

RELIABILITY ENGINEERING - MACHINERY FAILURE ANALYSIS & TROUBLESHOOTING

"Identify Root Causes, Prevent Failures, and Maximize Machinery Performance"

Schedule

Date	Venue	Fees (Face-to-Face)
06 - 08 Oct 2026	Doha, Qatar	USD 2495 per delegate

► **Available delivery methods:** Face-to-Face & Online Training

Introduction

Unplanned equipment failures are a leading cause of downtime, maintenance costs, and production losses in industrial operations. Reliability engineering provides a structured approach to identifying failure modes, investigating root causes, and implementing effective corrective actions to enhance equipment performance and plant uptime.

This intensive 3-day training course equips participants with the knowledge and tools to analyze machinery failures, assess reliability risks, and troubleshoot performance problems. Practical case studies and hands-on methods are used to build technical confidence and improve decision-making in maintenance and reliability environments.

Objectives

By the end of this course, participants will be able to:

- Understand the fundamental principles of reliability engineering and failure mechanisms
- Conduct effective failure analysis using structured problem-solving methods
- Apply root cause analysis (RCA), FMEA, and troubleshooting tools to real equipment problems
- Develop corrective and preventive actions that improve asset performance
- Use condition monitoring data to support failure prediction and intervention

Why Attend

- Learn to minimize recurring failures and extend equipment life
- Improve maintenance strategies with evidence-based failure analysis
- Strengthen in-house capacity for root cause investigations
- Reduce downtime and increase operational safety and reliability
- Gain practical experience through case-based learning and diagnostics

Target Audience

This program is designed for:

- Maintenance and reliability engineers and technicians
- Mechanical engineers and asset integrity specialists
- Condition monitoring professionals and vibration analysts
- Plant managers, operations supervisors, and planners
- Anyone involved in machinery inspection, repair, or reliability improvement

Individual Benefits

Key competencies that will be developed include:

- Failure mode identification and mechanism interpretation
- Structured root cause analysis (RCA) and fault tree analysis (FTA)
- Troubleshooting and diagnostic techniques
- Corrective and preventive action planning
- Reliability improvement planning and communication

Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Reduced failure rates and maintenance costs
- Improved mean time between failures (MTBF) and uptime
- Faster, more accurate failure investigations and resolutions
- Safer and more reliable plant operations
- Stronger maintenance planning and failure prevention programs

Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - Reliability fundamentals, failure mechanisms, and analysis frameworks
- Case Studies - Investigations of real-world machinery failures and RCA reporting
- Workshops - Failure investigation exercises and diagnostic simulations
- Peer Exchange - Group discussions on current reliability challenges and solutions
- Tools - Templates for RCA, failure reports, corrective action logs, and FMEA sheets

Course Outline

DETAILED 3-DAY COURSE OUTLINE

Training Hours: 7:30 AM – 3:30 PM **Daily Format:** 3–4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 – 02:00

Day 1: Understanding Machinery Failures and Reliability Concepts

- Module 1: Introduction to Reliability Engineering (07:30 – 09:30) • Key concepts: reliability, availability, maintainability • Failure definitions and classifications
- Module 2: Common Failure Modes and Mechanisms (09:45 – 11:15) • Wear, fatigue, corrosion, overload, misalignment, and more • Identifying symptoms and early warning signs
- Module 3: Workshop – Failure Mode Mapping (11:30 – 01:00) • Group exercise mapping typical failures in user-specific equipment
- Module 4: Peer Exchange – Failure Histories in Practice (02:00 – 03:30) • Participant experiences and shared lessons

Day 2: Root Cause Analysis and Troubleshooting Techniques

- Module 1: RCA Techniques and Approaches (07:30 – 09:30) • 5 Whys, Fishbone diagrams, fault tree analysis, Pareto analysis
- Module 2: Conducting Failure Investigations (09:45 – 11:15) • Site inspection, data gathering, evidence preservation, interviews
- Module 3: Workshop – Root Cause Analysis Simulation (11:30 – 01:00) • Perform RCA on a selected case study with group discussion
- Module 4: Failure Reporting and Communication (02:00 – 03:30) • Writing effective reports and presenting to management

Day 3: Preventive Strategies and Reliability Improvement

- Module 1: Corrective and Preventive Actions (07:30 – 09:30) • Action tracking, verification, and continuous improvement
- Module 2: Condition Monitoring and Predictive Tools (09:45 – 11:15) • Integrating vibration analysis, oil analysis, IR thermography into diagnostics
- Module 3: Workshop – Developing a Reliability Action Plan (11:30 – 01:00) • Build a reliability improvement plan for a selected asset or system
- Module 4: Final Exercise – Troubleshooting Challenge (02:00 – 03:30) • Team simulation of a complex machinery failure and resolution plan

Certification

Participants will receive a Certificate of Completion in Reliability Engineering – Machinery Failure Analysis & Troubleshooting, validating their ability to identify, analyze, and resolve equipment failures while enhancing asset reliability and operational excellence.

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