



Consulting and Training | Reach New Heights

Course Name

Fault Diagnosis and Troubleshooting in Control Systems

Sector Name

Instrumentation & Controls

Document Type

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Fault Diagnosis and Troubleshooting in Control Systems

Course Introduction

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. Knowledge of instrumentation and control is assumed.

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Fault Diagnosis and Troubleshooting in Control Systems

Target Audience

- ✓ Instrumentation and control engineers and technicians
- ✓ Design, installation, and maintenance engineers and technicians in the process industries
- ✓ System integrators
- ✓ System consultants

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Fault Diagnosis and Troubleshooting in Control Systems

Learning Objectives

- ✓ 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 the control loop documentation
- ✓ Diagnose and solve problems related to single-loop control loops
- ✓ Diagnose and solve problems with ratio, cascade, and three-element control loops
- ✓ Diagnose problems using DCS displays for information
- ✓ Construct and tune a feedback control loop

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Fault Diagnosis and Troubleshooting in Control Systems

Course Outline

✓ **01 Day One**

Learning to Troubleshoot

- ✓ Experience
- ✓ Apprenticeships
- ✓ Mentoring
- ✓ Classroom Instruction
- ✓ Individual Study
- ✓ Logic and Logic Development

The Basics of Failures.

- ✓ Definition of Failure
- ✓ How Hardware Fails
- ✓ How Software Fails
- ✓ Environmental Effects on Failure Rates
- ✓ Functional Failures
- ✓ Systematic Failures
- ✓ Common-cause Failures
- ✓ Root-cause Analysis

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✓ 02 Day Two

Failure States

- ✓ Overt and Covert Failures
- ✓ Directed Failures
- ✓ Directed Failure States
- ✓ What Failure States Indicate

Logical/Analytical Troubleshooting Frameworks

- ✓ Logical/Analytical Troubleshooting Framework
- ✓ Specific Troubleshooting Frameworks
- ✓ How a Specific Troubleshooting Framework Works
- ✓ Generic Logical/Analytical Frameworks
- ✓ A Seven-step Procedure
- ✓ Examples of How to Use the Seven-Step Procedure
- ✓ Vendor Assistance Advantages and Pitfalls
- ✓ Why Troubleshooting Fails

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Course Outline

✓ 03 Day Three

Troubleshooting Methods

- ✓ Why Use Other Troubleshooting Methods?
- ✓ Substitution Method
- ✓ Fault Insertion Method
- ✓ “Remove and Conquer” Method
- ✓ “Circle the Wagons” Method
- ✓ Trapping
- ✓ Complex to Simple Method
- ✓ Consultation
- ✓ Intuition
- ✓ Out-of-the-Box Thinking

Safety

- ✓ General Troubleshooting Safety Practices
- ✓ Human Error in Industrial Settings
- ✓ Plant Hazards Faced During Troubleshooting
- ✓ Troubleshooting in Electrically Hazardous (Classified) Areas
- ✓ Protection, Procedures, and Permit Systems

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✓ 04 Day Four

Tools and Test Equipment

- ✓ Hand Tools
- ✓ Contact-type Test Equipment
- ✓ Noncontact Test Equipment
- ✓ Simulators/Process Calibrators
- ✓ Jumpers, Switch Boxes, and Traps
- ✓ Documenting Test Equipment and Tests
- ✓ Accuracy of Test Equipment

Troubleshooting Scenarios

- ✓ Mechanical Instrumentation
- ✓ Process Connections
- ✓ Pneumatic Instrumentation
- ✓ Electrical Systems
- ✓ Electronic Systems
- ✓ Valves
- ✓ Calibration
- ✓ Programmable Electronic Systems
- ✓ Communication Loops
- ✓ Transient Problems
- ✓ Software

- ✓ Flow Meters
- ✓ Level Meters

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Course Outline

✓ 05 Day Five

Troubleshooting Hints

- ✓ Mechanical Systems
- ✓ Process Connections
- ✓ Pneumatic Systems
- ✓ Electronic Systems
- ✓ Grounding
- ✓ Calibration Systems
- ✓ Tools and Test Equipment
- ✓ Programmable Electronic Systems
- ✓ Serial Communication Links (Loops)
- ✓ Safety Instrumented Systems (SIS)
- ✓ Critical Instrument Loops
- ✓ Electromagnetic Interference
- ✓ Valves
- ✓ Miscellaneous

Aids to Troubleshooting

- ✓ Maintainability
- ✓ Drawings
- ✓ Tagging and Identification
- ✓ Equipment Files

- ✓ Manuals
- ✓ Maintenance Management Systems
- ✓ Vendor Technical Assistance
- ✓ Direct Vendor Access
- ✓ Maintenance Contracts

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 15, 2026	June 19, 2026	5 days	4250.00 \$	UAE , Dubai
Aug. 10, 2026	Aug. 14, 2026	5 days	4950.00 \$	Italy , Milan
Dec. 7, 2026	Dec. 11, 2026	5 days	4250.00 \$	UAE , Abu Dhabi
March 14, 2027	March 18, 2027	5 days	4250.00 \$	KSA , Riyadh

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