

# Boiler Operation, Control & Maintenance

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## Energy Milestones Corporation Advancing Professionals to the next level

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# Boiler Operation, Control & Maintenance

## Overview

Boiler operation is complicated, especially for modern boilers that are fully automatic. Safety, efficiency, and constant generation of steam or hot water depend on the smooth operation of the boiler. Moreover, some jurisdictions have laws and regulations governing boiler operation and the licensing of boiler operators. On the other hand, maintenance is performed on the boilers to increase efficiency, ensure safety, and prevent unscheduled shutdowns. A maintenance program should be established based on the type of boiler, its history, and age. This course has been designed to provide participants with comprehensive knowledge of boiler operation and maintenance, as outlined in the relevant Codes and Standards.

## Course Objectives

- Explanation of functions of controls, safeguards, interlocks and alarm systems
- Describe the correct procedures for boiler starting up and shutdown
- Explanation of the malfunctions that can cause a boiler shutdown
- Identification of the appropriate boiler feed water treatment method
- Identification of important steps in the inspection of cooling towers
- Knowing how to apply effective inspection and discover weak points
- Recommendation of the best practice for condition monitoring

## Course Content

### 1. Overview of Steam Generation and Use

- Overview of Boiler Types and Industrial Steam Generators
- Elements of Boiler Plant: Fired Tube Boilers and Water Tube Boilers
- Steam Generation Basics
- Generation operation parameters
- Power types - KW, KVAR, KVA
- Synchronisation techniques and basic conditions
- Flame Characteristics
- Products of Combustion and Environmental Regulations



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## Course Content

### 2. Boiler Efficiency and Performance

- Boiler Efficiency: Economic and Environmental Aspects
- Boiler Feed Water Preheating Train
- Air Economizers and Waste Heat Utilization
- Boiler Performance and Specifications
- Evaluating Boiler Efficiencies
- Boiler Blow-Down Control Recovery
- Steam Distribution System Losses

### 3. Boiler Safety Operation and Control

- Boiler Control Strategies: Safeguards, Interlocks and Alarm Systems
- Explain PLC for boiler controls (practical)
- Burner Management System (BMS)
- Safe Start Up and Shutdown Procedure
- Scale and Corrosion Control
- Chemical & Physical Treatment of Feed Water
- Deaeration of Feed Water: Removal of Oxygen and CO<sub>2</sub>

### 4. Boiler Inspection, Maintenance and Repairs

- Routine & Periodic Boiler Inspections: Risk-Based Inspection (RBI)
- Common Boiler Problems in Operation
- Abnormal Operating Conditions and Operator Actions
- Maintenance Work Done Periodically
- Checklist for Maintenance of Fuel Supply System
- Maintenance of Condensate Recovery and Treatment
- Using CMMS (computer management maintenance systems)

### 5. Boiler Troubleshooting and Accident Prevention

- Boiler Failures and Accidents: Root Cause Analysis
- How to apply FMEA (Failure Mode and Effects Analysis)
- Boiler Troubleshooting Guide
- Applying RBI (Risk-Based Inspection techniques)



# Boiler Operation, Control & Maintenance



## Targeted Audience

- Technicians and Engineers in charge of Boiler Operation
- Technical Personnel dealing with Boiler Maintenance
- Boiler Inspectors and Contractors
- Technical Personnel in charge of Steam Generation and Distribution Systems

## Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be employed before and during the course, as applicable. These methods are aimed at enhancing individual and group interaction while maximising learning. Some of these methods are:

- Online Pre-post Test
- Colourful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role plays
- Indoor & Outdoor games

