

WESTERN IOWA TECH COMMUNITY COLLEGE
Course Syllabus

Term:
Course Number and Section: MFG 465 ____
Course Title: Predictive Maintenance - Machine Vibration and Motors
Semester Hours: 2.00
Meeting time/location:
Instructor:
Phone: 712.274.8733 Ext.
E-mail: @witcc.edu
Office Location:
Office Hours:

COURSE DESCRIPTION AND PREREQUISITES/COREQUISITES:

This course is designed to provide knowledge and skills to work in the area of preventative and predictive maintenance. Subjects to be covered include vibration analysis, oil analysis, and vibration of induction motors.

Prerequisite: None
Corequisite: None

REQUIRED TEXTBOOKS/MATERIALS

COURSE OBJECTIVES

The course will provide information which should enable the student to:

1. Compare reactive vs. proactive maintenance programs
2. Describe the goals of predictive maintenance
3. Describe how and why vibration analysis is effective at preventing machine breakdown
4. List and discuss common steps used in condition monitoring
5. Discuss the relationship between frequency and vibration
6. Describe natural frequency and resonance
7. Identify a time waveform
8. Describe time and frequency domains
9. Describe vibration amplitude
10. Describe the relationship between displacement, velocity, and acceleration to machine RPM to choose a transducer for an application
11. Describe phase measurement and phase angles
12. List categories and types of transducers
13. Mount transducer in a proper location
14. Select data collectors/analyzers
15. Establish a data processing system using transducer and FFT spectrum analyzer
16. Identify proper measurement point identification conventions and locations
17. Describe how machines are put into a tour or route and discuss how to download and upload a route
18. Describe how to collect data and list what reports and plots can be gathered
19. Set guidelines for data analysis
20. Identify and locate root cause
21. Explain motor component functions
22. Recognize fundamental defect frequencies
23. Set up data collector to capture vibration data
24. Describe how electromagnetic problems affect stator/rotor current flow
25. Diagnose electromagnetic problems caused by broken wire or connector
26. Describe the effect of an uneven air gap due to static eccentricity and dynamic eccentricity
27. Identify the effect of torque pulses on motor operations
28. Explain functions of lubricating oil
29. Identify lubricant properties and additives
30. Describe different methods of machine lubrication
31. Discuss oil degradation and contamination-related failure modes
32. Explain use of oil analysis in preventive and condition based maintenance programs
33. Describe various oil analysis strategies and a successful oil analysis program

34. Identify general requirements for effective oil analysis
35. Identify common failure modes and condition indicators
36. Identify correct oil sampling procedures
37. Explain test methods used to monitor oil condition indicators
38. Select machines and evaluate test program
39. Recognize how and when to take oil samples
40. Apply data trending, interpretation and diagnostics
41. Evaluate data management techniques and automation technology
42. Analyze oil analysis integrity

CONTENT OUTLINE:

- I. Predictive Maintenance
 - A. Machine vibration
 - B. Basic theory
 - C. Preparing for data collection
 - D. Data processing
 - E. Data collection
 - F. Data analysis
- II. Advanced Vibration
 - A. Induction motors
 - B. Economy of motors
- III. Machinery oils
 - A. Fundamentals and methods
 - B. Strategies, options and testing
 - C. Effective programs

COMPETENCIES:

At the conclusion of the course the student will be able to:

1. Predict the failure of mechanical components involved in machine operations
2. Measure acceptable vibration parameters in induction motors
3. Select and recommend machine oils for prevention of premature failure

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