



(OVATION) STEAM TURBINE CONTROLS

TG530

This course targets the need for technicians/engineers to operate, maintain, calibrate and troubleshoot control systems such that availability and reliability can be maximized. It has been HPC's experience that when plant personnel have a control system problem and they seek help (for example, using HPC services) that the reason plant personnel had this problem troubleshooting was one of two explanations:

1. Lack of understanding of the "big picture", that is how the various control functions relate to one another.
2. Lack of understanding of how to use the tools that are available to troubleshoot the problem.

The overall benefit of this course is that the participant will walk away with this knowledge. This is accomplished by thoroughly understanding concepts of steam turbine control systems and how to use maintenance screens to quickly determine problems.

We are reminded that the steam turbine is the important asset. The Ovation control system is the human-machine-interface (HMI). This control system must be calibrated and maintained with the steam turbine-generator kept in mind. HPC approaches this course in this manner. As seen by the course objectives, particular attention is given to the development of control systems important to the operation of a steam turbine.

Topical Outline includes: Turbine Fundamentals, Turbine Control Concepts, Ovation Fundamentals and Hardware, Software Installation, HMI Documentation, Architecture, Blockware Concepts and Architecture, Blockware Functions, Introduction to the Software, Speed/Load Control, Protection Systems, Alarm Troubleshooting, Valve Position Control & LVDT Calibration, Sequencing Editing Validation / Build / Download, Adding Analog I/O, Adding Contact I/O, Forcing Signals, Changing Control Constants, Data Historian, Trending, Trip History. For BWR participants we add Pressure and Bypass Valve Control I/O and Algorithms

OBJECTIVES

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

1. Demonstrate an understanding of basic steam turbine operation.
2. Demonstrate an understanding of the concepts of steam turbine controls.
3. Demonstrate an understanding of the protective systems' purpose, operation and test functions.
4. Demonstrate the ability to use OEM provided documentation that will include the Control Specifications, Programming, I/O Configuration, and P&IDs.
5. Demonstrate the understanding of the Ovation hardware components, the component function, how they are accessed, and how they communicate.
6. Demonstrate the ability to use Ovation software.
7. Demonstrate the ability to calculate a speed error using the Ovation software.
8. Demonstrate the ability to determine the load demand signal, using Ovation software.
9. Demonstrate the ability to determine a stop valve, control valve, intercept valve, extraction control valve (if applicable) and bypass valve (BWR participants only) controlling signal, using Ovation software.
10. Demonstrate the ability to troubleshoot an equipment alarm from the Ovation panel to the field device.
11. Demonstrate the ability to interpret the more routine diagnostic alarms and recognize appropriate actions.
12. Demonstrate the ability to trace the derivation of a command signal to the servomechanisms.
13. Demonstrate the knowledge necessary to calibrate turbine valve mechanisms.
14. Demonstrate the ability (or knowledge -- based upon equipment availability) to more efficiently use the Ovation screens for evaluating/calibrating systems.
15. Demonstrate the ability (or knowledge -- based upon equipment availability) to force logic to facilitate calibration.
16. Describe how to change constants or re-program ladder logic such as to add contact input/outputs, add alarms, and/or alter sequencing.
17. Given plant drawings, trace a signal to/from a field device through appropriate terminal boards, through circuit boards, to a digital "signal name".
18. Demonstrate an understanding of how a trip signal is derived and applied.
19. Demonstrate the ability to determine the pressure demand signal, using Ovation software. (BWR participants only.)

COURSE DATES / LOCATION / FEE

Course typically 8-days in length (10-days on BWR sites). Can be adjusted per plant needs.

WHAT YOU WILL RECEIVE

1. 1 copy of HPC Technical Services' textbook, (Ovation) Steam Turbine Controls, drafted by Harold Parker.
2. A Certificate of Completion with 56 PDH awarded.

STEAM TURBINE I&C CERTIFICATION

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

1. Engineer
2. I&C 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.

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? No.
- 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.

COURSE OUTLINE

WEEK 1

Monday

Introduction
What a Controls Technician/Engineer Needs to know about
Steam Turbine Fundamentals
Steam Turbine Control Concepts

Tuesday

Ovation Fundamentals and Hardware
Software Installation
Documentation
Architecture

Wednesday

Blockware Concepts and Architecture
Blockware Functions
Introduction to the Ovation Software
Browsing Turbine Using Simulator

Thursday

Protection Systems
Alarm Troubleshooting – Process and Diagnostic

Friday

Alarm Troubleshooting (Continued)
Speed / Load Control

WEEK 2

Monday

Brief Review of Week-1
Valve Position Control & LVDT Calibration
Sequencing Editing
Validation / Build / Download

Tuesday

Adding Analog Inputs
Adding Contact Outputs
Adding Analog Outputs
Forcing Signals
Changing Control Constants

Wednesday

Data Historian
Trending
Trip History
Examination (if applicable)
Conclusion

Thursday (BWR Only)

Pressure Control I/O
Pressure Control Signal Development

Friday (BWR Only)

Bypass Valve Control Signal Development
Examination (If applicable)

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 LEARN OF THIS COURSE

- Attended other HPC courses.
- Internet Search
- Received a fax.
- Received an email.
- Other: _____