

Course No. 1850

Static Equipment Maintenance & Integrity Management Training Course

**MECHANICAL MAINTENANCE, RELIABILITY & TURNAROUND
OIL & GAS**

DURATION

5 Days

DELIVERY

Classroom



Course Overview

This advanced training course provides a comprehensive and practical approach to static equipment maintenance and integrity management in oil and gas, refining, petrochemical, chemical, power, and process industries. It focuses on maintaining mechanical integrity, preventing equipment degradation, reducing failure risks, and maximizing the safe and reliable operating life of critical static assets.

The course covers the major static equipment found in industrial facilities, including pressure vessels, storage tanks, heat exchangers, boilers, separators, drums, piping systems, and associated components. Participants will examine equipment construction, materials, operating conditions, degradation mechanisms, failure modes, inspection requirements, and maintenance strategies throughout the asset lifecycle.

A key focus is placed on integrating inspection, corrosion management, maintenance, reliability, risk assessment, and engineering evaluation into a unified asset integrity framework. Participants will learn how to identify degradation threats, assess equipment condition, prioritize maintenance activities, and make informed decisions regarding monitoring, repair, replacement, and life extension.

The program also addresses integrity management governance, inspection planning, risk-based prioritization, maintenance optimization, performance monitoring, turnaround integration, and continuous improvement. Through practical case studies and workshops, participants will develop the capability to establish effective static equipment integrity programs that support process safety, operational reliability, cost control, and long-term asset performance.

Objectives

- By the end of the course, participants will be able to:
- Analyze the principles and objectives of static equipment maintenance and integrity management.
- Identify critical static equipment and assess their operational and safety significance.
- Evaluate common degradation mechanisms affecting static equipment throughout its lifecycle.
- Assess the relationship between operating conditions, materials, corrosion, damage mechanisms, and equipment integrity.

- Develop inspection and maintenance strategies based on equipment criticality and risk.
- Apply effective corrosion monitoring and degradation management practices.
- Evaluate inspection results, thickness measurements, and equipment condition data.
- Determine appropriate preventive, predictive, corrective, and condition-based maintenance activities.
- Develop integrity management plans for pressure vessels, tanks, heat exchangers, boilers, and piping systems.
- Integrate inspection, maintenance, reliability, engineering, and operations activities.
- Establish performance indicators for monitoring static equipment integrity and maintenance effectiveness.
- Develop continuous improvement strategies for extending asset life and reducing integrity-related risks.

Who Should Attend

This course is designed for mechanical engineers, static equipment engineers, inspection engineers, maintenance engineers, reliability engineers, corrosion professionals, asset integrity specialists, and engineering personnel responsible for the safe and reliable operation of static equipment.

It is particularly relevant to professionals working with pressure vessels, storage tanks, heat exchangers, boilers, piping systems, process equipment, mechanical integrity, inspection planning, corrosion control, maintenance strategy, and asset performance management.

The course is also suitable for maintenance, inspection, engineering, reliability, and asset integrity supervisors and managers, as well as operations leaders and decision-makers responsible for process safety, equipment integrity, maintenance optimization, operational continuity, and long-term asset value.

Learning Outcomes

- Upon completion of the course, participants will be able to:
- Explain the principles of static equipment integrity management and its role in industrial asset performance.
- Identify the main types, components, and criticality levels of static equipment.
- Assess equipment degradation and failure mechanisms based on service and operating conditions.
- Identify corrosion, erosion, cracking, fatigue, thermal damage, mechanical damage, and other integrity threats.
- Develop inspection strategies based on equipment criticality, risk, and degradation mechanisms.
- Interpret inspection, thickness monitoring, and non-destructive examination results.
- Evaluate equipment condition and identify potential integrity concerns.
- Determine suitable maintenance and inspection tasks based on equipment condition and failure risk.
- Develop integrity management plans for critical static equipment.
- Integrate maintenance activities with inspection, corrosion management, engineering, and operations.
- Establish appropriate monitoring and performance indicators for equipment integrity.
- Evaluate opportunities for maintenance optimization and risk reduction.
- Support repair, replacement, monitoring, and life-extension decisions.
- Improve turnaround and shutdown planning for static equipment maintenance and inspection.
- Develop continuous improvement initiatives to enhance static equipment reliability and integrity.

Course Outline

DAY 01

Fundamentals of Static Equipment Integrity Management

- Principles, objectives, and lifecycle approach to static equipment integrity.
- Types and functions of pressure vessels, storage tanks, heat exchangers, boilers, separators, drums, and piping systems.
- Equipment design, materials of construction, operating conditions, and process services.

DAY 01 — CONTINUED

- Equipment criticality and identification of integrity-critical assets.
- Relationship between maintenance, inspection, reliability, process safety, and asset integrity.
- Roles and responsibilities within a static equipment integrity management system.

PRACTICAL APPLICATION

Develop an initial criticality assessment for static equipment in a process facility.

DAY 02

Degradation Mechanisms, Corrosion & Failure Prevention

- Internal and external corrosion mechanisms.
- Erosion, erosion-corrosion, cavitation, and flow-related degradation.
- Stress corrosion cracking, corrosion fatigue, hydrogen-related damage, and environmental cracking.
- High-temperature degradation, thermal damage, fatigue, and material deterioration.
- Mechanical damage, vibration, settlement, deformation, and structural degradation.
- Identifying degradation threats based on process conditions and equipment materials.

PRACTICAL APPLICATION

Identify and assess potential degradation mechanisms for selected static equipment.

DAY 03

Inspection, Condition Assessment & Integrity Evaluation

- Developing inspection strategies and inspection plans for static equipment.
- Visual inspection, thickness monitoring, and non-destructive examination.
- Inspection of shells, heads, welds, nozzles, tubes, tank bottoms, roofs, and piping components.
- Evaluating inspection findings and identifying integrity threats.
- Corrosion rate assessment, remaining thickness, and remaining service considerations.
- Risk-based inspection and prioritization of inspection activities.

DAY 03 — CONTINUED

PRACTICAL APPLICATION

Analyze inspection data and develop integrity recommendations for selected equipment.

DAY 04**Maintenance Strategy, Repair & Life Extension**

- Developing preventive, predictive, corrective, and condition-based maintenance strategies.
- Linking maintenance tasks to equipment degradation and failure mechanisms.
- Repair, replacement, monitoring, and engineering assessment decision-making.
- Managing recurring degradation and repeated equipment failures.
- Maintenance optimization and elimination of ineffective maintenance activities.
- Life-extension strategies for aging static equipment.

PRACTICAL APPLICATION

Develop a maintenance and integrity strategy for a critical static equipment system.

DAY 05**Integrity Program Management, Performance & Continuous Improvement**

- Integrating inspection, maintenance, corrosion management, reliability, and engineering.
- Integrity management during shutdowns and turnarounds.
- Managing integrity risks, overdue actions, inspection findings, and corrective measures.
- Developing key performance indicators for static equipment integrity.
- Reporting, documentation, data quality, and integrity performance reviews.
- Building continuous improvement and asset lifecycle management strategies.

FINAL WORKSHOP

Develop an integrated static equipment maintenance and integrity management program covering asset criticality, degradation mechanisms, inspection strategy, maintenance requirements, risk priorities, performance indicators, and life-extension actions.



Register or Request More Information

Course page: <https://quest-training.com/courses/static-equipment-maintenance-integrity-management-training-course>

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