Welcome To TPM
About T.P.M.

After World War II, Japanese industries determined that to compete successfully in the world market they had to improve the quality of their products. To do so, they imported management and manufacturing techniques from United States and adapted them to their circumstances. Subsequently, their products became known throughout the world for their superior quality, focusing world attention on Japanese-style management techniques.

TPM DEVELOPMENT PROGRAM
Implementing Total Productive Maintenance
Seiichi Nakajima.
WHAT IS T.P.M. ??

Definition of T.P.M:

T.P.M. IS: A PRODUCTIVE MANUFACTURING SYSTEM with the TOTAL Participation of: Managers, Supervisors, Engineers, Technicians and Operators.

T.P.M. Includes the Following Benefits:

• Maximize Overall Equipment Effectiveness
• Establishment a Complete System of Maintenance for the Machine Entire Life
• Create a Better Work Environment, Promoting the Participation for All Employees
T.P.M. = Medical Science of Equipment
The Main objective of TPM is:

Zero Interruptions
Zero Defects
Zero Accidents

Throughout total employees participation from Top Management to Operators, based in the following activities:

Autonomous Maintenance

• Planned Maintenance
• Individual Improvement
• Quality Maintenance
• Early Equipment Management
• Education/Training (People Development)
• Safety
PILLARS OF TPM

AUTONOMOUS MAINTENANCE
QUALITY
PLANNED MAINTENANCE
INDIVIDUAL IMPROVEMENT
TRAINING
PEOPLE DEVELOPMENT
SAFETY EHS
EARLY EQUIPMENT MANAGEMENT

5S's
T.P.M.

Total Productive Manufacturing

People, Equipment and Product Improvement by Working Together.
TPM Awareness Information

Thank You!
TPM Self Assessment

Background:

△ 1991 First attempt to implement TPM.
△ TPM consultant provides training to selected Managers, Supervisors and Engineers.
△ One coordinator with experience in Process and Maintenance is assigned to lead TPM.
△ Literature and materials, prepared and distributed.

⇒ Lack of support and involvement results on failing the implementation.
TPM Self Assessment

1996

△ One Staff Mgr. is assigned to lead the TPM Implementation plant wide.
△ A core team is formed on 2Q/96 with key people from different departments to coordinate the implementation.
△ Model equipment is selected based on bottleneck operation.
△ Equipment conditions analysis performed.
△ Most of the teams cover the initial cleaning.
△ Activities are focused on six big losses detected and 5 S’s implementation.
Asia Benchmarking
TPM Benchmarking Asia Facilities 1996

Facility 1  April
Facility 2  May
Facility 3  June

Committee:  4 Chosen Folks

Objective:  Learn from Asia success experiences in TPM implementation and come up with directions for Plant implementation.
Benchmarking Conclusions

- Total management involvement.
- T.P.M. Manager (dedicated).
- A well defined implementation process.
- Provide people with time to work on it. (4-6 Hr./wk).
- Each staff has their own T.P.M. Promoter full time.
- Focused in Consultant X model.
- Focused in just one product line per area.
- Budget assigned for consulting and external training.
TPM Implementation

PLANT OVERVIEW

TPM Self Assessment

Real Implementation

TPM Implementation

Thank You!
IMPLEMENTATION/CONSULTANT

* Q3 1996, Consultant X is selected to be Consultant.
* Training of Managers, Team leaders and Team members
* Master Plan Defined
* TPM implementation initiated according to Consultant X recommendations
T.P.M. POLICY

# ESTABLISH AN INTEGRATED STRUCTURE TO PROMOTE T.P.M. AS A COMPANY CULTURE.

# MAXIMIZE OVERALL EQUIPMENT EFFECTIVENESS

# TOTAL EMPLOYEE INVOLVEMENT.

# CULTIVATE EQUIPMENT & PROCESS RELATED EXPERTISE THROUGHOUT SHOP FLOOR. (Autonomous Maintenance, Planned Maintenance etc..)

# ESTABLISH A RELIABILITY AND MAINTAINABILITY SYSTEM TO MAXIMIZE EQUIPMENT LIFE TIME. (Planned Maintenance Autonomous Maintenance, Individual Improvement, Early Equipment Management.)

# ALL EMPLOYEES MUST PARTICIPATE IN T.P.M TRAINING PROGRAM.

# ALL AREAS MUST FOLLOW T.P.M. ESTABLISHED GUIDE LINES.

# DEPARTMENT HEAD IS RESPONSIBLE TO ACCOMPLISH AND SUPPORT T.P.M. GOALS.
T.P.M. PLANT WIDE STRUCTURE

TPM

Responsible
Plant Manager

T.P.M. Office

5´s

Autonomous
Maintenance

Planned
Maintenance

Individual
Improvement

Quality
Maintenance

Early
Equipment
Management

Safety

Training
People
Development
PROMOTION STRUCTURE

(OVERLAPPING SMALL GROUPS)

TPM PILLARS & PROMOTION OFFICE

TPM PROMOTERS

PLANT MANAGER

STAFF MANAGERS
OPERATIONS

DEPARTMENT MANAGERS

DEPARTMENT SUPERVISORS

TPM TEAM

Thank You!
VISION STATEMENT:

TPM
PLANT WIDE IMPLEMENTATION
Q1 2000
T.P.M. IMPLEMENTATION ACTIVITIES

MANAGER TEAMS
PREPARATION / PLANNING STAGE

# DEFINE PILOT LINES

# AMOUNT OF MACHINES INCLUDED PER LINE

# DEFINE CORE TEAM MEMBERS OF EACH LINE

# SELECT TEAM MEMBERS PER MACHINE

# START ACTIVITIES IN PILOT MACHINES (bottle neck.)
Line and Machine Selection

Machine 1

Machine 2

Machine 3

Machine 4

Thank You!
# TPM Implementation Plan

<table>
<thead>
<tr>
<th>PREPARATION STAGE</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DEFINE STRATEGIES</td>
</tr>
<tr>
<td></td>
<td>MASTER PLAN</td>
</tr>
<tr>
<td></td>
<td>ORGANIZATION</td>
</tr>
<tr>
<td></td>
<td>INTRODUCTION TRAINING</td>
</tr>
<tr>
<td></td>
<td>PUBLICITY</td>
</tr>
<tr>
<td>I M P L E M E N T</td>
<td>MODEL MACHINES</td>
</tr>
<tr>
<td>S T A R T</td>
<td>Machine 1</td>
</tr>
<tr>
<td>R E M E N T A T I O N</td>
<td>Machine 2</td>
</tr>
<tr>
<td>T A R G E T</td>
<td>Machine 3</td>
</tr>
<tr>
<td></td>
<td>Machine 4</td>
</tr>
<tr>
<td></td>
<td>EXTEND IMPLEMENTATION</td>
</tr>
<tr>
<td></td>
<td>SIMILAR PRODUCTION LINES</td>
</tr>
<tr>
<td></td>
<td>COMPLETE IMPLEMENTATION</td>
</tr>
<tr>
<td></td>
<td>DEFINED AREAS</td>
</tr>
<tr>
<td></td>
<td>TPM KICK-OFF</td>
</tr>
</tbody>
</table>

**ACTIVITIES by Year**

- **1996**
  - Q1: Define Strategies
  - Q2: Master Plan
  - Q3: Organization
  - Q4: Introduction

- **1997**
  - Q1: Training
  - Q2: Publicity
  - Q3: Machine Operations

- **1998**
  - Q1: Machine 1
  - Q2: Machine 2
  - Q3: Machine 3
  - Q4: Machine 4

- **1999**
  - Q1: Extend Similar Machines
  - Q2: Complete
  - Q3: Defined Areas

- **2000**
  - Q1: Autonomous Maintenance
  - Q2: Reduce 6 Big Losses
  - Q3: Extend Similar Machines
  - Q4: Complete

**Goals**

- **30%** to **50%**
- **100%**
## TPM 90 Days Explosion Plan

### Machine 1
- **PILOT TEAM** Step 3
  - Planned maintenance
  - 6 big losses Start
  - Individual Improvement Start
- 10 Extension teams step 1-2
- 19 Extension teams Start step 1

### Machine 2
- **PILOT TEAM** Step 2-3
  - Planned maintenance
  - 6 big losses
  - Individual Improvement
- 11 Extension teams step 1-2

### Machine 3
- **PILOT TEAM** Step 2-3
  - Planned maintenance
  - 6 big losses
  - Individual Improvement
- 6 Extension teams step 1-2
- 2 Extension teams Start step 1

### Machine 4
- **PILOT TEAM** Step 1-2
  - Planned maintenance
  - 6 big losses
  - Individual Improvement
- 4 Extension teams Start step 1

### PILLARS
- **IMPLEMENTATION MODEL**
  - TPM Activity Board
  - Extension Teams
  - Server Data collection

<table>
<thead>
<tr>
<th>Support Activities</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM Audit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team presentations</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TPM Office Audit</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Consultant visit</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM Meeting</td>
<td></td>
<td></td>
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<tr>
<td>Local BOOT CAMP</td>
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<tr>
<td>TPM MCOE MEETING, JAPAN</td>
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<tr>
<td>Pillars meeting</td>
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</tbody>
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### GANTT
- **TPM Activity Board**
- **Extension Teams**
- **Server**
- **Data collection**

### Schedule
- **October**
- **November**
- **December**
TPM Awareness Information

Thank You!

Courtesy, in part, of Motorola SPS.

T.P.M. TRANSITION CURVE

POLICIES DEVELOPMENT
T.P.M. PROMOTION OFFICE START
MANAGEMENT MACHINES
FOCUS IN FEW EQUIPMENT
FOCUS TRAINING
SUCCESS STORIES
5 S’s

CONSULTANT IN

DEVELOP DATA COLLECTION SYSTEM
ATTENTION TO FOCUS TEAMS
TRAINING DEPLOYMENT
IMPLEMENTATION PLAN
RESOURCE IMPLEMENTATION

RESISTANCE

CONSULTANT OUT

T.P.M. PROMOTION DELEGATION
INCLUDE T.P.M. IN PERFORMANCE
MANAGEMENT PLAN.
INCLUDE T.P.M. IN JOB
DESCRIPTION.
ACCELERATED
DEPLOYMENT.

EXPLORATION

GOALS SETTING FOR
ALL ORGANIZATION.

LOOK FOR ADDITIONAL WAYS
TO DEPLOY T.P.M.
FINISH CONFLICT WITH THE CULTURE
ORGANIZATION ALIGNMENT
REWARD SYSTEM
CONTROL CHAOS

CONSULTANT IN

KICK OFF

CONSULTANT OUT

DENIAL
# KEY GOALS

1. **TOTAL EQUIPMENT EFFECTIVENESS**
   - **A)** Equipment Breakdown: Hours/Month 1/10
   - **B)** M.T.B.A.: Minutes 1x10x
   - **C)** M.T.B.F.: Hours 1x2x

2. **REJECT CAUSED BY LINE EQUIPMENT**
   - PPM 1/5

3. **LINE REJECT RATE**
   - % 1/5

4. **CYCLE TIME**
   - Days 0.8x

5. **FATAL ERROR AT CUSTOMER**
   - # of 0

6. **ON TIME DELIVERED**
   - % 98

7. **MANUFACTURING COST**
   - USD 20% LESS

8. **LABOR PRODUCTIVITY**
   - K.Units/# of D/L 2X
AUTONOMOUS MAINTENANCE.

MANUFACTURING SPECIALIST
AUTONOMOUS MAINTENANCE IS:
Maintenance performed by equipment operators.

THE FIRST 3 STEPS OF AUTONOMOUS MAINTENANCE.

STEP # 1 INITIAL CLEANING.

STEP # 2 COUNTERMEASURES FOR THE CAUSES OF FORCED DETERIORATION AND IMPROVING HARD-TO-ACCESS AREAS.

STEP # 3 MAKING A TENTATIVE CLEANING/LUBRICATION STANDARD.
AUTONOMOUS MAINTENANCE

Step # 1
Initial Cleaning

1. Photos Before
2. Photos After
3. Put F Tags
4. Major Problems Selection
5. Formats: Daily Cleaning & Initial Inspection, Hot Spots, CAP-DO, 5W’s
6. Develop One Point Lesson
7. Standardization Cleaning / Lubrication
8. Training in One Point Lesson

Thank You!
AUTONOMOUS MAINTENANCE

1. Initial Inspection
2. Find & List Sources of Contamination
3. Find & List Areas of Hard Access
4. Put “F” Tags
5. Failures Analysis
6. Why’s Analysis
7. Actions in Sources of Contamination & Hard Access Areas
8. Modify Covers For Easy Visualization & Quick Disassemble

Step #2
Sources of Contamination & Hard Access Areas

Find & List Sources of Contamination
Initial Inspection
Final Inspection (Audit)
Remove “F” Tags

Thank You!

Courtesy, in part, of Motorola SPS.
Tentative Standards

Step # 3

1. Develop tentative standards
2. Cleaning / Lubrication implementation
3. Put “F” Tags (Establish time & frequency)
4. Verify actual time Vs estimated
5. Improve time of execution
6. Detail activities
7. Remove “F” Tags
8. Apply activities to similar machines

Thank You!

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# TPM Teams Status

## October 1997

- Number of Hot Spots detected: 284
- Number of Hot Spots solved: 126
- One Point Lesson developed: 44
- One Point Lesson Taught: 34
- Number of teams on TPM: 27
- Teams on step 3: 1
- Teams on step 2: 2
- Teams on step 1: 24
CURRENT EQUIPMENT IN T.P.M.
SAME KIND OF EQUIPMENT
1999/2000 EXPANSION
<table>
<thead>
<tr>
<th>Line</th>
<th>A.M. STEP # 1</th>
<th>A.M. STEP # 2</th>
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<tr>
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<td>Line 4</td>
<td>04</td>
<td>01</td>
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</tbody>
</table>
T.P.M. FOLLOW-UP

TEAMS PRESENTATION

TEAMS AUDITS

TEAMS MEETING

Consultant VISITS

MANAGERS PRESENTATION

6 TEAMS PER MONTH

6 TEAMS PER MONTH

WEEKLY

TWO DAY EVERY TWO MONTHS

MONTHLY MEETING

Thank You!
PILOT MACHINE

N-62361

Thank You!

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Courtesy, in part, of Motorola SPS.
Thank You!

N-662361

N-663242

N-649666
CLEANING IS INSPECTION....

AUTONOMOUS MAINTENANCE

5’S
INSPECTION IS DETECTION.
TPM Awareness Information

Courtesy, in part, of Motorola SPS.
Thank You!
TPM Awareness Information

CORRECT
INCORRECT

CORRECT
INCORRECT

Dummy Part

Thank You!

Courtesy, in part, of Motorola SPS.
CONTACT

CORRECT

INCORRECT

Thank You!

Courtesy, in part, of Motorola SPS.
TO STANDARDIZE AND PREVENT RECURRENCE

One Point Lesson

Thank You!
MACHINE PERFORMANCE
Defectives

“ZERO” Defectives

DOWN TIME

P.C. BOARD DAMAGED

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TPM Awareness Information

49
WHAT IS NEXT?

LINK

Autonomous Maintenance

6 Big Losses

Planned Maintenance