INDEPENDENT
TRAINING MANAGEMENT

Process Piping for Oil and Gas, Petrochemical sectors,

(including integrity assessment, application of ASME B31.3 code)

OVERVIEW

Process piping systems are critical assets in oil & gas production, refineries, petrochemical plants, and energy facilities. Their safe design, construction, inspection, and maintenance directly impact operational reliability, environmental protection, and personnel safety.

This comprehensive course provides engineers, technicians, inspectors, and maintenance professionals with practical and code-compliant knowledge of process piping systems in accordance with ASME B31.3 – Process Piping Code. Participants will gain a solid understanding of piping design principles, materials selection, stress analysis fundamentals, fabrication requirements, testing procedures, and lifecycle integrity management.

The program goes beyond theoretical code interpretation by integrating real-world case studies, failure mechanisms, and risk-based inspection approaches. Emphasis is placed on piping integrity assessment methodologies used in oil & gas and petrochemical facilities, including corrosion management, fitness-for-service evaluation, non-destructive examination (NDE), and remaining life assessment.

TRAINING OBJECTIVES

By the end of this course, participants will be able to:

- Understand process piping systems used in Oil & Gas and Petrochemical facilities.
- Apply the requirements of ASME B31.3 to piping design and operation.
- Perform basic piping stress evaluation and flexibility analysis.
- Identify corrosion mechanisms and degradation threats.
- Conduct piping integrity assessments and remaining life calculations.
- Apply inspection and testing requirements in accordance with code.
- Evaluate piping defects using fitness-for-service principles.
- Implement risk-based inspection (RBI) strategies.
- Improve reliability and reduce failure risk in process plants.

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Process Piping for Oil and Gas, Petrochemical sectors,

Introduction to Process Piping Systems

- Overview of Oil & Gas and Petrochemical processes
- Types of piping systems
- Process vs utility piping
- Piping components (pipes, fittings, flanges, valves, gaskets)
- Piping materials and specifications

Overview of ASME B31 Code Structure

- Introduction to ASME B31 Code series
- Scope and application of **ASME B31.3**
- Design conditions and criteria
- Pressure design equations
- Allowable stresses and material properties
- Code categories (Normal, Category D, Category M, High Pressure)

Piping Design Fundamentals

- Design pressure & temperature
- Pipe wall thickness calculation
- Corrosion allowance
- Branch reinforcement
- Flexibility and thermal expansion
- Pipe supports and restraints
- Basic piping stress concepts

Materials Selection for Process Piping

- Carbon steel, stainless steel, alloy steels
- Material selection criteria
- Corrosion resistance considerations
- Sour service considerations
- Material testing requirements

Fabrication, Welding & Installation

- Welding processes
- Welding qualifications (WPS, PQR, WPQ)
- Preheat and PWHT requirements
- Dimensional tolerances
- Inspection during fabrication
- Hydrostatic and pneumatic testing

Inspection & Non-Destructive Testing (NDT)

- Visual inspection
- Radiographic testing (RT)
- Ultrasonic testing (UT)
- Magnetic particle testing (MT)
- Dye penetrant testing (PT)
- Code acceptance criteria
- In-service inspection planning

Piping Integrity & Degradation Mechanisms

- Corrosion (uniform, pitting, MIC)
- Erosion and erosion-corrosion
- Fatigue and thermal fatigue
- Creep damage
- Stress corrosion cracking (SCC)
- Hydrogen damage
- Flow-accelerated corrosion

Integrity Assessment & Remaining Life Evaluation

- Wall loss evaluation
- Minimum allowable thickness calculation
- Remaining life calculation
- Corrosion rate determination
- Fitness-for-service concepts
- Introduction to API 579 methodology
- Defect assessment (cracks, dents, local thinning)

Risk-Based Inspection (RBI)

- RBI principles
- Probability vs consequence of failure
- Risk matrix development
- Inspection interval optimization
- Integration with maintenance planning

Failure Analysis & Case Studies

- Common piping failures in Oil & Gas
- Root cause analysis
- Lessons learned
- Preventive measures
- Best practices for lifecycle management

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Booking Contact (Approving Official) Mr/Mrs/Ms

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