



MUE215

Predictive Maintenance Of Pumps Using Condition Monitoring

Course Introduction:

Pumps are among the most widely manufactured items in the world and their various designs permit their use in a variety of applications. Pump running with least troubles and consequent less downtime improves whole system reliability. Right selection & operation, effective maintenance & inspection programs, and skilled staff are essential factors for prolonged pump life.

Vibration analysis and condition monitoring are useful tools of predictive maintenance for predicting incipient mechanical, electrical, and process-related problems within rotating machinery and process systems. This course is intended to provide understanding of pump maintenance techniques and troubleshooting. The course focuses on the application of condition monitoring techniques especially vibration analysis on pump maintenance. Overview of vibration basic concepts is presented. Explanation to practical aspects of vibration-related problems such as misalignment and unbalance is summarized. A systematic approach is used here to guide the trainee through a logical sequence of steps to determine a machine's condition by detailed examination of vibration signatures.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ Highlight the requirements for proper pump installation
- ✓ Learn the importance and methods of pump maintenance
- ✓ Identify the right procedure for pinpointing and eliminating pump problems
- ✓ Understand the overview and checklist of pump problems
- ✓ Explain the principles of condition monitoring
- ✓ Learn the basic concepts of vibration
- ✓ List the various instruments to measure vibration
- ✓ Explain the steps of machinery vibration analysis
- ✓ Know the right steps to diagnose and analyze machinery problems related to vibration such as misalignment, unbalance, oil whirl etc.

Who Should Attend?

This course is intended for engineers, senior Foreman, foreman and supervisors. In addition to those who wish to gain knowledge experience of pump maintenance and Condition monitoring applications.

Course Outline:

Day 1:

Pump Installation

- Piping Configuration
- Foundations
- Alignment basics
- Baseplates
- Setting the Baseplate and Pump Unit

Pump Maintenance

- Overview of Maintenance Practice
 - Corrective Maintenance
 - Preventive Maintenance
 - Predictive Maintenance
- Basics of Shaft Alignment
- Lubrication Principles
- Pump Periodic Maintenance
 - Daily -Monthly- Semi-annual – Annual

Day 2:

Centrifugal Pump Maintenance

- Introduction
- Pump breakdown and removal
- Single-stage pump dismantling and repair
- Preparation for reassembly
- Pump assembly
- Vertical pump repair
- Multistage pump repair
- Optimum time to maintain pumps

Pump Problems

- Problems from suction side
- Problems due to mechanical causes
- Problems due to system causes
- Cavitation
- Vibration

- Check list for Centrifugal Pump Troubles
- Check list for Rotary Pump Troubles
- Check list for Reciprocating-Pump Troubles

Day 3:

Condition Monitoring

- Condition Monitoring Techniques
 - Oil analysis
 - Wear particle analysis
 - Thermography
 - Motor current signature
 - Vibration

Introduction to Vibration

- What is Vibration?
- vibration: sources, uses, effects
- Vibration signals
- Relationships of displacement, velocity and acceleration.
- Using a vibration severity chart and trend analysis
- Vibration Glossary

Day 4:

Vibration Measurements

- Vibration Measuring System.
- Contact and non-contact vibration measurement sensors
- Vibration Transducers.
- Transducer mounting
- Calibration of sensors
- Baseline Data
- Vibration Data Collection.

Vibration Analysis

- What is Vibration Analysis?
- Vibration Analysis steps.
- Determining Vibration Limits
- Acceptable Vibration standards
- Waveform versus Spectrum Analysis
- Analysis using Crest Factor

- Time and Frequency Analysis
- Orbit and Phase Analysis.
- Resonance and Critical Speed Testing

Day 5:

Vibration Fault Analysis

- General Analysis Procedure
- Imbalance
- Misalignment
- Mechanical Looseness
- Bearing problems
- Gear problems
- Electrically Induced Vibration
- Oil Whirl
- case histories

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per the course location. This rate includes participant's manual, and-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee/Tea
08:20 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Coffee/Tea/Snacks)
13:30 - 15:00	Last Session

