



## Heat Exchanger Design, Operation, Performance, Inspection, Maintenance & Repair Training program



### Introduction:

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A heat exchanger is a device in which energy is transferred from one fluid to another across a solid surface. Heat Exchangers (HEs) are used extensively and regularly in process and allied industries and are very important during design and operation. Heat exchangers usually involve complex flow paths, with varying flows through different parts of the exchanger. With various design variables such as outer diameter, pitch, and length of the tubes; tube passes; baffle spacing; baffle cut etc. Hence the design engineer needs an efficient strategy in searching for the global minimum

Participants attending the Enhancing Leadership Presence training course will develop the following competencies:

- understanding the different types of heat exchanger and its application
- know how to classify the heat exchangers
- Building good idea how to operate the heat exchanger
- Understand how to maintenance the heat exchanger and define the troubleshooting

### Training Methodology:

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The heat exchanger design operation and maintenance training course will combine presentations with interactive practical exercises, supported by video materials, activities and case studies. Delegates will be encouraged to participate actively in relating the principles of heat exchanger theory and how to improve the efficiency to the particular standard

## Program Summary:

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**The heat exchanger course training course covers essential skills such as:**

- Definition of heat exchanger inspection Monitoring, Fault Diagnostics and Failure
- Heat exchanger Maintenance Strategies and their application (pros and cons)
- Principles of repair and tube plug or change
- Predictive Maintenance
- Various Techniques of testing
- Performance Analysis and control

## Program Objectives:

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**To provide the delegate with a detailed knowledge of the principles and engineering practice of the subject of heat exchangers in the following areas:**

- Types of heat exchangers
- Principles of heat transfer applied to different types
- Design of heat exchangers
- Industrial problem areas and solutions
- Improvement in heat exchanger efficiency
- The topics are presented in such a way that the mathematical treatment of the subject is simplify
- and the more important issues of design, operation and good practice are highlighted

## Program Outline:

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### Day 1 Introduction

- Heat transfer fundamental
- Laminar flow
- Turbulent flow
- Heat transfer properties of fluids
- Understanding the basic concept and design methodology
- Heat exchanger design procedure
- Estimate overall heat transfer coefficient
- Analysis required in design of heat exchanger

### Day 2 Understanding the basic concept and design methodology

- Understanding the basic concept and design methodology
- Heat exchanger design procedure
- Estimate overall heat transfer coefficient
- Analysis required in design of heat exchanger
- Heat exchanger design calculation
- Work examples

### Day 3 Heat pipes

- Materials and general Description
- Operating Principles
- Operating Limits
- Design Consideration
- Fouling and corrosion

- Excel spread sheet to perform parametric analysis and optimization of heat exchanger
- Work examples

#### **Day 4 Classification of heat exchangers**

- Tube Heat Exchangers
- Double-pipe heat exchangers
- Shell-and-Tube Heat Exchangers
- Spiral heat exchanger
- Mechanisms of Shell-Side Flow
- Controlling Parameters
- Heat Transfer and Pressure Drop Evaluations

#### **Day 5 Maintenance, Operation and Troubleshooting**

- Locating leak and repair
- Tube inspection technique
- Troubleshooting
- Performance monitoring and cleaning strategies and methods
- Flow-induced vibration, mechanisms, vibration prediction, damage numbers,
- Design procedure to avoid vibration including baffle selection, rod baffle exchangers, twisted tube exchangers

#### **Cost-effective maintenance and repair of heat exchangers**