Materials of Construction for Process Equipment and Piping Systems

Venue Information

Venue: London UK

Place:

Start Date: 2026-03-24

End Date: 2026-03-28

Course Details

Net Fee: £4750.00

Duration: 1 week

Category ID: METC

Course Code: METC-10

Syllabus

courses Syllabus

Introduction

Appropriate material selection is fundamental in the design, operation, and maintenance of pressure equipment and piping systems. This courses emphasizes the significance of materials in ensuring mechanical integrity, safety, and cost-effective operation throughout the plant life cycle, adhering to relevant industry Codes and standards.

Objectives

This courses aims to:

1. Clarify the selection process of construction materials for pressure equipment.
2. Enhance understanding of how materials impact plant operation safety, reliability, and cost-effectiveness.

maintenance decisions.

courses Content

Day 1 - Engineering Materials - Types and Properties

- Overview of Engineering Materials
- Types of Metals: Ferrous and Non-ferrous, Carbon Steel, Alloy Steel, Stainless Steel, Specialty Alloys
- Refractory Materials, Clad Materials, Composite Materials, Non-Metallic Materials
- Metallurgy Basics: Structure, Imperfections, Chemical Composition, Physical and Mechanical Properties
- Material Forming and Fabrication Techniques: Forming, Forging, Casting, Welding Processes, Heat Treatment
- Overview of ASME B&PVC Section IX 'Welding and Brazing Qualifications'

Day 2 - Materials Selection and Application

- Material Selection Process and Guidelines: Life Cycle Cost Considerations, Oxidation Resistance, Creep and Fatigue Properties
- Materials Standards and Codes: ASME B&PVC, ASTM, API RP 941, NACE MR0103, PIP Standards
- Material Selection for Specific Equipment: Refineries, Petrochemical Plants, Power Plants, Pressure Vessels, Piping, Valves, and Fittings

Day 3 - Degradation of Materials In-Service

- Material Ageing and Degradation Overview
- Failure Modes and Mechanisms: Corrosion, Erosion, Fracture
- Overview of API RP 571 Damage Mechanisms
- Metallurgical Failure Analysis
- Positive Material Identification Techniques

Day 4 - Inspection Strategies and Non-Destructive Examination Methods

- Mechanical Integrity Overview: Threats, Regulatory Requirements, Life Cycle Implications
- Inspection Strategies and Planning
- Overview of API RP 580 and 581 Risk-Based Inspection
- Overview of API RP 577 Welding Inspection and Metallurgy
- Non-Destructive Examination (NDE) Methods and Application
- Overview of ASME B&PVC Section V 'Nondestructive Examination'

Day 5 - Fitness-For-Service Evaluation

- Introduction to Fracture Mechanics
- Fitness-for-Service Assessment Overview
- Overview of API Std. 579-1/ASME FFS-1 with Worked Examples.