



## **GAS TURBINE MK-VIE FOR OPERATORS**

(CT324E)

The course combines good overall operational practices with specifics of the Mk-VIE control system. The Mk-VIE portion of the course is adjusted to specifically deal with level required by Operations personnel. To operate a machine safely and for the long-term, we need to have a good understanding of the basic theory, we need to know how different components might be placed at risk, we need to understand how the Mk-VIE control system “thinks”, how the Mk-VIE system files are utilized to an operators advantage, we need to know how and when the protective systems should react, and we need to know the importance of proper operation of the auxiliary systems. With respect to the protective systems, we need to understand the symptoms of some of the common problems, what actions the operator should (or should not) take, what actions protective systems should take, and when. This course discusses all of this in a generic fashion (that is not necessary specific to any given machine). A good big-picture is required to become a “skilled operator” and this course takes us down that path.

A **topical outline** includes: Review of Gas Turbine Theory, Review of Gas Turbine Construction & Operating Principles, Introduction to Mk-VIE Hardware, Documentation, How to Use the Toolbox Software to read Logic Diagrams, Alarm Drops, Auxiliary Systems, Start Up Sequencing, Speed Control, Temperature Control, NOx, Servo Valve Drive Systems, Overspeed / Over Temperature, Protective Circuits, Abnormal Conditions and Response.

### **WHAT YOU WILL RECEIVE**

1. 1 copy of HPC Technical Services' textbook, [Gas Turbine Mk-VIE for Operators](#), as written by Harold Parker. It is a valuable desktop reference in addition to being able to enhance the learning process.
2. A Certificate of Completion with 31 PDH.

### **GAS TURBINE OPERATOR CERTIFICATION**

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](http://www.TurbineGeneratorTraining.com), for detail on this certification program.

### **INSTRUCTORS**

All HPC instructors are educated ‘experts’ on the subjects they teach, with years of relevant hands-on experience (typically 20+ years), and have proven instructional skills. Brief resumes can be looked up on HPC's website, [www.TurbineGeneratorTraining.com](http://www.TurbineGeneratorTraining.com).

### **COURSE DATES / LOCATION / FEE**

See [www.TurbineGeneratorTraining.com](http://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 3<sup>rd</sup> 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.

## OBJECTIVES

Upon completion of this course, the participant will be able to:

1. Describe the relationship of the various turbine components and how they may be at risk during operations.
2. Describe the different fuel systems used in gas turbine operations.
3. Identify and describe the purpose of major hardware devices found in the Mk-VIE system.
4. Demonstrate the ability to use that Mk-VIE Toolbox Software that is pertinent to the operator.
5. Demonstrate the ability to navigate the Toolbox Software and documentation to trace an alarm drop to the device initiating that alarm.
6. For each of the gas turbine auxiliary systems (cooling & sealing air, lube oil systems, fuel forwarding, control and hydraulic oil) describe the systems' purpose, normal operations, and abnormal conditions.
7. Given a gas turbine control system block diagram, sequence the turbine through a start up, load changes, shutdown, and emergency conditions.
8. Demonstrate the ability to navigate the Toolbox Software sufficiently to trace an alarm drop to the initiating algorithm.
9. Given an alarm, describe how the unit may be at risk.
10. Given an alarm, describe what are the most proper actions to take.

## COURSE OUTLINE

### Day One

#### Review of Gas Turbine Theory

**Review of Gas Turbine Construction & Operating Principles:** Air Inlet Guide Vane & Casing, Compressor Stator, Compressor Rotor, Combustion Section, Turbine Stator, Turbine Rotor, Exhaust Section, Bearings

#### Mk-VIE Blockware Concepts and Hardware

### Day Two

**Mk-VIE Documentation:** Control Specs, Internal Power, Files, Inputs/Outputs,

**Understanding the Toolbox Software and Control Files:** Signal Names, Logic, And/Or, Math Functions, Comparators, Using the Toolbox Software.

#### Tracing an Alarm Drop

### Day Three

**Auxiliary Systems,** Schematic Piping Diagrams, Device Summary, Lube Oil and Hydraulic Supply, Trip Oil and Control Oil, Cooling and Sealing Air, Cooling Water

**Start Up Sequencing:** Overview, MkVIE Control Files, Alarms

**Speed Control:** Overview, MkVIE Control Files, Alarms

### Day Four

**Temperature Control:** Overview, MkVIE Control Files, Alarms, Combustion Monitor

**NOx:** Overview, MkVIE Control Files, Alarms

**Control Valve Positioning:** Servo Mechanisms, Gas Control Valve, Liquid Control Valve, Fuel Splitter, and DLN Splitter; Function, MkVIE Control Files, Alarms

### Day Five

**Protective Systems:** L4, Overspeed Trip, Emergency Overspeed Trip, Over-temperature Trip, Vibration, 20FG/20FL

**Certification Examination for those who are interested**

## 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](mailto: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? Yes.
- 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](mailto:Stephen@TurbineGeneratorTraining.com) for our rate sheets and any further information required.

**HPC TECHNICAL SERVICES**  
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Website: [www.TurbineGeneratorTraining.com](http://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: \_\_\_\_\_ Email: \_\_\_\_\_

Student #2: \_\_\_\_\_ Email: \_\_\_\_\_

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

Student #3: \_\_\_\_\_ Email: \_\_\_\_\_

**ENROLLED BY:** \_\_\_\_\_ **Email:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**METHOD OF PAYMENT**

Check to Follow: \_\_\_\_\_

Check Enclosed #: \_\_\_\_\_

MC/Visa/AMEX #: \_\_\_\_\_

Expiration Date: \_\_\_\_\_ CV Code: \_\_\_\_\_

Purchase Order #: \_\_\_\_\_

**How did you find out about this course initially?**

- Website search
- Fax advertisement
- Magazine advertisement
- Familiar with HPC
- HPC mailing
- Other: \_\_\_\_\_