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Course Information Letter ---- TG431

MANAGEMENT OVERVIEW OF STEAM TURBINE-GENERATOR O&M TG431

This course was organized recognizing that there are a greater number of power plant managers and support personnel who are not “engineers” and/or who have not “come-up-thru-the ranks”. This being the case, HPC has encountered a significant number of these personnel sitting in on our “operations” or “maintenance” courses. When quizzed why they are in this particular course the answer has been that have a need to better understand the operations & maintenance of these turbine-generator sets, such that they can:

- (1) Ask better questions (and understand the answers) of plant O&M personnel;
- (2) Have better appreciation of how/why the major components are at risk; and
- (3) Better understand why the plant engineer might argue so vehemently regarding a particular repair / replace / resuse decision.

To accomplish this, HPC’s Management Overview course will start with a fundamental description of the process and components, then provide an overview of operations, and end with an overview of maintenance. All of this presented with an “eye” to the plant management’s perspective.

Topical outline includes: Steam Turbine Principles, Component Descriptions, Main Steam Valves, Intro to Turbine Controls, Overview of Turbine Operations, Overview of Turbine Maintenance, Generator Fundamentals, Generator Components, Overview of Generator O&M, and Operational Audits.

Note: This course may be equally as valuable to corporate personnel who have a better need to understand steam turbine generator equipment operational and/or maintenance issues.

OBJECTIVES:

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

1. Describe, in fundamental terms, the steam turbine energy conversion process.
2. Given a cross-sectional diagram, identify and describe the purpose of the major steam turbine components.
3. Describe the purpose of the major steam turbine valves.
4. Demonstrate an understanding of how/why the steam turbine inlet valves are positioned.
5. Describe why and how operations control the turbine heating process during turbine startup.
6. List the 10 most common abnormal events that could cause considerable steam turbine damage.
7. List the 10 most common causes of steam turbine distress.
8. Describe the most fundamental cause of each of these listed forms of steam turbine distress.
9. Describe, in fundamental terms, the different corrective action(s) that might be taken, given an identified form of steam turbine distress.
10. Describe, in fundamental terms, the transformation of mechanical energy to electrical energy.
11. Given a cross-sectional diagram, identify and describe the purpose of the major generator components.
12. Demonstrate knowledge of how the voltage regulator responds to system events.
13. List the 10 most common abnormal events that could cause considerable generator damage.
14. List the 10 most common causes of generator distress.
15. Describe the most fundamental cause of each of these listed forms of generator distress.
16. Describe, in fundamental terms, the different corrective action(s) that might be taken, given an identified form of generator distress.
17. Describe the 5 most common causes of loss of steam-turbine generator efficiency.

COURSE OUTLINE

DAY ONE:

Steam Turbine Operating Principles: Fundamental Theory, Impulse and Reaction Turbines

Turbine Component Construction: Turbine Sections, Shells, Casings, Cylinders, HP-IP/LP, Nozzles/Diaphragms, Stationary Blades, Turbine Seals, Turbine Rotors/Spindles, Blades/Buckets, Standards/Pedestals, Bearings

Main Steam Valves: Steam Chests, Main Stop/Throttle Valve, Control/Governor Valve, Reheat Valves, Auxiliary Steam Valves

Turbine Controls: 3 Laws of Turbine Controls, Response to Frequency Deviation, Protection

DAY TWO:

Turbine Operation: Available Instrumentation, Thermal Stress, Fatigue, Starting/Loading Considerations, Operational Risks to Steam Turbine

Turbine Maintenance: Types of Distress, Planning, Inspection of Steam Path Components

DAY THREE:

Turbine Maintenance: Repair/Replace/Reuse Evaluation

Generator Fundamentals: Generation of AC Power, Synchronism, Air-Gap Magnetic Fields

Generator Construction: Stator, Frame, Coolers, High Voltage Bushings, Stator Core, Stator Windings, Conductor Cooling, End Shields, Generator Bearings, Rotor, Forging, Field Windings, Collector Rings & Brushes, Exciters, House Generators

Generator Operation: Automatic Voltage Regulator, Synchronizing, Limitations, Operational Risks

DAY FOUR (1/2 DAY):

Generator Maintenance: Outage Activities, Purpose of Maintenance Activities, Electrical Testing, Repair/Replace/Reuse Decision Making Considerations

RECENTLY SATISFIED CLIENTS:

American Sugar Refineries, Consumers Energy, Dominion Resources, Dresser-Rand Company, DTE Energy, Progress Energy, Public Works Government Services of Canada, Rayonier Inc.

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? Yes. \$95 + S&H.
- 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 Harold Parker, hparker@hpcnet.com for our rate sheets and any further information required.

WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' textbook, TG431, Management Overview of Steam Turbine Generator O&M, Written by Harold Parker.
2. A "Certificate of Completion" with 1.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

INSTRUCTOR (S):

Harold Parker is the founder & President of H Parker & Company, Inc. Mr. Parker has worked in the "Power Generation" industry for 36 years, 14-years with GE as a Field Engineer, Start-Up Engineer, Technical Training Specialist and Manager. In 1983 Mr. Parker resigned from GE and started a training company, Schenectady Learning Systems, in Schenectady NY, which evolved into H Parker & Company, Inc. today. During this post-GE period, Mr. Parker was briefly employed as Manager Turbine-Generator Services with General Physics (2-years) and as a Field Engineer with Mechanical Dynamics & Analysis (2-years). Mr. Parker is the primary contributor to the development of the text used in this course presentation. Mr. Parker holds a BSME ('69 from Lawrence Institute of Technology), a MBA ('81 from the State University of New York @ Albany) and is a member of ASME.



John Mitchell. John Mitchell is a multi-talented leader with over 33 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.



Douglas Lemmo, PE. Mr. Lemmo has 35 years experience in the power generation industry, 31 of them with GE. Within GE he was initially employed as a field engineer (1971-1976). Here he was responsible for the installation and startup of a number of large and medium steam turbine generators and the feed pump turbines. In addition to this installation work, Mr. Lemmo also performed maintenance service on a variety of nuclear, fossil and marine turbine units. After leaving the field, Mr. Lemmo taught in GE's Field Engineering Development Center. Here his specialty was steam turbine generators, installation, alignment and maintenance. After a couple years instructing, he accepted a position selling maintenance and repair services. In 1982, Mr. Lemmo was the Project Manager for a Waste-to-Energy site. Later projects included a modernization of a hydroelectric facility and the management of the installation of a few combined cycle sites. In 2002, Doug left GE and founded Power Generation Consulting Services, which focuses primarily on the operation, maintenance and repair of steam turbine generators. In this last position, Doug has been closely aligned with HPC as he has instructed many of our courses and provided site-engineering support on HPC contracts.



Art Hinch, P.E. Mr. Hinch as 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.

Robert Johndrow. Bob Johndrow hired into GE as a field engineer on the same day as HPC's founder, Harold Parker. That was 36-years ago. Since that date, Bob Johndrow has been a GE Field Engineer specializing in many disciplines including Turbine-Generator O&M courses. Bob completed GE's Generator Specialist Training Program early in his career and has been involved in many generator design issues, mechanical maintenance, electrical testing, and troubleshooting O&M problems since then. 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
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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 other HPC courses
- Website Search
- Received a Fax
- Received an email
- Other: _____