Course Overview

Training Courses and Services for ABB and ALSTOM Gas Turbine based Power Plants

Powergen Training Ltd.
Technical Training Consultants
Training and Consulting Services for the Power Generation Industry

Powergen Training Ltd. offers you a wide range of services for ABB/ALSTOM gas turbine plants and their related **Advant OCS and 800xA control systems**.

We specialise in power plant control systems used with ABB respectively ALSTOM gas turbines (GT26, GT24, GT13E2, GT11N2, GT8C2). Both combined cycle and open cycle applications can be covered as well as other industry applications. Training is fully customized to your staff's requirements and your specific plant configuration.
Training Programs cover the following products:

ABB Advant OCS:

- AC160 (AC110) Process Controller
- AC450 (AC410) Process Controller
- OS520 (Operator Station)
- IMS530 (Information Management)
- S100, S600 & S800 I/0

ABB 800xA:

- OperateIT 800xA
- PGIM

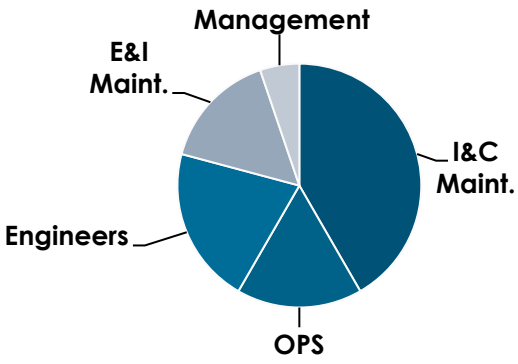
Other Plant Systems and Applications:

- EGATROL Gas Turbine Controller
- TURBOTROL Steam Turbine Controller
- DEPP

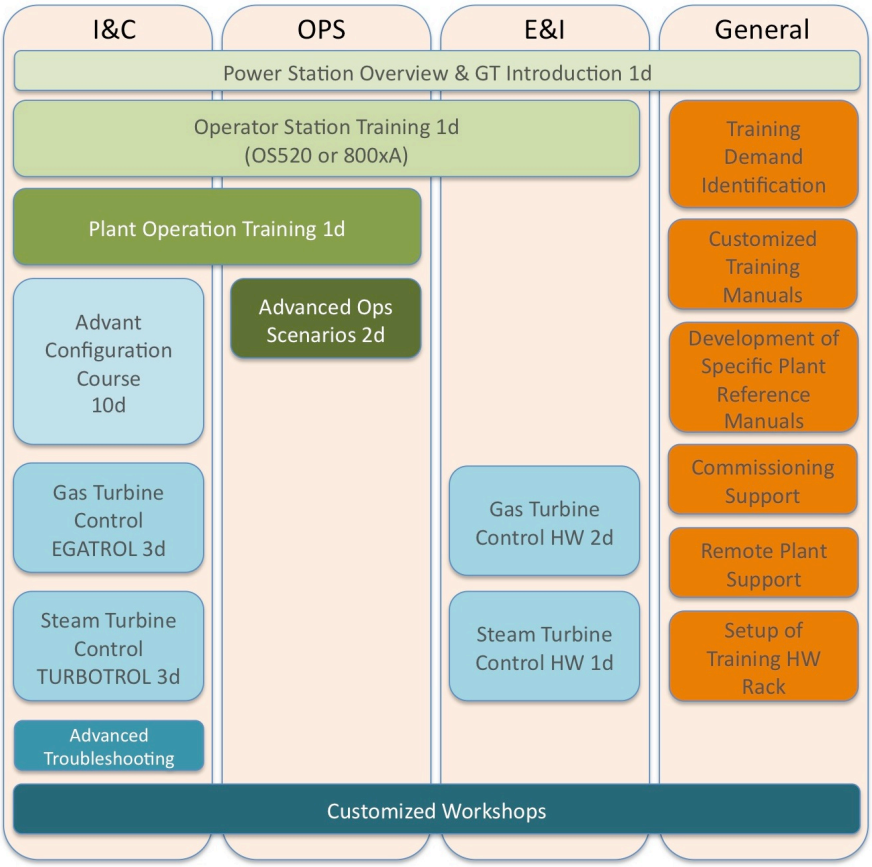
Other training programs include:

- Gas Turbine and Plant Overview
- Gas Turbine Operation
- Advanced Troubleshooting
- Workshops

Training is available for all target groups:



Course Overview:



Course Overview with Typical Durations

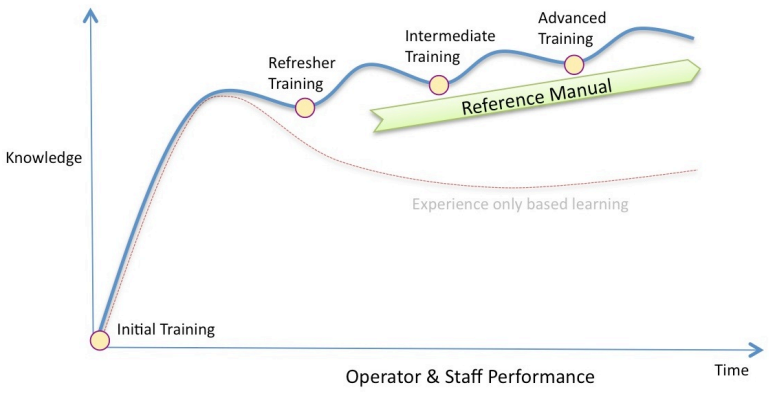
Fully customized training to maximize learning performance and ensure long-term success.

With Powergen Training you will get a training solution that is tailored to you staff's current knowledge and experience levels. Course subjects can be added or removed from any recommended program, which will then define the actual course duration.

Using this flexible approach allows us to reach the training goals faster and learn what is required to operate and maintain the plant efficiently and safely.

Our promise to you:

- **Most effective and best value course programs**
- **Your course for your people**
- **No standard audience courses and default documents**
- **Full flexibility towards contents, duration and participants**



How to choose your training course?

We can assist you through all the steps of identifying training demand and choosing the right program. We will then make a recommendation of required training courses and the cost involved. Please contact us for more information.
(email: s_blaas@powergentrainig.com)

Identification and Execution Process:	**Sample Answers:**
• Tell us your type of plant	1xGT13E2 open cycle plant
• Identify your target group	I&C maintenance staff
• How many people require training	6
• Where would you like to hold the Training session	Location x
• Together we assess the current knowledge and experience	no formal training, 2y on the job, basic control system knowledge
• Define the training goal	Staff to be able to carry out routine maintenance and day to day troubleshooting on the plant control system. No modification and implementation of logic required
• We recommend a training program	Total 12d consisting of: -1d Power Station Overview & GT Intro -8d Advant Configuration (less 2d due to existing basic knowledge) -3d Gas Turbine Control
• We submit a cost offer incl. all travel expenses	12 days of training $xxxxx
• We agree on training dates	16.6. – 1.7.
• You issue a purchase order to confirm the training course	Training execution
• After completion of training we Issue a summary report	Trainees performed well, would recommend the following action
• We discuss a long term training plan	Refresher Training Session after 6m Advanced Session after 1year

Power Station Overview & GT Introduction

Duration

1 day

Class Size:

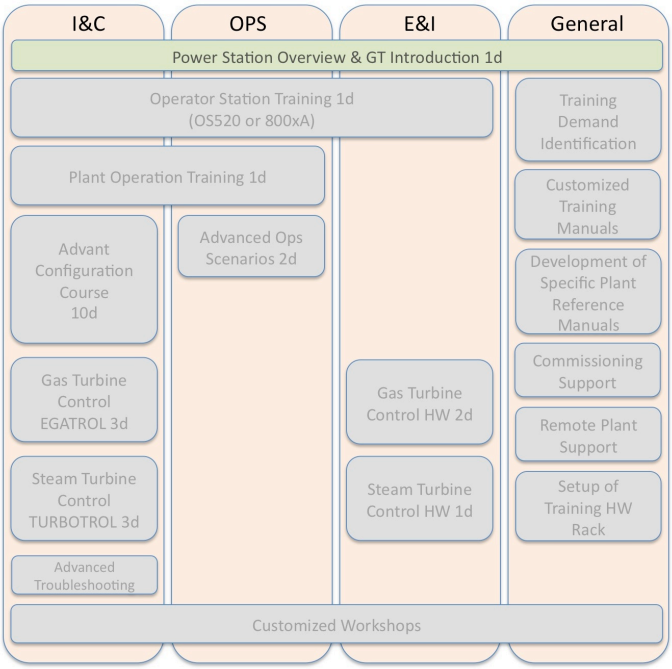
Up to 10 Participants

Location:

At your plant location

Prerequisites:

None



Course Objectives:
At the end of this course module the participants will have an understanding of power generation in general and the open/combined cycle process and its major systems.

Course Contents:

- Natural resources, their distribution and availability
- Forms of power generation
- Power station overview and systems
- Technical data and specification
- Gas Turbine Theory
- Details of the Gas Turbine (GT26 or GT24 or GT13E2 or GT11N2 or GT8C2)
- Plant systems (HRSG, ST, WSC, Condenser, BOP, Generator)

Course Format:

- Classroom
- Groups Exercises
- Q&A
- Site Visit

Operator Station Training (OS520 or 800xA)

Duration

1 day

Class Size:

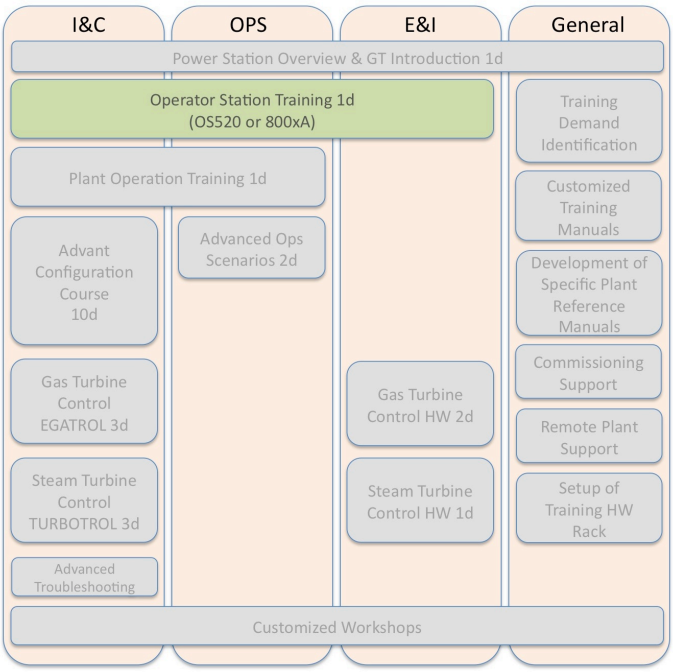
Up to 8 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
(or similar experience)



Course Objectives:
Enable the participant to understand and use the features of the Operator Station and being able to operate process devices such as pumps, valves, function groups and selectors.

Course Contents:

- KKS System
- Control System Overview
- Operator Station Features
- Display and screen navigation
- Keys, Object Displays, Face Plates
- Graphic Process Objects and Colour Indications (incl. Pumps, Valves, Function Groups, Sequencers)
- Trends and Event/Alarm List
- Searching signals

Course Format:

- Classroom
- Q&A
- Hands-on at control panel (operator station)

Plant Operation Training

Duration

1 day

Class Size:

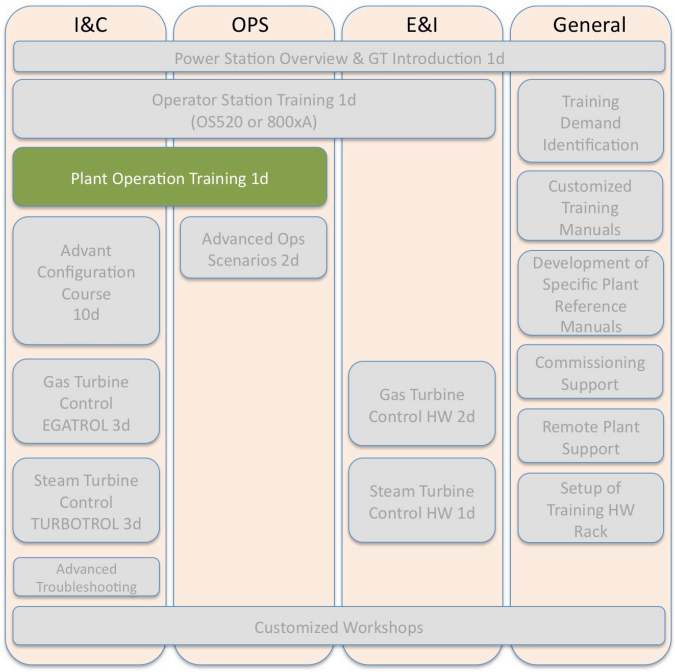
Up to 10 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
(or similar experience)



Course Objectives:
Allow the participant to understand the various power station sequencers including all their related steps and actions carried out within. Use the supplied manual as a reference to identify process criteria to start/stop equipment. Explain protective actions related to any drive/FG/SEL/SEQ.

Course Contents:

Course Contents:

- Unit Master and Sequencers
- Function Groups and Selectors
- How to use the reference manual
- Various exercises for any of the process areas

Course Format:

- Classroom
- Q&A
- Exercises
- Practical examples hands-on at control panel (operator station)

Remark:

To take full advantage of this training a fully customized reference manual for your plant can be developed at extra cost (development time approx. 6weeks) and would be used during the training session. This would allow your staff to repeat the course and practice by using the manual at their own pace whenever required.

Advant Configuration

Duration

10 days

Class Size:

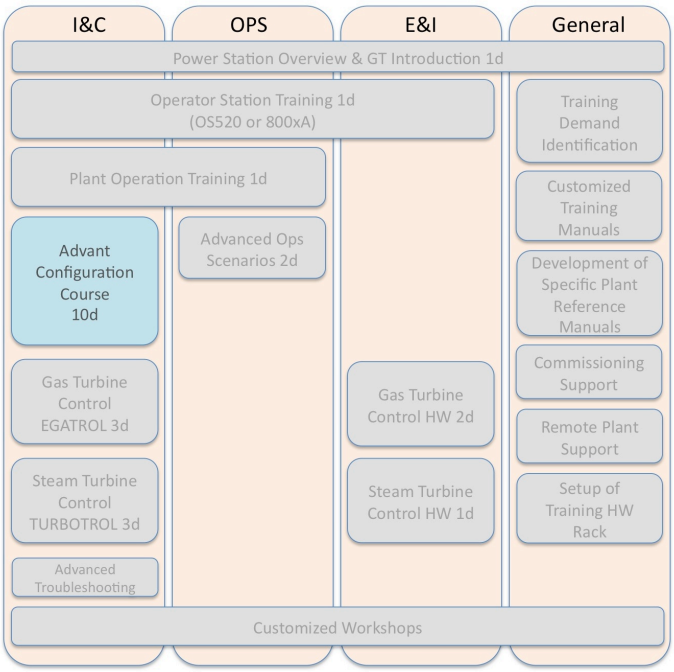
Up to 8 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
(or similar experience)



Course Objectives:
The course goal is to teach students how to configure and operate a running control system. Consisting of AC450 and AC160 controllers, operator interface OS520 or 800xA and ES100 engineering workplace.

The course will enable the participants to:

- Configure and operate the control system controllers
- Understand the basic elements and functional blocks for power plants (e.g. pumps, valves, FG, Sequencer)
- Read and understand the plant specific documentation
- Explain the functions of the hardware components (CPU; Communication; I/O modules)
- Troubleshoot errors and replace faulty components
- Carry out regular maintenance tasks
- Configure and operate the operator workplace
- Interpret control system error messages
- Configure an operator workplace
- Create process graphics and trend displays
- Use the engineering station and all its tools
- Design and read application programs
- Load the application software into the controller
- Test, simulate and analyze software
- Change functions on- and off-line

Advant Configuration (continued)

Course Contents:

- Overview and hardware components of the control system
- Software functions, such as basic analogue and binary elements, drive control functions, logical and sequential group control units and selectors
- APC (Advant Power Control) software options and Type Circuits
- Features of the engineering workplace such as: creating project architectures, creating and modifying function diagrams, converting and downloading application programs, simulating and displaying live values
- Configuration of the operator workplace, such as creation of process graphics, curves and lists. Setting up a system from scratch and creating backups.

Course Format:

- Classroom
- Group Exercises
- Q&A
- Site visits to electronic and control room
- Work on the actual equipment and training rack

Remark:

- It would be an advantage if you had your own training rack (typically built from spares, we can assist with the setup and identification of components required)
- At least one spare computer is required per 2 students to allow for installation of the engineering software already available.

Gas Turbine Control EGATROL (I&C)

Duration

3-5 days (depending on previous knowledge)

Class Size:

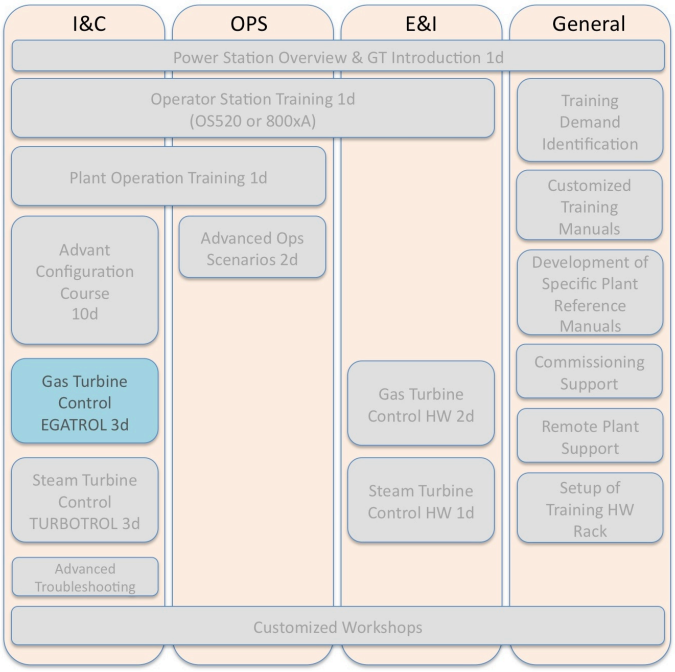
Up to 8 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
Advant Configuration
(or similar experience)



Course Objectives:

The course goal is to teach participants the function of the gas turbine control system.

The course will enable the participants to:

Explain and trouble-shoot the gas turbine control cabinet hardware

- Control system hardware
- Cabinet power supply and breakers
- Marshalling rack
- P&F signal converters and relays
- Overview of sub-systems

Understand the control and protection concept

- Open and closed loop control functions
- Machine protection using 3 channel concept (incl. protection matrix)

Explain and trouble-shoot the gas turbine application software

- Sequencer programs and release criteria
- Analyze and simulate conditions in software

Course Format:

- Classroom
- Group Exercises
- Q&A
- Site visits to electronic and control room
- Work on the actual equipment and/or training rack

Course Contents:

- Control system specific KKS endings
- Cabinet and rack layout
- Signal flow and conditioning
- Process function plans PFUP
- Protection concept and relevant function blocks
- Open and closed loop control functions
- Gas turbine operation concept including sequencers

Remark:

- It would be an advantage if you had your own training rack (typically built from spares, we can assist with the setup and identification of components required)
- At least one spare computer is required per 2 students to allow for installation of the engineering software already available.

Steam Turbine Control TURBOTROL (I&C)

Duration

3-5 days (depending on previous knowledge)

Class Size:

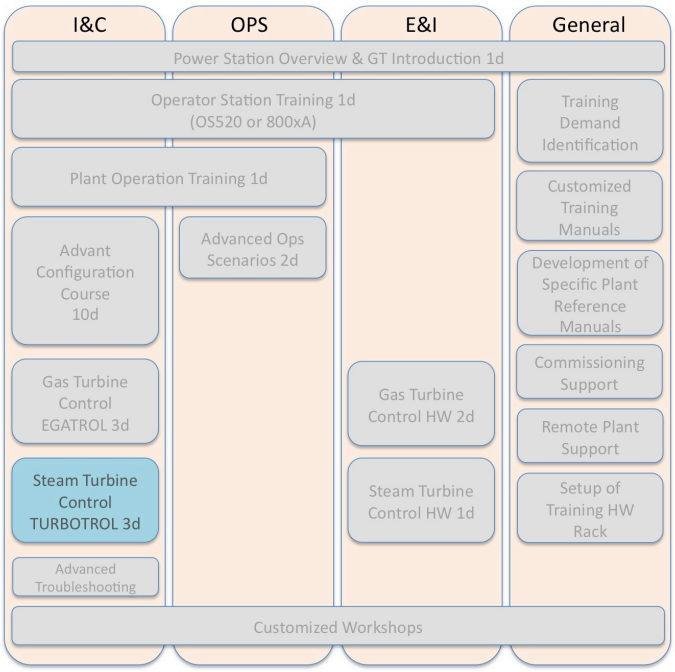
Up to 8 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
Advant Configuration
(or similar experience)



Course Objectives:

The course goal is to teach participants the function of the steam turbine control system.

The course will enable the participants to:

Explain and trouble-shoot the steam turbine control cabinet hardware

- Control system hardware
- Cabinet power supply and breakers
- Marshalling rack
- P&F signal converters and relays
- Overview of sub-systems

Understand the control and protection concept

- Open and closed loop control functions
- Machine protection using 3 channel concept (incl. protection matrix)

Explain and trouble-shoot the steam turbine application software

- Sequencer programs and release criteria
- Analyze and simulate conditions in software

Course Format:

- Classroom
- Group Exercises
- Q&A
- Site visits to electronic and control room
- Work on the actual equipment and/or training rack

Course Contents:

- Control system specific KKS endings
- Cabinet and rack layout
- Signal flow and conditioning
- Process function plans PFUP
- Protection concept and relevant function blocks
- Open and closed loop control functions
- Steam turbine operation concept including sequencers

Remark:

- It would be an advantage if you had your own training rack (typically built from spares, we can assist with the setup and identification of components required)
- At least one spare computer is required per 2 students to allow for installation of the engineering software already available.

Advanced Troubleshooting

Duration

2-5 days

Class Size:

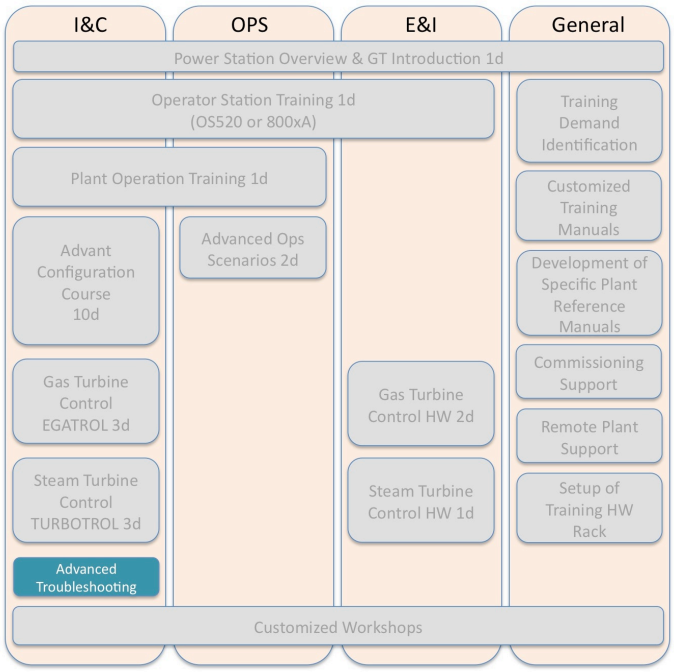
Up to 6 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
Advant Configuration
Gas Turbine Control EGATROL
Steam Turbine Control TURBOTROL
(or similar experience)



Course Objectives:
This advanced course will focus on programming tasks such as implementing new logic (i.e. type circuits, pumps, valves, sequencer steps) in both the AC160 and AC450. It will also cover more complex simulations such as opening BOV's during standstill, moving the VGV or stroking a gas control valve.

Course Contents:

- Design and implement logic modifications
- Carry out plant simulations during operation and standstill
- Carry our firmware upgrades
- Implement Type Circuits TC
- Develop maintenance and operation procedures
- Analyze and troubleshoot the logic
- Implement FSI's
- System lifetime planning & extension
- Your own requests

Course Format:

- Classroom
- Group Exercises
- Q&A
- Site visits to electronic and control room
- Work on the actual equipment and/or training rack

Remark:

- It would be an advantage if you had your own training rack (typically built from spares, we can assist with the setup and identification of components required)
- At least one spare computer is required per 2 students to allow for installation of the engineering software already available.

Advanced Operation Scenarios

Duration

2 day

Class Size:

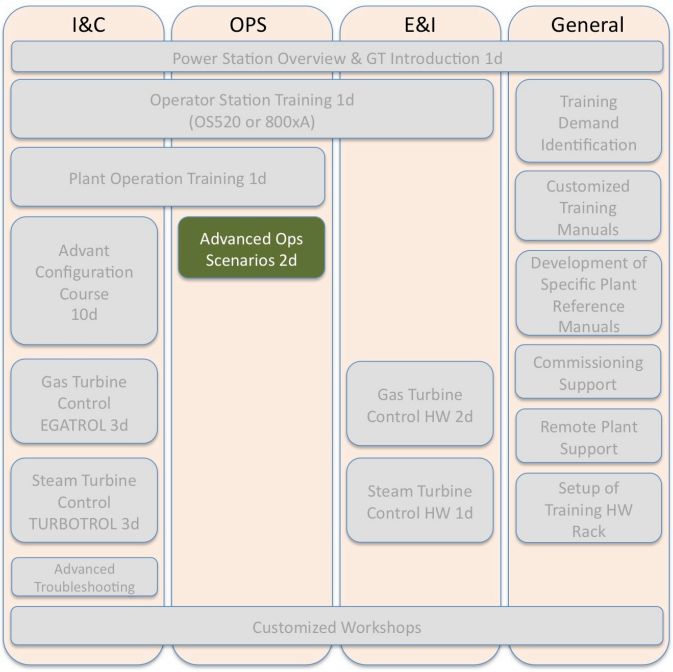
Up to 10 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
Plant Operation Training
(or similar experience)



Course Objectives:
Enable the participant to start-up the combined cycle process using the supplied sequencers. Explain special operation modes such as forced cool and idle mode. Use the PID controllers to intervene manually where possible.

Course Contents:

- PID controllers and their use
- Manual Station (Set-point Station)
- Start-up and shut-down procedures
- Idle Mode
- Forced Cool
- Handling after protective actions
- Manual process intervention
- Changeover of Master/Standby drive
- Manual Rotor Barring GT/ST

Course Format:

- Classroom
- Group Exercises
- Q&A
- Practical examples hands-on at control panel (operator station)

Gas Turbine Control Hardware (E&I)

Duration

2 days

Class Size:

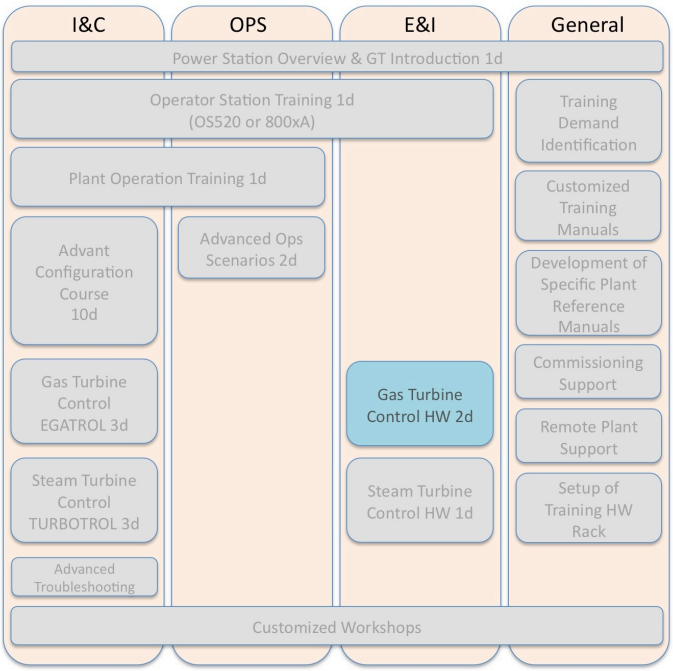
Up to 8 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
(or similar experience)



Course Objectives:

The course goal is to teach participants the function of the gas turbine control system.

The course will enable the participants to:

- Explain and trouble-shoot the gas turbine control cabinet hardware
  - Control system hardware
  - Cabinet power supply and breakers
  - Marshalling rack
  - P&F signal converters and relays
  - Overview of sub-systems
  - Field Instrumentation

Course Contents:

- Control system specific KKS endings
- Cabinet and rack layout
- Signal flow and conditioning
- Plant Documentation

Course Format:

- Classroom
- Group Exercises
- Q&A
- Site visits to electronic and control room
- Work on the actual equipment

Steam Turbine Control Hardware (E&I)

Duration

2 days

Class Size:

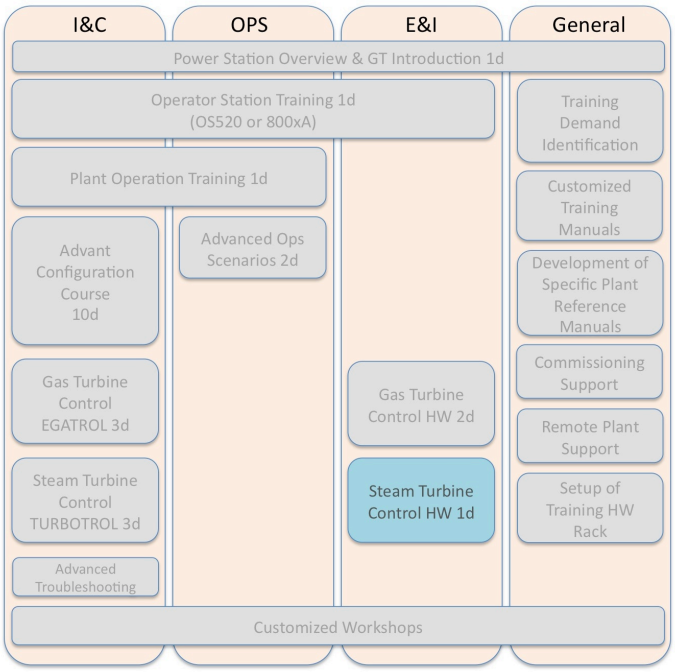
Up to 8 Participants

Location:

At your plant location

Prerequisites:

Power Station Overview & GT Introduction
Operator Station Training
(or similar experience)



Course Objectives:

The course goal is to teach participants the function of the steam turbine control system.

The course will enable the participants to:

- Explain and trouble-shoot the steam turbine control cabinet hardware
  - Control system hardware
  - Cabinet power supply and breakers
  - Marshalling rack
  - P&F signal converters and relays
  - Overview of sub-systems
  - Field Instrumentation

Course Contents:

- Control system specific KKS endings
- Cabinet and rack layout
- Signal flow and conditioning
- Plant Documentation

Course Format:

- Classroom
- Group Exercises
- Q&A
- Site visits to electronic and control room
- Work on the actual equipment

Other services include:

Customized Workshops

If the target audience has already reached a very high level of plant and system knowledge it is recommended to run a workshop. A group of experienced participants will analyze and discuss certain topics and plant issues under the guidance of our moderating instructor.

Development of Training Material

We can develop plant specific training manuals for either operation or maintenance staff. A plant specific reference manual for example will close the gap between the complex function of the control system and the often insufficiently described functionality of the plant. Contact us for a free sample.

Remote Plant Support

We offer short and long-term support for your plant and it's control system. Please contact us for more details.

Onsite & Commissioning Support

We provide comprehensive commissioning support for control systems as well as ongoing onsite technical support at your location.

Training Rack

We can help you setup a training rack made up of your existing Advant control system spare parts. To setup a AC160 and AC450 training rack only few components need to be purchased.

Powergen Training Ltd.

Technical Training Consultants

Training and Consulting Services for the Power Generation Industry

Address: 64 Ferry Rd, Arkles Bay
Whangaparaoa, 0932, Auckland, New Zealand

Email: s_blaas@powergentraining.com

Web: www.powergentraining.com