



MEP-402: Managing Electrical Reliability with PdM Technologies

Abstract

Designed specifically for those who have management or supervisory in the electrical 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 electrical machinery reliability programs.

This course begins with a discussion of different maintenance philosophies and methods as related to electrical reliability, 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 for electrical reliability in use today are discussed, including the benefits and applications of each:

- Visual Inspection and Monitoring
- Vibration Detection and Analysis
 - AC Induction Motors
 - DC Motors
 - Generators
- Oil Analysis
- Infrared Thermography
- Ultrasonics
- Performance Monitoring
- Motor Analysis Techniques
- Motor Circuit Analysis
- Motor Condition Monitoring
- IEEE Testing



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 electrical machinery reliability, vibration levels, bearing life, insulation life, phase unbalances 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 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 electrical maintenance, engineering, technical support and management personnel whose job functions involve managing electrical 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 electrical 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, calculating replace vs. repair analysis, calculating energy saving through electrical PdM technologies.



Seminar Outline

Day 1:

1. Introduction
 - A. Who is Universal IVC 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 for Electrical Equipment
 - A. Unbalance
 - B. Misalignment
 - C. Looseness
 - D. Resonance
 - E. Bearing defects
 - F. Electrical faults
 - G. Power Quality Monitoring
 - H. Phase Unbalance

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. Motor Circuit Analysis... 2 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. Switchgear Monitoring

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

13. Transformer Monitoring

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

14. Shop Testing

- A. Tests Available
- B. Theory of Operation
- C. Common Problems
- D. Technology Applications



15. Financial Considerations

- A. Repair vs. Replacement Analysis
- B. Principles of Operation
- C. Common Failure Modes
- D. Technology Applications

16. Motor Master + (DOE) Electric Motor Management Software

- A. Introduction
- B. Operation
- C. Test Cases
- D. Application

Day 5

17. Technology Application Activities

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

