

Industrial Process Measurement and Control Training

Description

Course Description

This course provides an overview of industrial measurement and control. Technicians, engineers, and managers are provided with fundamentals to more effectively communicate with other control system professionals.This course teaches a systematic approach to troubleshooting and start-up as they apply to single and multi-loop control loops.Covers how pressure, level, flow, and temperature loops operate to maintain good process control systems.

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Course Objective

Participant will be able to:

- Communicate the latest trends in measurement and control
- Understand the role of measurement and control in industrial processes
- Compare continuous, batch, and discrete control and how they are used in industry
- Interpret measurement and control terminology
- Compare the methods and devices used in temperature, pressure, level, flow measurement
- Understand the operation and components of a feedback control loop
- Understand the fundamental concepts of controller tuning
- Compare different control system architectures including single loop controllers, DCS, and PLCs
- Understand why a systematic approach to troubleshooting is most effective
- Follow specified procedures for proper loop check-out
- Verify, locate, and identify performance problems and the causes of the problems
- Take or recommend appropriate follow-up procedures to minimize problem recurrence
- Identify the common causes of sensor, transmitter, controller, and final control element problems
- Troubleshoot control systems
- Apply DCS functions for troubleshooting
- Understand pneumatic and electronic loops
- Apply safety practices for start-up
- Check and utilize control loop documentation

Course Outline

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Process Control Concepts:

- Continuous,
- Batch,
- Discrete Control,
- The Role of Measurement and Control in Industry,
- Graphic Description of Loop Components,
- Component Loop Dynamics

Industrial Measurement Systems:

- Overview,
- Sensor Selection and Characteristics,
- Transmitters,
- Smart Transmitters

Pressure Measurements:

- Concepts,
- Instruments,
- Differential Pressure Measurement

Level Measurement:

- Concepts,
- Hydrostatic Head Level Measurement,

- Capacitance Level Measurement,
- Ultrasonic Level Measurement,
- by Weight

Flow Measurement:

- Fluid Fundamentals,
- Methods and Concepts,
- Differential Head Flow Measurement,
- Velocity Flow Measurement Devices,
- Mass Flowmeters

Temperature Measurement:

- Concepts,
- Thermometers,
- Thermocouples,
- RTDs & Thermistors,
- Temperature Transmitters

Industrial Process Control:

- Basic Feedback Control,
- Components,
- PID Control,
- Final Control Elements,
- Tuning Concepts

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Trends in Control Technologies:

- Smart Components,
- Fieldbus.

Approaches to Troubleshooting:

- Purpose of Troubleshooting,
- Reasons for Troubleshooting Equipment History,
- Input/Output (Serial) | Shotgun Approach,
- Logical Analysis

Logical Analysis Troubleshooting:

- Verify, Identify, Repair and Test.
- Follow-up on Problems

Single-Loop Feedback Control Troubleshooting:

- Measurement Concerns,
- Controller Operations,

- Signal Conditioners,
- Troubleshooting Simulation

Multi-Loop Control Systems Troubleshooting:

- Ratio (Two Controlled Streams, Wild Stream),
- Cascade,
- Three-Element Control,
- Troubleshooting Simulation

Introduction to Digital Control Systems:

- Advantages,
- Digital Control (DDC),
- Supervisory DC,
- Supervisory Plus DDC,
- Analog Back-up

Distributed Control Functions for Troubleshooting:

- Elements,
- Displays (Graphic, Trend, Alarm)

Start-up Concerns:

- Safety, Documentation, and tuning Review

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