



Course Information Letter ---- TG316

Steam Turbine Overhauls

TG316

We all want to improve the effectiveness of steam turbine maintenance activities. This course is an important step toward accomplishing this goal. Collectively, we want to:

REDUCE: Outage Durations, Outage Extensions, Work Duplication, and Rework.

INCREASE: Outage Intervals, Reliability, Availability, and Productivity.

Extensive "Hands-On" lab exercises are utilized during the entire three-day session. This course is only presented at our new Education/Lab facility in Sarasota, FL due to extensive uses of steam turbine components for practical exercises. We have a small turbine in our shop for this hands-on exercise. It may be small, but all the important variables are represented: disassembly, rigging, visual inspection, non-destructive examination, alignment evaluation, alignment of steam path components, and reassembly.

This course has been designed for steam turbine facility foremen, supervisors, mechanics, engineers, and all other plant personnel who are concerned with increasing the effectiveness and reducing the cost of steam turbine/generator maintenance outages. A thorough understanding of turbine fundamentals is a prerequisite for this course. This basic knowledge may be obtained by "On-Job" experience or by completion of a turbine fundamentals course. (Effective about June 1, 2006, we will have our eTraining Steam Turbine Fundamentals course on-line.)

OBJECTIVES: Upon completion of this course, participants will be able to:

1. Describe the major activities associated with turbine maintenance.
2. Identify and define the items of concern related to turbine maintenance activity.
3. Identify the types of defects encountered during turbine maintenance inspections.
4. Identify the relationship between operational effects and maintenance activity.
5. Describe the various inspections performed during disassembly of the turbine.
6. Describe the procedures for cleaning and inspecting the turbine components.
7. Describe the impact of the various types of defects on turbine efficiency and reliability.
8. Describe the criteria used to evaluate turbine component defects.
9. Describe the various repair methods for defective component condition.
10. Describe the details required for an effective steam path audit.
11. Describe the methods used to properly align turbine components.
12. Describe the criteria used to establish unit specific maintenance clearances.

COURSE DATES/LOCATION/FEE

For current dates / locations / prices, please see HPC's website, www.hpcnet.com.

FREQUENTLY ASKED QUESTIONS

- Will HPC Technical Services bring this course to our location for our personnel only? YES, call or email Stephen Parker, stparker@hpcnet.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? No, however, HPC's full color illustrated Steam Turbine Generator Maintenance text is available for \$219 plus shipping & handling.
- What is the cost for HPC Technical Service to deliver this course at our location? Well, of course that can vary and it needs to be priced on an individual need basis. You gain from the customization and price.
- Is HPC Technical Services' consultants available for "technical advise" during our upcoming outage? Yes. Call Harold Parker, hparker@hpcnet.com for a rate sheet.

COURSE OUTLINE

- I. **Introduction**
 - a. Definition of Maintenance
 - b. Maintenance Concern
 - c. Types of Defects
 - d. Operational Effects
- II. **Turbine Overhaul**
 - a. Disassembly
 - b. Component Cleaning
 - c. Inspection Techniques
 - d. Component Inspections
 - e. Steam Path Audits
 - f. Reassembly
- III. **Bearing/Coupling Maintenance**
- IV. **Steam Valve Maintenance**
 - a. Safety Considerations
 - b. GE Valve Disassembly
 - c. W Valve Disassembly
 - d. Cleaning/Inspection
 - e. Practical Lab Exercises
 - f. Valve Assembly
- V. **Alignment**
 - a. Provisions
 - b. Alignment Checks
 - c. Internal Alignment Methods
 - d. Special Cases
- VI. **Certification Examination & Course Conclusion**

WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' textbook, Steam Turbine Overhauls.
2. A "Certificate of Completion" with 1.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

STEAM TURBINE MAINTENANCE CERTIFICATION:

There are two levels of certification (both levels require this certification or TG301).

- 1) Mechanical Maintenance Technician
- 2) Field Engineer

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.hpcnet.com, for detail on this certification program.

Completion of this certification program can be accomplished by taking individual courses at the most workable student pace or by taking the courses all at one time (lump-sum). The Steam Turbine Field Engineering Certification program can be taken lump-sum, if interested:

Session 1 – January / February 2009

7 January 20093-days.....	TG201.....	Steam Turbine Generator Fundamentals	Sarasota FL	\$1,395
12 January 20095-days.....	OP105.....	Mechanical/Electrical Principles	Sarasota FL	\$1,595
19 January 20094.5 days ...	TG327.....	Steam Turbine Operations & Alarm Response	Sarasota FL	\$2,195
26 January 2009.....3-days.....	TG316	Steam Turbine Overhauls	Sarasota FL.....	\$1,595
29 January 20092-days.....	TG412.....	Steam Turbine Repair	Sarasota FL	\$1,395
2 February 20094.5 days ...	TG331.....	“Hands-On” Steam Turbine Maintenance.....	Sarasota FL	<u>\$2,095</u>
				\$10,270

Session 2 – July/August 2009

8 July 20093-days.....	TG201.....	Steam Turbine Generator Fundamentals	Sarasota FL	\$1,395
13 July 20095-days.....	OP105.....	Mechanical/Electrical Principles	Sarasota FL	\$1,595
20 July 20094.5 days ...	TG327.....	Steam Turbine Operations & Alarm Response	Sarasota FL	\$2,195
27 July 20093-days.....	TG316	Steam Turbine Overhauls	Sarasota FL.....	\$1,595
30 July 20092-days.....	TG412.....	Steam Turbine Repair	Sarasota FL	\$1,395
3 August 20094.5 days ...	TG331.....	“Hands-On” Steam Turbine Maintenance.....	Sarasota FL	<u>\$2,095</u>
				\$10,270

INSTRUCTOR(S):



Ray Militello has approximately 30-years experience maintaining steam turbine generator equipment. He has worked as a Field Representative for GE Installation & Service Department, was employed as a Supervisor - Maintenance and Maintenance Planning with Southern California Edison Company. Ray also worked as Manager, Maintenance Training Services with HPC Technical Services for 4-years before deciding to become independent. Now Ray instructs specific turbine maintenance courses for HPC, depending upon availability. He has been instructing HPC’s Steam Turbine Overhaul course for the last 6-years. Ray resides in Bradenton FL.



Douglas Lemmo, PE. Mr. Lemmo has recently accepted an early retirement from General Electric. During his 31 years with GE Doug has been involved on gas and steam turbine maintenance outages. Doug has worked as a Sales Engineer, Project Management on turn-key type installations and outages, Test Engineer, Instructor - Technical Training, and finally as a Field Engineer. He has worked on nuclear units, standard fossil units, and waste-to-energy resource recovery facilities. Mr. Lemmo is one of our repetitive instructors on steam turbine maintenance topics. Doug resides in the Boston MA area.

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Art Hinch, P.E. Mr. Hinch has worked in the Power Generation industry for 30+ years. During the 1974-1980 period, Mr. Hinch was employed by GE and was responsible for the installation of multiple large steam turbine generators (fossil and nuclear) and for multiple steam and gas turbine generator outages. To 1992 Mr. Hinch worked as an independent consultant in the south and southwestern regions. During this time frame he worked many turbine-generator outages on GE, Westinghouse, and Siemens units. In addition he worked the start up of a 1300-MW turbine generator unit. In 1992 Art signed on with Arkansas Nuclear One as a senior engineer in the turbine group where he worked primarily in the planning and implementing of turbine generator outages (GE and Westinghouse units). In 2003, Art accepted an early retirement package and has again functioned as an independent engineer, an associate of HPC Technical Services. In this capacity Art has worked multiple steam turbine generator outages on a variety of manufacturers as well as being primary instructor on a number of courses that HPC offers.



John Mitchell. John Mitchell is a multi-talented leader with near 40-years management, engineering, installation and maintenance experience in thermoelectric power plants. He is especially an expert in steam turbines, generators and their controls. Prior to June 2003 (when he accepted an early retirement package from GE), John was a Customer Training Specialist with the GE International Department. Other past responsibilities included being Manager, Engineering Services, Senior Application Engineer, Senior Service Engineer, Lead Training Specialist, Program Support Engineer, Instructor Technical Training, and Field Engineer. All of this on operation & maintenance of steam turbine generator hardware and controls. John resides in Schenectady NY.

Robert Doughty. Mr. Doughty has more than 30 years of experience in start up, maintenance and operation of both large and small turbine-generators. Bob started his career as a power plant instrumentation technician while he completed his BS degree in Engineering Technology (1976) at the University of Houston. He has worked as a start up and field engineer for one of the major turbine-generator OEM's and as a consulting engineer, supporting the initial operation of two nuclear fueled power plants. He also was the field-engineering supervisor with overall responsibility for construction testing, initial start up and operations of a 600 MW coal fired generating plant. Later, as an employee of one of the larger independent turbine-generator service corporations, he worked as a start up and maintenance engineer on turbine-generators of all sizes from nearly all the major manufacturers. His most recent position (1999) as the President of Turbine Services, Inc., has allowed him to continue to provide on site technical direction, start up and controls adjustments for several major turbine inspections in the range of 35 to 835 MW. He is experienced in electro-hydraulic and mechanical governor control systems and turbine valve and control system up-grades. Bob is a member of ASME (18 years) and has worked closely with HPC on multiple projects, training as well as field service. Bob resides in Pittsburgh PA.

Robert Johndrow. Bob Johndrow has 35+ years experience as a Field Engineer working on steam turbine generators. His experience includes steam turbine generator maintenance and testing, as well as considerable work on the steam turbine controls. His work on the steam turbine Mechanical Hydraulic Controls included work on nuclear (BWR) units, fossil applications, and industrial 3-arm governors. Bob earned a BS in Industrial Distribution from Clarkson University in Potsdam NY and also has GE Six Sigma Green Belt Certification. Bob accepted an early retirement package late 2003 and has worked as an independent as well as being associated with HPC Technical Services since then. He resides in Connecticut.

HPC TECHNICAL SERVICES
500 Tallevast Road, Suite 101, Sarasota, FL 34243
Telephone: 941-747-7733 FAX: 941-746-5374
Website: www.hpcnet.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 LEARN OF THIS COURSE

Attended HPC courses before
 Received a fax
 Received an email
 Received HPC update
 Internet search
 Other: _____