



FUNDAMENTALS of COMBUSTION TURBINE MAINTENANCE (CT309)

In today's environment it is important to be properly prepared for turbine outages. Even if you are not expected to be the "technical advisor", it is still important for you to appreciate all the activities that are important to the outage plan and its implementation. This course is intended to improve the effectiveness of your combustion turbine maintenance activities. Reduce forced outages and increased unit reliability and availability can be the result.

We start by reviewing the basics. One cannot implement an effective outage plan if one does not understand the fundamentals of how a combustion turbine functions. Learn how operating duty affects turbine components AND how the integrity of turbine components affects operations. Learn important issues associated with disassembly / reassembly. Equipment needs to be taken apart safely and properly. Learn what components should be cleaned and how. Learn the basics of a good visual inspection and what mechanical / electrical tests might be performed. Finally, you will learn some of the control concepts as this will certainly impact how well the unit is returned to service.

Topics include: Construction • Auxiliary System O&M • Outage Planning • Disassembly • Inspection • Repairs

This course has been designed for plant personnel who are involved in safely and effectively operating and maintaining combustion turbines.

OBJECTIVES

The overall objective is to increase participants' capability to plan and implement future combustion turbine maintenance outages. Upon completion of this course the participant will be able to:

1. State the purpose of a combustion turbine.
2. Describe the major components making up the combustion turbine.
3. Describe those systems associated with combustion turbines.
4. Describe the sequencing that occurs in a normal startup, synchronization and operation.
5. Describe the different fuel systems and requirements for operation.
6. Demonstrate having the knowledge necessary to use effective and safe maintenance procedures.
7. Demonstrate the ability to properly plan a maintenance outage prior to shutdown.
8. Demonstrate the knowledge necessary to measure and interpret information as it relates to the unit outage.
9. Demonstrate the knowledge necessary to disassemble/reassemble equipment in an orderly and safe manner.
10. Demonstrate the knowledge necessary to properly clean and inspect combustion turbine components.
11. Describe fundamental combustion turbine control concepts and protective features.

COURSE DATES/LOCATION/FEE

See www.TurbineGeneratorTraining.com for detail on the course dates / locations / and registration fees.

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.

COURSE OUTLINE

- I. **Combustion (Gas) Turbine Fundamentals:** Basic Cycle: Gas Turbine Relationships, Power Relationships between Compressor, Combustor and Turbine, Overview of Differences in Gas Turbine Designs
- II. **Turbine Construction & Operating Principles:** Turbine Function, Turbine Flow, Inlet Guide Vane & Casing, Compressor Section, Combustion Section, Turbine Section, Exhaust Section, Bearings, Compressor Spindle/Rotor, Turbine Spindle/Rotor, Cooling and Sealing Air, Fuel Oil, Fuel Forwarding System
- III. **Turbine Auxiliary Systems:** Lube Oil System, Hydraulic Supply, Cooling Water Supply
- IV. **CT Controls Overview:** Control Philosophy, Major Components, Speed Control, Temperature Control, Alarm & Protection
- V. **Maintenance Preparation & Planning:** Periodic Inspections, Records, Running Inspections, Combustion Section Inspection, Turbine Inspection, Major Inspection, Documentation, Component and Parts Requirements, Safety, Tools & Measuring Equipment, Scheduling
- VI. **Combustion Section Inspection:** Accessibility, Parts Identification, Fuel System, Ignition and Flame Detection, Combustion Components, Borescope Inspection, Inspection Data, Reassembly
- VII. **Turbine Inspection:** Accessibility, Turbine Shell Disassembly, Nozzle Disassembly, Inspection, Reassembly
- VIII. **Major Inspection:** Accessibility, Disassembly, Bearings, Rotor, Compressor Stator, Reassembly
- IX. **Alignment:** Readings, Procedure
- X. **Startup & Test:** Pre-Startup Checks, Startup Checks, Evaluation

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? Available 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.
- Can HPC Technical Services provide "Technical Assistance" in conducting functional checkouts or troubleshooting problems? Yes we can. Call or contact Stephen Parker, Stephen@TurbineGeneratorTraining.com for our rate sheets and any further information required.

WHAT YOU WILL RECEIVE

1. 1 copy of HPC Technical Services' textbook, CT309 Fundamentals of Combustion Turbine Maintenance. It is a valuable desktop reference in addition to being able to enhance the learning process.
2. A Certificate of Completion

GAS TURBINE CERTIFICATION

There are two levels of certification (Both levels require this course):

1. Field Engineer
2. Maintenance Technician

Those who attend this course are automatically qualified to take HPC Technical Services' Certification Examination. This examination is offered at no additional expense to the participant. An 80% passing grade is required. The examination length will not exceed 2-hours. Those who complete this examination will receive a revised "certificate of completion" that recognizes this accomplishment along with two-copies of a "To Whom It May Concern" letter that states their accomplishment. (Two copies are provided, one for the participants' employer and one for the participants' personal file.) Consult HPC's website, www.TurbineGeneratorTraining.com, for detail on this certification program.

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 #: _____

HOW DID YOU HEAR OF THIS COURSE?

- Past attendance of HPC course(s)
- Website search
- Received a fax
- Received an email
- Someone at the plant told me about it.
- Other: _____