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Course Name

Heat Exchanger Performance & Troubleshooting

Sector Name

Management And Leadership

Sector Name

Mechanical Engineering

Document Type

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Heat Exchanger Performance & Troubleshooting

Course Introduction

Heat exchangers can remain in operation while gradually losing thermal and hydraulic performance, making developing problems difficult to recognize until they begin affecting production, energy consumption, pressure drop, or equipment availability. Fouling, flow restrictions, leakage, poor distribution, temperature changes, vibration, and operating conditions can produce similar symptoms, and cleaning or repairing the exchanger without identifying the actual source of deterioration may provide only temporary improvement.

Boost Consulting & Training offers this course to develop a practical engineering approach to evaluating and troubleshooting industrial heat exchanger performance. Participants examine heat-transfer behavior, exchanger configurations, temperature and flow relationships, pressure drop, fouling, leakage, vibration, and operating data. Practical cases focus on comparing expected and actual performance, isolating thermal, hydraulic, and mechanical causes, and selecting engineering actions that restore effective exchanger operation.

The **main concept of this course** is to diagnose heat exchanger problems by connecting thermal performance, fluid behavior,

mechanical condition, and operating evidence rather than treating individual symptoms in isolation.

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Target Audience

- ✓ Mechanical and process engineers
- ✓ Plant and equipment engineers
- ✓ Heat exchanger and static equipment specialists
- ✓ Technical engineers responsible for thermal equipment performance

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Learning Objectives

- ✓ Explain the operating principles of common industrial heat exchanger configurations.
- ✓ Evaluate the relationships between temperature, flow, heat duty, and exchanger performance.
- ✓ Interpret key operating data to identify performance deterioration.
- ✓ Assess pressure-drop problems and abnormal flow conditions.
- ✓ Identify fouling mechanisms and their impact on exchanger operation.
- ✓ Diagnose leakage, vibration, and other mechanical performance problems.
- ✓ Distinguish thermal, hydraulic, mechanical, and operational causes of poor performance.
- ✓ Apply structured troubleshooting to restore and optimize heat exchanger operation.

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Course Outline

✓ Day 01

Understanding Heat Exchanger Performance

Reading Heat Transfer Behavior

- ✓ Understand heat duty, temperature difference, heat-transfer coefficients, and thermal resistance.
- ✓ Examine how flow rate and fluid properties influence heat-transfer performance.
- ✓ Connect changing process conditions with exchanger thermal behavior.

Understanding Exchanger Configurations

- ✓ Compare shell-and-tube, plate, air-cooled, and other common exchanger arrangements.
- ✓ Examine flow paths and construction features that influence performance.
- ✓ Build a **Heat Exchanger Performance Profile** from design and operating information.

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Course Outline

✓ Day 02

Measuring Actual Performance

Interpreting Operating Data

- ✓ Use inlet and outlet temperatures, flow rates, pressures, and process conditions to assess performance.
- ✓ Compare current operation with expected or reference performance.
- ✓ Recognize patterns that indicate gradual deterioration rather than temporary operating variation.

Evaluating Thermal Performance Loss

- ✓ Identify changes in heat duty and approach temperatures.
- ✓ Examine how reduced heat transfer affects upstream and downstream processes.
- ✓ Complete a **Thermal Performance Assessment** using realistic exchanger operating data.

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Course Outline

✓ Day 03

Investigating Fouling and Flow Problems

Understanding Fouling Behavior

- ✓ Examine deposition, scaling, corrosion products, biological fouling, and other common mechanisms.
- ✓ Connect fouling location and development with process and operating conditions.
- ✓ Evaluate how fouling changes heat transfer and energy requirements.

Diagnosing Pressure Drop and Flow Distribution

- ✓ Investigate abnormal pressure drop, restriction, bypassing, and poor flow distribution.
- ✓ Distinguish hydraulic deterioration from purely thermal performance loss.
- ✓ Conduct a **Fouling & Flow Investigation** using temperature, pressure, and operating evidence.

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Heat Exchanger Performance & Troubleshooting

Course Outline

✓ Day 04

Diagnosing Mechanical Performance Problems

Investigating Leakage and Cross-Contamination

- ✓ Recognize internal and external leakage indicators.
- ✓ Assess tube, plate, gasket, joint, and connection-related leakage scenarios.
- ✓ Connect process contamination and pressure behavior with possible leakage paths.

Evaluating Vibration and Mechanical Damage

- ✓ Examine flow-induced vibration and its effect on tubes and internal components.
- ✓ Recognize erosion, tube damage, support problems, and mechanically driven deterioration.
- ✓ Run a **Heat Exchanger Mechanical Diagnosis Case** using inspection and operating evidence.

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Course Outline

✓ Day 05

Restoring and Optimizing Exchanger Performance

Selecting the Right Engineering Response

- ✓ Determine when cleaning, repair, operating adjustment, inspection, or equipment modification is appropriate.
- ✓ Compare intervention options according to performance recovery and operational impact.
- ✓ Avoid repeated corrective actions that do not address the actual deterioration mechanism.

Solving the Complete Performance Problem

- ✓ Combine thermal, hydraulic, mechanical, and operating evidence to test possible causes.
- ✓ Verify performance improvement after corrective action using meaningful operating indicators.
- ✓ Complete a **Heat Exchanger Troubleshooting Case** from declining performance through diagnosis to an optimized engineering response.

Heat Exchanger Performance & Troubleshooting

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Dec. 7, 2026	Dec. 11, 2026	5 days	4250.00 \$	UAE , Dubai

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