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www.hpcnet.com

Course Information Letter ---- CT401

FUNDAMENTALS OF GAS TURBINE PERFORMANCE

CT401

This 2-day course is designed to familiarize plant personnel with those design and operating parameters that effect gas turbine performance. In order to accomplish this we need a good understanding of basic theory, then we need to understand what components effect performance and why. 3rd, personnel need to understand how various plant designs can effect unit performance (again we need to why). Finally, personnel need to understand how operating practices effects unit performance. Once all this information is assembled in a logical manner, HPC's instructor will discuss how this material can be applied in a way to make a positive impact upon the gas turbines' operational availability and performance.

For plant engineers, this course is the first step toward the development and/or implementation of an effective heat rate (performance) improvement program. For operational personnel, this course identifies those operating practices that effect unit performance, that is, how do operating decisions impact performance. Design and operating theories of gas turbines are presented. Thermodynamics and heat transfer are reviewed and applied (in a practical way) to operation. Calculations are performed, using actual test data, to determine gas turbine efficiency and corrections.

A topical outline includes: Thermodynamic Cycles for Gas Turbines, Component Construction, Operation and Maintenance Considerations, ASME Performance Test Codes Applicable to Gas Turbines, Combustion Turbine Performance issues, and Efficiency Monitoring Programs/

OBJECTIVES:

At the successful completion of this seminar the attendee will be able to:

1. Describe the thermodynamic principles that apply to a gas turbine power plant.
2. List the operational / performance factors that impact the gas turbine performance.
3. Describe the level of testing and monitoring that is typically required to determine unit performance.
4. List those major steps required to perform 3 major component performance tests.
5. Demonstrate the ability to analyze plant performance data to determine where component efficiency has deteriorated
6. Determine realistic heat rate improvement goals
7. Develop corrective action plans to achieve the established heat rate performance goals.
8. List the types of measuring equipment and perform the calculations required to analyze plant performance.

COURSE OUTLINE:

Monday

Introductions
Gas Turbines: Thermodynamic Cycles for Gas Turbines, Component Construction, Gas Turbine Generators, Gas Turbine Systems, Operation and Maintenance Considerations
ASME Performance Test Codes Applicable to Gas Turbines

Tuesday

Combustion Turbine Performance: Design Point Performance, Off-Design Performance, Transient Performance, Correction Curves, Performance Testing, Performance Trending and Evaluation
Efficiency Monitoring Program: Establish Needs for Program, Establish Level of Detail from Needs Analysis, Identify Baseline Data, Determine Frequency of Testing and Monitoring, Performance Calculations, Performance Monitoring and Trending

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. $195 + 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 the planning and conduct of a performance analysis? 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, Fundamentals of Gas Turbine Performance. This text contains a significant number of equipment photographs, graphics and data tables.
2. A "Certificate of Completion" with 1.3 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

GAS TURBINE OPERATIONS AND/OR MAINTENANCE CERTIFICATION:

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

1. Engineer
2. Control Room Operator

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.

INSTRUCTOR (S):

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 medium steam turbine generators. 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.

Robert Johndrow. Bob Johndrow hired into GE as a field engineer In June 1969. That was 36-syears ago. Since that date, Bob Johndrow has been a GE Field Engineer specializing in many disciplines including Generator Maintenance and Testing. Bob completed GE's Generator Specialist Training Program early in his career. Since then he has been involved in the commissioning of several combined cycle power plants where he was responsible for the operations, turbine controls, auxiliaries, startup sequence and the generator. 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 Rhode Island.

Hayes, Robert: Mr. Hayes instructs HPC's Performance, Balance-of-Plant O&M, and our popular "Power Plant Blackout Preparedness" course. Mr. Hayes, prior to early retirement, held several positions during his long tenure at Illinois Power: (1) Results Engineer, Results Supervisor. Mr. Hayes had responsibilities, which included equipment performance testing, and rotating machinery vibration analysis and correction. (2) Supervisor Plant Operations. Mr. Hayes had responsibilities which included startup and checkout of new equipment, supervision of four operating shifts, and coal receiving and handling group. (3) Power Plant Operations Specialist. Mr. Hayes had responsibilities, which included frequent visits to all five fossil power stations, participation in control replacement projects, participation in development and implementation of clean air compliance plans, and served as an internal consultant for fossil power generation operations. He led several technical teams that identified and recommended protective system improvements to the large generating units. He conducted root cause analysis of several major equipment failures.

HPC TECHNICAL SERVICES
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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 in the past.
- ☐ Received a fax.
- ☐ Received an email.
- ☐ Website search.
- ☐ Someone at the plant forwarded information to me.
- ☐ Other: _____