

**Course Fee: US\$1200**

Why select a horizontal instead of a vertical thermosiphon? How do you size a heat exchanger for an application? How much margin should you select? What are typical operating problems?

This course focuses on developing design checklists and rules-of-thumb to help engineers avoid common problems in process heat transfer. It surveys common heat exchanger types used in the process industry including shell-and-tube, air-cooled, plate-frame, and plate-fin exchangers. Fundamentals of heat transfer and pressure drop are provided for single-phase, boiling, and condensing services. Selection criteria for common applications are discussed, guidelines for thermal design are provided, and detailed examples are summarized. Industry case studies of thermal design and operational problems are presented and lessons learned discussed.

A copy of *Process Heat Transfer: Principles, Applications, and Rules of Thumb*, by Robert Serth and Thomas Lestina, is included with the course and serves as the primary reference for course material. Engineers who have recently graduated and more experienced engineers who are responsible for design and operation of process heat exchangers will find this course valuable.

**Key Topics**

- Types and applications of heat exchangers
- Fundamentals of heat exchanger performance
- Heat exchanger selection criteria
- Single-phase applications and performance
- Boiling applications and methods
- Condensing applications and methods
- Operational problems
- Troubleshooting heat exchanger operation

**Suggested Participants**

Engineers—from novice to expert—who want to improve their design process and checklists

**Course credits:** 12 hours (PDH/CEU)

**Outline**

- I. Types and Applications of Heat Exchangers
  - Types
  - Applications
- II. Fundamentals of Heat Exchanger Performance
  - Energy balance
  - Rating methods
  - Pressure drop
  - Performance margins
- III. Heat Exchanger Selection Criteria
  - Customer requirements
  - Cost
  - Operating conditions
  - Maintenance needs
  - Material selection
  - Mechanical considerations

## IV. Single-phase Applications and Performance

- Heat transfer coefficients
- Pressure drop
- Extended surfaces
- Enhancements

## V. Boiling Applications and Methods

- Reboiler types and applications
- Boiling heat transfer mechanisms
- Two-phase pressure drop

## VI. Condensing Applications and Methods

- Condenser types and applications
- Condensing heat transfer mechanisms
- Two-phase pressure drop in condensing applications

## VII. Operational Problems

- Fouling
- Vibration
- Flow maldistribution
- Temperature pinch
- Two-phase flow instability

## VIII. Troubleshooting Heat Exchanger Operation

- Use of field data
- Inspections
- Case studies