MERCURY

Industrial Instrumentation and Modern Control Systems Workshop

28 December 2026 – 1 January 2027
Nairobi (Kenya)



Dubai - UAE: +971 4 450 5697
Istanbul - Türkiye: +90 539 599 1206
Amman - Jordan: +962 79 712 3347

Industrial Instrumentation and Modern Control Systems Workshop

Ref: 15802_1066546 **Date:** 28 December 2026 – 1 January 2027 **Location:** Nairobi (Kenya) **Fees:** 5300 Euro

Introduction:

Engineers' and technicians' expertise is crucial in an industrial setting where the precise measurement and control of various process parameters are essential. A fundamental grasp of the operation of sensors/transducers and instrumentation techniques and a working knowledge of Process Control methods and tuning procedures make professionals invaluable to their organizations.

This Industrial Instrumentation and Control Systems workshop will allow participants to delve into instrumentation and measurement, gaining insights into variables' characteristics and properties. Delegates will learn about the process control systems and methods utilized in contemporary industrial systems.

This hands-on Industrial Instrumentation and Control Systems training will be supplemented with practical activities wherever possible, ensuring the delegates can design, develop, construct, test, and evaluate their instrumentation systems according to theoretical studies.

The Industrial Instrumentation and Control Systems Workshop provides an in-depth exploration of industrial instrumentation and control systems, focusing on the fundamentals of industrial instrumentation and process control. Participants will learn how industrial instrumentation and control systems are designed to monitor and control processes efficiently.

This Industrial Instrumentation and Control Systems workshop is ideal for industrial instrumentation technicians and those interested in industrial instrumentation training. It offers insights into the operation and maintenance of control systems. Understanding industrial instrumentation and control to improve industries' process accuracy, safety, and productivity.

Understanding Industrial Instrumentation and Control:

Understanding and mastering industrial instruments, controls, and systems are vital in today's dynamic industrial environments. This Industrial Instrumentation and Control Systems workshop encompasses the comprehension of industrial instrumentation and control and the fundamentals of industrial instrumentation and process control.

Industrial instrumentation technicians are critical in maintaining, operating, and improving these systems. They often participate in an industrial instrumentation training program to enhance their skills. Engineers, plant management, and technicians collaborate to ensure seamless process control and measurement using the latest industrial instrumentation and control techniques.

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Targeted Groups:

- Plant Management Personnel
- Engineers from all disciplines
- Processing Control Technicians
- Instrumentation Artisans
- Supervisors
- Individuals engaged in Projects.
- Those involved with Instrumentation Equipment Selection
- Safety Department Representatives
- Purchasing Department Representatives
- Anyone with more than a passing interest in instrumentation

Workshop Objectives:

By the end of this Industrial Instrumentation and Control Systems workshop, the participants will:

- Understand the operating principles of a variety of sensors and transducers.
- Through hands-on exercises, investigate the functioning of an instrumentation system by designing, building, and testing sensor systems with appropriate signal conditioning.
- Become comfortable with various measurement techniques.
- Comprehend Process Control concepts and become acquainted with the properties of process variables.
- Share and disseminate experience and knowledge in open session discussions, enhancing the collective knowledge base.
- Gain familiarity with PID control and develop proficiency in tuning a process control system using PID techniques.
- Apply the learned techniques and principles to address unique measurement challenges in the workplace.
- Assess and choose the most appropriate sensor technology for an instrumentation system.
- Design, build, and test instrumentation systems to meet specific requirements
- Identify components and characteristics of a Process Control system.
- Calibrate and condition signals and take precise measurements from the system.

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Targeted Competencies:

Upon the end of this Industrial Instrumentation and Control Systems workshop, the participants will:

- Introduction to Instrumentation systems and Process variables. Symbols, units, and sample calculations.
- Temperature Measurement Techniques.
- Strain measurement.
- Exploration of Pressure and Flow Measurement.
- Understand ultrasonic techniques for non-invasive process measurement.
- Design, build, calibrate, and signal condition various sensor applications through practical activities.

Workshop Content:

Unit 1: Introduction to Sensors, Transducers, and Instrumentation Systems:

- Overview of Sensors, Transducers, and Instrumentation Systems.
- Provide examples.
- Terms and definitions linked to Instrumentation systems, including:
    - Maximum error.
    - Hysteresis.
    - Repeatability.
    - Sensitivity.
    - Resolution.
    - Span.
    - Response time.
- Discussion of Process Variables such as:
    - Mass flow.
    - Volumetric flow rate.
    - Pressure.
    - Viscosity.
    - Turbidity.

Unit 2: Strain, Pressure, and Flow Measurement:

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- Fundamental principles of strain measurement are tension, compression, stress, strain, and young modulus.
- Operate principles, applications, and installation considerations of different gauge types.
- Basics of Pressure measurement.
- Operating principles, applications, and installation considerations for:
    - Diaphragms.
    - Bellows.
    - Capacitive devices.
    - Fiber Optic pressure measurement techniques.
- Fundamentals of flow measurement.
- Concepts such as Reynolds number.
- The principle of operation, application, and installation considerations of Invasive types like:
    - Coriolis Flowmeters.
    - Differential Pressure type flowmeters.
    - Orifice plate.
    - Venturi tube.
    - Flow nozzle.
    - Dall flow tube.
    - Electromagnetic flowmeters.

Unit 3: Temperature, Level, and Non-Invasive Ultrasonic Measurement Techniques:

- Understand temperature scales.
- The operating principles, applications, and installation considerations of:
    - Resistance Temperature Detectors RTD's.
    - Thermistors.
    - Thermocouples.
    - Radiation Pyrometers.
- Principles of Single-Point and Continuous-Level Measurement Techniques.
- Direct and Indirect Level Measurement Techniques.
- The operating principles, applications, and installation considerations for:
    - Ultrasonic techniques.
    - Capacitive techniques.
    - Pressure techniques.
- Principles and Applications of Ultrasonic Techniques for Non-Invasive Measurement.
- Explanation of Doppler Shift and Transit Techniques and Ultrasonic Flowmeters.

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Unit 4: Introduction to Process Control Engineering:

- Overview of Control Strategies.
- Representation using block diagrams.
- Explore control components.
- Understanding Servomechanisms and Regulators.
- Differentiate between Open and closed-loop systems.
- Discussion on Negative Feedback NFB.
- Explain Transfer Functions for 1st and 2nd order systems.
- Connection Between Transfer Functions and Closed-Loop Systems.
- Examination of ON/OFF control, Two-step control action, Proportional control, including aspects like:
    - Proportional band vs. proportional gain.
    - Proportional offset.
- Understand Reset Integral action and challenges like Integral windup.
- Explore Derivative action and PID control.

Unit 5: Tuning PID Controllers:

- Evaluating Stability and System Response.
- Use the Bode plot and Nyquist plot for analysis.
- Investigate Load disturbances and offset.
- Learning Empirical methods of setting Controllers, including:
    - Open-Loop Reaction Curve Method Ziegler-Nichols.
    - Default and Typical Settings.
- Explore the Closed-Loop continuous cycling method Ziegler-Nichols.
- Techniques for Fine-tuning controllers.