



BOILER OPERATIONS & MAINTENANCE

(B301)

In this course we will climb inside the boiler (not literally) to better understand the how's and whys of boiler operation and maintenance. Understanding of the results of O&M decisions can improve boiler efficiency and reliability: two important variables needed to compete in today's marketplace. Proper boiler operating decisions are imperative to an efficient operating plant. Proper boiler maintenance decisions are imperative to an efficient and reliable operating plant. In this 4-day Boiler O&M class you will learn to make informed O&M decisions. Learn the benefits of various corrective actions that may be taken to repair a boiler and associated equipment. Learn more regarding O&M of the various components supporting boiler operation. Learn why a component is failing or has failed. Proper maintenance and operation can increase availability and reliability.

This 4-day course is designed for all maintenance and operations personnel involved in the daily use of steam boilers.

OBJECTIVES

At the completion of this course the participant will be able to:

1. Describe the natural circulation in a drum style boiler.
2. Describe the basic thermodynamics process that occurs in the steam generator.
3. Describe the various factors that determine proper combustion in the steam generator.
4. List the major components of a steam generator.
5. Describe the relationship of the major components of a steam generator.
6. Describe practical burner design with specific attention given to low NOx burners.
7. Describe the fundamental means for conducting efficiency testing on a steam generator.
8. List and describe a minimum of three ways one can improve steam generator efficiency.
9. Provide a basic description of the basic boiler metallurgy.
10. Given a fan characteristic curve, describe its use.
11. Describe the areas involved in a utility boiler inspection.
12. Given specific failure modes of a fossil-power plant boiler, describe the cause, how this failure might be prevented and routine repair procedures that might be applied.
13. Describe the most typical failure modes for boiler tubes.
14. Describe typical repair modes of failed boiler tubes.
15. Describe the major components of centrifugal pumps.

COURSE DATES / LOCATION / FEE

See www.TurbineGeneratorTraining.com for detail on the course dates / locations / and registration fees. Course typically 4-days in length.

HPC's 3-4-2 policy applies: Sign up 3 for the same course/date, pay in advance, and pay for only 2 (the 3rd participant is free)!

HPC Technical Services reserves the right to cancel any course/seminar within 10-working days of the scheduled date. Fees are 100% refunded or credited to another Seminar (clients' choice) if HPC should cancel any Seminar. HPC is not responsible for non-refundable airline tickets or other travel expenses under any circumstance.

WHAT YOU WILL RECEIVE

1. 1 copy of HPC Technical Services' textbook, [Boiler Operations & Maintenance](#). It is a valuable desktop reference in addition to being able to enhance the learning process.
2. A "Certificate of Completion" with 28 PDH awarded.

COURSE OUTLINE

- I. **Water and Steam:** Properties of Water, Steam Tables, Water and Steam at Work
- II. **Heat Transfer:** Conduction, Convection, Radiation, Using the Heat Transfer Equation
- III. **Steam Generators:** Steam Generator Theory, Heat Transfer in the Boiler
- IV. **Component Design and Construction:** Pressure Boundary Parts, Fuel Considerations, Furnace and Waterwall, Steam Drum Internals, Superheaters, Reheaters, Desuperheaters, Economizers, Auxiliary Equipment
- V. **Combustion Theory:** Fuel Analysis, Combustion Products, Combustion Calculations, Combustion Equipment
- VI. **Steam Generator Efficiency Testing:** Heat Loss Method, Efficiency Calculation, Input/Output Method, Air Heater Testing
- VII. **Steam Generator Efficiency Improvements:** Definition of Operating Efficiently, Excess Air, Operational Checks, Monitoring
- VIII. **Basic Metallurgy:** Atomic Structure of Iron, Physical Metallurgy of Steel, Microscopic Examination, Specific Effect of Alloying Elements, Heat-Treating Practices, Mechanical Working of Steel, Methods of Hot-Working, Mechanical Properties of Steel, High Temperature Properties of Steel, Some Factors Affecting Creep, Steels Used In Boiler Construction
- IX. **Burners:** Practical Burner Design, Low NOx Burners
- X. **Igniters:** Ignition Energy, Systems for Tangential Firing, IFM Igniter, HEA Igniter
- XI. **Power Plant Fans:** Forced-Draft Fans, Primary-Air Fans, Induced-Draft Fans, Gas-Recirculation Fans, How Fans Work, Types of Fans, Fan Characteristics, Fan Control, Fan Speed, Fan Selection, Fan Size Scale-Up
- XII. **Inspection of the Boiler**
- XIII. **Introduction to Boilers and How to Think Out a Boiler Repair Project:** Steam and Water Flow, How are Boilers Erected and How does the Erection Process Differ from the Repair Process, What are Some of the Common Boiler Repair Problems
- XIV. **Supplementary Information Concerning Detection, Causes, Prevention and Repair of Failures in Fossil-Power Boilers:** Hydrogen Damage, Caustic Gouging, Stress-Induced Corrosion (SIC), Long Term Overheating, Fireside Corrosion, Transition Weld Failures, Graphitization
- XV. **Boiler Tube Failure Modes and Possible Repairs:** Corrosion, Erosion, Superheater and Reheater Tubes, Exfoliation of External High Temperature Surfaces, Exfoliation of Internal High Temperature Surfaces
- XVI. **Air Heaters**
- XVII. **Regenerative Air Heaters**

FREQUENTLY ASKED QUESTIONS

- Will HPC Technical Services bring this course to our location for our personnel only? YES, call or email Stephen Parker, Stephen@TurbineGeneratorTraining.com for a price quotation.
- Will HPC Technical Services customize the presentation at our site to suit our particular needs? Yes.
- Is HPC Technical Services' textbook available for purchase as a reference document? Coming Soon
- What is the cost for HPC Technical Service to deliver this course at our location? Well, of course that can vary, but generally speaking, if you're planning on having 6+ attend, when considering your T&L, it is to your advantage to perform the course at your plant (office). You gain from the customization and price.
- Will HPC provide technical support in the authoring of O&M procedures? Absolutely, please contact Stephen Parker at Stephen@TurbineGeneratorTraining.com

HPC TECHNICAL SERVICES
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Website: www.TurbineGeneratorTraining.com

REGISTRATION FORM

Company: _____

Plant: _____

Address: _____

City/State/Zip: _____

Telephone: _____ FAX: _____

Course Number/Title: _____

Course Dates: ____/____/____ Thru ____/____/____

Course Location: _____ Course Fee: _____

Please enroll the following individual(s) listed below:

Student #1: _____

Student #2: _____

Taking advantage of HPC’s 3-4-2 Policy: Send 3, Pay for 2 when paying in advance.

Student #3: _____

Enrolled by: _____

Date: _____

METHOD OF PAYMENT

Check to Follow: _____

Check Enclosed #: _____

MC/Visa/AMEX #: _____

Expiration Date: _____ CV Code: _____

Purchase Order #: _____

Please advise how you found out about this course initially:

Website search.

Fax Advertisement

Magazine Advertisement

Familiar with HPC

HPC Mailing

Other: _____