



Consulting and Training | Reach New Heights

Course Name

Advanced Process Control and Loop Tuning

Sector Name

Instrumentation & Controls

Document Type

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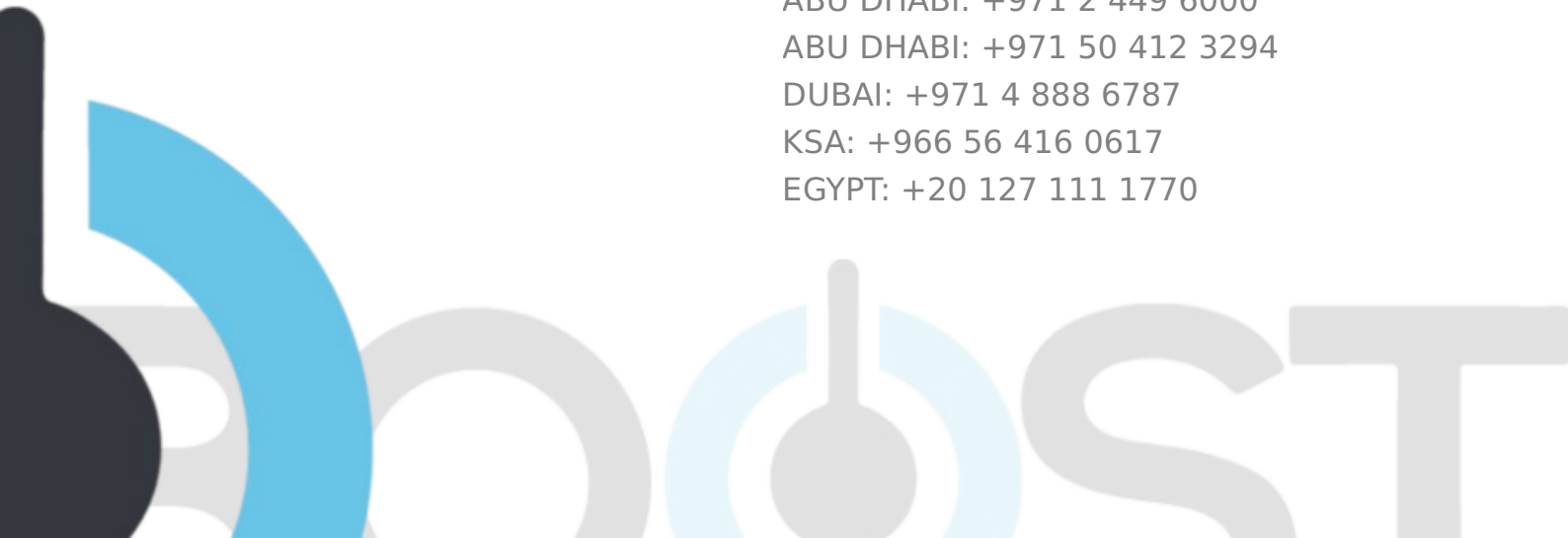
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Advanced Process Control and Loop Tuning

Course Introduction

This course offers an in-depth exploration of advanced process control strategies and loop tuning techniques to optimize industrial processes. Participants will gain a solid foundation in control theory, develop skills in implementing advanced control strategies, and enhance their understanding of dynamic behavior in process loops.

Through practical examples, case studies, and hands-on exercises, attendees will be equipped with the necessary tools to optimize process performance, improve efficiency, and reduce variability in operations.

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Target Audience

- ✓ Process control engineers and technicians.
- ✓ Plant operators are involved in process optimization.
- ✓ Instrumentation engineers and control system specialists.
- ✓ Maintenance personnel are responsible for control systems.
- ✓ Engineers interested in improving loop tuning and control processes

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Learning Objectives

- ✓ Understand the principles of process control and its applications in industrial settings.
- ✓ Apply advanced process control techniques to optimize plant performance.
- ✓ Analyze and fine-tune control loops for improved efficiency and reduced variability.
- ✓ Troubleshoot control systems and solve common process control problems.
- ✓ Implement control strategies to enhance process stability and productivity.

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Course Outline

✓ 01 Day One

Fundamentals of Process Control

Session 1: Introduction to Process Control Concepts

- ✓ Overview of process control systems in industrial environments.
- ✓ The role of control systems in process optimization.

Session 2: Control Loop Components and Architecture

- ✓ Breakdown of control loop elements: sensors, controllers, actuators.
- ✓ Types of control loops: open-loop and closed-loop systems.

Session 3: Process Dynamics and Control Responses

- ✓ Understanding dynamic behavior in processes.
- ✓ Analyzing first-order and second-order systems.
- ✓ Time delays, process gain, and process response characteristics.

Session 4: PID Controllers and Control Algorithms

- ✓ Proportional-Integral-Derivative (PID) control theory.
- ✓ Tuning and adjustments for PID controllers.

✓ Advanced PID control techniques for optimal process stability.

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Course Outline

✓ 02 Day Two

Advanced Process Control Strategies

Session 1: Introduction to Advanced Process Control (APC)

- ✓ The need for advanced control techniques in modern plants.
- ✓ Overview of advanced control strategies: feedforward, cascade, ratio, and model predictive control (MPC).

Session 2: Feedforward and Cascade Control Systems

- ✓ Feedforward control: design and implementation.
- ✓ Cascade control: configuration and benefits.
- ✓ Practical examples of feedforward and cascade control applications.

Session 3: Model Predictive Control (MPC)

- ✓ Fundamentals of MPC and its role in dynamic systems.
- ✓ Designing MPC systems and managing constraints.
- ✓ Application of MPC for multi-variable process control.

Session 4: Case Study and Hands-On Exercises

- ✓ Real-world case studies highlighting the use of advanced control systems.

- ✓ Practical exercises on implementing and tuning APC systems.

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Course Outline

✓ 03 Day Three

Loop Tuning and Performance Optimization

Session 1: Loop Tuning Fundamentals

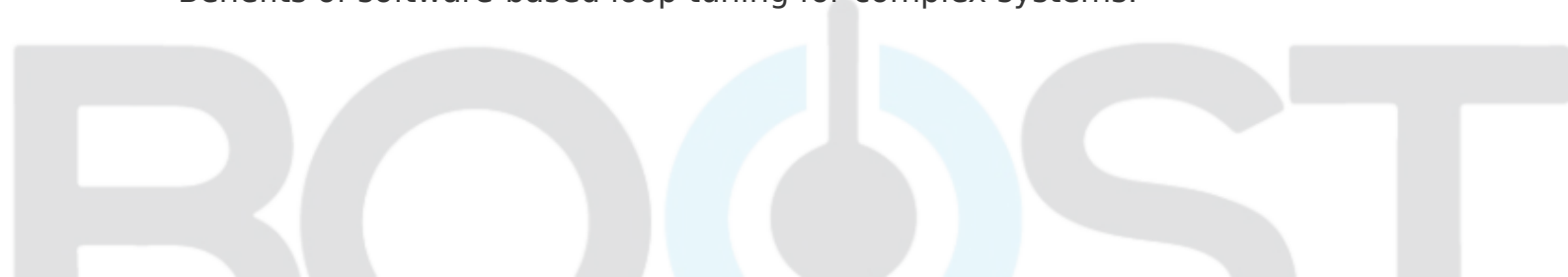
- ✓ Importance of loop tuning for process optimization.
- ✓ Basic and advanced tuning techniques.
- ✓ Criteria for evaluating control loop performance.

Session 2: Manual Tuning Techniques

- ✓ Ziegler-Nichols tuning method.
- ✓ Cohen-Coon method for loop tuning.
- ✓ Implementing tuning methods for different processes.

Session 3: Software-Based Tuning

- ✓ Introduction to tuning software and tools.
- ✓ Auto-tuning systems for PID controllers.
- ✓ Benefits of software-based loop tuning for complex systems.



Session 4: Troubleshooting Control Loop Problems

- ✓ Identifying and solving common control loop issues.
- ✓ Best practices for troubleshooting process control systems.
- ✓ Real-world examples and group problem-solving exercises.

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Course Outline

✓ **04 Day Four**

Process Control Implementation and Future Trends

Session 1: Control System Integration and Implementation

- ✓ Integration of advanced process control into existing systems.
- ✓ Managing and optimizing multi-loop control systems.

Session 2: Control System Performance Evaluation

- ✓ Tools and techniques for evaluating system performance.
- ✓ Implementing performance monitoring and continuous improvement processes.

Session 3: Emerging Trends in Process Control

- ✓ Digitalization and smart process control systems.
- ✓ Role of artificial intelligence and machine learning in control systems.
- ✓ Predictive analytics for proactive process optimization.

Session 4: Final Case Study and Wrap-Up

- ✓ Case study to integrate all concepts learned in the course.
- ✓ Group presentations and feedback.

✓ Q&A session and course summary.

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Sept. 28, 2026	Oct. 1, 2026	4 days	5950.00 \$	USA , Los Angeles
March 14, 2027	March 17, 2027	4 days	4250.00 \$	Qatar , Doha
Nov. 30, 2026	Dec. 3, 2026	4 days	4250.00 \$	UAE , Abu Dhabi
July 5, 2027	July 8, 2027	4 days	4250.00 \$	UAE , Dubai

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