

Course No. 1848

Pressure Vessels, Heat Exchangers & Storage Tanks Inspection and Maintenance Training Course

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

DURATION

5 Days

DELIVERY

Classroom



Course Overview

This comprehensive training course provides a practical and engineering-focused approach to the inspection and maintenance of pressure vessels, heat exchangers, and storage tanks used across oil and gas, refining, petrochemical, chemical, and process industries. It focuses on maintaining mechanical integrity, preventing equipment failures, minimizing unplanned shutdowns, and extending the operational life of critical static assets.

Participants will develop a deeper understanding of equipment construction, materials, operating conditions, degradation mechanisms, and common failure modes affecting pressure vessels, heat exchangers, and storage tanks. The course examines how pressure, temperature, process fluids, corrosion, erosion, vibration, thermal cycling, and mechanical stresses can affect equipment integrity throughout its operating life.

The program emphasizes practical inspection planning, visual inspection, thickness monitoring, corrosion assessment, non-destructive examination, inspection data interpretation, and maintenance decision-making. Participants will learn how to evaluate inspection findings and determine appropriate actions, including monitoring, repair, replacement, further assessment, and maintenance optimization.

The course also integrates inspection and maintenance with asset integrity management, risk-based inspection, reliability improvement, turnaround planning, and operational risk management. Through case studies and practical workshops, participants will develop effective inspection and maintenance strategies for pressure vessels, heat exchangers, and storage tanks in demanding industrial environments.

Objectives

- By the end of the course, participants will be able to:
- Analyze the design, construction, operating principles, and integrity requirements of pressure vessels, heat exchangers, and storage tanks.
- Identify critical components and potential failure points within static equipment.
- Evaluate common corrosion, erosion, cracking, fouling, fatigue, and mechanical degradation mechanisms.

- Assess the influence of pressure, temperature, process fluids, and operating conditions on equipment integrity.
- Apply appropriate inspection techniques for different equipment types and damage mechanisms.
- Interpret visual inspection, thickness measurement, and non-destructive examination results.
- Evaluate corrosion rates, wall thickness, remaining service life, and equipment condition.
- Develop inspection plans based on equipment criticality, degradation mechanisms, and operational risk.
- Determine appropriate maintenance, repair, replacement, and monitoring requirements.
- Improve inspection and maintenance strategies to reduce equipment failures and unplanned downtime.
- Integrate static equipment inspection with asset integrity, reliability, and turnaround management.
- Develop performance indicators and continuous improvement strategies for static equipment integrity.

Who Should Attend

This course is designed for mechanical, inspection, maintenance, reliability, asset integrity, corrosion, and engineering professionals responsible for the safe and reliable operation of static equipment in oil and gas, refining, petrochemical, chemical, power, and process industries.

It is particularly suitable for pressure vessel inspectors, mechanical engineers, inspection engineers, static equipment engineers, corrosion engineers, maintenance engineers, reliability engineers, asset integrity professionals, non-destructive examination specialists, and maintenance planners.

The program is also valuable for inspection and maintenance supervisors, engineering and asset integrity managers, operations personnel, turnaround professionals, and technical decision-makers responsible for equipment integrity, maintenance planning, operational safety, and long-term asset performance.

Learning Outcomes

- Upon completion of the course, participants will be able to:
- Explain the construction, operating principles, and integrity requirements of pressure vessels, heat exchangers, and storage tanks.
- Identify critical equipment components and areas susceptible to degradation and failure.
- Recognize major corrosion, erosion, cracking, fatigue, fouling, and mechanical damage mechanisms.
- Assess the impact of operating conditions on equipment degradation and integrity.
- Develop inspection strategies according to equipment type, service conditions, and criticality.
- Select appropriate visual and non-destructive examination techniques.
- Interpret thickness measurements and inspection findings.
- Calculate and evaluate corrosion rates and remaining wall thickness.
- Assess remaining service life and determine appropriate inspection priorities.
- Evaluate heat exchanger degradation, fouling, leakage, tube damage, and performance deterioration.
- Assess storage tank shells, bottoms, roofs, foundations, and associated components.
- Determine appropriate corrective, preventive, and condition-based maintenance actions.
- Integrate inspection results into asset integrity and risk management decisions.
- Improve turnaround inspection and maintenance planning for static equipment.
- Develop practical strategies for extending equipment life and improving reliability.

Course Outline

DAY 01

Pressure Vessels — Design, Integrity & Inspection

- Pressure vessel construction, components, materials, and operating principles.
- Shells, heads, nozzles, welds, flanges, supports, and pressure-retaining components.
- Operating conditions and their impact on vessel integrity.
- Common pressure vessel degradation and failure mechanisms.
- Inspection planning, visual inspection, thickness monitoring, and non-destructive examination.
- Corrosion assessment, localized damage, cracking, and mechanical degradation.

DAY 01 — CONTINUED

PRACTICAL APPLICATION

Develop an inspection plan for a critical pressure vessel based on service conditions and equipment criticality.

DAY 02

Heat Exchangers — Inspection, Maintenance & Performance

- Types and operating principles of shell-and-tube and other heat exchanger designs.
- Tubes, tube sheets, channels, shells, baffles, supports, and associated components.
- Corrosion, erosion, fouling, scaling, vibration, thermal fatigue, and tube failure.
- Tube inspection and non-destructive examination techniques.
- Leakage detection, tube plugging, repair, replacement, and performance assessment.
- Relationship between equipment condition, heat transfer performance, energy efficiency, and process reliability.

PRACTICAL APPLICATION

Analyze heat exchanger inspection findings and develop appropriate maintenance recommendations.

DAY 03

Storage Tanks — Inspection, Integrity & Maintenance

- Storage tank types, construction, components, and operating requirements.
- Tank shells, bottoms, roofs, foundations, nozzles, connections, and appurtenances.
- Internal and external corrosion mechanisms and localized deterioration.
- Settlement, deformation, cracking, leakage, and structural integrity concerns.
- Inspection methods, thickness measurement, visual examination, and non-destructive testing.
- Maintenance, repair, replacement, and integrity monitoring strategies.

PRACTICAL APPLICATION

Develop an inspection and maintenance strategy for an aboveground storage tank.

DAY 04

Inspection Data Evaluation, Corrosion Assessment & Maintenance Decisions

- Evaluation and interpretation of inspection data.
- Thickness monitoring and corrosion rate assessment.
- Minimum allowable thickness and remaining service life considerations.
- Identifying critical inspection findings and prioritizing corrective actions.
- Risk-based inspection and equipment criticality assessment.
- Repair, replacement, monitoring, and engineering assessment decision-making.

PRACTICAL APPLICATION

Evaluate inspection data from pressure vessels, heat exchangers, and storage tanks and establish risk-based maintenance priorities.

DAY 05

Asset Integrity, Turnaround Management & Reliability Improvement

- Integrating static equipment inspection with asset integrity management.
- Developing preventive, predictive, and condition-based maintenance strategies.
- Inspection and maintenance planning for shutdowns and turnarounds.
- Managing recurring equipment degradation and repeated failures.
- Performance indicators for inspection, maintenance, integrity, and reliability.
- Developing equipment lifecycle and reliability improvement strategies.

FINAL WORKSHOP

Develop an integrated inspection and maintenance program for pressure vessels, heat exchangers, and storage tanks, including equipment criticality, degradation mechanisms, inspection methods, maintenance actions, risk priorities, and performance indicators.



Register or Request More Information

Course page: <https://quest-training.com/courses/pressure-vessels-heat-exchangers-storage-tanks-inspection-and-maintenance-training-course>

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