Heat Exchangers and Pressure Vessels Design and Specifications Training

Course Description

This course is designed to provide theoretical, practical and operational concept of Heat Exchangers and Pressure Vessels, starting with codes and standards, applications, design requirements, selection, optimizations, costing and troubleshooting particularly for E&P operations. The course considers different types of Heat Exchangers such as Shell and Tube, Double Pipe, Multi-tube, Air coolers, as well as Compact and Non-tubular Heat exchangers such as Plate and Frame Heat Exchangers, Plate-fin Heat Exchangers etc. Various modes of heat transfer such as conduction, convection, contractive, radiative were covered. The course has provided full relevance of space requirements in Heat Exchanger design for Flat type. The course also considered Pressure vessels, their classification-based design, pressure and service, as well as variety of design requirements for such vessels including operations and maintenance.

The course considers a case studies one of Pinch Analysis concept as part of Heat Integration, its application to Heat Exchange across different industries, benefits, cost saving and design process to meet the target hot and cold utilities objectives. While the second one considers overpressure relief scenario and mitigation design in practical process facility.

Course Objectives

The aim of this course is to enable participants understand how to:

• Identify Importance of Heat Exchangers and Pressure vessels in Oil & gas industry
• To identify the facility requirements in terms of Heat transfer equipment
• To identify the various Heat Exchanger and Pressure vessels based on design, service and pressure class
• Thermal Design and Heat Transfer Equations in Pressure vessels and Heat Exchangers
• Suitability & Selection of various Heat Exchanger Types
• Surveillance problems with Heat Exchangers and Pressure vessels
• Identify information necessary for troubleshooting HX
• Design requirements for Pressure Vessels

Who Should Attend

Engineers and related personnel involved with Heat Exchanger and Pressure vessels design, operations, and maintenance. Other personnel directly or indirectly with E&P Projects, operations, regulations and maintenance can also attend.
Course Content

Day 1
Heat Exchangers
• Concept and Types of Heat Exchangers
• Why do we use Heat Exchangers?
• Theoretical basis: Heat transfer and thermodynamics in Heat Exchanger design
• Applications of Heat Exchanger
• Standards and Codes for Heat exchangers
• Estimating cost of Heat Exchangers
• Typical Operational problems of Heat Exchangers
• Management of Heat Exchangers and improvement

Day 2
Heat Exchangers
• Reference materials in Shell and Tube Heat Exchanger design and analysis
• Industry design programmes and methods
• TEMA types Heat Exchangers
• Factors to consider in TEMA type selection
• Required information for good Heat Exchanger design
• Achieving optimum design
• Thermal design of Heat Exchangers using HTRI
• Vibrational analysis of Heat Exchangers and limiting factors
• Baffles spacing and tube pattern in Heat Exchangers
• Safe guarding tube failure in Heat Exchangers
• Typical operational problems associated with Heat Exchangers

Day 3
Heat Exchangers and Pressure Vessels
• Components of Fired Heater
• Standards and codes
• Burners types and comparison
• Heat loss design and refractory
• Efficiency of Fired Heaters
• Combustion calculations and efficiency vs excess air requirements
• Economics of stack temperature
• Heat transfer mechanisms in Fired Heaters
• Allowable radiant flux
• Design metal temperature in Fired Heaters
• Elastic creep / rupture design

Part B: Pressure vessels
• History of Boiler and Pressure Vessels
• Process for Development of codes and standards for pressure vessels
• International relevance of pressure codes
• AME code and products
• Introduction to steam boiler design
• Flow diagram

Day 4
Pressure vessels
• Introduction to Boiler types by design
• Boiler types by service
• Boiler types by Pressure
• Water boilers and their benefits
• Water tube for the future
• Role of boiler in process plants
• Equipment considerations
• Boiler chemical treatment
• Advanced Fire tube boiler technology
• Unfired pressure vessels
• Overview of the design process
• Fabricability of pressure vessels
• Welding process

Day 5
Pressure vessels
Case studies: Practical Overpressure relief scenario and Heat Integration design examples

CPD Unit

Continuing Professional Development

35 HOURS CPD