Design, Operation, Performance, and Maintenance of Heat Exchangers

Energy Milestones Corporation

Advancing Professionals to the next level

Energy Milestones is proud to be accredited, partner and associated with the following association bodies:

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Overview

This course is designed to provide participants with a detailed and up-to-date overview of the operation and troubleshooting of heat exchangers, as well as the problems that may occur during the operation of fired heaters. The course will also cover the principles of heat transfer and the factors that affect heat transfer, as well as the flow arrangements of fluids inside heat exchangers and the various types, including their major components.

During this course, participants will learn to apply the proper procedure in taking out of services and putting in service of heat exchangers, identify the various types of furnaces and the major parts of a horizontal and vertical furnace, recognize the types of gas burner and its properties, apply combustion process, employ furnace start-up, shutdown and troubleshooting, identify the thin tube, hot spot, tube fireside heater, furnace explosion, flame temperature, flame stability and combustion.

Course Objectives

- Professionally operate and troubleshoot heat exchangers and fired heaters.
- Discuss the principles of heat transfer and the factors affecting heat transfer.
- Illustrate the flow arrangements of fluids inside heat exchangers and identify the types, along with their major components.
- Apply the proper procedure for taking heat exchangers out of service and putting them back into service.
- List the various types of furnaces and identify the major parts of a horizontal and vertical furnace.
- Describe the various types of gas burners, including their properties and the combustion process.
- Employ furnace start-up, shutdown and troubleshooting.
- Identify thin tube, hot spot, tube fire side heater, furnace explosion, flame temperature, flame stability and combustion.
- Evaluate the performance of heat transfer equipment

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Course Objectives

- Identify the best practice operation procedures of heat exchangers
- Identify the problems of heat exchangers and recommended solutions
- Identify the safe operating procedures for fired heaters
- Identify the issues of fired heaters and recommended solutions

Course Content

1- Basics of Heat Transfer and Combustion

- Conduction, Convection, and Radiation
- Fouling and Heat Transfer
- Combustion Reactions
- Lean, Rich and Stoichiometric Combustion
- Excess Air and Combustion Efficiency
- Premixed and Diffusion Combustion
- Techniques for NOx Control

2- Shell and Tube Heat Exchangers

- Types of Heat Exchangers
- Main Components of Shell and Tube Heat Exchangers
- Operation of Shell and Tube Heat Exchangers
- Factors Affecting the Performance of Shell and Tube Heat Exchangers
- Troubleshooting of Shell and Tube Heat Exchangers

3- Compact Heat Exchanger

- Main Components of Air Cooled Heat Exchangers
- Operation of Air-Cooled Heat Exchangers
- Troubleshooting of Air Cooled Heat Exchangers
- Types of Plate Heat Exchangers
- Main Components of Plate Heat Exchangers
- Factors Affecting the Performance of Compact Heat Exchangers
- Operation of Plate Heat Exchangers
- Troubleshooting of Plate Heat Exchangers

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Course Content

4- Components and Operation of Fired Heaters

- Classification of Fired Heaters
- Application of Fired Heaters
- Parts of Fired Heaters
- Control of a Fired Heater
- Operating a Fired Heater
- Responding to Abnormal Operating Conditions
- Case Studies

5- Monitoring and Troubleshooting of Fired Heaters

- Factors Affecting the Performance of Fired Heaters
- Optimising Fired Heater Operation
- Performance Monitoring
- Draft, Coking and Skin Temperature
- Troubleshooting of Fired Heaters
- Case Studies

Targeted Audience

- Process Plant Shift Leaders
- Environmental and Safety Technicians
- Supervisors and Operators
- Mechanical Technicians
- Maintenance Engineers

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Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be employed before and during the course, as applicable. These methods are aimed at enhancing individual and group interaction while maximising learning. Some of these methods are:

- Online Pre-post Test
- Colourful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role plays
- Indoor & Outdoor games