



ME135: Practical Machinery Vibration Monitoring, Analysis & Predictive Maintenance

Training Description:

This training course is designed to equip participants with comprehensive knowledge and practical skills in vibration monitoring, fault diagnosis, and predictive maintenance of rotating machinery. Machinery vibration analysis is a critical tool for ensuring equipment reliability, reducing unplanned downtime, and extending the life of industrial assets. This course provides a structured approach to understanding vibration principles, measurement techniques, signal analysis, and condition-based maintenance strategies.

This intensive training course focuses on vibration theory, measurement techniques, common vibration problems, diagnostic tools, data acquisition systems, and predictive maintenance planning. Participants will learn how to use vibration sensors, analyzers, and software to detect misalignment, imbalance, bearing faults, gear defects, resonance, and other mechanical issues. Hands-on exercises and real-world case studies are integrated to help participants apply theoretical knowledge to practical machinery health monitoring scenarios.

By the end of the training course, participants will be able to monitor, analyze, and interpret machinery vibration data, implement predictive maintenance strategies and recommend corrective actions to improve reliability and minimize operational risks. The training course enhances technical competence, analytical skills, and confidence in managing industrial rotating equipment effectively.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the fundamentals of machinery vibration and dynamic behavior
- ✓ Identify vibration sources and types in rotating equipment
- ✓ Select appropriate vibration monitoring instruments and sensors
- ✓ Conduct accurate vibration data measurement and acquisition
- ✓ Analyze vibration signals using time-domain, frequency-domain, and FFT techniques
- ✓ Detect common faults including imbalance, misalignment, looseness, bearing and gear defects
- ✓ Implement predictive maintenance strategies and reliability improvement practices
- ✓ Develop condition monitoring programs for machinery
- ✓ Interpret diagnostic reports and recommend corrective actions
- ✓ Apply best practices for machinery maintenance and reliability management

Training Designed for:

This training course is designed for maintenance engineers, reliability engineers, rotating equipment specialists, condition monitoring technicians, and plant operators responsible for machinery operation and maintenance. It is also suitable for mechanical engineers, instrumentation engineers, and technical supervisors in industries such as power generation, petrochemical, oil & gas, manufacturing, and water treatment who require practical expertise in vibration monitoring and predictive maintenance techniques.

Training Requirement:

"Hands on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

MACHINERY VIBRATION

- ❖ Understanding Vibration Principles and Measurement
 - Basic vibration theory and definitions
 - Types of vibrations: free, forced, torsional, and lateral
 - Vibration units, amplitude, velocity, and acceleration
 - Sources of vibration in rotating machinery
 - Overview of vibration standards and guidelines
 - Practical exercise: Identifying vibration sources on machinery

DAY TWO:

VIBRATION MONITORING INSTRUMENTATION

- ❖ Sensors, Data Acquisition and Field Measurements
 - Vibration transducers and sensors (accelerometers, velocity, displacement)
 - Data acquisition systems and signal conditioning
 - Instrument calibration and mounting techniques
 - Online vs offline monitoring approaches
 - Field measurement procedures
 - Workshop: Installing sensors and capturing vibration data

DAY THREE:

VIBRATION ANALYSIS AND FAULT DIAGNOSIS

- ❖ Interpreting Vibration Signals for Problem Identification
 - Time-domain and frequency-domain analysis
 - FFT and spectral analysis fundamentals
 - Common fault signatures: imbalance, misalignment, looseness
 - Bearing, gear and rotor defect identification
 - Case study: Vibration analysis of industrial pumps and motors
 - Practical session: Analyzing real vibration data

DAY FOUR:

PREDICTIVE MAINTENANCE STRATEGIES

- ❖ Condition-Based Maintenance Planning
 - Principles of predictive maintenance (PdM)
 - Machinery condition monitoring programs
 - Trend analysis and threshold setting
 - Maintenance scheduling based on vibration data
 - Reliability-centered maintenance concepts
 - Workshop: Developing a predictive maintenance plan

DAY FIVE:

TROUBLESHOOTING, REPORTING AND RELIABILITY IMPROVEMENT

- ❖ **Applying Vibration Analysis to Optimize Equipment Life**
 - Root cause analysis and corrective action recommendations
 - Reporting and documentation best practices
 - Integrating vibration analysis with other condition monitoring techniques
 - Cost-benefit analysis of predictive maintenance
 - Final exercise: Comprehensive machinery health assessment and action plan
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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