



Advanced Furnace Waste Heat Reduction and Recovery Training Course

24 – 28 January 2027
Johannesburg

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Ref: 1406_203824 **Date:** 24 – 28 January 2027 **Location:** Johannesburg **Fees:** 6000 Euro

Overview

Advanced Furnace Waste Heat Reduction and Recovery Training Course is a one-week course for process, furnace, energy, operations, maintenance, engineering, and sustainability functions who leave with a Furnace Heat-Loss and Recovery Opportunity Dossier. Participants connect furnace heat balance, measurement quality, combustion, flue-gas and surface losses, recovery technologies, process integration, controls, reliability, safety, economics, emissions boundaries, and verification. Agile Leaders Training Center presents furnace waste heat recovery as a systems-engineering decision discipline.

Who Should Attend

- Process functions responsible for furnace operating conditions and heat-transfer performance
- Energy functions assessing thermal efficiency and recovery opportunities
- Operations functions controlling combustion, pressure, throughput, and product conditions
- Maintenance functions managing refractory, insulation, burners, fouling, and recovery equipment
- Engineering functions developing heat-recovery concepts and integration studies
- Sustainability functions reviewing energy and emissions performance evidence

The course assumes participants already support industrial furnaces, process heating, energy assessment, operations, maintenance, engineering, or sustainability and leaves out introductory thermodynamics, detailed equipment fabrication, and guaranteed savings, productivity, emissions, or payback results.

Departments and Industries

The course supports departments and industries that operate, maintain, assess, or improve industrial process-heating systems.

- Metals, minerals, glass, ceramics, and cement processing
- Chemical, petrochemical, refining, and food manufacturing
- Process engineering, production, and plant operations
- Energy management, utilities, and sustainability functions
- Mechanical, maintenance, reliability, and inspection departments
- Capital projects, technical services, and operational assurance teams

Learning Objectives

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



- Analyze furnace energy flows and heat-loss mechanisms
- Use measurements to build a defensible heat balance
- Diagnose combustion, pressure, fouling, and insulation losses
- Compare recovery technologies and integration constraints
- Evaluate safety, reliability, economics, and emissions boundaries
- Build a verification and implementation case

Course Agenda

Day 1: Furnace Baseline and Heat Balance

- Process Heating System Boundary Map
- Furnace Material and Energy Flow Diagram
- Heat-Balance Calculation Workbook
- Measurement Point and Uncertainty Register
- Baseline Operating Condition Record

Day 2: Heat-Loss Reduction Controls

- Air-to-Fuel Ratio Diagnostic Method
- Excess-Air and Flue-Gas Loss Model
- Furnace Pressure and Air-Infiltration Control Map
- Refractory, Insulation, and Opening-Loss Survey
- Fouling and Heat-Transfer Performance Test

Day 3: Recovery Technology Screening

- Waste-Heat Source and Sink Temperature Map
- Recuperator and Regenerator Selection Matrix
- Economizer and Load-Preheating Concept Review
- Contamination, Corrosion, and Dew-Point Constraint Register
- Recovery Duty and Equipment Sizing Worksheet

Day 4: Integration and Project Evaluation

- Thermal Integration Opportunity Diagram
- Control, Bypass, and Safety Interface Review
- Maintainability and Reliability Assessment
- Lifecycle Cost and Sensitivity Model
- Energy, Productivity, and Emissions Verification Plan



Day 5: Furnace Recovery Project Practice

- Exercise: Reconcile a Furnace Heat Balance
- Exercise: Diagnose Combustion and Surface Losses
- Exercise: Screen a Recovery Technology Set
- Exercise: Evaluate an Integration Business Case
- Capstone Exercise: Furnace Heat-Loss and Recovery Opportunity Dossier

Practical Exercises

The course uses suggested activities from metals, minerals, chemical, and food-processing settings.

- Suggested activity: reconcile fuel, air, material, exhaust, product, surface, opening, and unaccounted energy flows within a defined boundary.
- Suggested activity: separate combustion, infiltration, refractory, insulation, fouling, and heat-transfer losses using measured evidence and uncertainty notes.
- Suggested activity: compare source and sink temperatures, duties, contaminants, controls, maintenance needs, and integration constraints for recovery options.
- Suggested activity: assemble baseline, loss, technology, economics, safety, verification, and governance artifacts in the capstone dossier.

FAQs

Who suits advanced furnace waste heat reduction and recovery training, and what does it assume?

Advanced furnace waste heat reduction and recovery training suits experienced process, furnace, energy, operations, maintenance, engineering, project, and sustainability personnel who already support industrial process-heating systems.

How does furnace waste heat recovery training differ from introductory energy-efficiency training?

Furnace waste heat recovery training concentrates on heat balances, measured losses, combustion controls, technology screening, thermal integration, reliability, economics, and verification rather than general energy-awareness concepts.

What information is needed to evaluate furnace waste heat recovery?

Furnace waste heat recovery evaluation needs a defined system boundary, operating baseline, temperatures, flows, compositions, duties, schedules, constraints, equipment condition, control philosophy, maintenance evidence, and potential heat sinks.



How are recuperators, regenerators, and economizers compared for furnace heat recovery?

Recuperators, regenerators, and economizers are compared through source and sink conditions, recoverable duty, temperature approach, contamination and corrosion risk, pressure effects, control needs, maintainability, integration, and economics.

Does a furnace heat-recovery assessment guarantee energy or emissions improvement?

A furnace heat-recovery assessment does not guarantee improvement; it provides a structured technical and economic basis for testing assumptions, risks, integration effects, and verification requirements.

Conclusion

The course connects furnace baselines, heat losses, recovery technologies, integration, controls, reliability, safety, economics, and verification. Participants take back a Furnace Heat-Loss and Recovery Opportunity Dossier containing measurement, calculation, screening, evaluation, and implementation tools. The dossier helps teams compare opportunities, document uncertainty, and govern investment decisions without treating projected outcomes as predetermined.