



PE054: Process & Mechanical Engineering Essentials

Training Description:

This essential combined course focuses on the central areas of Process and Mechanical Engineering and guides the delegates in developing both fundamental and practical understandings of key issues. Process engineering is at the heart of much of the chemical, oil, gas, and petrochemical industries.

Process and Mechanical Engineers are interested in the safe containment, transportation and transformation of solids, liquids and gases. Of specific importance are separation processes including distillation, heat transfer, hydraulics and fluid flow, reaction engineering, process control and economics. It also focuses on sound mechanical engineering principles, together with other engineering techniques including inspection, monitoring and condition evaluation, that enable mechanical engineers to design and maintain the equipment required by process engineers.

This course will focus on:

- Practical introduction to the fundamentals of process engineering
- Practical introduction to the fundamentals of Mechanical Engineering, Equipment and Materials
- Key areas applicable to major process industries especially oil, gas & petrochemical
- Process and Mechanical Engineering influence on Safety and Risk, Failure Modes and Maintenance
- The links between the two engineering disciplines

This course is composed of two modules: -

Module 01 - **Process Engineering Essentials: Upstream & Downstream Process Control & Optimisation**

Module 02 - **Mechanical Engineering Essentials: Rotating & Static Equipment & Structural Integrity**

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply practical understanding of central issues in process & mechanical engineering in oil, gas, petrochemical, chemical, and allied facilities
- ✓ Understand fundamental principles used in processes & facilities & apply practical understanding of essential process units & classes of units involved in separations, heat exchange & reactions.
- ✓ Apply practical understanding to static & rotating mechanical equipment & related condition mentoring & inspection techniques
- ✓ Understand mechanical testing methods, Failure Mechanisms & Fitness for Service, NDT & principles of corrosion & corrosion protection
- ✓ Perform relevant calculations & analyses to assist in operation, sizing, & troubleshooting of chemical processes & mechanical equipment

Training Designed for:

This course is intended to a wide range of professionals but will greatly benefit technical and non-technical personnel in the chemical, petrochemical, oil and process and mechanical industries with a need to understand and discuss fundamental process and mechanical engineering; Petroleum Engineers,

Maintenance & Production Engineers, Process Engineers, R&D Chemists, Plant Chemists and Economists & Business Managers.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ Pre-Test
- ❖ Introduction
- ❖ **Module 01: Process Engineering Essentials: Upstream & Downstream Process Control & Optimisation**
- ❖ **Introduction and Fundamentals of Process Engineering**
 - Mass and energy balances
 - Reactor types
 - Process & Engineering Diagrams
 - Flammability
 - Electrical area classification
 - Risk Management and Hazard Studies
- ❖ **Hydraulics and Fluid Flow**
 - Pressure and head & Bernoulli's theorem
 - 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
 - Mechanical Equipment – Pumps, Compressors & Mixer

DAY TWO:

- ❖ **Heat Transfer and Reaction Engineering**
 - Heat Transfer Mechanisms
 - Heat transfer coefficients and calculation
 - Heat exchangers, type and sizing
 - Catalysis and Reaction Engineering
 - Chemical reactions & kinetics
 - Green Chemistry & Engineering and Sustainability
- ❖ **Distillation Processes and Equipment**
 - Phase behavior and vapour/liquid equilibria
 - Gas/Liquid separation
 - Distillation equipment - Columns and vessels
 - Troubleshooting of process equipment
 - Overview of Other Separation Processes
 - Effluent treatment [in refinery and petrochemical] industries

DAY THREE:

- ❖ **Process Control and Economics**
 - Classification of control systems
 - Measured variables
 - Simple feedback control
 - Preliminary economic analysis
 - Fixed and variable costs, break even analysis
 - Estimating the cost of process equipment and plants
- ❖ **Module 2: Mechanical Engineering Essentials: Rotating & Static Equipment & Structural Integrity**
- ❖ **Introduction & Fundamentals of Materials Selection, Types & Failures**
 - Engineering Material Properties and Selection
 - Materials Testing
 - Types of Metals
 - Static Strength and Fitness for Service
 - Materials Failure Mechanisms
 - Mechanical Design, Standards and Codes

DAY FOUR:

- ❖ **Static Equipment, Valves, Piping & Fitness for Service**
 - Valves Types and Characteristics
 - Valve Selection
 - Valve Actuators
 - Piping Systems and Pipe Supports
 - Overview of API 570 - Inspection & repair of Pipelines & Piping
 - Fitness for Service, API 579 overview
- ❖ **Rotating Equipment, Pumps & Compressors**
 - Pump Types, Positive Displacement and Dynamic
 - Pump curves
 - Pump Selection
 - Types of Compressors
 - Compressor Performance Curves

DAY FIVE:

- ❖ **Corrosion & Corrosion Protection**
 - Corrosion Fundamentals
 - Types of Corrosion
 - Corrosion Inspection and Monitoring
 - Corrosion Minimization
 - Corrosion Protection
- ❖ **Mechanical Maintenance**
 - Strategies & Philosophies
 - Code and Standards
 - Condition Monitoring
- ❖ **Non-Destructive Inspection techniques**
- ❖ **Course Conclusion**

❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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