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Course Name

Process Control & PID Loop Optimization

Sector Name

Instrumentation & Controls

Document Type

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Process Control & PID Loop Optimization

Course Introduction

Stable process control depends on more than placing a controller in automatic mode. Poorly configured loops, inappropriate tuning, changing process dynamics, interaction between control elements, measurement problems, and final control limitations can result in oscillation, slow response, excessive variability, and frequent operator intervention. Engineers therefore need to understand not only how PID control works, but how the complete loop behaves under real operating conditions.

Boost Consulting & Training offers this course to develop practical capability in analyzing and improving industrial process-control loops. Participants examine process dynamics, feedback control, PID actions, tuning approaches, loop-response patterns, common control problems, and performance optimization. Practical activities use process scenarios and response trends to help participants distinguish tuning problems from instrumentation, valve, process, and configuration issues.

The **main concept of this course** is to turn PID tuning from trial-and-error adjustment into a structured process of understanding loop behavior, diagnosing performance problems, and achieving stable and responsive process control.

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Process Control & PID Loop Optimization

Target Audience

- ✓ Instrumentation and control engineers
- ✓ Process and automation engineers
- ✓ Control system specialists
- ✓ Engineers responsible for process performance and control optimization

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Process Control & PID Loop Optimization

Learning Objectives

- ✓ Explain the behavior and components of industrial process-control loops.
- ✓ Interpret process dynamics and their influence on controller performance.
- ✓ Distinguish proportional, integral, and derivative control actions.
- ✓ Evaluate PID controller response under different operating conditions.
- ✓ Apply practical approaches for PID loop tuning.
- ✓ Diagnose oscillation, sluggish response, instability, and excessive process variability.
- ✓ Distinguish controller-tuning problems from measurement, valve, and process-related issues.
- ✓ Optimize control-loop performance and verify improvement using operating evidence.

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Process Control & PID Loop Optimization

Course Outline

✓ DAY 01

Understanding Process Control Behavior

Reading the Complete Control Loop

- ✓ Trace information and control action through measurement, controller, final control element, and process.
- ✓ Distinguish controlled variables, manipulated variables, disturbances, and setpoints.
- ✓ Analyze how individual loop components influence the overall process response.

Understanding Process Dynamics

- ✓ Examine process gain, time constant, dead time, and their effects on controllability.
- ✓ Compare fast, slow, self-regulating, and integrating process behavior.
- ✓ Complete a Process Response Analysis using different operating trends.

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Course Outline

✓ DAY 02

Understanding PID Control Actions

Applying Proportional and Integral Control

- ✓ Examine how proportional action responds to control errors.
- ✓ Understand integral action and its role in eliminating sustained offset.
- ✓ Analyze the effects of excessive or insufficient proportional and integral action.

Using Derivative and Combined PID Control

- ✓ Understand derivative action and its response to changing process conditions.
- ✓ Compare P, PI, PD, and PID control according to process requirements.
- ✓ Complete a PID Behavior Challenge by predicting loop response to controller changes.

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Course Outline

✓ DAY 03

Tuning PID Control Loops

Establishing Effective Controller Tuning

- ✓ Identify the relationship between controller settings and process dynamics.
- ✓ Compare practical approaches for establishing initial PID settings.
- ✓ Recognize the trade-off between fast response, stability, and robustness.

Evaluating Loop Response after Tuning

- ✓ Interpret overshoot, settling time, oscillation, offset, and recovery behavior.
- ✓ Adjust controller settings based on observed process response.
- ✓ Conduct a PID Tuning Simulation across processes with different dynamic characteristics.

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Process Control & PID Loop Optimization

Course Outline

✓ DAY 04

Diagnosing Poor Control Performance

Investigating Unstable and Sluggish Loops

- ✓ Diagnose sustained oscillation, cycling, excessive overshoot, and slow recovery.
- ✓ Recognize when aggressive or weak tuning is contributing to poor performance.
- ✓ Use operating trends to identify characteristic control-loop problems.

Looking Beyond Controller Settings

- ✓ Examine measurement noise, instrument lag, valve stiction, deadband, and process disturbances.
- ✓ Distinguish genuine tuning problems from instrumentation and final-control-element limitations.
- ✓ Completing a Loop Troubleshooting Case where retuning alone does not solve the problem.

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Course Outline

✓ DAY 05

Optimizing Control Loop Performance

Improving Control under Changing Conditions

- ✓ Evaluate how operating-point changes can alter process dynamics and controller effectiveness.
- ✓ Apply practical concepts of cascade, feedforward, and other control arrangements where basic feedback control is insufficient.
- ✓ Determine when controller retuning, configuration changes, or equipment intervention is appropriate.

Proving Control Performance Improvement

- ✓ Compare process variability and response before and after optimization.
- ✓ Establish practical indicators for identifying deteriorating control-loop performance.
- ✓ Complete a PID Loop Optimization Challenge from process-response diagnosis through tuning and corrective action to verified stable performance.

Process Control & PID Loop Optimization

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Nov. 30, 2026	Dec. 4, 2026	5 days	4250.00 \$	UAE , Dubai
Jan. 4, 2027	Jan. 8, 2027	5 days	4250.00 \$	UAE , Abu Dhabi
Aug. 30, 2027	Sept. 3, 2027	5 days	4950.00 \$	England , London
June 27, 2027	July 1, 2027	5 days	4250.00 \$	KSA , Riyadh

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