Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com

MU057:
Machinery Failure Analysis, Prevention & Troubleshooting

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Training Description:

Machinery failures represent one of the most significant sources of operational losses in industrial environments. Unexpected breakdowns lead to costly downtime, safety risks, expensive repairs and reduced equipment reliability. In many organizations, failures are often treated reactively rather than systematically analyzed to prevent recurrence.

This intensive training course equips participants with the knowledge and practical skills required to identify, analyze, prevent and troubleshoot machinery failures. The training course focuses on understanding failure mechanisms, root cause analysis, condition monitoring techniques, vibration diagnostics, lubrication-related failures, and effective preventive strategies. Participants will learn how to move from reactive maintenance toward predictive and reliability-centered practices.

Through real-world case studies, practical examples, and structured methodologies, attendees will develop a systematic approach to machinery failure investigation and problem-solving, enabling improved equipment reliability, performance and lifecycle management.

Training Objectives:

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

- ✓ Understand common machinery failure modes and mechanisms
- ✓ Understand common machinery failure modes and mechanisms
- ✓ Identify symptoms and early indicators of equipment deterioration
- ✓ Apply structured root cause failure analysis (RCFA) techniques
- ✓ Interpret condition monitoring data (vibration, temperature, oil analysis)
- ✓ Diagnose mechanical defects and operational abnormalities
- ✓ Develop effective failure prevention and mitigation strategies
- ✓ Improve troubleshooting effectiveness and reduce repeat failures
- ✓ Enhance equipment reliability and maintenance decision-making

Training Designed for:

This training course is designed for Maintenance Engineers and Supervisors, Reliability Engineers and Asset Management Professionals, Mechanical Engineers and Technicians, Plant Engineers and Operations Personnel, Condition Monitoring Specialists, Maintenance Planners and Inspectors and Technical Professionals involved in rotating equipment.

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.

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Training Program:

DAY ONE:

- **Fundamentals of Machinery Failures -** Understanding failure behavior and mechanisms
  - Introduction to machinery reliability and failure concepts
  - Types of machinery failures (sudden vs. progressive)
  - Common failure modes in rotating equipment
  - Mechanical failure mechanisms:
    - Fatigue
    - Wear
    - Corrosion
    - Overload
    - Thermal effects
  - Failure patterns and the bathtub curve
  - Understanding failure symptoms and warning signs
  - The cost and impact of machinery failures
  - Case studies of typical equipment failures

DAY TWO:

- **Failure Analysis & Root Cause Investigation -** Systematic failure investigation
  - Principles of Failure Analysis
  - Reactive vs. proactive failure management
  - Root Cause Failure Analysis (RCFA) methodology
  - Failure data collection and evidence preservation
  - Structured problem-solving tools:
    - 5 Whys
    - Fishbone (Ishikawa) Diagram
    - Fault Tree Analysis
  - Failure documentation and reporting
  - Identifying primary vs. secondary failure causes
  - Human factors and systemic contributors
  - Practical exercises and case-based analysis

DAY THREE:

- **Condition Monitoring & Diagnostic Techniques -** Early detection of failures
  - Introduction to predictive maintenance
  - Key condition monitoring technologies:
    - Vibration Analysis
    - Temperature Monitoring
    - Oil & Lubrication Analysis
    - Ultrasound Techniques
  - Vibration fundamentals:
    - Frequency
    - Amplitude
    - Spectrum interpretation

- Identifying mechanical defects:
  - Imbalance
  - Misalignment
  - Bearing defects
  - Looseness
  - Resonance
- Trend analysis and failure prediction
- Integrating monitoring into maintenance strategies

DAY FOUR:

❖ Machinery Failure Prevention Strategies - Reducing failure occurrence

- Reliability-centered maintenance (RCM) concepts
- Failure prevention methodologies
- Design-related failure considerations
- Installation and alignment best practices
- Lubrication management and contamination control
- Balancing and precision maintenance
- Operating condition influences on failure
- Maintenance-induced failures
- Developing preventive and predictive programs
- Practical reliability improvement examples

DAY FIVE:

❖ Troubleshooting & Practical Problem Solving (TS) - Effective diagnosis and corrective actions

- Structured troubleshooting methodology
- Symptom-based diagnostics
- Differentiating mechanical vs. operational problems
- Troubleshooting common issues:
  - Excessive vibration
  - Overheating
  - Noise abnormalities
  - Repeated component failures
- Decision-making under uncertainty
- Practical failure scenarios and exercises
- Developing corrective and preventive actions (CAPA)
- Building a culture of reliability and continuous improvement

❖ 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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