Industrial Furnace Engineering Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Industrial furnace systems are at the core of modern manufacturing, powering critical processes in steel production, heat treatment, petrochemical refining, ceramics, glass manufacturing, and advanced material processing. With increasing demand for energy-efficient thermal systems, decarbonization of industrial heating, and smart furnace automation, professionals must develop strong competencies in furnace design, combustion technology, refractory engineering, heat transfer optimization, and predictive maintenance systems. This training course is designed to equip engineers and technicians with advanced knowledge of industrial furnace engineering, high-temperature process control, and operational safety standards aligned with global industry 4.0 trends.

Industrial Furnace Engineering Training Course provides a comprehensive blend of theory, simulation, and real-world industrial case applications. Participants will gain hands-on understanding of combustion systems, burner design, furnace thermodynamics, refractory lining performance, emission control systems, and digital furnace monitoring technologies (IoT & AI-based diagnostics). The course emphasizes energy optimization, cost reduction strategies, operational reliability, and sustainable furnace operations, making it ideal for professionals aiming to enhance productivity while meeting environmental compliance standards such as ISO energy management systems and low-emission industrial furnace operations.

Programme Curriculum

Industrial Furnace Engineering Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Master fundamentals of industrial furnace design and thermal engineering
2. Understand advanced combustion technology and burner optimization
3. Apply heat transfer principles in high-temperature systems
4. Develop skills in furnace energy efficiency optimization
5. Analyze refractory materials and failure mechanisms
6. Implement predictive maintenance using IoT and AI diagnostics
7. Improve emission control and decarbonization strategies
8. Optimize fuel consumption and thermal performance
9. Design and evaluate industrial heating systems
10. Enhance process automation and digital furnace control
11. Ensure industrial safety and hazard management in furnace operations
12. Conduct performance auditing and troubleshooting of furnace systems
13. Align furnace operations with sustainability and green manufacturing standards

Target Audience

1. Mechanical Engineers
2. Metallurgical Engineers
3. Process Engineers
4. Maintenance Engineers & Technicians
5. Energy Managers & Sustainability Officers
6. Plant Operators in steel, cement, and petrochemical industries
7. Industrial Automation Engineers
8. Technical Consultants in thermal systems

Course Modules

Module 1: Fundamentals of Industrial Furnaces

- Types of industrial furnaces
- Furnace thermodynamics and heat balance
- Fuel types and combustion basics

- Furnace classification by industry application
- Case Study: Steel reheating furnace efficiency analysis in rolling mills

Module 2: Combustion Technology & Burner Systems

- Burner design and flame characteristics
- Air-fuel ratio optimization
- Low-NOx burner systems
- Flame stability and control mechanisms
- Case Study: Natural gas burner optimization in cement kiln operations

Module 3: Heat Transfer in Furnace Systems

- Conduction, convection, and radiation in furnaces
- Heat loss reduction techniques
- Thermal efficiency improvement methods
- Temperature uniformity control
- Case Study: Heat distribution failure in aluminum melting furnace

Module 4: Refractory Materials & Furnace Linings

- Types of refractory materials and selection criteria
- Wear, corrosion, and thermal shock resistance
- Installation and maintenance practices
- Life cycle analysis of refractory linings
- Case Study: Refractory failure in glass melting furnace

Module 5: Furnace Instrumentation & Control Systems

- Temperature sensors and control loops
- PLC and SCADA integration
- Real-time furnace monitoring systems
- Automation in thermal processes
- Case Study: SCADA-based control in petrochemical heating furnace

Module 6: Energy Efficiency & Optimization

- Energy auditing in furnace systems
- Waste heat recovery systems
- Fuel switching and optimization strategies
- KPI tracking for energy performance
- Case Study: Energy reduction in steel annealing furnace

Module 7: Emissions Control & Environmental Compliance

- NOx, SOx, CO2 emission control techniques
- Industrial decarbonization strategies
- Environmental regulations and standards
- Green furnace technologies
- Case Study: Emission reduction in refinery fired heaters

Module 8: Predictive Maintenance & Digital Furnace Engineering

- IoT sensors and smart furnace systems
- AI-based predictive maintenance models
- Digital twin simulation of furnaces
- Failure prediction and diagnostics
- Case Study: AI-based failure prediction in continuous heat treatment furnace

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price

23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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