

Maximizing Machinery Reliability...

Production and Operation

Seminar Synopsis

Abstract

In order to successfully implementing machinery reliability programs, it takes a total team approach. One key organizational entity is Operations/Production. An operator can provide a wealth of input into the condition monitoring program, as well as take key roles in its' implementation. In order to do so, not only do processes need to be in place, but also a sound knowledge foundation must be established identifying the Operators role in the overall plant initiatives.

This seminar provides the Operator with an overview of the maintenance philosophies, equipment failure modes, and predictive technologies that are available. A sound understanding of the principles of operation of the various rotating machinery is essential, including an awareness of common problems that are encountered for each. An activity based approach to address the capabilities of, and the safe and effective use of various inspection tools integrated with the application of the visual, audible, and tactile techniques of inspection are covered.

Seminar Duration

The ideal duration of this seminar is 3 days, but can be modularized and customized into segments for implementing in a desired time period. Based on client requirements, the 3-day outline can be used as a "menu" to select subjects for shorter 1-day and 2-day versions.

Who should attend?

This seminar is designed for operators and production personnel and management personnel whose job functions involve the operation and monitoring of rotating machinery.

3-Day Outline

1.0 Introduction

- 1.1 Overview of maintenance philosophies
- 1.2 Introduction to precision maintenance

2.0 How Machines Fail

- 2.1 Introduction to machine failure modes

3.0 Overview of Predictive Technologies

- 3.1 Visual Inspection
- 3.2 Hand Feel
- 3.3 Vibration Analysis
- 3.4 Oil Analysis
- 3.5 Thermography
- 3.6 Performance Monitoring

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4.0 Introduction to Vibration Analysis

- 4.1 Terminology
- 4.2 Sound vs. Vibration
- 4.3 Sources of vibration
- 4.4 Overview of analysis procedures

5.0 Inspection Tools

- 5.1 Overall vibration meters
- 5.2 Ultrasonic Detection Tools
- 5.3 Infrared Thermometers
- 5.4 Strobe Lights

6.0 Principles of Lubrication

- 6.1 Purpose of lubricant
- 6.2 Boundary Lubrication
- 6.3 Hydrodynamic lubrication
- 6.4 Lubrication levels
- 6.5 Visual appearance of lubricants
- 6.6 Sight glass applications
- 6.7 Foaming

7.0 Machinery Inspection Procedure

7.1 Visual

- 7.1.1 General cleanliness
- 7.1.2 Oil/fluids on surrounding machine
- 7.1.3 Oil/fluids on machine casing or bearing caps
- 7.1.4 Oil/fluids on coupling guard
- 7.1.5 Unusual marks
- 7.1.6 Visible leaks
- 7.1.7 Lighting conditions
- 7.1.8 Local instrumentation
- 7.1.9 Fretting and wear particles
- 7.1.10 Corrosion

7.2 Audible

- 7.2.1 Strange noises/sounds
- 7.2.2 Listening devices

7.3 Tactile

- 7.3.1 Heat
- 7.3.2 Vibration

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8.0 Principles of Operation of Common Machine Components

- 8.1 Induction Motors
- 8.2 Centrifugal Pumps
- 8.3 Gear Boxes
- 8.4 Fans
- 8.5 Rolling Element Bearings
- 8.6 Belt Drives

Seminar Objectives

1. Create awareness of the different maintenance philosophies, where they are applied and with particular emphasis on precision maintenance.
2. Create an awareness of the critical role operators/production personnel play in machinery reliability/precision maintenance.
3. Create awareness of the different equipment failure modes.
4. Create awareness of the different predictive technologies.
5. Explain the basic principles of operation, major components of, and develop the ability to detect common problems/root cause failures associated with various machines in a plant including:
 - Motors
 - Pumps
 - Fans
 - Gearboxes
 - Rolling Element Bearings
 - Belt Drives
6. Understanding how to perform routine inspections of a piece of rotating equipment utilizing visual, audible, and tactile techniques and procedures.
7. Understand the fundamentals of vibration including sources and its effect on machinery life.
8. Understanding capabilities of, and how to safely and effectively use various inspection tools including:
 - Overall vibration meter
 - Ultrasonic measurement tool
 - Infrared thermometer
 - Strobe lights

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9. Understanding the significance of bearing temperatures and explain the difference between metal surface temperature and oil temperatures.
10. Understand the principles of lubrication
11. Understand the significance of oil levels and oil condition.
12. Effectively communicate, both orally and in writing, machine performance data/information into the condition monitoring program/system.