

Course No. 1847

Piping & Static Equipment 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 structured approach to the inspection and maintenance of piping systems and static equipment across oil and gas, refining, petrochemical, and process industries. It focuses on maintaining mechanical integrity, preventing failures, extending asset service life, and ensuring safe and reliable plant operations.

The course covers the principal static assets found in process facilities, including process piping, pressure vessels, storage tanks, heat exchangers, boilers, separators, drums, and associated components. Participants will examine common degradation mechanisms and learn how operating conditions, materials, process fluids, temperature, pressure, and environmental exposure influence equipment integrity.

A strong emphasis is placed on inspection planning, damage mechanism identification, thickness monitoring, non-destructive examination, corrosion assessment, inspection data interpretation, and maintenance decision-making. Participants will learn how to connect inspection findings with appropriate maintenance actions and determine when repair, replacement, monitoring, or further engineering assessment is required.

The program also addresses the integration of inspection and maintenance activities with risk management, asset integrity management, reliability programs, turnaround planning, and regulatory and industry requirements. Through practical exercises and case studies, participants will develop the ability to establish effective inspection and maintenance strategies for critical piping and static equipment.

Objectives

- By the end of the course, participants will be able to:
- Analyze the principles of piping and static equipment inspection and maintenance in process facilities.
- Identify critical piping and static equipment and evaluate their operational importance.
- Assess common degradation mechanisms affecting piping, pressure vessels, tanks, and heat exchangers.
- Evaluate corrosion, erosion, cracking, mechanical damage, vibration, and other integrity threats.

- Apply appropriate inspection techniques based on equipment type, damage mechanism, and operating conditions.
- Interpret thickness measurement, visual inspection, and non-destructive examination results.
- Evaluate corrosion rates, remaining thickness, and potential remaining service life.
- Develop risk-based inspection and maintenance priorities for critical static assets.
- Determine appropriate maintenance actions based on inspection findings and asset condition.
- Improve coordination between inspection, maintenance, engineering, and operations teams.
- Apply effective documentation, reporting, and follow-up practices for inspection findings.
- Develop strategies to improve equipment integrity, reliability, safety, and lifecycle performance.

Who Should Attend

This course is designed for inspection, mechanical integrity, maintenance, reliability, mechanical engineering, asset integrity, and plant engineering professionals working in oil and gas, refining, petrochemical, chemical, power, and other process industries.

It is particularly relevant to piping engineers, mechanical engineers, inspection engineers, corrosion engineers, static equipment engineers, maintenance engineers, reliability professionals, non-destructive examination specialists, integrity engineers, maintenance planners, and technical supervisors.

The course is also suitable for maintenance and inspection managers, asset integrity managers, engineering managers, operations personnel, turnaround professionals, and decision-makers responsible for plant integrity, maintenance strategy, operational safety, regulatory compliance, and long-term asset performance.

Learning Outcomes

- Upon completion of the course, participants will be able to:
- Explain the principles of piping and static equipment integrity management.
- Identify the major types of piping and static equipment used in process facilities.
- Define inspection requirements according to equipment design, service conditions, and criticality.
- Identify corrosion, erosion, cracking, mechanical damage, and other degradation mechanisms.

- Select appropriate visual and non-destructive examination techniques.
- Interpret thickness measurement and inspection results.
- Calculate and evaluate corrosion rates and remaining wall thickness.
- Assess the condition and integrity of piping and static equipment.
- Prioritize inspection and maintenance activities according to risk and asset criticality.
- Develop inspection plans for piping circuits and static equipment.
- Determine suitable corrective and preventive maintenance actions.
- Evaluate inspection findings and determine when further engineering assessment is required.
- Improve inspection reporting, data management, and integrity follow-up.
- Integrate inspection and maintenance activities with turnaround and shutdown planning.
- Develop practical strategies for extending asset life and improving plant reliability.

Course Outline

DAY 01

Fundamentals of Piping & Static Equipment Integrity

- Introduction to piping and static equipment systems in process facilities.
- Types and functions of process piping, pressure vessels, tanks, heat exchangers, boilers, separators, and drums.
- Equipment design, materials of construction, operating conditions, and service environments.
- Mechanical integrity principles and asset criticality assessment.
- Inspection and maintenance responsibilities throughout the asset lifecycle.
- Relationship between inspection, maintenance, reliability, safety, and production.

PRACTICAL APPLICATION

Identify critical piping and static equipment and establish initial integrity priorities.

DAY 02

Damage Mechanisms, Corrosion & Failure Prevention

- Internal and external corrosion mechanisms.
- Erosion, erosion-corrosion, cavitation, and flow-related damage.

DAY 02 — CONTINUED

- Stress corrosion cracking, corrosion fatigue, hydrogen-related damage, and environmental cracking.
- High-temperature degradation and material deterioration.
- Mechanical damage, vibration, thermal effects, settlement, and fatigue.
- Relationship between process conditions and equipment degradation.

PRACTICAL APPLICATION

Analyze actual and potential damage mechanisms affecting selected piping and static equipment.

DAY 03

Inspection Techniques & Condition Assessment

- Developing effective inspection programs and inspection plans.
- Visual inspection and surface condition assessment.
- Thickness measurement and corrosion monitoring techniques.
- Non-destructive examination methods and their applications.
- Inspection of welds, joints, flanges, valves, supports, and critical components.
- Interpretation of inspection results and identification of abnormal conditions.

PRACTICAL APPLICATION

Review sample inspection data and determine equipment condition and priority actions.

DAY 04

Inspection Evaluation, Maintenance & Integrity Decision-Making

- Corrosion rate assessment and remaining wall thickness evaluation.
- Remaining service life and inspection interval considerations.
- Risk-based inspection principles and prioritization of inspection activities.
- Developing preventive and corrective maintenance strategies.
- Repair, replacement, monitoring, and engineering assessment decision-making.

DAY 04 — CONTINUED

- Integration of inspection findings with maintenance planning and turnaround activities.

PRACTICAL APPLICATION

Develop an inspection and maintenance strategy for a high-risk piping or static equipment system.

DAY 05**Asset Integrity Management & Reliability Improvement**

- Integrating inspection and maintenance into mechanical integrity management.
- Inspection data management, reporting, recommendations, and follow-up.
- Key performance indicators for inspection, maintenance, and equipment integrity.
- Managing recurring degradation and repeated equipment failures.
- Improving asset lifecycle performance and extending equipment service life.
- Building an integrated inspection and maintenance improvement program.

FINAL WORKSHOP

Develop a complete inspection and maintenance plan for selected piping and static equipment, including criticality, damage mechanisms, inspection methods, maintenance actions, risk priorities, and performance indicators.

Register or Request More Information

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

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