



※ There should be no dirt or overheating.

2 Stage unit

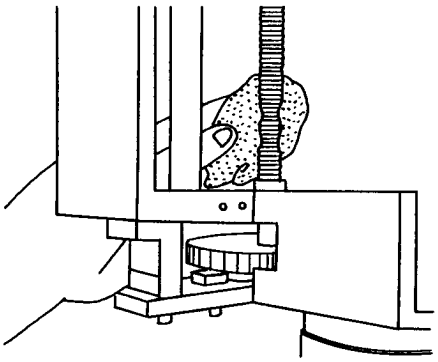
Apply absolute alcohol to the cloth and wipe clean.



※ There should be no waste or deformation.

3 Feed screw unit

Apply machine oil to a cloth and wipe clean.

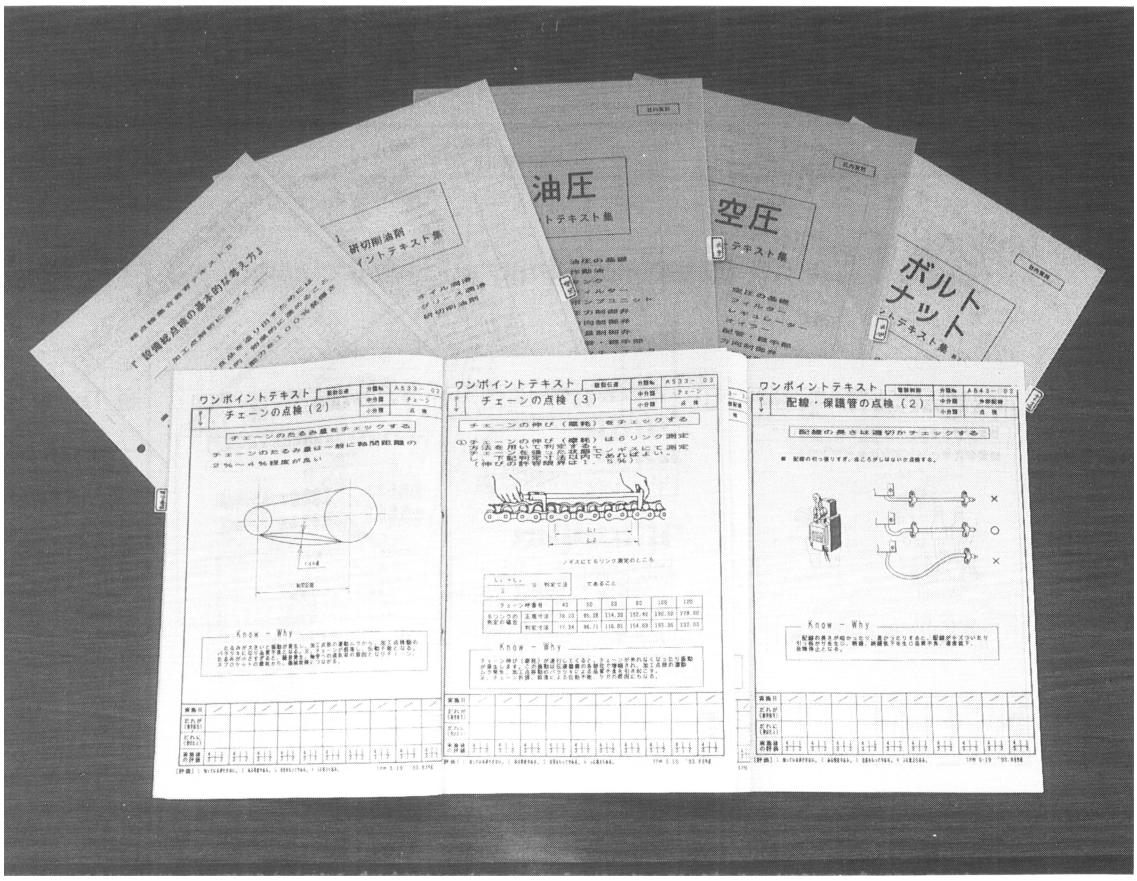


※ There should be no deterioration or dispersion of the grease.

◎ Verify operation after cleaning.

Education record				Section Manager	Created by	Standard time	Level
						30 min	Beginner Intermediate Advanced

Example of Operation Skills Textbook



Operation Skills Education Schedule

No. ___ ___ Circle

Process	
Item	

A. Difficult
B. Regular
C. Simple

No.	Work details	Mastery difficulty	Standards Textbooks Manuals	Category: Specific	Category: Versatile	h: Knowledge	h: Practical training	h: Total	Education schedule: 1 month	2 months	3 months	

Operation Skills Evaluation Table

Circle Section Department

Criteria	Knowledge / Skills	Level 1: Understands intellectually	Level 2: Can perform work to some extent
		Level 3: Can perform work with confidence	Level 4: Can teach others

Subject	Item	Name															
	Knowledge																
	Skill																
	Knowledge																
	Skill																
	Knowledge																
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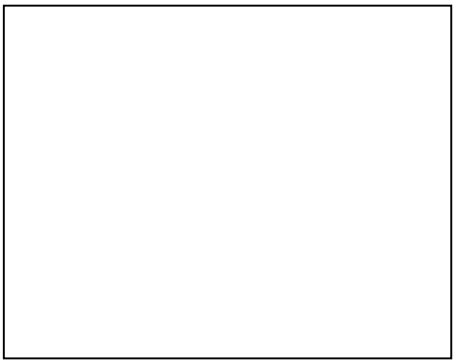
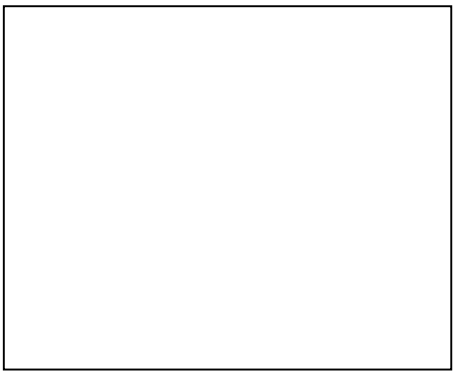
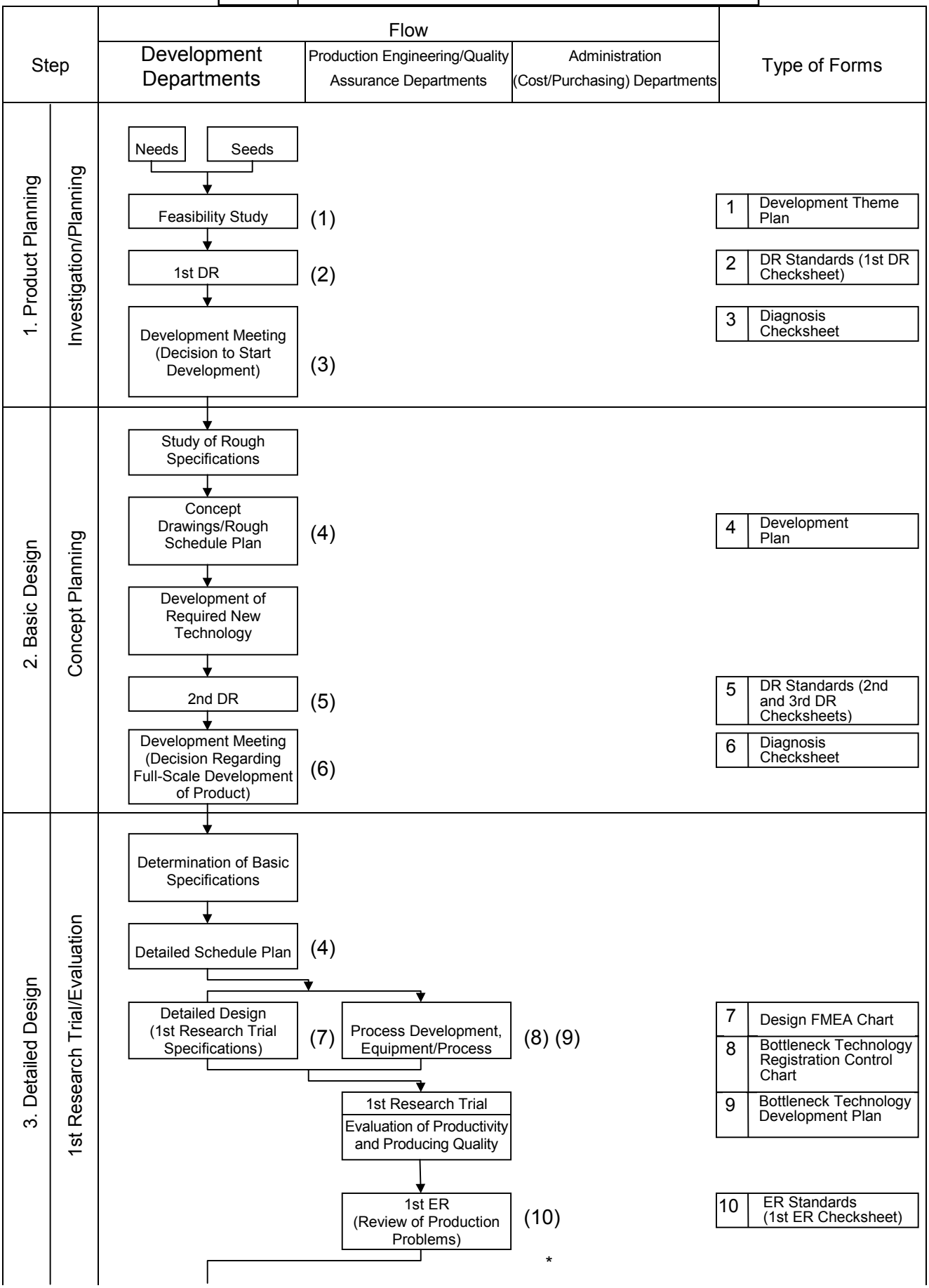


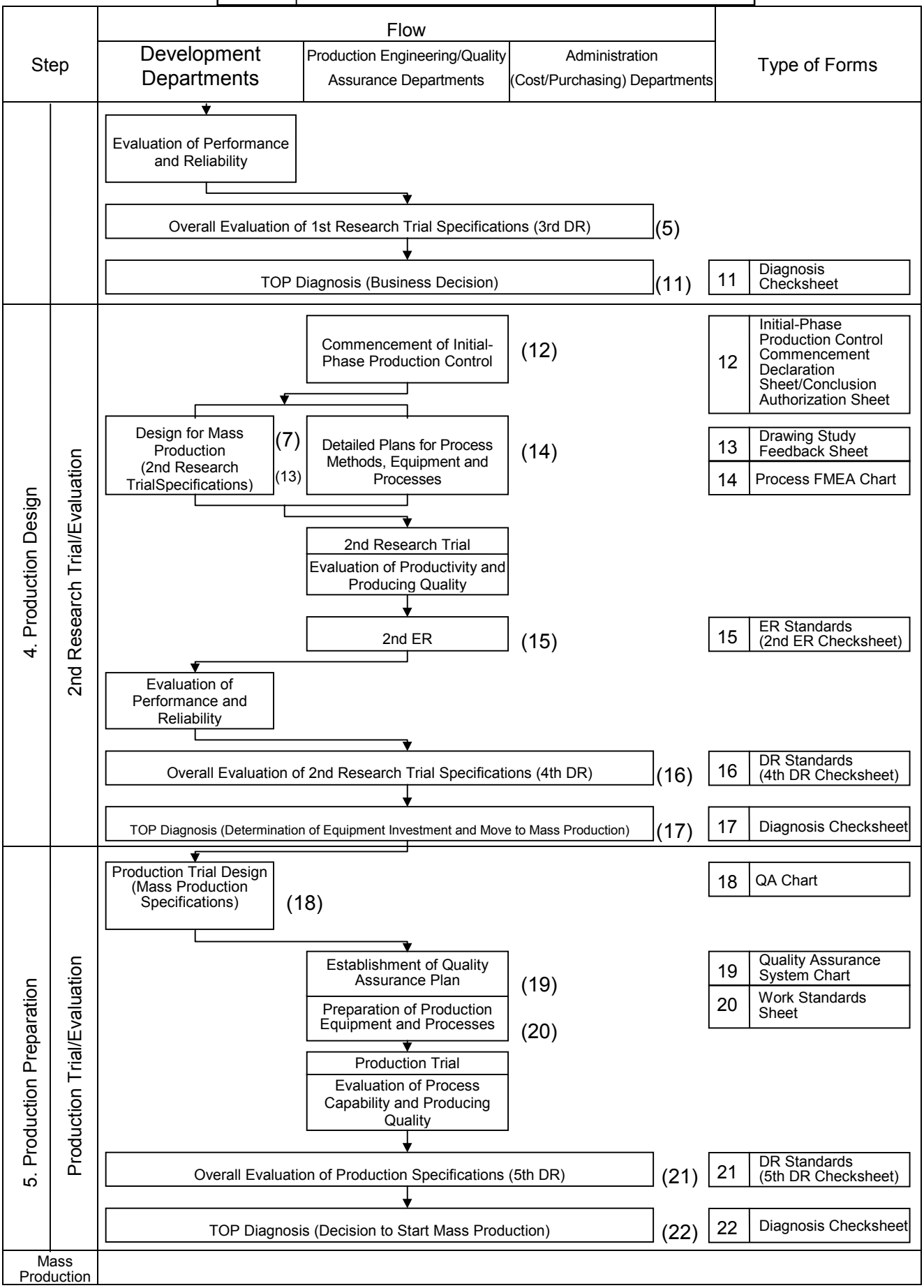
8･1 Initial-Phase Product Control



8·1 Initial-Phase Product Control



8·1 Initial-Phase Product Control



Development Theme Plan

Revised ___/___/___ | | | |

Created ___/___/___ ___/___/___

Record No:		Theme Name:				
In Charge of Development		Division		Department		Group
Reason for Necessity of Development						
Contents and Goals						
New Function-Related Technology						
Competitor Status and Comparison						
Tentative Product Targets	Sales Volume	Unit cost and quantity 3 years after SOP (launch) ¥/unit units/year [Estimated market size ¥_____million annually]				
	Cost	Base production cost 3 years after SOP ¥/unit				
	Quality	Major performance/reliability targets				
Development Plan	Development Period	Start of development Date:_/_/_	Target completion of detailed design Date:_/_/_	Target SOP Date:_/_/_		
		Period	( ) Period	( ) Period	( ) Period	( ) Period
		Schedule and stage				
	Invested manpower (persons)					
	Developed equipment (¥, thousands)					
	Development trial cost (¥, thousands)					
	Joint development; with --> ( ) Related divisions;					
Anticipated Sales Route						
In-house Technology, Equipment						

1st DR Checksheet (Product Plan)

Product Name			DR Member's Dept.: Name:					
No.	**DR Item**	**Check Point**	**Evaluation (5 Levels)**					**Opinion**
1	**Evaluation of goals of theme**	Suitability of domain strategy	5 Suitable	4	3	2	1 Not Suitable	
		Evaluation of environmental effect	5 Good	4	3	2	1 Bad Effect	
		Sales Volume (¥millions/year)	>100	100-50	50-10	10-1	>1	
2	**Grasp of market trends**	Evaluation of market maturity	5 Expanding	4	3	2	1 Contracting	
		Patent search	5 No problem	4	3	2	1 Not yet done	
		Development status of other companies' rival products	5 Undeveloped	4	3	2	1 Finished	
		Evaluation of distinguishability from rival products	5 Big difference	4	3	2	1 No difference	
3	**Evaluation of theme contents**	Evaluation of basic design specifications	5 Good	4	3	2	1 Problem	
		Establishment of quality targets	5 Established	4	3	2	1 Not yet	
		Establishment of cost targets	Est. incl. sales price		Cost only		Not yet	
		Evaluation of schedule plan	5 Good	4	3	2	1 Problem	
		Necessary manpower plan	5 Good	4	3	2	1 No plan yet.	
		Necessary equipment plan	5 Good	4	3	2	1 No plan yet.	
		Evaluation of technical feasibility	5 Prototype made.	4	3	2	1 Not made yet.	
		Use of in-house know-how	Adequate use.		Partial use.		Unrelated	
Overall Judgment		Proceed to next step	OK		OK with conditions		Not OK	

Diagnosis Checksheet

Date of Diagnosis___/___/___

Diagnosed By_____

(At stage when product planning is complete.
Product: Newly developed version of an existing product)

Points Diagnosed: The product concept 10 years from now is clear, and the tentative targets for QCD have been set.

Theme Name:_____

Development Department Name:_____

Results of Diagnosis (Please circle the appropriate answer. Circle the middle answer if unsure).

	Evaluation Item	5	4	3	2	1	Evaluation Comments
1	Product differentiation (compared to other companies)	Major		Some		No diff.	
2	Match with customer needs	Adequate		Right Direction		Doubtful	
3	Target cost level (% reduced from current cost level)	Major (30% +)		Some (10-20%)		No diff.	
4	Timing for completion of development of functions	Ahead of customer needs.		Meeting customer needs.		Behind	
5	Sales volume after 3 years (¥ millions/year)	>100	100-50	50-10	10-1	>1	
6	Development status at other companies	Undevel-oped.		Sales with in 3 years.		Mass prod. stage.	
7	Effect on current equipment	Can use as is.		Can use with modification.		Need new.	

Overall Judgment and Comments

Proceed to next step (basic design): OK Not OK

Master Schedule of Initial-Phase Product Control Theme Activities

Dept.	Schedule of Activities / Product Name (Person in Charge)	Prior to First Half	First Half [of Fiscal Year] /4	5	6	7	8	9	Second Half 10	11	12	/1	2	3	Beyond Second Half
E															
M															
L															
Research															

2nd and 3rd DR Checksheet (Function Development)

Product Name			DR Member's Dept.: Name:					
No.	**DR Item**	**Check Point**	**Evaluation (5 Levels)**					**Opinion**
1	Evaluation of basic plan	Evaluation of development schedule plan	5 Good	4	3	2	1 Problem	
		Evaluation of solutions to items pointed out in 1st DR	5 Countermeasure completed.	4	3	2	1 Not yet.	
2	Evaluation of design	Evaluation of basic design specifications	5 Good	4	3	2	1 Problem	
		Evaluation of basic structure	5 Good	4	3	2	1 Problem	
		Evaluation of proprietary technology	5 In use.	4	3 Partial use.	2	1 New.	
3	Evaluation of quality	Reliability evaluation Level of attainment (%)	5 ≥ 90	4	3 80	2	1 ≤ 70	
		Evaluation of quality control items	5 Good	4	3	2	1 Problem	
		Evaluation of safety and maintainability	5 Good	4	3	2	1 Problem	
		Evaluation of environmental affect (listing materials, etc.)	5 Good	4	3	2	1 Problem	
4.	Marketability	Match with market needs	Adequate		Right direction		Does not match	
		Investigation of rival products, technical differentiation	5 Big difference.	4	3	2 No difference.	1	
		Patent search	5 No problem.	4	3	2 Serious problem.	1	
5.	Evaluation of business ability	Outlook on target cost achievement	Adequate ≥ 95%		Possible ≥90%		Impossible ≤ 70%	
		Outlook on profit Cost ratio in 3 yrs	Adequate ≤85		So-so 90-95		Impossible 100+	
		Scope of sales after 3 yrs. (¥million/year)	>100	100-50	50-10	10-1	>1	
6.	Evaluation of production engineering	Evaluation of critical technology in prod. engineering	5 No problem.	4	3	2	1 Not OK	
Overall Judgment		Proceed to next step	OK		OK with conditions		Not OK	

Diagnosis Checksheet

Date of Diagnosis___/___/___
Diagnosed By_____

(At stage when basic design is complete.
Product: Newly developed version of an existing product)

Points Diagnosed: The product concept 10 years from now is clear, and the tentative targets for QCD have been set.

Theme Name:_____

Development Department Name:_____

Results of Diagnosis (Please circle the appropriate answer. Circle the middle answer if neither extreme fits).

	Evaluation Item	5	4	3	2	1	Evaluation Comments
1	Product differentiation (compared to other companies)	Major		Some		No diff.	
2	Match with customer needs	Adequate		Right Direction		Doubtful	
3	Target cost level (% reduced from current cost level)	Major (30% +)		Some (10-20%)		No diff.	
4	Timing for completion of development of functions	Ahead of customer needs.		Meeting customer needs.		Behind	
5	Sales volume after 3 years (¥ millions/year)	>100	100-50	50-10	10-1	>1	
6	Development status at other companies	Undevel-oped		Sales within 3 years		Mass prod. stage	
7	Outlook on technical achievement of new functions	Adequate		Possible		Difficult to achieve.	
8	Effect on current equipment	Can use as is.		Can use with modification.		Need new.	

Overall Judgment and Comments

Proceed to next step (basic design): OK Not OK

Design FMEA
(Failure Mode and Effect Analysis)

No._____

Our Part No.	Development Code

Manufacturer Part No. / Manufacturer Part Name	Deliver To	Model	Date of Analysis / Analyzed By	Approval	Check	In Charge	Date Created ___/___/___

No.	Part Name (Part No.) (System)	Part Function	Failure Mode	Effect of Failure	Cause of Failure	Before Countermeasure				After Countermeasure				Description of Treatment	Deadline	Dept. in Charge of Treatment	Remarks
						Frequency	Degree of Effect	Degree of Detection	Importance	Frequency	Degree of Effect	Degree of Detection	Importance				

Date of Analysis	Description, Analysis By	Change Sequence	Date of Analysis	Description, Analysis By	Change Sequence

Design FMEA Chart

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Critical [Bottleneck] Technology Registration Control Chart

Date Prepared: _____

Department: _____

Development Theme Name:	Product Name:	SOP [Launch] Date:

No.	Critical [Bottleneck] Items	Relevant Fields	Description	Rank of Difficulty	Degree of Effect		Registration Date	Main Dept. in Charge	Completion Deadline	Remarks
					Q	C				

[How to Fill Out Form]

1. Relevant Field

(1) Processing accuracy and configuration (2) New materials (3) Surface treatment
(4) Heat treatment (5) Process method (6) Measurement technology (7) Sealing method
(8) Lubrication (9) Other

2. Rank of Difficulty

S: Hard-to-develop technology
A: Undeveloped technology
B: Not-yet-applied technology

3. Degree of Effect

Circle the column which critical technology affects the most, Q or C.

Critical [Bottleneck] Technology Development Plan

Date Prepared: _____

Department: _____

Development Theme:	Product Name:	SOP [Launch] Date:

No.	Critical [Bottleneck] Items	Items Studied	Development Schedule	Main Dept. in Charge (Person in Charge)	Evaluation	Remarks

[How to Fill Out Form]

1. Reporting Periods

*1st Time: when functions have been developed.

*2nd Time: when mass production specifications have been established.

1st ER Checksheet

Date of Diagnosis___/___/___

Diagnosed By_____

Items to Be Checked		Points to be Checked	Main Reporter	Evaluation
Identification of Critical [Bottleneck] Technology	1	Is new production engineering development necessary?	Production Eng.	
	2	Is new manufacturing technology development necessary?	Production Eng.	
	3	Is new development needed for quality control?	Qual. Assurance,	
	4	Is the plan to handle the above issues appropriate?	Production Eng. Quality Assurance	
Process Design Concept	1	Are processes (line) and process methods appropriate?	Production Eng.	
	2	Are facilities, jigs/tools, measuring equipment, and dies appropriate?	Production Eng.	
	3	Is anything missing from the main problem [FUGUAI] items?	Production Eng.	
	4	Is target production capacity and amount of manpower appropriate?	Production Eng.	
	5	Is the preparation plan easy to achieve?	Production Eng.	
Division of In-house and Subcontracted Processing	1	Is division of in-house and subcontracted processing appropriate for mass production?	Production Eng.	
	2	Are in-house processing departments appropriate for mass production?	Production Eng.	
	3	Are process instructions clear for mass production?	Design	
	4	Among subcontracted parts, are technologically questionable parts clearly known?	Production Eng.	

[Notes for the "Evaluation" column] O: good, Δ: basically OK, X: must be investigated.

Comments

Diagnosis Checksheet

Date of Diagnosis___/___/___
Diagnosed By_____

(At stage when basic design is complete.
Product: Newly developed version of an existing product)

Points Diagnosed: Through the design and prototype manufacture of the planned product, are we ready to mass produce the product from the perspectives of quality, cost, and processes?

Theme Name:_____

Development Department Name:_____

Results of Diagnosis (Please circle the appropriate answer. Circle the middle answer if neither extreme fits).

	Evaluation Item	5	4	3	2	1	Evaluation Comments
1	Product differentiation (technical capability)	Major		Some		No diff.	
2	Match with customer needs	Adequate		Right Direction		No match	
3	Outlook on performance and reliability (rate of achievement)	Adequate ≥90%		So-so ≥80%		Bad outlook Needs work.	
4	Outlook for achievement of critical technology (rate of achievement)	Adequate ≥90%		So-so ≥80%		Bad outlook Needs work.	
5	Outlook on target cost achievement (rate of achievement)	Adequate ≥ 95%		Possible 90%		Impossible ≤ 70%	
6	Outlook on profit (Cost ratio in 3 years)	Adequate ≤85		So-so 90-95		Impossible 100+	
7	Scope of sales after 3 years (¥ million/year)	>100	100-50	50-10	10-1	>1	

Overall Judgment and Comments

Proceed to next step (production design): OK Not OK

Initial-Phase Production Control Commencement Declaration Sheet/Conclusion Authorization Sheet

Commencement No.		Sheet No.	

Commencement Declaration: We declare commencement of initial-phase product control of the following products.		Quality Assurance Dept.	Commencement Declaration Issue Date		
Customer Name	Product No.		Department Manager		In Charge
Organization Name	Product Name				

Initial Control Forecast Product Information No.		Technology Evaluation No.		Production Control Schedule No.	

Reason for Commencement

Control Items and Scope

Distribution

Rough Schedule

Initial-Phase I Activity Evaluation

	Quality Assurance Dept.	Conclusion Authorization Issue Date:		
Conclusion Authorization: We authorize conclusion of the initial-phase product control of the respective product.		Department Manager		In Charge

Drawing Study Feedback Chart

No._____

Development Code	( )

Development step shown inside parenthesis.

Manufactured In-house / Outsourced (Circle one).

Product Name	
Product No.	
Desired Date of Response to Design Dept.	Date: _/_/_

Name of Issuing Group ___/___/___

Studying Dept. ___/___/___

Name of Responding Group ___/___/___

Problem Areas in Production Processes (Hard-to-make, problems with equipment, standardization, quality assurance, etc.)	Proposed Countermeasures (Proposals for improvements to the problem areas at left.)	Design Engineering Response (Plans to incorporate countermeasures into production drawings).
	Predicted Effect: Approximately ¥/unit	
	Approximately ¥/unit	
	Desired Response Date ___/___/___	

Process FMEA Chart

(Failure Mode and Effect Analysis)

No._____

Category		Heavy/Special Original Dev. Function General	
Our Part No.	Development Code	Model/Year	

Manufacturer Part No.	Process Name	In-house or Outsourced	Analysis Date	Approved By	Checked By	In Charge	Date Prepared
Manufacturer Part Name		In-house / Outsourced	Analyzed By				___/___/___

No.	Process Name	Process Function	Failure Mode (anticipated problem)	Effect of Failure	Cause of Failure	Before Countermeasure				After Countermeasure				Critical Points (current control status)	Description of Treatment (description of countermeasure)	Date	Dept. in Charge of Treatment
						Frequency	Degree of Effect	Degree of Detection	Importance	Frequency	Degree of Effect	Degree of Detection	Importance				

Date of Analysis	Description, Analysis By	Change Sequence	Analysis Date	Description, Analysis By	Change Sequence

2nd ER Checksheet

Date of Diagnosis___/___/___

Diagnosed By_____

Items to Be Checked		Points to be Checked	Main Reporter	Evaluation
Process Design Plan	1	Is treatment of items of concern during 1st ER appropriate?	Prod. Engineering	
	2	Are planned equipment capacity and production capacity appropriate?	Prod. Engineering	
	3	Is the amount of planned manpower appropriate?	Prod. Engineering	
	4	Is the layout appropriate?	Prod. Engineering	
Preparation of Equipment and Jigs/Tools	1	Can equipment, jigs/tools, and dies be prepared?	Prod. Engineering	
	2	Can quality assurance equipment and jigs/tools be prepared?	Qual. Assurance	
	3	Are there any inadequate jigs/tools?	-	
	4	Is equipment easy to handle (for manufactureability and safety)?	Prod. Engineering	
	5	Can functions be adequately maintained?	Prod. Engineering	
	6	Must spare parts be prepared?	Prod. Engineering	
Preparation of Standard Documents	1	Are work standards and inspection standards prepared?	Prod. Eng./QA	
	2	Do the above documents match the QA-M control process charts?	Prod. Eng./QA	
	3	Are Key Point Cards prepared?	Manufacturing	
Operator Education and Training	1	Is there a plan for education and training?	Manufacturing	
	2	Is the focus of education and training appropriate?	Manufacturing	

[Notes for the "Evaluation" column] O: good, Δ: basically OK, X: must be investigated.

Comments

4th DR Checksheet (Production Design)

Product Name			DR Member's Dept.: Name:					
No.	**DR Item**	**Check Point**	**Evaluation (5 Levels)**					**Opinion**
1	Evaluation of basic plan	Evaluation of development schedule plan	5 Good	4	3	2	1 Problem	
		Evaluation of solutions to items pointed out in 2nd and 3rd DR	5 Countermeasure completed.	4	3	2	1 Not yet.	
2	Evaluation of design	Evaluation of design function specifications	5 Good	4	3	2	1 Problem	
		Evaluation of performance specifications	5 Adequate	4	3	2 Not within spec.	1	
		Degree of drawing completeness	5 Complete	4	3	2	1 Not yet	
3	Evaluation of quality	Reliability evaluation Level of attainment (%)	5 100	4	3 90	2	1 ≤ 80	
		Evaluation of failure analysis (FMEA, FTA)	5 Adequate	4	3	2	1 Incomplete	
4.	Evaluation of serviceability	Level of completeness of service diagrams	5 Adequate	4	3	2	1 Incomplete	
		Evaluation of safety and ease of operation	5 Good	4	3	2	1 Dangerous	
5.	Marketability	Investigation of rival products, technical differentiation	5 Big difference.	4	3	2 No difference.	1	
		Patent search	5 No problem.	4	3	2 Serious problem.	1	
6.	Evaluation of business ability	Outlook on target cost achievement	Adequate 100%		Possible 95%		Impossible ≤ 80%	
		Outlook on profit Cost ratio in 3 yrs	Adequate ≤85		So-so 90-95		Impossible 100+	
		Outlook on sales price	Agree with customer		Agree in-house		Big diff. with customer	
7.	Evaluation of production engineering	Evaluation of problems with manufacturing equipment	5 No prob.	4	3 Solution	2 Possible	1 Not Possible	
		Achievement of critical [bottle-neck] technology	5 Achieved.	4	3 Possible.	2	1 Difficult.	
Overall Judgment		Proceed to next step	OK		OK with conditions		Not OK	

Diagnosis Checksheet

Date of Diagnosis___/___/___
Diagnosed By_____

(At stage when production design is complete.
Product: Common)

Points Diagnosed: Through the design and prototype manufacture of the planned product, have we confirmed the suitability of quality and cost, based on customer requirements?

Theme Name:_____

Development Department Name:_____

Results of Diagnosis (Please circle the appropriate answer. Circle the middle answer if neither extreme fits).

	Evaluation Item	5	4	3	2	1	Evaluation Comments
1	Determination of production specifications	All decided.		Partial. No effect on equip.		Basic specs. may be changed.	
2	Achievement of performance and reliability (rate of achievement)	Achieved (100%)		Possible (≥90%)		Difficult (≤80%)	
3	Achievement of critical technology (rate of achievement)	Achieved (100%)		Possible (≥90%)		Difficult (≤80%)	
4	Achievement of target cost, estimated value (rate of achievement)	Achieved (100%)		Possible (≥95%)		Difficult (≤80%)	
5	Outlook on earnings (cost ratio within 3 years)	Achieved (≤85%)		Possible (90-95%)		Difficult (100%+)	
6	Outlook on sales price	Agreement with customer		Agreement in-house		Big gap from desired customer	

Overall Judgment and Comments

Proceed to next step (production design): OK Not OK

QA Chart

Theme	

Manufacturer:

Model:

Relevant Product:

Date Created		Originator	

No.	Part Name	Quality Characteristics	Standards	Points to Be Aware Of (when out-of-spec.)	Problems Occurring During Prototype	Remarks

Information processing route: design engineering departments (design FMEA) → quality assurance, production engineering, and manufacturing departments

Quality Assurance System Chart | **8 • 1** | **5 - 19**

Importance Code		Foolproofing Rank Code		Preparer's Evaluation Code	
A	Cannot achieve the initial goals.	A-1	Standard type of auto selection, auto stop	O	100% detectable through inspection by special inspector or A/B-1 foolproofing.
		A-2	Standard type of manual set		
B	Characteristics which slightly affect functions.	B-1	Continuous motion type of caution	Δ	B-2 foolproofing, double checking
C	Almost no relation to performance	B-2	Buzzer and lamp warning type of caution	X	Self-check by operator

Quality Assurance System Chart

Quality Grade	Product	Product No.
	Line	Product Name

Process No.	Process Name	Description of Problem (failure mode)	Effect of Problem (effect of failure)	Importance	Anticipated Problem	Problem Experienced			Process Itself											Pre- and Post-Processes (Process No.)					Preparer's Evaluation	Remarks (cause of problems, countermeasures, etc.)
									Foolproofing				Self-Check							Pre-Process (sub-assy, etc.)	Process Name					
									Standard Type		Caution Type										Process No.					
						Process Itself	Post-Process	Flow-through	A-1	A-2	B-1	B-2	Total No.	Initial Product	Final Product	Units/Lot	Random Inspection	100% Inspected								

Code	Change No.	Change Date	Description of Change	Prepared By	Approved	Code	Change No.	Change Date	Description of Change	Prepared By	Approved

Preparer's Overall Evaluation	Overall Eval. Of Control Points	Comprehensive Eval.

QA Dept.			Prod. Engineering Dept.			Mfg. Dept.			Registration
Approved	Checked	Prepared	Approved	Checked	Prepared	Approved	Checked	Prepared	___/___/___
									Registration No.

Work Standards Sheet | **8 • 1** | **5 - 20**

Work Standards Sheet

Process Sequence	Process Name	Machine Name	Machine No.	Material	Dwg. Method
					3rd Angle Projection

Line Name	Tact Time

Work Procedures

No.	Major Work	Time (sec.)	Precautions, Other
	Total		

Setup

No.	Replacement Time	Work Contents

Machining Oil

Name	Type	Replacement Time	Replacement Period

Jig/Tool

Location	Jig or Tool No.	Jig or Tool Name	Feed	Notch	RPM	Replacement Time	Replacement Period	Remarks

Inspection Item

Location	Inspection Item	Inspection Value	Inspection Tool	Inspection Standard			Remarks

Lubricant

Lubricant Name	Fill Location	Fill Time

∇	Change Seq.	Change Notice No.	Change Entry Date	Change Entered By:	Inspection Dwg.	Desc. Of Change
∇						
∇						
∇						
∇						
∇						
∇						

Eng. Dept., Prod. Eng. Section	Gen. Mgr.	Mgr.	Subsection Mgr.	Insp. Dwg.	Mfg.	
						___/___/___

5th DR Checksheet (Production Preparation)

Product Name			DR Member's Dept.: Name:						
No.	**DR Item**	**Check Point**	**Evaluation (5 Levels)**						**Opinion**
1	Evaluation of development progress	Reflection of items pointed out in 4th DR	5 Countermeasure completed.	4	3	2	1 Not yet		
2	Identification of production problems	Solution of problems during production trial	5 Improved	4	3	2	1 Not yet		
		Problems in processing, procurement, assembly	5 Solved	4	3	2	1 Difficult		
		Evaluation of production process drawings.	5 Complete	4	3	2	1 Not yet		
3	Evaluation of trial production quality	Evaluation of process capability	5 Adequate	4	3	2	1 Out-of-spec.		
		Evaluatuin of reliability of improved areas	5 Achieved	4	3	2	1 Difficult		
		Evaluation of inspection items and methods	5 Adequate	4	3	2	1 Unrevisable		
		Eval. of quality assurance items	5 Adequate	4	3	2	1 Unrevisable		
		Evaluation. of problems during switch to mass production	5 No prob.	4	3	2	1 Mass prod. is impossible.		
4.	Evaluation of maintenance and safety	Level of completeness of service diagrams	5 Adequate	4	3	2	1 Incomplete		
		Manuals	5 Adequate	4	3	2	1 Incomplete		
5.	Evaluation of business ability	Outlook on target cost achievement	Adequate 100%		Possible 95%		Impossible ≤ 80%		
		Outlook on profit Cost ratio in 3 yrs	Adequate ≤85		So-so 90-95		Impossible 100+		
		Outlook on sales price	Agree with customer		Agree in-house		Big diff. with customer		
6.	Evaluation of equipment investment plan	Preparation of production equipment	5 In place & tested.	4	3 In place	2	1 Not yet.		
Overall Judgment		Proceed to next step	OK		OK with conditions		Not OK		

Diagnosis Checksheet

Date of Diagnosis___/___/___
Diagnosed By_____

At stage when production preparation is complete.
Product: Common

Points Diagnosed: Based on production trials, production preparation and process evaluations have been done, and Q, C, D targets for mass production process methods have been met.

Theme Name:_____

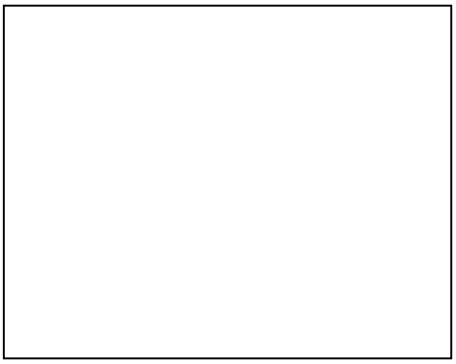
Development Department Name:_____

Results of Diagnosis (Please circle the appropriate answer. Circle the middle answer if neither extreme fits).

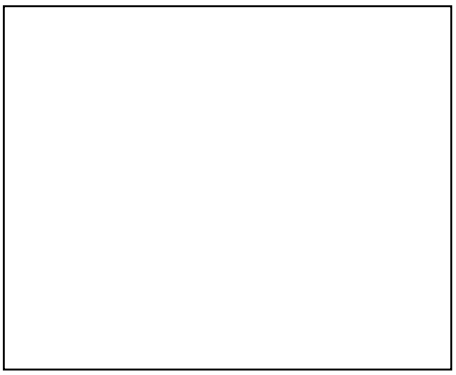
	Evaluation Item	5	4	3	2	1	Evaluation Comments
1	Determination of production specifications	All decided.		Possible with artial eng. changes. (No quality prob.)		Quality problems. Studying.	
2	Achievement of performance and reliability (rate of achievement)	Achieved (100%)		Possible (≥95%)		Difficult (≤90%)	
3	Achievement of critical [bottleneck] technology (rate of achievement)	Achieved (100%)		Possible (≥95%)		Difficult (≤90%)	
4	Achievement of target cost, estimated value (rate of achievement)	Achieved (100%)		Possible (≥95%)		Difficult (≤90%)	
5	Outlook on earnings (cost ratio within 3 years)	Achieved (≤85%)		Possible (90-95%)		Difficult (100%+)	
6	Outlook on sales price	Agreement with customer		Agreement in-house		Big gap from desired customer	
7	Production process preparation (including standards)	Complete		Partial. To be done by SOP.		Not completed.	
8	Production equipment preparation	In place & tested.		In place Partial test. Done by SOP.		Major equip. Not yet in place.	
9	Establishment of process assurance (comprehensive evaluation on quality assurance system charts)	Established. (100%)		Possible. (90-95%)		Processes with unstable quality. (Studying countermeasures)	

Overall Judgment and Comments

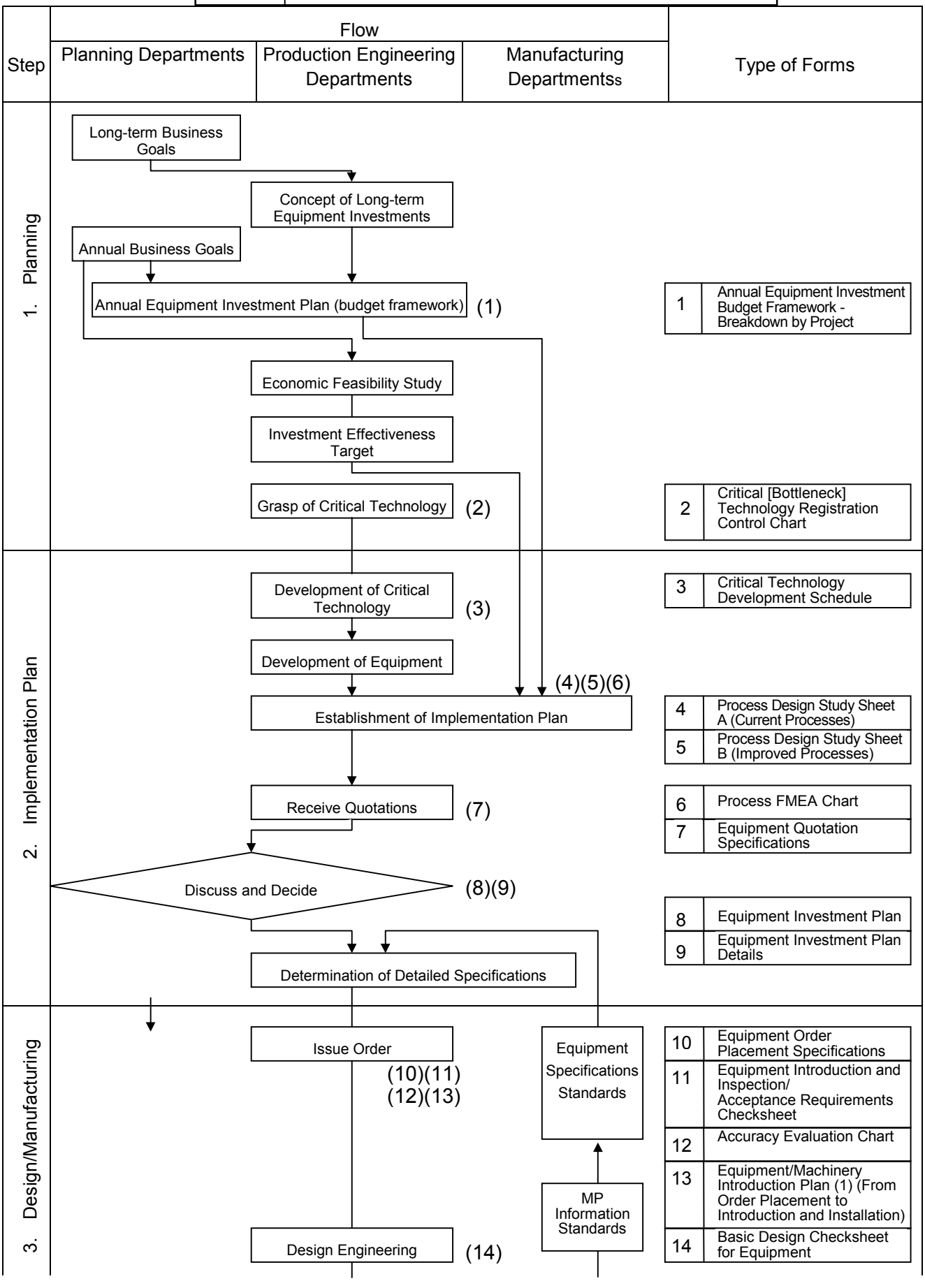
Proceed to next step (production design): OK Not OK



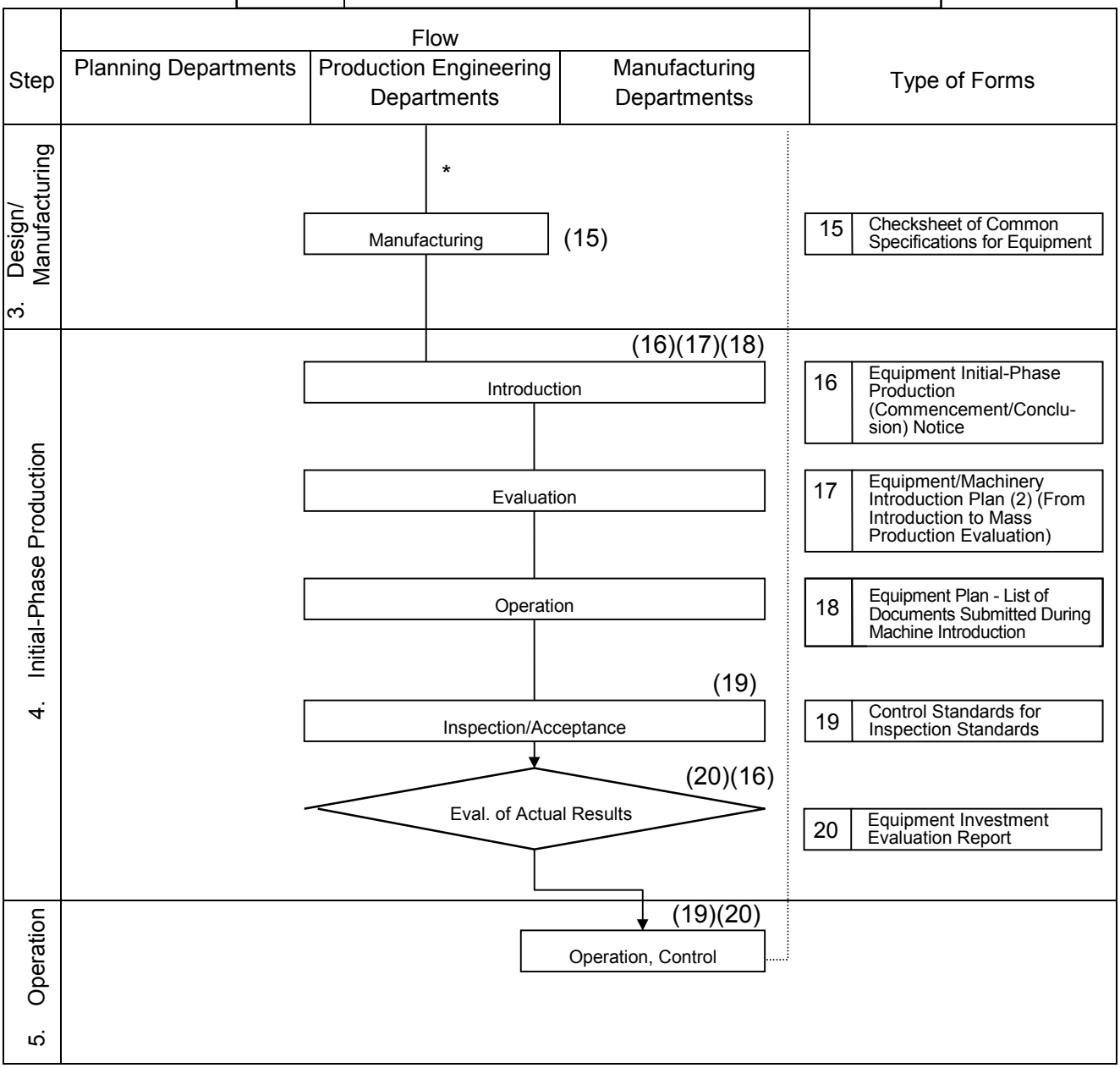
8·2 Initial-Phase Equipment Control



8·2 Initial-Phase Equipment Control



8·2 Initial-Phase Equipment Control



__ Year (Period) Equipment Investment Budget Framework - Breakdown by Project

___/___/___

Operations Dept. ☐ Page

Per Product	Per Budget Framework *1	Per Motivation *2	Project Name No.	Budget Framework Mil. Y (¥10,000)	Earmarked Funds				Investment Summary · Major Equip.	Investment Effectiveness Target	Date:_/_/_ Decision Planned	Strategy Category
					/1st Half	/2nd Half	/1st Half	/2nd Half		Production capacity, manpower reduction, improved quality, in-process work reduction, time savings, expense reduction, other		

[*1: Guidelines for filling out "Per Budget Framework" column] Budget Framework Categories: A: production equipment, B: TPM, C: R&D, D: CIM, E: Retrofitting, F: engineering division, G: quality control department, H: general affairs department, I: global environment, J: safety environment, K: workplace environment, L: buildings

[*2: Guidelines for filling out "Per Motivation" column] Motivation Categories: 0: TPM, 1: increased production, 2: new/changed specifications, 3: rationalization, 4: quality improvements, 5: R&D, 6: in-house manufacture, 7: renovation, 8: special investment, 9: other, 10: buildings

Annual Equipment Investment Budget Framework - Breakdown by Project

8・2

1 - 1

Critical [Bottleneck] Technology Registration Control Chart

Date Prepared: _____

Preparing Dept. _____

Approved By:	Checked By:	Prepared By:

Project Name:	Product, Part, or Line Name	Planned SOP:

No.	Critical [Bottleneck] Items (per part, or line)	Relevant Fields	Content	Difficulty Rank	Effect		Registration Date	Dept. in Charge	Deadline	Remarks
					Quality	Cost				

[Entry Guidelines]

1. Relevant Field

(1) Processing accuracy and configuration (2) New materials (3) Heat treatment
(4) Cleaning, surface treatment (5) Bonding technology (6) Measurement technology
(7) Sealing method (8) Equipment essentials (9) Other

2. Difficulty Rank

S: Hard-to-develop technology
A: Undeveloped technology
B: Not-yet-applied technology

3. Effect

Enter a circle in whichever has the greater effect, cost or quality.

Critical [Bottleneck] Technology Development Schedule

Date Prepared _____

Preparing Dept. _____

Approved By:	Checked By:	Prepared By:

Project Name:	Product, Part, or Line Name:	Planned SOP:

No.	Critical [Bottleneck] Items	Item to be Studied	Development Schedule	Department in Charge	Evaluation	Remarks

[Entry Guidelines]

1. Reporting Periods:

First Time: when functions have been developed

Second Time: when mass production specifications have been determined

Process Design Study Sheet A
Current Processes

Line Name

Asst. Dept. Mgr.	Section Mgr.	GL	In Charge

Document No. _____

Date Prepared _____

Formal Organization Name. _____

(1) Process Seq.		
(2) Process Name		
(3) Machine Name		
(4) Manufacturer Name		
(5) Process Method		
(6) Required Quality		
(7) Process Diagram		
(8) Type of Problem		
(9) Defect Status		
(10) Cp Value		
(11) Explanation of Problem Phenomenon/Cause Analysis		
Entry Guidelines	[1] Fill in everything if different manufacturer's machines are present in the same process. [2] Fill in from subcontracted processes, and the process sequence decided by the subcontractot. [3] Fill in the alphabet code shown at right for section (8) problem type.	Problem: (a) Machine (b) Fixture (c) Tool (d) Cutting (grinding) oil (e) Measurement apparatus (f) Inspection tool (g) Process standards (h) Clamp method (i) Locator (j) Establishment of process conditions (k) Maintenance, administration (l) Prior process accuracy (m) Prior process status (burrs, chips) (n) Loading, conveyance (o) Machine breakdown (p) Minor stoppage (q) Defect losses (r) Startup and yield losses (s) Setup changeover adjustement losses (t) speed losses (u) C/T deviation

Process Design Study Sheet A (Current Processes)

8・2

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Process Design Study Sheet B
Improved Process

Line Name

Asst. Dept. Mgr.	Section Mgr.	GL	In Charge

Document No. _____

Date Prepared _____

Preparing Dept. _____

(1) Process	
(2) Process Name	
(3) Machine Name	
(4) Manufacturer Name	
(5) Process Method	
(6) Required Quality	
(7) Process Diagram	
(8) Explanation of Improvement Measures Proposed Countermeasure Effect	
(9) Equipment Investment Contents	
Entry Guidelines	[1] In section (1), Process Sequence, mark a star (*) above processes which have been improved or added in relation to current processes.

Process Design Study Sheet B (Improved Process)

8・2

2 - 5

Product Name: _____

Line Name: _____

Process Name: _____

Process FMEA Chart

Date: _____

Prepared By: _____

Dept. and Section Name: _____

Process No.	Process Name	Function	Defect Mode	Presumed Cause	Effect of Defect		Preventative Measure	Defect Mode Class	Treatment (proposed)
					Effect on Later Processes	Effect on Product			

Equipment Quotation Specifications

Document No.	

Date Prepared:	Asst. Dept. Mgr.	Section Mgr.	GL	In Charge
Formal Name:				

Equipment Name		Qty.__	machines					
Equipment Location	Building		Floor		Line Name		Process Name	
Intro. Schedule	Quotation Deadline		Planned Order Date		Planned Introduction Date			
Relevant Work	Processed Part Name				Process Reference Dwg. No.			
	Type		Lot		Prior Process Reference Dwg. No.			
Equipment Specs.	C/T (incl. dress.)	sec.	Operating Rate	%	Operating Time/Mo.	h	Equip. Capacity/Mo.	___machines ___units
	Changeover Conditions							
	Equip. Dimensions	L (length) mm	W (width) mm		H (height) mm		Work Insertion Height mm	Work Extraction Height mm
Summary of Equipment								
Quotation Items Project Scope								
Work Flow	Direction		Attachment Method		Removal Method			
Required Quality								
Spare Parts								
Special Comments								
Equipment Regulations	Machine Equipment Paint Color							
	Plant Equipment Regulations							

Equipment Investment Plan

Prepared ___/___/___

Operations Dept.:_____ Dept.:_____

Sect. (G):_____

Div. Mgr.	Dept. Mgr	Sect. Mgr.	GL	In Charge

Year Framework Name		Year Frame. No.	
This Plan Name		No. of Units Planned	

Budget	Budget for Plan (¥ mil.)	Working Budget (¥ mil.)	Equip. Location				
			Control Team	Expense Team		Line Team	

Motivation Category	0 TPM	1 Prod. Increase	2 New or Changed Specs.	3 Rationalization	4 Improved Qual.	5 R&D	6 In-house Mfg.	7 Renovation	8 Special Invest.	9 Other	10 Building

In-house/ Outsourced Mfg. Categoory			Qty.	¥ Amount	Planned Order Placement		Planned In-Stock		Planned Project Completion Date:_/_/_
	1	In-house							
	2	Outsourced (Domestic)			Date:_/_/_	¥ Amount	Date:_/_/_	¥ Amount	
	3	Outsourced (Imported)							

1. Background Explanation and Purpose

2. Contents of Plan

Safety Check (during equipment planning)	Registration with Govt.	Qualified Personnel	Pollutants	Special Explanation about Equipment Specs.
	Req. • Not Req.	Req. • Not Req.	Present/Absent	Present ( ) • Absent

(Suspended • Reallocated • Discarded (partially discarded) Machinery) (Unit: Yen thousand)

Machine Name	Control No.	Acquisition Date	Acq. Cost	Book Value	Deprec. Rate	Machine Reallocation Plan No.
					%	

Attached Documents (1)_____ (2)_____ (3)_____ (4)_____

(5)_____ (6)_____ (7)_____ (8)_____

Equipment Investment Plan (continued)

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3. Targets

(To establish target values related to QCD).

Production Capacity
Personnel
Cycle Time
Man-hours
Operating Rate
Product Function
No. of Complaints
Rate of Non Thru-put
Process Capacity
Cleanliness
Lead Time
In-process
Space
etc.

Item	Current Status	After Introduction

4. Effect and Return Period

Product Life	Years
Equipment Life	Years
Sales Price	
Quantity Sold	

Return Period	
A	Less than 3 years
B	Between 3 and 5 years
C	More than 5 years
D	Strategic investment

Non-monetary Effects

5. Problems if Investment Not Made

6. Other Alternatives and Effects

7. Uncertain Factors

8. Problems, Critical [Bottleneck] Technology

Equipment Investment Plan Detail

Prepared ___/___/___			Dept. Mgr.	Sect. Mgr.	GL	In Charge
Operations Div.	Dept.	Sect. (G)				

Equipment Contents								Budget-related				Machine Operating Plans					Effect		Remarks
Machine Equipment Name	Qty.	Motiv. Categ.	In-house/ Outsource Category	Planned Order	Planned Insp./Accept.	User	Line Team Name	Year Frame No.	Equip. Plan No.	Plan Budget (Yen million)	Working Budget	Machine Cycle Time (sec.)	Machine Oper. Rate (%)	Pace Time (sec.)	Machine Capacity	Planned Oper. Time (hr./month)	Return on Investment (%)	Personnel Reduced	

Equipment Order Placement Specifications

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Equipment Plan No.		/

Equipment Order Placement Specifications

Date Prepared: Formal Name

Asst. Dept. Mgr.	Mfg.	Improved	Insp.	Prod. Eng.	Sect. Mgr.	GL	In Charge

Equipment Name		Qty.	__ machines					
Purchase From	Manufacturer Name			Trading Co. Name				
Intro. Schedule	Manufacturer Meeting Date		Introduction Date		Operating Date		Inspect/Accept-ance Date	
Relevant Work	Processed Part Name			Process Reference Dwg. No.				
	Type		Lot		Prior Process Reference Dwg. No.			
Equipment Specs.	C/T (incl. dress.)	sec.	Operating Rate	%	Operating Time/Mo.	h	Equip. Capacity/Mo.	___machines ___units
	Changeover Conditions							
	Equip. Dimensions	L (length) mm	W (width) mm	H (height) mm	Work Insertion Height mm	Work Extraction Height mm	Height of Lower Operating Panel Surface mm	
Summary of Equipment								
Project Scope								
Work Flow	Direction		Attachment Method		Removal Method			
Supply Parts (Quantity, Timing)								
Spare Parts								
Special Comments								
Equipment Regulations Agreement	Machine Equipment Paint Color							
	Plant Equipment Regulations							
Attendees	Meeting Date			Meeting Location				
Signatures	Manufacturer		Trading Company					

Equipment Introduction and Inspection/Acceptance Checksheet

Managing Dept. Production Eng. Gr

Equipment Plan No.		/

Machine Name		Processed Part Name		Process Name		Sect. Mgr.	GL	In Charge
Pre-meeting Eval. Date		Manufacturer Meeting Eval. Date		In-house Meeting Eval. Date				

No.	Evaluation Item	Evaluation Steps			Evaluation Method	Pre-meeting Evaluation Results	Check	Manufacturer Meeting Evaluation Results	Check	In-house Meeting Evaluation Results	Check	Remarks
		Pre-Mtg.Eval.	Mfg. Mtg. Eval.	In-house Mtg. Eval.								

Comments	{1} Condition for deciding whether or not to meet: pre-meeting evaluation items must be satisfied. (Done by manufacturer). {2} Condition for introduction: manufacturer meeting evaluation items must be satisfied. {3} Condition for inspection/acceptance: in-house meeting evaluation items must be satisfied.

Equipment Introduction and Inspection/Acceptance Checksheet

8・2

3 - 11

Accuracy Evaluation Chart

Equipment Plan No.		/

Managing Dept. Production Eng. Gr

Machine Name		Processed Part Name		Process Name		Sect. Mgr.	GL	In Charge
Pre-meeting Eval. Date		Manufacturer Meeting Eval. Date		In-house Meeting Eval. Date				

Location No.	Evaluation Item	Standard Value	Guarantee		Pre-meeting				Manufacturer Meeting				In-house Meeting				Measurement Device Used
			Cp	Total Qty.	Eval. Qty.	Sampling Method	Results	Check	Eval. Qty.	Sampling Method	Results	Check	Eval. Qty.	Sampling Method	Results	Check	Manufacturer
Comments																	

Sampling No.	Sampling Method	Sampling No.	Sampling Method	Process Reference Dwg. No.
A		A		
B		B		
C		C		

Equipment/Machinery Introduction Plan (1)

STEP 3 (From Order Placement to Introduction and Installation)

Document No.			
Asst. Dept. Mgr.	Section Mgr.	GL	In Charge

Date Prepared ___/___/___

Dept. Name _____

Equipment Name	Year Framework No.	Line Name		Entry Items	1 Introduction Schedule	2 Meeting Schedule	3 T/P Release Schedule	4 Jig/Tool Release Schedule
Control No.	Equipment Plan No.	Manufacturer Name	Qty.		5 Gage Release Schedule	6 Spare Part Release Schedule	7 Document Release Schedule	8 Activity Plan

Critical Implementation Items	Achievement Level	Activity Item		Schedule	Remarks Shared Responsibility Depts.

Distribution	Mfg. Section___	Operations Improvement	Inspection Sect.	Equipment Sect.	Manufacturer	Trading Company	

Equipment/Machinery Introduction Plan (1)
(From Order Placement to Introduction and Installation)

8 • 2

3 - 13

Basic Design Checksheet for Equipment

8 • 2	3 - 14

Production Section			Equipment Section	
Sect. Mgr.	GL	In Charge	Manager	In Charge

Basic Design Checksheet for Equipment

Equipment Name		Production Dept.	

Category	Item	No.	Contents of Check	Engineer	Dwg. Checker	Approval	Remarks
Assembly Drawing (Concept Drawing)	Reliability	1	Are measures for strength, vibration, and chatter adequate?				
		2	Are there adequate wear countermeasures for reference [datum] surfaces and reference pins?				
		3	Is rust prevention adequate?				
		4	Are there adequate countermeasures for chip intrusion in sliding areas, etc.?				
		5	Are there any variations in process or installation accuracy due to hydraulic or air pressure fluctuation?				
		6	Are there adequate quality measures for seat sensors, etc.?				
		7	Have cooling countermeasures been implemented for heat-generating areas?				
		8	Have measures been taken to prevent unprocessed or defective parts from getting mixed in?				
		9	Do sensors have a guaranteed temperature range?				
			Check whether or not MP information (reliability) is checked/compared.				
	Productivity	1	Are there countermeasures for minor stoppage? Have considerations been made to simplify return to normal status?				
		2	Are defective parts automatically ejected?				
		3	Is set-up "external" set up or single during machine operation?				
			Check whether or not MP information (productivity) is checked/compared.				
	Cost Effectiveness	1	Equipment should not be over-mechanized, too high performance, or have excessive functions.				
		2	Are commercially available products used as much as possible?				
		3	Are the replacement periods and life of oils and consumables indicated?				
		4	Are there adequate countermeasures for air and oil leakage?				
		5	Is current consumption kept to a minimum?				
			Check whether or not MP information (cost effectiveness) is checked/compared.				
	Flexibility	1	Can equipment be used when new types are added?				
		2	Is unit modification easy?				
		3	Is it possible to add equipment such as loaders later?				
			Check whether or not MP information (flexibility) is checked/compared.				

Equipment Common Specifications Checksheet

Item	a	Specifications	b	Check Columns					h
				c	d	e	f	g	
Wiring	7-1	Cables, flexible hose, etc. should be fixed with saddles.		○	○	○	○	○	
	7-2	A specified amount of spare wire and spare terminals should be attached.		○	○	○	○	○	
	7-3	Wiring should be protected by flexible hose, cable bearer, etc.		○	○	○	○	○	
	7-4	Ground line should be securely attached and connection should be made properly.		○	○	○	○	○	
	7-5	Wiring of moveable parts should not contact anything, and should have minimum margin.		○	○	○	○	○	
	7-6	2 or more wires should not be crimped inside a 1 crimp-type terminal.		○	○	○	○	○	
	7-7	Terminal No. should be affixed to terminal block. Terminal blocks should not be stacked (but zig-zag type terminals can be stacked).		○	○	○	○	○	
	7-8	Wiring should not be attached to the floor so that the floor can be cleaned.		○	○	○	○	○	
	7-9	Protect the parts which come in contact with chips, heat-generating materials, and machining fluid.		○	○	○	○	○	
	7-10	For wiring to moveable parts, establish a terminal box and route wiring through it.		○	○	○	○	○	
	7-11	Wiring must be stored in duct which has openable cover. Wiring ducts and piping (fluid) ducts must be separated.		○	○	○	○	○	
Basic Circuits	8-1	By emergency stop, operations should be completely stopped, and it should be easy to resume operations.		○	○	○	○	○	
	8-2	Equipment should not be operated via manual buttons during automatic operation.		○	○	○	○	○	
	8-3	Electrical specification standards should be strictly followed.		○	○	○	○	○	
	8-4	When the machine is stopped, the detector should detect stoppage, and the machine should not automatically resume operations.		○	○	○	○	○	
	8-5	Clamps should operate properly and be safe at all times.		○	○	○	○	○	
	8-6	Robot safety standards should be strictly followed.		○	○	○	○	○	
	8-7	A machine cycle monitor timer should be installed.		○	○	○	○	○	
	8-8	Counters should be installed for required parts (tool life, quality check, production quantity, no. of dressing cycles, etc.)		○	○	○	○	○	
	8-9	A (three-colored) signal lamp should be installed for operation status indication.		○	○	○	○	○	
Safety	9-1	A caution sign should be posted if parts stick out during operations.		○	○	○	○	○	
	9-2	The structure should be designed so that operators do not have to assume unnatural postures during operations.		○	○	○	○	○	
	9-3	The structure should be designed so that hands and fingers will not be caught in clamps or moveable drive parts.		○	○	○	○	○	
	9-4	The cut end of binding bands should be cut perpendicular to base.		○	○	○	○	○	
	9-5	Stoppers should be attached to cranes and hoists.		○	○	○	○	○	
	9-6	Necessary interlocks should always be attached (single, automatic).		○	○	○	○	○	
	9-7	The generation of harmful materials such as noise, mist, and dust should be prevented.		○	○	○	○	○	
	9-8	A fire prevention function should be installed where fire and heat are generated. 1) Fire prevention dampers should be installed at exhaust ducts. 2) Fire extinguishers should be installed on mechanical equipment.		○	○	○	○	○	
	9-9	Measures to prevent hoists from dropping should be taken.		○	○	○	○	○	

a. Classification No.
b. Relevant Item Category
c. Mfg. Self
d. Interim Meeting
e. Final Meeting
f. Equip. Intro. Meeting
g. Insp./Accept. Meeting
h. Remarks

Equipment Control Notice of Initial Mass Production Phrase

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Equipment Control Notice of Initial Mass Production Phrase

Initial-phase Mass Production No.	

This is to inform you that initial-phase production control of the following equipment has
COMMENCED CONCLUDED (circle one).

Equipment Plan No.						
	Asst. Dept. Mgr.	Mfg.	Improvement	Inspection	Prod. Eng.	Draft
Start						
Finish						

Equipment Plan No.	Equipment Name	Control No.	Purpose of Intro.
Manufacturer	Quantity	Model Name	Part Number
Line Name	Process Name	Intro. Date: Planned / Actual	Operating Part: Planned / Actual

Newness		Development Factorss	
1	New product, new part	A	Equipment which includes development factors
2	New equipment, new line, rationalized equipment	B	Multiple process line (Transfer Machine, assembly)
3	Change of manufacturing location (in-house, affiliates)	C	Important task (product function, quality, safety, cost)
		D	No development factors (fully copied machines, multiple work machines)

Initial-phase Mass Production Control Item		Item	Target Value	Actual Value	Remarks
	1	Process defects, non thru-put rate			
	2	Process capacity Cp of major characteristics			
	3	Equipment capacity			
	4	Overall equipment efficiency			
	5	Amount of reduction in base cost			
	6	Number of equipment changes (number of improvements)			
Initial-phase Mass Production Period		Commencement Date	___/___/___	___/___/___	
		Conclusion Date	___/___/___	___/___/___	
		Period	months	months	

Promoting Organization				
Team Leader		Inspection		
Production Engineering		Machine Tools (manufacturer)		
Operation Improvement		Maintenance		
Manufacturing		Design Engineering, Other		

Implementation Plan	Implementation Items (STEP)	Schedule (Plan/Actual)
	Equipment prototype evaluation {1} (from order placement to introduction)	
	Equipment prototype evaluation {2} (from introduction to operation)	
	Trial production evaluation (from operation to mass production launch)	
	Mass production evaluation (from launch to stable operation)	

Equipment/Machinery Introduction Plan (2)

STEP 4 (From Introduction to Mass Production Evaluation)

Document No.			
Asst. Dept. Mgr.	Sect. Mgr.	GL	In Charge

Date Prepared ___/___/___

Dept. Name

Equipment Name	Year Framework No.	Line Name		Entry	1 Remaining plan from previous STEP	2 Equipment evaluation	3 Quality evaluation	4 Document related
Control No.	Equipment Plan No.	Manufacturer Name	Qty.	Items	5 Spare jig/tool parts	6 SOP evaluation meeting	7 Trial production evaluation	8 Inspection/ acceptance mass production evaluation

Critical Implementation Items	Achievement Level	Activity	Schedule	Remarks Shared Responsibility Depts.

Distribution	Mfg. Section___	Operations Improvement	Inspection Sect.	Equipment Sect.	Manufacturer	Trading Company	

Equipment/Machinery Introduction Plan (2)
(From Order Placement to Introduction and Installation)

8 • 2

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Equipment Plan — List of Documents Submitted During Machine Introduction

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Equipment Plan — List of Documents Submitted During Machine Introduction

___/___/___

Company Name	

Equipment Plan No.	Equipment Name	Equipment No.	Div.
		Manufacturing No.	Dept.
		Control No.	Gr.

No.	Document Name	Contents	Check Column	Specified Form No.	Remarks
1	Processing Conditions Sheet				
2	Basic Conditions Sheet				
3	List of Information per Machine				
4	Users Manual				
5	Summary Explanation of Equipment	• Structure •Process principles • Layout • Mechanism diagrams (explanatory diagrams)			
6	Operating Procedures	With sketches			
7	Setup and Adjustment Procedures	For operators			
8	Daily Inspection Guidelines				
9	Inspection, Repair, and Maintenance Guidelines	For machine maintenance personnel			
10	Electrical Circuit Diagram	Based on electrical equipment standards			
11	Hydraulic, Vacuum Lubrication Circuit Diagram				
12	Lubrication Standards	Should be indicated on drawings of lubrication refill location			
13	Static Accuracy Inspection Score Sheet				Also acceptable to use a score sheet created by the manufacturer.
14	Expendable Parts Drawing				
15	Jig Drawing				
16	Tool Drawing				If new (3 months prior to meeting with manufacturer)

Note) {1} Check Column O = document exists X = document does not exist

Control Standards for Inspection Standards

Operations Dept. Dept. G

Document No.	

Drawing Name	
Drawing No.	
Standard Drawing No.	

Prepared ___/___/___

Asst. Dept. Mgr.	Sect. Mgr.	GL	In Charge

1. Drawing Standards

3. Interpretation of Standards

2. Inspection Standards {1} Standard Value {2} Measurement Method {3} Measurement Location {4} Measurement Scope

4. Establishment of Measurement Device Conditions {1} Measurement device used {2} Setup of conditions (probes, magnification, operating conditions, etc.)

	Type of Measurement Device	Manufacturer	Model	Establishment of Conditions	Remarks

Remarks

Plan Approval							Draft		Distribution
Approval	Approval	In Charge	Approval	In Charge	Approval	In Charge	Approval	Prepared By	

Control Standards for Inspection Standards

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Product Name	Line Name

Equipment Investment Evaluation Report (Per Line)

Operations Dept..

Dept.

Gr.

Div. Mgr.	Dept. Mgr.	GL	In Charge

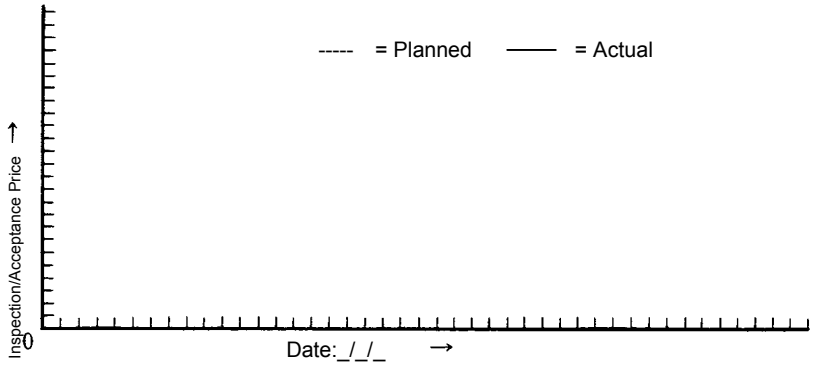
Investment Plan

No.	Year Framework No.	Project Name	Motivation Category	Working Budget	Mo./Yr. of Decision	Inspection/Acceptance Plan

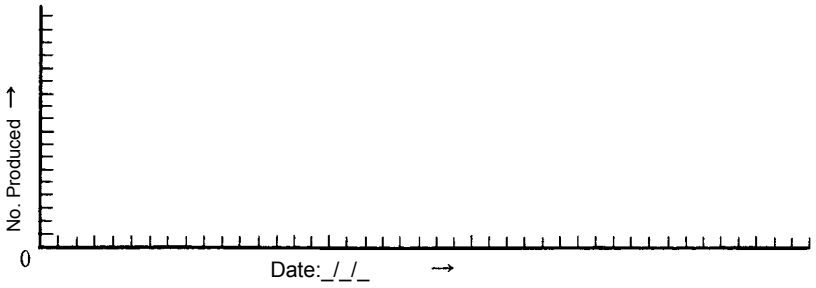
Critical Control Items

Item	Unit	Current Value	Planned Value	Actual Value	Difference	Remarks
Production Capacity	units/month (value)					
Per Unit Man-hours	sec., min., hr./piece					
Rate of Non Thru-put	%					
Overall Equipment Efficiency	%					

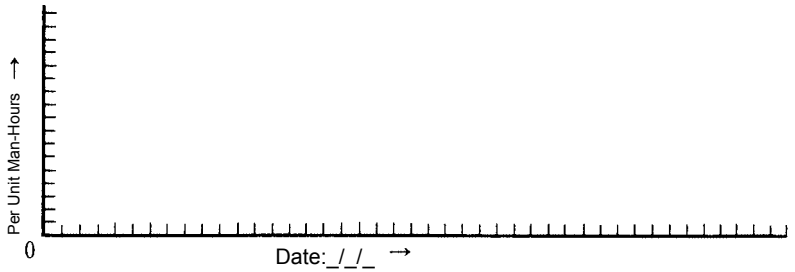
Equipment Progress Status



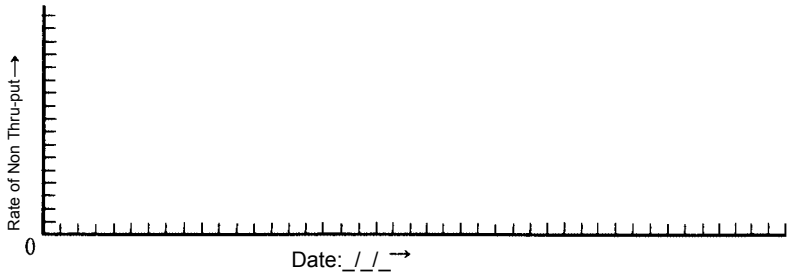
No. Produced and Production Capacity



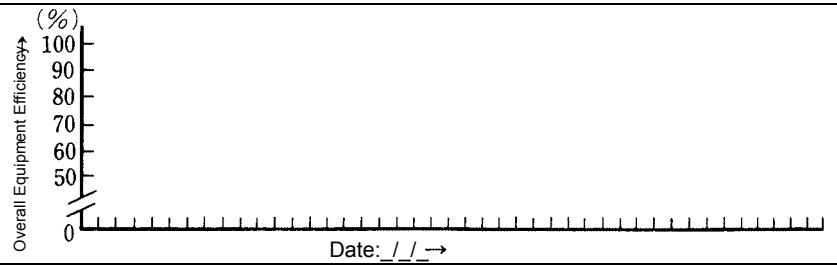
Per Unit Man-Hours



Rate of Non Thru-put



Overall Equipment Efficiency



Problems · Tasks

Equipment Investment Evaluation Report

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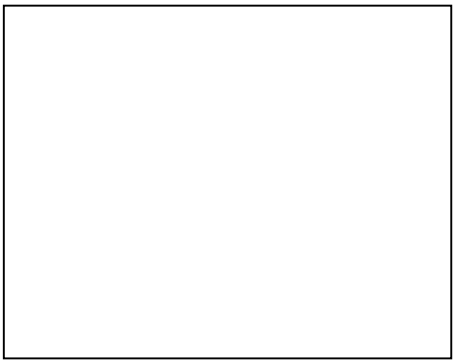
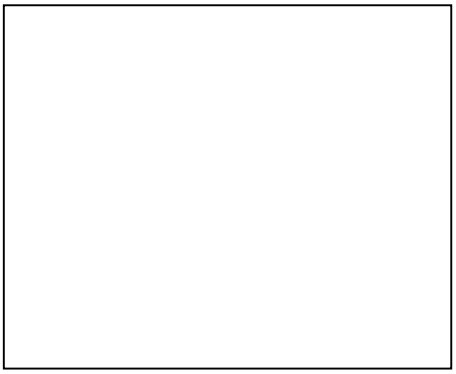


9. Hinshitsu Hozen (Quality Maintenance)



9 Quality Maintenance

Development of the 10 Steps of Quality Maintenance

1 Step 1:
Confirmation of the Actual Condition

- Confirmation of Quality Standards / Quality Characteristics (1)-(5)
  - 1 QC Process Diagram
  - 2 Process Capability Investigation Chart
  - 3 Process Capability Map
  - 4 Scatter Diagram
  - 5 x - R Control Diagram
- Quality Defect Status and Phenomenon per Investigation Level (6)(7)
  - 1) Understanding the conditions under which quality defects arise
  - 2) Defect phenomenon according to level
  - 6 Defect Phenomenon Checksheet
  - 7 Pareto Diagram
- Confirmation of Equipment Mechanisms, Functions, and Processing Principles and Sequences (8)(9)
  - 8 Mechanism/Function Diagram
  - 9 Work Standards Sheet

[To Step 2]

9	Quality Maintenance

Development of the 10 Steps of Quality Maintenance

2 Step 2:
Investigation of Processes in which Defects Occur

Related Investigation of Single Processes and Defect Modes (10)

10	QA Matrix

3 Step 3:
Survey and Analysis of 4M Conditions

Survey and Analysis of 4M Conditions (11)

11	4M Conditions Survey Chart

4 Step 4:
Problem Countermeasure Study and Restoration

Confirmation and Restoration of Epuipment Conditions

1) Study of countermeasures for items whose causes are clear
2) Establishment of countermeasure plans
3) Implementation of countermeasures
4) Confirmation of effects

[To Step 5]

Development of the 10 Steps of Quality Maintenance

5 Step 5:
Analysis of Items With Unconfirmed Conditions for Becoming Acceptable-Level Parts

Organization of Defect Causes

1) Clarification of defect causes
2) Defect causes by level
3) Selection of PM analysis items (prioritization)

(12)(13)(14)(15)

Implementation of PM Analysis

(16)

Establishment of Ideal Conditions and Optimization of Process Conditions and Set-up Methods

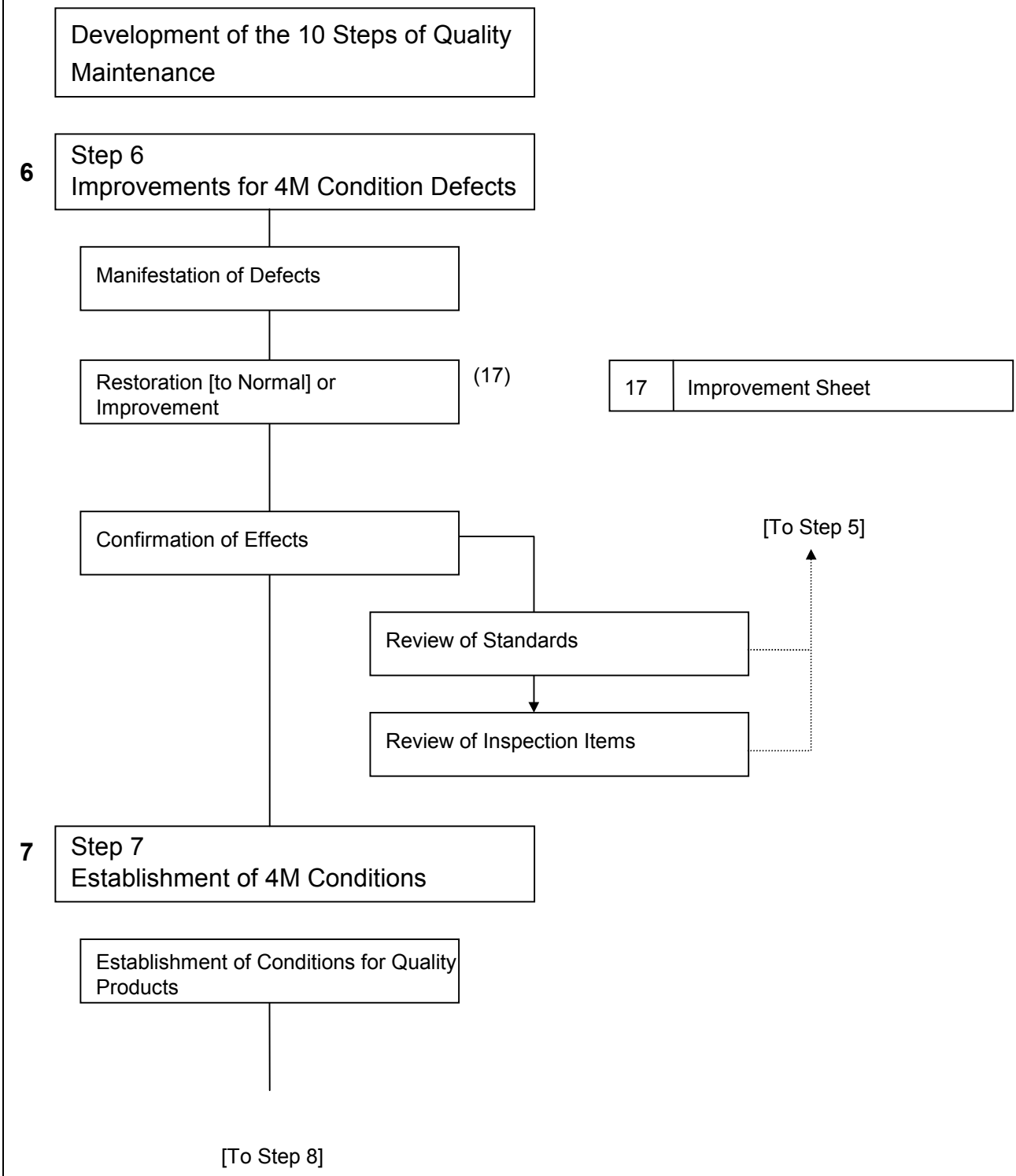
[To Step 6]

[Step 6]

Review of Standards

Review of Inspection Items

12	Defect Cause Analysis Table
13	"Why-Why" Analysis Sheet
14	Process Point Analysis Chart
15	Component Part Function Analysis Sheet
16	PM Analysis Sheet


Development of the 10 Steps of Quality Maintenance
6
Step 6
Improvements for 4M Condition Defects
Manifestation of Defects
Restoration [to Normal] or Improvement
(17)
17
Improvement Sheet
Confirmation of Effects
[To Step 5]
Review of Standards
Review of Inspection Items
7
Step 7
Establishment of 4M Conditions
Establishment of Conditions for Quality Products
[To Step 8]

9 Quality Maintenance

Development of the 10 Steps of Quality Maintenance

8 Step 8
Streamlining and Improvement of Inspection Items

Categorization, Streamlining, and Improvement of Inspection Items (18)(19)

[Step 10]

Review of Inspection Items

18	Implementation Flow Chart for Streamlining Inspection Items
19	Example of Streamlining

9 Step 9
Determination of Standard Values for Inspections

Determination of Standard Values for Inspections

[Step 10]

Review of Standards

Creation of Quality Maintenance Matrix (20)(21)

20	Quality Maintenance Matrix
21	X-type M-Q Matrix

Improving Inspection Reliability, Simplification of Inspections, and Labor Savings (22)

22	Measurement Device Inspection Results

{1} Dial gauges
{2} Calipers
{3} Micrometers

Reflection of Improvements in Inspection Standards and Establishment of Formal Standards

[To Step 8]

9	Quality Maintenance

Development of the 10 Steps of Quality Maintenance

10 Step 10
Revision of Standards

Reflection of Revisions in Standards and Establishment of Formal Standards (23)

23	Autonomous Maintenance Standards

Indication of Q Components (24)

24	Example of Q Component Indication

Confirmation of Trend Control and Results

1] Maintenance of “zero defects”
2] Establishment of high quality workplace

[To Step 9] ◄ Review of Standards

[To Step 8] ◄ Review of Inspection Items

No.		Page	

QC Process Diagram	Product Model		Date Prepared	Version	Department Manager	Chief Engineer	In Charge

Process No.	Process Name	Machines/ equipment	Control Items	Control Level	Control Method					Measurement Tool	Record		Remarks
					Initial piece		Periodic				In Charge	Method	
					Sampling method/sampling quantity	Measured by: /Manager:	Interval	Sampling method/sampling quantity	Measured by: /Manager:				

Symbol	___/___/___	Revised Items	In Charge	Symbol	___/___/___	Revised Items	In Charge

Use the symbols below to fill in the “Measured by: / Manager:” column.

Deptmnt / Job Title	Manufacturing Department	Inspection Department
Supervisor		
Operator		
Assistant to Section Manager		

QC Process Diagram

9

1 - 1 - (1)

New QC Process Diagram

Machine Model

Name of Overall Process

Date Prepared ___/___/___

Approved By:	Checked By:	Prepared By:

Process Route	Indication of Specifications/Drawings		Control Level	Related	M-Q Control Standard			Measurement Tool	Period	Shared Responsibility	Factors	Results	Control Method
	Quality Characteristics	Specification Standards			Q Component (location)	Item	Control Standard						

Process Capability Investigation Chart	9	1 - 2

Process Capability Calculation Chart

Date of investigation: ___/___/___ Drawing number Measurement point

Standard value Product name Operator

Machine number Machine name

Grade	Boundary Value	Central Value	Check	*fi*	*Ui*	*fi·Ui*	$fi \cdot Ui^2$
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
	*h*①			*Σf*②		*Σfi·Ui*③	$\Sigma fi \cdot Ui^2$④

Calculations

Average value (x bar) = $\boxed{※} + \frac{\boxed{③}}{\boxed{②}} \times \boxed{①} =$

Standard deviation (S) = $\boxed{①} \times \sqrt{\frac{\boxed{④} - \frac{(\boxed{③})^2}{\boxed{②}}}{(\boxed{②} - 1)}} =$

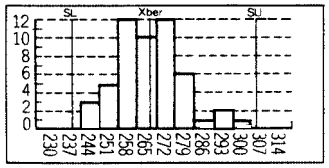
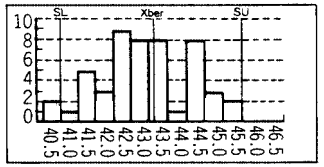
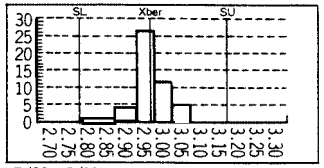
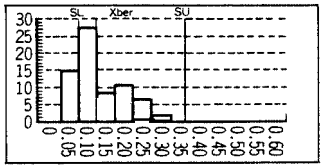
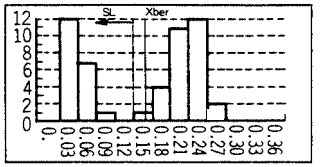
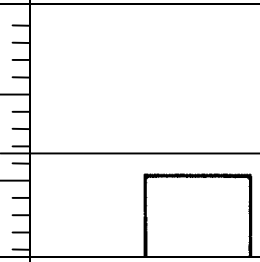
Process capability index (Cp) = $(Cp) = \frac{\boxed{\text{Tolerance}}}{6 \times \boxed{S}} =$

(Evaluation)

Grade 1:	1.33 ≤ Cp
Grade 2:	1.00 ≤ Cp < 1.33
Grade 3:	0.67 ≤ Cp < 1.00
Grade 4:	Cp < 0.67

Process Capability Map

Required Quality: Off spring or no spring

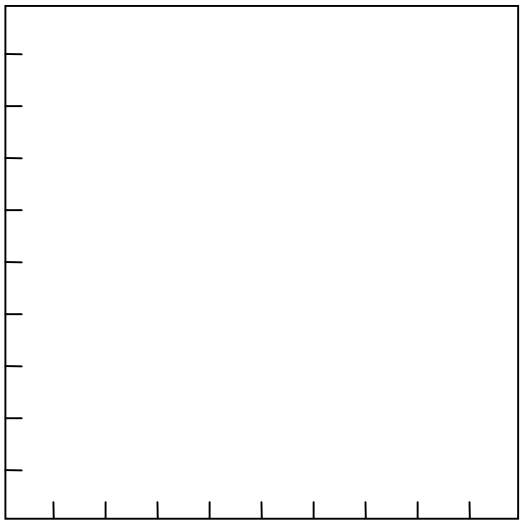
Process (overall assembly)	Spring Process				
Important Characteristics of Parts	Spring annealing hardness	Spring annealing length	Position of spring slot	Spring slot eccentricity	Spring flash
Degree of Effect	A	B	A	A	B
Standard	Hv ~		2		or less
Index Distribution Graph	 7/1~7/31 $\bar{x}$ = MAX = σ = MIN = Cp = n = CpK =	 7/22~7/31 $\bar{x}$ = MAX = σ = MIN = Cp = n = CpK =	 7/22~8/11 $\bar{x}$ = MAX = σ = MIN = Cp = n = CpK =	 10/20~10/29 $\bar{x}$ = MAX = σ = MIN = Cp = n = CpK =	 7/22~8/11 $\bar{x}$ = MAX = σ = MIN = Cp = n = CpK =
Cp Value (2.0 / 1.33 / 1.0)					
Evaluation	○	×	◎	× △	×
Description of Maintenance and Improvements	{1} Check measurement error: set measurement device to zero. {2} Review factor-related control standards	{1} Confirm feed roller positioning accuracy	{1} Control the accuracy of the die	{1} Improve installation of the stamping die {2} Avoid misalignment of spring during stamping {3} Improve the feed roller {4} Install spring guide Improve the feed roller (done by Mr. ____ by the end of October)	{1} Change result-related controls (methods of measurement)

Scatter Diagram

Worksite	Process	Prepared on: ___/___/___	Prepared by:	Page
Product Name	Part Name	Notes		

No	Primary Data	Secondary Data	No	Primary Data	Secondary Data	No	Primary Data	Secondary Data	No	Primary Data	Secondary Data	No	Primary Data	Secondary Data
1			21			41			61			81		
2			22			42			62			82		
3			23			43			63			83		
4			24			44			64			84		
5			25			45			65			85		
6			26			46			66			86		
7			27			47			67			87		
8			28			48			68			88		
9			29			49			69			89		
10			30			50			70			90		
11			31			51			71			91		
12			32			52			72			92		
13			33			53			73			93		
14			34			54			74			94		
15			35			55			75			95		
16			36			56			76			96		
17			37			57			77			97		
18			38			58			78			98		
19			39			59			79			99		
20			40			60			80			100		

[ ]
Secondary Data



Observations

Primary Data [ ]

$\bar{x}$ - R Control Diagram

The Month of _____

Process
Vibration Diaphragm: Line___

Control Item: Station Number
Groove thickness

Sampling

Measurement Method/ Measurement Device

Establishment of Control Limits		
5/1/93 to 5/31/93:		31 Days
$\bar{X}$	UCL	0.63
	CL	0.615
	LCL	0.6
R	UCL	0.05
	CL	0.025
Standard		0.6 - 0.68

Actions when Abnormal

Remarks

Month/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Time																															
Measurement Value X1																															
Measurement Value X2																															
Measurement Value X3																															
Measurement Value X4																															
Measurement Value X5																															
$\bar{X}$																															
R																															

$\bar{X}$: 0.63, 0.615, 0.60

R: 0.05, 0.025

Measured by:																															
Confirmed by:																															

Notes

Central Value	Frequency	
0.57		
0.58		
0.59		
0.60		
0.61		
0.62		
0.63		
0.64		
0.65		
0.66		
0.67		
0.68		
0.69		
0.70		

$\bar{X}$	
σ	
Cp	

Comments

Approved by:	Checked by:	Prepared by:

Map of Defect Phenomena Per Process (Model 1 Line)

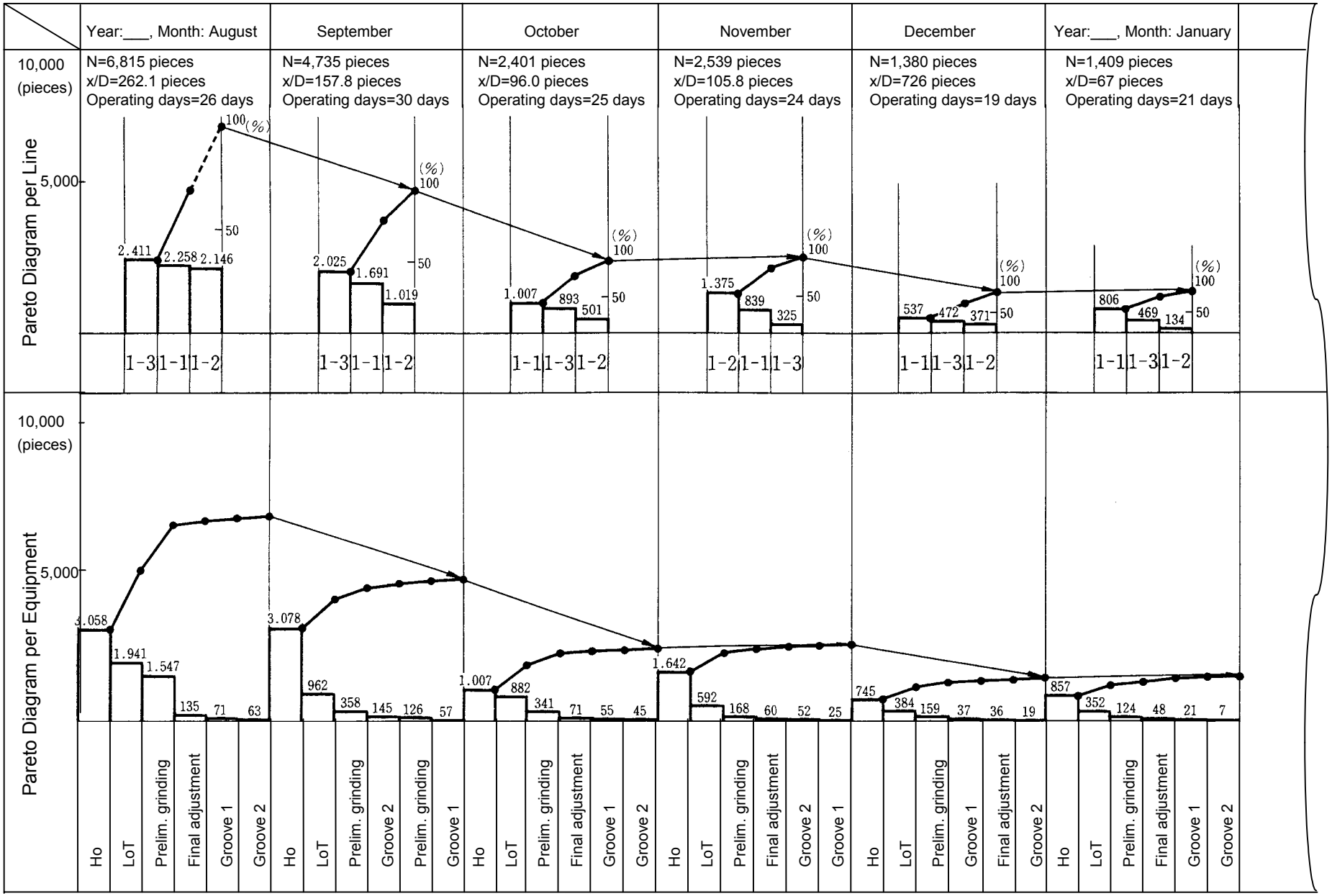
Equipment Name	BM Value (Conducted In June)					September Actuals											Tasks		
	Description of Defect	Data	Defect Rate	QA Cost		Description of Defects	Data	Defect Rate	QA Cost		Defect Phenomenon	Data	Number of Defects per Phenomenon	Rate of Detects per Phenomenon	QA Cost per Phenomenon		Description of Improvements	In Charge	Schedule
	Emission Defect	MMS	0.625 %	Emission Treatment	80216.0	Emission Defect	MMS	0.78%	Emission Treatment	85893.3						(yen)			
						14509/ 1863869					Time error	MMS - Manual Tabulation	4796	0.23%	Emissions Treatment	28416.0			
											No spring	Monitor Manual Tablulation	8832	0.47%	Emissions Treatment	52285.4	Cut #1 shaft and change shaft	○○	Make plan by end of November
											Off spring	Manual Tabulation	68	0.0036%	Emissions Treatment	402.6			
											Spring interrupted	Manual Tabulation	105	0.006%	Emissions Treatment	621.6	Install metal detection sensor		Completed
											Spring one-sided “ear”	Manual Tabulation	89	0.0048%	Emissions Treatment	5316.2	Control vertical dislocation		Completed
											Stoppage	Manual Tabulation	19	0.001%	Emissions Treatment	112.5	Optimize shape of spring ears		Completed
											Emission defect	Manual Tabulation	569	0.031%	Emissions Treatment	3368.5	Retightening unit		Completed
																	Change spring shape		In progress
											Spring “ear” cut off	Manual Tabulation	8	0.0004%	Disposal	380.0	Timing of switching wrap speed		Completed
											Stoppage	Manual Tabulation	297	0.016%	Disposal	14107.5			
											Tool engage	Manual Tabulation	31	0.0017%	Disposal	1472.5			
											Box broken	Manual Tabulation	56	0.003%	Disposal	2660.0			
											2 spring sheets entered	Manual Tabulation	10	0.0005%	Disposal	475.0			
											Damage from dropping	Manual Tabulation	17	0.0009%	Disposal	807.5			
											Ratchet damage	Manual Tabulation	1	0.00005%	Disposal	47.5			
											Disposal defect	Manual Tabulation	111	0.006%	Disposal	5272.5			
											Stoppage defect mode				Disposal				
											Off spring	Stoppage Analysis	93	0.005%	Disposal	4417.5	Countermeasure for frame #3 tenon short circuit	○○	
											Frame #3 short M	Stoppage Analysis	36	0.0019%	Disposal	1710	Countermeasure for ratchet damage	○○	
											Ratchet damage	Stoppage Analysis	164	0.009%	Disposal	7790			
											Foreign object inserted	Stoppage Analysis	47	0.0025%	Disposal	2232.5			
											Worm bending	Stoppage Analysis	20	0.0011%	Disposal	950			
											Other	Stoppage Analysis	84	0.0045%	Disposal	3990			

Defect Phenomenon Checksheet

9

1 - 6

Remedy of Work Defects by Level



Mechanism Diagram: Functional Parts Chart

Equipment Name:

Unit Name:

Part Name:

Reasons for Selection:

(Key Points of Parts)

TPMG:	Section Manager:	Supervisor:	Made By:

Work Standards Sheet

Process name		Standard Time							
Work Name									
						Code		Approved by:	Checked by:	Prepared by:
						Prepared on:	___/___/___			
	No.	___/___/___	Reasons for Revision		In Charge:					

No.	Description And Sequence of Work	Standard Value	Critical Points/Areas (Pass/Fail, Safety, Ease-of-Operation)	Tools Used	Sketch

Work Standards Sheet

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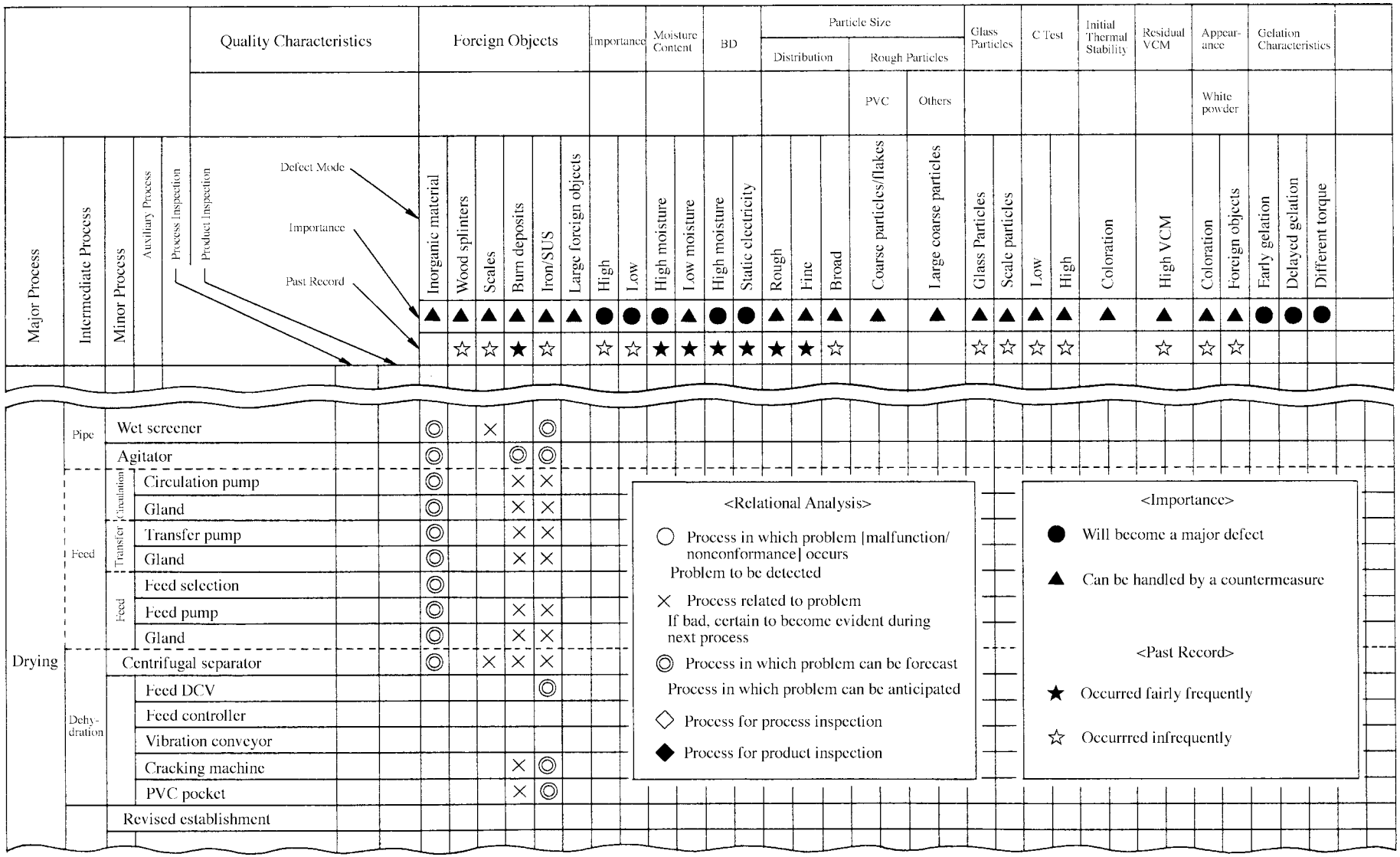
1 - 9

QA Matrix



Survey and Analysis of 4M Conditions: Product A (Drying)

○: Standards followed　×: Standards not followed

△: Uncertain whether standards followed or not　⊗: No relevant standards

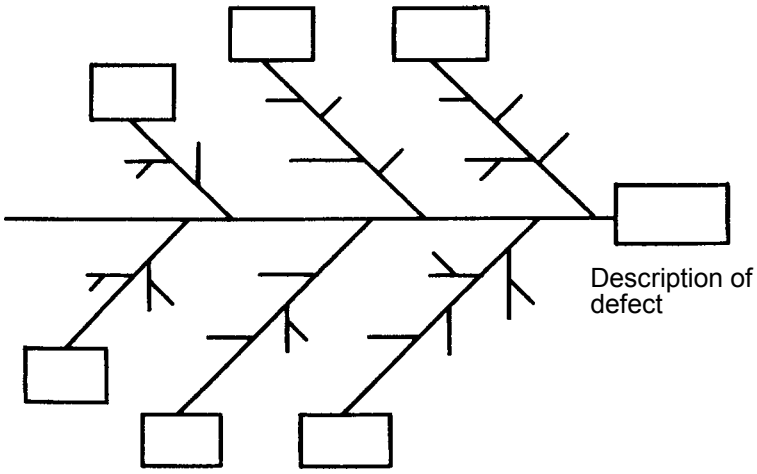
Major Process	Intermediate Process	Minor Process	Defect Mode	Raw Materials		Equipment		Methods (people)	
Drying	Storage	Storage	Foreign objects	Concentration: 30% Temperature: 70°C or less F_w	○ ○	V 11-2-D rubber lining: no rust V 11-3-D stainless: no rust V 11-4-D PVC lining: no rust V 11-5-D stainless: no rust	○ ○ ○ ○	Internal corrosion inspection Storage temperature: 70°C or less Use: only for V 11-4-D R. Use other product type for V 11-1, 2, 3, 5-D.	⊗ ○ △
	Feed	Circulation Transfer Feed	Foreign objects	PVC slurry Concentration: 30% Temperature: 70°C or less F_w: Turbidity standard	○ ○ ○	P 11-1, 2, 3, 4-D: no gland leakage P 11-1, 2, 3, 4-D: no gland heat generation P 11-1, 2, 3, 4-D: gland fluid injection volume P 11-1, 2, 3, 4-D: gland fluid injection pressure Gland fluid injection pump discharge pressure: at least 5 kg/cm^2	× △ ⊗ △ △	Standards for gland leakage volume Inspection of gland heat generation: once/shift Inspection of gland fluid injection volume Gland inspection standards Inspection of gland fluid injection pressure Inspection of gland fluid injection pump discharge pressure: once/shift	⊗ △ ⊗ ⊗ △ ○

Defect Cause Analysis Table

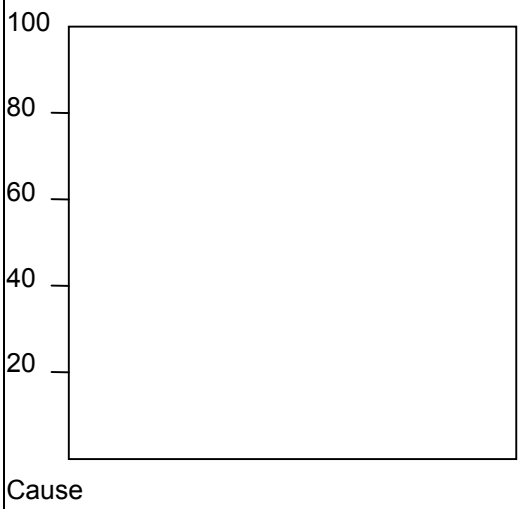
Defect Item		Inspection Section Manager:	Prepared on:
Worksite	Process		
Product name	Produced on:	Issued on:___/___/___	

Description of defect

Cause And Effect Diagram



Pareto Diagram



Cause	Countermeasure	In Charge						

“Why-Why” Analysis Sheet

Circle Name	Prepared by	Prepared on:

Theme

1. Problem Phenomena

Why?

2. Why 1. Why did the problem phenomenon occur?

Why?

3. Why 2. Why did “Why 1” occur?

Why?

4. Why 3. Why did “Why 2” occur?

“Let’s do this!”

5. Countermeasure

Before countermeasure

Photo

Investigation/Confirmation

Investigation/Confirmation

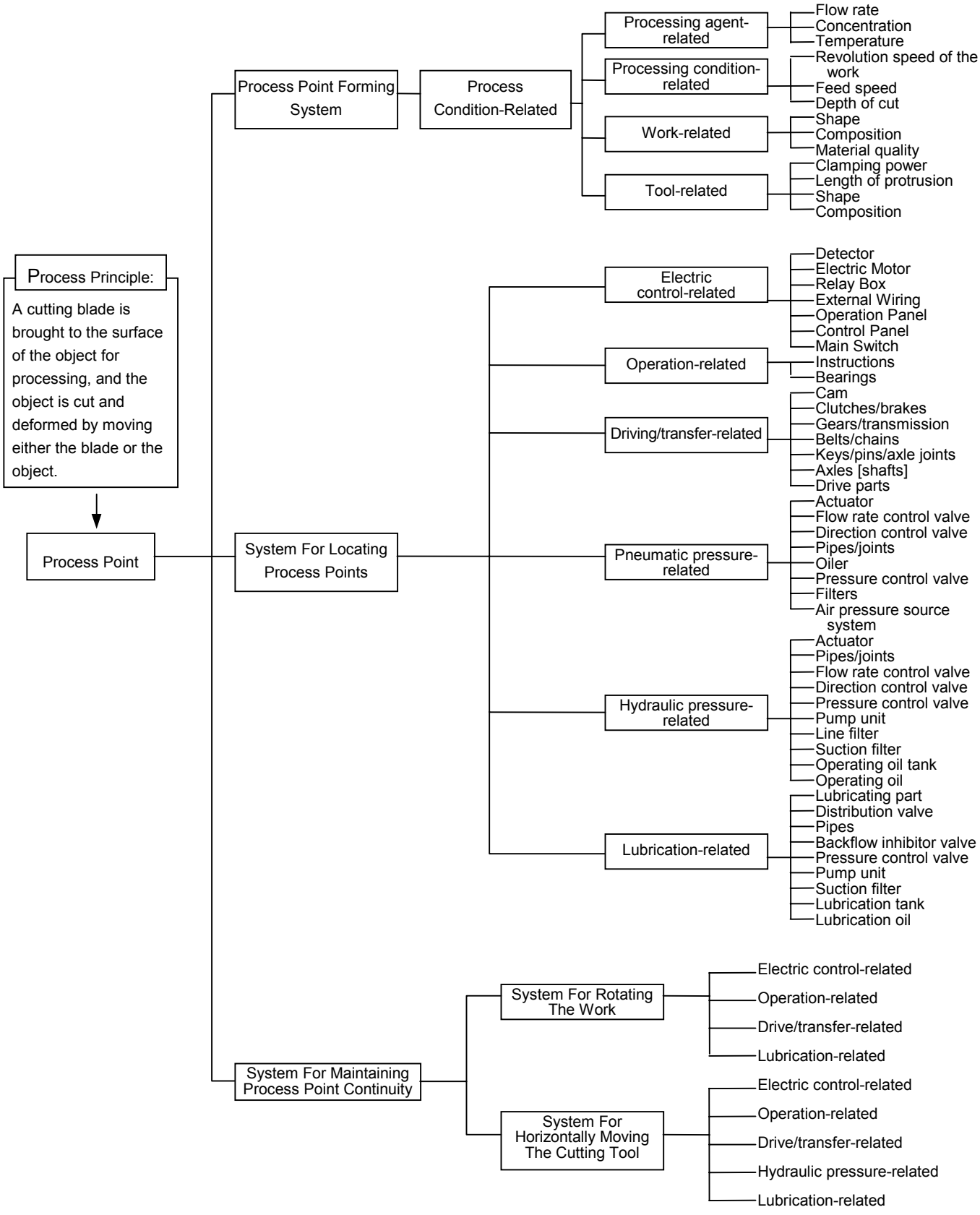
Investigation/Confirmation

Stopping the problem from reoccuring

After countermeasure

Photo

Machine Tool Process Point Analysis Chart



Component Part Function Analysis Sheet

Worksite	Prepared by:	Date prepared

Part Name	Function	Problems Caused When That Function Is Damaged	Extent Of Function Degradation	Inspection Period		Remarks
				Specified	Actual	

PM Analysis Sheet

Theme Name	8 Major Loss Category	___/___/___	Clarification of Phenomena	Physical Appearance (sketch)
		Prepared by:		
Process Name:	Equipment Name:	Equipment No.		

Conditions to be Established (Unit Level)	Standard Value	Measured Value	Judgment	Relation to Location, Jig/Tool, Material, and Method								Item No. Measurement Method (sketch)	Contents of Countermeasure Restoration / Improvement	In Charge Month/Day	Results		
				Primary Cause (part assy. level)	Standard Value	Measured Value	Judgment	Secondary Cause (part level)	Standard Value	Measured Value	Judgment				Standard Value	Measured Value	Judgment
1				1-1				1-1-1									

Improvement Sheet

Control No.	
Date Prepared	

Subsection Manager	Group Manager	Prepared By

Theme

Reason for Theme Selection

Before Improvement		After Improvement	
Problem Phenomenon		Description of Countermeasure	
		Effect	

PM Circle should evaluate the contents of improvement, and circle either {1} or {2} below, and submit a copy of this sheet.

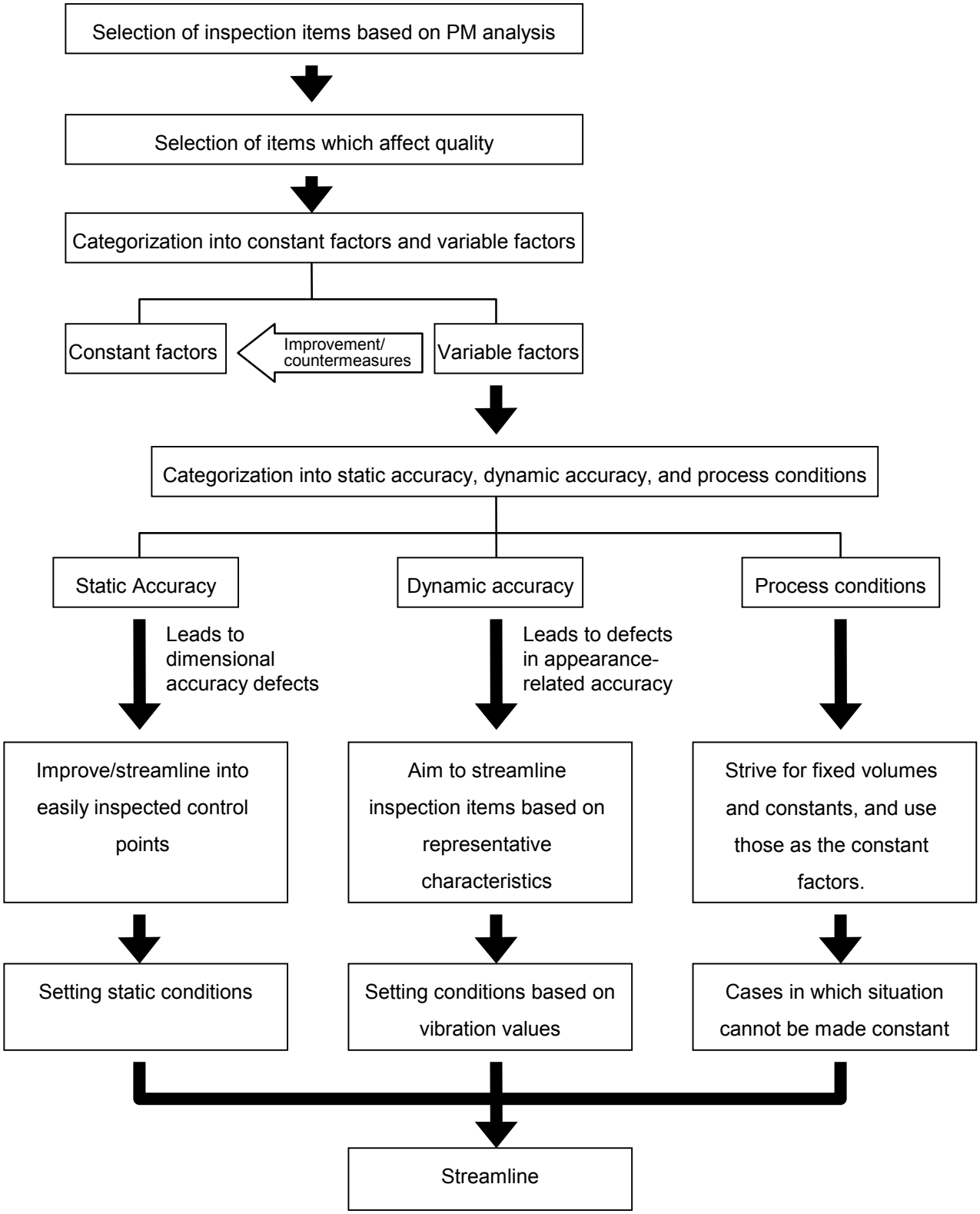
{1} MP information --> supervisor in charge of production engineering (MP sheet)	{2} Need to reflect [same improvement] in other lines --> Subsection Manager (Group Manager).

Let's actively submit MP information!

Implementation Flow Chart for Streamlining Inspection Items

9	8 - 18

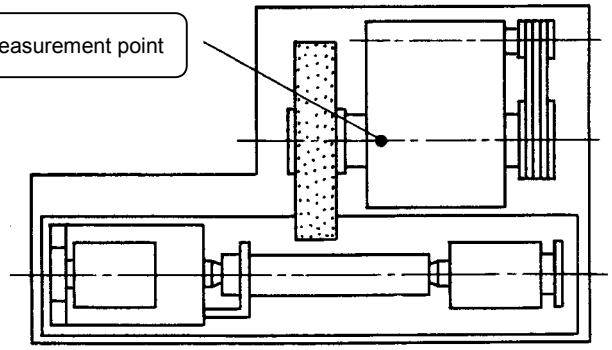
Quality Maintenance Implementation Flow Chart



Implementation of Quality Maintenance (Inspection Standard)

Plan view of cylindrical grinding machine

Vibration measurement point

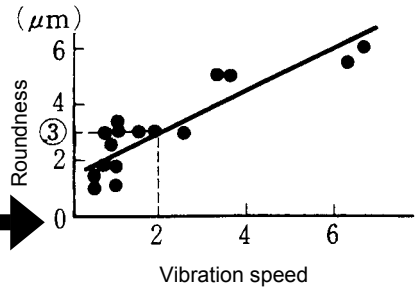


Investigated vibration values and roundness for the same equipment model.

There was a correlation between vibration and roundness, and the regression line was determined from a correlation coefficient of 0.87.

Vibration had to be kept within 2 mm/s to keep roundness within the standard value of 3 μm from the regression line.

Correlation between Vibration Speed and Roundness



Upper limit of vibration was set at 2 mm/s.

Why do some machines have lesser vibration while others have greater vibration?

Machines with high vibration have a large gap between metal and spindle axle.

Tried to adjust metal. Vibration was reduced, and roundness improved.

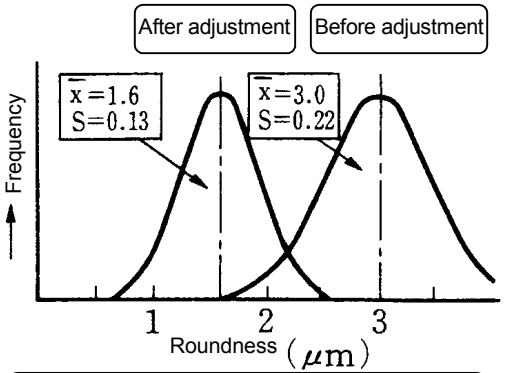
For machine with high vibration, metal was adjusted to bring vibration below 2 mm/s.

- Vibration should be measured once every 2 weeks, and trends should be controlled.
- Metal should be adjusted when vibration approaches 2 mm/s.

Relationship between Metal Adjustment, Roundness and Vibration

	※	Roundness	Vibration value
Before metal adjustment	μm 80 ∫ 100	5.0 μm	12.1 mm/s
After metal adjustment	μm 20 ∫ 30	2.7 μm	1.8 mm/s

※ Gap between metal and spindle axle

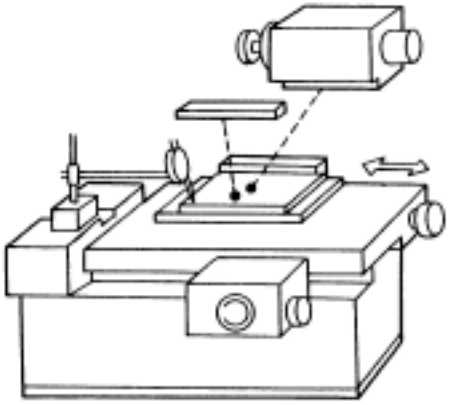


Comparison of Pre- and Post- Metal Adjustment Roundness Frequency Distribution

Quality Maintenance Matrix

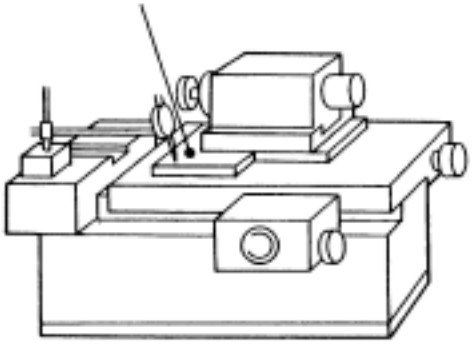
Equipment		A	B		D	E	F
Location		Honing Spindle	Work Spindle		Table	Auxilliary Guide	Auxilliary Guide
Measurement Item		Vibration	Vibration		Parallelism	Wear amount	Wear amount
Standard Value		Ymm/s or less	Ymm/s or less		Aμm or less	Bmm or less	Cmm or less
Measurement Interval		Once/month	Once/month		Once/month	At setup	At setup
Quality Characteristic	Roundess	○	○				
	Cylindricity				○	○	○
	Scratches					○	○

Before improvement



After improvement

Layout of reference surface for measurement



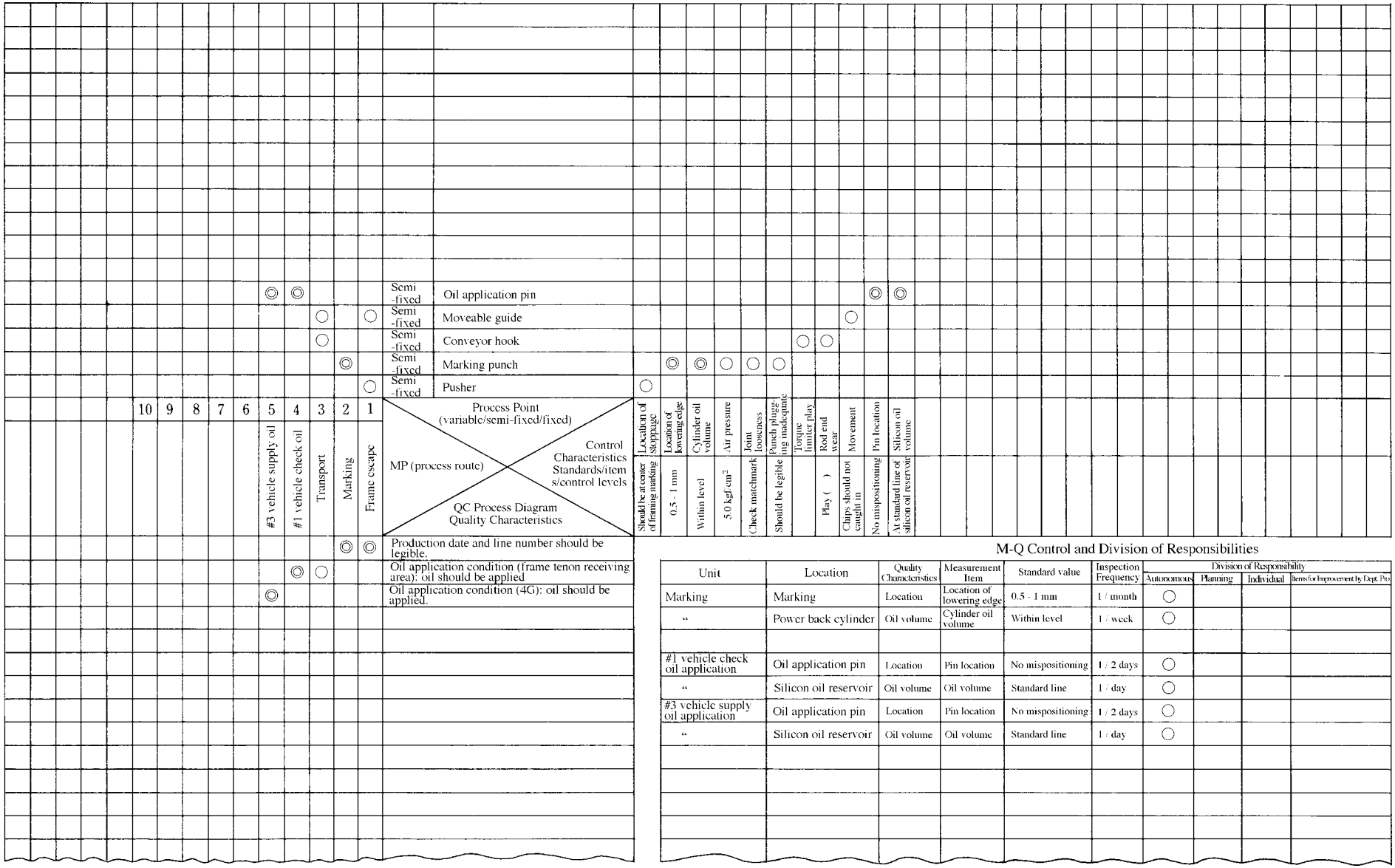
X-type MPQ Matrix

Process name: Assembly

Equipment name: OA-301

Quality Maintenance	Individual Improvement	Planned Maintenance	Autonomous Maintenance

Subsection Manager	Preparer



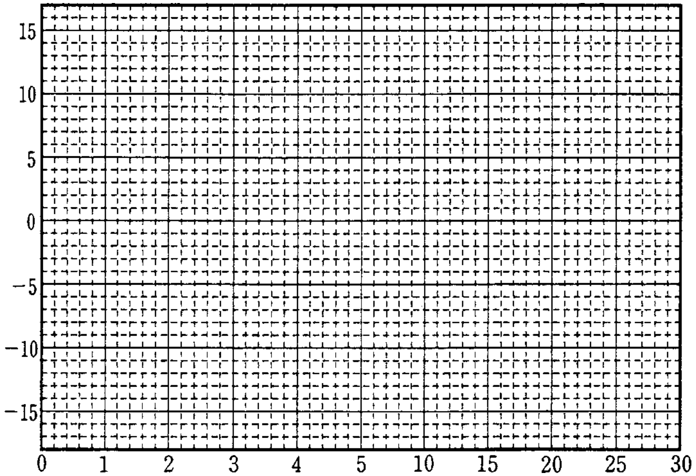
M-Q Control and Division of Responsibilities

Unit	Location	Quality Characteristics	Measurement Item	Standard value	Inspection Frequency	Division of Responsibility: Autonomous	Planning	Individual	Items for Improvement by Dept. Pro
Marking	Marking	Location	Location of lowering edge	0.5 - 1 mm	1 / month	○			
"	Power back cylinder	Oil volume	Cylinder oil volume	Within level	1 / week	○			
#1 vehicle check oil application	Oil application pin	Location	Pin location	No mispositioning	1 / 2 days	○			
"	Silicon oil reservoir	Oil volume	Oil volume	Standard line	1 / day	○			
#3 vehicle supply oil application	Oil application pin	Location	Pin location	No mispositioning	1 / 2 days	○			
"	Silicon oil reservoir	Oil volume	Oil volume	Standard line	1 / day	○			

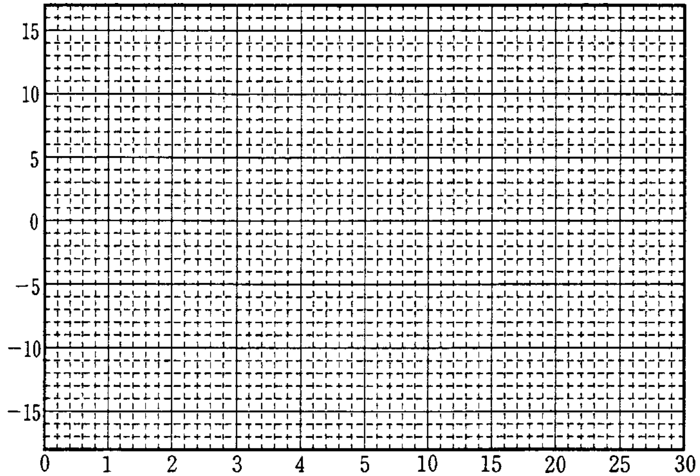
Dial Gage Accuracy Inspection Results Sheet

Measurement Tool No.	Manufacturer	Type	Process	Registration Date

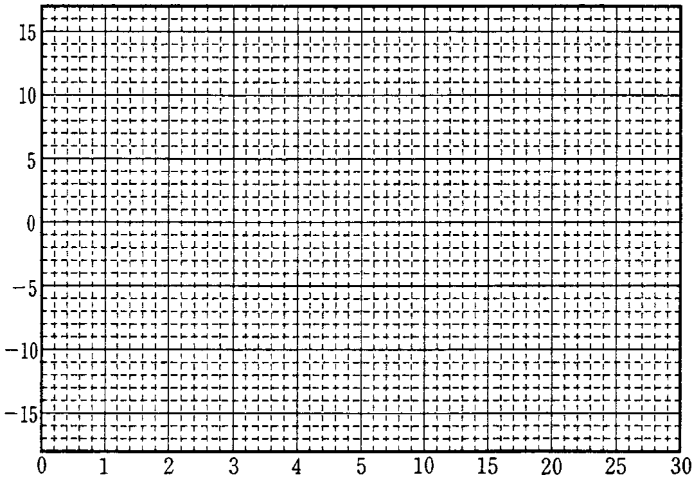
Spindle axle looseness	Scale
Forward accuracy	μm
Return deviation	μm
Indication stability	Scale
Room temperature	C°
Judgment	
Measured by:	



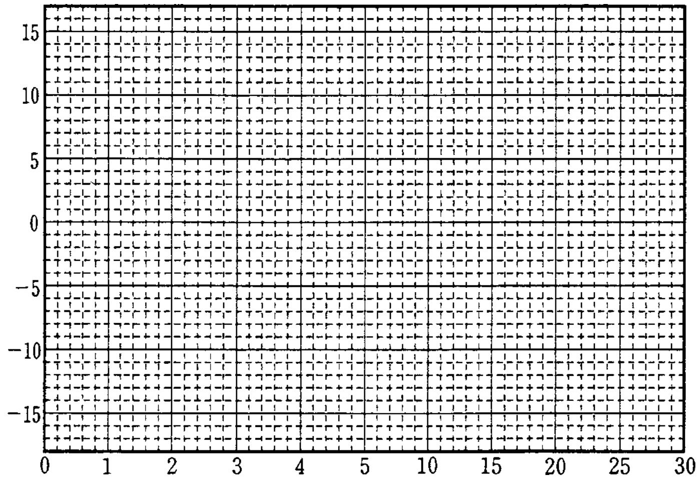
Spindle axle looseness	Scale
Forward accuracy	μm
Return deviation	μm
Indication stability	Scale
Room temperature	C°
Judgment	
Measured by:	



Spindle axle looseness	Scale
Forward accuracy	μm
Return deviation	μm
Indication stability	Scale
Room temperature	C°
Judgment	
Measured by:	



Spindle axle looseness	Scale
Forward accuracy	μm
Return deviation	μm
Indication stability	Scale
Room temperature	C°
Judgment	
Measured by:	



Caliper Inspection Results

○ Bahniya
○ With dial

Inspection Date ___/___/___ Temperature ____°C Humidity ____%

Model			Minimum readable value	mm
Measurement range		mm	Manufacturing No.	
Scale	Instrumental error	mm	Appearance (scratches on scale area)	
mm	Outside	Inside	Operation	
0			Measurement surface gap	
20			Clamp	
50			Zero depth point	
100			Zero height differential point	
150			Sheath [cover plate]	
200			Judgement	pass / fail
300			Inspector	
400			Remarks	
600				
800				
1000			Reference Device No.: No._____	

Measurement Device Inspection Results	9	9 - 22 - (3)

Micrometer Inspection Results

○ Outside
○ Inside

Inspection Date ___/___/___ Temperature °C Humidity %

Model				Measurement range - mm	
Size mm				Manufacturing No.	
Flatness		Anvil	Spindle	Appearance (scratches on scale area)	
		μm	μm	Screw area fit	
Parallelism			μm	Screw looseness	
Scale mm		Instrumental error	μm	Aperture base looseness	
0	0			Ratchet stoppage	
2.5	1			Measurement force	
5.1	1.25			Thimble measurement	
7.7	1.5			Clamp	
10.3	2			Delay/advancement of counter	
12.9	3			Judgement	pass / fail
15.0	5			Inspector	
17.6	10			Remarks	
20.2	15				
22.8	20				
25.0	25				
30.0	30			Reference Device No.: No._____	

Autonomous Maintenance Standards

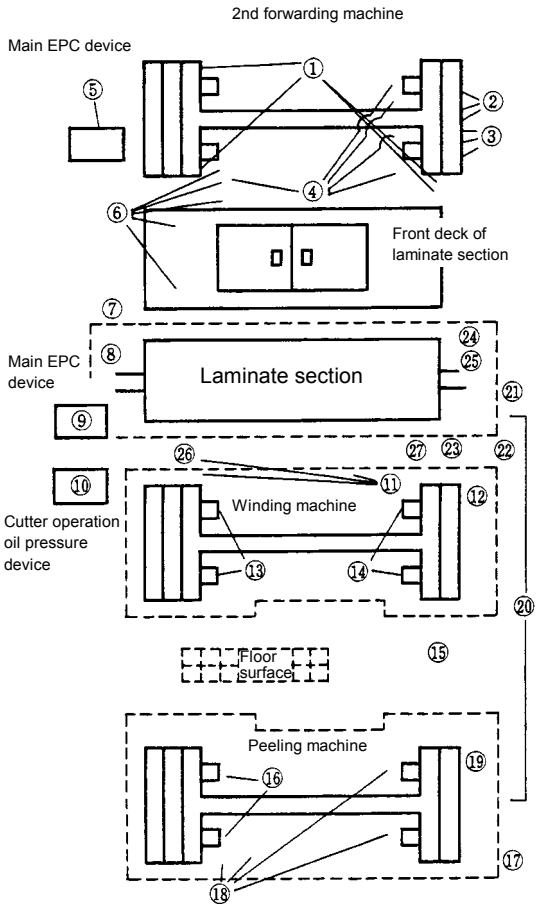
Section	Subsection	Work	Prepared
Manager	Manager	Foreman	by

Date Created	___/___/___
Date Revised	___/___/___
Version	3rd version

Name	Autonomous Maintenance Standards for _____ Machine

Autonomous Maintenance Standards Number

Location	Item	Frequency
Winding section	Inspection	* See below.*

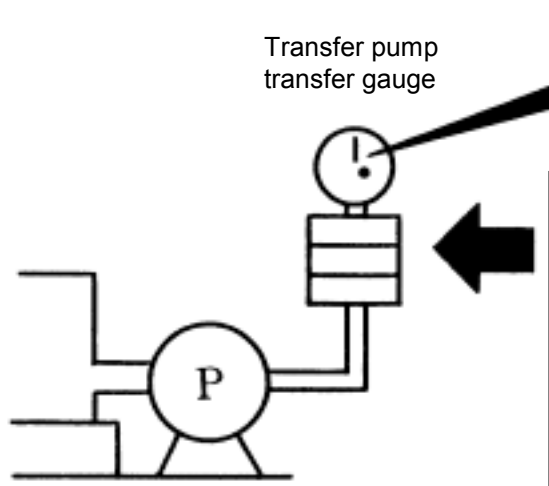


No	Location	Standards	Inspection Methods	Tools and Correction Methods	Frequency	Inspection Duration
1	Hand valve for 2nd forwarding machine: 4 locations	No air leakage or oil adhesion	Visual, sensory [all 5 senses], and touch.	UESU, hand valve	3 months	30 sec.
2	Pressure decreasing valve for 2nd forwarding machine: 3 locations	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, replacement	3 months	10 sec.
3	2nd forwarding machine air pressure cutter splice chuck	Must be within appropriate range: 4-6 kg	Visual.	Adjust pressure decreasing valve	1 month	10 sec.
4	Chuck cutter splice roll air cylinder for 2nd forwarding machine	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	30 sec.
5	Main EPC device and oil pressure cylinder	10-20 kg/cm^2	Visual, sensory, and touch.	UESU, contact maintenance	1 month	10 sec.
6	2nd forwarding machine guide roll	Must rotate smoothly and without abnormal noise	Visual, sensory, and touch.	Contact maintenance	3 months	30 sec.
7	Main air filter (set of 3)	No drain build-up	Visual	UESU, remove drain	1 month	10 sec.
8	Pinch roll drive V belt	No breakage or looseness	Visual	Contact maintenance	3 months	10 sec.
9	BOX exit of main EPC device	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	1 month	10 sec.
10	Main cutter operation oil pressure device & solenoid valve	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
11	Air / oil pressure cylinder for cutter operation splice	[No] air leakage. 4-6 kg	Visual, sensory, and touch.	UESU, contact maintenance	3 months	30 sec.
12	Chuck hand valve for winding machine / pressure decreasing valve	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
13	Winding machine motor / transmission / deceleration machine	No abnormal noise. Thermo label: 65 °C. No color change.	Visual and sensory.	Maintenance, electric communication	3 months	10 sec.
14	Chuck air cylinder for winding machine	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance and electrical	3 months	10 sec.
15	Guide roll for peeling machine	Must rotate smoothly and without abnormal noise.	Visual, sensory, and touch.	Contact maintenance	3 months	60 sec.
16	Motor and deceleration machine for peeling machine	No abnormal sound. Thermo label: 65 °C. No color change.	Visual and sensory.	Maintenance, electric communication	3 months	10 sec.
17	Cutter operation solenoid valve for peeling machine	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
18	Cutter operation air cylinder for peeling machine	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
19	Check air cylinder, hand valve and pressure decreasing valve for peeling machine	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
20	Manometer for peeling / winding operation panel	Minimum: 5mmH_2O	Visual	Tighten door, adjust damper	1 month	10 sec.
21	Dancer controlled electricity/air converter and air filter differential pressure gauge	Maximum: 0.7 kg/cm^2	Visual	Exchange microELETTA filter	1 month	10 sec.
22	Air cylinder for peeling luminate roll	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	30 sec.
23	BEROFRAM [company name?] cylinder	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
24	Press roll air cylinder for laminate section	[No] air leakage. 4±0.2 kg/cm^2	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
25	Press roll hand valve for laminate section & pressure decreasing valve	No air leakage or oil adhesion	Visual, sensory, and touch.	UESU, contact maintenance	3 months	10 sec.
26	Dancer guide roll & adjustment section	Must rotate smoothly and without chattering	Visual, sensory, and touch.	UESU, contact maintenance	1 month	20 sec.
27	Cutter splice roll & adjustment section	No misalignment of adjustment handle.	Visual	Adjust right/left misalignment by manually turning handle	3 months	10 sec.

An Example of Q Components Indication

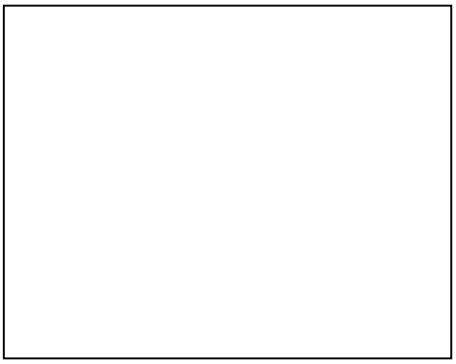
9	10 - 24

An Example of Q Components Indication

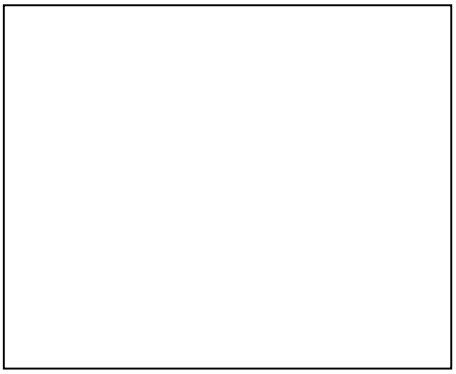


Quality Component No.

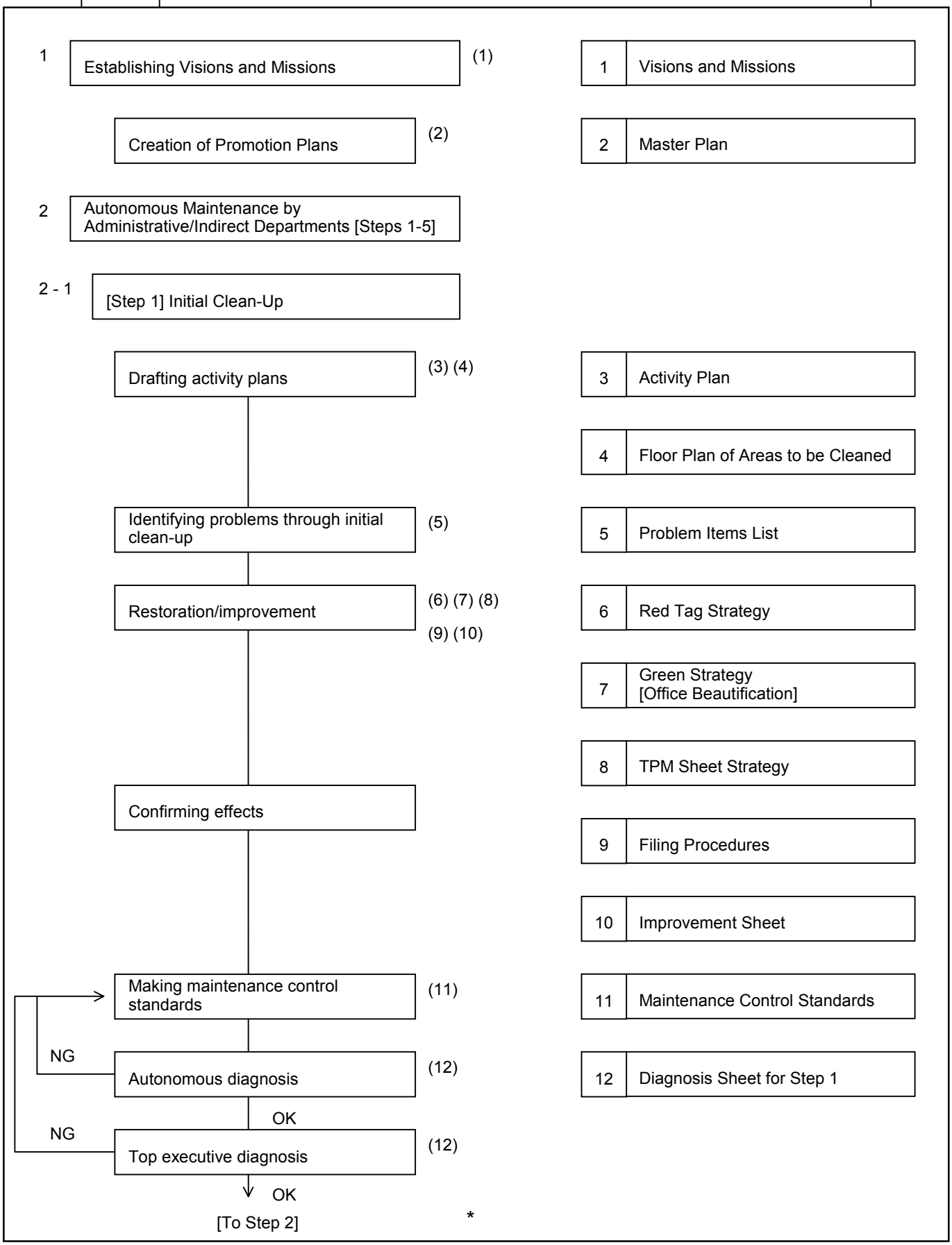
Area to be Inspected	Adhesive pump
Inspection Item	Transfer pressure
Standard Value	2.0 ±0.2 kg/m^2
Inspection Frequency	Once/shift



10. O f f i c e T P M



10. Administrative and Indirect Departments



10. Administrative and Indirect Departments

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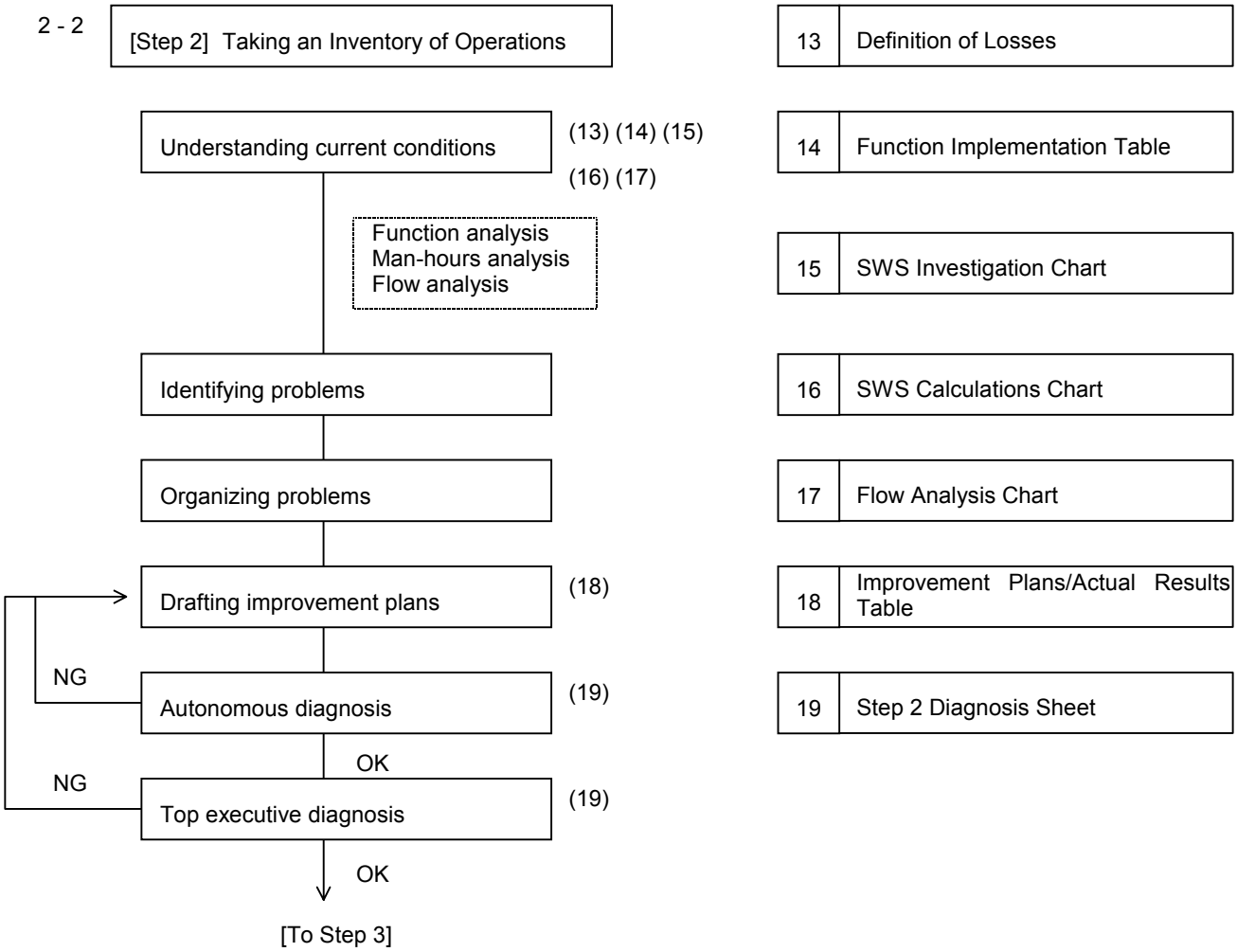

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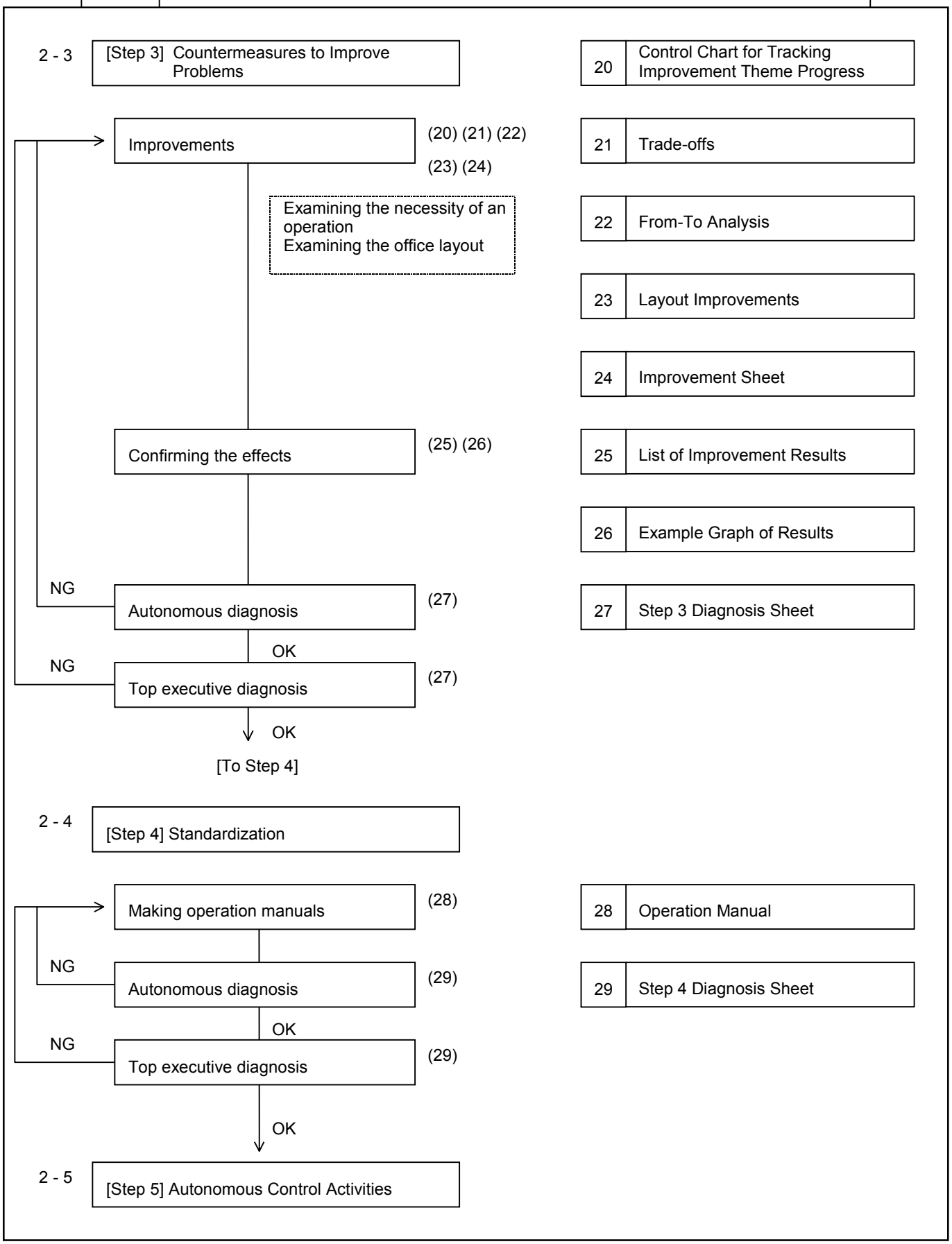
10. Administrative and Indirect Departments



10. Administrative and Indirect Departments

3	Autonomous Maintenance Diagnosis System	(30) (31) (32)	30	Diagnosis Flowchart
			31	Step Diagnosis Application Form
			32	Step Progress Chart
4	Individual Improvement In Administrative/Indirect Departments	(33)	33	Administrative/Indirect Department Project Themes and Manufacturing Support Project Themes

An Example of "Cost Control Function"-Related Visions and Missions

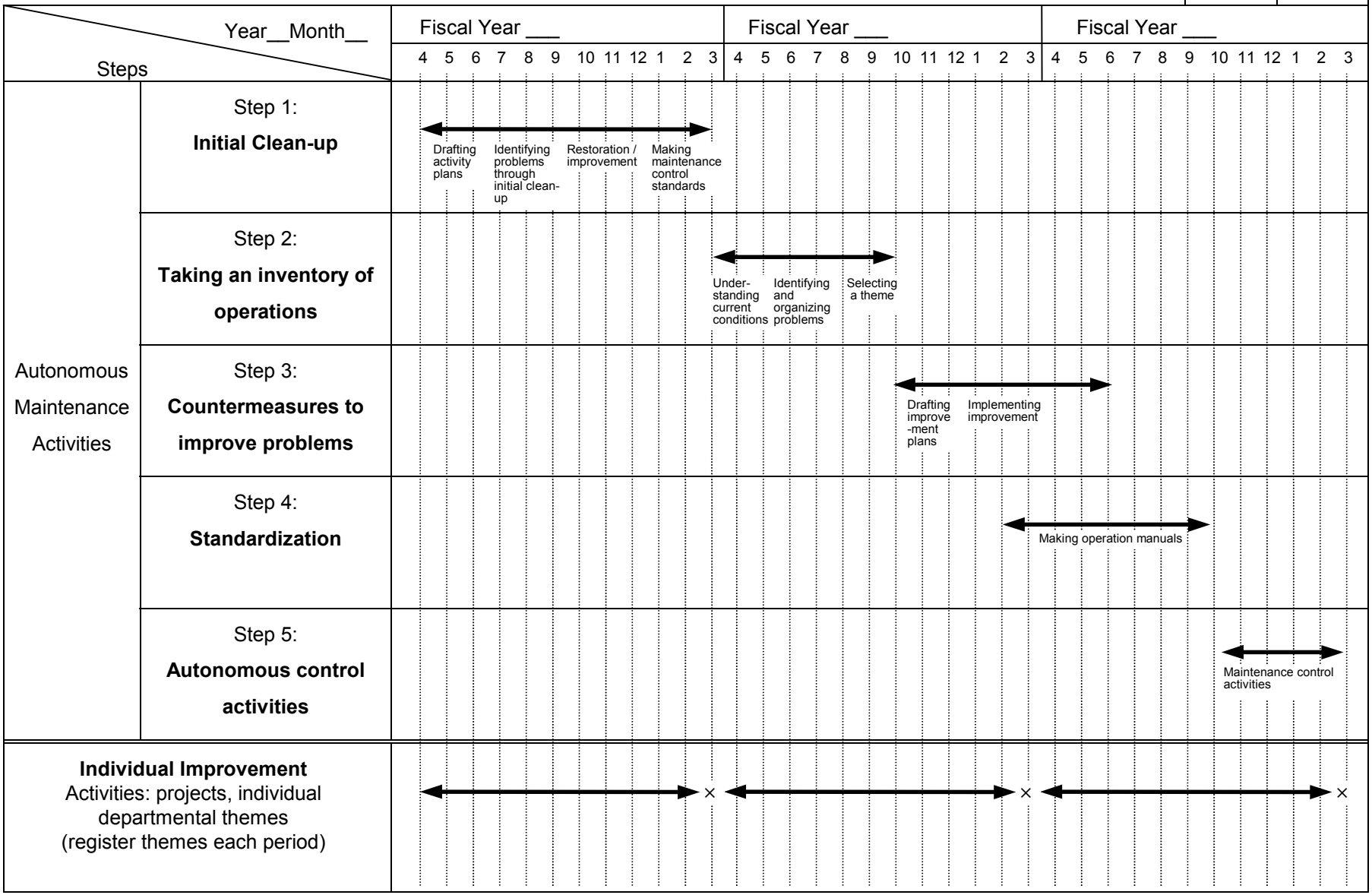
Department	Visions	Missions
Planning	Aim to establish a system in which necessary cost information can be provided to management and related divisions in a timely manner.	1 By tracking estimated price and final price, evaluate and analyze the potential profit by series. 2 Analyze the difference between sales price and purchased unit cost, set a target cost, and provide the information to related departments.
Sales	Aim to optimize the cost estimation operations in product fine-tuning stages, and improve the efficiency and speed of estimation work.	1 Establish estimate calculation methods and standardize estimate calculation operations per each stage of product fine-tuning, per each factor of the estimate, and per specification level (depth, roughness). 2 Establish in-house rules for cost calculation standards and calculation methods, and make a system for evaluation of conformance.
Purchasing	Aim to establish a system in which cost calculation work can be done faster, easier, and more precisely.	
Production Administration		

Deciding "how things should be"

To make a more efficient system for the provision of timely cost information to related departments, strive to clarify, simplify, and standardize the cost calculation work, thereby contributing to improvements in accuracy and productivity.

A Master Plan Example For Administrative/Indirect Departments

Department Manager	Section Manager



Step 1 Improvement Plans

Department Manager	Section Manager	In Charge

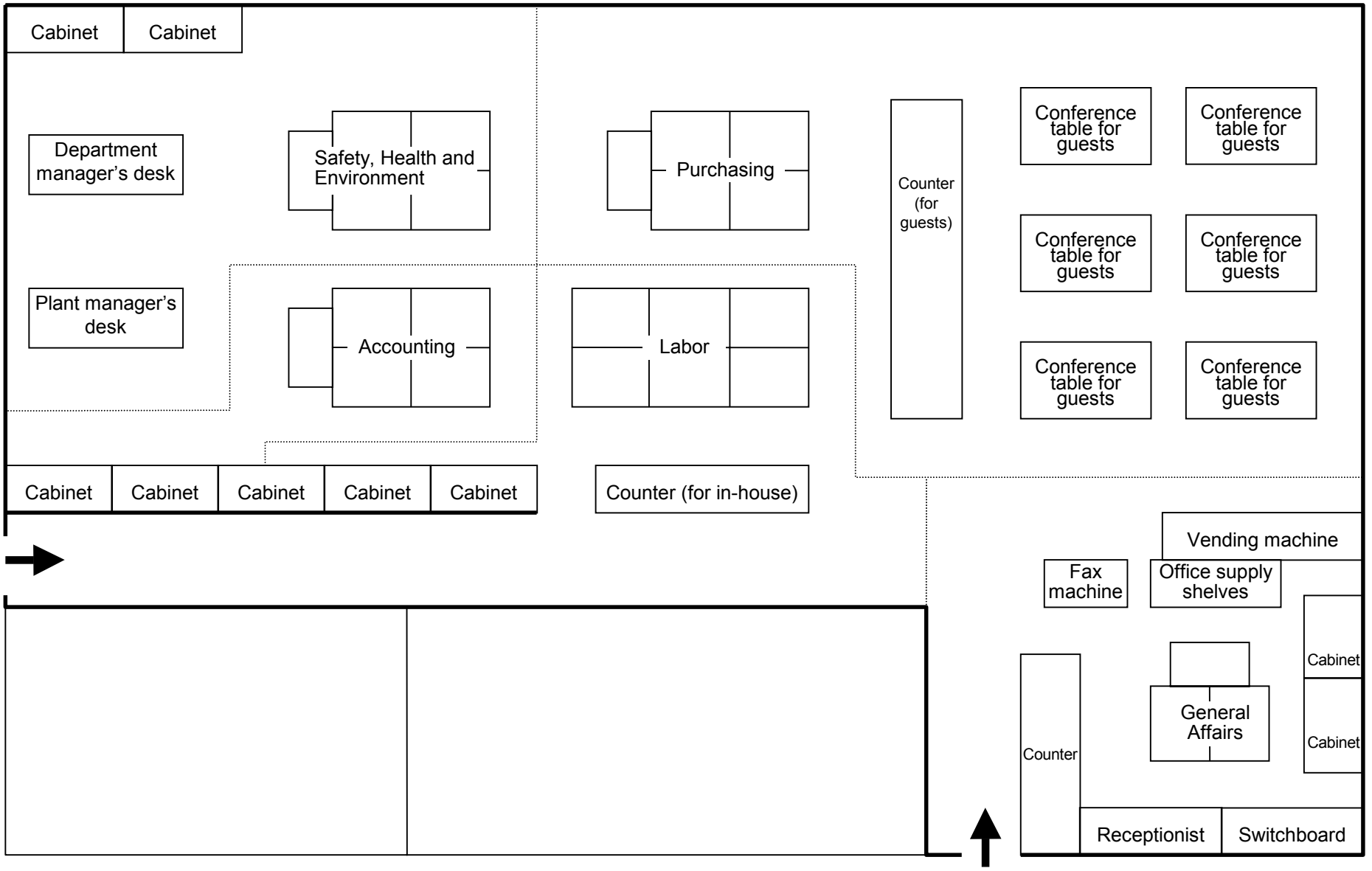
Section _____ Department _____

Planned
Actual Results

No.	Items	In Charge	Year: 4 5 6 7 8 9 10 11 12 Year: 1 2 3	Remarks
1	Making an area map	_____Section Manager		
2	Determining responsibility for each area	_____Section Manager		
3	Reorganizing/rearranging office equipment locations	All Members		
4	Reorganizing/rearranging desks and areas around desks	All Members		
5	Making filing standards	Sub-Leader to _____Section Manager		
6	Reorganizing/rearranging shelves and cabinets	All Members		
7	Making maintenance control standards	_____Section Manager		
8	Implementing autonomous inspections	_____Section Manager		
9	Getting the top executive diagnosis	_____Section Manager		

Step 1. Floor Plan of Areas to be Cleaned

Business Office of _____Department



Problem Items List

Leader	In Charge

_____Circle _____Section _____Department Workplace Name: ___/___/___

No.	Problem Items / Description	Know-Why	Relationship to Losses							Know-Why	Measures				One-point
		Why is this a problem?	1	2	3	4	5	6	7	Why did this happen?	Methods	In Charge	Deadline	Completi-on Date	Lesson Sheet Control No.
1	Employees' office supplies are put in their desk drawers in a disorganized fashion.	{1} Wasting office supplies {2} Hard to get out when needed				○			○	{1} There are no rules about how offices supplies are to be handled.	Determine rules about storage of employee office supplies, and organize supplies in fixed locations.	○○	○/○	○/○	○-○○
2	Files stored in filing cabinet cannot be identified at a glance.	Because it's disorganized, it takes time to find files. Unneeded documents will increase.				○	○			{1} There are no rules about filing. {2} There are no labels on files.	Reorganize and rearrange filing cabinets, and determine filing standards.	△△	○/○	○/○	○-○○
3	Employees' own files are stored in their desk drawers so others cannot find them.	Other people will have a hard time finding files. The files stored in one's own desk drawers will increase.				○	○			There are no rules about filing.	Determine filing standards, and limit the amount of files stored at desks.	△△	○/○	○/○	○-○○
4	There is no fixed place where cleaning equipment is stored.	It takes time to find them.					○			Cleaning equipment location has not been specified.	Determine the storage location and label it.	××	○/○	○/○	○-○○

Categorization of the 7 Major Losses: 1. Value loss 2. Processing loss 3. Accuracy loss 4. Speed and timing loss 5. Idling loss 6. Communication loss 7. Cost loss

Red Tag Strategy

Goal

To eliminate unneeded items by attaching red tags to distinguish between needed and unneeded items and evaluating.

TPM Part 3 "All Clean" [HUMAN] Strategy

Red Card

Department Name: _____ Date: ___/___/___

Category	1. Office supplies 2. Tools 3. Office machines 4. Equipment 5. Miscellaneous
Product Name	
Quantity	
Reasons	

Standard: Make a distinction between:
Needed items (to be used within 1 month)
Unneeded items (not to be used within 1 month)

Points:
1 Do not allow everyone in the workplace to affix red tags. (only one section should be in charge)
2 People in the workplace will tend to say everything is "needed."
3 Be objective in viewing items.
4 When attaching tags, do not be merciful.
5 If unsure, attach a red card.

Section Manager

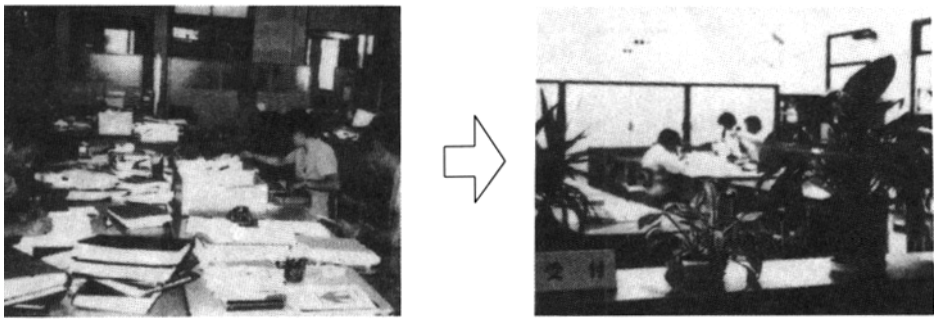
In Charge

Example Usage

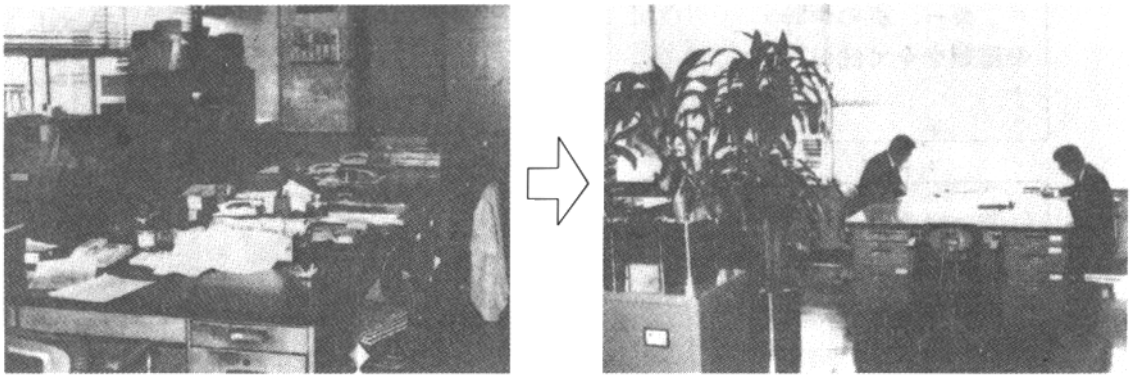
Green Strategy

Goal

To create a calming effect in the workplace by introducing greenery such as indoor plants to the office.



Before | After

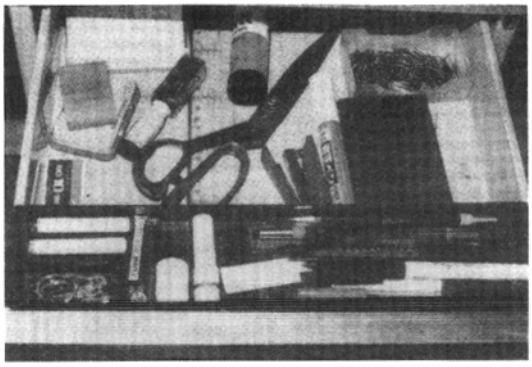


Before | After

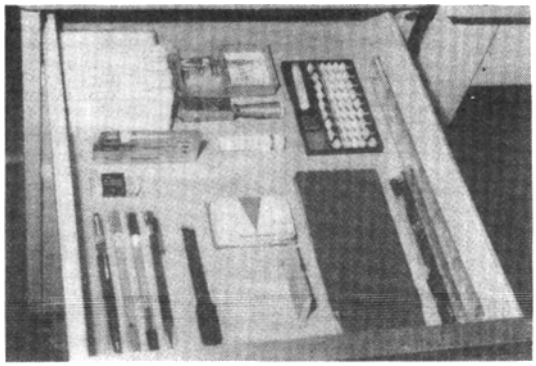
TPM Sheet Strategy

Goal

To put needed offices supplies in fixed locations so that one can see at a glance that everything needed is there, and nothing extra is.

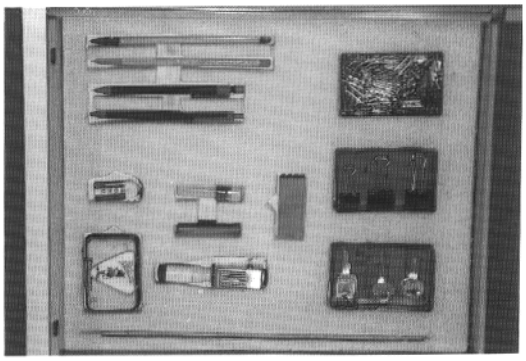


Before



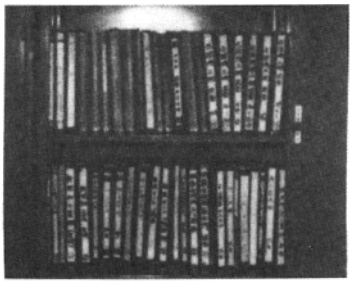
After

Before

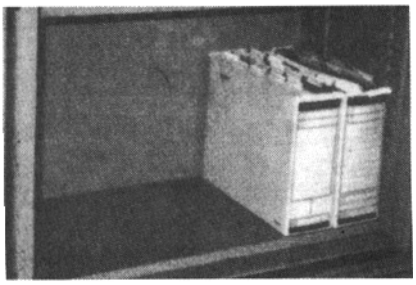


After

Filing Procedures



Before



After

- Remove all documents in bookcases and on shelves.
- Determine whether materials need to be retained or not, and discard any unneeded materials.
- Categorize materials according to the contents of operations.
- Make filing standards for major, intermediate and minor categories.
- Register filing numbers based on the standards.
- Perform a visual check.
- Perform a 30-second retrieval test.

Filing Arrangement Standard

Initials___ ___ ___

General Affairs Section

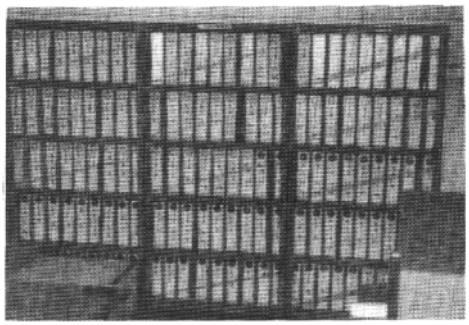
1. Application
   This standard specifies the filing arrangement standards of the General Affairs Section.
2. Purpose
   To strive for integration of materials and documents in the General Affairs Section and use as a management tool.
   1) To make it possible for anyone to retrieve needed documents at any time.
      To clarify file categories and storage location, and affixtitles.

Person in Charge of Files, by Category No. 3 Person in Charge of Storage Location No. 3

Initials ___ ___ ___

Intermediate Category	Category Name	Minor Category No.	Initials of Person in Charge	Remarks
00	Operation standards	00.....04	○ ○	
D1	Stock related	01	Same as above	
D2	Stock policy	07.....08	Same as above	

Storage No.	Person Responsible
Bookcase 1	○ ○
Bookcase 2	○ ○
Bookcase 3	○ ○

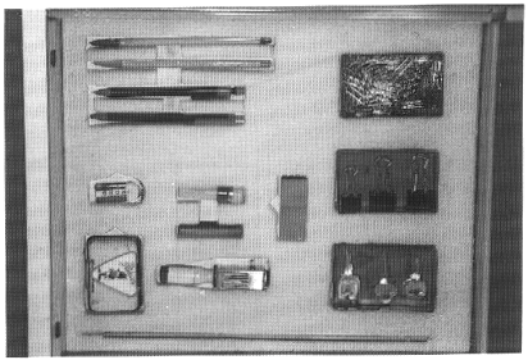


Performing a 30-second test to refine file arrangement.

Improvement Sheet

Control No.	○○-○○○

Theme	Fixed location of office supplies	_____Department _____Section _____Circle

Before	**After**
Problems: Office supplies are stored in desk drawers in a messy way, which results in the following. (1) It takes time to find needed things. (2) There are too many writing utensils, which is a waste of office supplies. (3) Even unnecessary things are stored.	Effects of Improvement: What office supplies each employee should have were determined, and those suppliers were placed in a fixed location in drawers. (1) Needed items can be retrieved quickly, which makes work easier. (2) All the unnecessary office supplies were collected and put where everyone can use them. This resulted in a savings of ¥____. (3) Employee became more aware of saving money by using office supplies wisely. (4) With a neat workplace, employees can work more comfortably.
 Photo before improvement	 Photo after improvement

"5S's of the Environment" Checksheet

In charge:

"Make the first day of every month a 5S check day."

Department_____Year_____Month_____

Fill in either o: pass or X: fail. Describe the contents of X in the Notes section.

Desk	On the desk • Location of the supplies is labeled. • Documents are not scattered about. • Desk is not dirty.		Drawers • Office supplies are placed in a set location. • 5 files and 5 books at most. • Retention indicated (with "approved" stamp). • No extra things in drawers.		Below • The area below the desk is cleaned thoroughly. • Nothing is below the desk. • Wiring is done in an organized way.	
Shared Items	Shared items are located in labeled places.		Indicated contents of the shared items box match the actual contents.			
Document Flow	Document retention form • Circulation of documents and business forms is not delayed. • Sheet damage • Today's documents are handled separately from the next day's documents.		Circulated documents • The sequence of circulation is indicated. • The documents are clipped together.		Document "In" Box • The box is labeled. • Documents within the box are being processed.	
Cabinet	Above/on cabinet • Nothing is placed above cabinets. • Contents of cabinets are displayed clearly.		Inside the cabinet • There are no unregistered files or ledgers. • The contents inside files are being maintained.		Overall • No dust or dirt. • Doors and drawers open and close smoothly.	
Filing Registration Book	• Retention lists are maintained. • A dummy [number] is used. • Retention periods are appropriate. • Filing registration book is placed in the designated place.		• There is a dummy [number]. • There are magnets. • The designated cover sheets are used. • The categories are indicated.		• No inserted documents in the filing registration book. • No files that have an excessive amount of documents. • No unregistered files. • No damaged files.	
Environment	Ceiling • Lighting is appropriate. • No dirt on ceiling equipment.		Windows • Glass is dirty. • Dust on window frames.		The floor • The floor is clean, even in the corners. • The location of garbage cans is indicated. • Garbage cans are not dirty.	
Document Storage Room	• Business forms are reorganized and rearranged. • A clear route for walk-through is secured. • Everything is stored in the designated place.		• Retention information indicated on shelves. • Files, etc. rearranged and reorganized.			
Miscellaneous	• Keys for cabinets and other equipment are maintained.		• Do chairs squeak or not?		• The condition of counters.	
Notes:						

Step 1 Diagnosis Sheet	10	2 - 1 - 12

Step 1 Diagnosis Sheet

Application form for operation improvement diagnosis
Operation improvement diagnosis sheet
Step 1: Initial Clean-up

Diagnosis	Autonomous	Section manager	Top executive

Team name	
Registration No.	:___/___/___ ___a.m./p.m. to ___a.m./p.m.
Diagnosis date and time	
Diagnosed by:	

____points	Pass	Fail

Autonomous diagnosis	90 or more points
Section manager diagnosis	85 or more points
Top executive diagnosis	80 or more points

Diagnosis items	Diagnosis points	Bad ←		Mediocre	→ Good		Suggestions
		2 points	4 points	6 points	8 points	10 points	
1. Bookcases and desks (both inside and outside) [individual]	• No garbage, dust, dirt, or graffiti? • No looseness, rattling, or dents? (10 points)						
	• Are unnecessary things removed? • No extra office supplies? • Is it reorganized and rearranged? (10 points)						
2. The condition of document storage room (cabinets) [group] and business forms	• No garbage, dust, dirt, or graffiti? • No looseness, rattling, or dust? (10 points)						
	• Are unnecessary things removed? • Are things filed properly? • Is it reorganized and rearranged? • No holding onto documents and business forms for a long time? (10 points)						
3. Cleaning status of machines/equipment and re-arrangement of their location (office machines, office automation equipment [computers], and telephones)	• No garbage, dust, or dirt on machines and equipment? • Is there a designated place for these machines and equipment? • Are they placed in the designated places in the correct way? (misaligned or oddly angled) (10 points)						
4. Cleaning status of the surrounding areas	• No garbage, dust, or dirt on the floor, the walls, panels, or wall ledges? • Are the surrounding areas neat? • Are unseen places also cleaned (above, below, behind, inside the object) ? • Is a clear route to an emergency exit secured? • Is a clear everyday route secured? • Are fire extinguishers placed in designated places? (10 points)						
5. Filing	• Are there filing standards, and are they appropriate? (2 points) • Are files categorized and registered based on the standards? (2 points) • Is the file registration ledger updated (2 points) • Are file labels appropriate? (2 points) • Do file titles match their contents? (2 points)						
	• Can files be retrieved speedily? (10 points)						
6. Reorganization and rearrangement in a “flowing and visible” way	• No documents which need to be filed lying around? • No excessive storage of documents in the storage room? • Is the location of documents clear to everyone? • Are the addresses of files designated? • Are missing files noticeable? • Is it clear where circulating documents are to be received? • Are unprocessed documents or documents needing to be processed on that day clearly indicated as such? • Is any document held more than a day? • Is there any countermeasure to prevent the delay of document flow? (10 points)						
7. Measures for hard-to-clean locations, for stopping things from getting dirty, and for keeping things clean	• Is there any plan to deal with the cleaning of hard-to-clean locations? • Is there any plan to deal with the difficulty of removing unnecessary things? • Is there a system to maintain reorganization and rearrangement? • Is there any preventive measure to keep things from getting dirty again? (10 points)						

Evaluation level		2 points	4 points	6 points	8 points	10 points
	Things	Almost no implementation.	Only easy things are implemented.	Even difficult tasks are being attempted.	Even difficult tasks are implemented.	Cleaning inspection is finished, and they are continuing to work on improvements.
	People	Everybody is indifferent.	Only the leader is implementing.	Easy parts are done by members.	Almost everything is done by members.	The division of responsibility is clear and well-observed.

Definition of 7 Major Losses for Administrative and Indirect Departments

No.	Loss Category	Loss Phenomena	Effects after improvement
1	Value loss	Obsolete work or procedure which is unused or rarely used	Elimination or simplification of the work, and reduction of expenses
2	Processing loss	Redundant, mistaken, redone, or readjusted process	Streamlined, more efficient operations
3	Accuracy loss	The level of accuracy, certainty, or roughness	Improved accuracy and coordination, avoidance of excessive accuracy
4	Speed and timing loss	The time required, the timing	Reduction of time required, higher processed volume, and improved timing
5	Idling loss	Waiting-time losses, transferring time losses, and searching time losses	Increased efficiency, reduced expenses
6	Communication loss	The level of communication, the level of cooperation, and the level of response	Correct delivery timing and time periods
7	Cost loss	Processing cost and how money is spent	Cost reduction, price reduction

TPM Function Implementation Analysis Table

No.	Current Operation Status				Problems from a Function Implementation Perspective
	Operation Name	Contents	Goals	Current Situation	
1	Control of the EDP system	(1) Reporting to management (2) Development of EDP personnel (3) User training (4) Promotion of the standardization of development and operations (5) EDP cost control (6) Outsourcing control	Clarify the QCD of the EDP system, and aim to maintain and improve it.	(1) Reporting to the management and user trainings are done in an inconsistent and unsystematic way. (2) The standardization of EDP operation is at a satisfactory level, but the standardization of development is weak. (3) Although the EDP cost is budgeted according to the fiscal term and the actual amounts spent are calculated every month, the analysis of the difference between budget and actuals is insufficient.	(1) It is necessary to regularly report to management on the conditions of QCD, in writing. (2) It is necessary to promote the standardization of development to increase efficiency. (3) Cost management based on the comparison between budgeted and actual spending is insufficient.
2	Development and maintenance of the EDP system	(1) Development of new systems (2) Improvement and maintenance of existing systems	Create a logical and effective system in order to minimize inventory, out-of-stock situations, and lead time.	(1) Most development is reactionary, passive type development to meet the needs of each department. (2) Much time is spent keeping up with program development, so system design is weak.	(1) It is necessary to switch to a planned system in which EDP takes the lead. (2) It is necessary to strengthen system design.
3	I/O control of the EDP system	(1) Collection and control of all samples (2) Control of data volume	(1) Reduce unnecessary I/O. (2) Understand the increase in data volume, then reflect that into equipment plans.	(1) As for input control, the analysis of both samples and the data volume is at a sufficient level. (2) Output management is weak.	(1) It is necessary to regularly investigate output usage conditions in order to reduce losses.
4	Control of EDP data	(1) Retention of transaction data (2) Retention of personnel data (3) Retention of master data	(1) Retain the data as an audit trail. (2) Use data to make historical statistics.	(1) Retention period of all data is determined and managed.	
5	Integration of the computer introduction plans at plants	Closely examine the introduction plans proposed by each department, and submit plans to the SSC department.	(1) Standardize machine types. (2) Avoid redundant investments.	(1) Procedural rules are observed throughout the plant. (2) There are insufficient follow-up investigations of the effects of investment.	(1) It is necessary to check computer usage conditions at regular intervals and volumes, and then evaluate the results.
6	Operation and administration of the plant mainframe	(1) Prepare a monthly operation process [schedule] (2) Operate and manage based on the daily standard schedule.	Clarify the operation plan, and aim to standardize the computer usage within plants.	Operation plan is documented and understood throughout the plant.	

SWS Investigation Chart

Theme name	Gender		Investigation chart				Employee number						Name
	Male	Female	Month		Day								

Time	The Nth time investigated	Code			Description of operation				Ability to be planned			OA		Remarks (notes about operations, etc.)
					Routine operation	Decision-related operation	Investi-gation / planning	Other	Planned	Provi-sional	Other	Used	Unused	
8 : 45	01				11	21	31	41	51	52	53	61	62	
9 : 15	02				11	21	31	41	51	52	53	61	62	
45	03				11	21	31	41	51	52	53	61	62	

Example: Observation of Phone Operations

Observation Form — Observer _____ — Page _____

Date___/___/___

The number of times of observation	Time	Persons who are actually on the phone		Persons who could be on the phone		Persons who cannot be reached by the phone (5)	Total	
		Persons who are receiving phone calls (1)	Persons who are making phone calls (2)	Persons who are waiting for a phone call (3)	Persons who are doing work which could be put off (4)		(1) + (3) + (4) (6)	Total
1	9.12	𝍸 /// 𝍸 𝍸 𝍸 𝍸 𝍸	/			𝍸		
2	.31	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸		//	//	////		
3	.45	𝍸 𝍸 // 𝍸 𝍸 𝍸 𝍸 𝍸	/	//	/	𝍸		
4	.52	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸		////	///	𝍸 ////		
5	.59	𝍸 𝍸 𝍸 / 𝍸 𝍸 𝍸 𝍸 𝍸	/	//		𝍸 //		
Total		168	3	10	6	30	202	235

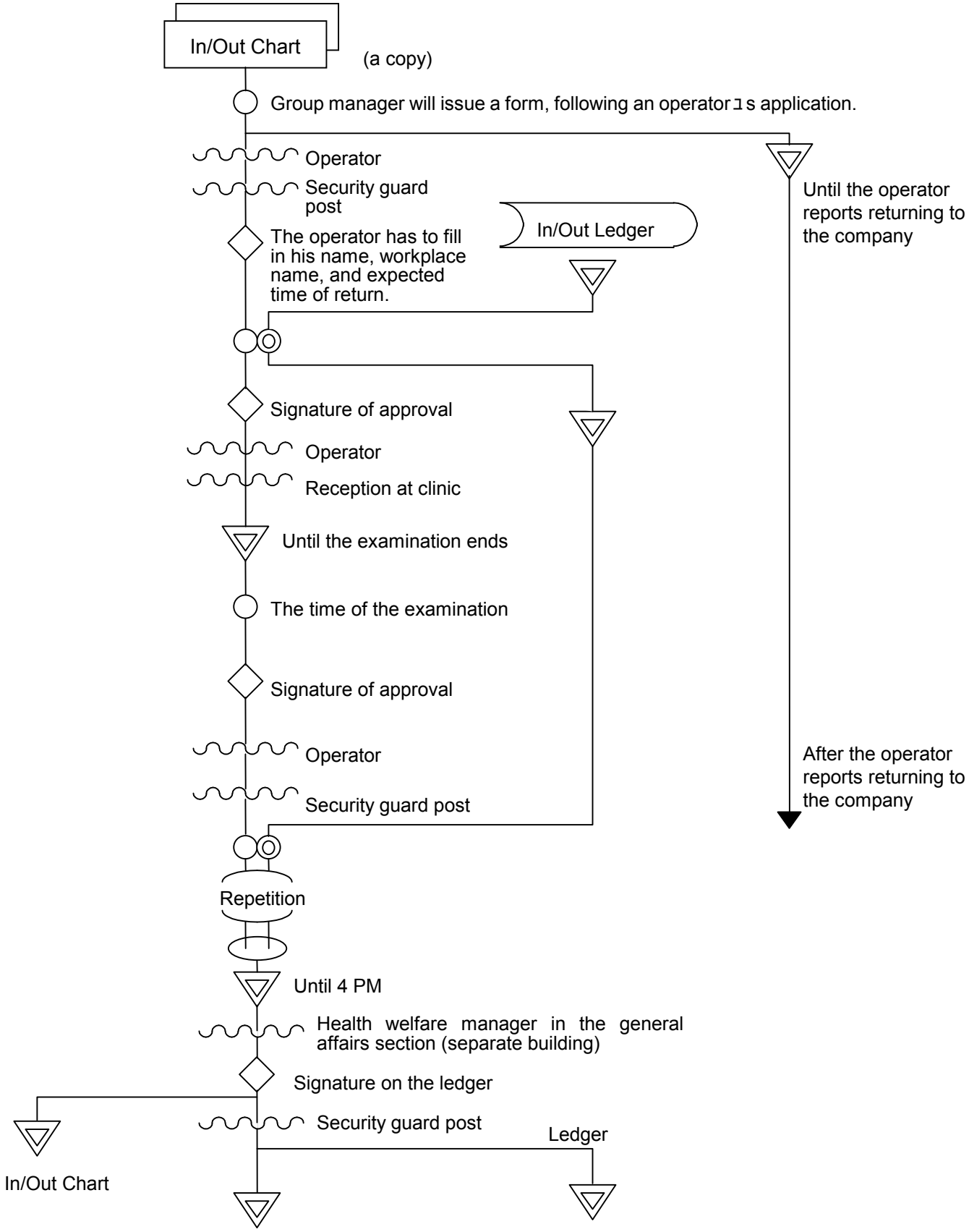
SWS Calculations Chart

Date___/___/___

Behavioral objective		Processing business forms																			Description of operation			
																		Autonomous maintenance activities	Other	Total	Routine operation	Decision-related operation	Investigation / planning	Other
Description of the behavior	Code	A	B	C	D	E	F	G	H	I	J	K	L		V	W	X	Y	Z		11	21	31	41
Gathering information																								
Preparing materials, cleaning up	11	0.9	1.2	0.1	0.5		0.1					0.2								4.1	2.8	0.6	0.6	0.1
Reading materials	12	0.3	0.4	0.8			0.1			0.1		0.1	0.1		0.1	0.2				2.8	2.1	0.5	0.2	0.0
Looking for materials	13	0.1		0.1			0.1						0.1			0.1				0.9	0.4	0.2	0.4	0.0
Others	14								0.2				0.1							0.4			0.1	0.2
Subtotal		1.3	1.6	1.0	0.5		0.2		0.2	0.1		0.3	0.4		0.1	0.3				8.1	5.2	1.3	1.3	0.4
Information																								
Calculation/totaling	21	0.2	0.8	0.8	0.1	0.1	1.2	0.1	0.1	0.1			0.4						0.1	4.3	3.0	0.5	0.8	0.0
Making charts, descriptions, and thinking	22	1.9	2.8	1.1	0.1	0.2	0.4		0.4	0.9		0.4	0.3					0.1		13.9	7.6	1.0	5.2	0.1
Checking/matching	23	4.2	0.6	0.8	0.8		0.5	0.7	0.5	0.1	0.3	0.1	0.1		0.5	0.2	0.1	0.1		15.7	0.4	2.4	2.8	0.0
On-line operations	24	3.8	2.1	0.1		0.3														11.6	7.9	1.9	1.8	0.0
	25	0.3	0.2	0.2	0.3																			

Flow Analysis Chart

Procedures for going to a medical clinic during office hours



Improvement Plans/Actual Results Table

_______________Section _________________Department ____Period ____Period

___/___ (mo./yr.) to ___/___

No.		In Charge	Period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	BM	Target	Actual Result	Effect	Evalu-ation
1	Simplification of the work procedures dealing with retiring employees	○ ○	Oct. - Dec.							12 h	8 h	8 h	4 h	○
2	Improving the efficiency of procedures dealing with seminar applications	○ ○	Nov. - Jan.							5 h	3 h	3 h	2 h	○
3	Improving the publication of the plant newsletter	× ×	Dec. - Mar.							10 h	5 h	7 h	3 h	In Progress
4	Office automatization of employees' service records	Δ Δ	- Oct.							12 h	3 h	3 h	9 h	○
5	Improving the efficiency of patrol/management of company-owned houses for single employees	Δ Δ	Oct.. - Dec.							24 h	16 h	15 h	9 h	○
			- [month]											
			- [month]											
			- [month]											
			- [month]											
			- [month]											
			- [month]											
			- [month]											
			- [month]											
			- [month]											
							Total			97 h	55 h	69 h	28 h	

Step 2 Diagnosis Sheet

Application form for operation improvement diagnosis
Operation improvement diagnosis sheet
Step 2: Information and operations flow analysis

Diagnosis	Autonomous	Section manager	Top executive

Team name	
Registration No.	:___/___/___ ___a.m./p.m. to ___a.m./p.m.
Diagnosis date and time	
Diagnosed by:	

____points	Pass	Fail

Autonomous diagnosis	90 or more points
Section manager diagnosis	85 or more points
Top executive diagnosis	80 or more points

Diagnosis items	Diagnosis points	Score	Suggestions
1. Taking an inventory of operations	・Is there an operations inventory chart, and is it updated? (4 points) ・Is responsibility for operations within a section clear? (2 points) ・Is the person in charge clearly indicated? (2 points) ・Is the operations inventory chart coordinated with the responsibility for operations in the section? (2 points)		
2. Function analysis	・Is section function analysis implemented? (5 points) ・Is the function analysis coordinated with the operations inventory chart? (5 points) ・Given the purposes of functions, is it clear whether it is appropriate for that section to undertake the operation? (5 points)		
3. Operation flow	・Is the operation flow chart made for all operations? (15 points)		
	・Are contents of the operation flow chart written correctly, in detail, without ommissions, and the way things are actually practiced? (5 points) ・Are contents coordinated with work duty rosters? (5 points)		
	・Are problems identified? (5 points) ・Are minor improvements implemented immediately? (5 points) ・Are problem improvement plans made for an operation or within a section? (5 points)		
4. Evaluation of the status of circle activities	・Does everybody participate in making the operation flow chart and in discussing problems? (5 points) ・Are there more than two proposals per person per month? (5 points) ・Are expected effects and results of improvement activities made clear? Is an activity board used effectively? (5 points)		
5. Retention of conditions after each previous step	・Is the conditions after the initial clean-up sustained? (5 points) ・Are filing standards implemented thoroughly, and are they maintained? (5 points) ・Are documents circulating? (5 points) ・Are previous “suggestion” items addressed and improvements maintained? (5 points)		

	Evaluation criteria	Bad ←		Mediocre	→ Good	
		20%	40%	60%	80%	Perfect score
Evaluation level	Things	Almost no implementation.	Only easy things are implemented.	Even difficult tasks are attempted.	Even difficult tasks are implemented.	There have been remarkable improvements.
	People	Everybody is indifferent.	Only the leader is implementing.	Easy parts are done by members.	Almost everything is done by members.	Division of responsibility is clear and well-observed.

Detailed Schedule and Control Chart for Tracking Improvement Theme Progress

Control Chart for Tracking Improvement Theme Progress

Department		No.
Theme Name		

Step 3 of Autonomous Maintenance

Theme No.	Theme name	Targets		Item No.	Implementation items (details)	Plans		In Charge	Progress Rate				Implementation (completion date)	Remarks
		BM	Target Value			Start Date	Completion Date		25 %	50 %	75 %	100 %		
1	Reviewing weekly plan documents	The number of critical control products which are out-of-stock	No out-of-stock products	1	Knowing the actual sales records up to that week	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				2	Understanding the sales trends once a week	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				3	List of outstanding D/O [direct orders] of in-stock goods	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				4	Reviewing the base purchasing cost code	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				5	Understanding the unprocessed orders of the week	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
2	Making a system for transferring stock	41 man-days	9 man-days	1	Creating a system for allocating stock transfers	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				2	Improving the direct transfer rate	○ / ○	○ / ○	○○	●	●	●		○ / ○	
3	Simplification of shipment release procedures	91 man-days	65 man-days	1	Automatic creation of on-deposit D/O's	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				2	Improving the procedures of on-deposit D/O's	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
				3	Improving the procedures of D/O's whose shipments are designated	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	
4	Shortening the processing time of returned products	99 man-days	89 man-days	1	Improving the procedures of receiving returned products	○ / ○	○ / ○	○○	●	●	●	●	○ / ○	

Examples of Reduced Man-Hours Through Trade-Offs

Prepared by: Section (Group) Subsection List of “C” rank operations by profit-receiving departments (_____Section (Group) _____Department)

Date	The 4th WC Operation Name	No.	The 3rd WC Operation Name	Objectives or Roles of Operations	How to Reduce Clerical Function Losses							Responses from Profit-receiving Departments			The final trade-off
					Abolishing	Extending the cycle	Reducing quality	Reducing quantity	Reducing frequency	Integrating	Transferring Control	Adopted	Not Adopted	Reasons for not adopting	
2	Development estimation	203	Schedule arrangement	Checking progress/extending delivery dates	○							○			Abolition
	Same as above	204	Organizing drawings/checking specifications	Selecting drawings/checking contents			○				○ Development	○	○	There is a gap in timing of drawing issuance.	Lowering the quality
	Same as above	206	Organizing in-house process charts	Organizing process charts/centralizing control			○				○ Production engineering	○	○	Same as above	Same as above
8	Production volume estimation	404	Organizing drawings/checking specifications	Selecting drawings/checking contents			○				○ Development	○	○	Same as above	Same as above
	Estimation of company “A”	2707	Establishing processes	Determining processes for estimation							○ Production engineering	○			Production engineering
	Same as above	2705	Assessing time	Determining processes for estimation							○ Production administration	○			Production administration
1	Estimation of in-house inventory	5101	Collecting data	Determining the base unit of the estimation			○					○			Lowering the quality
	Same as above	5102	Submitting the total estimation to the accounting department	Implementing the estimation			○					○			Same as above
5	In-house release of parts for shipment	501	Entering part names	Determining part names							○	○			
	Same as above	502	Entering in-house delivery numbers	Determining in-house delivery numbers							○	○			
	Same as above	503	Making a trial calculation of designated delivery date	Determining designated delivery dates							○		○	Need to calculate delivery dates of those deliveries whose dates have been requested to be changed.	
	Same as above	507	Reporting the designated delivery date	Notifying of the designated delivery dates					○				○	An increase in paper work for changing the delivery date	
	Same as above	505	Checking delivery documents	Matching the delivery dates					○				○	An increase in paper work for confirming the delivery date change	
	Preparation for parts shipment	601	Making punch cards	Determining label contents							○ Calculator		○	As a rule, this should be done by a profit-receiving department.	
	Same as above	1000	Checking cards	Distinguishing between correct and incorrect	○						○ Calculator		○	Same as above	
	Same as above	603	Correcting errors	Correcting errors							○ Calculator		○	Same as above	

Examples of Speeding Up Estimation Work by Using From-To Analysis

From / To	Sales	Production Administration	Engineering	
Sales	Aim to optimize the cost estimation operation in product fine tuning stages. ● It takes time to calculate estimates, which often inconveniences customers.	● There are too many process sequence changes from development to production prototype stages. ● The cost table is old. ● The cost table is not accurate.	● Product/part drawings are submitted late from development to production prototype stages.	Sections from here on are omitted.
Production Administration	● Cost information of other manufacturers is unavailable.	● It takes time to establish process sequences (due to insufficient manpower).	● Finalization of drawings is delayed. ● There are a lot of drawing changes.	
Engineering	● Needs and requests of customers are not transmitted accurately, or are delayed. ● Final confirmation with customers is insufficient.			

Layout Improvements

Before

After

Improvement Sheet	10	2 - 3 - 24

Improvement Sheet

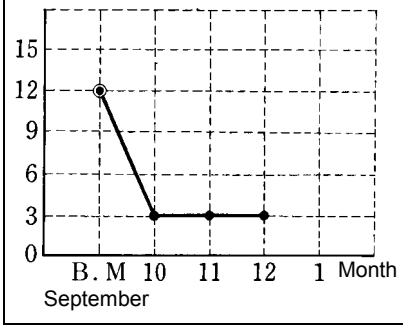
_____Circle _____Section _____Department Leader:_____

Theme: Shortening the time to make employee service record reports

Reasons for selection	Target
{1} To improve departmental operation efficiency by 30 %. {2} To computerize reports which are now made manually.	12 hrs/month --> 3 hrs/month Period:___/___/___ - ___/___/___

Before Improvement	After Improvement
1 Making service record reports (three times a month) 2 Procedure {1} Making a photocopy of previous service record report. {2} Take changed parts from the "hiring/retiring changes administration notice." {3} Calculate the increase/decrease by section. (Calculate manually.) {4} Fill in names in the "increase/decrease" column. {5} Total by section, and calculate the total number. (Calculate manually.) {6} Make a clean copy of the report. (Handwrite.) Handwriting/manual calculation operationmistakes. 4 hrs x 3 times = 12 hrs/month Mistakes made in rewriting: 0.7 cases / month	The number of personnel per section is input into a personal computer. Zero rewriting/calculation · No more rewriting necessary. · No more calculation necessary. (Work reduction of 3 hrs per report.) · Zero rewriting/calculation mistakes. 3 hrs x 3 times = 9 hrs/month work

Eliminate 7 major losses. * Mark improved items with a "O".	1. Value losses (reduction of expenses through elimination, simplification) 2. Processing losses (more centralized, more efficient) 3. Accuracy losses (improved accuracy and coordination. Avoiding excessive accuracy.) 4. Speed and timing losses 5. Idling losses 6. Communication losses (timing, delivery date, time) 7. Cost losses

Effect Graph	Measures to Prevent Recurrence	Leader's Comments
	Standardization: once Issuing an improvement sheet: once Making a one-point lesson sheet: once	_____, who was in charge of this theme, has produced a significant effect by studying personal computers and making use of the knowledge to improve his own operations. He has enjoyed a great feeling of accomplishment, and is now working on the next theme.

Receipt by TPM Promotion Office	Department Manager	Project Manager	

Example List of Improvement Results

_____Department

No.	Department	Name of Theme	Description of Improvements Implemented	Results (hr./mo.)	Improve-ment Period
1	○○○○	Improvement of customer reception work	Divided of customer reception work among employees	○○	93.6
2	○○○○	Improvement of telephone operator work	Abolished specialized telephone operator position and had that person perform multiple tasks	○○	93.7
3	○○○○	Improvement of commuting expense payment operations	Automated [computerized] office operations	○○	93.9
4	××××	Improvement of processing related to retirement	Avoided missed processing and increased speed.	○○	94.4
5	××××	Improvement of office work related to improvement proposals	Automated office operations	○○	94.4
6	××××	Improvement of job attendance record data management	Automated office operations	○○	94.9
7	××××	Improvement of reporting workers' attendance status	Automated office operations	○○	94.10
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
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21					
22					
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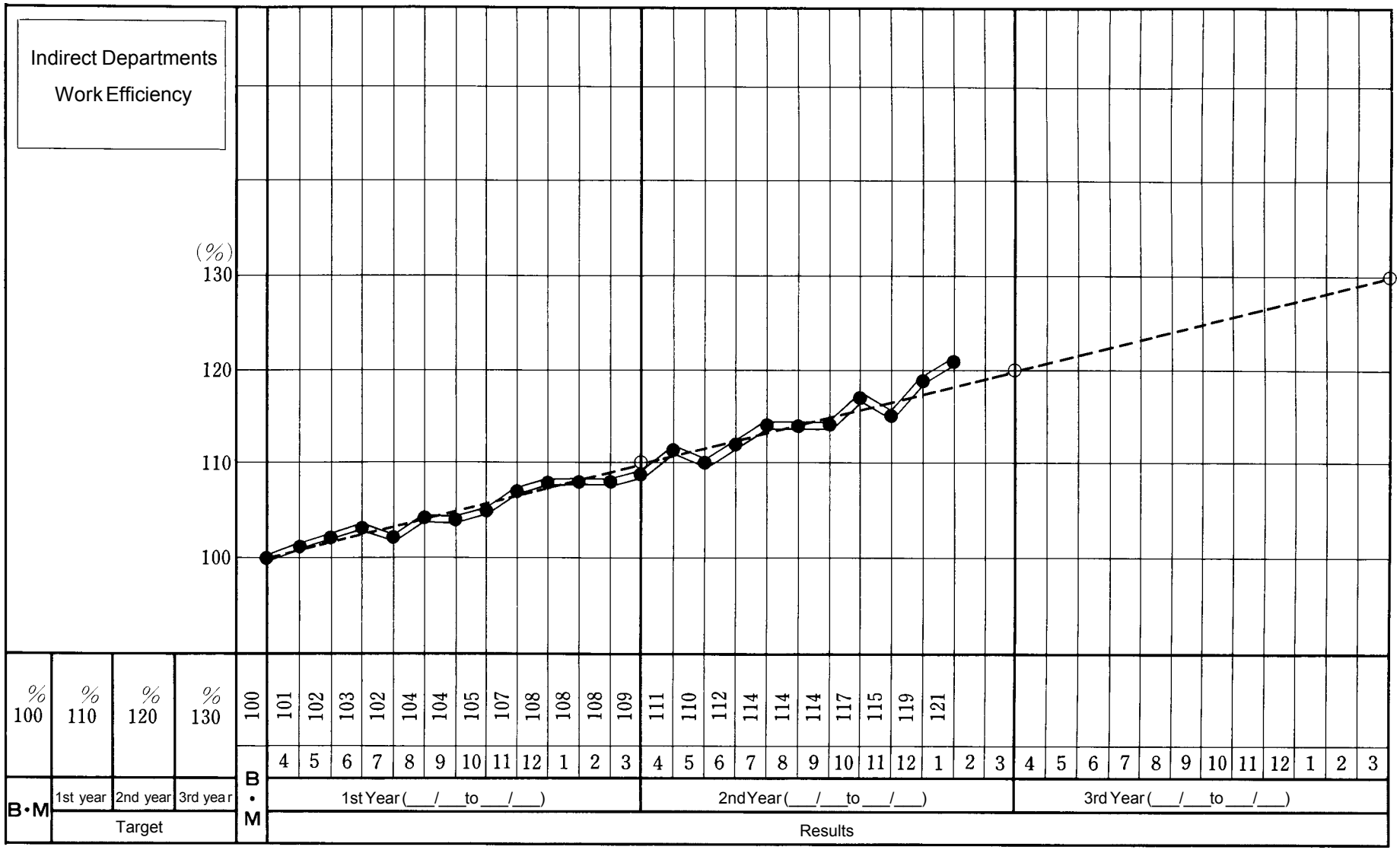
24					
25					
26					
27					
28					
29					
30					
31					

Example Graph of Results



Step 3 Diagnosis Sheet

Application form for operation improvement diagnosis
Operation improvement diagnosis sheet
Step 3: Measures for improving problems

Diagnosis	Autonomous	Section manager	Top executive

Team name	
Registration No.	:___/___/___ ___a.m./p.m. to ___a.m./p.m.
Diagnosis date and time	
Diagnosed by:	

____points	Pass	Fail

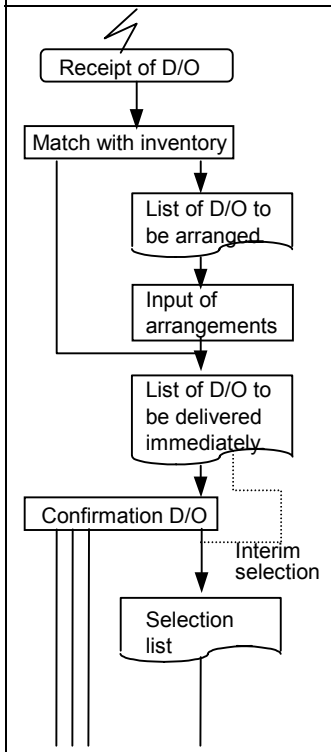
Autonomous diagnosis	90 or more points
Section manager diagnosis	85 or more points
Top executive diagnosis	80 or more points

Diagnosis items	Diagnosis points	Score	Suggestions
1. Implementation of improvements to problems	・Diagnosis pointsAre there plans for improvement of problems identified through function analysis and flow analysis, and have the plans been implemented and completed? (20 points)		
2. Thorough pursuit of work efficiency	・Have the individual improvement themes for the thorough pursuit of work efficiency been implemented and completed? (10 points) ・Is work efficiency pursued with the goal of reducing office work by 50%? (10 points)		
3. Level of target achievement	・Are the effects of target achievement increasing as problems are improved and efficiency pursued? (10 points) ・Are the methods for improvement appropriate? (10 points) ・Are new problems discovered in the process of examining the proposals for improvements? (5 points)		
4. Evaluations of circle activities	・Are the improvements being made by everyone? (5 points) ・Are there at least 3 proposals per person per month? (5 points) ・Are the activity boards interesting, with plans, progress, and the effects clearly displayed? (5 points)		
5. Retention of conditions after each previous step	・Are the conditions after the initial clean-up maintained? (5 points) ・Are filing systems maintained? (5 points) ・Are documents circulating? (5 points) ・Are previous “suggestions” addressed and improvements maintained? (5 points)		

	Evaluation criteria	Bad ← ···		Mediocre	··· → Good	
		20%	40%	60%	80%	Perfect score
Evaluation level	Things	Almost no implementation.	Only easy things are implemented.	Even difficult tasks are attempted.	Even difficult tasks are implemented.	There have been remarkable improvements.
	People	Everybody is indifferent.	Only the leader is implementing.	Easy parts are done by members.	Almost everything is done by members.	Division of responsibility is clear and well-observed.

Operation Manual

Date Prepared	__. __. __		Department in Charge	Section Manager	Subsection Manager	In Charge
Revision 1						
Revision 2						

Name of Operation	Product Shipment Processing						
Flow of Operations and Business Forms	Description of Operation	Originators of Information, Documents		Processed By (company)	Control Points Items to be Confirmed	Standards for Management Decision-making Reference Materials	Remarks
		Department	Period (Delivery Date)				
	⊙ System Center → Factory, D/O received ⊙ Matched with actual stock ⊙ Output ★list of designated shipment date and designated delivery date D/O (IP) ⊙ Input releases on D/O confirmation date. Process on ★D/O system screen 4. ● Check delivery date and whether stock shortages have been solved. ★ Process delivery date changes or cancellation requests on D/O system screen 5. ⊙ Implement selection (interim → confirmed) and shipment mode	System Center E.D.P. Office E.D.P. Office E.D.P. Office	7 times/day Upon receipt 11:40 AM 2:30 PM Deadlines	System section Persons in charge of deliveries Persons in charge of deliveries, system section Persons in charge of deliveries (Senkoh Operations)	Confirmation of designated dates Confirmation of designated dates Shipment mode (1) centralized (2) regional	Process to be stored in D/O control box.	*One-point lesson No. 003 *One-point lesson No. 004 *One-point lesson No. 005

Step 4 Diagnosis Sheet

Application form for operation improvement diagnosis
Operation improvement diagnosis sheet
Step 4: Standardization of Operations

Diagnosis	Autonomous	Section manager	Top executive

Team name	
Registration No.	:___/___/___ ___a.m./p.m. to ___a.m./p.m.
Diagnosis date and time	
Diagnosed by:	

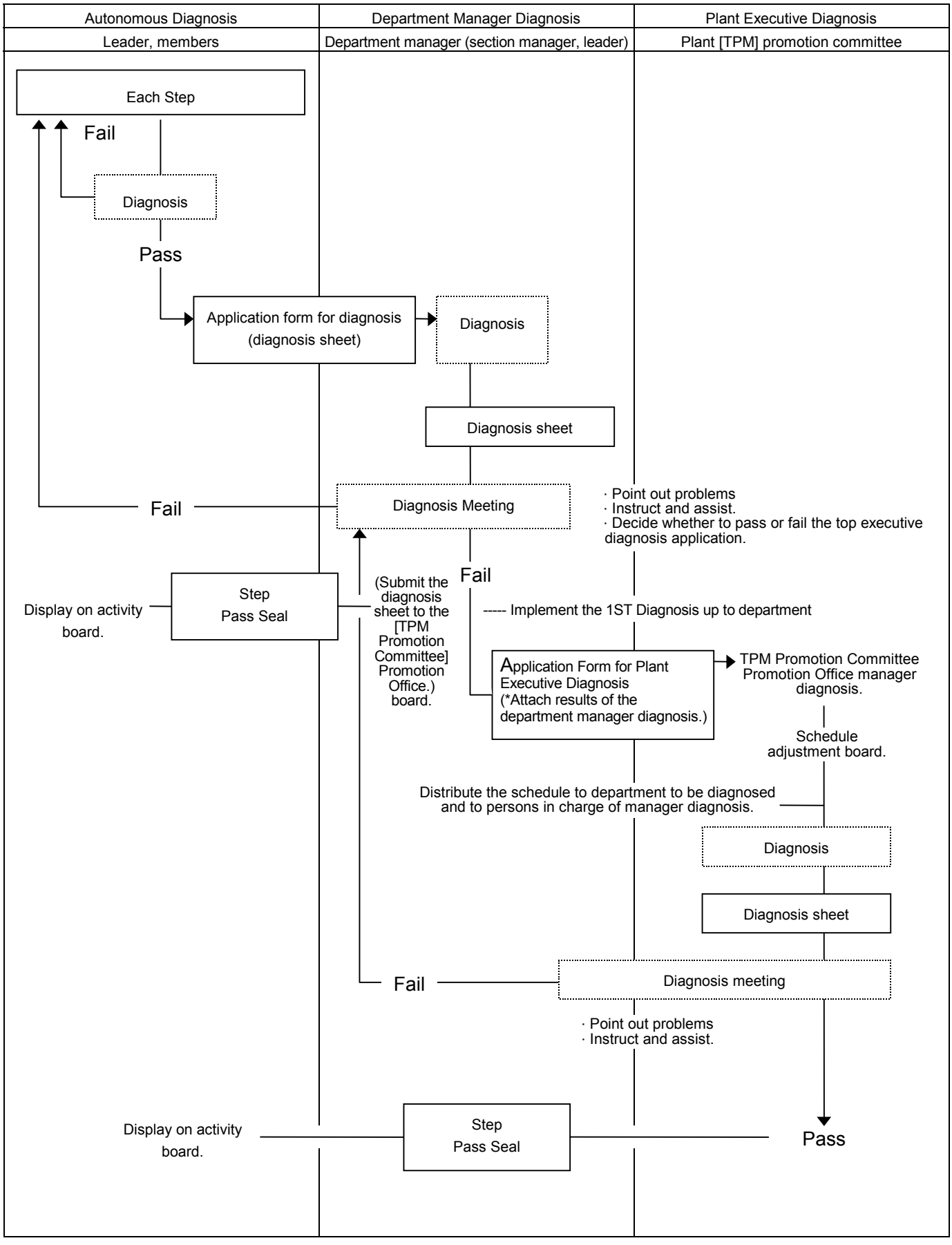
____points	Pass	Fail

Autonomous diagnosis	90 or more points
Section manager diagnosis	85 or more points
Top executive diagnosis	80 or more points

Diagnosis items	Diagnosis points	Score	Suggestions
1. Making rules and manuals for operations	・Are operation manuals made for all operations? (10 points) ・Are manuals easily understood by everyone? (10 points) ・Are flow charts (or block diagrams) attached? (5 points) ・Is there education/training about manuals? (5 points)		
2. Making systems for work improvement and thorough pursuit of work efficiency	・Are there systems so that improvements to operational problems and pursuit of improvement can be done automatically? (10 points) ・Are system structures established for operations “as they should be”? (10 points) ・Is the system for increased office automation in place? (10 points)		
3. Revision of standards	・Is there a system for comparing actual operations with standards and manuals and reviewing? (10 points) ・Are filing procedures reviewed and revised? (5 points) ・Are there are least 5 suggestions per person? (10 points)		
4. Retention of conditions after each previous step	・Are the conditions after the initial clean-up maintained? (5 points) ・Is there thorough visual control of operations? (10 points) ・Are previous “suggestions” addressed and improvements maintained? (5 points)		

	Evaluation criteria	Bad ←・		Mediocre	←・ Good	
		20%	40%	60%	80%	Perfect score
Evaluation level	Things	Almost no implementation.	Only easy things are implemented.	Even difficult tasks are attempted.	Even difficult tasks are implemented.	There have been remarkable improvements.
	People	Everybody is indifferent.	Only the leader is implementing.	Easy parts are done by members.	Almost everything is done by members.	Division of responsibility is clear and well-observed.

Flowchart for Indirect Department Autonomous Maintenance Diagnosis



Step Diagnosis Application Form

Prepared on:___/___/___

Step___ (Number of times___) **Application Form for Plant Executive Diagnosis (Indirect Department)** Pass date of the previous step:___/___/___

Promotion Office receptionist	Department manager	Section manager	Prepared by

	Circle name	Section	Department	Leader's name	Number of members	Worksite to be diagnosed
Applying Circle						

Activity status of this step					Description of activities	Number of times	Number of staff involved	Total number of hours
					Meetings	___ times	_____people	h
					Work operations	___ times	_____people	h
	Attaching tags on nonconformities: _____ cases	Detaching tags on nonconformities: _____ cases	Remaining tags on nonconformities: _____ cases	Requests to other departments	Education/training, one-point lessons	___ times	_____people	h
					Total	___ times	_____people	h

Things emphasized during diagnosis	The requested scope of diagnosis	
	Diagnosis points	
	Hardships	
	Other	

Results of Factory Executive Diagnosis Step no.____

Judgment	Score received
Pass Fail Re-audit	____points

Date of diagnosis	___/___/___		
Time of diagnosis	___a.m./p.m. to ___a.m./p.m.		
Diagnosis staff	Committee members specializing in diagnosing indirect departments	Remarks by diagnosis chief	

Step Progress Chart

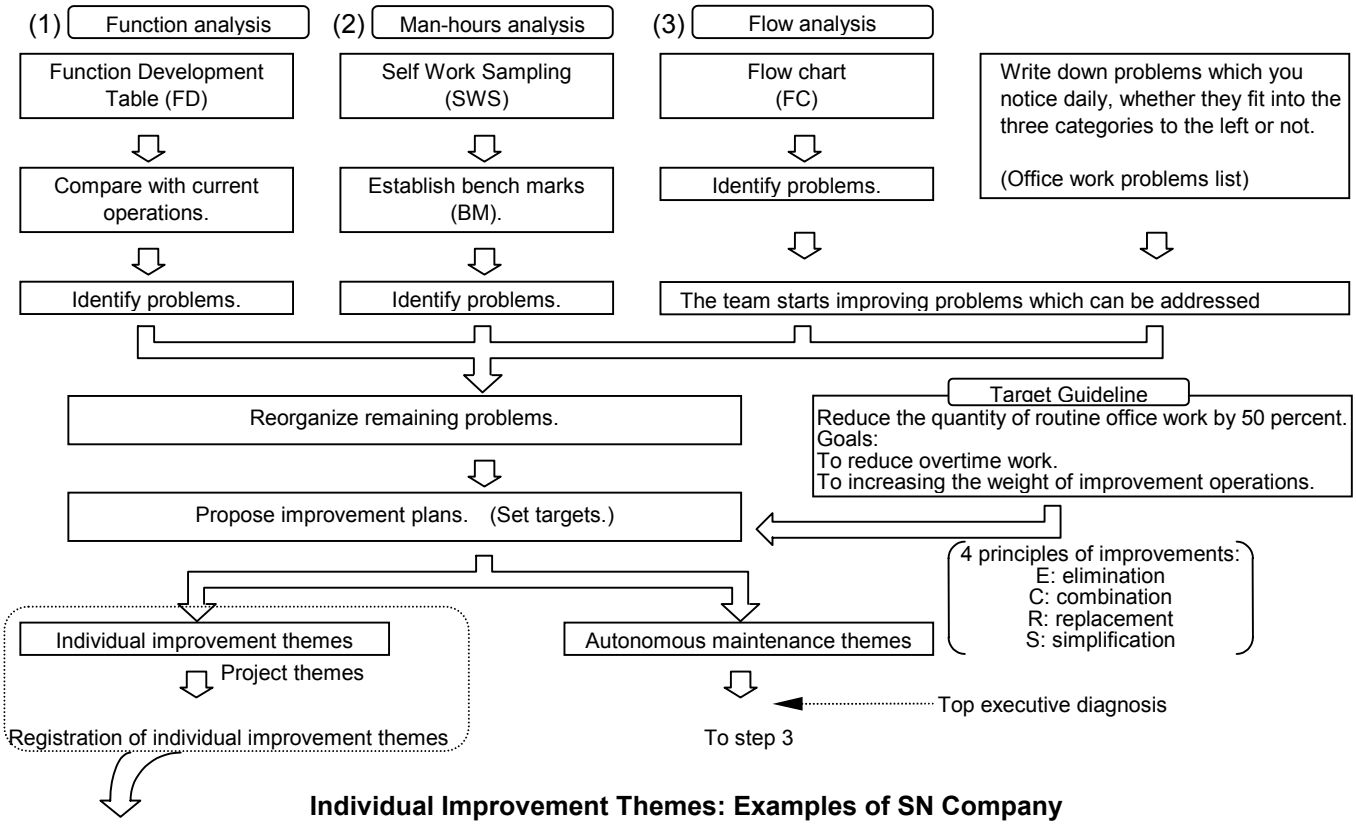
Step Chart For Indirect Department Autonomous Maintenance

_____ Circle

Step 1	Step 2	Step 3	Step 4	Step 5
Passed 3/27/__	**Passed** 9/24/__	**Passed** 4/13/__	**Passed** 9/23/__	**Activities in progress**

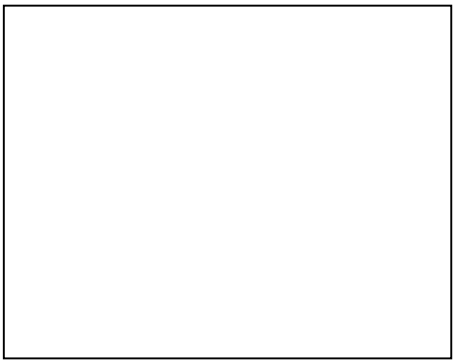
Administrative/Indirect Department Project Themes and Manufacturing Support Project Themes

Project Themes

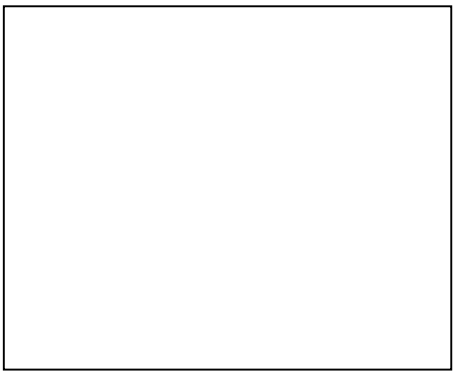


Individual Improvement Themes: Examples of SN Company

Themes	Goals	Implemented Items	Project Members	Major Effects
Improving production administration	To establish a system in which we accomodate local FTS production, and can provide services with the minimum inventory.	• Shortened the plan-drafting cycle • Introduced the MRP system	• Manufacturing sections • System section	Production lead time • Stocked products (important control parts) Reduced from 14 - 40 days to 7 - 13 days (from the date production plan is drafted to the date stocked.) • Ordered products Reduced from 20 - 25 days to 10 - 15 days (from date delivery scheduled to the date stocked)
		• Introduced AI to process formation	• Manufacturing/system sections • Engineering staff from the head office	
		• Developed the production plan-drafting system	• Manufacturing/operations sections • System/business sections	
		• Introduced CAD	• Manufacturing sections • System section	
Improving purchasing	To establish a system in which we can procure needed products at the time needed in just the needed quantiy.	• Material ordering system through MRP	• Manufacturing sections • System section	Raw materials procurement lead time (maximum) • Stocked products Reduced from 25 to 3 days (major materials: zero days) • Ordered products Reduced from 10 to 3 days
		• Personal computer networking with cooperating companies	• Manufacturing sections • System section • Cooperating companies	
		• Introduced TA system.	• Manufacturing sections • System section • Cooperating companies • Departments from the head office	
Improving distribution	To increase the productivity of freight processing so that we can improve our customer services.	• Smoother flow of the freight processing work after the introduction of the “wharf” method • Introduced the shelf numbers control system • Bar code shipment system	• Operations section • System section • Cooperating companies	Freight processing productivity • Stocked products: 1.6 times • Ordered products: 1.7 times



11. Safety, Health, and Environment Management System



11 Creation of a Safety, Health and Environment Management System

1 The Safety Activities Triangle : Design, Operation, and Maintenance

Correctly build, correctly operate, and correctly maintain equipment.

Make equipment fundamentally safe and maintain its functions.

Ensure safety during new construction and renovation.

- Safety Audit Guidelines{1}
- Safety Audit Implementation Report {2}
- Initial-phase Production Control {3}{4}{5}
- Safety Evaluation Guidelines {6}{7}
- MP Proposals {8}{9}

Improving Safety of Existing Equipment

· Equipment Inspection Schedule {10}
· Improvement Proposal Form {11}

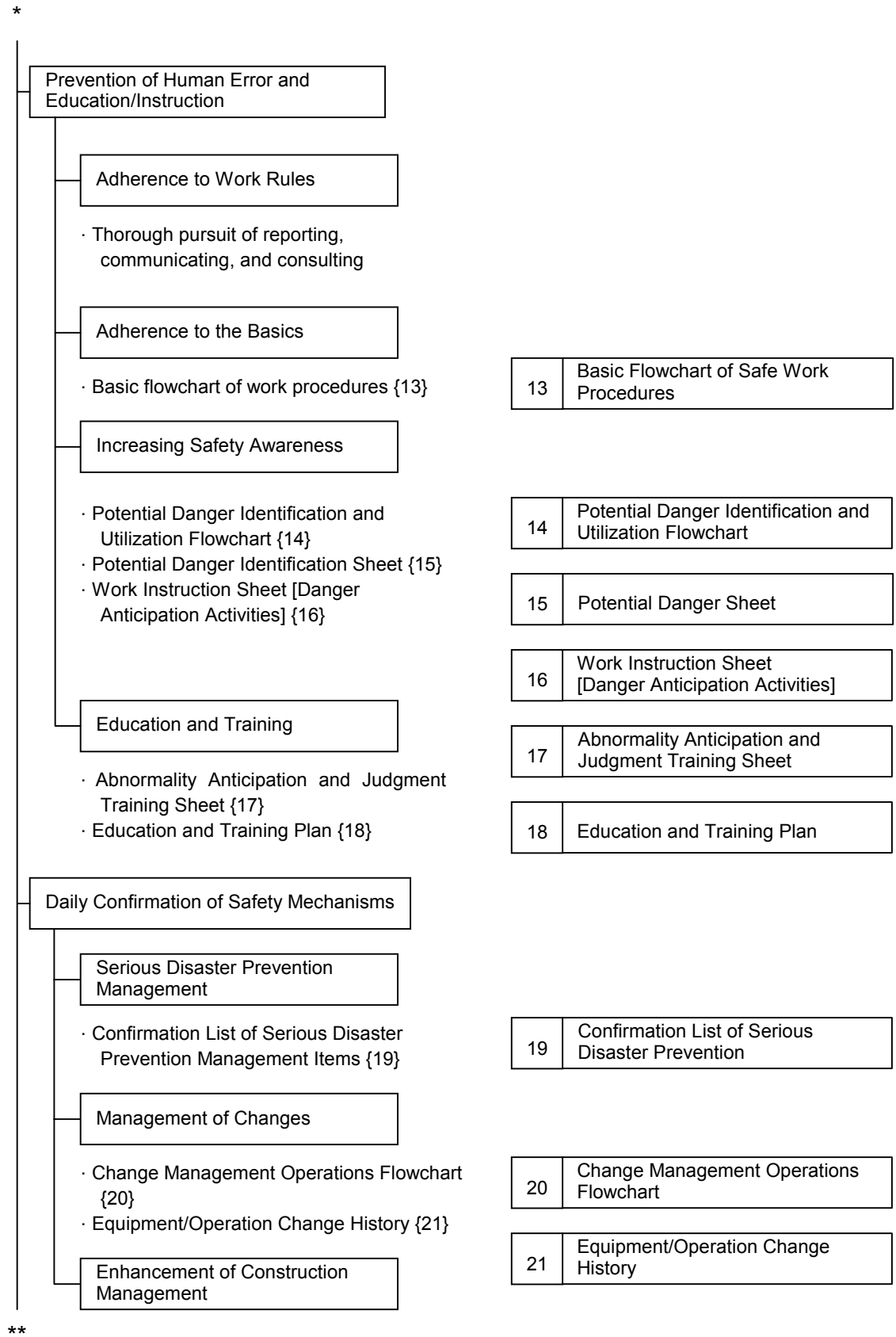
Improving Safety of Safety Equipment and Disaster Prevention Equipment

· Safety Equipment Maintenance Control Chart {12}

*

1	Safety Audit Guidelines
2	Safety Audit Implementation Report
3	Initial-phase Production Control Sheet
4	Initial-phase Production Control Items Inspection Implementation Evaluation Chart
5	Initial-phase Production Control Problem Handling Chart
6	Safety Evaluation Guidelines
7	Safety Evaluation Items and Application Periods {1} {2}
8	MP Proposal Activities Operation Flowchart
9	MP Information Sheet
10	Equipment Inspection Schedule
11	Improvement Proposal Form
12	Safety Equipment Maintenance Control Chart

11 Creation of a Safety, Health and Environment Management System



11 Creation of a Safety, Health and Environment Management System

**

- Identification and Improvement of Potential Dangers
  - Correction of Equipment Operation Problems
    - · Case Utilization Table {22}
  - Obtaining and Utilizing Safety Technology Information
- Preparation for Safety Management System
  - Safety Policies and Plans
    - · Annual Site Safety, Health, and Environment Management Plan {23}
    - · Workplace Safety and Health Management Plan {24}
  - Implementation of Safety Patrols
  - Establishment of Committees
  - Establishment of Disaster Prevention [Preparedness] System
    - · Emergency Handling Standards {25}
    - · Disaster Prevention Training {26}

22	Case Utilization Table
23	Annual Site Safety, Health, and Environment Management Plan
24	Workplace Safety and Health Management Plan
25	Emergency Handling Standards
26	Disaster Prevention Training (photos)

11 Creation of a Safety, Health and Environment Management System

2 Creation of an earth-friendly, people-friendly environment

Achieving Zero Pollution

- Environment Committee Operating Guidelines {27}
- Environmental Management Regulations {28}
- Environmental Management Standards {29}
- Environmental Management Standard Values Table (water purity) {30}
- Environment Maintenance Patrol Guidelines {31}
- Environment Maintenance Patrol Inspection Chart {32}

27 Environment Committee Operating Guidelines

28 Environmental Management Regulations

{1} Environmental Management Regulations
{2} Pollution Prevention Organization Law

29 Environmental Management Standards

30 Environmental Management Standard Values Table (Water Purity)

31 Environment Maintenance Patrol Guidelines

32 Environment Maintenance Patrol Inspection Chart

Air Pollution Prevention Measures

Water Pollution Prevention Measures

Soil Pollution and Landslide Prevention Measures

Handling of Industrial Waste

- **Waste Treatment Guidelines {33}**
- **Waste Cards {34}**

33 Waste Treatment Guidelines

34 Waste Card

Work Environment Improvement

- Work safety standards
(List of Protective Articles used by Work Type) {35}
(Work Environment Control Values List) {36}

35 List of Protective Articles Used by Work Type

36 Work Environment Control Values List

Noise And Vibration Prevention Measures

- Work Environment Improvement Evaluation Standards (noise pollution) {37}

37 Work Environment Improvement Evaluation Standards (Noise)

Odor Prevention Measures

Improvement of Insufficient Lighting

- Work environment improvement evaluation standards (lighting) {38}

38 Work Environment Improvement Evaluation Standards (Lighting)

Improvement of Dust And Heavy Labor {39, 40}

39 Work Environment Improvement Evaluation Standards (Dust)

40 Work Environment Improvement Evaluation Standards (Heavy Labor)

11 Creation of a Safety, Health and Environment Management System

3 Creation of Good Health

Enhancement of Health Management

Regular Health Examinations

· Health Management Plan Table {41}
· Health Plan {42}

Enhancement of “Trim” Activities

· Japan Archipelago Walking Map {43}
· Map-walking Record {44}

41	Health Management Plan Table
42	Health Plan
43	Japan Archipelago Walking Map
44	Map-walking Record

Safety Audit Guidelines

1. Purpose

To contribute to the improvement of facility and equipment safety, these guidelines stipulate required items for safety audits based on the "Safety and Health Management Regulations."

2. Facilities Subject to Safety Audits And Audit Period

(1) Facilities undergoing new construction or renovation

As a rule, safety should be audited at the following five stages.

{1} When the basic plan is almost decided upon.
{2} When the basic plan is almost finished.
{3} When the detailed design is almost finished.
{4} Before the construction project starts.
{5} When the construction project is almost finished.

(2) Equipment Undergoing Periodic Replacement Work

{1} Before project starts.

Safety audits should be done after completely stopping equipment, after project preparation work such as draining of systems, purging, edge cutting, and drip sealing have been completed, and directly before any firing/heating work will be done.

{2} After project is finished. (Before starting up.)

Safety audits should be done after the work project, cleaning, and installation are finished, after safety equipment has been restored, and immediately prior to beginning equipment operation.

(3) Equipment in Operation

{1} __ years after newly installed equipment began operating.
{2} Every __ to __ years for equipment which is already installed.

(4) Safety audits in other cases should be done upon instruction by the assistant site manager in charge of engineering.

Safety Audit Implementation Report

Report date: ___/___/___

Assistant Site Manager	Safety & Environment Office	Section Manager	Subsection Manager	In Charge

Implementation Date and Time:	___/___/___ (_____day) ___:___ to ___:___
Audit Category	
Audit Committee Members	
Section Audited	

No.	Issues Identified	Status of Treatment

No.	Issues Identified	Status of Treatment

Comments By Audit Committee Chairman		
Audit Results	Pass	Fail

Initial-phase Production Control Sheet

___/___/___

_____Year _____ Construction Project ITEM No. _____-_____

No.	Item (location)	Design/Study of Drawing			Manufacturing/Meetings with Customer			Installation/Work Project			Initial-phase Production Control Period		
		Category	Problems	Countermeasures	Things to implement and check	In charge	Evaluation	Things to implement and check	In charge	Evaluation	Things to implement and check	In charge	Evaluation

Initial-phase Production Control Items, Inspection Implementation Evaluation Chart

Equipment		Relevant Classification		System No.		Control Point No.		Control Level	

1. Pending Items

	Prepared __/___/___		
	Approved by	Inspected by	In Charge
Section			

2. Foreseeable Problem Contents and Phenomena

3. Evaluation Method

- ☐ Visual inspection
- ☐ Device monitoring
- ☐ Non-destructive inspection
- ☐ Other

5. Evaluation of Implementation

___/___/___

	Approved by	Inspected by	In Charge
Section			

- ☐ No abnormalities (return to periodic inspection)
- ☐ Production control should continue (until ___ (month) __ (day))
- ☐ Control contents should be revised
- ☐ Should take measures to improve equipment

Engineering Section	Civil Engineering Section	Section in Charge of Maintenance

4. Inspection Results

Item No.	Measurement point	Judgment value	Measurement value	Month/day	Remarks

6. Measures (renovation of facilities, correction of standards and guidelines, procedures for revision of standards)

Initial-phase Production Control Items
Inspection Implementation Evaluation Chart

11

1 - 4

Initial-phase Production Control Problem Handling Chart

Equipmen		Relevant Classification		System No.		Control Point No.		Control Level	

Name of Incident

__/___/___, __:__, _____shift, Name:_____

1. Problem Contents and Phenomenon

2. Causes

(Confirmation of problem)

3. Countermeasure (Proposed)

4. Results

5. Measures to Prevent Recurrence

(Confirmation of countermeasure)

Section Manager		Subsection Manager	Shift A	Shift B	Shift C	Shift D	Reporting: Needed / Not needed			
							Date and time		In charge	

Section Manager		Subsection Manager	Shift A	Shift B	Shift C	Shift D	Response			
							Date and time		In charge	

Initial-phase Production Control Problem Handling Chart

11

1 - 5

Safety Evaluation Guidelines

1. Purpose

To help assure safety, these guidelines define the necessary items regarding safety evaluations when facilities are newly constructed or renovated, based on the "Safety and Health Management Regulations."

2. Application

These guidelines apply to the evaluation of safety when facilities are newly constructed or renovated.

3. Terminology

(1) Safety evaluation: a series of preliminary investigations, conducted at each stage of the facility/equipment life cycle from research and development to design, construction, operation, and disposal, including 1) detection of dangers, 2) calculation of the possibility of accident occurrence and the level of influence of the accident, and evaluation of the risks, and 3) system improvements based on the level of risk.

(2) Hazard: The potential danger of accidents in systems, plants, and processes.

(3) Risk: The level of possibility of facility damage or human accidents, and the level of potential economic loss or human injury in the event that these events occur.

4. Implementation

(1) Responsibilities

{1} The section manager (project manager) in charge of facility construction or renovation is responsible for implementing safety evaluations at each level, from basic planning of facilities to operation.

{2} When implementing safety evaluations, there should be complete cooperation the between the business site and related departments such as the head office.

Explanation of Safety Evaluation Guidelines

1. Application

* As for a newly-founded corporation, safety evaluation must be implemented based on "Construction Control Regulations" or "Guidelines for Auditing Basic Process Design & Engineering." The application of safety evaluation methods must be implemented based on these guidelines.

2. Terminology

* "Safety evaluation" means evaluating the safety of a facility being planned and improving safety when necessary, by using all technical know-how and other available methods. Safety evaluations are included in the scope of operations related to facility design, construction, operation and so on. A safety audit is conducted at every major stage, from facility planning to operation, in which a third party checks and audits whether safety evaluations are implemented properly or not. Therefore, safety evaluations must to be completed before each stage's safety audit.

* Willie Hammer, in his book *Handbook of System and Product Safety*, has defined the terminology below as follows.

(1) Hazard (potential danger): A potential cause of human injury or physical damage, but the prevention of phenomenon occurrence is possible.

(2) Risk: Possibility of loss occurring within a certain time period, indicated as the product of the probability of occurrence and the level of loss.

* The above are defined by the American Institute of Chemical Engineering (AIChE) in their "Guidelines for Hazard Evaluation Procedures." (Hereafter referred to as "Guidelines.")

* Refer to Supplemental Table 1 (omitted) for example results of safety evaluations of hazards, initial phenomena, mid-term phenomena, and accidents.

3. Implementation

* Safety evaluations are not always conducted by in-house staff. Depending on the circumstances, outside organizations, such as public research organizations, may be contracted to conduct evaluations. The Section Manager (Project Manager) is responsible for the implementation of safety evaluations, including those conducted by outside organizations.

Safety Evaluation Items and Application Periods (1)

Safety evaluations are to be implemented at the stages indicated below, such as during facility construction or renovation. Safety evaluation methods for each step are shown in{4} (omitted.)

	Project Status	Prior to Approval			Upon Obtaining Approval For Construction		After Approval	
	Stages	Project development	Basic planning	Deciding the contents of plan/basic design	Detailed design and material procurement	Construction and safety check	Trial operation	Normal operation
	Investigation Period	No.{1} Basic plan		No.{2} Basic design	No.{3} Detailed design	No.{4} Construction	No.{5} Trial operation	No.{6} Performance check
Safety Evaluation Items	Basic items		◎	○	○			
	Plot plan		◎	○	○	○	○	○
	Materials	◎	○	○	○			○
	Processes	○	◎	◎	○	◎	○	○
	Operations			○	◎	○	○	○
	Equipment and Facilities		○	◎	◎	◎	○	○
	Safety and Accident Prevention System Plan		◎	○	○	○	◎	○
	Line Worker Training, etc.		◎	○	○	○	○	○
	Safety Evaluation Methods	* Check list * PHA		* FTA * ETA * DOW & ICIMOND	* HazOp * FMECA	* Confirming the implementation of safety measures		* Confirming safety * Checking dislocation * Confirming designs
	Safety Audit			* Basic plan	* Basic design * Process engineering audit	* Detailed design * Before construction		* Before completion * Before start-up
	Remarks	◎: Evaluation items which should be implemented selectively at this stage ○: Evaluation items which should be implemented at this stage, and evaluation items to be reviewed and confirmed This checklist can be used at all phases of a project. For more detailed information, refer to “Safety Evaluation Items and Application Periods” in Appendix 1 (omitted).						

Safety Evaluation Items and Application Periods (2)

1. Determine the level of influence by referring to the table below. (This table is in accordance with the philosophy of DuPont).

Level of Influence	Extent of Accident Damage	Human Injury	Physical Damage
3	Accident extends outside the plant.	There is a death.	More than ¥___ million.
2	Accident damages most of the plant.	There is serious injury.	Between ¥__hundred and¥___million.
1	Accident damages part of the plant.	There is minor injury.	Less than ¥___.
0	Source machines are damaged and broken, and restoration is possible.	No injury.	Minor damage.

2. Codes within the matrix indicate system improvement methods.
   A: Removing the hazard itself. (Example: Change material to a non-toxic one.)
   B: Reducing the level of hazard. (Example: Change process conditions such as temperature and pressure.)
   C: Reducing the level of risk to an acceptable level. (Example: Expand safety and accident prevention systems to protect a plant.)
   D: An acceptable risk.

3. Detailed steps of foreseeable hazard evaluations and example applications of safety evaluation methods are indicated in Supplemental Table 2. When evaluating, it is not necessary to implement all detailed steps, nor is it necessary to always begin from the top. Use an appropriate method, depending on the importance and complexity of the system.

4. Major construction is presumed for the application period [previous page], but the application period for minor construction or renovation can be used more flexibly.

5. Explanation of Investigation Timing

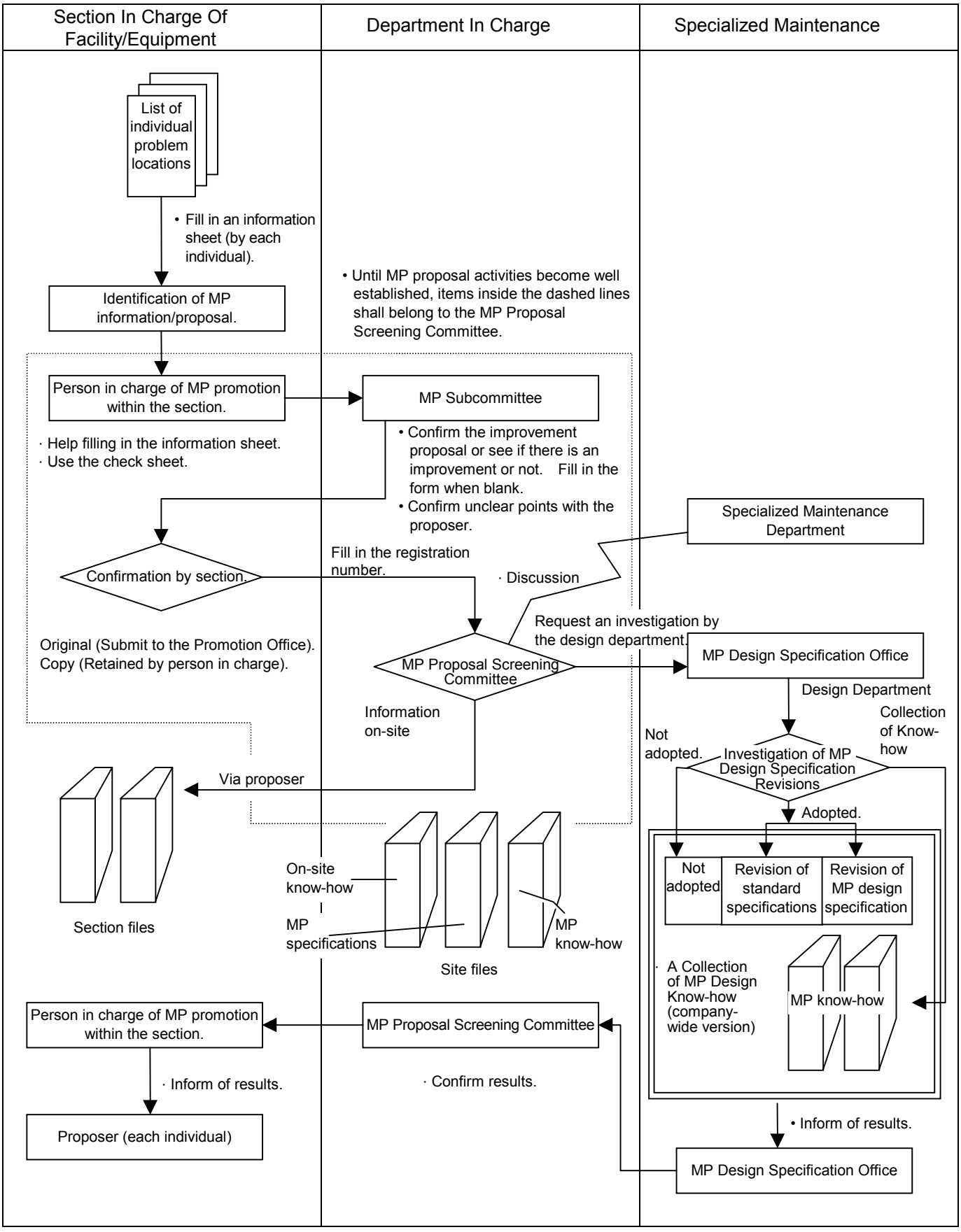
Investigation No. 1: Investigation at basic planning stage

- The investigation should be done at an early period in the project because the purpose of the investigation is to detect hazards unique to the raw materials and processes.
- For example, one must to check the range of explosivity of mixtures of combustible materials and oxygen (or material which include oxygen.) (As a current example, the explosive limit of a mixture of isopropanol and hydrogen peroxide must be checked at this stage.) Also, the toxicity of newly-produced materials must be verified through testing.
- The investigations must be started at this stage because they are time-consuming. Here, checklists, PHA and so on, are used.

MP Proposal Activities Operation Flowchart

11	1 - 8

MP Proposal Activities Operation Flowchart



MP Information Sheet

Registration No.
Reference No.

___/___/___ Proposer:	Confirmed by:	Checked by:	Prepared by:
Section/Office/PJ			

Proposal Description	Case Name									
	Classification	{2} Heating furnace	{3} Tank tower	{4} Heat exchanger	{5} Movable machine	{6} Instrumentation	{7} Electricity	{8} Piping	{9} Tank	{10} Civil engineering [construction equipment]
		{11} Steelworks	{12} Paint	{13} Thermal insulation	{14} Welding	{15} Boiler	{99} Other (_____)			
	Purpose	{1} Safety	{2} Reliability	{3} Operability	{4} Maintainability	{5} Profitability	{6} Other (_____)			

Actual Conditions	After Improvement
Illustration/photo	Illustration/photo

Results of Section Investigation	Screening request {1} Necessary / {2} Unnecessary				
	{1} Already implemented {2} Not implemented {3} Scheduled to be implemented in: Year___ Month____			Effects	
Results by Screening Committee	{1} Adopted	{1} Standard specification {2} MP design specification	Received on:	___/___/___	Promotion office
	{2} Not adopted	{3} Collection of know-how	Date of screening:	___/___/___	
		{4} Other (_____)	Date returned:	___/___/___	
	Contents of screening				
Evaluation	(LCC Calculation)				

Circulation route: ☐ Proposing section ⇒☐ Promotion office (_____ section) ☐Adopted (copy) → ☐ _____ section

• File the original of adopted proposals (in the Collection of Know-how) ☐ Not adopted (original) → ☐ Proposing section

Equipment Inspection Schedule of Fiscal Year _____

Month	Item	Confirmed	Month	Item	Confirmed
APRIL	Emergency valve leak inspection		OCT	Rotating machinery performance inspection	
	Level gauge inspection			Dust-collecting machine inspection	
	Valve function inspection			Centrifugal filter inspection	
	Valve appearance inspection			AFC tubesheet inspection: every year	
MAY	Piping inspection			Cable exposure preventative measure inspection	
	Spring hanger inspection		NOV	Heavy rotating machinery lubricating oil inspection	
	Sea water cooler flow rate inspection			Class 2 pressure vessel inspection	
	Flexible inspection			Rotating machinery function inspection	
	Weather seal inspection			Piping inspection	
	Rotating machinery function inspection			AFC tubesheet inspection: every year	
JUNE	Flange inspection		DEC	Dust-collecting machine accessory grease up	
	Seal oil tank O_2 gas detection			Sea water cooler flow rate inspection	
	Branched tubing inspection			Nitrogen gas seal inspection	
	Expansion inspection			AFC tubesheet inspection: every year	
	Grounding inspection		JAN	Valve sticking prevention	
	Nitrogen gas seal inspection			AFC tubesheet inspection: every year	
JULY	Heavy rotating machinery lubricating oil inspection		FEB	Centrifugal filter inspection	
	Thermal insulation inspection			UV seal, breather valve inspection	
August	Piping inspection (inside pits)			Rotating machinery function inspection	
	Rotating machinery function inspection			AFC tubesheet inspection: even years	
SEPT	Relief valve inspection		MARCH	Tank actual dimensions check	
	Sea water cooler flow rate inspection			Nitrogen gas seal inspection	
	Flame arrester inspection			AFC tubesheet inspection: every year	
	Nitrogen gas seal inspection			AFC tubesheet inspection: even years	
	Periodic inspection of manufacturing site				
	AFC tubesheet inspection: every year				
	AFC tubesheet inspection: even year				

Improvement Proposal Form	11	1 - 11

Improvement Proposal Form

Name of Business Site: _____ Section/Office _____ Subsection

Reference No.	_____-_____	Section Manager/ Office Manager	Subsection Manager	Committee Members
Month of proposal:				

Proposer Name (group): _____ (_____group)

Case Incident Name	
Proposal field	1. Safety and environment (safe environment/stable operation) 2. Revenue improvement (which can be directly converted into a sum of money) 3. Improved efficiency of operations (which can be converted into time) 4. Other

1. Problems with actual condition (before improvement) Insert before and after sketches and so on.

2. Contents of improvement

3. Tangible and intangible effects

Improvement in money:	__ (thousand yen [¥___00] per year)	Improvement in time:	___ (hours per year),	_____ (thousand yen per year)

(Note) Improvements are converted into money in order to calculate tangible improvement points.

A. Advice related to the proposal and the adjustment of opinions			Adopted or not	Application for honorable work
Committee on shift (members)	A			
	B			
	C			
	D			
Day shift members				

B. Contents of discussion within section/office

☐ Implemented	☐ Needs to be investigated.	☐ Please replicate horizontally in other sections or sites.
☐ Scheduled to be implemented (around month:_____)	By section in charge ( )	☐ Please submit a practical use proposal or patent application.
Autonomous activity / Order	By other section (_____section)	☐ Please add this to the theme bank.
☐ Regretfully, we will not implement it.	☐ Evaluation of safety (such as the management of changed areas)	☐ Please register this in engineering information.
	☐ Please standardize.	

	Tangible effects	Intangible effects	Continuity	Practicality	Creativity	Management creativity	Level of efforts	Presentation record	Total points
Individual proposal	(25)	(25)	(10)	(10)	(30)		(30)	(10)	140
Group proposal	(25)	(25)	(10)	(10)	(20)	(20)	(20)	(20)	150

Supporters' Tips

When these tips are implemented, cut off the lower right corner of the page and submit it.

Safety Equipment Maintenance Control Chart

1. Inspection Chart For Emergency Shut-off Valves

Section Manager	In Charge

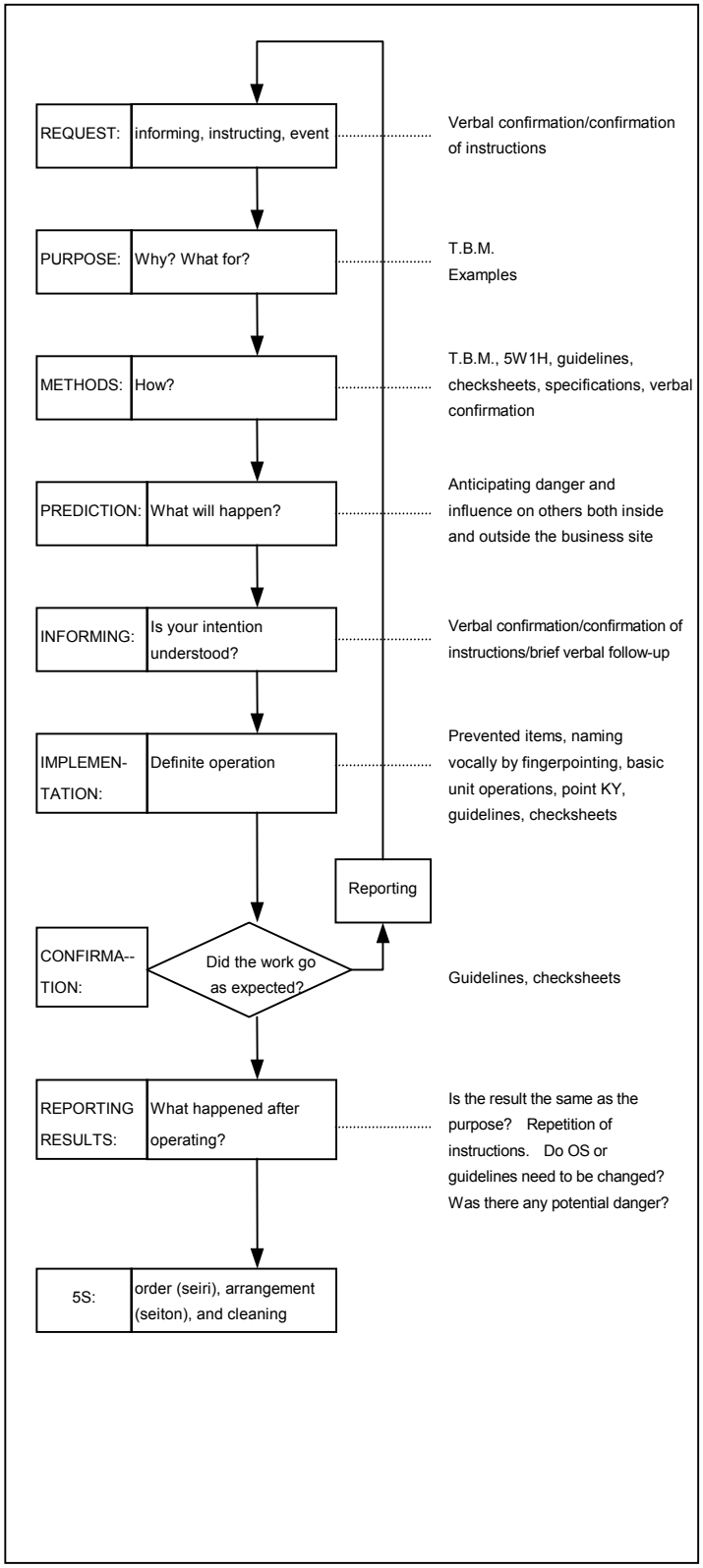
Item	Location	Appearance inspection	Actual operating time	Inspection date	Inspector
HXC-1A	H1 F/O				
HXC-1B	H1 F/G				
HXC-2A	H2 F/O				
HXC-2B	H2 F/G				
HXC-3A	CH'G				
HXC-3B	CH'G				
FX1C-1	CH'G				
FX1C-2	P1 DIS				
HXC-4	PIA stoppage				
	PIB stoppage				
HXC-5	H2 IN				
HXC-6	C2 stoppage				
HXC-7	C3 stoppage				
HXC-8	C2SUC				
	C3 SUC				
HXC-9	CIA stoppage				
HXC-10	CIB stoppage				

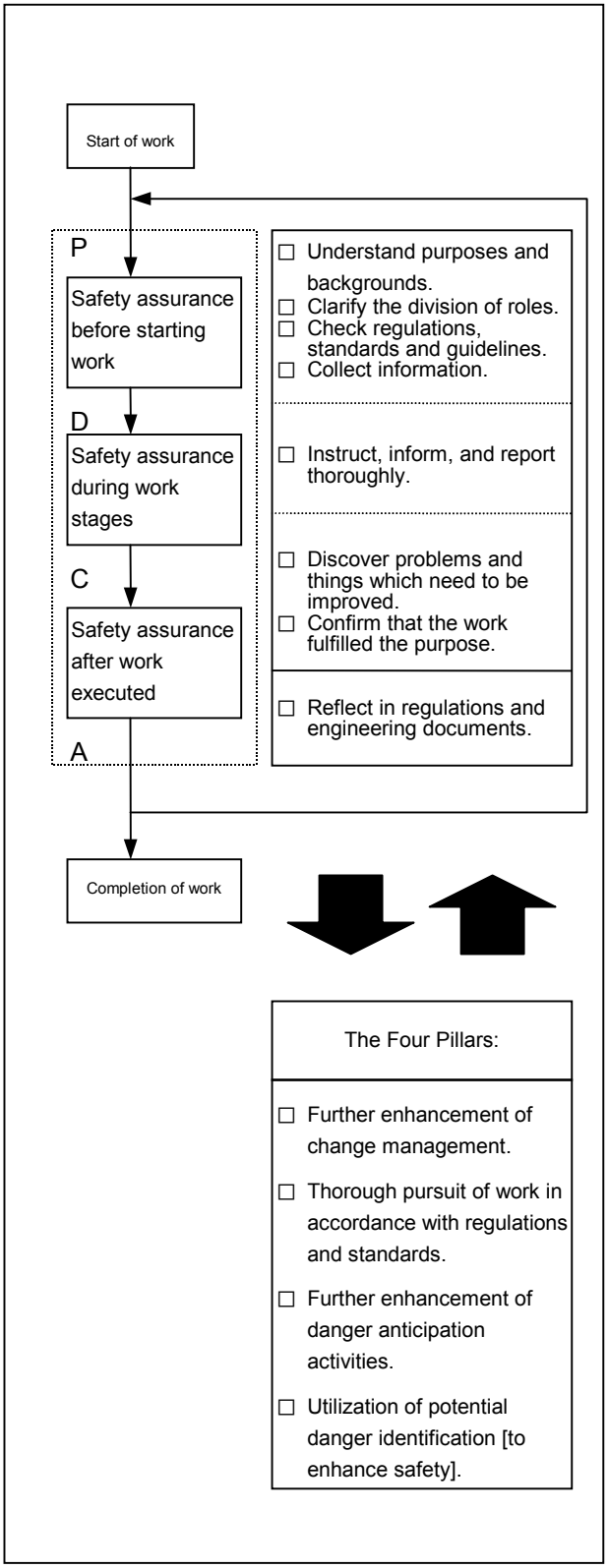
Item	Location	Appearance inspection	Actual operating time	Inspection date	Inspector
HXC-11	FXIC-10(P2 DIS)				
	FXIC-12(P2 DIS)				
	LXIC-4(V5)				
HXC-12	HXC-12A (V7 bypass)				
	HXC-12B (V7 in)				
HXC-13	LXIC-10(V8)				
	LXIC-11(V9)				
	FXIC-13(V8)				
HXC-14	H1(SNUF'ST'M)				
HXC-15	H2(SNUF'ST'M)				

Basic Flowchart of Safe Work Procedures

11	1 - 13

Basic Flowchart of Work Procedures

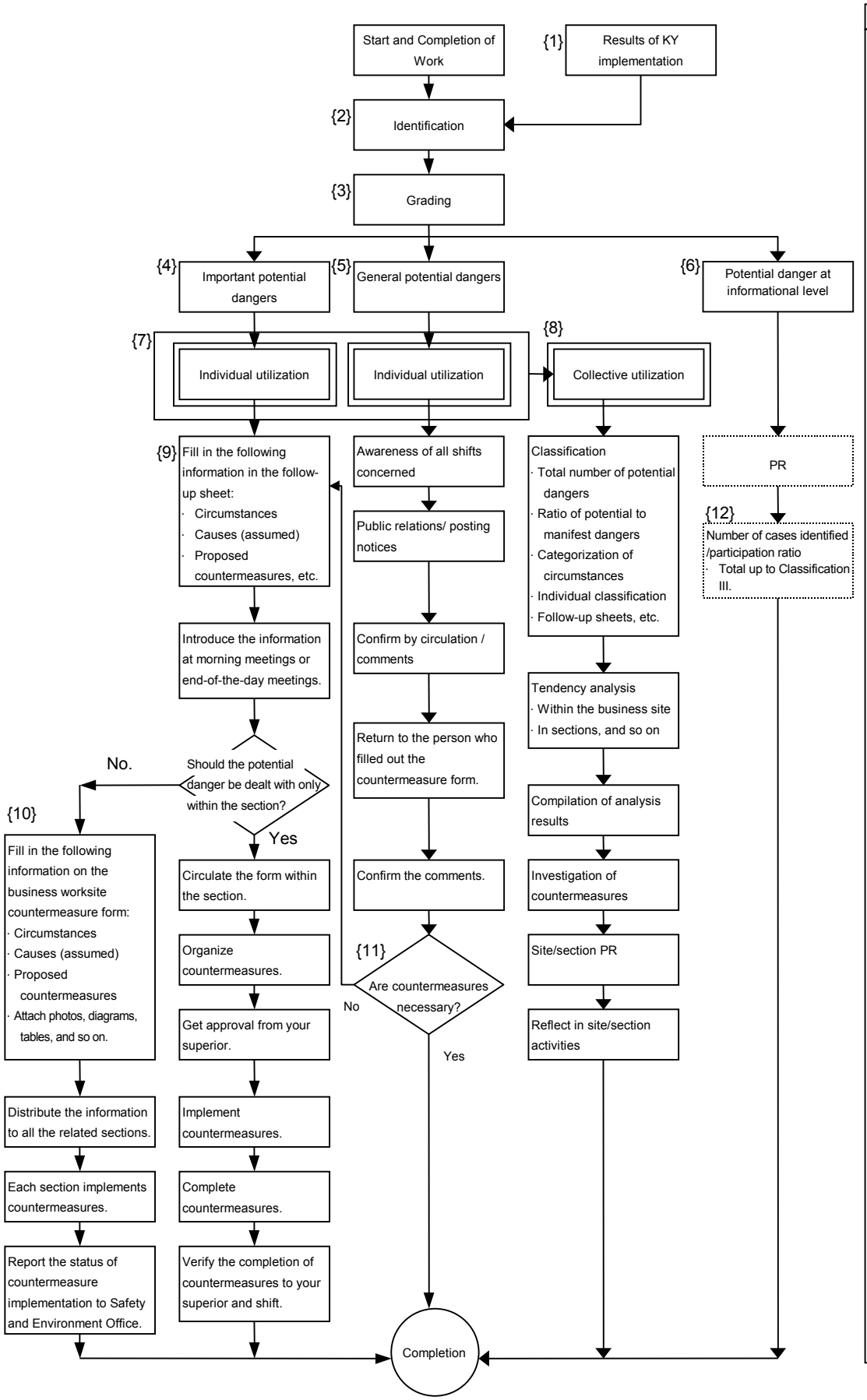




Potential Danger Identification and Utilization Flowchart

11	1 - 14

Potential Danger Identification and Utilization Flowchart



Remarks:

{1} Identify the contents of potential dangers in routine work.
{2} Fill out "the potential danger sheet."
{3} Grading should be decided by a person who identified the potential danger and his superior.
{4} Types of potential dangers which require countermeasures.
{5} Potential dangers which have already been experienced during work and need to be universally known. Countermeasures for these potential dangers should be made as needed.
{6} Types of potential dangers in the daily routine of which everyone needs to be informed.
{7} Potential dangers which need individual countermeasures to prevent reoccurrence.
{8} Implement a totaling analysis as a preventative measure:
• Improve customary behavior at the site/section.
• Individual behavioral traits
{9} It is difficult to find causes or make countermeasures through "the potential danger sheet"; countermeasures should be investigated by filling in "the potential danger follow-up sheet."
{10} Types of potential dangers whose information and causes need to be addressed horizontally across other departments on-site. (It is up to each section whether to issue a sheet or not.)
{11} By circulating or publicizing potential dangers, some "general potential dangers" may be discovered to be "important potential dangers."
{12} Analyze the status of danger identification too.

Potential Danger Sheet (Operating Department)

Section Manager	Subsection Manager	Safety and Health	Shift A	Shift B	Shift C	Shift D	

Month: __________ Section: ______________________________

I. Grading Classification	IV. Machine Model Classification	VI. Classification of Management Weaknesses	VII. Subject Classification	IX. Items of Classification per Section
1. Important	9. Static equipment	19. Unprepared guidelines	31. Autonomous maintenance	
2. General	10. Dynamic equipment	20. Missing or inadequate education	32. SDM	
3. Informational	11. Electric	21. Inappropriate instruction	33. Quality abnormality	
II. Manifest/Potential Classification	12. Instruments	22. Poor equipment	34. Critical identification	
4. Manifest	13. DCS	23. Poor work environment		
5. Potential (No need to fill in sections VI and VII.)	14. Bench	24. Poor inspection		
	15. Transportation	VII. Classification of Weaknesses in Work Procedures		
III. Classification by Sense	V. 3M Classification			
6. Occurred	16. People	25. Insufficient informing and reporting		
7. Identified	17. Things	26. Insufficient understanding of the purpose of operations		
8. Assumed	18. Work environment, information, procedures	27. Insufficient confirmation of work location		
		28. Insufficient understanding of circumstances		
		29. Insufficient understanding of guidelines		
		30. Insufficient confirmation after operations		

No.	Incident Name:	Classification I	
	Description:	Classification II	
Shift Name (circle one)		Classification III	
A B C		Classification IV	
D U	Treatment:	Classification V	
		Classification VI	
Month/Day	Background of “VI” (management): ( )	Classification VII	
Month/Day	Background of “VII” (work procedures): ( )	Classification VIII	
Name	Comments:	Classification IX	
		Follow-up Sheet	Used / Not Used

No.	Incident Name:	Classification I	
	Description:	Classification II	
Shift Name (circle one)		Classification III	
A B C		Classification IV	
D U	Treatment:	Classification V	
		Classification VI	
Month/Day	Background of “VI” (management): ( )	Classification VII	
Month/Day	Background of “VII” (work procedures): ( )	Classification VIII	
Name	Comments:	Classification IX	
		Follow-up Sheet	Used / Not Used

No.	Incident Name:	Classification I	
	Description:	Classification II	
Shift Name (circle one)		Classification III	
A B C		Classification IV	
D U	Treatment:	Classification V	
		Classification VI	
Month/Day	Background of “VI” (management): ( )	Classification VII	
Month/Day	Background of “VII” (work procedures): ( )	Classification VIII	
Name	Comments:	Classification IX	
		Follow-up Sheet	Used / Not Used

Work Instruction Sheet (Hazard Anticipation Activities)	11	1 - 16

Work Instruction Sheet (STK)

Team No.		Work Instructions by:	_____	Members	
Team Name			TEL.		
Work Name				Date and time	___/___ (_____day) ___:___

S	Purpose	Why		
	Description	When		
		Where		
		What		
T	Personnel Allocation	Who (Who, with whom?)	Leader	Members
K	Methods, Procedures	How		
	Hazard Anticipation — KY points and instruction of critical implementation items			
	1			
	2			
	3			
	Office address of person giving instruction			
	Verbal Confirmation (F1)			
	Individual KY (verbal confirmation)			

Team Behavioral Goal	
Items to be named by “one-point” fingerpointing	
Actual practice of naming by pointing at worksite	
Repetition of Instruction (F2)	

Abnormality Anticipation and Judgment Training Sheet

Section Manger	Subsection Manager	Shift Leader		Prepared by

(Preparation date: __/__/__, _____Section, _____Shift, Name: _____

Equipment Name: *Select one system, block, etc. by P&I.		Primary phenomenon *Start-up, normal operation, loading work, and the specific work, etc.
Summary P&I *Fill in the summary P&I.	Secondary phenomenon	Summary conditions *Fill in operating conditions, and a summary of the abnormal phenomenon. * Write down the Check Follow-up Sheets, and so on.

What will happen if left alone? What are the measures for prevention of reoccurrence?					Why did these kinds of phenomena occur? What should be done to prevent reoccurrence?				
Equipment and operation-related countermeasures	Treatment <-----	Prevention points <-----	Potential phenomenon (effects) <-----		Primary cause ----->	Secondary cause(s) ----->	Judgment points ----->	Treatment ----->	Equipment and operation-related countermeasures
* Among treatments at right, things for which equipment operating countermeasure (manuals) are needed * Fail-safes * Interlocks * EMG. S/D OS * Other	* Fill in the work operations which will avoid the phenomenon which could occur if left alone.	* Fill in the specific points, checks, and judgment points for preventing the phenomenon which could occur if left alone.	* Fill in the phenomenon which could occur if left alone. * Fire, explosion * Quality abnormality * Overflow * Machine breakage * Other	* See Document—1, and make a prediction.	* Cause of abnormal phenomenon occurrence (identification of primary cause) * Instrument malfunction Mis-indication? Other * Pump malfunction * Blockage * Other	* Identify secondary cause(s). Malfunction of each instrument C/V sticking Tripping Not sucking Valve disk fell off Strainer clogged	* What is the reason for judging that the phenomenon occurred due to a secondary cause, and which locations should be checked to identify this cause?	* Treatment if the causes at left did cause the abnormal phenomenon	* To assure that the abnormal phenomena do not occur from the beginning, consider “how things should be” in terms of equipment and operations (manuals), evaluate current equipment and manuals, investigate, and draft countermeasures. * Maintenance of inspection standards * Equipment inspection OS * Performance enhancements * Other

Abnormality Anticipation and Judgment Training Sheet

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Fiscal Year ____ Education and Training Plan

Category	Seminar Name	Items to be Learned	Section in Charge	Target Participants	Course Size	Dates Held	Remarks
Operations Engineering	Chemical engineering seminar •Catalyst reactions	• To understand the particular reactions of each process. • To understand the design engineering requirements related to catalysts and reactions. • To understand the evaluation of catalyst activation.	Engineering sections	Operating sections	10 per course	2-day course {1} September 10 and 11 {2} September 12 and 13	
	Chemical engineering seminar • Simulators	• To understand simulator functions. • To understand simple process analysis methods by using process analysis tools. • To understand vapor-liquid equilibrium calculations of reaction systems, physical properties of each equipment, and heat balance methods.	Engineering sections	Operating sections staff	10 per course	2-day course {1} May 12 and 13 (operating sections) {2} May 14 and 15 (staff)	
	Usage management seminar • Energy savings	• To understand the basis for derivation of usage unit. • To understand the focus of optimization.	Administration sections	Operating sections	40	1-day course October 15	
System Engineering	System engineering seminar I	• To understand the concept of calculators and system structure. • To be able to do VMS operations. • To know how to use an editor.	Engineering section	Operating section	10	3-day course March 1, 2, 3	
	System engineering seminar II	• To understand the concept of SETCON. • To be able to make GCS screens. • To be able to make application programs.	Engineering sections	Operating sections	10	5-day course April 15, 16, 17, 18, and 19	
	Process control seminar	• To understand how to test dynamic characteristics of processes. • To be able to make control-related [systems] • To understand basic structure of optimization control systems. • To understand the control methods of process optimization control.	Engineering sections	Operating sections	30 per course	1-day course August 23, 25, 29 or 31	
Equipment Management Engineering	Metal materials seminar	• To be able to judge whether material selections are good or bad. • To understand actual problematic examples of material selection and their countermeasures.	Civil engineering sections	Operating sections	25 per course	4-hour course June 12, 18, 22, or 28	
	Handling dynamic equipment	• To understand the basis of inspection contents. • To be able to judge whether machines are operating normally or not and take appropriate measures.	Civil engineering sections	Operating sections	30 per course	1-day course December 1, 8, 12, or 16	

Confirmation List of Serious Disaster Prevention Management Items

(Equipment management)

Management items	Contents of Confirmation	By what means?	When?	How?	Remarks
Heating furnace	Operation of emergency shutdown valve (fuel oil, fuel gas, snuffing steam)	Operation test	Before starting or during periodic inspection	Confirm that operation is smooth and that it is completely “closed,” based on the safety system inspection list or the emergency shut-off valve operation inspection list.	
	Leakage of emergency shut-off valve (fuel oil, fuel gas)	Leak test (valve seat leakage)	Before starting	Confirm that it is within the allowable volume.	
	Minimum flow volume setting	Actual equipment, or indication by flow meter	Before igniting burner and after setting conditions	Confirm that the value is set the same as the start-up check flow value.	
	Minimum stopper setting of damper	Actual equipment or DCS	Same as above.	Same as above.	
Thermal expansion countermeasures {1} Line block during normal operation {2} Line block during emergency stop {3} Line block during stoppage {4} Check valve	Implementation and indication of liquid seal prevention measures	Actual equipment	After operating applicable valves	Confirm that liquid seal prevention measures are implemented as stipulated in the guidelines. Match with the list.	
	Perforation [adding holes]	Actual equipment	At the time of check valve disconnection inspection	Confirm that there is no clogging by using the check valve list.	
	Indication	Actual equipment	Periodically	Confirm that it is displayed by using the check valve list.	

Change Management Operations Flowchart

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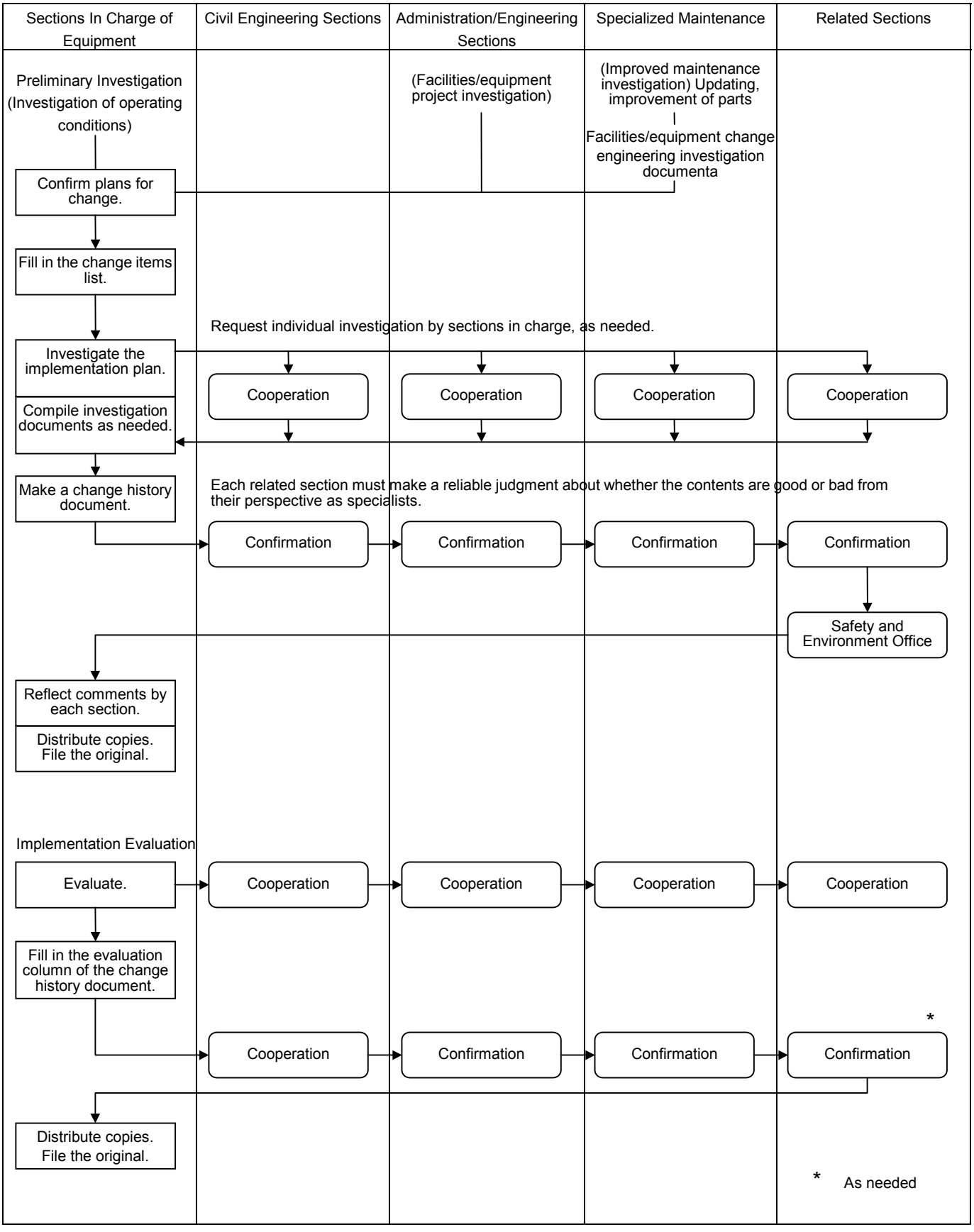
Change Management Operations Flowchart



Equipment/Operation Change History

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Operation Requirements/Equipment Change History

File No.	
Prepared on:	___/___/___

Case Name							Scheduled Implementation Period				
Area Changed							Scheduled Evaluation Period				
Reasons for Change											
Description of Change		Actual condition				After change					
Prediction of Effects After Change and Their Countermeasures		Prediction of Adverse Effects {1} (Name of detailed reference document::)				Prevention of recurrence of adverse effects, countermeasures {1} (Correction of inspection control tables 1, 2: necessary / unnecessary)					
Implementation Evaluation After Change		(Correction of inspection control tables 1, 2: necessary / unnecessary)									
Confirmation Columns	Section	Equipment Section	Safety And Environment Section		Administration Section	Engineering Section	Civil Engineering Section	Prepared By ( ) Section			Subsection Manager	Prepared by:
	Before Change											
	After Change											

Case Utilization Table

Prepared on:___/___/___ Sheet No.____

1. Case Name	Section in charge:	Subsection in charge:	
	Section Manager	Subsection Manager	In Charge
2. Occurrence Section (site)	3. Occurrence Date: ___/___/___		

4. Summary, Causes, and Countermeasures (Describe briefly.)	Items for Improvement	Description	Section In Charge/Deadline
Attachments: [ ] yes [ ] no		As a measure to prevent recurrence, confirm whether these are reflected in regulations/standards and guidelines.	

Responding sections	Countermeasure required or not	Scheduled completion	Confirmation	Responding sections	Countermeasure required or not	Scheduled completion	Confirmation
Section				Section			
Section				Section			
Section				Section			
Section				Section			
Section				Section			
Section				Section			
				Section			
Section							
Section				Section			
Section							
Section							
Section							

Completion confirmed		
___/___/___		
Section Manager	Subsection Manager	In Charge

Circulation route:
seal affixed by section in main charge --> distributed to each related section --> seal affixed of confirmation after improvement --> distributed to each related section

Distribution:

Fiscal Year___ Safety, Health, and Environment Management Plan

＊ Frequency must be at least the number indicated here. ◎ indicates the agenda of the Safety and Health Committee. ※ indicates the timing of plan explanation.

		Items	Frequency *	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Remarks
National Events and so on		Environment month			※	◎										
		Hazard safety week			※	◎										6/8 - 6/14
		National safety week			※	△	◎									7/1 to 7/7 △ Preparation month
		Electricity usage safety month						◎								
		Disaster prevention week							○							8/30 - 9/5 (industrial complex drills)
		National labor health week						※	△	◎						10/1 - 10/7 △ Preparation month
		National industrial safety and health conference							※	◎			○ Applications for next year's presentations			10/19/10/21 Dispatching presenters
		High pressure gas harm prevention week							※	◎						10/23 - 10/29 (Participating in the
		National fire disaster prevention week								※	◎			※	◎	prefectural air-breather-installation competition during the conference)
		Campaign for an accident-free year-end & New Year									※	◎				12/15 - 1/15
On-site events		Safety and environment instruction	Once a year						※	※	◎					
		Continuing certification														
	SDM and so on	SDM plan safety audit		○											○	
		SDM pre-project start safety audit		○	○										○	
		SDM pre-start-up safety audit	Whenever necessary		○	○	○									
		Facility construction/expansion safety audit														
		Creation of SDM Safety and Environment Management Policies										◎	◎			
		High pressure gas safety inspection									{1}				{2}	{1} Device {2} Operation, transmission, nitrogen CE
		Boiler pressure performance inspection		○	○	○						(Interim confirmation is implemented at the mid-point of the effective period, +/- one month, during device operation.)				
	Disaster Prevention Day															
	Touring	Touring by plant manager and assistant plant manager	Once a month	○ Fiscal year ___ behavior plan	○	○	○ Adherence to the basics	○	○	○	○	○ Year-end & New Year safety assurance	○	○	○ SDM preparation status	
		Touring by an industrial doctor	Once per two months	○	□	○	□	○	□	○	□	○	□	○	□	□ (Comments necessary)
	Committees	Safety and environment committee	Once a month	○	○	○	○	○	○	○	○	○	○	○	○	
		Nominating committee members		○												Nomination on 4/1
		Safety and disaster prevention committee	Once a month	○	○	○	○	○	○	○	○	○	○	○	○	
		Environment specialists committee	3 times a year	○		△					○					△ Confirmation of heavy rain countermeasures
	Confirmation	Confirming the revision status of regulations and standards.		○												
		Checking the confirmation status of the major disaster prevention management items.							{1}						{2}	{1} Interim confirmation {2} Year-end confirmation and reporting to head office.
		Confirming the status of case countermeasures.	Once a month	○	○	○	○	○	○	○	○	○	○	○	○	

Annual Site Safety, Health, and Environment Management Plan

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Fiscal Year___ Safety, Health, and Environment Management Plan

＊ Frequency must be at least the number indicated here. ◎ indicates the agenda of the Safety and Health Committee. ※ indicates the timing of plan explanation.

		Items	Frequency *	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Remarks
On-site Events	Council	General meeting	Once a year	○												4/28
		Safety conference	Once a year			※	○									7/1
		Ship of Excellence Award	Once a year				○									7/22
	Exchange Meetings	Potential danger exchange meeting	Twice a year					◎								
		KY exchange meeting	Twice a year				◎					◎				
		RTS seminar members exchange meeting	Once a year								○					
	On-site Education	Work safety and health education	Once a month													Implement at applicable worksites.
		• Study group for high pressure gas-related laws and ordinances.	Once a year							○Implement during high pressure gas harm prevention week. (The office manager will be the lecturer.)						
		• Study group for fire fighting and oil disaster-related laws and ordinances.	Once a year		※	○Implement during hazard safety week.										
		• Study group for labor safety and health-related laws and ordinances.	Once a year		※		○Implement during national safety week.									
		• Environment-related education	Once a year		※	○Implement during environment month.										
		• SDM education	Once a year			○Before S/U.								Before SDM.○		
		• Education of prohibited items, units and basic operation.	Once a year													
		• Education of the “mechanisms of operations management.”	Once a year													
		• Education during the establishment of regulations and standards.	When established.													
		• Education during the establishment guidelines.	When established.													
		• Disaster/accident cases meeting	Once per two months													
		Special education														
		• Electricity safety education	Once a year													
		• Education for radiation hazard prevention	Once a year				※	○Implement during the electricity usage safety month.								
		• Safety and health education for shift manager level personnel	Once a year											○ Implement before SDM.		
		Study group for proposing bills	Once a year	○ Not in fiscal year ___									○			
	Off-site Education	Training					○		○		○			○		
		Potential danger seminars									○					
		The Red Cross Society of Japan first-aid methods									○					
	Training	Overall disaster prevention training:	Five times a year				□		□		□		※□		□	
		section(s) in which disaster(s) occurred														
		Month/day					□		□		□		※□		□	
		Applicable shifts				A	□	B	□	C	□	A	※□	D	□	
		“At-desk” disaster training	Five times a year			○		○		○		○		○		
		Notification training	Five times a year				□		□		□		※□		□	
		Consultation training (riot police, cooperation meetings)	Four times a year				○	○			○				○	
		Section/shift-based disaster prevention training	Nine times a year				○	○	○	○	○	○	○	○	○	
		Abnormality judgment training	Twelve times a year	○	○	○	○	○	○	○	○	○	○	○	○	
		Section/subsection disaster prevention training	Whenever necessary													
		Training to wear protective articles	Once per three months							○						On-site air-breather-installation competition
		Disaster-coping training for day/night shifts	Once a year													(10/5)
	Other	Health examinations	Twice a year		※	△		※	◎		※	△		※	◎	△ Those handling ionizing radiation
		Typhoon, heavy wind, heavy rain, and thunder preparedness month				○										June 1: preparation and instruction
		Freezing preparedness month									○					November 1: instructions to prepare for
		Roles of regulations specialists					◎									freezing March 23: release
		Reviewing accidents and breakdowns of the previous year												◎		# indicates September 1 training on how an industrial complex gives
		Measures when an earthquake alarm is issued						◎	#							notification.

Annual Site Safety, Health, and Environment Management Plan

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Workplace Safety and Health Management Plan

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____Year ___Month Workplace Safety and Health Management Plan

Site Manager	Assistant Site Manager		Safety and Environment Office	

___Fiscal Year Important Goals

1. Adherence to regulations and standards
2. Utilization of techniques/methods
3. Utilization of work mechanisms
4. Promotion of equipment quality assurance
5. Strengthening safety management of cooperating companies
6. Making an earth-friendly environment

_____Section

	Section Manager	Subsection Manager	Safety and Health Committee Member	In Charge of Safety
Plan				
Review				

This Month's Safety and Health Goals	Scheduled Events This Month
Specific Implementation Plans	Opinions/Evaluations/Review
Comments	

(Note: A copy of the following month's goals should be submitted by the 30th of each month, and the review of the current month should be submitted by the 15th of each month to the Safety and Environment Office.

Emergency Handling Standards

1. Purpose

These standards aim to control and contain accidents and disasters which occur outside the immediate facility but still affect this location, by specifically stipulating organizational restructuring and behavioral standards in the event of such accidents or disasters, based on "Safety and Health Management Regulations."

2. Scope of Application

These standards apply when accidents or disasters occur and they require the establishment of a disaster handling office to organize the in-house disaster preparedness corps. Other related regulations should be followed for handling equipment malfunction and breakdown which do not require the assistance of other sections.

3. Cooperative Support System

(1) Support between business offices

When accidents or breakdowns occur, offices should mutually support one another and implement disaster prevention activities.

(2) Support between sections in same location

Sections in charge of operations should adopt partner sections. In the event of an accident or disaster, the partner section should cooperate with the section where the accident/disaster occurred (hereafter referred to as "section of disaster" and implement necessary measures such as disaster prevention activities as a support section. Table 1 (omitted) indicates the arrangement of partner sections.

4. Notification And Informing

(1) Principles of notification and informing

{1} If an accident or disaster has occurred, or if there is an acknowledged possibility of occurrence, [proper parties] should be notified and informed immediately based on "3. (1) Informing at the site" (omitted) and "3. (2) Informing government agencies, headquarters, and so on" (omitted).

Examples of Disaster Prevention Training

Environment Committee Operating Guidelines

1. General Rules

1.1 Name

(1) This committee shall be called the _____ Plant Environment Committee (hereafter referred to as "Committee.")

1.2 Purpose

(1) The Committee serves to investigate and discuss all types of specific rules related to environmental preservation and contributes to the environmental preservation of the region by promoting activities within each workplace.

2. Organization

2.1 Organization

(1) This Committee consists of a director of pollution prevention (committee chairman), a representative of the director of pollution prevention (vice chairman), a pollution prevention head manager, a pollution prevention manager, and other members appointed by the committee chairman (hereafter referred to as "Members.")

2.2 Term of Members

(1) The term of Members shall be as long as they remain in their current positions.

(2) Any vacancies should be filled immediately.

3. Operations

3.1 Roles of Members

(1) The committee chairman should convene the Committee and chair the meetings.

(2) The vice chairman shall assist the chairman and shall assume the chairman's role in the event of his absence.

(3) Members shall attend Committee meetings and discuss items related to environmental preservation.

(4) Members shall inform all employees at every worksite about the items discussed and decisions made by the Committee, and strive to promote environmental preservation.

Environmental Management Regulations

Chapter 1: General Regulations

1. Purpose

These regulations aim to contribute to the environmental preservation of the region by stipulating basic items related to _____ site environmental management based on "_____ site Operating Guidelines."

2. Definitions

The "Environmental Management" referred to in these regulations means to manage equipment and facilities, operations, and work in order to prevent, in advance, air pollution, water pollution, noise, vibrations, odor, and pollution from waste treatment.

3. Scope of Application

These regulations apply to all environmental management at this site.

Chapter 2: Organization and Division of Operations

1. Organization

(1) The site manager should direct all environmental management at this site.

(2) To promote environmental preservation, the site manager should establish an environmental management organization in the "_____ site Environmental Management Organizational Chart" based on the "Law Related to the Arrangement of Pollution Prevention Organizations in Specific Plants" (hereafter called as "Pollution Prevention Organization Law").

2. Selection and Role of the Pollution Prevention Director

(1) Pollution Prevention Director

The director of pollution prevention stipulated in the Pollution Prevention Organization Law shall be the site manager, and the representative shall be the assistant site manager.

(2) Pollution Prevention Chief Manager

The site manager shall appoint the following pollution prevention chief manager and others based on related laws and pollution prevention agreements.

{1} Pollution prevention chief manager and representative (Pollution Prevention Organization Law)

{2} Pollution prevention manager and his representative (same as above)

Name		Duties
Pollution Prevention Organization Law	Pollution Prevention Chief Manager	(1) The pollution prevention chief manager shall assist the director of pollution prevention and instruct the pollution prevention manager regarding technical issues based on Article 5 of Pollution Prevention Organization Law. The chief manager's representative shall assume the chief manager's duties in his absence. (2) The following operations shall be implemented. {1} Creation of an environmental management plan {2} Planning and promotion of employee education and training plans {3} Operation of the environment committee and environmental specialist committee {4} Creation, revision and abolishment of regulations, and understanding implementation status {5} Promotion, guidance and support of pollution prevention activities at each workplace {6} Overall management of pollution prevention technology surveys and research {7} Establishment of annual environment-related measurement plans and retention of measurement records {8} Negotiation with government agencies and organizations concerning the environment {9} Other items related to pollution prevention
	Air Pollution Prevention Manager	(1) The air pollution prevention manager shall manage the following technical items based on Article 4 of Pollution Prevention Organization Law. The manager's representative shall assume the manager's role in the event of his absence. {1} Inspection of fuel or raw materials used {2} Inspection of soot and dust generating facilities {3} Operating inspections and repair of equipment and peripheral equipment which process soot and dust produced by the soot and dust generating facilities {4} Records of facilities where soot and dust or soot and dust concentration measurements were made, and records of measurement results. {5} Inspection and repair of measurement devices

Environmental Management Standards

1. General Rules

(1) Purpose

These standards aim to correctly implement environmental management by specifying management standards based on "Environmental Management Regulations."

(2) Definitions

Definitions of terms used in these standards are as follows.

{1} Regulation values

Values regulated by related laws and pollution prevention agreements.

{2} Control values

Values which are autonomously established by the site based on related laws and pollution prevention agreements.

{3} Abnormal cases

Cases in which a measurement value exceeds or may exceed control values, or cases in which odor, noise and other pollution may affect living standards of the surrounding area.

{4} Emergency

Cases in which government agencies make an emergency notification because there is a noticeable level of air pollution and water pollution in the public water supply, and there is a risk of causing damage to human health or living environment.

2. Environmental Management

Autonomous management standards are stipulated as follows.

(1) Control Values of Air and Other

Control values of air, water, noise, vibration, and odor are stipulated in Tables 1 to 4 (omitted).

(2) Waste Management

Management concerning waste is stipulated in the "Waste Treatment Guidelines."

(3) Measurement Standards

Measurement standards concerning air, water (including sediment), noise, vibration, and odor are stipulated in Tables 5 to 7 (omitted,) and those concerning waste are specified on page "11 2-23."

(4) Records and Retention

The following items shall be recorded on special forms. Retention of records is specified in Table-8 (omitted), and retention of records concerning waste is specified in "Waste Disposal Guidelines" (omitted).

{1} Measurement results

Environmental Management Standard Values Table (Water Purity)

(1) Control Values Related to Drainage Ditches

Control Item		Drainage Ditch		
		Control Value	Regulation Value	
pH				
COD	Concentration (mg/liter)			
	Load (kg/day)			
SS	Concentration (mg/liter)			
	Load (kg/day)			
N-hexane extraction	Concentration (mg/liter)			
	Load (kg/day)			
Total nitrogen *	Concentration (mg/liter)			
	Load (kg/day)			
Total phosphorus *	Concentration (mg/liter)			
	Load (kg/day)			

* Guideline values from anti-pollution agreements are shown for nitrogen and phosphorus.

Environment Management Patrol Guidelines

1. Purpose

These guidelines aim to prevent environmental abnormalities from occurring, to detect environmental abnormalities at an early stage, and to contribute to environmental maintenance, by stipulating patrols for environment maintenance monitoring at a particular site based on "Environmental Management Regulations."

2. Application

These guidelines apply to environmental maintenance patrols conducted by the director of pollution prevention and pollution prevention manager at a particular site.

3. Patrol Guidelines

3.1 Patrols by the Pollution Prevention Director

The director of pollution prevention shall patrol [monitor] overall items concerning environmental maintenance of a particular site.

(1) Patrols should be conducted on an as-needed basis.

(2) The pollution prevention manager or staff from the Safety and Environment Office shall accompany the director's patrols to take notes and so on.

3.2 Patrols by the Pollution Prevention Manager

The pollution prevention manager shall, patrol areas within his jurisdiction at least once a day to check the following items.

(1) Whether abnormalities affecting air, noise, odor, and so on, are present or not

(2) Drainage conditions of devices in his jurisdiction

(3) Drainage conditions at drain ports in his jurisdiction

(4) Other

3.3 Patrols by Shift Leader

The shift leader shall patrol areas within his jurisdiction at least once per shift to check the following items.

(1) Whether abnormalities affecting air, noise, odor, and so on, are present or not

(2) Whether drainage abnormalities are present in the manholes of oil-inclusive system piping or rainwater drain piping in areas under his jurisdiction

(3) Drainage conditions at drain ports in his jurisdiction

(4) Other

Environmental Maintenance Patrol Inspection Chart

Type of Patrol	Inspected Area	Inspection Items
Patrol by pollution prevention manager and shift leader	1. Drain ports	{1} appearance, {2} oil film present or not, {3} odor present or not
	2. Wastewater treatment equipment	{1} appearance, {2} oil film present or not, {3} odor present or not {4} management status of equipment
	3. Flare stack	{1} combustion conditions, {2} abnormal noise present or not, {3} odor present or not
	4. Incinerator	{1} combustion conditions, {2} odor present or not, {3} management status of equipment
	5. Smokestack	{1} smoke color normal or abnormal, {2} falling soot and dust present or not
	6. Perimeter of areas in jurisdiction	{1} odor present or not, {2} abnormal noise present or not, {3} falling soot and dust present or not
	7. Waste disposal site of area in jurisdiction	{1} management status of facilities, {2} odor present or not, {3} sorting and organizing conditions
	8. Final oil impregnated rainwater manhole of area being inspected	{1} appearance, {2} oil film present or not, {3} odor present or not
	9. Other	{1} status of adherence to control standards
Patrol by safety and environment office staff	1. Drains and wastewater treatment equipment (1) Drain ports (2) Rainwater separator (3) Overall wastewater treatment equipment (4) Ballast wastewater treatment equipment	{1} appearance, {2} oil film present or not, {3} odor present or not
	2. Flare stack	{1} combustion conditions, {2} abnormal noise present or not, {3} odor present or not
	3. Smokestack	{1} smoke color normal or abnormal, {2} falling soot and dust present or not
	4. Other	
	(1) Incinerator	{1} combustion conditions, {2} odor present or not, {3} management status of equipment
	(2) Waste treatment center	{1} status of sorting waste, {2} management status of equipment
	(3) Surface of sea water at edge of land	{1} appearance, {2} oil film present or not {3} Oil/gas leakage from ships or not
	(4) Vicinity of areas being inspected	{1} odor present or not, {2} falling soot and dust present or not, {3} abnormal noise present or not

Waste Treatment Guidelines

1. Purpose

The purpose of these guidelines is to properly handle waste by defining treatment of waste generated in the _____ of this site, based on the "Environmental Management Standards," and thereby contribute to environmental preservation.

2. Applicable Laws

(1) Laws related to waste treatment and cleaning

(2) _____Prefectural law

(3) _____City ordinance

(4) Detailed agreements related to pollution prevention

3. Categorization of Waste

Waste refers to the garbage, bulky refuse, cinder, sludge, bilge, and so on generated by this site. Waste can be roughly categorized as follows.

(1) General waste

Waste listed in the general waste column of the "Waste Classification Table" (omitted).

(2) Special control — general waste

Waste listed in the special control — general waste column of the "Waste Classification Table."

(3) Industrial waste

Waste listed in the industrial waste column of the "Waste Classification Table."

(4) Specially controlled industrial waste

Waste listed in the specially controlled industrial waste column of the "Waste Classification Table."

4. Methods of Treatment and Disposal

(1) Items implemented when waste is generated

The Waste Section shall implement the items specified per category in "Waste Treatment and Disposal Methods" (omitted).

Waste Card	11	2 - 34

Waste Card

___/___/___

Name of industrial waste　　Equipment name　　Section name

Classification	Sludge, bilge, waste acid, waste alkali, waste plastic, waste paper, waste wood, waste rubber, waste metal, glass/ceramics, construction waste, heat waste

Specific Characteristics

Appearance		Color		Odor	
Shape		Preservation		Other	

Composition		%	Health Items	Content (mg/liter)	Elution (mg/liter)	
		%	Cadmium			
		%	Cyanide			
		%	Organic phosphate			
		%	Lead			
Composition of Toxins		%	Chromium (sexivalent)			
		%	Arsenic			
		%	Total mercury			
pH		Moisture	%	Alkyl mercury		
Oil content	%	Solids	%	PCB		
Sulfur content	ppm	Chlorine content	ppm	Trichloro ethylene		
Heat reduction amount	%	BOD, COD	mg/l	Tetrachloroethylene		
Specific gravity		Gasoline	Present Not	Carbon tetrachloride		

Cautions Regarding Handling

Combustibility		Corrosiveness		Reactivity	
Toxicity		Explosivity		Excitability	

Cautions regarding transportation	
Protective articles and clothing	Protective gloves, safety glasses, protective masks, other:(　　)

Generation Conditions

Generation Process		Machine Name	
Causes of Generation			
Generation Frequency	Continuous	t • kl/day	t • kl/month
	Periodic	times/month	t • kl/time　　t • kl/month
	Irregular	(SDM/trouble)	t•kl/time　　t•kl/year

Treatment Methods

Methods of Disposal	Incineration, neutralization, detoxification, stabilization-type disposal site, control-type disposal site, other (　　)			
Transportation Methods	(200 liter drums, 18 liter cans, fiber drums, flexible containers) -> 10 ton vehicle, 10 kl rolling [container], 10 ton dump truck, other (　　)			
Treatment Frequency	Individual	_____times/week, _____times/month	Mixed load	____times/week, ____times/month
Collection/Transportation				
Location of Treatment				
Cautions Regarding Treatment				
Remarks				

List of Protective Articles Used by Work Type

11	2 - 35

Number		
Prepared on:	___/___/___	
Revised on:	___/___/___	

Work Safety Standards

List of Protective Articles Used by Work Type

Protective Articles \ Name of Work		1. Cutting work at milling cutter etc.	2. Grinding work at grinders etc.	3. Rust removal	4. Sandblasting work	5. Gas welding, fusion, heating work	6. Electric welding, fusion work	7. Handling of poisonous gas and steam	8. Handling of poisonous liquid	9. Handling of substances which could cause major eye injury, such as acids, alkalines, etc.	10. Handling of poisonous powders or solids	11. Work in which exposed to radiation	12. Work involving radioactive material pollution	13. Work involving dust generation	14. Work under danger of oxygen deprivation	15. " (inside nitrogen) see Note.	16. Work under danger of falling from heights	17. Work under danger of flying or falling objects	18. Live wires, and work near live wires	19. Power outage work	20. Handling of high temperature substances	21. Handling of machines	22. Noise generation work	23. Loading and unloading of freight trucks	24. Work on water or onboard ships
Air Inhalators	Air inhalator																								
	Oxygen inhalator																								
	Breathing mask [as used on airlines]																								
	Air supply mask																								
Poison Prevention Masks	For organic gases																								
	For halogen gases																								
	For carbon monoxide																								
	For ammonia																								
	For sulfuric acid/sulfurs																								
Anti-dust masks																									
Safety Glasses	Safety glasses																								
	Goggles																								
	Safety face shield, protective face shield																								
	Anti-dust glasses																								
	Anti-light ray glasses																								
	Anti-light ray face shield																								
Protective Clothing	Protective clothing																								
	Protective apron																								
Protective Gloves	Leather gloves																								
	Solvent-proof rubber gloves																								
	Heat-proof gloves																								
	Fabric gloves																								
Shoes	Safety shoes																								
	Rubber boots																								
Insulating Protective Articles	Insulating gloves																								
	Insulating rubber sleeves																								
	Electricity-proof clothing/insulating mat																								
	Insulating boots																								
	Grounding devices/voltage detectors																								
Safety Belts	Safety belts																								
	Emergency tools such as ropes																								
	Hooking belt																								
Ear plugs																									
Lifesavers																									
Film badges																									
Device to measure amount of radiation geiger counter																									
Safety net																									

Number		
Prepared on:	___/___/___	
Revised on:	___/___/___	

Work Safety Standards

Work Environment Control Values List

Items				Control Values	Related Laws	Remarks
Lighting	Precise work		Drafting work, punching work with card hole puncher, typing, work requiring constant viewing of lettering 2 mm or smaller in size		Safety and health statutes: No. 604, 605 Company regulations: No. 10	
	Ordinary work		Ordinary office work			
	Heavy work		Operating meters inside crane control cabin			
Toxic Chemical Substances, etc.	Organic Solvents		Xylene Styrene monomers Trichloro ethylene Toluene Methanol Gasoline Petroleum naphtha (as naphtha)		Toxins law	Japan Society of Industrial Health (1989) Same as above Same as above Same as above Same as above Same as above ACGIH (1988 to 1989)
	Special Chemical Substances		Asbestos Vanadium pentoxide Coal tar Tolylene diisocyanate Benzene Hydrogen sulfide Ammonia Hydrogen chloride Sulfuric acid gas		 Toxins law Toxins law	Japan Society of Industrial Health (1989) ACGIH (1988 to 1989) ACGIH (1978) Japan Society of Industrial Health (1980) Japan Society of Industrial Health (1989) Same as above Same as above Same as above Same as above
	Ionizing Radiation		(1) Maximum permissible exposure limits (normal)		Ionization statute: No. 4 Ionization statute: No. 5	
			(2) Exposure limits under emergency work		Ionization statute: No. 7	
	Oxygen Concentration in Air				Oxygen deficiency statute: No. 5	
	Dust	Class 1 dust	Mineral dusts with 30% or more free silicic acid, talc, agalmatolites, aluminum, alumina, diatomaceous earth, and sulfide mineral (excluding asbestos)			Japan Society of Industrial Health

Work Environment Improvement Evaluation Standards (Noise Pollution)

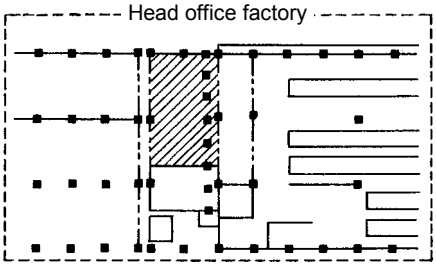
11	2 - 37

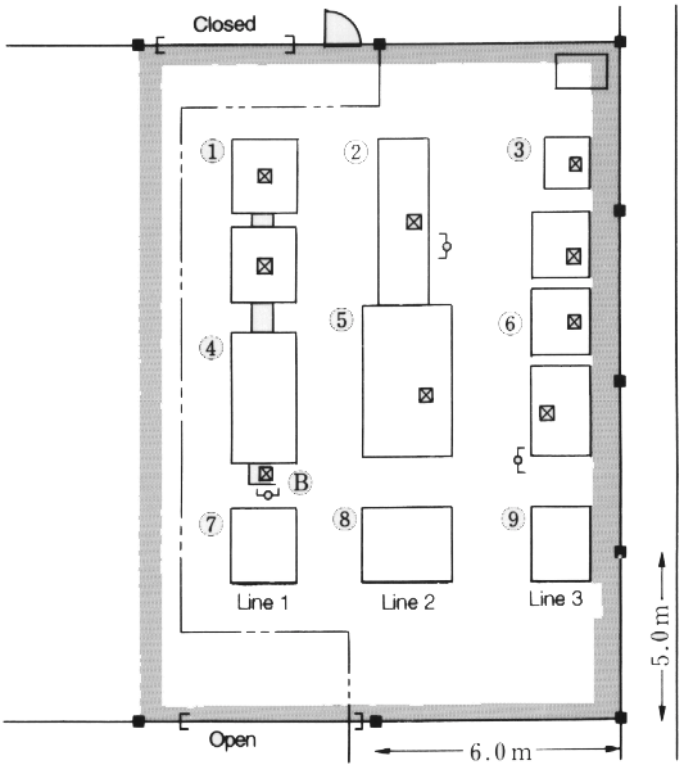
Work Environment Improvement Evaluation Standards (Noise Pollution Standards)

	Less than 80 dB (A)	80 dB (A) to less than 85 dB (A)	85 dB (A) to less than 88 dB (A)	88 dB (A) to less than 90 dB (A)	90 dB (A) to less than 93 dB (A)	93 dB (A) or more
	First Control Category of the Legislation		Second Control Category of the Legislation		Third Control Category of the Legislation	
Noise	Primarily 1 to 4 kHz level noise under 80 dB (A), and does not require ear plugs	Noise level which does not require ear plugs in general, but a level at which persons with sensitive ears would wear ear plugs	Noise level at which a site manager would have people wear ear plugs at his discretion	Noise level at which a site manager would have people wear ear plugs at his discretion	Noise level which requires ear plugs	Noise level which requires ear plugs

Show the specific work zone, main equipment, noise emanation sources, measurement points, etc.

Company site name: _____ Manufacturing Corp., head office factory Specific work site: machine tool section, CH piston line





Target: 85 dB or less
① 85.7
② 85.5
③ 85.5
④ 86.7
⑤ 86.5
⑥ 86.5
⑦ 87.6
⑧ 88.4
⑨ 87.5
Ⓑ 89.8

Average: 86.5 dB

Measurement height: 1.5 meters

[Symbols] ①②③ : Measurement point A Ⓑ : Measurement point B ◉ : Parallel measurement points
⊠ : Generation source : Enclosed hood : Externally attached hood
: Behavior zones : Air current ⊕ : Ventilation system

※ Write down the length and width dimensions of the specific work zone. As for other required items, refer to the description guidelines.

Work Environment Improvement Evaluation Standards (Lighting)

11	2 - 38

Work Environment Improvement Evaluation Standards (Lighting Standards)

___/___/___

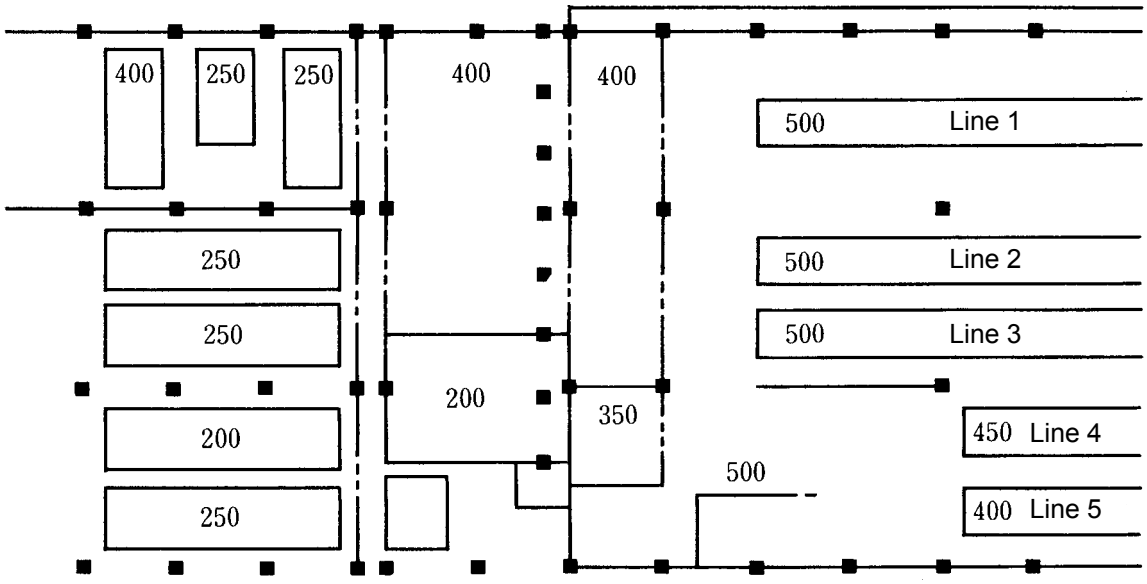
No. __ __ __

Digits	Site	Work Category	Spot Lighting (lux)	Overall Lighting (lux)
1	Business office	Drawing, calculating	300-400	←
		General	150-300	←
		Conference rooms	100-150	←
2	Plant	Ultra precise	1000-5000	400
		Precise (near machines and measurement instruments)	300-1000	300
		Ordinary (near machines)	100-300	-
		Heavy work (warehouse)	50-100	-

Show the specific work zone, main equipment, emanation sources, measurement points, etc.

Company site name: _____ Manufacturing Corp. head office factory Specific work site: machine tool section, CH piston line

Head Office Factory



Measurement height: 75 to 90 cm

Head Office Factory Line Lighting Measurement Results (Unit: lux)

Measurement conditions

1. Measurement date and time: ___/___/___, __:__ AM/PM.
2. Measurement instrument: __ __ __, __ __ __
3. Weather conditions: daytime–clear, evening–thunderstorm, at the time of measurement–cloudy
4. Measured by: _____ of civil engineering section

Prepared on: ___/___/___

Work Environment Improvement Evaluation Standards (Dust)

11	2 - 39

Work Environment Improvement Evaluation Standards (Mineral Dust Standards)

$$E\ (\mathrm{mg/m^3}) = \frac{2.9}{0.22\,Q + 1}$$

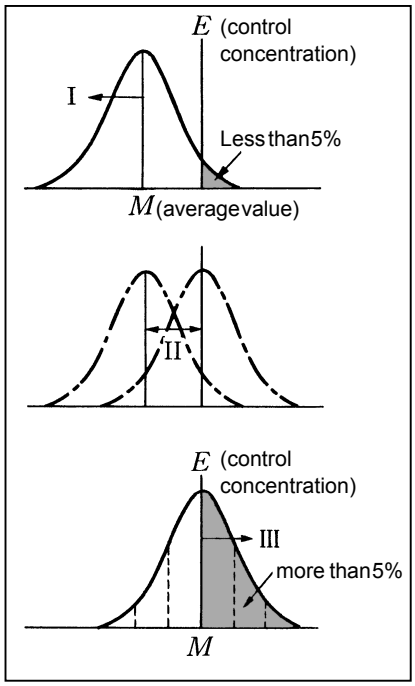
E: Control concentration
Q: Free silicic acid inclusion rate (%)

In casting plants, Q ranges between 10 and 35 percent, E ranges between 0.3 and 0.9 mg/m^3, depending on the worksite.
Evaluate the value of E and determine to which environmental control category it belongs.

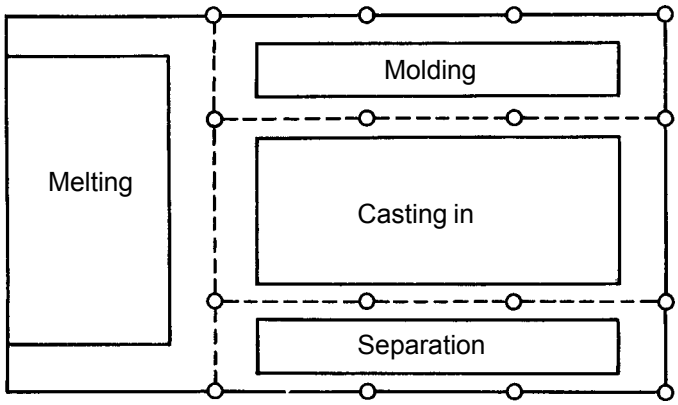
First Control Category:
When the control status is good, with little risk of damage to health.

Second Control Category:
Unable to evaluate immediately, but the transition can be seen through repetition of measurements.

Third Control Category:
Insufficient control with the risk of damage to health; requiring immediate improvement measures.



Show the specific work zone, main equipment, emanation sources, measurement points, etc.
Company site name: Specific work site:
____ Manufacturing Corp. head office factory machine tool section, CH piston line



Measurement height: between 50 to 150 cm above the floor

Measurement conditions
1. Measurement date and time: ___/___/___, __:__ AM/PM
2. Measurement instrument: digital dust measurement instrument/low volume air sampler
3. Weather conditions: clear
4. Measured by: Safety Health and Environment _____ (Measurement engineer license No. __ __ __)

Work Environment Improvement Evaluation Standards (Heavy Labor)

Work Environment Improvement Evaluation Standards (Heavy Labor Standards)

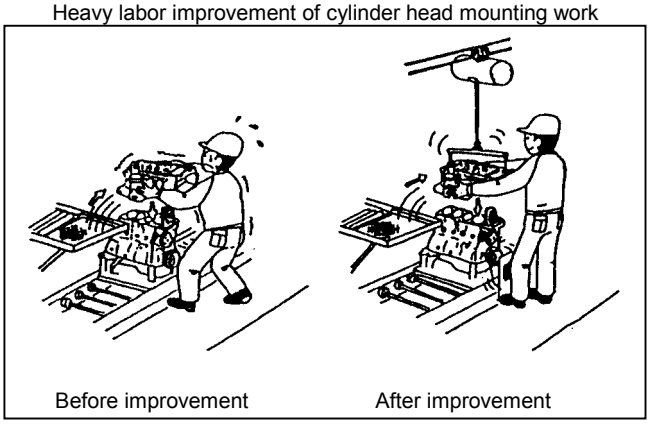
Difficult Labor Category	Evaluation Item	Evaluation standard			
		Rank 1	Rank 2	Rank 3	Rank 4
Heavy Labor	Weight handled	Less than 3 kg	Less than 5 kg	Less than 7 kg	7 kg or more
	Distance handled	Less than 30 cm	Less than 60 cm	Less than 90 cm	90 cm or more
	Moving height handled	Less than 30 cm	Less than 60 cm	Less than 90 cm	90 cm or more
	Total amount of torque tightening (per shift)	Less than 1 T.m	Less than 2 T.m	Less than 3 T.m	3 T.m or more
Difficult Position Labor	Times (times per tact-time) *	Zero times	1 time	2 times	3 times or more
Difficult Assembly Work	Number attachment part points	5 points or less	7 - 8 points	Between 9 and 10 parts	11 points or more
	Number of types of parts selected	10 types or less	20 types or less	30 types or less	31 types or more
	Number of items tightened	10 or less	15 points or less	20 or less	21 or more
	Number of numeric readings, alignment work, and front/back recognition work	Zero times	1 time	2 times	3 times or more
	Number of blind operations	Zero times	1 time	2 times	3 times or more
	Number of micro or flat parts	Zero times	1 point	2 points	3 points or more
	Number of hose press-in operations	Zero times	1 time	2 times	3 times or more
	Number of universal tool operations	Zero times	1 time	2 times	3 times or more
	Cases of press-fit/drive-fit points	Zero times	1 point	2 points	3 points or more
	Multi-directional tightening	Zero times	1 time	2 times	3 times or more
	Number of oil application operations	Zero times	1 time	2 times	3 times or more

Note) * indicates number of positions requiring bending, standing on tiptoe, squatting, looking through peepholes, and body twisting.

Evaluation points are as follows: Rank 1: 0 point Rank 2: 1 point Rank 3: 2 points Rank 4: 3 points

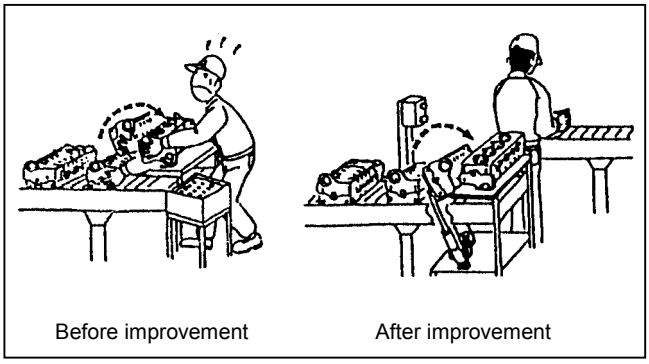
Examples of Heavy Labor Improvements

Heavy labor improvement of cylinder head mounting work



Before improvement After improvement

Heavy labor improvement of cylinder head inversion work



Before improvement After improvement

Fiscal Year__ Health Management Plan Table

__/__/__

Implementation Items	Target Group	Implementation Dates
Spring Regular Health Examinations	All employees	Tues. 3/1 - Fri. 3/11, 19___ 8:00 AM to 4:00 PM
Autumn Regular Health Examinations	All employees	Mon. 9/1 - Thurs. 9/22, 19___ 8:00 AM to 11:45 AM
Special Health Examinations	Employees who handle ionizing radiation	Thurs. 6/9 - Thurs. 6/16, 19___ 9:00 AM to 11:00 AM; Wed. 11/24 - Wed. 12/1, 19___ 9:00 AM to 11:00 AM
Family Health Examinations	Dependents of [primary holder of] health insurance	Mon. 9/26 - Sat. 10/8, 19___ 8:00 AM to 12:00 PM Mon. 9/26 - Fri. 9/30 Sat. 10/1 - Wed. 10/5 Wed. 10/6 - Sat. 10/8
Dental Examinations	All employees	Mon. 10/17 - Fri. 10/28, 19___ 8:00 AM to 4:30 PM
Blood Donations	Interested persons	Fri. 7/1, 19___: Shift A 9:00 AM to 4:00 PM; Mon. 7/4, 19___: Shift B 9:00 AM to 4:00 PM; Mon. 12/12, 19___: Shift C 9:00 AM to 4:00 PM; Tues. 12/13, 19___: Shift D 9:00 AM to 4:00 PM
Health Seminars	Interested persons	

Spring Regular Health Examinations

Implementation date	1	2	3	4	5	6	7	8	9	10	11
Day of the week	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.
First shift name	D	D	A	A	Closed	Closed	B	B	Wome	C	C

Autumn Regular Health Examinations

Implementation date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Day of the week	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.
First shift name	A	B	Closed	Closed	C	C	Wome	D	D	Closed	Closed	A	A	B	Closed	B	C	Closed	C	D

Special Health Examinations

Implementation date	9	10	15	16
Day of the week	Thurs.	Fri.	Wed.	Thurs.
First shift name	A	B	C	D

Implementation	24	25	30	1
Day of the week	Wed.	Thurs.	Tues.	Wed.
First shift name	A	B	C	D

Family Health Examinations

21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6
Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.
Assembly Hall	Assembly Hall	closed	closed	closed	Assembly Hall	Assembly Hall	Assembly Hall	Shakutosui	Shakutosui	Shakutosui	closed	Aobadai	Aobadai	Aobadai	Aobadai

Dental Examinations

Implementation date	17	18	19	20	21	22	23	24	25	26	27	28
Day of the week	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.
First shift name	A	A	A	B	B	Closed	Closed	C	C	D	D	D
Second shift name	B	C	C	C	D			A	A	A	B	B

* "Trim" day
* Measurement of physical strength
* Health guidance
Touring by industrial doctors
* Cultural & athletic recreation Spring Schedule
2/16: Arrival of medical examination chart
4/13 - 4/15: Re-examination
4/1: Arrival of results chart
4/25: Arrival of re-examination results chart
4/6: Distributing to each section

Health Plan

Goal: to be healthy, make a pleasant workplace, and make a healthy and comfortable environment.

Important Items	Detailed Implementation Items	Schedule 4	5	6	7	8	9	10	11	12	1	2	3
	Implementation of health examinations												
	•Regular health examinations						▽						▽
	•Family health examinations							▽					
	•Special health examinations			▽						▽			
	•Dental examinations							▽					
1. Strengthening health management guidance and support	(1) Coordinating and informing of [health] promotion system					▽							
	(2) Implementation of health guidance		▽				▽			▽		▽	
	Health seminars		▽					▽					
	(3) Enhancement of touring by industrial doctors	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽
	(4) Providing physical strength measurements and exercise programs		▽		▽								
2. Promotion of recreational events	(1) Intra-office sports meet												
	a) Indiaka [game]						▽						
	b) Large ball ping pong							▽					
	c) Intra-office relay race											▽	
	(2) Sports open												
	a) Badminton					▽							
	b) Tug-of-war							▽					
	c) Skating											▽	
	(3) Holding a light sports class		▽										
3. Promotion and establishment of working “trim”	(1) Making walking a habit	▽											▽
	(2) Establishing a “trim day” in each section	▽											▽
4. Adjusting facilities	(1) Coordinating facilities which contribute to good health	▽											▽
5. Collecting and providing information concerning health	(1) Review of Trim Committee [activities]	→											

Japan Archipelago Walking Map

GOAL

		A
		B
		C

200,000 steps

Let's start with walking 8,000 steps a day, with the goal of 10,000 steps per day.

*Colored numbers on the map indicate distance between areas. Units: 10,000 steps

START

___/___/___

	C	B	A
Names			
Start Point			

190,000 steps
180,000 steps
170,000 steps
160,000 steps
150,000 steps
144,000 steps
140,000 steps
130,000 steps
120,000 steps

10,000 steps
20,000 steps
30,000 steps
40,000 steps
50,000 steps
60,000 steps

180,000 steps
A: __/__
B: __/__
C: __/__

Scale of other exercise equivalent to the energy burned walking 10,000 steps

Activity	Standard Time
Brisk walking (110 steps/minute)	80 minutes
Jogging (140 m/minute)	36 minutes
Running (200 m/minute)	24 minutes
Badminton	53 minutes
Tennis	48 minutes
Volleyball	48 minutes
Softball (outfielder)	144 minutes
Baseball (outfielder)	110 minutes
Swimming (breast stroke)	35 minutes
Hiking (mountainous)	60 minutes
Cycling	96 minutes
Aerobics	70 minutes
Golf (flat)	96 minutes
Gateball	144 minutes
Cross-country skiing	50 minutes
Skating	48 minutes

* 1 step is equivalent to 65 cm for both men and women.
* The table above is based on an amount of energy (300 kcal) burned when walking 10,000 steps.

You have reached the first goal! Keep up the good work!

144,000 steps
A: __/__
B: __/__
C: __/__

30,000 steps
A: __/__
B: __/__
C: __/__

120,000 steps
A: __/__
B: __/__
C: __/__

90,000 steps
A: __/__
B: __/__
C: __/__

60,000 steps
A: __/__
B: __/__
C: __/__

Hakodate
Asahikawa
Kushiro
Sapporo
Tomakomai
Aomori
Morioka
Akita
Sendai
Niigata
Koriyama
Maebashi
Utsunomiya
Mito
Kanazawa
Matsumoto
Omiya
Tokyo
Chiba
Ichihara
Tachikawa
Yokohama
Shizuoka
Nagoya
Kyoto
Osaka
Kobe
Okayama
Takamatsu
Hiroshima
Tokuyama
Tokushima
Wakayama
Matsuyama
Kochi
Kitakyushu
Fukuoka
Oita
Kumamoto
Nagasaki
Miyazaki
Kagoshima
Naha

110,000 steps
100,000 steps
90,000 steps
80,000 steps
70,000 steps

How to Use this Map

- For both men and women, advance to the next square when you walk 10,000 steps. Note that the energy consumption for both men and women is set at 300 kcal as a standard.
- When you do other exercise, see the times for other exercise in the chart above which are equivalent to walking 10,000 steps.
- Convert the amount of exercise each day into a distance, and filling the boxes with a marker or other writing instrument. If you exercised for a duration about half as long as the exercise time, either fill in half a box, or wait until the next day and add it to that day's exercise.
- Let's make slow, steady exercise a part of our daily routines and try to reach the goal.

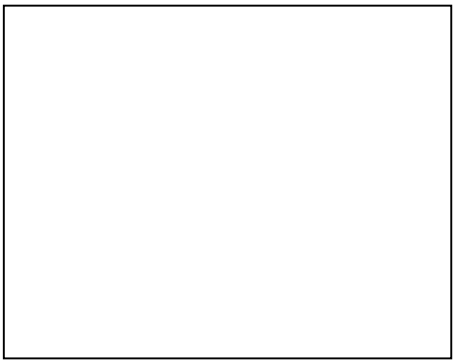
Map-walking Record Table

I am reporting the following. Name:_____

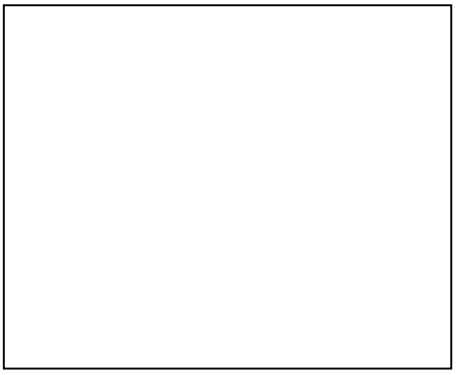
June	Mon			6		13		20		27		
	Tues			7		14		21		28		
	Wed	1		8		15		22		29		
	Thur	2		9		16		23		30		
	Fri	3		10		17		24				
	Sat	4		11		18		25				
	Sun	5		12		19		26				Monthly total of steps
	Totals											__0,000 steps
July	Mon			4		11		18		25		
	Tues			5		12		19		26		
	Wed			6		13		20		27		
	Thur			7		14		21		28		
	Fri	1		8		15		22		29		
	Sat	2		9		16		23		30		
	Sun	3		10		17		24		31		Monthly total of steps
	Totals											__0,000 steps
Aug	Mon	1		8		15		22		29		
	Tues	2		9		16		23		30		
	Wed	3		10		17		24		31		
	Thur	4		11		18		25				
	Fri	5		12		19		26				
	Sat	6		13		20		27				
	Sun	7		14		21		28				Monthly total of steps
	Totals											__0,000 steps
Sept	Mon			5		12		19		26		
	Tues			6		13		20		27		
	Wed			7		14		21		28		
	Thur	1		8		15		22		29		
	Fri	2		9		16		23		30		
	Sat	3		10		17		24				
	Sun	4		11		18		25				Monthly total of steps
	Totals											__0,000 steps
Oct	Mon			3		10		17		24		31	
	Tues			4		11		18		25		
	Wed			5		12		19		26		
	Thur			6		13		20		27		
	Fri			7		14		21		28		
	Sat	1		8		15		22		29		
	Sun	2		9		16		23		30		Monthly total of steps
	Totals											__0,000 steps
Nov	Mon			7		14		21		28		
	Tues	1		8		15		22		29		
	Wed	2		9		16		23		30		
	Thur	3		10		17		24				
	Fri	4		11		18		25				
	Sat	5		12		19		26				
	Sun	6		13		20		27				Monthly total of steps
	Totals											__0,000 steps

- Fill in the number of steps you walk each day. If you reach more than 144,000 steps by the end of month_____, submit this form to the section in charge within your office by ___/___/___ (_____day). (If you are a temporary employee or a special retiree, submit this to the health insurance office.)

Name	(If the person who records this table is a family member of an employee, fill in the name of the employee.)			
Health Insurance Code and Number				
Company Worksite Name		Section (Office) Name		
Address (Only for a temporary employee or a special retiree)				
Steps Walked (Goal: 144,000 Steps)	June	July	August	September
	__0,000 steps	__0,000 steps	__0,000 steps	__0,000 steps
	October	November	total	
	__0,000 steps	__0,000 steps	__0,000 steps	
Comments				



12. Thorough Implementation and Continuous Improvement of TPM



12 Thorough Implementation and Continuous Improvement of TPM

Measurement of TPM Effectiveness [Evaluation]

1	Overall Management	{1}{2}{3}	1	Value of product shipments
			2	Operating profit/sales profit
			3	Value added productivity
2	Production [P]	{4} to {14}	4	Labor productivity
			5	Overall equipment effectiveness
			6	Availability
			7	Performance rate
			8	Quality products rate
			9	Cases of equipment failure
			10	Failure duration rate
			11	Failure frequency rate
			12	MTBF
			13	MTTR
			14	Cases of minor stoppage
3	Quality [Q]	{15} {16}	15	In-process defect rate
			16	Cases of customer complaints
4	Cost [C]	{17} {18} {19}	17	Maintenance cost
			18	TPM investment amount
			19	Amount of cost reduction

12 Thorough Implementation and Continuous Improvement of TPM

Measurement of TPM Effectiveness [Evaluation]

5	Delivery Times [D]	{20}{21}	20	Production lead time
			21	Taking inventory and inventory-months of assets in-stock
6	Safety [S]	{22} {23}	22	Cases of disasters causing suspension of operations
			23	Cases of disasters not causing suspension of operations
7	Education/Work Ethic[M]	{24} {25}{26}	24	Number of improvement proposals submitted per person
			25	Number of public certifications/licenses obtained
			26	Number of certified machine maintenance technicians

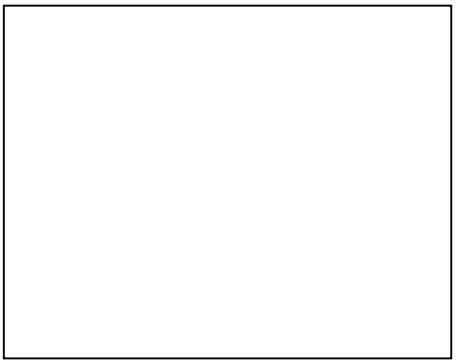
Calculation Formulas For TPM Effectiveness Evaluation Items

Classi-fication	No.	Item		Calculation Formula	Unit	Management Cycle	Remarks
Overall Management	1	Monetary value of product shipments			100 million yen	Yearly	Fiscal period
	2	Operating profit/sales profit			100 million yen	Yearly	Fiscal period
	3	Value added productivity		$\frac{\text{Production value (¥) - (consumption tax + raw material cost + depreciation cost)}}{\text{total number of employees}}$	Million yen	Yearly	Production value = Value of shipped products - inventory fluctuations of products Also clearly indicate any changes in the total number of employees.
P (Production)	4	Labor productivity		$\frac{\text{Production value}}{\text{total labor hours of employees directly involved in production}}$	Thousand yen	Yearly	Also clearly indicate the change in number of employees directly involved in production.
	5	Overall equipment effectiveness		Availability x performance rate x quality products rate	%	Monthly	{1} Clearly indicate the total number of lines or units of equipment at a given plant. {2} Clearly indicate the number of lines or units of equipment which are measuring overall equipment effectiveness. {3} Write the average value of measured lines or equipment in item No. 5, overall equipment effectiveness. It would be even better if maximum and minimum values are also written down. 4} The objects of measurement in items No. 6 through 12 should be the same lines and equipment measured in item No. 5.
	6	Availability	Processing /assembling systems	$\frac{\text{Loading time - stoppage time}}{\text{Loading time}}$	%	Monthly	
			Equipment systems	$\frac{\text{Calendar time - (closure loss + stoppage loss)}}{\text{Calendar time}}$			
	7	Performance rate	Processing /assembling systems	$\frac{\text{Reference [standard] cycle time x volume processed}}{\text{Operating time}}$	%	Monthly	
			Equipment systems	$\frac{\text{Actual production volume /operating time}}{\text{Reference production volume/unit time}}$			
	8	Quality products rate	Processing /assembling systems	$\frac{\text{Processed volume - defective volume}}{\text{Processed volume}}$	%	Monthly	
			Equipment systems	$\frac{\text{Production volume - (process defects + re-processed volume)}}{\text{Production volume}}$			
	9	Cases of equipment failure		Actual number of equipment failures at equipment where TPM has been applied	Cases	Monthly	
	10	Failure duration rate		$\frac{\text{Total hours of failure stoppage}}{\text{Total operating time}} \times 100$	%		
	11	Failure frequency rate		$\frac{\text{Total number of failure stoppages}}{\text{Total operating time}} \times 100$	%		
	12	MTBF (Average interval between failures)		$\frac{\text{Total operating time}}{\text{Number of stoppages}}$	Hours	Monthly	

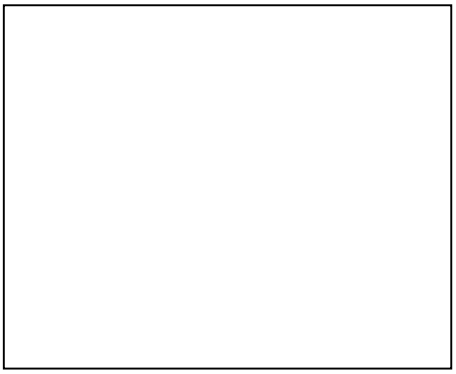
Production (P), Quality (Q), Cost (C), Delivery Times (D), Safety (S), Education and Work Ethic

12	2

Cate-gories	No.	Item		Calculation Formula	Unit	Management Cycle	Remarks
P (Production)	13	MTTR (Average recovery time)		Total stoppage time / Number of stoppages	Hours	Monthly	
	14	Cases of minor stoppage		Actual number of minor stoppages at equipment where TPM has been applied	Cases	Monthly	
Q (Quality)	15	In-process defect rate	Processing/ assembling systems	Defect volume / Processed volume	%	Monthly	
			Equipment systems	Re-processed + out-of-spec. products + scrapped products / Production volume			
	16	Cases of customer complaints		Actual number of cases	Cases	Monthly	
C (Cost)	17	Maintenance cost		Costs (material cost, outsourcing cost) + in-house personnel cost	Million yen	Monthly	
	18	TPM investment amount		In-house personnel cost + TPM consulting cost + education cost + production cost, etc.	100 million yen	Yearly	Indicate unit and totals (fiscal period).
	19	Amount of cost reduction			100 million yen	Yearly	Clearly indicate the calculation method.
D (Delivery Times)	20	Production lead time		Average days between order receipt date and shipment date	Days	Monthly	Products which make up the largest component of sales are applicable.
	21	Inventory-months of in-stock assets		Inventory value (products + work in process + raw materials) / Value of shipped products	Months	Monthly	Evaluate the value at the end of that particular month.
S (Safety)	22	Cases of disasters causing suspension of operations		Actual number	Cases	Yearly	
	23	Cases of disasters not causing suspension of operations		Actual number	Cases	Yearly	
M (Education and Work Ethic)	24	Number of improvement proposals submitted per person		Actual number	Cases	Monthly	
	25	Number of public certifications/licenses obtained per person		Actual number	Cases	Yearly	
	26	Number of certified machine maintenance technicians		Actual number	Persons	Yearly	

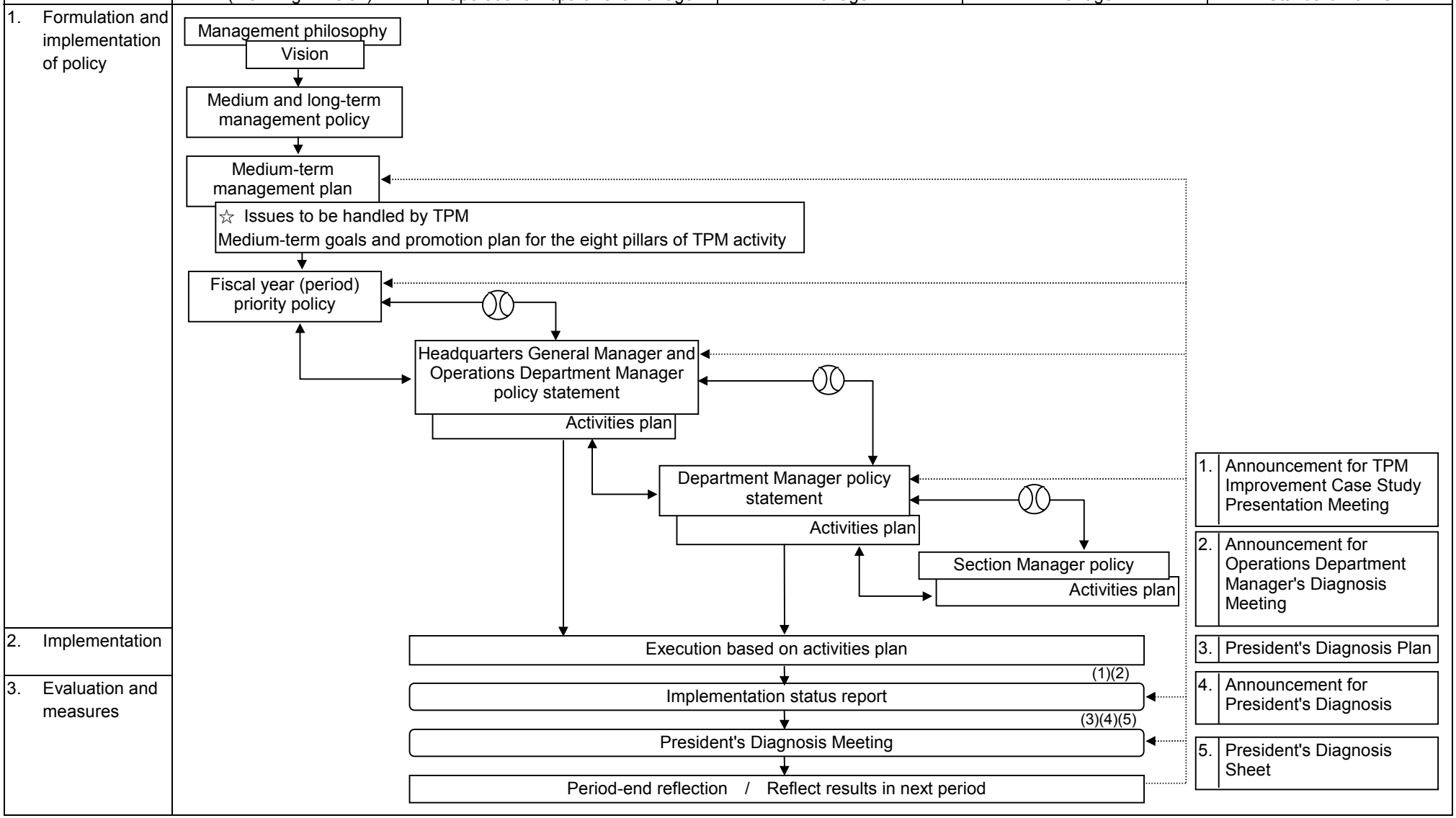


A. TPM President's Diagnosis Meeting



A. TPM President's Diagnosis Meeting

	Top Management (Planning Division)	Headquarters General Manager and Operations Department Manager	Department Manager	Section Manager	Major Standard Forms



Announcement for TPM Improvement Case Study Presentation Meeting	A	1

TPM Improvement Case Study Presentation Meeting

- Your attendance is kindly requested at the following meeting.

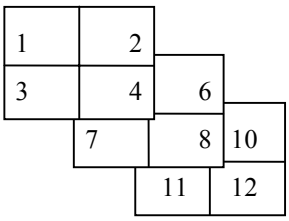
__/__/__
PM Promotion Office (Headquarters)

Purpose	Diagnosing, guidance and task sharing
Date	__/__/__ (__day) __:__ - __:__
Location	__ Club, Auxiliary Hall

Program

1. Opening remarks: Promotion Office (Headquarters)
2. Explanation of rules: Emcee
3. (3) Status of individual improvement diagnosis for Operations Departments overall (Theme and acceptance determination)
   Status of progress for horizontal replication of individual improvement:
   Promotion Office (Operations Department) ..... 5 min
4. (4) Representative case study presentation: Leader and Subleader ..... 15 min.
5. (5) Q&A: 5 min
6. (6) Two minute comments by screening committee members. ..... 1 member: 2 min
   (→ Each Operations Department Manager is requested to provide their comments)
   .....Repeat (3) - (6).
7. Overall evaluation: __ Steering Committee Chair
8. Present passing certificates (stickers): "
9. Close of meeting: Emcee

Presentation forms



- Presentations will be made using an OHP [overhead projector].
- Sheets should be written horizontally.
- Maximum number of sheets: 12 *
- By the morning of two days before the presentation, reduce the original onto three A3-sized transparencies and submit them to the Promotion Office (Headquarters).
  (Fit four presentation sheets on each transparency sheet.)
- On the day of the presentation, distribute copies of the materials to all attendees.

(When reducing the original materials, arrange them in presentation order as shown in the figure at left).

※ It is prohibited to add supplementary OHP materials.

※ Use easy-to-read characters on the presentation materials.

Attendants

Senior Director __, Senior Director __
Headquarters General Manager, Operations Department Manager, Assistant Operations Department Manager, Department Managers, Staff of Manufacturing and Production Divisions related to the Operations Department and Headquarters
Leader scheduled for the same theme next time
Promotion Office (Operations Department) and Promotion Office (Headquarters)

Those able to attend on the presentation date are requested to make their best efforts to attend.
Those who know in advance that they will be able to attend are requested to contact the Promotion Office (Operations Department).

On-site inspection	Inspect on the morning of __/__/__ (__day)

Announcement for Operations Department Manager's Diagnosis Meeting	A	2

Announcement for Operations Department Manager's Diagnosis Meeting Month: ____

TPM Promotion Department

- Your attendance is kindly requested as follows.

Purpose

- Line diagnosis of direct divisions
- Inspection tour of affiliated companies
- Other

Note

1. Date and time: __/__/__ __:__ - __:__

2. Inspection tour attendees: Managing Director __, Managing Director __, TPM Promotion Headquarters Manager, Engineering Division Headquarters Manager, Operations Department Manager __, Assistant Operations Department Manager __ and TPM Promotion Department

3. Reports made by: Department Managers and Section Managers in charge of lines, and those in charge of diagnosis departments

4. Target lines and schedule

Time	Departments targeted for diagnosing
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	
＊＊：＊＊～＊＊：＊＊	

Distribution: Diagnostician, Promotion Office of Operations Department (Headquarters) and the Secretarial Office

＊＊ The Promotion Office of the Operations Department (Headquarters) should have a consulation meeting [with other departments] when conducting self-diagnosis of the Promotion Office.

Fiscal Year 19__ (Second Half) President's Diagnosis Plan

Mr./Ms. _____ PM Promotion Headquarters

Monthly	Month: __/__ (day: __)	Month: ___ (day: __)	Month: ___ (day: __)	Month: __/__ (day: __)	Month: ___ (day: __)	Month: ___ (day: __)
Principle divisions targeted	E Operations Department	M Operations Department	Engineering Division Headquarters and L Operations Department	S Operations Department	All sales departments, all overseas departments and other independent departments	Research and Development Headquarters, Information and Statistics Division Headquarters, Purchasing Division Headquarters and other independent departments
9:00 ~	Operations Division Report on production, sales and inventory	←	←	←	← Report on cost of new priority quality products	←
	Report on personnel utilization Report on safety	←	← Report on quality	←	←	←
	Respond to items cited for improvement in the previous month	←	←	←	←	←
10:30 10:40	Break					
(12:00 - 13:00) Lunch (Including 10 min break)	Policy progress report ◎ Progress report on TPM implementation plan • Progress and evaluation of priority policies ◎ Site diagnosis • Report on TPM activities and improvements Status report on VA activities (including parts commonization)	← Status report on VA activities	← (Comments for each plant) ←	← (Comments for each plant) ←	←	← (Comments for each plant)
	Activities report _____	M) Purchasing Department	L) Manufacturing Department	_____	Sales Department No. 2 Overseas Department No. 1 Personnel Department	Service Department No. 1
16:00 16:30	General questions and answers, and diagnosis comments	←	←	←	←	←

- Distribution: All Directors, Operations Division Managers, Operations Office Managers, all Department Managers, all Promotion Office Managers, and the Secretarial Office

President's Diagnosis Plan

A

3

Announcement for President's Diagnosis	A	4

Mr./Ms. ____ TPM Promotion Headquarters

Announcement of Fiscal __/19__ President's Diagnosis

Your attendance is kindly requested as follows.

Note

1. Date and time: __/__/__ (__day) __:__ - __:__
2. Location:
3. Attendees: President, Senior Directors, Managing Directors, Planning Division Headquarters Manager, Information and Statistics Division Headquarters Manager, Research and Development Division Headquarters Manager, Engineering Division Headquarters Manager, Operations Department Managers, Assistant Operations Department Managers, Purchasing Engineering Department Manager, Standing Auditor, and other persons connected with diagnosing (Promotion Office: TPM Promotion Headquarters)
4. Diagnosis program

Classification	Time	Item (details)	
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		
○ : ○○～○ : ○○	○○’		

* The performance report should place an emphasis on the progress of the initial plan, on remaining issues, and on whether those issues are reflected in the next-period plan. The __th period policy should place an emphasis on the means and measures taken to achieve targets at the department level.

President's Diagnosis Sheet	A	5

Fiscal Month __: President's Diagnosis Sheet

Date of Implementation	Divisions targeted	Evaluator

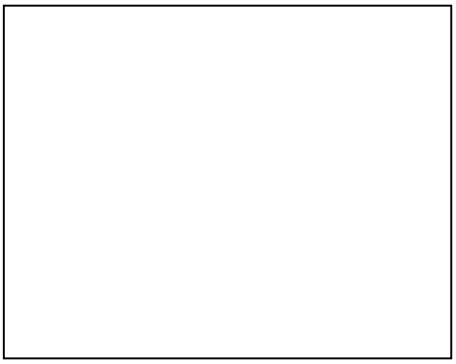
Policy control checksheet

Level	Item		Details of check		Evaluation
Planning level (P)	1	Set policy	1.1	Is managerial news (top management ideas, medium and long-term plans) reflected in the policy?	5 Excellent 4 Very good 3 Satisfactory 2 Needs some improvement 1 Needs
			1.2	Does policy focus on critical issues of one's own department?	
			1.3	Are the resulting views obtained of sufficient detail?	
			1.4	Has the review of the previous period been taken into consideration and acted upon? Have the results of that review been incorporated in the policy?	
	2	Target value (guide)	2.1	Has the evaluation guide been set appropriately?	5 4 3 2 1
			2.2	Are the targets and deadlines appropriate?	
	3	Activity plan	3.1	Is the activity plan detailed and specific?	5 4 3 2 1
			3.2	Are the means for achieving the plan appropriate?	
			3.3	Is it clear who will carry out the activity plan (including autonomous diagnosis), and how they will carry it out?	
Imple-mentat-ion level (D)	4	Progress status and follow-up	4.1	Is work being carried out based on the activity plan?	5 4 3 2 1
			4.2	Are related departments (persons) cooperating sufficiently in the implementation phase?	
			4.3	Are checks being performed at each step?	
			4.4	Is there any delay in progress?	
			4.5	Are appropriate measures being taken for changes in prerequisites?	
Evaluation and measures	5	Performance evaluation and measures	5.1	To what extent has the target been reached?	5 4 3 2 1
			5.2	If not reached, are the factors being analyzed?	
			5.3	Are remaining problems and countermeasures clear?	

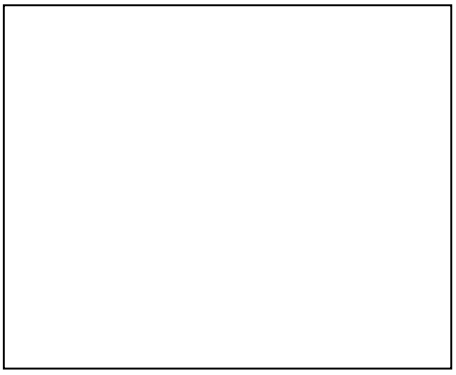
- Please provide your comments on policy management and the site diagnosis.

	Diagnosis (cited items, opinions, demands and impressions)	Reply requested (Y/N)

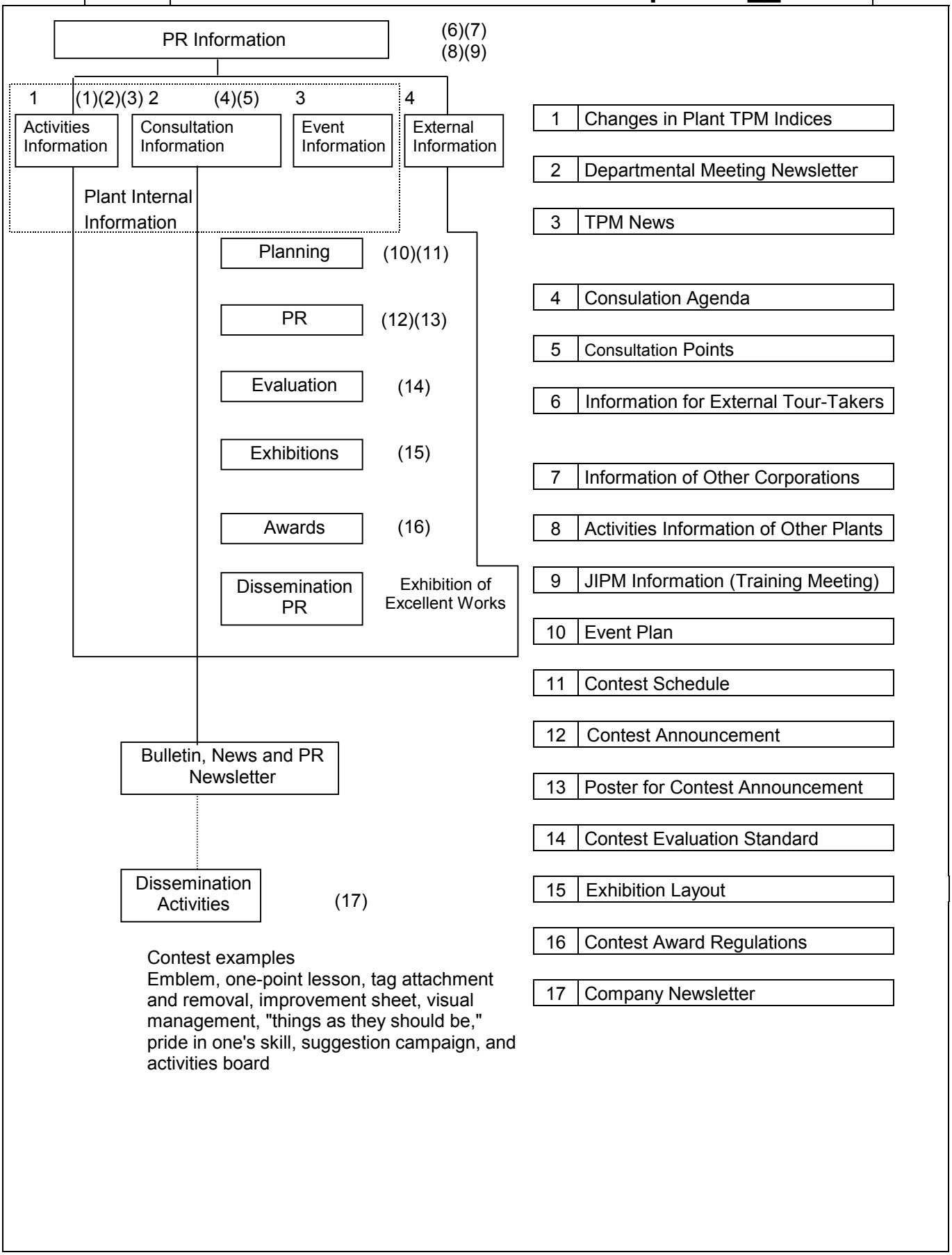
* Please fill in whether or not a reply is requested.



B. TPM PR Activities



B TPM PR Activities Case Example for __ Plant



Changes in Plant TPM Indices	B	1 - 1

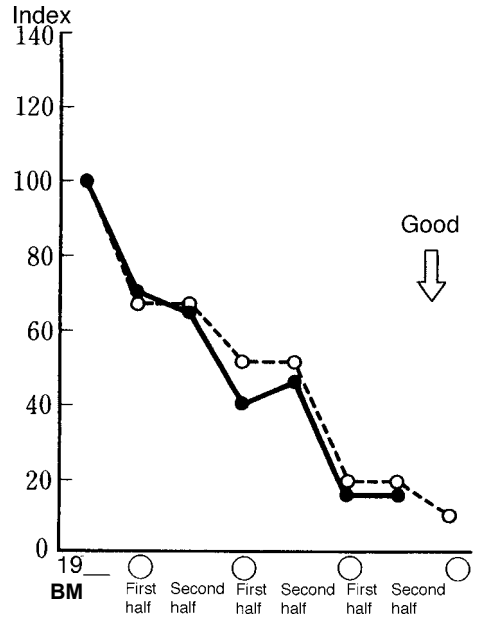
Fiscal Month __: Changes in TPM Goals

TPM Promotion Office

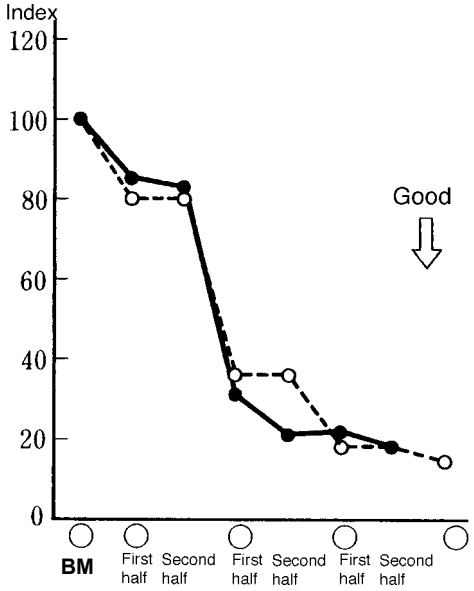
- Tangible effects

Legend ○... Target ●— Actual results

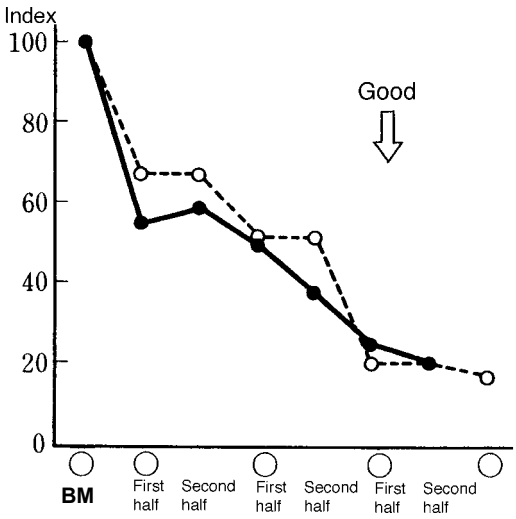
(1) Number of pieces of information cited by the customer



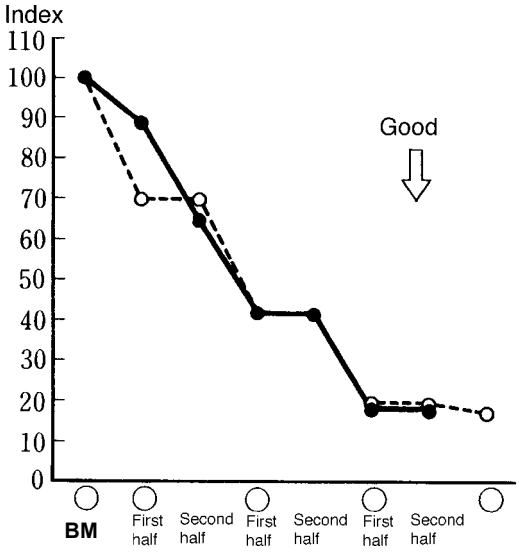
(2) Process quality index (1)



(3) Process quality index (2) (A.B.C.D)



(4) Number of abnormalities with production quantity (A.B.C.D)



Let's work together to reach the target!

Maintenance School News

Issued by: Planning and Maintenance Departmental Meeting

Third Maintenance School
Instructor entrance examination

○. 2/8

Introduction of 11 instructors

( ) ( ) ( )
( ) ( ) ( )
( ) ( ) ( )
( ) ( ) (Titles omitted)

This program produced 22 instructors in fiscal 19__. Based on a review of last year's results, we would like to strive this year to further enhance the program. In particular, we would like to further strengthen education that takes advantage of plant characteristics.

Problems of the month

(101) The purpose of annealing is to eliminate residual stress.
(102) Motors that run at 1500 rpm in 50 Hz regions will run at 1800 rpm in 60 Hz regions.
(103) According to labor safety and health regulations, there should be no obstacles below 1.8 m in plant passageways.
(104) Compared with steel products, ceramic products do not vary much with changes in temperature.
(105) When a load is placed on a cantilever, the bending stress is inversely proportional to the area.
(106) When using a grinder, be sure to perform a run test of at least 1 min on the day of usage prior to using the grindstone.
(107}) A shear force of 450 kgf is applied to a material with a cross sectional area of 150 sq. mm. The shear force will be 3 kgf/sq. mm.
(108) Surface hardness is greater for water-quenched materials than for oil-quenched materials.
(109) In order to balance the needle shown below, the fulcrum should be placed 2 m from the 40 kgf load point.

(110) Steel with less than 0.1% carbon is suited to frame hardness.

Schedule for third autonomous maintenance instructors' education

2/5/19__ Planning and maintenance departmental meeting

Date of imple-mentation	Item	Time	H	Person-in-charge	Date of imple-mentation	Item	Time	H	Person-in-charge
2/8 (Mon)	• Orientation (schedule, education materials, CAI manual)	16:30 ~ 17:30	1		4/22 (Tue)	• Knowledge about pumps	15:00 ~ 17:00	2	
2/13 (Sat)	• How to read a schematic • Knowledge about machine materials	15:30 ~ 18:00	3		4/27 (Tue)	• Knowledge about reduction gears (Toa Kinzoku Co., Ltd.) • Knowledge about conveyors	15:00 ~ 18:00	3	
2/17 (Wed)	• Knowledge about nuts and bolts • Heli-sert	15:00 ~ 17:00	2		5/8 (Sat)	• Knowledge about piping	15:00 ~ 17:00	2	
2/26 (Fri)	• Knowledge about drills • Dimensional tolerance and fitting • Knowledge about keys	15:00 ~ 17:00	2		5/14 (Fri)	• Knowledge about seals	15:00 ~ 17:00	2	
3/9 (Tue)	• Knowledge about bearings (from journal bearings to rolling bearing materials)	15:00 ~ 17:00	2		5/21 (Fri)	• Knowledge about air conditioning and heat exchangers	15:00 ~ 17:00	2	
3/18 (Thu)	• Knowledge about bearings (cage materials and roller bearing service life)	15:00 ~ 17:00	2		5/27 (Thu)	• Knowledge about stainless steel • Knowledge about argon welding	15:00 ~ 18:00	3	
3/25 (Thu)	• Knowledge about lubrication • Knowledge about gears	15:00 ~ 18:00	3		6/4 (Fri)	• Basic knowledge about electricity (voltage, current, resistance, function, DC and AC, and safety)	15:00 ~ 18:00	3	
3/30 (Tue)	• Knowledge about V-belts • Drive chains • Centering of power transmission elements	15:00 ~ 18:00	3		6/11 (Fri)	• Basic knowledge about electricity (motors and sequence)	15:00 ~ 17:00	3	
4/7 (Wed)	• Knowledge about hydraulics and pneumatics	15:00 ~ 17:00	2		6/17 (Thu)	• Basic practical training on electricity (sequence, and how to use measuring instruments)	15:00 ~ 17:00	3	
4/16 (Fri)	• Knowledge about hydraulics and pneumatics	15:00 ~ 17:00	2		6/25 (Fri)	• Basic knowledge about electricity (maintenance of on-site equipment)	15:00 ~ 17:00	3	
* Assistance to be provided by ___ if the person-in-charge cannot attend. * Since instruction will be given during work hours, supervisors in the relevant department are requested to give consideration with regard to work attendance and work responsibilities. Total instruction time: 48 hr					6/30 (Wed)	• Graduation ceremony (graduation examination)	15:00 ~ 17:00	3	Top man-agement GL Maintenance

Toward Step 4 (general inspection)

The technical education provided to master the identification and restoration of minor equipment defects is the basis of the general inspection of Step 4. The idea is to polish the skills of the workers at the same time as polishing the equipment. Strengthen the activity by having all circle members utilize computer assisted instruction (CAI).

19__ Maintenance technician examination

This test will be conducted on 1/31 and 2/21. There will be 281 test takers in the metropolis of Tokyo. Of these, 28 persons will take the examination at the ___ Plant. This is about 10% of all test takers. Test results will be announced at the end of March. All test takers have been making their best efforts.
Well then, what are the results?

TPM Circle Plaza

Which circles will be appearing at the Tokyo Selection Conference?
The __th Circle Conference approaches!
The following circles have made the final cuts and have been selected to attend the __th ___ Circle Conference on __/__ :

__ Division __ Division __ Division
__ Circle __ Circle __ Circle
__ Circle __ Circle __ Circle

The Circle Conference is scheduled to take place in the morning of the event, and the periodic Branch Office Meeting will take place in the afternoon.
In order to save time during the presentations, please note that a collection of summaries will not be prepared this time.

Learning from Painting Professionals

A talk on easy painting was given by ___ Painting Co. and a practical guidance meeting was conducted by the ___ Paint Shop on ___/___.

Participants heard talks on the function of painting, painting and the weather, brush hairs, as well as lectures on paint colors and the five senses. Over 100 listeners at the talks, who thought that painting was simply a matter of applying paint, were quite impressed.

The skill exhibited by professional painters during a demonstration made the audience realize what it takes to be a pro.
Advice from the Pros:

- Paint the most difficult areas first
- Don't apply too much paint to the brush hairs

Two to participate in TPM Ocean University

It has been decided that ____ (name) of Manufacturing Section 2 and ____ (name) of Engineering Management will participate in the TPM Ocean University to be conducted this year from 11/__ until 11/__.

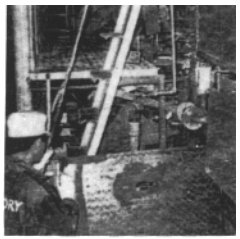
__ Circle to Appear at TPM Women's University

This will be this company's first participation at a TPM Conference. I would like to ask for everyone's strong support and cooperation in this regard. Presenter ____ is making his/her best efforts and will make his/her presentation with confidence.

Circle Introduction Series No.

In this introduction series, the circle to have the honor of being first at bat is the __ Line Circle.

Line __ Circle



This circle is actively engaged in activities with 12 company employees and 8 affiliate members under the direction of Circle Leader __ (total of 21 members). The circle was established in 19__, and the first equipment theme was "_____." Subsequently, the circle took on the theme of _____, and has already passed Step 5 (end of __/19__).
It is important when promoting these activities to make sure that the activities are efficient by improving "setup." This point was explained to me as follows:

The Seven Tools of Setup

(1) Ordering materials (2) Preparation of materials
(3) Schematics (4) Method of Implementation
(5) Preparation of parts (6) Provision of tools (7) Protective gear

These are the seven points that I learned about. Please ask the __ Line for specific details.
Although it is exciting to be a model line, I expect even greater activity in the future.
Due to a change in personnel on __/__, three people have joined the ___.
I would like to introduce them now.

Section Manager ___
I pledge to succeed in the ___ Strategy using on-site production activitiesand TPM.

Section Manager ___
I believe that the members of ___ are steadily achieving results through the ___ Strategy.

Section Manager ___
I will make my best efforts to achieve the goals of the "Strategy." I ask for your kind cooperation in this endeavor.

★★

__ (month) Schedule for the ___ Strategy
__ (day): Instructor __ Guidance Meeting
__ (day): Second Circle Conference
__ (day): Autonomous Maintenance Day
__ (day): Instructor __ Guidance Meeting
__ (day): TPM Women's Conference
__ (day): Instructor __ Guidance Meeting
Autonomous Maintenance Day
__ (day): ____ Report Meeting

Quality Maintenance One-Point Sheets

Number of Responses Exceeds 200
As a part of the Strengthen ___ Month, which began on __/__, we received
223 one-point sheets on the subject of quality. The __ Departmental
Meeting, which is struggling with the selection of the Distinguished Work
Award, was overjoyed. The results are scheduled to be announced shortly

Consultation Agenda	B	2 - 4

__/__ Instructor _____ Consulation Agenda

Time	Details	Explanation given by	Location	Attendees
	1. Summary explanation of screening, and OHP guidance rehearsal Emcee: Section Manager ___		Conference Room 3	Members of each Departmental Meeting
9:05	Opening remarks	Emcee		
	Remarks by representative of the factory	Plant Manager		
	Chapter 14: TPM Effectiveness and Evaluation	Plant Manager		
	Chapter 4: Individual Improvement Activities	Departmental Meeting Chairperson		
	Chapter 5: Autonomous Maintenance Activities	Departmental Meeting Chairperson		
	Chapter 6: Planned Maintenance Activities	Departmental Meeting Chairperson		
~	Chapter 7: Quality Maintenance Activities	Departmental Meeting Chairperson		
	Chapter 8: Initial-phase Equipment Control	Departmental Meeting Chairperson		
	(Break)			
	Chapter 9: Education and Training Activities	Departmental Meeting Chairperson		
	Chapter 10: Information Promotion Activities	Departmental Meeting Chairperson		
	Chapter 11: Administrative and Indirect Department Activities	Departmental Meeting Chairperson		
	Chapter 12: 5S Activities	Departmental Meeting Chairperson		
	Report on progress of items cited for consultation	Plant Manager		
	Question and answer (Please ask the instructor questions)	Emcee		
12:00	(Lunch) (Program free time and explanation of concepts)			
13:00	2. On-site screening rehearsal			Group Leaders and higher
~	A. _____Manufacturing Division on-site screening guidance		Manufacturing	Participation by
	• Case example of free time		Division ___ site	all
14:55	Break and venue change			
~				
15:05	A. _____Manufacturing Division on-site screening guidance		Manufacturing	
~	• Case example of free time		Division ___ site	
16:55	General evaluation		Conference	
~			Room 3	
17:00	End			

* Prepare a chair for those providing explanations 5 minutes or longer.

10/1 Consultation with Instructor ___

Manufacturing Department 1

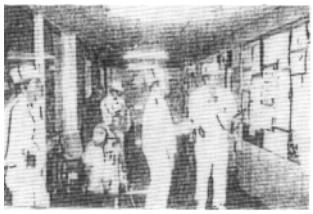
Analysis of machining work
1. First create a flowchart of the entire system.
2. Thoroughly identify the functions of the equipment
3. Summarize each equipment by element

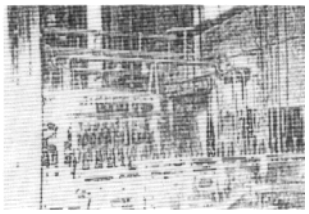
Aim to pass Step 4 by the end of October

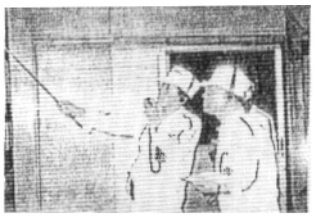
Women working in the silo

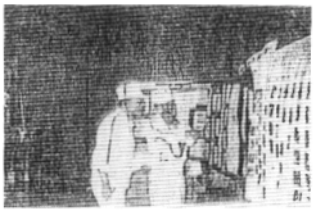
Manufacturing Department 2

Clarify the autonomous maintenance plan for newly introduced equipment.
Each circle should create at least one case example of "zero" and "one-shot set-up."

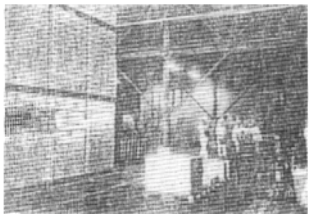








Materials group Individual improvement: Secure space for placing empty cans



Conversation with instructor. "Let's all participate in activities that contribute to the management index!"

Information for External Tour-Takers	B	4 - 6

JIPM Promotion Office Forum

__/__ TPM Promotion Office Forum Schedule

Time	Explanation		Person in charge of explanation	Attendees	Venue
					Guest room No. 2
13:00 ~	Arrive at plant (Guide: __)				
13:05	• Opening remarks from JIPM Promotion Office	(5 min)	JIPM Promotion Office	Promotion Office	
~	• Opening remarks by representative of ___ Plant	(5 min)	Plant Manager		
	• Explanation of schedule	(3 min)	Promotion Office		
13:15	1. Overview of ___ Plant TPM activities (40 min)		Promotion Office		
	• Company and plant overview	(3 min)			
	• TPM policy and targets	(5 min)			
~	• TPM promotion organization and management	(3 min)			
	• TPM promotion case example	(20 min)			
	• Results of activities	(5 min)			
13:55 ~	Break (15 min.)				
14:10	2. On-site tour (__ Division)	(50 min)		Promotion Office	Division site
		(3 min)	Leader ___	Division Promoters	
	• Explanation of divisional activities	(8 min)			
	• __ Pre-processing room	(18 min)	Group Manager ___		
~	• Improvement case example (reducing failures of the __ grinding machine)	(15 min.)			
	• Control room	(3 min)	Group Manager ___		
		(3 min)			
15:00	3. On-site tour (__ Division) (30 min)				Division site
	• Explanation of divisional activities	(8 min)	Leader ___		
	• Explanation of ___ during walk	(5 min)			
~	• Countermeasures to prevent bottles toppling at the outlet of __ machine	(8 min)			
	• Case example of improvement for ___	(8 min)			
		(3 min)			
15:35 ~	4. Tour as far as __ (45 min)			Promotion Office	Tour route
16:20	Q&A			Promotion Office	Guest room No. 2
	• Remarks by JIPM Promotion Office		JIPM Promotion Office	Division Promoters Case example presenters Autonomous maintenance Departmental Meeting members	
~					
17:00	End				

• We will visit all sites. Your cooperation is appreciated.

TPM Information of Other Corporations

Mr./Ms. ___ of __ Co. will tour the TPM activities of this plant. Next time, we will introduce the TPM activities of Mr./Ms. ___ of __ Co.

1. Profile

- The TPM kick-off was in 19__. The goal is to produce top level products, and implementation is currently in progress.

2. Reference materials will be on display. Please be sure to view them.

- TPM overview by Mr./Ms. __
- Company details

The tour is scheduled for __/__. An on-site explanation will be provided. Your cooperation is kindly requested.

TPM Promotion Office

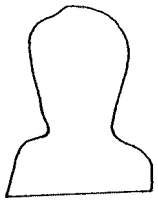
Activities Information of Other Plants

B	4 - 8

TPM News No. 9

__ Plant TPM News
__/__/__

Issue No. 9
Published __/__
__ Promotion
Promotion Office



First Anniversary of __ and __ activities kickoff
Plant Manger __

Like the proverb "time flies like an arrow," it will soon be one year since the __ and __ activities kickoff. We now confront a milestone (first anniversary) in these activities. I wonder how everyone's activities development went. Some of you are currently working on Step 3, but most teams have fallen quite a bit behind the plan.

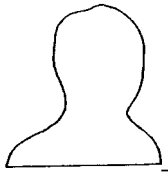
I recently listened to the experiences of top management at companies that have received a TPM Award this year. It seems that for every one of them, the first year of the program was quite tough. They were persistent, however, and continued their TPM activities with conviction.

They overcame various hurdles and finally achieved excellent results. In the truest sense of the word, we are now at the make or break point. On the occasion of the first anniversary, let us all redouble our efforts and aim for great results.

All Circle Leaders

First Anniversary of the
____ and ____ Kickoff
Let's be resolved in our efforts
toward 19__!

To establish autonomous maintenance activities



___ ___ (name)

To establish autonomous maintenance activities, one must first come to like the equipment one is using. To like the equipment one uses is to understand its structure, function, and usage conditions (so that it becomes one's own). When workers like the equipment they use, they perform not just a standard inspection, but an inspection using their five senses. Equipment failures disappear and the workplace becomes an easier place in which to work. Understanding each piece of equipment will take time, and I would like to pursue this goal slowly but surely.

Let's make our first temple visit of the New Year

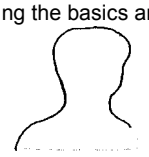
___ ___ (name)

After about 2,000 hours of effort, we have polished the machines, polished the piping, and even polished the skills of the "workers" to pass Step 2. We have been fortunate to receive the __ Award, and things appear to be going well.

We made our best efforts to make the time for these activities. The time when things didn't go well was when activities were halted from March to April. I realized for the first time how important it is to change attitudes when it seems that no one can agree on anything.

Next year will bring more hardships. Let's make our first temple visit of the New Year.

Learning the basics and establishing TPM



___ ___ (name)

Initial cleaning has brought a shine to the equipment it hasn't seen in 12 years. Some of you may feel that you've had it with cleaning! That feeling has given rise to many concepts for improvements, such as countermeasures for the source of problems. We are keeping the equipment polished to a shine. We can say that this change in mood is the principal result of this year of activities.

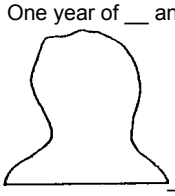
From hereon, I would like to master the basics of each step, and to strive to establish activities.

Our performance will match our plans next year

___ ___ (name)

A year is soon ending since the kickoff of the __ & __ activities. After repeated trials and errors, we finally finished Step 2.... If we continue this way, I suppose it would not be possible to finish Step 4 by the end of 19__, but I would like to finish it somehow. No, we must finish it somehow. Next fiscal year, we should take aim to match our performance with the plan. I would like to proceed with activities with the cooperation of all members so that we are not left behind by other circles.

Walking the path of ___
One year of __ and __ activities



___ ___ (name)

Looking back, I feel it has been a busy and exciting year. Since the __ and __ kickoff, production has dropped and goals were imposed on dispirited Line __. Their activities focused on the 4S of __ rank equipment. However, just when they had carried out initial cleaning a number of times, the site made a complete turnaround and broke into the ___ and recovery ___ business. Although ___ production started in July, a series of problems arose, and dealing with them took everyone's time every day with "___ & ___". This went on for a long period of time, and activities could not start until October, which significantly delayed other circles. It was painful for me whenever I asked about passing the top management diagnosis. In 19__, I would like to roll back the delays in activities and adopt the good points of other circles. Let's all join hands in making our best efforts.

Using our collective wisdom, let's find the time for activities

___ ___ (name)

It's almost one year since the start of the __ & __ activities. Our circle is presently working on the activities of Step 2. Looking back on this year, our greatest difficulty has been to find the time for activities in the face of production that runs two to three shifts, day after day. Although I think these difficulties will continue, I would like to proceed with the activities as planned, through the sharing of the collective wisdom of all circle members.

JIPM Training Meeting Information

Presentation by __ Circle of this plant

7th TPM Ladies Conference

I play a major role in TPM.

Date	9/22/94 (Thu) 10:00 - 16:00
Venue	JA Building, Chiyoda-ku, Tokyo 1-8-3 Otemachi Chiyoda-ku, Tokyo Tel: 03-3245-7467 (event date only)
Participants	• Women in the Manufacturing Division, Administrative and Indirect Divisions • Leaders and members of women's groups • Managers promoting the activities and improved performance of women's groups

- Those wishing to participate should telephone the Promotion Office.

Event Plan	B	3 - 10

Plan approval route: Subsection Manager-in-charge → Section Manager → Plant Manager
Report approval route: Person-in-charge → Subsection Manager → Section Manager → Plant Manager

Event Plan

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Date created: __/__/__

Event name	"Activities contents" contest
Plan interval: __/__/__ - __/__/__	199_. __. __ ~ 199_. __. __
Presentation venue	Cafeteria (announced in Company Bulletin) Award: Presented at __th Circle Conference
Person-in-charge of plan	Autonomous Maintenance Departmental Meeting Chairperson ___
Budget for plan	Yen___,___ (Budget code: ___-__)

Plan details

1. Purpose

To evaluate the contents of circle activities, and to award a prize to the Distinguished Circle.

There are six contest items:

- Number of one-point lesson sheets created (per person)
- Number of problem improvements and individual improvement sheets (per person)
- Number of tags attached and removed (per person)
- Number of activity man-hours (per person)
- Number of suggestions (per person)
- Number of improvements implemented (per person)

Award: __ (number) __ coupons are awarded for the __ Prize

Expense: Yen___,___

Approval

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Implementation status

1. Results

- Number of one-point lesson sheets created (per person) ___ Circle
- Number of problem improvements and individual improvement sheets (per person) ___ Circle
- Number of tags attached and removed (per person) ___ Circle and ___ Circle
- Number of activity man-hours (per person) ___ Circle
- Number of suggestions (per person) ___ Circle
- Number of improvements implemented (per person) ___ Circle

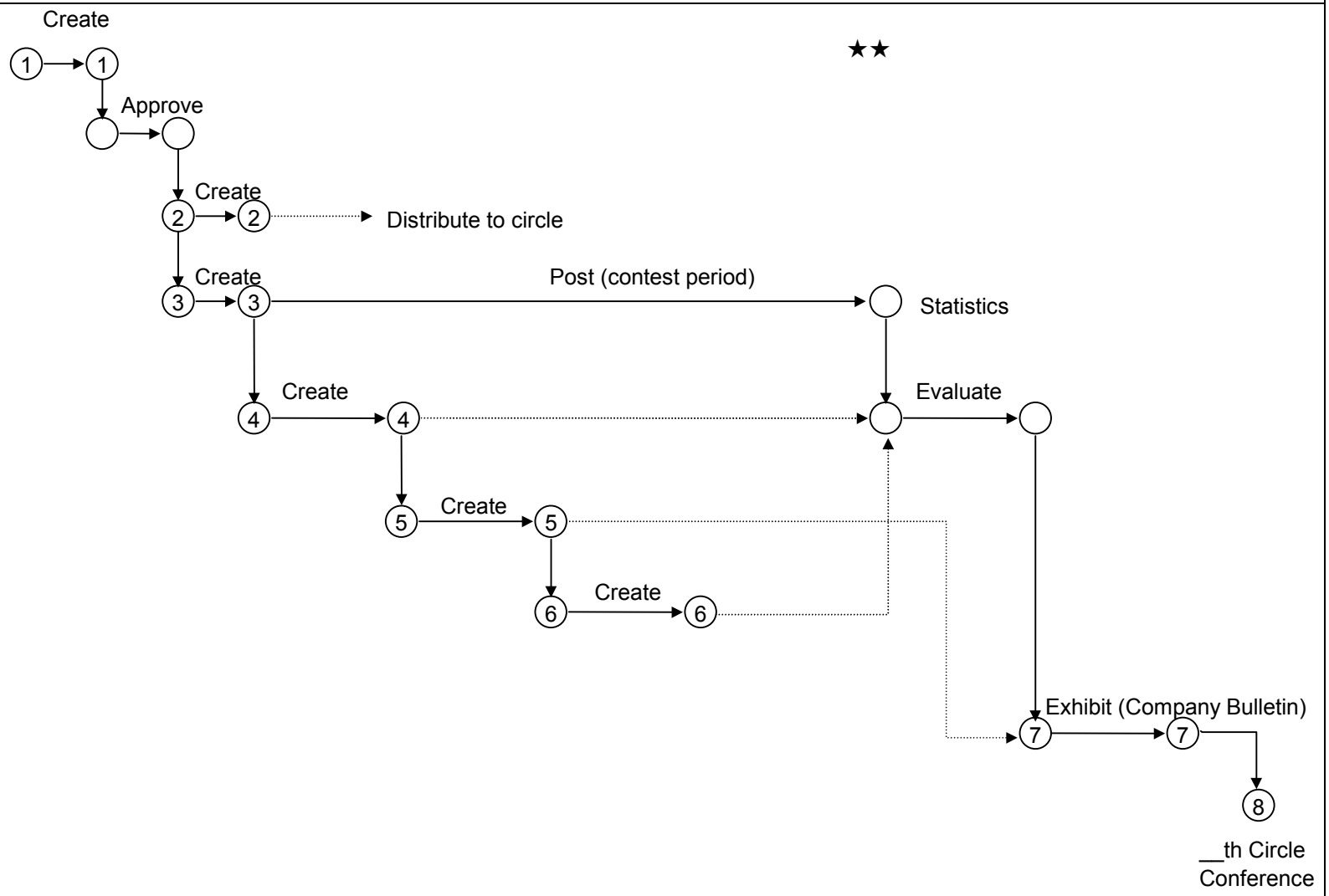
Report approval

2. Expense

Yen__,___

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

"Activities Contents" Contest Schedule

Item	Schedule
1. Event plan	
2. In-house announcement	
3. PR poster	
4. Creation of evaluation standard	
5. Exhibition layout	
6. Creation of award regulations	
7. Introduction of Distinguished Circle	
8. Award	

Contest Announcement	B	3 - 12

"Autonomous Maintenance Activity Contents" Contest

Autonomous maintenance activity have also been actively implemented. A contest will be conducted concerning the activities status of each theme.

1. Target period — The contest will target activity performance from __/__ until the present time.

2. Contest details

   1. Awards will be given to groups or circles with the largest per-person score for the following items:

      - Number of one-point lesson sheets
      - Number of problem location improvement sheets and individual improvement sheets
      - Number of tags attached
      - Number of tags removed
      - Number of activity man-hours
      - Number of suggestions
      - Number of suggestions implemented

   2. In the campaign contest, awards will be given for the strength and uniqueness of the contents of each of the following items:

      - One-point lesson sheet contest (number of cases)
      - Activities board contest (number of cases)
      - Problem location improvement sheets and individual improvement sheets (number of cases)

3. Submission method — Each Division's promotion committee members should submit this year's statistics for the items in "1." and should select up to five cases for the items in "2."

4. Contest deadline — __/__/__

5. Determination of award group — Decided by the Executive Committee.

Poster for Contest Announcement	B	3 - 13

Implementation of Autonomous Maintenance Activity Contents Contest

Autonomous maintenance activities have been actively implemented. A contest will be conducted concerning the status of activities for each theme.

Let's all put in our best efforts.

Target period	The contest will target the performance of activities from __/__ to the present.
Contest details	• Number of one-point lesson sheets • Number of problem location improvement sheets • Number of individual improvement sheets • Number of tags attached • Number of tags removed • Number of activity man-hours • Number of suggestions • Number of suggestions implemented
Evaluation method	Collect statistics for data up to __/__. The Executive Committee will make the final decision.
Awards	Prizes will be given for each award.

- Let's all work together as one circle.

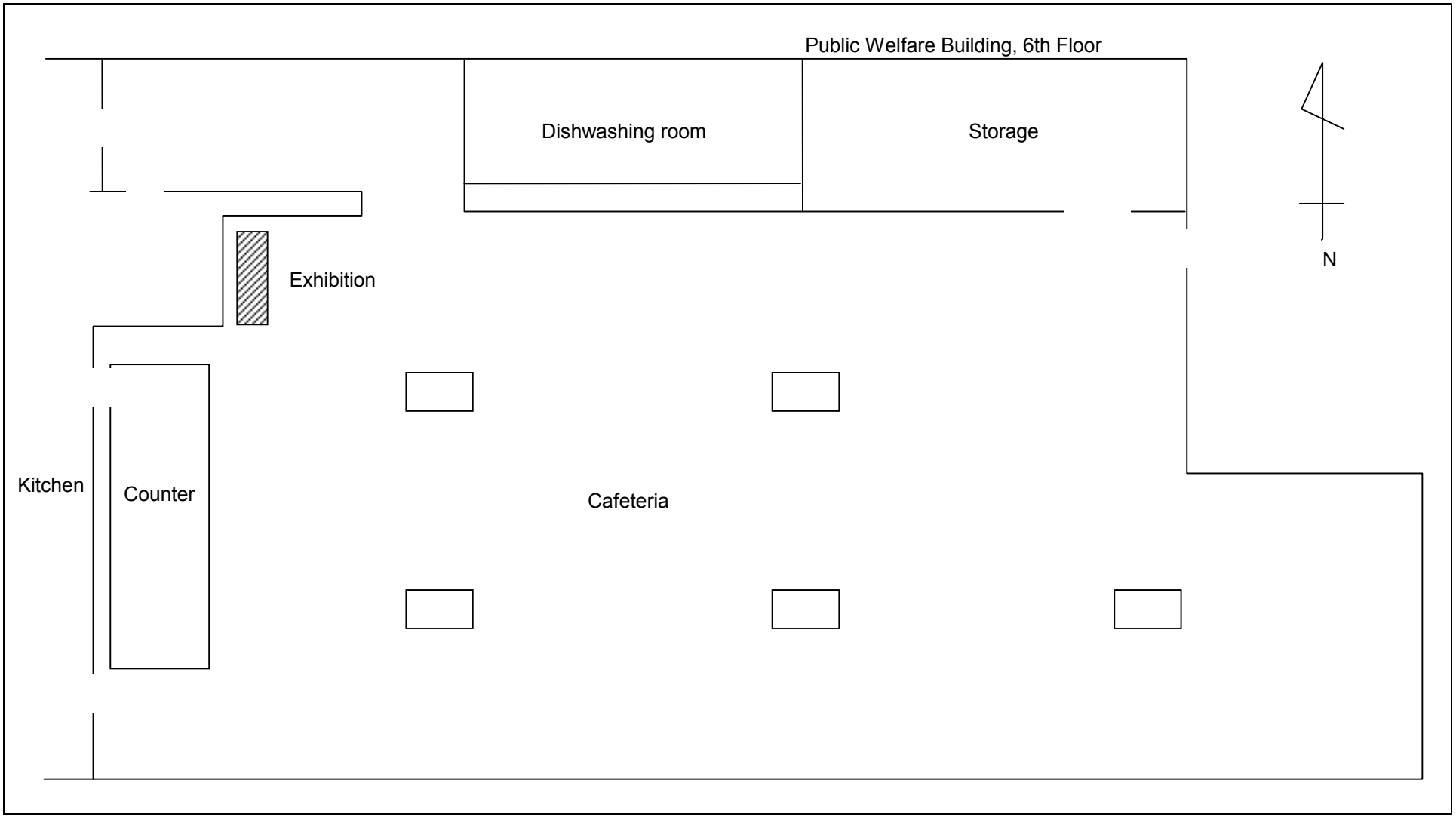
Autonomous Maintenance Departmental Meeting
Promotion Office

Contest Evaluation Standard	B	3 - 14

"Activity Contents" Contest Evaluation Standard Sheet

Division	Evaluation item / Circle name	Number of one-point lesson sheets created per person	Number of problem and individual improvement sheets created per person	Number of tags attached per person	Number of tags removed per person	Number of activity man-hours per person	Number of suggestions per person	Number of suggestions implemented per person	Evaluation standard	Other
	○ ○	3.1	1.9	28.0	21.2	57.2	16.0	10.4		
○	○ ○	2.1	4.2	7.1	5.6	73.3	6.6	6.0		
	○ ○	4.0	1.0	19.4	17.5	88.2	25.7	14.0	The circle	
○	○ ○	2.3	0.6	10.6	7.1	37.4	14.4	10.2	with the	
	○ ○	1.4	0.9	6.1	3.3	22.2	6.1	5.8	greatest	
	○ ○	3.2	0.2	9.2	4.1	42.0	9.3	0.5	number of	
○	○ ○	0.9	2.6	6.8	6.5	83.4	3.4	0.4	cases per	
	Line ○	0.5	-	12.9	1.9	21.5	3.7	5.1	person.	
	○	2.4	2.6	23.4	9.3	95.0	2.9	2.3		
	○ ○	2.4	1.4	22.9	11.3	27.3	5.1	2.1		
○	○ ○	0.9	0.9	2.3	9.3	83.4	20.3	10.9		
	○ ○	1.5	0.9	5.0	4.8	58.0	7.0	1.0		
	○ ○	1.0	1.2	2.6	5.0	42.0	5.1	2.6		
	○ ○	7.3	1.5	27.8	23.8	55.0	14.0	0.5		
○	○ ○	2.0	0	1.3	9.0	21.0	12.0	5.0		
○	○ ○	4.0	0	11.6	10.1	35.2	14.0	9.0		
	○ ○	5.0	2.0	15.8	12.0	77.4	13.0	8.8		
○	○ ○	0.4	0.6	8.9	6.9	26.4	12.1	11.9		
○	○ ○	1.3	1.0	5.3	3.8	21.3	8.7	2.0		
○	○ ○	1.4	1.2	11.6	6.9	25.4	8.5	6.5		
○	○ ○	0.9	2.6	5.0	9.3	26.4	5.1	2.6		

Exhibition Layout



Exhibition Layout

B

3 - 15

"Activity Contents" Contest Award Regulations

1. Number of one-point lesson sheets created

<Evaluation guide>
- The circle with the greatest number of one-point lesson sheets created per person from __/__ to __/__.

<Award>
- Send __ (number) __ coupons for the Distinguished Circle.

2. Number of problem and individual improvement sheets created.

<Evaluation guide>
- The circle with the greatest number of problem and individual improvement sheets created per person from __/__ to __/__.

<Award>
Send __ (number) __ coupons for the Distinguished Circle.

3. Number of tags attached and removed

<Evaluation guide>
- The circle with the greatest number of tags attached and removed per person from __/__ to __/__.

<Award>
- Send __ (number) __ coupons for the Distinguished Circle for Tag Attachments.
- Send __ (number) __ coupons for the Distinguished Circle for Tag Removal.

4. Number of activity man-hours

<Evaluation guide>
- The circle with the greatest number of activity man-hours per person from __/__ to __/__.

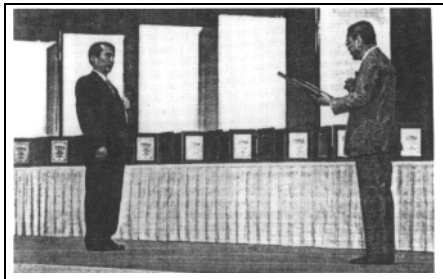
<Award>
- Send __ (number) __ coupons to the Distinguished Circle.

5. Number of suggestions and suggestions implemented

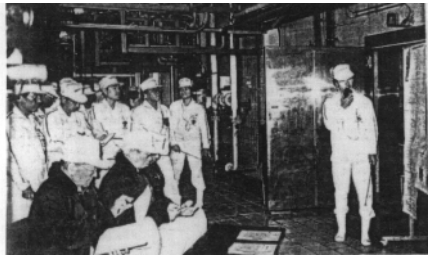
<Evaluation guide>
- The circle with the greatest number of suggestions per person from __/__ to __/__.
- The circle with the greatest number of suggestions implemented from __/__ to __/__.

<Award>
- Send __ (number) __ coupons for the Distinguished Circle for Suggestions.
- Send __ (number) __ coupons for the Distinguished Circle for Suggestions Implemented.

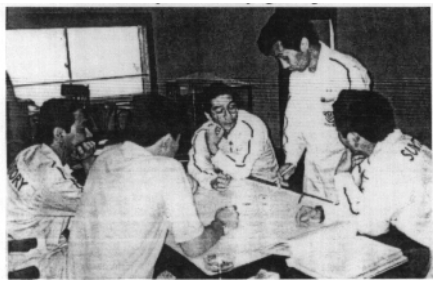
Example of Company Newsletter



Above: Award ceremony at Prince Hotel.
Below: Tension-filled screening



Below: PM analysis study group



Below: Japan Institute of Plant Maintenance.
Guidance by Instructors Sugiura and Akagawa

Above: Autonomous maintenance activity that was very highly evaluated.
Restoration is currently in progress (leaks, overhangs, dirt, mold and rust)

Suntory Musashino Beer Plant receives TPM Distinguished Award

First time awarded to the beer industry

The "Fiscal 1994 PM Distinguished Award Ceremony" was held this past October 18th at the Tokyo Prince Hotel. The Suntory Musashino Beer Plant was selected from among 49 companies nationwide to receive the TPM Distinguished Award - First Category."

TPM is an abbreviation for Total Productive Maintenance, and is a PM activity in which all company employees participate.

TPM yields results only to the extent that it is carried out. The number of corporations introducing TPM has increased in recent years, starting with domestic corporations and even at overseas firms as well. The Japan Institute of Plant Maintenance screens corporations that have introduced TPM programs and have achieved results in that endeavor, and confers the "TPM Distinguished Award."

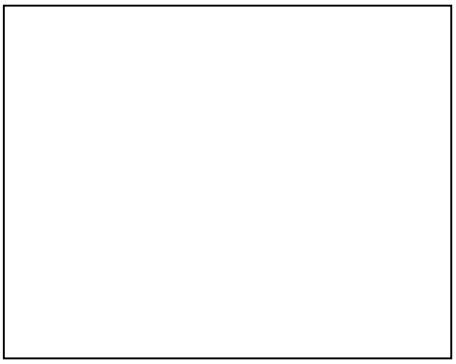
The Suntory Musashino Beer Plant aims to maintain the environment of employees and equipment in the best possible condition, and to produce the highest quality products. The plant kicked off its TPM program in December 1991 with a slogan of "Stable Processes and Stable Quality."

The following three years tells a story of the participation by all employees, and of their efforts and inventiveness. Through these activities, employees have become adept at operating and maintaining their equipment, and the number of failures has drastically decreased and equipment overall efficiency has dramatically improved. Various results were obtained, such as extending equipment service life and reducing inspection costs.

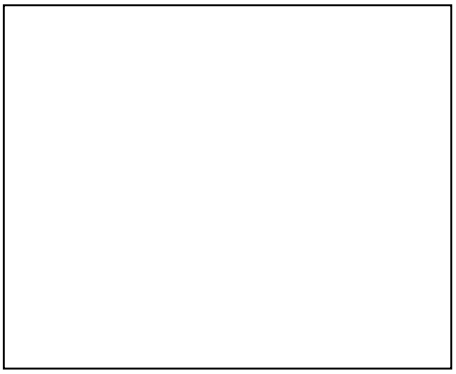
These activities have given employees a sense of accomplishment and a taste of satisfaction. At the same time, these activities have also greatly enhanced their confidence.

Suntory Musashino Beer Plant intends to further support TPM in the future, and will challenge even higher targets.

(Suntory Musashino Beer Plant)



C. Three Jewels ofJishu Hozen (AM)



C Three Jewels of Autonomous Maintenance

Activating Autonomous Maintenance (Three Jewels)

1 Activities Board (1)

- ○ Policy and Goals
- ○ Activities Plan
- ○ Results Index
- ○ Selection of Priority Themes
- ○ Understanding the Current Situation
- ○ Analysis
- ○ Countermeasures
- ○ Effectiveness
- ○ Preventing Future Recurrence (Standardization)
- ○ Review

2 Meetings

- Ten Points of Meetings (2)
- Meeting Minutes (3)

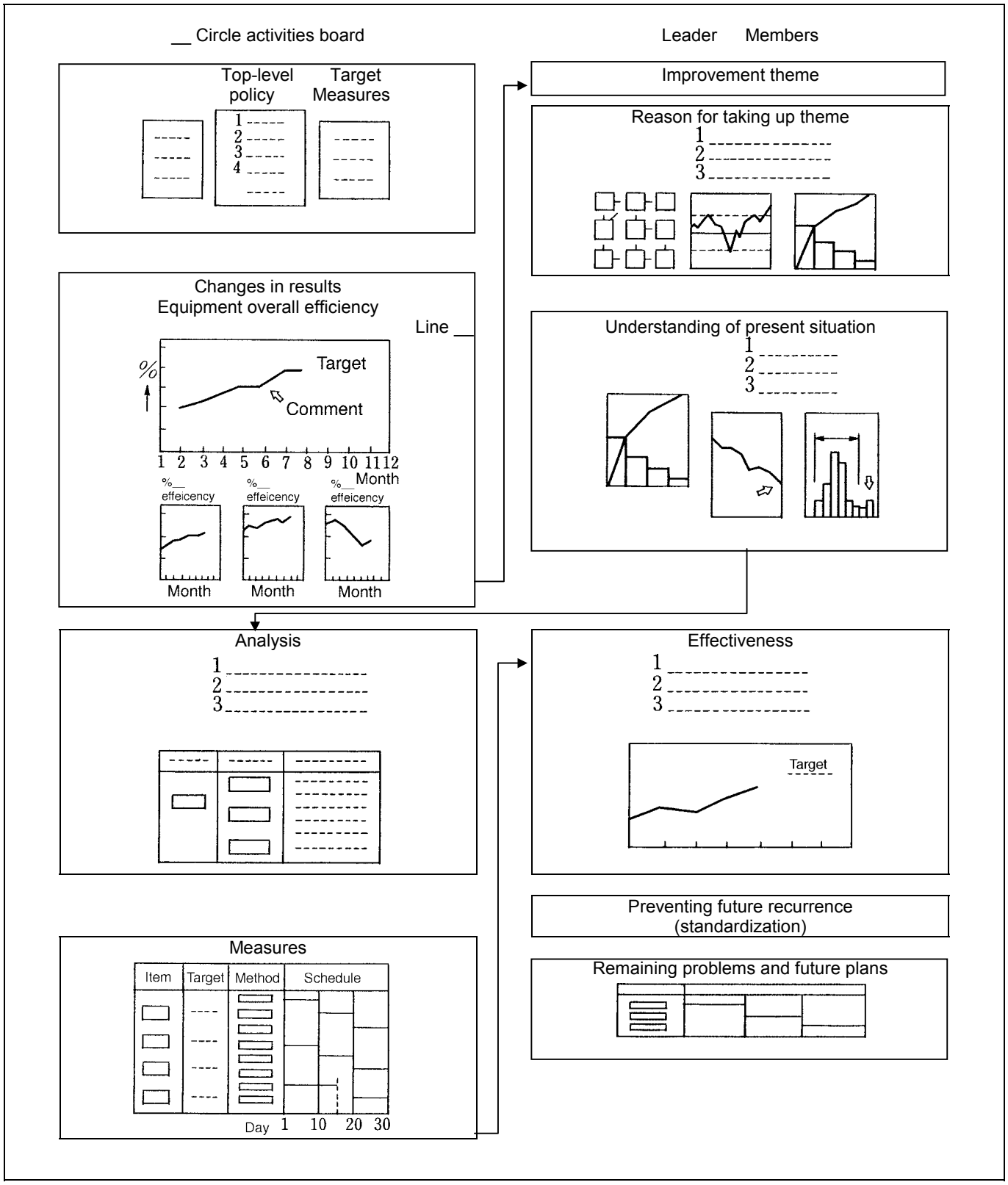
3 One-Point Lessons

- Types of One-Point Lessons (4)
- Person-to-Person Education and One-Point Lessons (5)
- One-Point Lessons Sheets (6)

1	Example of Activities Board
2	Ten Points of Meetings
3	Meeting Minutes
4	Types of One-Point Lessons
5	Person-to-Person Education and One-Point Lessons
6	Example of One-Point Lesson Sheet

Example of Activities Board	C	1 - 1

Contents of Activities Board



Ten Points of Meetings

C	2 - 2

Ten Points for Leaders in Meetings
• Before the meeting
(1) Announce beforehand
(2) Report to superior
(3) Write on blackboard
• Holding the meeting
(4) Clarify the closing time
(5) Decide the person in charge for each responsibility
(6) Confirm theme and items to be decided
(7) Divide roles and reconfirm period to achieve target
(8) Decide date and time of next meeting
• After meeting
(9) Fill in activities plan
(10) Receive advice from superiors

Circle Activities Report (Example)

Circle activities report	Date issued	__/__/__ (__th)		
	Name of circle	○○○○○		
Theme Toward undergoing a Step 2 diagnosis	Assigned area	Tools Section 3, Team 1, Group 5		
	Circle Leader	○○	Record	○○
Participants ○ ○ ○ ○ ○ ○ ○ ○ Absentees: None	Activity contents	Actual work	__/__ __:__ - __:__	
		Meeting	__/__ 15:50 - 17:00	
		Education and practical training	__/__ __:__ - __/__	
		Total time	(1.[1 hr]) x (5 [persons]) = (5.[5 man-hours])	

No.	Item	Details implemented and measures taken	Period	Person-in-charge
1	The Step 2 diagnosis is set for 10/22. What will you do until then?	(1) In addition to reevaluating initial cleaning (day and night shifts), will vigorously carry out initial cleaning for 15 minutes after breaks.	Starting from __/__	__/__
		(2) Will identify priority items for initial cleaning.	__/__	__/__
2	A dispersion prevention cover was attached, but it had no effect because the machine was out of service.	(3) Will record the status of oil leak tag removals on the activities board.	__/__	__/__
		(1) Since the D9 machine is used, will create a model using the D9 machine and examine its effectiveness.	__/__	__/__ __/__ __/__
3	Improvement of the suction inlet is not making progress (countermeasure for the source of the problem).	(1) Will examine the trial polishing powder on the D9 machine.	__/__	__/__ __/__ __/__

Section Manager's comments	Section Operation Office's comments	Group Leader's comments
Read and understand Step	Increase the number of meetings.	Circulate the PDCA and continue to make progress.

Meeting Minutes	C	2 - 3

Meeting and Work Minutes

Date issued	__/__/__	Promotion Group	Section Manager	Subsection Manager	Group Manager	Created by
Date implemented	__/__/__					
Circle name	Circle					
	Subsection					
Leader's name						
Recorded by						
Theme						

Activity contents			
	Meeting	__/__/__ __:__ - __:__	Attendees:
	Operations	__/__/__ __:__ - __:__	
	Education	__/__/__ __:__ - __:__	
	Training	__/__/__ __:__ - __:__	
	Education and practical training	__/__/__ __:__ - __:__	
	Total time	Total time = (__ hr) x (__ persons) = (__ man-hours)	Absentees:

No.	Item	Details implemented and measures taken	Period	Person-in-charge

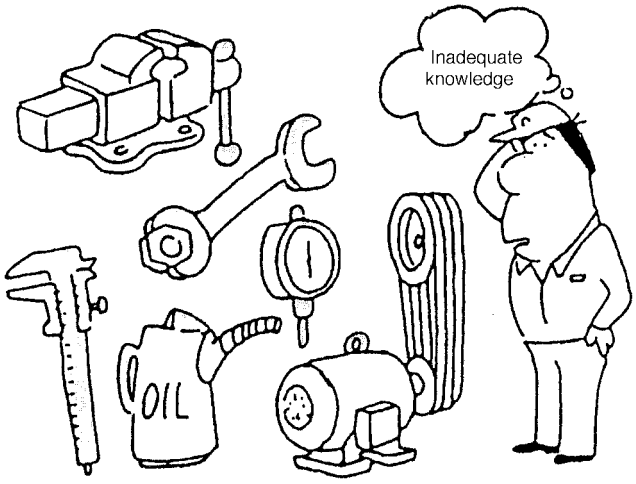
Next theme		Schedule for next meeting	__/__ (__day) __:__ - __:__ (Meeting venue: ____)

Group Manager's comments	Subsection Manager's comments	Section Manager's comments	Operation Office's comments

Types of One-Point Lessons

TPM one-point lesson

Basic knowledge sheet

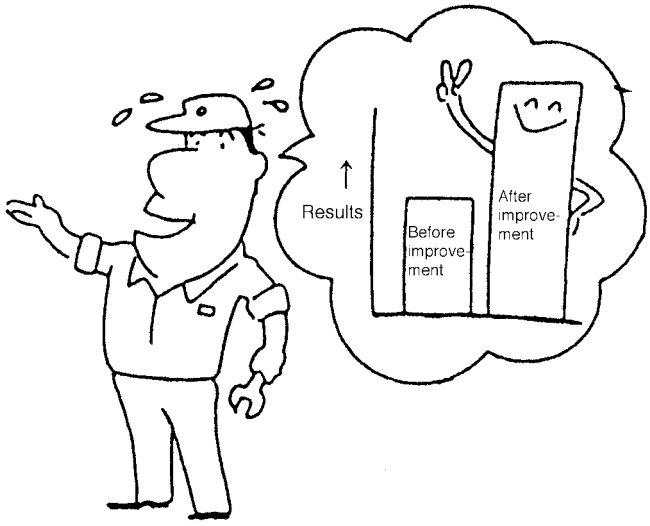


TPM one-point lesson

Trouble case example sheet

TPM one-point lesson

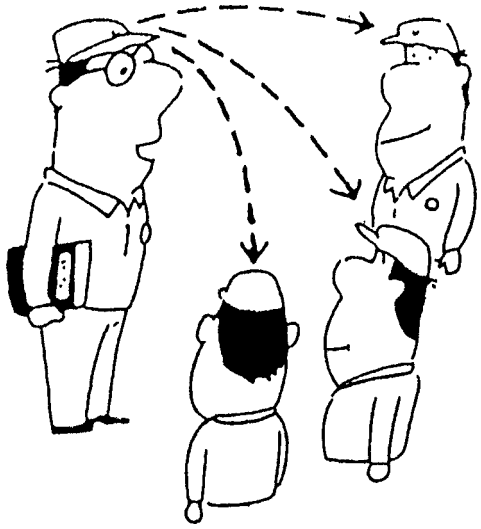
Improvement case example sheet



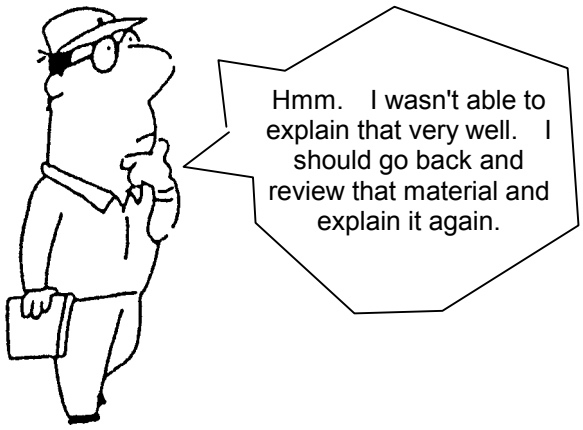
Person-to-Person Education and One-Point Lessons	C	3 - 5

Person-to-Person Education and One-Point Lessons

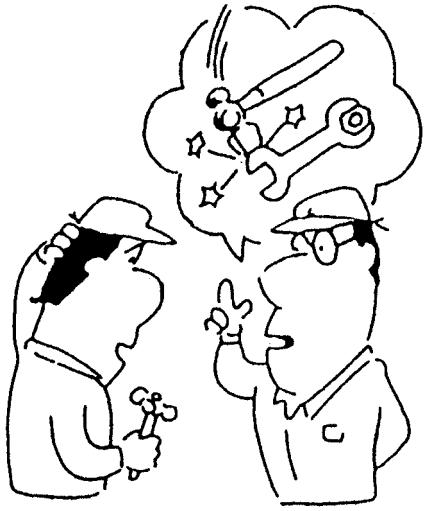
- Leaders have an obligation to pass on their knowledge to the circle members.



- Leadership is established through the activity of teaching.



- After passing on your knowledge, follow up to see that it is put into daily practical use.



- A one-point lesson is an education technique that effectively conveys the keypoint in a short period of time.

Example of One-Point Lesson Sheet	C	3 - 6

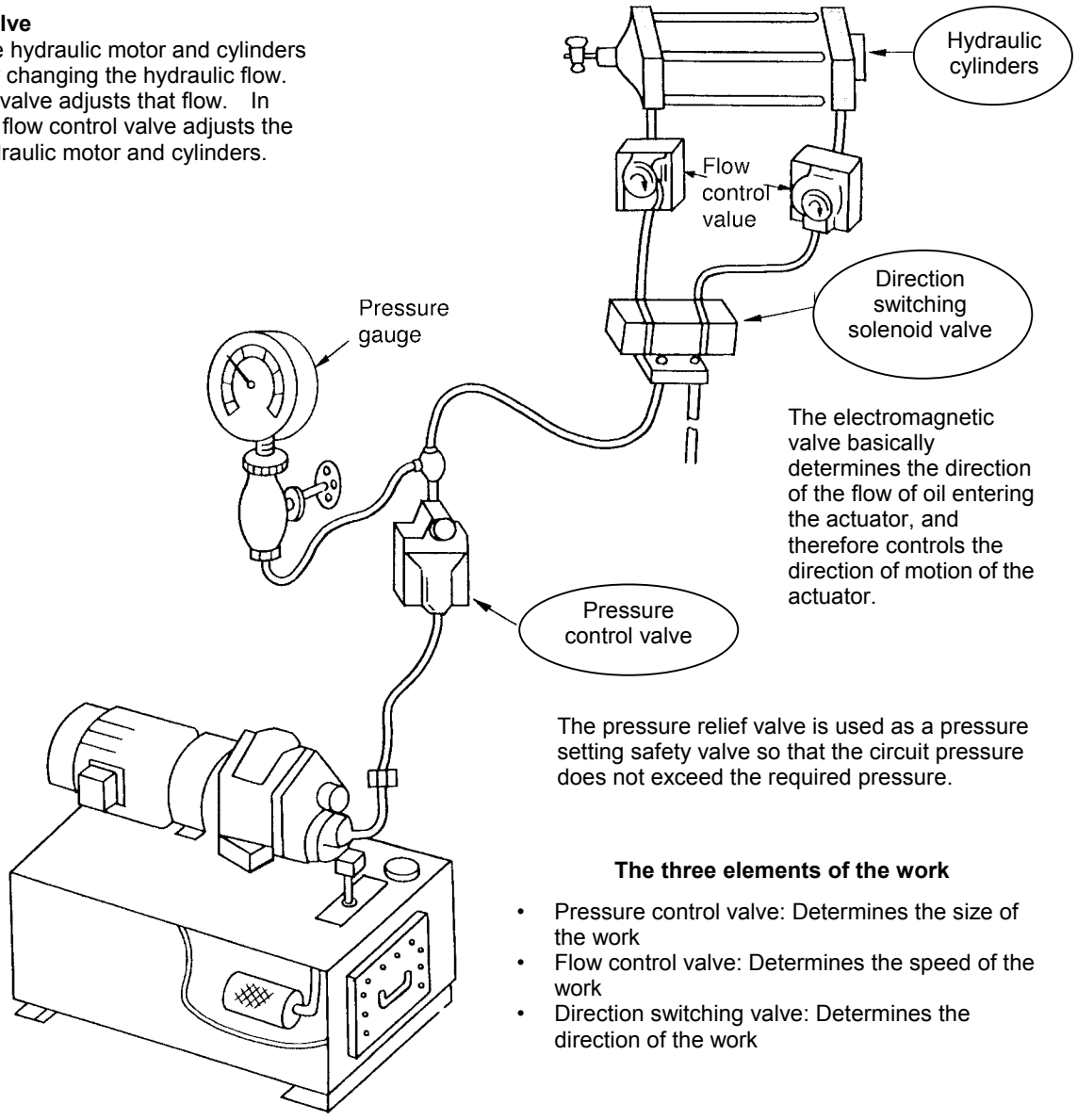
TPM One-Point Lesson

	Registration No.	
	Date	/ /

Case name	Mechanism and function of hydraulic equipment	Basic knowledge / Failure / Improvement	Section Manager	Subsection Manager	Plant Manager	Created by

Flow control valve

The speed of the hydraulic motor and cylinders can be varied by changing the hydraulic flow. The flow control valve adjusts that flow. In other words, the flow control valve adjusts the speed of the hydraulic motor and cylinders.



The electromagnetic valve basically determines the direction of the flow of oil entering the actuator, and therefore controls the direction of motion of the actuator.

The pressure relief valve is used as a pressure setting safety valve so that the circuit pressure does not exceed the required pressure.

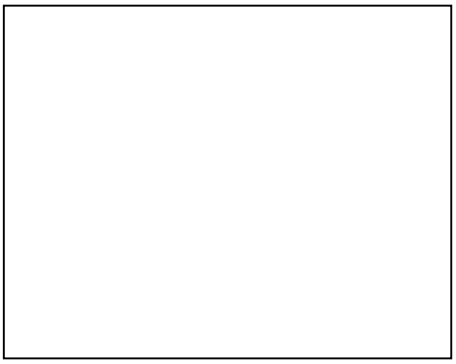
The three elements of the work

- Pressure control valve: Determines the size of the work
- Flow control valve: Determines the speed of the work
- Direction switching valve: Determines the direction of the work

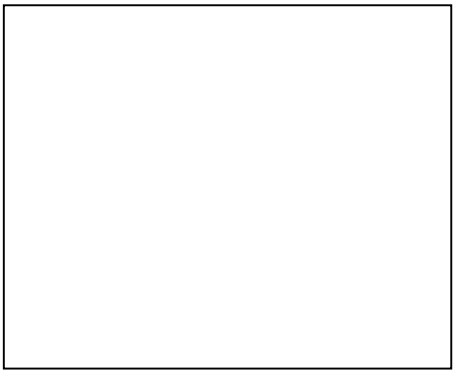
Lesson									
	Date								
	Who								
	To whom								
Evaluation after implementation		4 3 \ 1 2	4 3 \ 1 2	4 3 \ 1 2	4 3 \ 1 2	4 3 \ 1 2	4 3 \ 1 2	4 3 \ 1 2	4 3 \ 1 2

Evaluation

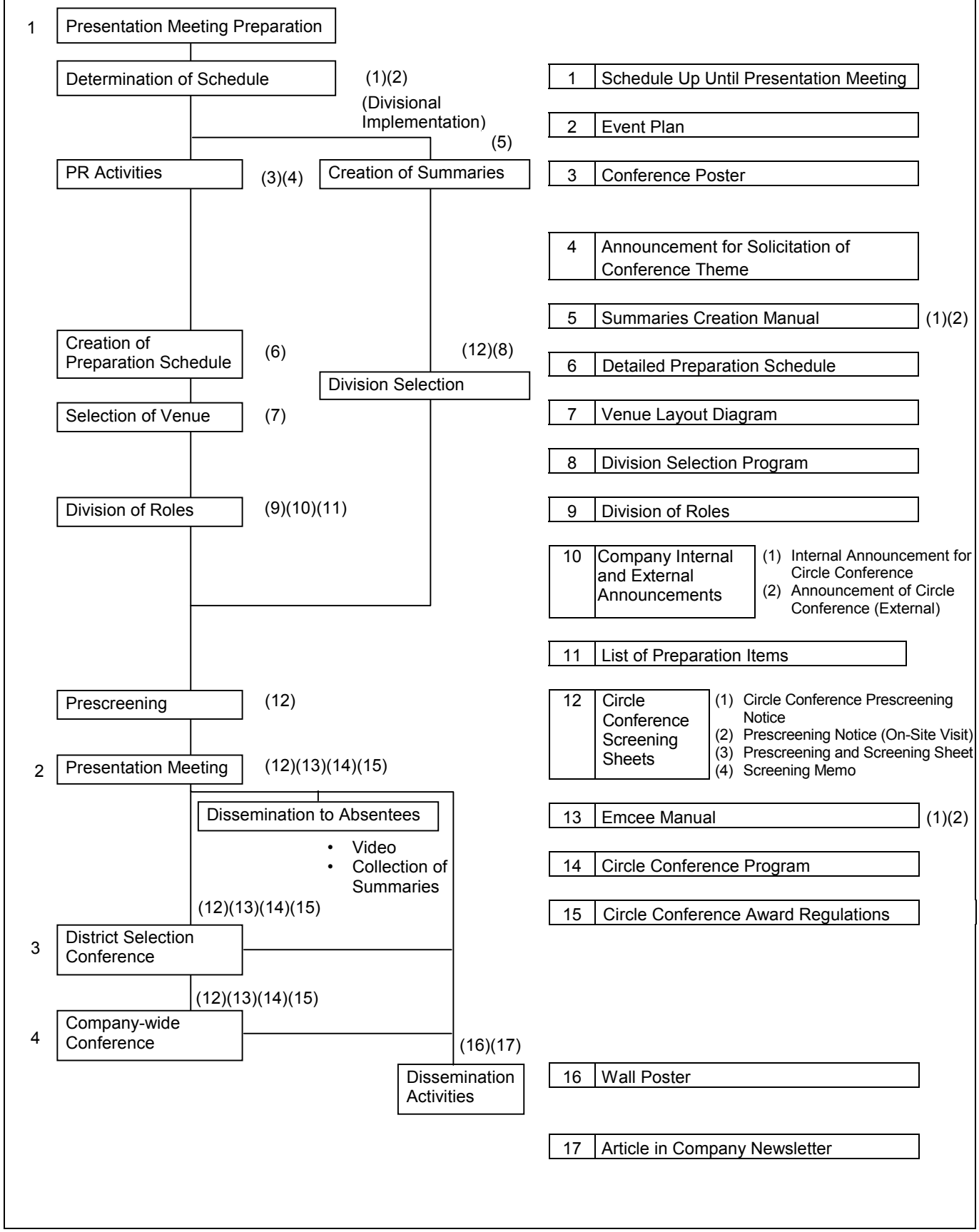
1. Understands the work intellectually, but cannot perform the work
2. Can perform the work to some degree
3. Can perform the work with confidence
4. Can teach others



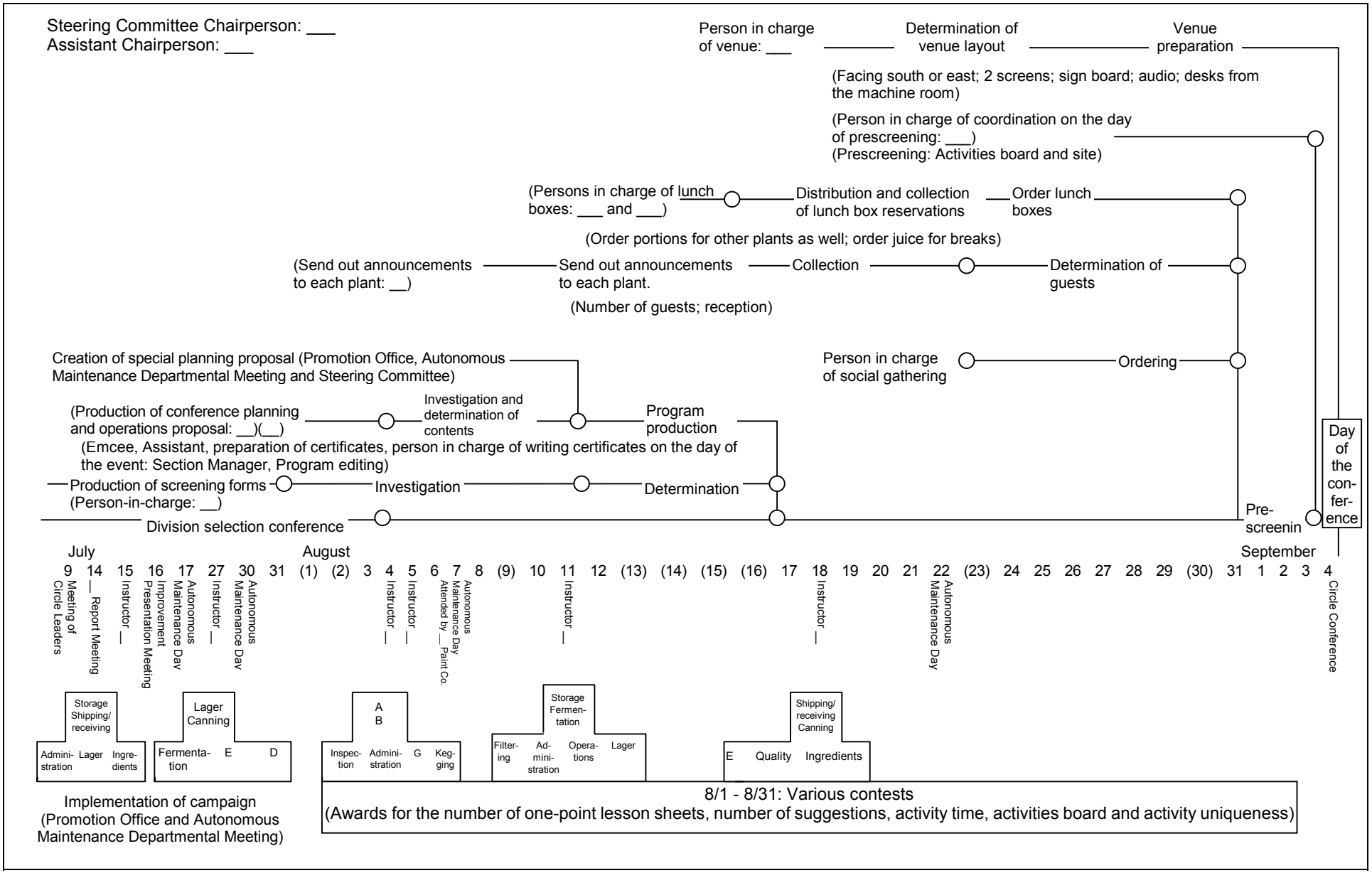
D. Presentation Meeting (Circle Conference)



D Presentation Meeting (Circle Conference) Case Example for ___ Co.



__th Circle Conference: Schedule Up Until Conference



Schedule Up Until Presentation Meeting

D

1 - 1

Event Plan

Plan Approval Route: Person-in-charge → Subsection Manager → Section Manager → Plant Manager
Report Approval Route: Person-in-charge → Subsection Manager → Section Manager → Plant Manager
Date created: __/__/__

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Event name	__th Circle Conference
Event date	__/__/__ __:__ - __:__
Event venue	Cafeteria
Person in charge of event	Autonomous Maintenance Departmental Meeting Chairperson __ (Section Manager __)
Event budget	Yen___,___ (Budget code: ___-__)

Event details

1. Purpose
   - As a venue for the presentation of case studies of circles, and as a venue to learn about the contents of the activities of other circles, to present a case study (individual improvement case study) of a small group activity.
   - To nominate candidates for the company-wide circle conference
2. Social gathering
   To hold a social gathering for exchange between presenters and invitees.
3. Please refer to the separate attachment for a detailed schedule of the Circle . Conference

(Approval)

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Implementation status

1. Number of participants: 130 persons (Number of participants may be reduced depending on line operations)
2. Results
   Conference Award: ___ Circle
   Distinguished Award: ___ Circle
   ___ Circle
   Encouragement Award: ___ Circle
   ___ Circle
   ___ Circle
3. Expenses: Yen___,___

(Report approval)

Plant Manager	Section Manager	Subsection Manager	Person-in-charge

Circle Conference Poster

__th Circle Conference

Conference Theme: Daily improvement for everyone
Circle activities for mutual improvement

Date and time: __/__ __:__ - __:__

Venue: Cafeteria

Circle Conference Steering Committee

Announcement for Solicitation of Conference Theme	D	1 - 4

Announcement of Solicitation of Theme for __th Circle Conference

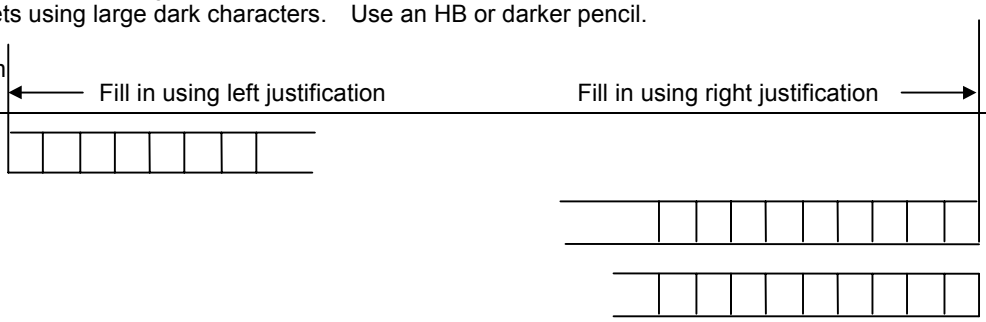
The __th Circle Conference theme is being solicited as follows. The cooperation of all circles is kindly requested.

Note

1. Solicitation details: A theme that demonstrates the promotion of improvements and the cooperation of members is solicited.
2. Solicitation period: __/__ - __/__
3. Submit to: TPM Promotion Office (__ or __)
4. Screening method: Submit a Circle Conference theme → Circle Conference Steering Committee (Now down to 10 themes) → Executive Committee (Final decision)

Summaries Creation Manual

1. Forms: Circle presentation writing paper (__ Department B4 size) (1) (2)
   Fill in up to 3 sheets using large dark characters. Use an HB or darker pencil.
2. Uniform entry form



<Introduction field>

<Photo field>

Photo of all circle members

<Circle background field>

<Process overview explanation field>

Fill in using illustrations, process diagrams and text

(____) Circle

Overview of circle	Members		Status of circle activities	
Date organized	Number of members	(__) persons __ Males	Number of meetings per time	Thirty minutes or longer: (__) times per month
__/__/__		__ Females		Less than 10 minutes: (__) times per month
Name of Circle Leader		__ Part-time workers	Improvement time per case	
	Average age: (__) years old		Activities time for the step	Step (__): (__) minutes
Age of members	Maximum age: (__) years old Minimum age: (__) years old		Average number of suggestions for the circle	(__) cases/person-month

* Completed forms should be checked for errors by at least 2 persons.

Summaries Creation Manual

Activities schedule

Understanding of present situation

Target

Analysis

Countermeasures

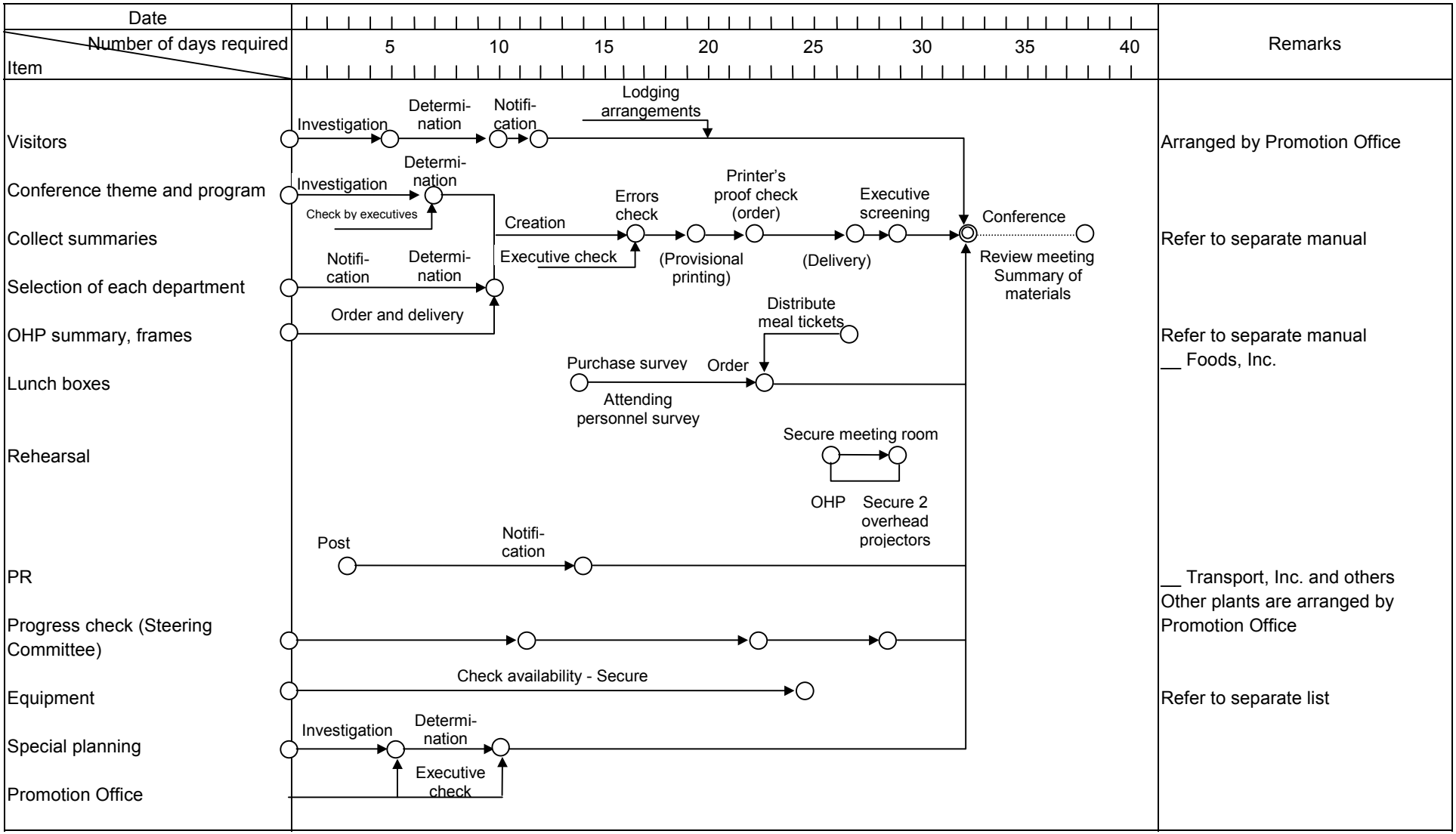
Verification of countermeasures

Measurement of effectiveness

Preventing future recurrence

Evaluation and reflection

Detailed Preparation Schedule for Circle Conference

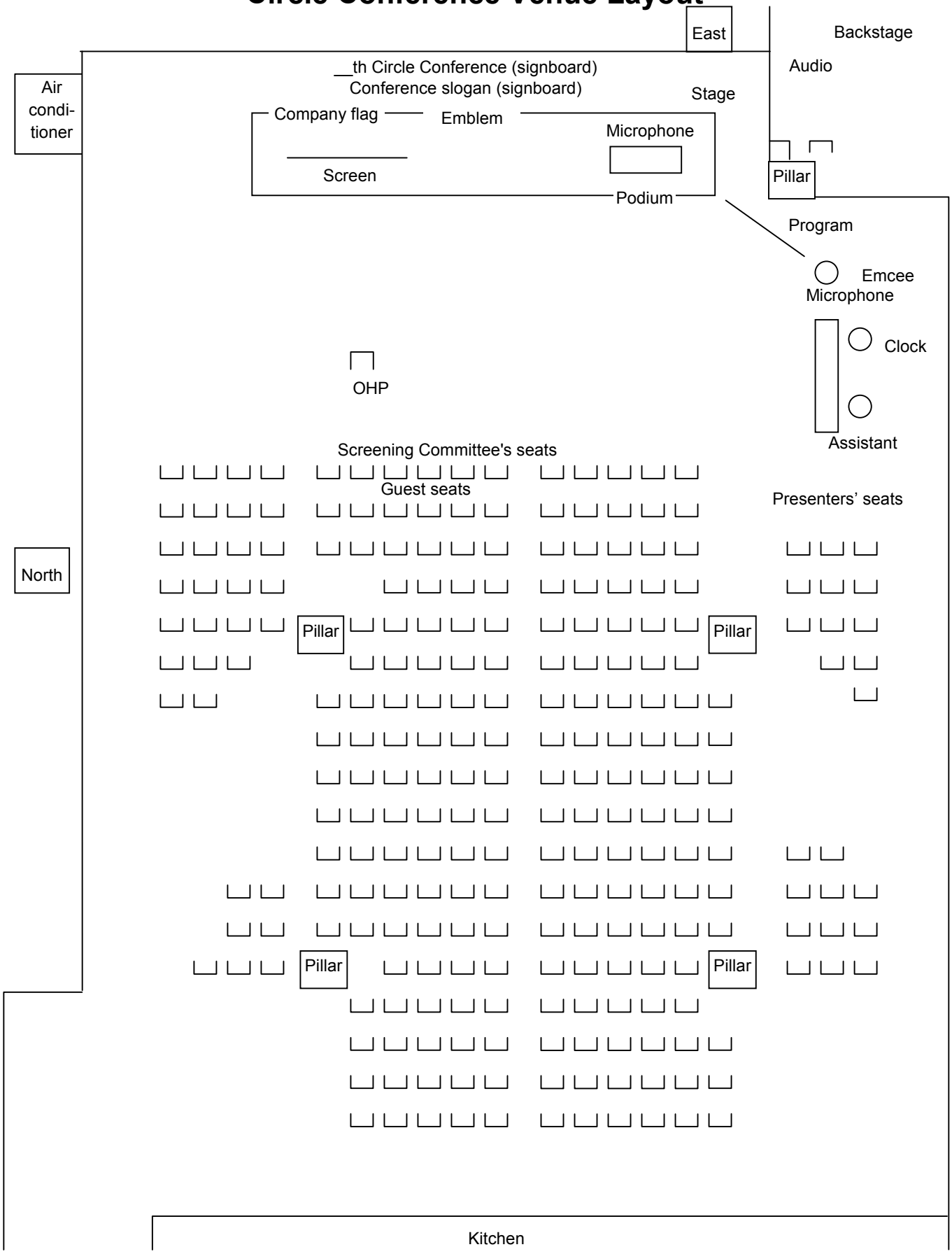


Note

- The number of days is the actual number of days, not including holidays.
- Venue operations are to be performed in the afternoon of the day before the conference.
- The number of days indicated on the chart are minimum guidelines. Additional time should be added to each item as needed.

Venue Layout Diagram	D	1 - 7

Circle Conference Venue Layout



Circle Conference Division Selection Program

Please make the following preparations for the above program.

Note

1. Date and time: __/__/__ (Tuesday) __:__ - __:__

2. Venue: __ Division, Meeting Room No. __

3. Method

a. Please present a report using overheads on the subject of individual improvement theme registration, or a topic conforming to that subject.
b. Please present an oral report on insufficiencies in the contents of the report. Further, if there are supplementary materials, please prepare one set of copies.
c. Allow 7 minutes for the presentation and 7 minutes for the Q&A period for each circle.

4. Schedule

Order	Circle	Theme title	Presented by	Time
1	○○	Preventing __ in the __ Equipment on Line __	○○○○	○○：○○～○○：○○
2	○○	Reducing the Number of Toppled Bottles at the Outlet of __ on Line __	○○○○	○○：○○～○○：○○
3	○○	Prevention of __ Inversions	○○○○	○○：○○～○○：○○
4	○○	Countermeasures for __ Printing Faults	○○○○	○○：○○～○○：○○
5	○○	Preventing Dispersions in the __ Machine	○○○○	○○：○○～○○：○○
6	○○	Reducing __ Losses	○○○○	○○：○○～○○：○○

5. Screening Committee

Section Manager __, Subsection Manager __, Staff Member __ and Staff Member __ (total of 4 persons)
* Please conduct screening using the circle presentation screening sheets.

6. Other

a. The top two circles in the screening results should appear at the Plant Circle Conference.
b. Please keep the presentation as short as possible.
c. Please take Instructor __'s comments from the previous conference into consideration in selecting the presentation contents for each circle.

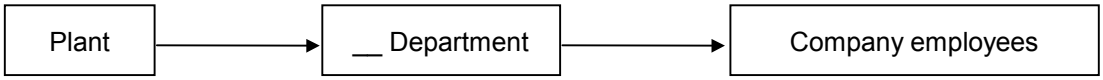
Division of Roles for the Circle Conference

No.	Name of Role	Personnel	Responsible Party	Name of Person-in-charge
1	Conference Committee Chairperson	1	○○○○	
2	Conference Steering Committee members	6		○○、○○、○○、○○、○○、○○
3	Emcee (proceedings)	1	○○○○	○○
4	Timekeeper	1	○○○○	○○
5	Assistant (female)	1	○○○○	○○
6	Broadcasting group	1	○○○○	○○
7	Lighting group	2	○○○○	○○、○○
8	Wireless microphone group	2	○○○○	○○、○○
9	Prize awarding group	1	○○○○	○○
10	Venue logistics group		○○○○	Division in charge of operations
11	Person in charge of sign production	2	○○○○	○○、○○
12	Lunch box group	1	○○○○	○○
13	Reception group	2	○○○○	○○、○○
14	Camera group	1	○○○○	○○
15	Program production		○○○○	
16	Invitation card production		Promotion Office	
17	Awards production		Promotion Office	
18	Complimentary prizes (preparation of gifts)		Promotion Office	
19	Preparation of consumables (thumbtacks and cellophane tape)		Promotion Office	
20	Preparation of screening sheets (binders and writing implements)		Promotion Office	
21	Preparation of social gathering	6	○○○○	Conference Steering Committee
22				
23				
24				
25				
26				
27				

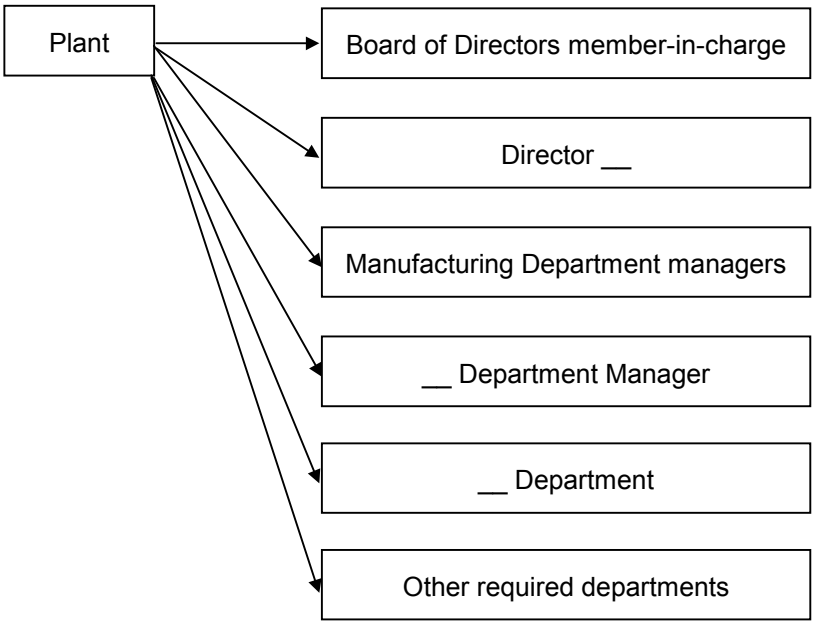
Internal Announcement for Circle Conference

(1) In-house announcement

a. Notification of schedule



b. Notification of announcement and confirmation of attendance



* The Promotion Office should give notification of the announcement to each business establishment and the __ Department.

(2) Announcement for outside the company

a. Prepare the announcement sheet (use A4 size specified paper)

• Refer to the manual on preparing text for outside the company.

Announcement of the __th __ Plant Circle Conference

The above conference will be held as follows.

Note

1. Date and time: __/__/__ (Friday) __:__ - __:__
2. Venue: __ Plant, Cafeteria (6th floor)
3. Circles giving presentations

Division	Circle Name	Theme Title
○○	__ Circle	Reducing the volume of dust and dirt in Room __
	__ Circle	Reducing the volume of dust and dirt in Room __
○○	__ Circle	Correcting problems when switching over __
	__ Circle	Reducing __ complaints
○○	__ Circle	Improving water processing in the __ Pump Room

End

List of Preparation Items

List of Circle Conference Preparation Items

* The following equipment is needed at the conference. Please refer to separate relevant manuals for equipment needed for each section (presentations, awards, etc.).

	Equipment Item	Qty. Needed	Storage Location	Remarks
1	Stage	8	Cafeteria Machine Room	
2	Podium	1	Projection booth	
3	OHP	2	Meeting Room No. 3	1 unit is for spare
4	OHP screen	1	Meeting Room No. 3	
5	Sign (large)	1	Cafeteria Machine Room	For conference name or slogan
6	Sign (small)	1	1st floor, __	Installed horizontally at the entrance; for venue information
7	Company flag and TPM flag	1 each	Promotion and Promotion Office	
8	Award certificates	7	Promotion Office	The award and circle name are filled in on the day of the event
9	Vase	1	Promotion	
10	Flower arrangement	1	Purchasing and Promotion Office	Reserve in advance
11	Guest seat placards	Depending on the number of guests	Prepare for each occasion; Promotion Office	Limited to copies
12	Ashtrays	5	Security	
13	Summary collection, survey forms and questionnaires	200 each	Prepare for each occasion	Paper for surveys and questionnaires are in the Promotion Office
14	Water jugs, cups and towels	1 each	Promotion	
15	Forms for meal tickets	Depending on the number of purchasers	Prepare for each occasion; Promotion Office	
16	Microphone and audio	Wireless microphone 5 Wired microphone 2	Music Room	
17	Stopwatch and bell	1 each	Promotion Office	
18	Camera and film	1	Promotion	
19	Lamp indicator	1	Cafeteria Machine Room	
20	Screening sheets and binders	6 each	Promotion Office and Promotion	A3 size
21	Pointer and penlight	1	Promotion Office and Promotion	
22	Juice	Depending on the number of participants	Purchasing and Promotion Office	Reserve in advance
23	Thumbtacks and cellophane tape	1 each	Promotion	
24	Program (for venue)	1	Prepare for each occasion; Promotion Office	
25	Bulletin board	1	Cafeteria	For venue program
26	Seats	250	Cafeteria Machine Room Meeting Room No. 3	
27	Table	5	Cafeteria	One round table and 4 square tables
28	Waste basket (cardboard box)	5	Coordinate with Manufacturing Section 2G	
29	White cloth	2	Promotion	For Emcee's seat

Circle Conference Prescreening Notice

Circle Conference Prescreening

1. Date and time: __/__/__ (__day) __:__ - __:__

2. Venue: Plant Manager's Office

3. How to proceed

   (1) Overview of presentation contents for each circle:
   Approx. 10 min Division Manager (Section Manager)
   (2) Discussion on that circle:
   Approx. 15 minutes All members of Screening Committee
   * Repeat (1) and (2) for each circle
   (3) General question and answer, and compilation of preliminary scores (reference data):
   Approx. 20 minutes Emcee
   (4) On-site screening

4. Emcee: Departmental Meeting Chairperson ___

5. Preparation by screening members

   (1) After a careful reading of the summaries, enter preliminary scores on the "screening sheets."
   (2) List the "good points" and "unclear points" for each circle, and summarize theme in the "prescreening memo."

   * The "screening sheets" and "prescreening memos" are used on the day of prescreening.
   Further, the "prescreening sheets," "prescreening materials" and "summaries" are attached herein. Please contact Departmental Chairperson __ if you have any questions.

Prescreening Notice (On-Site Visit)

An on-site visit will be conducted for prescreening.

1. Date and time: __/__/__ (__day) __:__ -

2. Method
   Explanation of activities board: Up to 10 minutes
   Explanation at the site: Up to 5 minutes
   Question and answer: Up to 5 minutes

3. Scheduled visit time
   __ Circle__:__ - __:__
   __ Circle__:__ - __:__
   __ Circle__:__ - __:__
   __ Circle__:__ - __:__
   __ Circle__:__ - __:__
   __ Circle__:__ - __:__

4. Visitors: Screening Committee Members (all executives of the Executive Committee)

5. Explanations made by: Representatives of the circle members (does not have to be a presenter).

__th Circle Conference Prescreening and Screening Sheets

Checkpoint		Points Allotted	Circle Name
1. Activities planned and the implementation thereof; upgrading the skill level of members	• Are the goals and purposes of autonomous maintenance activities understood, and are means being devised to advance that activity?	15	
	• Are efforts being made to upgrade the skill level of members?	15	
2. Understanding the present situation	• Are losses related to the theme being addressed from multiple viewpoints? • Are targets set quantitatively, and is the basis clear? • Is the plan specific for 5W1H, and is the division of roles clarified?	10	
3. Analysis	• When considering the question "What went wrong?" for the phenomenon in focus, have the main factors, subsidiary factors and background factors been examined from various angles, and have the factors been accurately narrowed down? • Have the factors been fully identified, and has the data been verified? • Are analytic methods such as PM analysis and why-why analysis being accurately used?	20	
4. Countermeasures planning and implementation	• Are effective countermeasures being taken for the main factors, subsidiary factors and background factors? • Does it lead to quick startup (one-shot startup)? • Are inventive means being devised?	10	
5. Verification of effectiveness	• Are the effects seen in the loss structure and management indices? • Are efforts being made to upgrade the level of autonomous maintenance capabilities (independent work and autonomous maintenance)? • Are the intangible effects and multiplier effects understood?	10	
6. Preventing future recurrence	• Are there cleaning and inspection standards, and are they steadily carried out? • Are countermeasures adequately taken to prevent future recurrence of main factors? • Is 5W1H (horizontal replication) clearly carried out for similar work in one's own division and in other divisions?	5	
7. Reflection and future issues	• Are activity processes being reflected upon? • Are future issues set appropriately?	5	
8. Is there anything in particular that should be evaluated?	• Was the presentation easy to understand? • How was the reaction of the audience? • What about the effective monetary amounts and means devised for activities?	10	
Total		100	
Award title	(Conference Award: __ Circle) (Distinguished Award: __ Circle) (Encouragement Award: __ Circle)		

Circle Conference Screening Memo

Circle Conference Prescreening and Screening Memo		Screening Committee Member Name	

Circle	Good points	Bad points	Unclear points

Circle Meeting Manual

	Program	Waiting Time	Cumulative Time	Person-in-Charge	Remarks
1	Remarks	1 min	1 min	Emcee	As much as possible, the emcee should be a woman
2	" (Open conference)	5	6	Conference Steering Committee Chairperson	
3	Guest introduction	5	11	Emcee	Make introductions starting with the main guests
4	Remarks	5	16	Promotion Committee Chairperson	
5	Cautionary items	5	21	Emcee	
6	Presentation of case example " " "	20 + 2 20 + 2 20 + 2 20 + 2	41 61 81 101	Presenter and Assistant " " "	Presentation: 15 min.; questions: 5 min " " "
7	Break	10	111		Distribute drinks
8	Presentation of case example " "	20 20 20	131 151 171	Presenter and Assistant " "	Presentation: 15 min.; questions: 5 min " "
9	Special planning	40	211		
10	Promotion Committee Report	10	221	Promotion Committee	Screening by the Screening Committee (Executives: ___ persons)
11	Screening report and awards	15	236	Plant Manager, Emcee and Assistant	Screening announcement is made by Emcee
12	Critique	10	246	Main guests (Department Manager, Section Manager, Outside Instructor)	
13	Remarks (Close meeting)	2	248	Conference Steering Chairperson	
14	Announcements	2	250	Emcee	Venue 4S, clean-up, etc.

* The screening time and award fill-in time should continue from Step 9 "Special Planning" to Step 10 "Promotion Committee Report."
* Critiques should be given by the main guests. Up to two persons should provide critiques, depending on the situation. However, please take time into consideration.
* Smoking is not permitted at the venue. Smoking is permitted at ___ (5th floor in case of rain).

Circle Meeting Manual

1.	Remarks	The __th __ Plant Circle Conference is now open. My name is ___ and I will be the emcee for this event.
2.	Remarks (Open meeting)	I would like to ask Conference Steering Committee Chairperson ___ to give his opening remarks. --Thank-you. --
3.	Guest introduction	I would like to introduce our guests, who have taken time out of their busy schedules to attend today. (* Introduce starting from the main guests.)
4.	Remarks	I would like to ask opening remarks from __ Plant Departmental Meeting Chairperson ___. --Thank-you .--
5.	Cautionary items	I would like to communicate some cautionary items regarding this conference. (1) Smoking is not permitted in the venue. Those who wish to smoke can do so at __ during the break time. (2) As a rule, telephone calls will not be transferred. (3) The presentation time is 15 minutes. A bell will sound after 13 minutes have elapsed. Two bells will sound when 15 minutes have elapsed. Presenters are asked to observe the time strictly.
6.	Presentation of case examples	We will now begin the presentation of case examples. (* As needed, introduce the circles and Circle Leaders, and give their profiles.) Well then, I would like to ask __ to give their presentation. If you have any opinions or questions regarding this presentation, please raise your hand. The question period is now over. If you have any further questions, please write them on the questionnaire. Let's give a round of applause to the __ Circle. I would like to say thank-you to the __ Circle. Repeat this sequence for each circle.
7.	Break	We will now take a break for 20 minutes. Those wishing to smoke can do so at __. Also, please help yourself to drinks. Please use the disposal boxes for the empty cans. Please return to the venue at __:__.
8.	Special planning	I would like to ask the Screening Members to please move to the screening room and conduct the screening of the presentations. We will now enter the special planning time and I would like to ask Mr./Ms. __ to temporarily be the emcee.
9.	__ Depart-mental Meeting Report	I would like to ask the __ Plant __ Departmental Meeting to present their report.
10.	Screening report and awards	We will now begin the reading of the screening reports and announcement of the awards. I would first like to ask the Plant Manager to read the screening report, including the comments for each circle. We shall now begin the presentation of the awards. I would like to ask the presenters to please line up at the front. The Encouragement Award is given to the __ Circle (award is presented by each Plant Manager). The Distinguished Award is given to __ Circle ("). The Conference Award is given to __ Circle ("). Let's give them all another round of applause. -- Thank you very much.-- --I'd like to ask the presenters to please return to their seats now.--
11.	Critique	I would like to ask __ for a critique of this conference. (Depending on the circumstances, up to two persons) And now I would like to ask __ for a critique.
12.	Remarks (Close of meeting)	I would like to request Conference Steering Committee Chairperson __ to give the closing remarks for this conference.
13.	Guests depart from the venue	Our guests will now depart from the venue. Let's send them off with a round of applause. This conference is now closed but we still have some announcements. (1) Please submit your questionnaires and survey forms when returning. (2) Please clean up the area around you. (3) __ is requested to remain behind to clean up the venue. Once again, I would like to thank everyone for their participation in this conference. This conference is hereby closed.

__th __ Plant Circle Meeting Program

Emcee: __ __
Assistant: __ __

1. Conference opening	Steering Committee Chairperson __	__:__ - __:__
2. Guest introduction	Emcee	__:__ - __:__
3. Remarks by Autonomous Maintenance Departmental Meeting Chairperson	Departmental Meeting Chairperson __	__:__ - __:__
4. Explanation of presentation and cautionary items	Emcee	__:__ - __:__
5. Presentation of case examples		__:__ - __:__

1) __ Circle "Activity to reduce minor stoppages and assure quality on the __ machine" __ Department __ __
2) __ Circle "Improving the environment of __ work" __ Department __ __
3) __ Circle "Reducing minor stoppages in the __ process" __ Department __ __

Break

4) __ Circle "Reducing the loading time of __" __ Department __ __
5) __ Circle "Reducing minor stoppages at the outlet of __ on Line __" __ Department __ __

6. Special planning "Mini improvement presentation meeting"	Q&A	__:__ - __:__
7. Autonomous Maintenance Departmental Meeting report	Autonomous Maintenance Departmental Meeting	__:__ - __:__
8. Promotion Office report	TPM Promotion General Committee Chairperson	__:__ - __:__
9. Screening report and awards	Screening Committee Chairperson __	__:__ - __:__
10. Award for Pride in One's Skill Contest	Screening Committee Chairperson __	__:__ - __:__
11. Critique	Guest	__:__ - __:__
12. Closing remarks	Steering Committee Chairperson __	__:__ - __:__

Conference Theme: "Daily improvement for everyone"

"Circle activities for mutual improvement"
* Although the schedule is still being adjusted, Instructor __ is planning to attend on the day of the event.

Circle Conference Award Regulations

1. Purpose — To present an award, based on screening standards, at the Circle Conference for the personal experience presentation and for the on-site screening.

2. Award — Prescribed as follows:

Award	Qty.	Screening points
Conference	1	__ or more points
Distinguished	2	__ - __ points
Encouragement	As appropriate	__ - __ points

3. Commendations

a. Critique — The Plant Manager gives a critique in the order of the presenting circles.

b. All presenters line up on the stage — Facing the stage, the presenting circles line up in the order of their presentation, starting from the left.

c. Announcement of screening results — The emcee announces the results.

d. Awarding the prize — Award the prizes in the following order: Encouragement Award → Distinguished Award → Conference Award. Encouragement Awards (__ circles) and Distinguished Awards (__ circles) should be given in the order of the presenting circles. When the emcee calls out a circle name, the circle members should reply "present," step forward, take a bow and step back again. After the previous circle has received its commendation, they should leave the venue at the emcee's instruction.

Required items:

(1) Commendation cards
Conference Award: ___
Distinguished Award: ___
Encouragement Award: ___

(2) The winners of the Conference Award and Distinguished Award will receive prizes (entrusted to the Steering Committee).

(3) Black vase

* Move the podium and the flower arrangement to the side so that they do not get in the way of presenting awards.

Example of Wall Poster

Bulletin

Company-Wide Circle Conference

__ Circle wins the Conference Award!

Twenty circles appeared before the __th Company-Wide Circle Conference, and the following prizes were awarded.

Prize winning circles

Conference Award	__ Plant	__ Circle
Conference Runner-up Award	__ Plant	__ Circle
Encouragement Award	__ Plant	__ Circle
	__ Plant	__ Circle
	__ Plant	__ Circle
	__ Plant	__ Circle
	__ Plant	__ Circle

Congratulations to the __ Circle.

Promotion Office

Company Newsletter: TPM News

Let's all take up the challenge to _____ ! Cheerful Fun TPM

TPM News (No. __) __/__/__ __ Plant TPM Operation Office

3rd __ Plant TPM Presentation Meeting Ends Successfully!

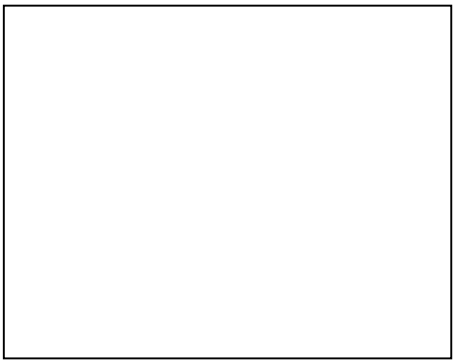
The 3rd __ Plant TPM Presentation Meeting held on __/__ ended in a success.
There was a total of __ participants, including participants from support groups, _____, _____, Headquarters, the __ Plant and __ Plant.

It has been a year and a half since the TPM kickoff. With this meeting, we have reached the end of the runway and taken off with the third round of case example presentations. These were wonderful presentations, with substantial contents and fruitful results.

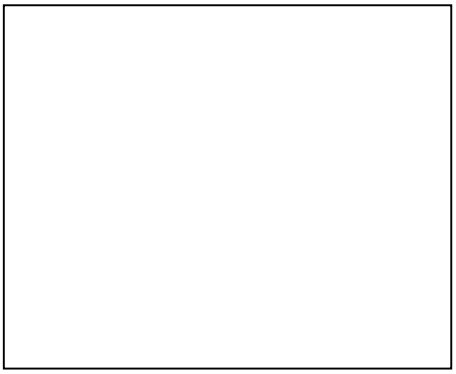
Using these case example presentations as a turning point, let's shoot for the moon with the upcoming 4th round.
(For details on the presentations, please refer to the 3rd __ Plant TPM Presentation Meeting summaries.)

A Talk by Instructor __ (Summary)

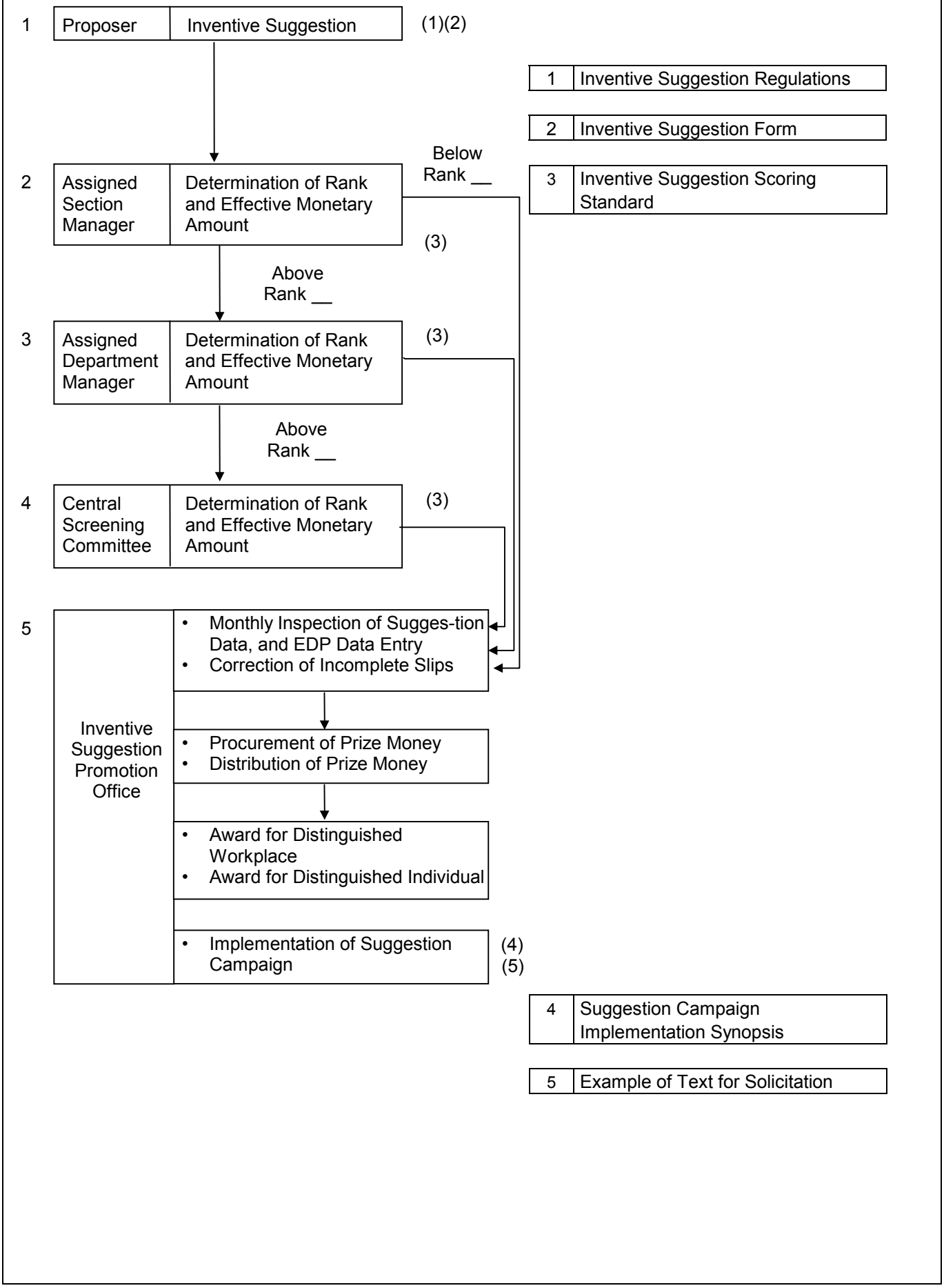
(1) I really get the sense that "things have changed." I know it has been a struggle, but I also know that you have learned much during this time. Your combined strength has been demonstrated here today.
(2) Your strength in development is also apparent. By linking together, you are continuing to implement unattended operation. A clear vision is emerging.
(3) A variety of sensors have been installed, but it is the front line workers that will maintain them. Our behavior must undergo a change. Activities that develop attentive workers speak to this point.
(4) I believe we should hasten horizontal implementation by using presentation case examples as models.
(5) Results must be achieved step-by-step. I ask you to create standards and improve your skills.
(6) Presently, the situation is changing in the United States. Even the United States has launched TPM programs. Companies like DuPont, Ford and Motorola are starting TPM programs. Japan is ahead of the game in TPM. As a TPM leader, I would like to ask you to make your best efforts in developing plants.



E Suggestion System



E Suggestion System



Inventive Suggestion Regulations

Chapter 1: General Rules

Article 1 (Purpose)

These regulations encourage employee inventiveness and increase the desire to participate in management through suggestions. By utilizing that inventiveness, these regulations aim to contribute to the improvement of company business.

Article 2 (Persons qualified to make suggestions)

All employees, except Managers with a rank of Section Manager Level 1, are qualified to make suggestions.

Article 3 (Suggestion items)

A suggestion refers to one of the following numbered items. Things that are not concrete, such as mere opinions, complaints, or expressions of dissatisfaction, as well as suggestions equivalent to suggestions adopted in the past, are not accepted as suggestions.

1. Suggestions regarding jigs, tools, machines and equipment
2. Suggestions regarding improvements to work methods or work processes
3. Suggestions regarding the saving of materials, labor or other expenses
4. Suggestions regarding the improvement of administrative efficiency
5. Suggestions regarding the improvement of safety and health
6. Suggestions regarding the improvement of other company operations

Article 4 (Promotion Office)

The Promotion Office of this system should be located in the Welfare Service Group of the Labor Service Department.

Article 5 (Suggestion procedures)

Those wishing to make a suggestion should fill in the required items on the prescribed inventive suggestion sheet, and submit it to their immediate superior.

Chapter 2: Screening

Article 6 (Screening organization and duties)

Organization	Composition		Duties
Central Screening Committee	Committee Chairperson	Department Manager of the department in charge of the Suggestion Promotion Office	1. Convening and promoting the Central Screening Committee 2. Appointing an Assistant Committee Chairperson and Screening Committee members
	Assistant Committee Chairperson	Appointing a Screening Committee Chairperson from among the Screening Committee members	1. Assisting or acting for the Screening Committee Chairperson
	Screening Committee Members	Persons appointed by the Screening Committee Chairperson	1. To screen suggestions assigned a preliminary ranking of 3 or higher by the Workplace Screening Committee, and to determine the ranking
Workplace Screening Committee	Workplace Screening Committee Chairperson	Assigned Department Manager or Assistant to Department Manager or equivalent Chief of Staff	1. To convene and promote the Workplace Screening Committee as needed 2. To consult on company-wide operation of the suggestion system 3. To pass suggestions to the Central Screening Committee that have been assigned a temporary rank of 4 or 5, or are believed to have a rank of 3 or higher.
	Workplace Screening Committee members	Assigned Section Managers or Staff Leaders	1. From among those suggestions in the relevant assigned area, to screen those suggestions which have been implemented or could be implemented, and for which the effectiveness after implementation can be predicted. 2. To pass to the Workplace Screening Committee Chairperson, those suggestions which have been given a temporary ranking of 6 or lower, or are believed to have a ranking of 5 or higher. 3. In Divisions having a Subsection organization, the judgment of the Workplace Screening Committee can be entrusted to screening by the Subsection Manager, as needed. 4. After screening is completed, unimplemented suggestions should be implemented within 3 months.

Article 7 (Handling of unimplemented suggestions)

1. Unimplemented suggestions that cannot be implemented.
   All unimplemented suggestions that cannot be implemented should be granted a Suggestion Award.
2. Unimplemented suggestions that can be implemented, that for which effectiveness cannot be predicted.
   Confer a Suggestion Award at the time the suggestion is made, and implement the suggestion within 3 months after the suggestion is made under the responsibility of the Workplace Screening Committee. Screen the suggestion based on effectiveness after implementation, and determine the ranking of the suggestion.
   However, since special measures are being taken in connection with the implementation, give advanced notice to the Promotion Office of the scheduled implementation date if the suggestion cannot be implemented within 3 months.
3. Unimplemented suggestions for which implementability cannot be determined.
   If a Workplace Screening Committee member cannot determine the implementability of a suggestion, it should be judged by the Workplace Screening Committee. If the Workplace Screening Committee determines it necessary that judgment be made by another division, the Promotion Office shall judge the implementability of the suggestion based on consultation with relevant divisions.

Article 8 (Screening deadline)

The following lists the screening deadlines for the Screening Committee members at each level.

Committee Member	Deadline
Workplace Screening Committee member	Screen within 10 days of the date submitted.
Workplace Screening Committee Chairperson	Screen within 5 days of a request for screening by a Workplace Screening Committee member
Central Screening Committee	The "Central Screening Committee" should meet around the 20th of each month. However, the Screening Committee should not meet if there are no suggestions given a ranking of 3 or higher by the Workplace Screening Committee.

Article 9 (Processing and management of suggestion forms)

The suggestion form should be a three part form, with one copy for computer input, one for the submitter and one for the ledger. The processing of these copies is as follows:

1. The proposer of the suggestion should fill in the required items and submit the form to the Workplace Screening Committee through the office organization.
2. Suggestions for which the temporary ranking has been determined should be given a registration number on a monthly basis (as a rule, a serial number in the order of completion of screening), and the registration number should be entered on the suggestion form.
3. The computer input copy of the suggestion form should be passed onto the Promotion Office; the submitter copy should be sent to the work team or group (for those areas without a team system). The ledger copy should be filed and stored at each section or group in the order of the month and suggestion number.

Chapter 3: Awards

Article 10 (Types of awards)

There are five types of awards given for the inventive suggestion:

1. Merit Award
   Awarded to each and every suggestion
2. Distinguished Suggestion Workplace Award
   The Distinguished Suggestion Workplace Award is granted based on the score in the Merit Award ranking and the suggestion participation rate.
3. Maximum Number of Suggestions Workplace Award
   Monthly Award: Awarded to the workplace with the greatest number of suggestions per person in a month.
   Annual Award: Awarded to the workplace with the greatest number of suggestions per person in a year.
4. Distinguished Suggestion Proposer Award
   Awarded to the individual with the highest total score in a year.
5. Special Award
   Awarded specially to the workplace or individual that does not fall under any of the awards above (1-4), but demonstrated particularly remarkable performance in suggestion activities.

Inventive Suggestion Regulation (Continued)

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Article 11 (Merit Award)

The following shows the rank, prize money and score for the Merit Award:

Rank	Prize money	Score	Rank	Prize money	Score
Special rank	150,000 yen	200 points	Rank 6	3,000 yen	15 points
Rank 1	100,000 yen	130 points	Rank 7	1,000 yen	10 points
Rank 2	60,000 yen	90 points	Rank 8	500 yen	7 points
Rank 3	40,000 yen	60 points	Rank 9	300 yen	5 points
Rank 4	15,000 yen	30 points	Rank 10	200 yen	3 points
Rank 5	5,000 yen	20 points	Suggestion Award	100 yen	2 points
			Idea Award	50 yen	1 point

The above monetary amounts apply regardless of whether the suggestion was made by an individual or by more than one person. Further, the scoring for suggestions submitted by more than one person is calculated per capita by dividing the score by the number of individuals. Fractional scores are rounded off to the nearest unit. However, prize money is paid with paper money, and fractional parts are paid with coupons.

Article 12 (Distinguished Suggestion Workplace Award)

The unit of the Distinguished Suggestion Workplace Award is the section or the group. Every year, the score is calculated for suggestions ranked starting from September 21st until September 20th of the following year, and the top three workplaces are awarded as follows:

Rank	Award details
1st place	500 yen per person, a certificate and a trophy
2nd place	400 yen per person, a certificate and a trophy
3rd place	300 yen per person, a certificate and a trophy

The formula used is the total score divided by the number of persons times the participation rate. The participation rate is the average of the participation rate each month (October through the following September) for the relevant assigned area. The participation rate for each month is derived by setting the month-end currently enrolled number of persons in the relevant assigned area (all employees excluding seasonal workers; however, supporters are included in the calculation for the areas they support) as the denominator, and the number of persons who have made a suggestion in the assigned area (an individual counts only as one person even if they have made multiple suggestions) as the numerator.

Article 13 (Maximum Number of Suggestions Workplace Award)

The Maximum Number of Suggestions Workplace Award is awarded as follows to the section or group with the greatest number of suggestions per person.

	Award contents	Calculation standard
Monthly Award	Certificate Souvenir to each member	The number of suggestions which have been assessed a ranking each month divided by the number of persons qualified to submit a suggestion and who are enrolled at the end of the current month
Annual Award	Certificate 300 yen per person	The total of the number of suggestions from persons qualified to submit an award and who are enrolled as of the end of September, divided by the number of persons qualified to submit a suggestion as of the end of September

The period for the Annual Award is every year from September 21st until September 20th of the following year. Suggestions not assigned a ranking are excluded.

Article 14 (Distinguished Suggestion Proposer Award)

Persons who have attained a set annual total score from Merit Awards for suggestions assessed a ranking each year from September 21st until September 20th of the following year are awarded a certificate and a souvenir as a Distinguished Suggestion Proposer. Persons who have received the Annual Distinguished Suggestion Proposal Award over the course of several years are awarded separately.

Article 15 (Award method)

Awards for suggestions are presented as follows.

Inventive Suggestion Regulations (Continued)

Merit Award	Rank 3 or higher	Awarded each year by the President at the Company Anniversary Ceremony
	Rank 4 and Rank 5	Awarded by the Workplace Screening Committee Chairperson
	Rank 6 or lower	Awarded by a Workplace Screening Committee member
Distinguished Suggestion Workplace Award	Awarded every year by the President at the Company Anniversary Ceremony (However, the recipients of the Greatest Number of Suggestions Workplace Award and the Distinguished Suggestion Award should not overlap.)	
Distinguished Suggestion Proposer Award		
Greatest Number of Suggestions Workplace Award - Annual Award		
Greatest Number of Suggestions Workplace Award - Monthly Award	Awarded monthly by the Central Screening Committee Chairperson	

Prize money is sent to a Workplace Screening Committee member by the Promotion Office within 10 days after the ranking is determined. Prize money is paid directly to the individual, or to a representative in the case of a joint proposal or a group proposal.

Article 16 (Screening items and scoring standard)
The screening items and scoring standard are as prescribed in the table.

Article 17 (Determination of rank)
The rank is determined as follows based on the points scored in the previous articles.

Rank	Special rank	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Score	81 points or higher	71 - 80 points	61 - 70 points	51 - 60 points	41 - 50 points	31 - 40 points
Rank	Rank 6	Rank 7	Rank 8	Rank 9	Rank 10	Suggestion Award
Score	26 - 30 points	21 - 25 points	16 - 20 points	11 - 15 points	6 - 10 points	5 points or lower
						Idea Award
						For unimplementable suggestions that remain only an idea

Chapter 4: Promotion of Suggestion Activities

Article 18 (Promotion organization)
In order to actively promote suggestion activities in the workplace, the Section Manager and Chief of Staff can assign a number of Workplace Promotion Committee members. The Workplace Suggestion Promotion Committee members are registered with the Suggestion Promotion Office. These members plan and implement various activities to stimulate suggestion activities in the workplace. Further, the Promotion Office plans and implements company-wide activities.

Article 19 (Theme suggestions)
In order to promote suggestion activities, the Promotion Office may solicit suggestions on specified themes during prescribed periods. Replies, screening and award standards regarding these suggestions are stipulated separately on each occasion.

Article 20 (Education)
The Promotion Office will implement education and PR activities to promote suggestion activities. In addition, it will also support, as needed, activities conducted autonomously at each level of the company.

Supplementary Rules

Article 21 (Rights regarding suggestions)
The rights regarding suggestions belong to the company.

Article 22 (Miscellaneous)
Items not prescribed by these regulations shall be prescribed by the Labor Service Department Manager, depending on the circumstances.

Article 23 (Enactment)
These regulations were established and enacted starting on 4/1/60.
These regulations were revised and enacted starting on 4/20/73.
These regulations were revised and enacted starting on 9/1/81.
These regulations were revised and enacted starting on 3/1/82.
These regulations were revised and enacted starting on 1/1/83.
These regulations were revised and enacted starting on 11/1/84.
These regulations were revised and enacted starting on 5/1/87
These regulations were revised and enacted starting on 9/1/90.

Inventive Suggestion Form

Inventive Suggestion Form

Case name	Form code	Issued to	Registration year	Registration No.	Rank	Effective monetary amount	Prize money
	01	02	03	04	05	06	
	1 4	5 7	8 9	10 15	16 17	18 25	__ yen

Computer input copy

Name of representative	Joint suggestion proposers (fill in only name codes)							
Name code	07	08	09	10	11	12	13	14
	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65
Name		15	16	17	18	19	20	21
		66 70	70 75	76 80	81 85	86 90	91 95	96 100

1. This portion is a 3 part form. Press firmly when writing.
2. Suggestion proposers should fill in all information within the heavy lined box.

Date of submission __/__/__

Notes on filling in the form

- Be sure to verify the name code so that there is no error in this field.
- All form fields should be filled in right justified.
- Fill in the last 2 digits of the year for the registration year field.
- Fill in 6 digits for the registration number. The first 2 digits are the registration month, and the last 4 digits are the serial number for that month.

<Before improvement>	<Pre-improvement sketch>
<After improvement>	<Post-improvement sketch>

Suggestion type	Handling of classification and workplace screening (place a circle in the circle column for the relevant item)		Circle column
	Implementation completed (rank determination)		
	Unimplemented	Suggestion is implementable and effectiveness is predictable (screen within 3 months, the same as for suggestions already implemented)	
		Implementability cannot be determined and effectiveness cannot be predicted (award a Suggestion Award and rescreen implementability within 3 months)	
	Suggestions that are unimplementable and will remain just an idea (Idea Award)		
	Suggestions that cannot be screened at the section submitting the suggestion (pass onto Suggestion Promotion Office) → Screening section ( ) → Promotion Office → section submitting the suggestion		

Department Manager (Assistant Manager)		Section Manager		Subsection Manager (Supervisor)		Work Team Leader	
Approval	Temporary ranking	Approval	Temporary ranking	Approval	Temporary ranking	Approval	Temporary ranking
○		○		○		○	

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Inventive Suggestion Scoring Standard

Screening Item		Scoring Standard									Points to Observe when Scoring
Effec-tiveness	Classifi-cation	Remarkable effectiveness		Considerable effectiveness		Some effectiveness			Nearly Ineffective		Effectiveness is calculated as follows: Man-hours = Time saved (hr) x Monthly production volume x Charge (2,000 yen) (1) Other = Unit cost saved x Monthly production volume (2) Floor space secured = New floor space (sq. m) as a result of improvement x 2,400 yen (3) Effectiveness = (1) + (2) + (3) - Implementation costs If quality, safety, or other factors cannot be converted to time or money, screen the factor in accordance with the degree of effectiveness based on its classification.
	Time	1500h	≥ 500 and < 1,500 hr	≥ 250 and < 500 hr	≥ 125 and < 250 hr	≥ 60 and < 125 hr	≥ 25 and < 60 hr	≥ 5 and < 25 hr	≥ 0.5 hr and < 5 hr	≥ 0.0 hr and < 0.5 hr	
	Effective monetary amount (monthly amount)	≥ 3,000,001 yen	1,000,001 - 3,000,000 yen	500,001 - 1,000,000 yen	250,001 - 500,000 yen	120,001 - 250,000 yen	50,001 - 120,000 yen	10,001 - 50,000 yen	1,001 - 10,000 yen	0 - 1,000 yen	
	Points	35	30	25	20	17	13	10	5	1	When judging the suggestion, consider whether the application is in actual use, and whether there are similar suggestions in other fields; take a broad view, not limited to just this company
Origi-nality (level of technical idea)	Classifi-cation	Completely unique suggestion without precedence	Some parts are similar to another suggestion, but the majority of the suggestion is a new concept	Similar to another suggestion, but further developed into a new idea	Almost completely similar to a previous suggestion, but some parts show a new idea at work	Has further developed a previous suggestion; cannot say that it is unique, but the proposer's idea is useful	Has somewhat changed a past suggestion, but the proposer's idea is useful	Has modified a past suggestion, but the proposer's idea is somewhat useful	The suggestion has some new ideas		
	Points	35	30	25	20	15	10	5	1		
Effort	Classifi-cation	The mark of great efforts can be clearly recognized		Considerable efforts can be recognized		We can say that efforts were made		Shows the mark of efforts	Shows the mark of some efforts		Make a judgment placing priority on how much effort was made leading up to the suggestion, and whether the mark of diligence can be seen
	Points	20		15		10		5	1		
Applicable range	Classifi-cation	Has extremely wide applicability		Can be applied to other work		Is a useful reference for other work		Is somewhat of a useful reference for other work	Would be difficult to use as a reference for other work		Screen based on the extent of applicability of the suggestion contents to other work
	Points	10		8		6		4	1		
Connecti on with work duties	Classifi-cation	A suggestion made by someone for whom making improvements is their main work duty, or a suggestion that is made in the natural course of their work duties (person in charge of Production Engineering, person in charge of CAPPS, etc.)		A suggestion made by someone for whom making improvements is part of their work duties, or a suggestion made jointly with such a person (improvement personnel, Subsection Manager, etc.)		A suggestion made by someone for whom making improvements could not be said to be a part of their work duties, but who has promoted suggestion activities within their assigned area and who is in a position to provide guidance on improvements, or a suggestion made jointly with such a person (Team Leader, etc.)			Almost completely unrelated to work duties		Judgment is made based on whether making improvements is itself the person's work duties, or whether the person is in a position to actively promote improvement suggestions
	Points	-20		-10		-5			0		

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Suggestion Campaign Implementation Synopsis

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Enactment date: __/__/__	Work Management Regulations **Suggestion Campaign Implementation Synopsis**	○○○○−○
Revision No. __		Cost Control Department

Purpose	1. This document is a synopsis of the suggestion campaign implementation based on "Suggestion Handling Regulations (____)."
Campaign purpose	2. The suggestion campaign aims to raise the participation of employees in event themes (Quality Emphasis Month, etc.) by emphasizing the importance of suggestions, and to promote improvements.
Campaign type	3. The following lists the types of suggestion campaigns: (1) Campaigns implemented as a part of events of general departments Example: (1) Safety Suggestion Campaign (2) Quality Suggestion Campaign (3) Energy Saving Suggestion Campaign (4) Expense Reduction Suggestion Campaign (5) Work Improvement Suggestion Campaign (6) Clerical Work Improvement Suggestion Campaign (7) PM (Maintenance) Suggestion Campaign (8) IP (Information) Suggestion Campaign (9) Measurement and Weighing Suggestion Campaign (2) Suggestion campaign implemented principally by the Central Suggestion Promotion Office Example: (1) Campaign to Reach 2,000,000 Cumulative Suggestions (3) Suggestion campaign implemented by the Block Suggestion Promotion Office based on the policies of the Plant Manager Example: (1) Safety Suggestion Campaign
Course of campaign implementation	4. The following describes the course of implementing a suggestion campaign: (1) General departments and the Central Suggestion Promotion Office should make the arrangements for implementing the campaign. (2) Based on the arrangements, general departments should prepare a plan. (3) General departments should prepare announcement cards, directed to the managers (Department Manager, Section Manager, Foreman and Group Leader), and Suggestion Advisers, as well as posters. (4) The announcement cards and posters should be distributed to each workplace by the Block Suggestion Promotion Office via the Central Suggestion Promotion Office. (5) The Central Suggestion Promotion Office should send the following data to general departments and to the Block Suggestion Promotion Office after the campaign has ended. (1) Suggestion campaign performance table by block and section: • Suggestion population • Current-month total number of suggestions • Number of campaign suggestions • Number of campaign suggestions per person • Campaign participation population • Campaign participation rate
Reorganization	5. The reorganization of this synopsis should be studied at a meeting of the Suggestion Promotion Office, with the Central Suggestion Promotion Office and Block Suggestion Promotion Office in attendance, and approved by the Central Suggestion Promotion Office (Department Manager).

Solicitation for "Energy Saving Suggestions"

__/__/__
Inventive Suggestion Promotion Office

This company is presently implementing company-wide energy saving activities in the Energy Saving Subcommittee of the World Environment Preservation Promotion Committee (Promotion Office: Engineering Division Headquarters, Production Engineering Department). In line with Energy Saving Month (once every two years) prescribed by this country, we are soliciting "Energy Saving Suggestions." You are requested to lead the personnel in your area to work on this solicitation.

Note

1. Solicitation period
__/__/__ - __/__/__

2. Solicitation contents
Implemented suggestions or idea suggestions related to saving or curtailing energy used in the company.
For details, please refer to the "Energy Unit Cost Tables" published by the Energy Saving Promotion Office.

3. How to respond
1) Please use the existing "Inventive Suggestion Form" for the response paper.
2) In order to distinguish this suggestion from general suggestions, please write "Energy Saving" in the upper left corner of the Case Name field.
3) Use a registration number starting with the sequence of 02E001.

Note: The "E" in the registration number is a symbol used for computer processing to aggregate these suggestions separately from general suggestions.

4. Screening and Ranking
1) The effective monetary amount is calculated based on the Energy Unit Cost tables.
2) Other screening items should be ranked conventionally.
3) Submit the three-part form of idea suggestions, as is, without screening.
(The Energy Saving Promotion Office will screen the suggestion, and return the 2nd and 3rd copies to the workplace.)

5. Submission Office
Please submit all suggestions to the Energy Saving Subcommittee Promotion Office in the Production Engineering Department.

6. Deadline
__/__/__ (__day)

7. Inquiries
Please address inquiries to the Energy Saving Subcommittee:
Tel: _____
Person-in-charge: _____

JIPM - TPM® 600 Forms Manual

Sample Formats for the12 Steps of TPM

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