MERCURY

Boiler & Steam System Management

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Introduction:

This course is intended to introduce delegates to operation of boiler units and the associated equipment for steam generation and steam distribution. Process of combustion of various types of fuels in the boiler furnace will be thoroughly discussed and efficiency of combustion equipment will be analyzed. Methods and techniques of energy saving and optimization related to efficient steam distribution system management will be explained in detail. The course will be primarily focused on practical aspects related to operation, control, maintenance and troubleshooting of problems encountered in boiler systems. The course material with workshop examples selected from real life industrial practice, will include the guidelines for improving the reliability of boiler units, as well as on efficient management of the entire steam system.

Targeted Competencies:

- Analyze the guidelines for safe and reliable operation of boiler plant and steam distribution systems
- Review and discuss elements for improving boiler performance and overall efficiency of entire steam generation system
- Compare and contrast optimal improvement techniques for a given industrial application
- Estimate the degree of deterioration and inefficiency of boiler system due to corrosion and fouling and the ways to remedy the situation by alteration or modification
- Identify and analyze the problems in everyday operations and find the most economical solution based on the best practices

Targeted Groups:

- Boiler plant engineers, technicians and operators from chemical, petrochemical and process industries, oil refineries and gas production, as well as power generation
- Project engineers and boiler operation supervisors and managers
- Personnel dealing with boiler and steam system control and maintenance
- Engineers involved in boiler plant and steam system optimization.
- Operation and technical service engineers
- Plant engineers and technicians dealing with steam systems maintenance and repair
- Product engineers, corrosion-erosion technologists and maintenance coordinators

Course Objectives:

At the end of this course the participants will be able to:

- Improved knowledge of practices for thermal efficiency enhancement used in today’s industrial boilers and steam generators
- Better understanding of combustion techniques and fuel handling as employed for the given application, taking into account specific steam demands and environmental standards
- Experience with complex analysis involving waste heat recovery techniques and cogeneration

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process.
- Familiarity with boiler feed water treatment and the condensate recovery treatment
- Recognition of importance of proper maintenance of all vital elements of boiler plant taking into account structural integrity and reliability

The Course Content

Unit 1: Overview of Boilers and Steam Generation Systems

- Boilers and steam generators used in chemical & petrochemical industry
- Classification of industrial steam boilers
- Main components of industrial boilers
- Principles of steam generation in boiler plants
- World standards related to steam boilers
- Thermal and mechanical aspects of boiler design and construction
- Air, fuel, water and steam train in boiler components
- Thermodynamic characteristics of steam and steam quality

Unit 2: Process of Combustion of Fuels in Boiler Furnace

- Technical characteristics of fuels used for combustion in boilers
- Combustion process in boiler furnaces
- Burner design and air-fuel mixing process
- Efficiency of combustion and heat transfer optimization
- Products of combustion: NOx and SOx
- Environmental standards
- Heat recovery boilers and flue gas utilization
- Feed water preparation and chemical treatment standards

Unit 3: Boiler Operation and Control Systems

- Components of boiler master control system
- Advanced boiler instrumentation
- Boiler safety system
- Boiler operation range and load variation
- Fuel control and burner management system
- Combustion control system
- Drum level control
- Casing and insulation heat loss control

Unit 4: Steam System Management

- Boiler plant efficiency monitoring
- Blow down control and recovery
- Steam trap operation optimization
- Condensate recovery treatment
- Reducing de-aeration losses
- Air venting of condensers
- Steam throttling and selection of valves

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- Scale and corrosion control

Unit 5: Boiler Maintenance and Troubleshooting

- Boiler and steam system performance testing
- Inspection of most critical parts
- NDT and stress measurements
- Scope of regular maintenance
- Guidelines for boiler starting and stopping
- Boiler failure prevention
- Troubleshooting tips and guidelines