Boiler Systems

This three-day course provides a strong introduction to the operation and design theory surrounding boilers and boiler control systems. Students leave the classroom with an in-depth knowledge of boiler systems, including topics such as combustion theory, fuel quality, air pollution control, and boiler operation. This course maintains a steady focus on the environmental concerns surrounding the operation and maintenance of boilers, including a thorough discussion of governmental laws and guidelines that pertain to this area.

I. Air Pollution Fundamentals
   - Fuel Dependant Air Pollutants
   - Combustion Dependant Air Pollutants
   - Smoke and Particulate
   - Steam Generators
   - Laws and Regulations
   - Regulatory Requirements

II. Boiler Fundamentals
   - Boiler Fundamentals
   - Package Boilers
   - Combustion Process
   - Fans
   - Fuel Supply Systems
   - Burner Arrangements - Natural Gas
   - Oil Fired Boilers
   - Atomization
   - Operation
   - Burner Arrangements
   - Boiler Design Parameters

III. Fossil Fuels
   - Natural Gas
   - Fuel Oil
   - Liquid Fuel Characterization
   - Fuel Oil Properties

IV. Combustion Principles
   - Basic Combustion Reactions
   - Products of Combustion
   - Incomplete Combustion
   - Undesirable Products of Combustion

V. Normal Operation
   - Maintaining Suitable Combustion Conditions
   - Monitoring Combustion
   - Combustion Fuel
   - Maintaining Steam Temperature and Pressure
   - Controlling the Steam Temperature
   - Startup Procedures
   - Shutdown Procedures

VI. Automatic Control Systems
   - Automatic Analog Control System Elements
   - Automatic Combustion Control Systems
VII. Continuous Emission Monitoring

- General Classification of CEM’s
- Components of CEM’s
- Usage of CEM’s in Utility/Industrial Boilers
- Sulfur Oxides
- Nitrogen Oxides Control Overview
- Control of NOx Emissions