



500 Tallevast Road • Suite 101
Sarasota, FL 34243 USA
Tel: 941-747-7733 • Fax: 941-746-5374
www.hpcnet.com

Course Information Letter ---- B403

OPTIMIZATION AND CONTROLS OF FURNACES, BOILERS & STEAM PLANTS

B403

The *Optimization and Controls of Furnaces, Boilers and Steam Plants* course is intended for process engineers, control engineers or instrumentation personnel with responsibility over the optimization of the powerhouse processes including boilers, furnaces, steam headers, turbines, power plants and steam plants.

This is a 4-day course that uses a first-principle process simulator as a learning tool to better understand the different process control challenges of a powerhouse. This simulator provides hands-on experience to the participants by allowing them to apply the concepts learned in the lecture to a virtual steam plant. Topics for this course include thermodynamics, steam/boiler process design, typical steam plant regulatory controls, advanced process controls and optimization of the boiler/header/turbine load response.

Prerequisites: B402 or a good understanding of the boiler/steam process

OBJECTIVES: At the end of the session, the participants will be able to:

- Demonstrate how to optimize the response of PID loops for steam plant applications.
- Describe the applications of cascade, feedforward, mid-range, split-range and ratio control in a steam plant
- Describe the impact of thermodynamics and steam system design on the controllability of a steam plant
- Describe cross-limiting combustion logic with %O₂ trim control
- Describe how to reduce furnace draft, steam temperature, drum level and header pressure variations during rapid unit load response
- Describe the control challenges of cogeneration
- Demonstrate and describe some of the main troubleshooting methods for plant variability analysis.

COURSE DATES/LOCATION/FEE

For current dates / locations / prices, please see HPC's website, www.hpcnet.com.

Optimization and Controls of Furnaces, Boilers and Steam Plants

www.hpcnet.com

COURSE OUTLINE

Lecture 1	Introduction to process variability and its different representation (Auto-correlation, cross-correlation, 2-sigma and frequency analysis)
Lecture 2 (+Lab)	Process dynamics: 1 st order processes, 2 nd order processes, integrating processes
Lecture 3 (+Lab)	Mixing/Agitation/Heat Sinks and its impact on process variability
Lecture 4 (+Lab)	Controller tuning for 1 st order processes
Lecture 5(+Lab)	Controller tuning and its impact on process variability
Lecture 6 (+Lab)	Controller tuning for integrating loops
Lecture 7	Approach to a multi-variable processes (pairing variables, cascaded loops, decoupling controllers)
Lecture 8 (+Lab)	Advanced Control Concepts (Feedforward Control, Adaptive Control – Fuzzy Logic, Near-Integrating Rule, Derivative Control)
Lecture 9	Optimization Lab

ONSITE PERFORMANCE PROGRAM OPTION

The **Onsite Performance Program** is a hands-on option to the B403 course. This program is valuable to professionals who wish to apply the troubleshooting methodology learned in the lectures to specific applications of their steam plant or power plant. The Onsite Performance program includes:

- Practical concepts to field testing
- Practical concepts to the loop tuning methodology
- Practical concepts to process dynamics analysis
- Practical concepts to drum level and temperature control
- Practical application of variability analysis (statistical analysis, and spectral analysis)

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' course material available for purchase as a reference document? Sorry, this material is not for sale.
- 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' Lecture Material, OPTIMIZATION AND CONTROLS OF FURNACES, BOILERS & STEAM PLANTS. It is a valuable desktop reference in addition to being able to enhance the learning process.
2. A "Certificate of Completion" with 2.6 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

HPC TECHNICAL SERVICES
500 Tallevast Road, Suite 101, Sarasota, FL 34243
Telephone: 941-747-7733 FAX: 941-746-5374
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 #: _____