

Course No. 1851

Mechanical Static Equipment Inspection & Maintenance Training Course

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

DURATION

5 Days

DELIVERY

Classroom



Course Overview

This professional training course provides a practical and engineering-focused approach to the inspection and maintenance of mechanical static equipment used in oil and gas, refining, petrochemical, chemical, power, and process facilities. It is designed to strengthen mechanical integrity, prevent equipment failures, improve operational reliability, and extend the safe service life of critical static assets.

The course covers the construction, components, operating principles, inspection requirements, degradation mechanisms, and maintenance practices associated with major static equipment, including pressure vessels, storage tanks, heat exchangers, boilers, separators, drums, piping systems, and related pressure-containing components.

Participants will develop practical skills in inspection planning, visual examination, thickness measurement, non-destructive examination, corrosion assessment, damage mechanism identification, inspection data interpretation, and maintenance decision-making. Particular emphasis is placed on recognizing early indications of deterioration and translating inspection findings into effective maintenance and integrity actions.

The program also addresses the integration of static equipment inspection with mechanical integrity management, corrosion control, reliability improvement, risk-based inspection, shutdown and turnaround planning, and lifecycle asset management. Practical exercises and industry-based case studies enable participants to apply inspection and maintenance principles to real-world equipment integrity challenges.

Objectives

- By the end of the course, participants will be able to:
- Analyze the construction, operating principles, and integrity requirements of mechanical static equipment.
- Identify critical components and potential failure locations in static equipment.
- Evaluate major degradation mechanisms affecting pressure-containing equipment.
- Assess the impact of operating conditions, materials, pressure, temperature, and process fluids on equipment integrity.

- Apply appropriate inspection methods according to equipment type and damage mechanism.
- Evaluate visual inspection findings and thickness measurement results.
- Interpret non-destructive examination results and identify potential integrity concerns.
- Assess corrosion rates, wall thickness, remaining service life, and equipment condition.
- Develop effective inspection and maintenance plans for critical static equipment.
- Determine appropriate preventive, corrective, predictive, and condition-based maintenance activities.
- Integrate inspection findings with mechanical integrity, reliability, and risk management decisions.
- Develop strategies to reduce equipment failures, unplanned downtime, and integrity-related risks.

Who Should Attend

This course is designed for mechanical engineers, static equipment engineers, inspection engineers, maintenance engineers, reliability engineers, corrosion engineers, asset integrity professionals, and technical personnel responsible for mechanical integrity and static equipment performance.

It is particularly suitable for professionals working with pressure vessels, storage tanks, heat exchangers, boilers, separators, drums, piping systems, pressure-containing components, inspection planning, corrosion monitoring, and maintenance strategy development.

The course is also highly relevant to inspection and maintenance supervisors and managers, engineering and reliability leaders, operations personnel, turnaround specialists, and decision-makers responsible for equipment safety, integrity assurance, maintenance optimization, operational continuity, and asset lifecycle performance.

Learning Outcomes

- Upon completion of the course, participants will be able to:
- Explain the principles of mechanical static equipment inspection and maintenance.
- Identify the major types and components of static equipment used in process facilities.
- Evaluate equipment criticality and identify integrity-critical components.
- Recognize corrosion, erosion, cracking, fatigue, thermal degradation, and mechanical damage.

- Identify potential failure mechanisms based on equipment design and service conditions.
- Develop inspection plans based on equipment criticality and degradation mechanisms.
- Select appropriate visual inspection and non-destructive examination techniques.
- Interpret thickness measurement and inspection data.
- Calculate and evaluate corrosion rates and remaining wall thickness.
- Assess remaining service life and identify appropriate inspection priorities.
- Determine suitable maintenance actions based on equipment condition and failure risk.
- Integrate inspection results into mechanical integrity and reliability programs.
- Improve maintenance strategies for critical static equipment.
- Support repair, replacement, monitoring, and life-extension decisions.
- Develop practical strategies for improving static equipment reliability and integrity.

Course Outline

DAY 01

Fundamentals of Mechanical Static Equipment

- Types, functions, and applications of mechanical static equipment.
- Pressure vessels, storage tanks, heat exchangers, boilers, separators, drums, and piping systems.
- Equipment construction, materials of construction, components, and pressure-retaining boundaries.
- Operating conditions, process services, and equipment criticality.
- Mechanical integrity principles and lifecycle asset management.
- Relationship between inspection, maintenance, reliability, and process safety.

PRACTICAL APPLICATION

Identify critical components and establish an initial integrity assessment for selected static equipment.

DAY 02

Degradation Mechanisms & Failure Prevention

- Internal and external corrosion mechanisms.
- Erosion, erosion-corrosion, cavitation, and flow-related degradation.
- Stress corrosion cracking, corrosion fatigue, and hydrogen-related damage.
- Thermal degradation, fatigue, creep, and material deterioration.
- Mechanical damage, vibration, settlement, deformation, and structural deterioration.
- Identifying damage mechanisms from process conditions and equipment history.

PRACTICAL APPLICATION

Analyze potential degradation mechanisms for pressure vessels, heat exchangers, tanks, and piping systems.

DAY 03

Inspection Techniques & Equipment Condition Assessment

- Inspection planning and development of equipment inspection programs.
- Visual inspection and surface condition assessment.
- Thickness measurement and corrosion monitoring.
- Non-destructive examination methods and their applications.
- Inspection of shells, heads, nozzles, welds, tubes, tank bottoms, roofs, supports, and connections.
- Evaluation and interpretation of inspection findings.

PRACTICAL APPLICATION

Review inspection data and determine the condition and integrity status of selected equipment.

DAY 04

Maintenance Strategy, Integrity Evaluation & Life Extension

- Preventive, predictive, corrective, and condition-based maintenance strategies.
- Linking maintenance tasks to degradation mechanisms and failure modes.

DAY 04 — CONTINUED

- Corrosion rate evaluation, remaining thickness, and remaining service life.
- Risk-based inspection and prioritization of inspection and maintenance activities.
- Repair, replacement, monitoring, and engineering assessment decisions.
- Strategies for extending the service life of aging static equipment.

PRACTICAL APPLICATION

Develop an integrated inspection and maintenance strategy for a critical static equipment system.

DAY 05

Mechanical Integrity Management & Reliability Improvement

- Integrating inspection, maintenance, corrosion management, reliability, and engineering.
- Managing static equipment integrity during shutdowns and turnarounds.
- Inspection findings, corrective actions, overdue recommendations, and risk management.
- Key performance indicators for inspection, maintenance, integrity, and equipment reliability.
- Reporting, documentation, data quality, and integrity performance reviews.
- Continuous improvement and lifecycle management of mechanical static equipment.

FINAL WORKSHOP

Develop a complete mechanical static equipment inspection and maintenance program covering equipment criticality, degradation mechanisms, inspection techniques, maintenance requirements, risk priorities, performance indicators, and life-extension actions.

Register or Request More Information

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

Website: <https://quest-training.com>

Email: info@quest-training.com

Phone: +905016771440