

An LDI Training Course

# Preventive and Predictive Maintenance

by

*LDI Instructor*

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## OBJECTIVES

This course is designed to teach the participants the processes and applications of preventive and predictive maintenance. It covers topics on maintenance information flow, preventive and predictive maintenance management, parameter monitoring and analysis, and maintenance budget estimation.

By attending this workshop the maintenance technicians, engineers and supervisors will be able to implement and apply the preventive and predictive maintenance technology to manage the maintenance activities that will improve machine availability, equipment lifetime, productivity, overall plant performance and profits.

### Benefits of attending this workshop are:

1. Understand the concepts and practices of preventive and predictive maintenance
2. Implement preventive and predictive maintenance management in your workplace
3. Develop your competency and confidence in executing preventive maintenance
4. Improve your machine availability and equipment lifetime
5. Reduce the frequency of equipment failure
6. Reduce the duration of equipment downtime
7. Learn how to improve your maintenance information flow
8. Reduce overall maintenance costs and improve company profits

## COURSE CONTENT

- *Maintenance*  
Maintenance Philosophy and Goals, Product Life Cycle, Scope of Maintenance, Planned & Unplanned Maintenance, Pareto Law.

- ***Maintenance Terms***  
Preventive Maintenance, Corrective Maintenance, Predictive Maintenance, Condition Monitoring, On-Condition Maintenance, Reactive Maintenance, Overhaul, Servicing, Centralized Maintenance, Field Maintenance, Area Maintenance, Shop Maintenance, Total Maintenance, Maintenance Management.
- ***Preventive Maintenance***  
Goals, Preventive Maintenance Characteristics, PM Flowchart, PM Facilities, PM Tasks, Levels of PM, Failure Definition, Time Definition in Maintenance, Maintenance Performance Indicators.
- ***Maintenance Information Flow.***  
Typical Benchmarks, Maintenance Work Order, Design of Work Order, The Four Types of Work Order Forms
- ***Managing Preventive Maintenance***  
Understanding PM, Examples of Critical Wear, Appropriate PM Strategy, Justifying PM Expenditures, Installing PM Systems, Access to Equipment, PM frequency and its Effect on Breakdown, PM Frequency Determination, Common Tasks, Staffing the PM Efforts, Strategies to Get PM Done, Steps to Install a PM System and Survey
- ***Estimating Maintenance Budget***  
Elements of maintenance budget, formula to estimate maintenance budget, Case Study
- ***Predictive Maintenance***  
Advantages of Predictive Maintenance, Failure in Mechanical Equipment/Component, Predictive Maintenance Techniques, Vibration Monitoring, Broadband Trending, Narrowband Trending, Signature Analysis, Implementation of Vibration Monitoring, Thermography, Energy Emission, Implementation, Tribology, Oil Analysis Report, Common Test for Lubricant, Wear Particles Analysis, Wear Type According to Particle Classification, Process Parameters, Visual Inspection, Ultrasonic Monitoring, Other Techniques.
- ***Optimum Predictive Maintenance Program***  
Predictive Maintenance Systems, Microprocessor-Based System, Selection Criteria for Microprocessor-Based System, Training and Technical Support
- ***Predictive Maintenance Program Implementation***  
Management Support, Dedicated and Accountable Personnel, Efficient Data-Collection and Analysis Procedures, Equipment Regrouping
- ***Parameters Monitoring***  
Mechanical Equipment, Machine-train component, Bearing and Bearing Type, Gears and Gearboxes, Gear-Mesh Frequency, Backlash, Gear Excitation,

Running Speed, Mode Shape and Resonance, Preloads and induced Loads, Process Variables, Blades and Vanes, Belt Drive.

- ***Diagnostic and Analysis***

Analisis using RMS Data, Analysis Method Using RMS Data, Analysis using Full-Signature (FFT), Analysis Method Using FFT Data, Comparative Analysis Trending, Failure-Mode Analysis, Root-Cause analysis, A Case Study

- ***Diagnostic Monitoring***

Failure Analysis, Signal Processing, Frequency Domain, Coherency, Vibration Charateristic of Rotary Components, Signal Characteristic of Unbalanced Mass, Misalignment, ISO Standard for Shaft Misalignment, Analysis of Mechanical Vibration Signal, *A Case Study*

## **WHO SHOULD ATTEND**

- Maintenance Technicians and supervisors
- Production operators and Supervisors
- Mechanical Engineers
- Electrical Engineers
- Service engineers and supervisors

## **Training Confirmation**

LDI Training will provide a Confirmation Letter after we receive registration according to the required quota.

**For more information please contact**

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