Operation and Maintenance of Heat Exchangers

Energy Milestones Corporation

Advancing Professionals to the next level

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Operation and Maintenance of Heat Exchangers

Overview

The course concentrates on heat exchanger hardware, performance requirements, inspection, maintenance, repair, and life extension. The material is applicable to tubular exchangers used in chemical and petrochemical plants, oil refineries, power stations, and other industrial facilities. Thermal design is not discussed except where it affects the structure. The TEMA system, which is internationally recognised, is used to describe size and type. TEMA nomenclature and terminology are illustrated. The ASME code and TEMA standards are observed. Design point setting, which affects the structure of the operating deviations, transients and upsets, is examined. An overview of tube vibration includes descriptions and illustrations of damage caused by tube vibration, as well as the mechanisms that force vibration and the information required for vibration analysis.

Course Objectives

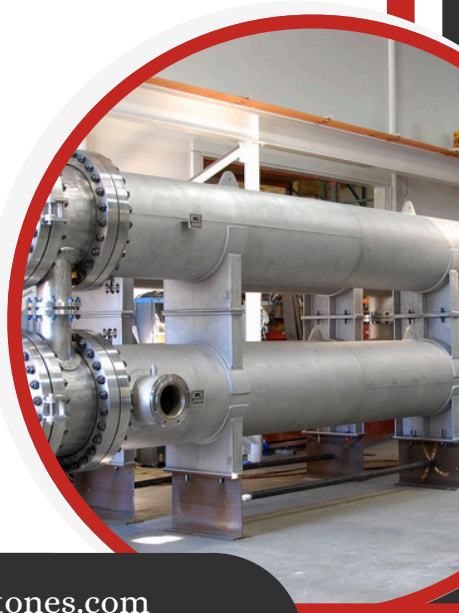
At the end of this course, the participants will be able to:

- Understand the types, components, and applications of shell and tube heat exchangers.
- Explain the thermal, hydraulic, and mechanical design principles of heat exchangers.
- Interpret engineering drawings, specifications, and relevant codes (e.g., TEMA, ASME).
- Describe materials, fabrication methods, and assembly processes.
- Perform inspection, maintenance, and troubleshooting of operational issues.
- Apply techniques for performance enhancement, optimisation, and fouling control.

Course Content

1. Types and Applications of Heat Exchangers

- Overview and Basic Fundamentals
- Heat Transfer Fundamentals and Heat Transfer Coefficients
- Heat Exchanger Types and Applications
- Geometry Of Shell & Tube Heat Exchangers (STHE)
- Double Pipes TEMA Nomenclature, Front End Head Types, Shell Types
- Rear End Types, Double Pipe Units, Selection Guidelines



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Course Content

2. Thermal and Hydraulic Design of Heat Exchangers

- Sizing and Specifying the Heat Exchanger
- Flow vs. Temperature Difference in STHE
- Temperature Difference in STHE
- Condensers and Reboilers

3. Mechanical Design of Heat Exchangers

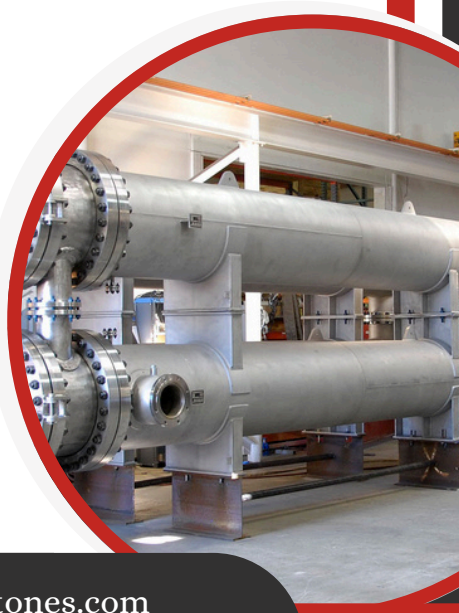
- Mechanical Design Of Heat Exchangers
- Basic Design Of Heat Exchangers
- Special Design Considerations
- Piping Loads on Exchanger Nozzles
- Materials of Construction On Heat Exchangers
- Fabrication of Heat Exchangers

4. Operation and Maintenance of Heat Exchangers

- Fouling in Heat Exchangers
- Corrosion and Erosion in Heat Exchangers
- Heat Exchanger Inspection Methods
- Operation and Troubleshooting
- Performance Monitoring and Testing
- Cost-Effective Maintenance and Repair of Heat Exchangers

5. Performance Enhancement and Optimisation of Heat Exchangers

- Heat Transfer Augmentation Techniques
- Finned Tubes
- Heat Integration Basics
- Pinch Technology
- Heat Exchanger Train Optimisation
- Tube Bundle Replacement - Alternative Enhanced Tube Bundle Design



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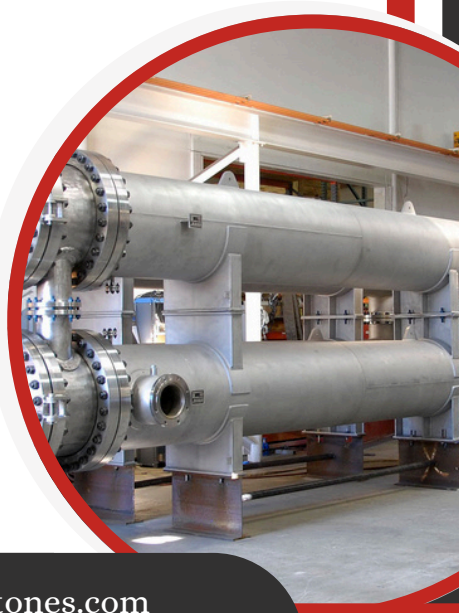
Targeted Audience

The course is designed for personnel involved in procurement, construction, installation, inspection, troubleshooting, as well as maintenance, repair, mechanics, operation, and life expectancy of shell and tube heat exchangers. The program will also be of special value to individuals who specify or buy heat exchangers or who are in charge of evaluating the condition of existing equipment

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



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