Steam System Optimization 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

Steam systems remain the backbone of industrial energy usage across sectors such as manufacturing, oil & gas, food processing, pharmaceuticals, and power generation. With rising fuel costs, carbon reduction targets, and ESG compliance requirements, steam system optimization has become a critical driver of operational efficiency. Steam System Optimization Training Course is designed to equip engineers, technicians, and energy managers with advanced, practical skills in energy efficiency, thermal performance improvement, steam trap management, condensate recovery, and industrial decarbonization strategies.

The course focuses on modern, data-driven approaches to boiler performance optimization, steam distribution efficiency, heat recovery systems, and real-time monitoring using IoT-enabled energy analytics. Participants will learn how to reduce energy losses, improve plant reliability, minimize greenhouse gas emissions, and implement globally recognized best practices aligned with ISO 50001 Energy Management Systems, carbon neutrality goals, and sustainable industrial operations.

Programme Curriculum

Steam System Optimization Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of steam generation and distribution systems
2. Apply energy efficiency optimization techniques in industrial steam networks
3. Identify and eliminate steam leakage and thermal energy losses
4. Improve boiler combustion efficiency and fuel utilization
5. Optimize steam trap selection, maintenance, and diagnostics
6. Enhance condensate recovery and reuse systems
7. Implement heat recovery and waste heat utilization strategies
8. Conduct steam system auditing and performance benchmarking
9. Integrate IoT-based steam monitoring and smart sensors
10. Reduce carbon emissions through steam system decarbonization
11. Apply predictive maintenance for steam equipment reliability
12. Align operations with ISO 50001 energy management standards
13. Achieve cost reduction through industrial energy optimization strategies

Target Audience

1. Mechanical engineers in industrial plants
2. Energy managers and sustainability officers
3. Boiler operators and maintenance technicians
4. Process engineers in manufacturing industries
5. Facility and utilities managers
6. Oil & gas plant engineers
7. Pharmaceutical and food processing engineers
8. Industrial energy consultants and auditors

Course Modules

Module 1: Steam System Fundamentals & Thermodynamics

- Steam properties and phase change principles
- Boiler types and operational configurations
- Steam distribution network design basics
- Pressure, temperature, and enthalpy relationships
- Industrial steam applications overview
- **Case Study:** Power plant steam cycle efficiency comparison in a coal-fired facility

Module 2: Boiler Efficiency Optimization

- Combustion optimization techniques
- Excess air control and flue gas analysis
- Fuel-to-steam efficiency improvements
- Boiler blowdown optimization

- Heat balance calculations
- **Case Study:** Reducing fuel consumption by 12% in a textile industry boiler system

Module 3: Steam Distribution System Optimization

- Pipeline insulation best practices
- Pressure drop reduction strategies
- Steam quality improvement
- Leak detection and repair methods
- Flow measurement techniques
- **Case Study:** Steam loss reduction in a petrochemical distribution network

Module 4: Steam Trap Management & Maintenance

- Types of steam traps and applications
- Failure detection techniques
- Ultrasonic and thermal inspection methods
- Maintenance scheduling strategies
- Trap performance benchmarking
- **Case Study:** Steam trap audit saving $250,000 annually in a food processing plant

Module 5: Condensate Recovery Systems

- Condensate recovery principles
- Flash steam utilization
- Pumping and return systems
- Water treatment considerations
- Energy reuse strategies
- **Case Study:** Condensate recovery implementation in a paper manufacturing plant

Module 6: Heat Recovery & Waste Energy Utilization

- Economizers and heat exchangers
- Waste heat recovery boilers
- Pinch analysis fundamentals
- Energy cascading techniques
- Integration with process heating systems
- **Case Study:** Waste heat recovery improving efficiency in a cement plant kiln system

Module 7: Digitalization & Smart Steam Systems

- IoT sensors in steam systems
- Real-time monitoring dashboards
- Predictive maintenance analytics
- AI-driven energy optimization
- Digital twin applications
- **Case Study:** Smart steam monitoring system reducing downtime in a refinery

Module 8: Steam System Auditing & ISO 50001 Compliance

- Energy audit methodologies
- KPI development and benchmarking

- Carbon footprint assessment
- ISO 50001 implementation steps
- Continuous improvement frameworks
- **Case Study:** ISO 50001 implementation reducing energy cost by 18% in manufacturing plant

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

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