TRAINING TITLE

DIRECT FIRED HEATERS: DESIGN AND OPERATIONS

Training Duration

5 day

Training Venue and Dates

Ref. No. PE192	**Direct Fired Heaters: Design and Operations**	**5**	**05-09 May 2025**	**$5,500**	**DUBAI, UAE**

In any of the 4 or 5-star hotels. The exact venue will be informed later.

Training Fees

- **$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch**

Training Certificate

Define Management Consultants Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

The course covers both the theoretical principles and practical aspects of DFH systems, including heat transfer, combustion processes, safety considerations, and troubleshooting. Participants will gain insights into the essential factors that influence heater performance and efficiency, while also learning how to optimize the design and operation of direct-fired heaters for better operational safety and cost-effectiveness.

TRAINING OBJECTIVES

By end of course participants will be able to understand

- Understand the basic principles behind the design and operation of direct-fired heaters (DFH).
- Evaluate the key factors influencing DFH efficiency, including heat transfer, combustion, and burner technology.
- Design DFH systems that meet specific industrial requirements, such as heat duty, temperature, and flow conditions.
- Optimize the operation of DFH units for efficiency, safety, and cost-effectiveness.
- Identify and address common operational issues such as burner problems, fuel optimization, and flame stability.

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- Apply safety standards and practices in the design, operation, and maintenance of DFH systems.
- Use monitoring and diagnostic tools to assess the performance of direct-fired heaters and troubleshoot operational issues.
- Implement best practices for maintenance and troubleshooting to ensure long-term operational reliability.

WHO SHOULD ATTEND?

- Process Engineers
- Operations Supervisors and Technicians
- Maintenance Engineers and Technicians
- Project Managers
- Safety Officers and Compliance Managers
- Energy Managers

COURSE PROGRAM

Day 1: Introduction to Direct-Fired Heaters (DFH)

- Overview of direct-fired heaters: Function and applications in industry.
- Types of direct-fired heaters (e.g., box heaters, radiant heaters, process heaters).
- Key components of a direct-fired heater: Burners, furnace, radiant section, convective section, and stack.
- Basic principles of heat transfer and combustion in DFH.
- Heat duty calculations and determining the required heater capacity.
- Factors influencing heater performance: Fuel type, combustion efficiency, air-to-fuel ratio.
- Burner types and their selection criteria.
- Safety considerations in the design and operation of DFHs.

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Day 2: Design Principles for Direct-Fired Heaters

- Heater design fundamentals: Furnace design, combustion air distribution, and flame characteristics.
- Heat transfer in DFHs: Convection, radiation, and heat recovery.
- Calculating heat exchanger area and sizing of the combustion chamber.
- Optimizing heater design for temperature uniformity and fuel efficiency.
- Material selection for direct-fired heater components: High-temperature alloys, refractory linings, and burner design.
- Burner management systems (BMS) and their role in safety and performance.

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- Combustion air systems: Pre-heating, filtration, and fan selection.

Day 3: Combustion, Fuel Selection, and Operational Optimization

- Combustion process in direct-fired heaters: Fuel properties and combustion reactions.
- Types of fuels used in direct-fired heaters: Natural gas, oil, and alternative fuels.
- Combustion efficiency and its impact on heater performance.
- Troubleshooting common combustion issues: Flame instability, incomplete combustion, and NOx emissions.
- Air-to-fuel ratio and its optimization for performance and emissions control.
- Understanding and managing excess air and oxygen content in flue gases.
- Operational strategies for optimizing fuel consumption and minimizing waste.

Day 4: Operation, Control, and Monitoring of DFHs

- Operating principles of direct-fired heaters: Startup, normal operation, and shutdown procedures.
- Key process variables and instrumentation for monitoring heater performance.
- Control systems for DFH: Burner management, temperature control, and flame monitoring.
- Role of advanced control systems: Distributed Control Systems (DCS) and Supervisory Control and Data Acquisition (SCADA).
- Performance monitoring and diagnostics: Temperature, pressure, and flow measurements.
- Troubleshooting DFH problems: Common issues and diagnostic techniques.
- Improving heater efficiency through process optimization and control.

Day 5: Maintenance, Troubleshooting, and Safety Practices

- Preventive maintenance for direct-fired heaters: Key tasks and intervals.
- Common operational issues and how to troubleshoot them: Burner problems, flame detection, and heat transfer inefficiencies.
- Combustion air and fuel system maintenance: Filters, fans, and valves.
- Best practices for periodic inspection and overhauls.
- Safety protocols in DFH operations: Ensuring safe operation and avoiding hazardous situations.
- Combustion air safety and venting: Emergency shutdown systems, flame arrestors, and flame detectors.
- Regulatory requirements and safety standards (e.g., NFPA, OSHA, ASME).

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NOTE:

Pre-& Post Tests will be conducted.

Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.

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