

Course No. 1280

Radiographic Testing (RT) Training Course

CORROSION, INSPECTION & NDT
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Radiographic Testing (RT) Training Course provides a comprehensive and practical understanding of radiographic testing principles, techniques, equipment, image formation, interpretation, and industrial applications. The course is designed to develop the technical knowledge required to use radiographic testing as a non-destructive testing method for detecting and evaluating internal discontinuities in welds, castings, fabricated components, pipelines, pressure equipment, and other critical industrial assets.

Radiographic testing is an important non-destructive examination method used to assess internal conditions that may not be visible through conventional visual or surface inspection techniques. By producing radiographic images of components, the method can provide valuable information about internal discontinuities such as porosity, inclusions, lack of fusion, incomplete penetration, cracks, voids, and other conditions that may affect component integrity. Understanding the principles of radiographic testing enables inspection professionals to select appropriate techniques, evaluate image quality, and interpret radiographic indications systematically.

The course covers the fundamentals of X-ray and gamma radiation, radiation interaction with materials, radiographic image formation, exposure principles, image quality, radiographic sensitivity, film and digital radiography, image interpretation, and common industrial applications. Participants will examine radiographic techniques for weld inspection, casting inspection, component examination, and quality control while considering factors such as material thickness, geometry, radiation source, exposure parameters, image quality indicators, and inspection accessibility.

The program also addresses the role of radiographic testing within broader inspection, quality assurance, asset integrity, maintenance, and reliability programs. Participants will learn how to plan radiographic examinations, select suitable techniques, evaluate image quality, identify and interpret indications, document findings, and communicate technical conclusions. The course supports organizations in strengthening inspection planning, fabrication quality control, defect detection, asset integrity assessment, and informed engineering and maintenance decisions.

Objectives

- Analyze the fundamental principles of radiographic testing and explain how X-ray and gamma radiation interact with industrial materials during the course.
- Identify the characteristics and applications of different radiation sources, radiographic equipment, image receptors, and supporting inspection accessories.
- Evaluate the suitability of radiographic testing for different materials, component geometries, thicknesses, weld configurations, and inspection objectives.
- Apply fundamental radiographic testing principles to the examination of welds, castings, fabricated components, and industrial equipment.
- Assess radiographic image quality using appropriate image quality indicators, exposure considerations, and essential examination parameters.
- Interpret radiographic images to identify and characterize common internal discontinuities and relevant indications.
- Evaluate factors affecting radiographic sensitivity, contrast, density, resolution, geometric unsharpness, and overall image quality.
- Develop appropriate radiographic examination plans that define inspection objectives, techniques, coverage, exposure requirements, and reporting considerations.
- Assess radiographic testing results in relation to quality requirements, inspection objectives, component integrity, and applicable acceptance considerations.
- Strengthen the quality and traceability of radiographic inspection records through systematic documentation of examination conditions, images, findings, and conclusions.
- Improve communication between radiographic testing personnel, inspectors, engineers, quality professionals, maintenance teams, and asset integrity specialists through clear technical reporting.
- Develop a practical radiographic testing strategy for a selected industrial component, weld, or asset by the end of the course.

Who Should Attend

The Radiographic Testing (RT) Training Course is designed for professionals involved in non-destructive testing, inspection, quality assurance, engineering, fabrication, welding, manufacturing, maintenance, and asset integrity. It is particularly suitable for radiographic testing personnel, NDT inspectors, inspection engineers, quality engineers, mechanical engineers, materials engineers, welding engineers, metallurgical engineers, asset integrity engineers, corrosion professionals, and

technical specialists involved in industrial inspection.

The course is also relevant to inspection supervisors, NDT coordinators, quality managers, inspection managers, engineering managers, fabrication managers, project engineers, technical authorities, and professionals responsible for examining welds, castings, pressure equipment, pipelines, storage tanks, fabricated structures, and critical industrial components. It is valuable for professionals who review radiographic testing reports, evaluate inspection findings, establish examination requirements, or participate in quality and asset integrity decisions.

Managers, project decision makers, procurement and quality professionals, and technical specialists can also benefit from the course by developing a stronger understanding of radiographic testing capabilities, limitations, image quality requirements, inspection planning, indication interpretation, and technical reporting. The course supports effective communication between NDT personnel, engineering, quality, fabrication, maintenance, and asset integrity functions.

Learning Outcomes

- Explain the fundamental principles of radiographic testing and the interaction of radiation with industrial materials.
- Distinguish between X-ray and gamma radiation sources and identify their principal industrial applications.
- Identify the major components of radiographic testing systems, including radiation sources, image receptors, screens, filters, and image quality indicators.
- Select suitable radiographic testing techniques according to material type, component thickness, geometry, weld configuration, and inspection objectives.
- Explain the principles of radiographic image formation, exposure, density, contrast, sensitivity, and resolution.
- Evaluate radiographic image quality and identify factors that may affect the reliability and interpretability of examination results.
- Interpret representative radiographic images and identify common discontinuities in welds, castings, and fabricated components.
- Distinguish relevant indications from geometric features, image artifacts, and conditions requiring further evaluation.
- Develop structured radiographic examination plans covering inspection areas, exposure

requirements, image quality controls, documentation, and reporting.

- Prepare professional radiographic testing records and reports containing examination conditions, image references, findings, and technical conclusions.
- Integrate radiographic testing results into quality assurance, inspection, maintenance, reliability, and asset integrity decision-making.
- Develop a practical radiographic testing strategy for a selected industrial component or asset based on inspection objectives and potential discontinuity mechanisms.

Course Outline

DAY 01

Fundamentals of Radiographic Testing and Radiation Principles

- Introduction to radiographic testing and its role in non-destructive examination.
- Fundamentals of X-ray and gamma radiation.
- Radiation generation, sources, energy, intensity, and exposure concepts.
- Interaction of radiation with matter and principles of attenuation.
- Relationship between material thickness, density, composition, and radiation absorption.
- Radiographic image formation and the basic principles of projection imaging.
- Components of radiographic testing systems and supporting equipment.
- Radiation sources, image receptors, screens, filters, and image quality indicators.
- Advantages, limitations, and industrial applications of radiographic testing.
- Introduction to radiographic examination planning and inspection objectives.

PRACTICAL APPLICATION

Analyze different industrial components and determine where radiographic testing can provide valuable internal examination information.

DAY 02

Radiographic Equipment, Exposure Techniques, and Image Quality

- X-ray equipment and gamma radiography systems.
- Selection of radiation source according to material, thickness, geometry, and examination requirements.
- Exposure factors and their influence on radiographic image quality.
- Source-to-object distance, object-to-image distance, and geometric considerations.
- Radiographic density, contrast, sensitivity, and resolution.
- Geometric unsharpness and factors affecting image definition.
- Image quality indicators and their application.
- Film radiography principles and film processing considerations.
- Digital radiography and digital image acquisition concepts.
- Common radiographic image quality problems and their causes.

PRACTICAL APPLICATION

Evaluate radiographic exposure conditions and identify factors that may improve image quality and inspection sensitivity.

DAY 03

Radiographic Weld Inspection and Discontinuity Interpretation

- Principles of radiographic examination of welded joints.
- Radiographic techniques for butt welds, fillet welds, and different joint configurations.
- Identification of common weld discontinuities through radiographic images.
- Porosity, slag inclusions, lack of fusion, incomplete penetration, cracks, undercut, and other relevant indications.
- Relationship between discontinuity characteristics and radiographic appearance.
- Evaluation of indication location, size, shape, distribution, and significance.
- Radiographic examination of pipelines, pressure equipment, and fabricated structures.
- Selection of suitable exposure arrangements for different weld geometries.
- Identification of image artifacts and non-relevant indications.

DAY 03 — CONTINUED

- Documentation and reporting of radiographic weld inspection findings.

PRACTICAL APPLICATION

Review representative radiographic weld images and identify, classify, and document relevant indications.

DAY 04

Radiographic Testing of Castings, Components, and Industrial Equipment

- Radiographic inspection of castings and complex components.
- Detection of shrinkage, gas porosity, inclusions, cracks, cavities, and other internal discontinuities.
- Radiographic examination of plates, pipes, forgings, and fabricated components.
- Challenges associated with complex geometry and varying material thickness.
- Selection of exposure techniques for irregular and multi-thickness components.
- Film and digital image interpretation considerations.
- Image quality verification and examination adequacy.
- Common radiographic testing limitations and sources of interpretation uncertainty.
- Comparison of radiographic testing with ultrasonic testing and other non-destructive testing methods.
- Selecting complementary inspection methods for complex inspection requirements.

PRACTICAL APPLICATION

Develop an appropriate radiographic testing approach for selected industrial components with different geometries and potential defect mechanisms.

DAY 05

Radiographic Examination Planning, Reporting, and Asset Integrity

- Developing effective radiographic testing examination procedures.
- Defining inspection objectives, examination areas, coverage, exposure arrangements, and image quality requirements.
- Selecting suitable radiation sources and radiographic techniques.
- Establishing image quality and examination verification requirements.
- Systematic interpretation and evaluation of radiographic indications.
- Documentation, image traceability, examination records, and technical reporting.
- Communicating radiographic testing findings to engineering, quality, fabrication, maintenance, and asset integrity teams.
- Integrating radiographic inspection results with quality assurance and asset integrity programs.
- Using radiographic findings to support engineering evaluation, repair decisions, and maintenance planning.
- Identifying inspection limitations and determining when complementary NDT methods may be required.
- Improving radiographic examination consistency, data quality, and reporting practices.

FINAL WORKSHOP

Develop a comprehensive radiographic testing strategy for a selected industrial component or asset, including inspection objectives, radiation source selection, examination technique, exposure considerations, image quality requirements, potential discontinuities, image interpretation, reporting requirements, and recommended follow-up actions.

Register or Request More Information

Course page: <https://quest-training.com/courses/radiographic-testing-rt-training-course>

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