



Total Productive Maintenance

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Total Productive Maintenance (TPM) is a program, which brings maintenance into focus in order to minimize downtime and maximize equipment usage. Maintenance through TPM is no longer regarded as a non-profit activity. The goal of TPM is to avoid emergency repairs and keep unscheduled maintenance to a minimum. This helps to increase output and make it more uniform and predictable. It is essential to define equipment effectiveness and downtime. Then procedures are implemented to achieve predictive and preventive maintenance to assure continuous uptime.

Key Benefits

- More reliable equipment with improved, more predictable uptime leading to increased / more predictable output
- Employee involvement - maintenance technicians and operators - increase ownership and improve outcomes
- Preventive and predictive maintenance avoids unexpected downtime and resulting missed commitments

Activities

- Use a number of techniques to clean-up machines, involve operators, visually identify maintenance and ensure compliance
- Observe methodology to understand Overall Equipment Effectiveness (OEE) and respond to observed deficiencies
- Facilitate team to review, analyze, improve and track progress on maintenance and overall operations effectiveness

Does unreliable equipment introduce process delays? Are maintenance costs growing in the absence of improvements in maintenance practices and equipment reliability? Use proven techniques to yield increased equipment uptime. Obtain support to improve your maintenance program and results.

Total Productive Maintenance (TPM) Definition

A series of methods to ensure that process machines are always able to perform their functions so that production is never interrupted

TPM Program

- ❑ Implement a company-wide preventive maintenance system
- ❑ Involve production equipment designers, operators, and maintenance personnel

Philosophy

- ❑ Optimize maintenance through equipment and competent operators trained in autonomous maintenance and equipment knowledge.
- ❑ Replace traditional approach of detecting and correcting faulty conditions as they occur.
- ❑ Use a proactive system, which monitors and corrects root causes.
- ❑ Base maintenance strategy on understanding the cause and effect system affecting process equipment performance
- ❑ Treat the operator as the first line caretaker
- ❑ Maintenance personnel are the specialized caretakers
- ❑ Implement through small self-directed team activities

Maintenance approaches

- ❑ Time-based or Planned Maintenance: periodically scheduled maintenance
- ❑ Predictive Maintenance: action performed resulting from ongoing equipment monitoring
- ❑ Corrective Maintenance: maintenance to restore optimal equipment function after breakdowns
- ❑ Preventive Maintenance: a combination of time based and predictive maintenance and actions taken to sustain optimal equipment performance and preclude breakdowns

Autonomous Maintenance Implementation

- ❑ Identify process critical machinery and equipment
- ❑ Perform initial cleaning
- ❑ Resolve sources of dirt and contamination
- ❑ Create cleaning and lubrication standards
- ❑ Train operators on equipment maintenance requirements
- ❑ Implement a comprehensive maintenance system
- ❑ Establish periodic audits of maintenance effectiveness

Eliminate Factors Contributing to Failure

- ❑ Secure and tighten all fasteners and fittings
- ❑ Replace missing parts
- ❑ Replace damaged or worn parts
- ❑ Resolve all causes of leaks and spills

Lubrication

- ❑ Experts estimate that 60% of machine breakdowns associated with moving parts are due to lack of or improper lubrication practices.

Establish an Equipment Failure Database

- ❑ Gather and manage failure information
- ❑ Analyze for trends and patterns
- ❑ Develop and issue periodic summary reports
- ❑ Include reports as a meeting agenda for regular review

Predictive Maintenance as a Diagnostic Tool

- ❑ Failures decline with the introduction of time-based maintenance
- ❑ Predictive maintenance employs equipment diagnostics
- ❑ Requires measurement of equipment performance
- ❑ Requires the identification and measurement of performance characteristics

Maintenance Audits

- ❑ Audits are the most important factor in the successful implementation of an autonomous maintenance program
- ❑ Verify success of implementation - provide improvement feedback
- ❑ Instill a sense of achievement and reinforce effort

Overall Equipment Effectiveness (OEE)

- ❑ $OEE = Availability \times Efficiency \text{ rate} \times Quality \text{ rate}$
- ❑ An index of overall operating performance
- ❑ Points to the need to: eliminate stoppages, increase operating speed and improve quality