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Course Name

Advanced Instrumentation Calibration Techniques

Sector Name

Instrumentation & Controls

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Advanced Instrumentation Calibration Techniques

Course Introduction

In industrial environments, accurate measurement and precise control are critical for ensuring the efficiency, safety, and reliability of processes. Engineers and technicians are often called upon to solve complex measurement and control problems by applying technical knowledge and innovative solutions.

Advanced instrumentation systems

This course provides a comprehensive understanding of the principles of sensors, transducers, and advanced instrumentation systems, as well as their integration into process control systems. Participants will gain hands-on experience in designing, building, testing, and evaluating instrumentation systems while learning modern calibration and tuning techniques.

By exploring the properties of various process variables and process control systems, participants will develop the knowledge and confidence to address measurement challenges in industrial scenarios. This practical, hands-on course ensures that theoretical studies are reinforced with real-world applications, enabling participants to apply their skills effectively in the workplace.

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Target Audience

The course is for professionals in instrumentation maintenance and calibration, including technicians, engineers, quality control personnel, and plant managers seeking to enhance system reliability.

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Learning Objectives

- ✓ Understand the principles and practical applications of a wide range of sensors and transducers.
- ✓ Gain hands-on experience in designing, building, and testing instrumentation systems, including signal conditioning circuits.
- ✓ Acquire familiarity with various measurement techniques and become confident in their application.
- ✓ Develop a solid understanding of process control concepts and the properties of process variables being measured.
- ✓ Share and broaden their knowledge base through collaborative discussions with peers.
- ✓ Learn PID control fundamentals and develop the ability to tune process control systems effectively.
- ✓ Gain the confidence to address unfamiliar and customized measurement challenges in industrial environments.

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Course Outline

✓ 01 Day One

Introduction to Sensors, Transducers, and Instrumentation Systems

- ✓ Course overview and objectives
- ✓ Introduction to sensors, transducers, and instrumentation systems
- ✓ Key terms and definitions:

Maximum error, hysteresis, repeatability, sensitivity, resolution, span, response time

- ✓ Overview of process variables
- ✓ Mass flow, volumetric flow rate, pressure, level, temperature

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Course Outline

✓ 02 Day Two

Pressure and Flow Measurement

Pressure Measurement:

- ✓ Principles and sources of pressure measurement
- ✓ Mechanical and electrical transducers
- ✓ Installation considerations and control loop impact
- ✓ Future pressure technologies and selection guides

Flow Measurement:

- ✓ Principles of flow measurement
- ✓ Types of flow meters: Differential pressure, magnetic, ultrasonic, mass flow, etc.
- ✓ Installation considerations and control loop impact
- ✓ Future flow technologies and selection guides

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Course Outline

✓ 03 Day Three

Level and Temperature Measurement

Level Measurement:

- ✓ Principles and techniques: sight glasses, buoyancy devices, ultrasonic, radar, and more
- ✓ Installation considerations and future level technologies

Temperature Measurement:

- ✓ Principles and types: thermocouples, RTDs, thermistors, non-contact pyrometers
- ✓ Installation considerations and future temperature technologies

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Course Outline

✓ 04 Day Four

Introduction to Process Control Engineering

- ✓ Overview of control strategies and components
- ✓ Servomechanisms, regulators, and block diagram representation
- ✓ Open and closed-loop systems
- ✓ Control actions: ON/OFF, proportional, integral, derivative
- ✓ PID control fundamentals and practical examples

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Course Outline

✓ 05 Day Five

Tuning PID Controllers

- ✓ Stability and system response analysis
- ✓ Bode and Nyquist plots
- ✓ Load disturbances and offsets

Empirical tuning methods:

- ✓ Open-loop reaction curve (Ziegler-Nichols)
- ✓ Closed-loop continuous cycling (Ziegler-Nichols)

Fine-tuning techniques

- ✓ Practical activity: PID tuning using real-world control systems

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
April 26, 2027	April 30, 2027	5 days	4250.00 $	UAE , Dubai
March 14, 2027	March 18, 2027	5 days	4250.00 $	Bahrain , Manama
Oct. 26, 2026	Oct. 30, 2026	5 days	4250.00 $	UAE , Dubai
Aug. 9, 2027	Aug. 13, 2027	5 days	5950.00 $	USA , Los Angeles

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