

# Boiler Control and Burner Management Systems Training

## Description

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The boiler components and their purpose. Standard symbols that are used in boiler control and identifying the engineering and control of boilers using the symbols and a method of presenting the engineering. The course includes defining the control and ratio control fundamentals feed forward control, feed forward plus feed back control, cascade control and ratio control and how they are implemented in boiler control.

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Also reviewed are control concepts proportional controls, proportional plus reset control, and proportional plus reset, plus derivative controlling what they are and how they are used. Flame detection methods are covered including the advantages of each method.

Systems for the safe start-up, monitoring, and shut-down of multiple burner boiler furnaces are covered in detail. Causes of furnace explosions and ways of avoiding them are discussed. The relationship of burner management systems and boiler control systems is explained. An understanding of boilers and boiler control is assumed.

### Course Objectives

**Participant will be able to:**

- Understand the benefits of improved boiler process control and savings as a result of improved efficiency
- Develop proper control systems documentation
- Apply principles and methods for flow and level measurements to improved boiler operations
- Specify appropriate strategies for flow, level and pressure control
- Tuning of boiler control systems
- Implement analyzer measurements for improving boiler efficiency
- Analyze basic control loops required for boiler operation
- Apply control concepts such as cascade, ratio and feedforward control for boiler control
- Specify appropriate safety system interlocks

- Evaluate process requirements for writing instrumentation specifications
- Understand the primary cause of furnace explosions
- Use design basis documentation and flow sheets
- Identify equipment needs for gas, oil, and pulverized coal systems
- Understand pre-firing purge requirements for both single and multiple burner boilers
- Follow the ignition-permissive establishment procedures for single and multiple burner systems
- Implement flame failure protection for specific systems
- Design alarms, interlocks, and emergency shutdown systems
- Understand the function and use of the burner front, operator interfaces, and logic systems

**Course Outlines**

- Basic Control Loops
- Combustion of Fuels
- Fuel Gas Analysis
- Steam Supply and Firing Rate Demand
- Feedwater Control Systems
- Boiler Draft Systems
- Combustion Control
- Improving Operations with Computers and Analyzers
- Emerging Technologies
- Causes of Furnace Explosions
- BMS Interlock and Alarm Systems
- Control Systems
- System Design Trip Philosophy
- Programmable Electronic Systems
- Develop P&IDs for the boiler and gas, oil, and pulverized coal
- Review methods of efficiency calculations
- Use personal computer software to simulate boiler start-up and shutdown, and boiler control including drum level and cross -limiting fuel control
- Tune a boiler control system for maximum efficiency and learn the effects of boiler tuning

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