



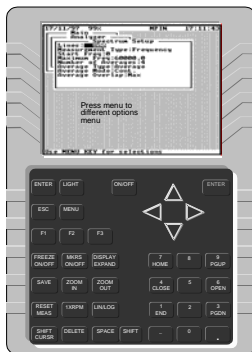
## MEP-401: Managing Mechanical Reliability using PdM Technologies

### Abstract

Designed specifically for those who have management or supervisory roles within the organization, this seminar increases management personnel awareness of the need for a “precision” approach through use of extensive case histories and success stories. It also provides information on proven methods for justifying the investment in PdM tools, time and training, as well as setting up the organization and implementing machinery reliability programs.

This course begins with a discussion of different maintenance philosophies and methods, including use of Reliability-centered Maintenance (RCM) practices, as well as examples of how and where each maintenance strategy is appropriately applied. Case histories and practical examples drive home key points and reduce confusion often created by use of the many buzzwords surrounding machinery reliability.

Each of the primary condition monitoring/PdM technologies in use today is discussed, including the benefits and applications of each:



- Visual Inspection and Monitoring
- Vibration Detection and Analysis
- Oil Analysis
- Infrared Thermography
- Ultrasonics
- Performance Monitoring
- Motor Analysis Techniques

***Understanding and even using each of these technologies has proven over and over again NOT to be enough! If maximizing machinery reliability is the goal, processes must be in place not only to detect problems, but also to analyze them, determine the root cause of the problem, correct the problem, and verify the problem has indeed been corrected. Key elements of successful machinery reliability programs are discussed.***

Throughout this seminar, instructor demonstrations reveal the impact of course content on machinery reliability, vibration levels, bearing life, etc. Attendees will leave this seminar with a *refreshed understanding* of maintenance principles and procedures they had forgotten, never used, or never learned. This seminar



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provides practical, easy-to-implement techniques and processes for ensuring maintenance tasks are performed *confidently right the first time*.

### **Seminar Duration**

The duration of this seminar is 5 days.

### **Who should attend?**

This seminar is designed primarily for maintenance, engineering, technical support and management personnel whose job functions involve managing mechanical reliability, machinery repair, and asset management. The scope of content is appropriate for management personnel, as well as technicians or other employees who will benefit from an overview of machinery reliability processes and requirements.

### **Associated Tasks**

Manage implementation of Machinery Reliability processes and use of PdM technologies.

Given a simulated plant environment including rotating and stationary assets, develop and populate an asset health matrix.



# Seminar Outline

## Day 1:

1. Introduction
  - A. Who is Universal Technologies?
  - B. Seminar Goals and Overview
2. Reliability Overview
  - A. Condition-based vs. Precision/Proactive Maintenance
  - B. RCM Introduction
  - C. Failure Patterns
  - D. Development and Use of an Asset Health Matrix
3. Effective Condition Monitoring...the cornerstone of reliability improvement
  - A. The 4 Steps in an effective defect elimination process
    - **Detection**...routine data collection picking out bad actors
    - **Analysis**...Root cause Failure Analysis
    - **Correction/Improvement**...Assembly, Tolerances, Alignment, PM tasks, attention to detail, job kits, job plans, tools, planning
    - **Verification**...Standards, QC checks, post-repair checks
  - B. Cargill Maintenance & Reliability Work Flow Processes
4. Common Failure Modes-Sources of Failure
  - A. Unbalance
  - B. Misalignment
  - C. Looseness
  - D. Resonance
  - E. Bearing defects
  - F. Electrical faults
  - G. Flow related
  - H. Gear problems



**Day 2:**

5. Vibration Analysis...4 hours

- A. Overview of Technology
- B. Terminology
- C. Types of Tools Available
- D. Data Collection Procedures
- E. Analysis Processes and Procedures
- F. Typical Reports
- G. Common Challenges

6. Ultrasonics...2 hours

- Overview of Technology
- Terminology
- Types of Tools Available
- Data Collection Procedures
- Analysis Processes and Procedures
- Typical Reports
- Common Challenges

7. Infrared Thermography...2 hours

- Overview of Technology
- Terminology
- Types of Tools Available
- Data Collection Procedures
- Analysis Processes and Procedures
- Typical Reports
- Common Challenges

**Day 3:**

8. Oil Analysis...4 hours

- Overview of Technology
- Terminology
- Types of Tools Available
- Data Collection Procedures
- Analysis Processes and Procedures
- Typical Reports
- Common Challenges

9. Motor Current Evaluation...4 hours

- Overview of Technology



Terminology  
Types of Tools Available  
Data Collection Procedures  
Analysis Processes and Procedures  
Typical Reports  
Common Challenges

10. Performance Monitoring Overview

**Day 4:**

11. Technology Application to Electric Motors

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

12. Technology Application to Pumps

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

13. Technology Application to Gearboxes

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

14. Technology Application to Compressors

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications



15. Technology Application to Blowers

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

16. Technology Application to Fans

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

17. Technology Application to Rotary Dryers

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

18. Technology Application to Mills and Grinders

- A. Construction
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

**Day 5:**

19. Technology Application Activities

20. Work Performance, Job Plan Improvement and Equipment Reliability Improvement

