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Fundamentals of Process Technology

2 - 20 September 2024

Singapore

Fundamentals of Process Technology

course code: E6050 From: 2 - 20 September 2024 Venue: Singapore - course Fees: 8250 Euro

The Course

Process engineering is at the heart of much of the chemical, oil, gas, and petrochemical industries. It requires familiarity not only with chemical engineering principles, but also with many of the other engineering disciplines including mechanical, electrical and instrumentation. The process engineer is interested in the transportation and transformation of solids, liquids and gases. Of specific importance are separation processes including distillation, heat transfer, hydraulics and fluid flow, reaction engineering, but also process control and economics.

The Goals

This seminar focuses on the central areas of process engineering and guides the delegates in developing both fundamental and practical understandings of key issues. Workshop examples will be drawn from the oil and gas processing, petrochemicals and chemical manufacturing industries.

The Process

In addition to formal lectures and discussions, the delegates will learn by active participation through the use of problem-solving exercises, group discussions, analysis of real-life case studies, and industry best practices.

The Benefits

Upon completion of this workshop, the delegates will develop both fundamental and practical understanding of central issues in processes used in oil, gas, petrochemical, chemical, and allied facilities.

The Results

The seminar provides a practical introduction to the fundamentals of process engineering thereby developing perspective and focus from a company viewpoint.

The Core Competencies

Key competencies include practical understanding of essential process units and classes of units involved in separations, heat exchange, and reactions as well as hydraulics and fluid flow. Delegates will be able to perform relevant calculations and analyses to assist in operation, sizing, and troubleshooting.

The Programme Content

Introduction and Fundamentals of Process Engineering

- Process engineering basics
    - Mass and energy balances
    - Batch and continuous processes

    - Reactor types
    - Process equipment and flow diagrams
    - P&IDs
- Flammability
- Electrical area classification
- Risk Management and Hazard Studies
- Hydraulics and Fluid flow
    - Pressure and head
    - Bernoulli's theorem and its field applications
    - Flow of liquids
    - Reynolds number and pressure drop in pipes
    - Two-phase and multi-phase flow
- Enthalpy and thermodynamics
- Principle of process relief devices and process design of relief systems
- Principles of pressure vessel and piping design
- Pumps
- Compressors
- Mixers
- Mechanical Equipment - Types and application guidelines

Heat Transfer and Reaction Engineering

- Heat Transfer
    - Thermal conductivity
    - Conduction and convection
    - Insulation
    - Heat transfer coefficients and calculation
    - Heat exchangers, type and sizing
    - Steam reboilers
    - Condensers and sub-cooling
    - Introduction to energy recovery
- Catalysis and Reaction Engineering
- Chemical reactions
- Reaction kinetics
- Introduction catalysis
- Green Chemistry and Engineering
- Reactor Design and Operation

Distillation Processes and Equipment

- Distillation basics
    - Phase behavior and vapor/liquid equilibria
    - Gas/Liquid separation
- Distillation equipment - Columns and vessels
- Columns and vessels - Sizing and selection guidelines
- Column and vessel internals - Types and selection guidelines
- Troubleshooting of process equipment

Separation Processes and Equipment

- Overview of Other Separation Processes
    - Absorption and adsorption
    - Amine sweetening

    - Solid Liquid separation
    - Effluent treatment [in refinery and petrochemical] industries

Process Control and Economics

- Process Control Basics
    - Classification of control systems
    - Measured variables
    - Simple feedback control
- Process Economics
- Preliminary economic analysis
- Fixed and variable costs, break even analysis
- Calculating raw materials usage
- Estimating the cost of process equipment and plants