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Convention on Quality Improvement
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CREATING A WORLD-CLASS ORGANIZATION THROUGH “TPM”

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R.MUKUNDAN
Director, Total Quality Management Consultants, INDIA
9th International Convention on Quality Improvement
ICQI 2005, Karachi
14-15, NOV, 2005

Profile of the Speaker
Mr. R. Mukundan, Director, TQMCONSULTANTS, Chennai, India is a post graduate in Engineering with 20 years of experience in Quality, Production, HRD Functions. Had worked in reputed large Indian Industries. Extensively Trained in Japan on TQM/TPM areas and a certified Trainer on TPM. Traveled to many countries for presenting papers in international conferences.

One of the leading consultants in offering Specialized services for implementation of TQM/TPM and KAIZEN
Global Players and Niche Players are Changing the rules of the game. If you Can’t play the new Global Competitive Game, the only thing you can do is to Watch from the SIDELINES.

- The Illiterates of 21st Century will not be those who cannot read or write, but those who cannot learn, unlearn & relearn

Alvin Toffler
It is a fundamental law of today that for any organisation to survive, its rate of learning \( L \) must be equal to, or greater than, the rate of change \( C \), in its environment.

\[ L \geq C \]

**Need of the Hour?**

**CHANGE**

*The Change warranted at the Operations area.*
# Paradigm Shift in Focus

<table>
<thead>
<tr>
<th>Core Competence</th>
<th>Human Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design of Business</strong></td>
<td>Technology oriented or Compete on Human Edge</td>
</tr>
<tr>
<td><strong>Mindset of Business</strong></td>
<td>Global</td>
</tr>
<tr>
<td><strong>Job Design</strong></td>
<td>Based on Customisation, Quality &amp; Continuous Improvement</td>
</tr>
<tr>
<td><strong>Recruitment</strong></td>
<td>Broad Based</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>As a Tool of Engineering</td>
</tr>
<tr>
<td><strong>Leadership</strong></td>
<td>Thro’ Cross Functional Teams</td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td>Thro’ Autonomy &amp; Freedom</td>
</tr>
<tr>
<td><strong>Compensation</strong></td>
<td>Competitive &amp; Sharing of Wealth Created</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Self Managed; Self Certified &amp; Trust Leading to Virtual Organisation</td>
</tr>
</tbody>
</table>

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**Corporate Objective**

- Become A Global Player
- Become a world class company

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## MEASURING WORLD CLASS PERFORMANCE

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>World Class</th>
<th>2nd Class</th>
<th>3rd Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality rejects per million parts</td>
<td>&lt; 500</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td>Setup time</td>
<td>&lt; 10 min</td>
<td>&lt; 20 min</td>
<td>&lt; 30 min</td>
</tr>
<tr>
<td>Utilized capacity</td>
<td>90%</td>
<td>75%</td>
<td>55%</td>
</tr>
<tr>
<td>Breakdown losses</td>
<td>1%</td>
<td>5%</td>
<td>19%</td>
</tr>
<tr>
<td>On Schedule production</td>
<td>100%</td>
<td>90%</td>
<td>80%</td>
</tr>
<tr>
<td>Engineering change process response time</td>
<td>1 Day</td>
<td>5 Days</td>
<td>10 Days</td>
</tr>
<tr>
<td>Annual training days per employee</td>
<td>20</td>
<td>10</td>
<td>&lt; 5</td>
</tr>
</tbody>
</table>

11/12/2005  TQM CONSULTANTS, Chennai

## Requirement Of a Global Player

- Right Product at the right time and at the right price. THRO

  - Quality Product
  - Customer satisfaction
  - Low-cost producer

- This warrants a Change at the Operations area...
Common Features of Organisations
Achieving Manufacturing Excellence

- Clear policies and goals.
- Good employee relations.
- Training has a high focus.
- Bias towards action at all levels.
- Measurement systems consistent with objectives and goals.
- Market and customer driven.

World Class Organization – Common Activities

Recognize and regularly practice the following:

- Goals and visions are larger than individuals.
- Group effort with group recognition.
- Unlimited expectations – Continuous Improvements cycles of PDCA at all levels in the organisation.
- Attention to detail is of major importance.
- Foster effective training, communication and feedback cycles of PDCA.
- Visual controls and communication are task oriented – not power oriented.
- Quantity focus by everyone to give the customer what he wants.
How do we change

The answer is the

**TPM is one of the tools**

---

**TPM Supports World Class Manufacturing**

- **Customer Delight**
  - Total Productive Maintenance
  - Just in Time
  - Total Quality Control
  - Continuous Improvement
  - Management Support and Commitment

- Reduce breakdowns and defects to zero
- Reduce defects to parts per million
- Empower and involve everyone
- Reduce inventory and lead times
**T.P.M the definition**

**Total Productive Maintenance**

Which Also Means

**Total Profit Management**

Through

**Total Perfect Manufacture**

Through

**Total Productive Maintenance**

Through

**Total People Management**

---

**TQC and TPM**

<table>
<thead>
<tr>
<th>Category</th>
<th>TQC</th>
<th>TPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Improvement of corporate culture (Improvement in actual performance, creating a cheerful working environment)</td>
<td></td>
</tr>
<tr>
<td>Object</td>
<td>Quality (Output side, Effect)</td>
<td>Equipment (Input side, Cause)</td>
</tr>
<tr>
<td>Means to achieve the end</td>
<td>Systematise the management (Systematisation/Standardisation) Software oriented.</td>
<td>Realisation of ideal production operation -Hardware oriented-</td>
</tr>
<tr>
<td>Cultivation and education of employees</td>
<td>Education focusing mainly on the management technique (QC technique)</td>
<td>Education centering on the equipment / maintenance technologies</td>
</tr>
<tr>
<td>Small group activities</td>
<td>Voluntary circle activities</td>
<td>Integrating the activities based on job description and by small group circle</td>
</tr>
<tr>
<td>Target</td>
<td>Quality for PPM order</td>
<td>Through elimination of losses and wastes (Aiming at achievement of zero loss)</td>
</tr>
</tbody>
</table>
TPM’s Origin

TPM had its inception at NIPPONDENSO CO., LTD., as well known manufacturer of automobile parts in 1971.

Japan Institute of Plant Engineers (JIPE), the forerunner of the present Japan Institute of Plant Maintenance (JIPM) provided thorough support for TPM movement and spared no effort to spread and promote TPM ever since.

TPM activity, born in Japan and intended for Production Divisions in the past, has recently been extended to the whole company, the whole industry and then to the whole world. TPM activity has been extended not only to plants in Japan, but also to plants overseas. For instance, the winning of PM prize for outstanding PM enterprise in the recent past by the plants overseas, indicates the way TPM activity is spreading all over the world.
Three main features of TPM

1. It guarantees dramatic results
2. It visibly transforms the work place.
3. It raises the level of knowledge and skill of employees

T.P.M Analogy

- Analogous to Maintaining Body health.
  - Daily routine: Brushing Teeth, bathing etc etc = Jishu Hozon
  - Sickness: approach the Specialist Doctors like Ophthalmist, Cardiologist, Dentist, Neurologist etc etc = Plant Maintenance.
  - Meditation, Yoga, Playing, Exercise = Kōheisū kaizen

11/12/2005
TQM CONSULTANTS, Chenna
### TPM is Not About Traditional Maintenance

<table>
<thead>
<tr>
<th>Traditional Maintenance</th>
<th>Total Productive Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Functional organisation</td>
<td></td>
</tr>
<tr>
<td>- Demarcation</td>
<td></td>
</tr>
<tr>
<td>- Reactive to breakdowns</td>
<td></td>
</tr>
<tr>
<td>- Equipment is the Maintenance Department's responsibility</td>
<td></td>
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<tr>
<td>- Necessary evil</td>
<td></td>
</tr>
<tr>
<td>- Productive team</td>
<td></td>
</tr>
<tr>
<td>- Multi-skilled and operator maintenance</td>
<td></td>
</tr>
<tr>
<td>- Preventive maintenance</td>
<td></td>
</tr>
<tr>
<td>- Operator ownership and pride in equipment by everyone</td>
<td></td>
</tr>
<tr>
<td>- Vitally important</td>
<td></td>
</tr>
</tbody>
</table>

Business environment around enterprises has become more competitive and elimination of wastage is required. Wastage such as stoppages in costly equipments due to breakdowns and manufacturing of defective parts cannot be allowed at all. In other words, this means that the importance of TPM has now been recognized for survival of enterprises.
TPM started spreading widely not only within Japan but also throughout the world such as in various Asian and European countries, Brazil and United States of America. So, in order to spread TPM correctly in the global context, it became necessary to describe clearly the ideology and philosophy of TPM so as to make it easily understandable to people all over the world.
COURSE OF EVENTS FROM ‘PM’ TO ‘TPM’

The activities to improve productivity of the equipment by doing Preventive Maintenance (PM), Corrective Maintenance (CM) and Maintenance Prevention (MP) with regard to the overall life cycle of the equipment, are generically known as Productive Maintenance (PM). This further developed to TPM i.e. PM with total employee participation.

Continued

With the progress of automation, the demand for the job content and expertise from the production operators and maintenance personnel has now changed, and needs to be upgraded.
TPM includes these meanings

T : TOTAL

① Total has got three meanings.
   Maximization of total efficiency (Item 1 of definition)
② Entire lifecycle of Production System (Item 2 of definition)
③ Covers All Departments (Item 3 of definition) and participation by all
   employees (Item 4 of definition)

P : PRODUCTIVE

To pursue for the maximization of efficiency of the production
system. This does not only mean to pursue for productivity, but also to
make all losses zero. In other words, Zero-Accident, Zero-Defect, Zero-
Breakdown are the real meanings of maximization of efficiency.

Continued ➔

M : MAINTENANCE

Maintenance is used here in a wider sense covering the entire life
cycle of Production System. It refers to maintenance of individual
processes, plants and production management system.

Maintenance of production management system means to maintain
production management system in such shape that it makes survival of
enterprise possible by always pursuing for maximization of efficiency while
coping with changes in the environment.

➔ Continued
TPM Requires a Different Approach to achieve the Overall Goals

- Managers are typically process and results oriented and leave equipment management to the maintenance department.

- With TPM Managers will need to change to: managing the equipment, the process and the results.

- TPM will require everyone to shift their Paradigms.

TRADITIONAL MANUFACTURING

- Breakdowns
- Setting
- Defects
- Maintenance
- Adjustment
- Misc. stoppage

8 hrs.

MANUFACTURING WITH TPM

- Operator meet
- Full output of defect free products - 7 hrs. 40 min.
- Equipment cleaning/checking

8 hours.
ORGANIZATION STRUCTURE FOR TPM

“TPM Activity by formation of small groups”
From TPM by Production Department to TPM by Entire Company

OBJECTIVES OF TPM
Objectives of TPM

TPM aims at the improvement of an enterprise through radical reforms in equipment and personnel.

(1) Radical Reforms of Personnel

Radical reforms of personnel refers to the upbringing of employees to enable them to cope with the era of FA. Each employee should acquire following abilities:

1. Operator should possess ability to perform Self Initiated Maintenance
2. Maintenance man should possess ability to do maintenance of all types of equipments
3. Production Engineering man should acquire the ability to design such equipments which shall not require any maintenance.

2. Improvement of Equipment

1. Aim at improvement in overall efficiency through improvement of equipment in use at present.
The Overall Goals for TPM

<table>
<thead>
<tr>
<th>Programme of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cleaning becomes checking</td>
</tr>
<tr>
<td>2. Checking becomes discovery of abnormalities</td>
</tr>
<tr>
<td>3. Abnormalities become things to be restored or improved</td>
</tr>
<tr>
<td>4. Restoration and improvement become positive effects</td>
</tr>
<tr>
<td>5. Positive effects become pride in the workplace</td>
</tr>
</tbody>
</table>

Motivation
- Department leaders
- Pride in one's work

Changing the equipment

Effects
- Reduction of defects and breakdowns

Changing the people

Continued on next page
PILLARS OF TPM DEVELOPMENT

To achieve the goals of TPM, the following activities must be done and these are known as the “8 Pillars of TPM Development”

8 Pillars of TPM Development

1. Individual Improvement for the maximization of Equipment efficiency (Maximization of Production efficiency—Reduction of losses)
2. Establishing an autonomous Maintenance system/Program (Promote autonomous maintenance focusing on operators by following 7 steps method)
3. Establishing a Planned Maintenance System by Maintenance department (Maintenance Department)
4. Education and training to increase operation and Maintenance skills (Skill Development Department)

→ Continued

Establishing a system to control equipment at initial stage (Production Engineering Department must design a maintenance free equipment at the design stage and Product Engineering Department must stabilize the operation of new equipment at the earliest).

5. Establishing a Quality Maintenance system/Program
6. Establishing a System/Plan for maximization of efficiency of Indirect Department
7. Establishing a Safety and Environment Management System/Plan

→ Continued
EXPECTED BENEFITS OF TPM
Example of TPM Effectiveness

- Breakdowns per month

Note: TPM is not a quick fix!

Overall TPM Effectiveness

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### The Effectiveness of TPM

<table>
<thead>
<tr>
<th>Tangible Effect (3 to 4 years)</th>
<th>Results from successful TPM companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>(P) Productivity</td>
<td>Reduction in Number of Breakdown Failures 1/50 of current level</td>
</tr>
<tr>
<td></td>
<td>Overall Equipment Efficiency 1.5 to 2 times</td>
</tr>
<tr>
<td>(Q) Quality</td>
<td>Reduction in Process Defects 1/10 of current level</td>
</tr>
<tr>
<td>(C) Cost</td>
<td>Manufacturing costs Reduced by 30%</td>
</tr>
<tr>
<td>(D) Delivery</td>
<td>Inventory Reduced by 30% to 50%</td>
</tr>
<tr>
<td>(S) Safety</td>
<td>Time off work for accidents Reduced to zero</td>
</tr>
<tr>
<td>(M) Morale</td>
<td>Implemented employee suggestion 5 to 8 per month per employee</td>
</tr>
</tbody>
</table>

We now concentrate on Implementation of TPM.
## TPM Implementation Program

<table>
<thead>
<tr>
<th>Stage</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td></td>
</tr>
<tr>
<td>1. Declaration by top management to introduce TPM</td>
<td></td>
</tr>
<tr>
<td>2. Introductory education and campaign for TPM</td>
<td></td>
</tr>
<tr>
<td>3. Establishing TPM promotion organization &amp; organization model (Pilot)</td>
<td></td>
</tr>
<tr>
<td>4. Setting basic policy and target for TPM</td>
<td></td>
</tr>
<tr>
<td>5. Creation of master plan to implement TPM</td>
<td></td>
</tr>
<tr>
<td><strong>Kick off</strong></td>
<td>6. TPM kick-off – Manager Model results are shared to all employees, customers, and Suppliers</td>
</tr>
</tbody>
</table>

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## TPM Implementation Program

<table>
<thead>
<tr>
<th>Stage</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Implementation</strong></td>
<td></td>
</tr>
<tr>
<td>7. Establishing systems for improving production efficiency:</td>
<td></td>
</tr>
<tr>
<td>7.1 Jishu Hozen – Autonomous Maintenance covering all equipments</td>
<td></td>
</tr>
<tr>
<td>7.2 KK - Individual Equipment Efficiency Improvements</td>
<td></td>
</tr>
<tr>
<td>7.3 Planned Maintenance System establishment</td>
<td></td>
</tr>
<tr>
<td>7.4 Education and Training – imparting knowledge and skill – On the Job training</td>
<td></td>
</tr>
</tbody>
</table>
TPM Implementation Program

<table>
<thead>
<tr>
<th>Stage</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation</td>
<td>8. Initial control system for new products and equipments Developments (Development Management)</td>
</tr>
<tr>
<td></td>
<td>9. Establishing Quality Maintenance (Hinshitsu Hozen)</td>
</tr>
<tr>
<td></td>
<td>10. Establishing administrative department efficiency</td>
</tr>
<tr>
<td></td>
<td>11. Establish Safety, Health and Environment System</td>
</tr>
<tr>
<td>Stability</td>
<td>12. Total application and raise to higher levels of activities</td>
</tr>
</tbody>
</table>

TPM Implementation Plan

<table>
<thead>
<tr>
<th>Activities</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM organisation</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Launching Model</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Kickoff</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Establish Autonomous Maint. Kobetsu Kaizen</td>
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</tr>
<tr>
<td>Planned Maintenance</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Education and Training</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Quality Maintenance</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Development Management</td>
<td></td>
<td></td>
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<tr>
<td>Administration TPM</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SHE Management</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Raise to target level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continue and stabilise challenge
1. Autonomous Maintenance

The Seven Step approach

Step 1  Initial Cleaning & Tagging
Step 2  Counter measures against sources & kaizen
Step 3  Develop Tentative standards
Step 4  General inspection
Step 5  Autonomous Inspection
Step 6  Standardisation
Step 7  Autonomous Management

AM process

Manager Model Team

Manager Model machine

Implement 5-S
Steps 1, 2, 3
Kick-off

Form Autonomous Maintenance Teams

Steps 1, 2, 3 with Audits
Deploy to other m/cs
Go to Steps 4 and 5 continue
# Manager Model Implementation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Resp</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training and selection of Manager Model team &amp; Line</td>
<td>TPM/Mfg</td>
<td>6</td>
</tr>
<tr>
<td>Initial cleaning, daily tagging, and audit Step 1</td>
<td>Team</td>
<td></td>
</tr>
<tr>
<td>Identification of hard to access areas and audit</td>
<td>Team</td>
<td></td>
</tr>
<tr>
<td>Implementation of Step 3 and audit</td>
<td>Team</td>
<td></td>
</tr>
<tr>
<td>Identification of Losses and reduction of major losses</td>
<td>Team</td>
<td></td>
</tr>
</tbody>
</table>

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## MODEL CELL ACTIVITY - MASTER PLAN

<table>
<thead>
<tr>
<th>SNO</th>
<th>ACTIVITY</th>
<th>RESP</th>
<th>Mar-Apr'03</th>
<th>May-Jun'03</th>
<th>Jul-Aug'03</th>
<th>Sep-Oct'03</th>
<th>Nov-Dec'03</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Training the Team</td>
<td>TPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Step 1: Initial Cleaning</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cleaning Schedule &amp; Tsg</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Identify the repeated</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>cleaning areas &amp; improve</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>Identify hard to</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>approach for cleaning</td>
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<tr>
<td></td>
<td>for Cleaning, Lubrication</td>
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<tr>
<td></td>
<td>&amp; inspection &amp; make QPLs</td>
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<tr>
<td>6</td>
<td>Audit for Step 1</td>
<td>Leader</td>
<td></td>
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<tr>
<td>7</td>
<td>Step 2: Implement</td>
<td>Team</td>
<td></td>
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<tr>
<td>8</td>
<td>Audit for Step 2</td>
<td>Leader</td>
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<tr>
<td>9</td>
<td>Develop Tentative</td>
<td>Team</td>
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<td></td>
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<tr>
<td>10</td>
<td>Develop Visuals</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Implement Standards</td>
<td>Leader</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>Audit Step 3</td>
<td>Leader</td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>Identify Losses</td>
<td>Leader</td>
<td></td>
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<tr>
<td>14</td>
<td>Improve OEE of Equipment</td>
<td>Leader</td>
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</tbody>
</table>

© Pakistan Institute of Quality Control
Objective

- Make the operator an Expert of Equipment and become manager of the equipment - competency in autonomous management.
- To eliminate breakdowns occurring due to accelerated deterioration.
- Improve Visual Management in shop floor.
- Learn to participate in Kaizen activities.

2. Individual Improvement

Objective

To continuously improve the utilisation and cost of production process through

a. Reduction of losses due to
   Equipment down time (equipment break down, setup etc)
   Human related down time
b. Reduction of manufacturing cost
Loss Structure During Production Activities (16 Major Losses)

1. Management loss
2. Operating workstation loss
3. Line stoppage loss
4. Maintenance loss
5. Energy loss
6. Die and tool loss

8. Breakdown loss
   1. Failure loss
   2. Setup loss
   3. Change over loss
   4. Start-up loss
   5. Other breakdown loss
   6. Major stoppage
   7. Reduced speed
   8. Rejects & rework loss

3 Major Loss: Preventing Efficiency of Material and Energy

Relationship between Major Losses on Equipment and Overall Equipment Effectiveness

Calculation of overall equipment effectiveness

Overall equipment effectiveness = Availability x Performance efficiency x Rate of quality products

E.g. 0.67x0.50x0.96 x 100 = 42.6
3. Planned Maintenance

Objective

- Generate high reliability equipment (zero failures) – elimination of major losses of equipment
- Reduce Maintenance cost by increasing Mean time between failure of parts and reducing Mean time to repair (MTBF & MTTR)

Planned Maintenance

Zero Equipment Failures through

- Establish basic condition and Comply with correct conditions of use by elimination of accelerated deterioration
- Reverse deterioration by optimal equipment condition
- Abolish environments causing accelerated deterioration by optimal condition of process
- Correct design weakness and lengthen life
- Improve skills and eliminate unexpected failures
4. Education and Training

Objective
1. To eliminate breakdowns that occur due to poor skill in Autonomous Maintenance
2. To eliminate operator mistakes leading to Customer complaints, defects and accidents
3. To develop multi-skill
4. To improve skills of Maintenance personnel
5. To achieve minimum cost - nonconformance due to lack of skill.

Education and Training

Basic concept
1. Ability to detect and improve abnormality
2. Ability to do kaizens
3. Develop multi-skill
4. Develop skills of Maintenance
5. Ability to teach (theory and practice (OJT))
5. Quality Maintenance

Objective

1. Eliminate in-process defects
2. Eliminate customer complaints
   - by observing required conditions
3. Reduce Cost of Quality through elimination of defects / rework

Quality Maintenance

<table>
<thead>
<tr>
<th>Origin of Quality Defect</th>
<th>Improve &amp; build methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality suppliers</td>
</tr>
<tr>
<td></td>
<td>Defect free equipment</td>
</tr>
<tr>
<td></td>
<td>Fail safe methods</td>
</tr>
<tr>
<td>Establish Material conditions yielding Zero defects</td>
<td>Skill training for competent men</td>
</tr>
<tr>
<td>Establish Equipment conditions yielding Zero defects</td>
<td>Achieve Zero quality defect</td>
</tr>
<tr>
<td>Establish methods conditions yielding Zero defects</td>
<td></td>
</tr>
<tr>
<td>Establish operating conditions yielding Zero defects</td>
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</tbody>
</table>
6. Initial Control Activities

Objective

• **New Products:**
  To reduce product development lead time
  To reduce cost of development

• **New Machines**
  To reach 85% OEE within one month of commissioning.
  To develop economical configurations at minimum cost (LCC)

7. Safety, Hygiene and Environment

Objective

• Attain and maintain Zero-Accident level

• Create a healthy and clean working area

• Create and maintain Zero pollution level
8. Administration TPM

Objective

- Render service and support functions to the production departments
- Organise high efficiency Offices
- Realise Zero functional Loss
- Build Image to Customers

TPM Results

Develop Indicators (objectives) for TPM Effects and Evaluate Achievement
**Tangible Benefits**

- **P...** Productivity Improvement ---- 1.5 to 2 times
  - Reduction in number of failures and losses
- **Q...** Reduction in product defects ---- 1/10
  - Reduction in customer claims ---- 0
- **C...** Reduction in maintenance cost ---- 30%
- **D...** Reduction in inventory ---- 1/2
- **S...** Reduction in accident, and pollution ---- 0
- **M...** Increase in number of employee suggestions ---- 5 to 10 times

**Intangible Benefits**

- Excellent Morale of employees, CAN DO spirit
- Sense of ownership and participation by employees
- Ability to work as a team and Company-wide sense of unity through TPM organisation
- Pleasant physical & enjoyable working environment
- Good image and impression created to customers / visitors
Let us now understand how 2 Indian Companies have become Global through implementing TPM.