CALIBRATING AND MONITORING CONTROL SYSTEMS USING SIMULATORS

ICE135
Instrumentations
& Control
Engineering

TRAINIT
ACADEMY

COURSE TITLE

CALIBRATING AND MONITORING CONTROL SYSTEMS USING SIMULATORS

COURSE DATE/VENUE

13th – 17th Jul 26'

London, U.K.

COURSE REFERENCE

ICE135

COURSE DURATION

05 Days

DISCIPLINE

Instrumentations & Control Engineering

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. A knowledge of instrumentation and control is assumed.

COURSE OBJECTIVE

- Monitor, maintain & configure different types of control systems (eg PLC, DCS, SCADA)
- Apply tuning concepts for controllers
- 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
- 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
- Troubleshoot several single loop control systems

COURSE AUDIENCE

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

COURSE CONTENT

DAY 1:

Ch.1: Learning to Troubleshoot

1.1 Experience

1.2 Apprenticeships

1.3 Mentoring

1.4 Classroom Instruction

1.5 Individual Study

1.6 Logic and Logic Development

Ch. 2: The Basics of Failures.

2.1 Definition of Failure

2.2 How Hardware Fails

2.3 How Software Fails

2.4 Environmental Effects on Failure Rates

2.5 Functional Failures

2.6 Systematic Failures

2.7 Common-cause Failures

2.8 Root-cause Analysis

DAY 2:

Ch. 3: Failure States

3.1 Overt and Covert Failures

3.2 Directed Failures

3.3 Directed Failure States

3.4 What Failure States Indicate

Ch. 4: Logical/Analytical Troubleshooting Frameworks

4.1 Logical/Analytical Troubleshooting Framework

4.2 Specific Troubleshooting Frameworks

4.3 How a Specific Troubleshooting Framework Works

4.4 Generic Logical/Analytical Frameworks

4.5 A Seven-step Procedure

4.6 Examples of How to Use the Seven-step Procedure

4.7 Vendor Assistance Advantages and Pitfalls

4.8 Why Troubleshooting Fails

DAY 3:

Ch. 5: Other Troubleshooting Methods

5.1 Why Use Other Troubleshooting Methods?

5.2 Substitution Method

5.3 Fault Insertion Method

5.4 "Remove and Conquer" Method

5.5 "Circle the Wagons" Method

5.6 Trapping

5.7 Complex to Simple Method

5.8 Consultation

5.9 Intuition

5.10 Out-of-the-Box Thinking

Ch. 6: Safety

6.1 General Troubleshooting Safety Practices

6.2 Human Error in Industrial Settings

6.3 Plant Hazards Faced During Troubleshooting

6.4 Troubleshooting in Electrically Hazardous (Classified) Areas

6.5 Protection, Procedures, and Permit Systems

DAY 4:

Ch. 7: Tools and Test Equipment

7.1 Hand Tools

7.2 Contact-type Test Equipment

7.3 Noncontact Test Equipment

7.4 Simulators/Process Calibrators

7.5 Jumpers, Switch Boxes, and Traps

7.6 Documenting Test Equipment and Tests

7.7 Accuracy of Test Equipment

Ch. 8: Troubleshooting Scenarios

8.1 Mechanical Instrumentation

8.2 Process Connections

8.3 Pneumatic Instrumentation

8.4 Electrical Systems

8.5 Electronic Systems

8.6 Valves

8.7 Calibration

8.8 Programmable Electronic Systems

8.9 Communication Loops

8.10 Transient Problems

8.11 Software

8.12 Flow Meters

8.13 Level Meters

DAY 5:

Ch. 9: Troubleshooting Hints

9.1 Mechanical Systems

9.2 Process Connections

9.3 Pneumatic Systems

9.4 Electronic Systems

9.5 Grounding

9.6 Calibration Systems

9.7 Tools and Test Equipment

9.8 Programmable Electronic Systems

9.9 Serial Communication Links (Loops)

COURSE CERTIFICATE

TRAINIT ACADEMY will award an internationally recognized certificate(s) for each delegate on completion of training.

COURSE FEES

£5,500 per Delegate. This rate includes participant's manual, Hand-Outs, lunch, coffee/tea on arrival, morning & afternoon of each day.

COURSE METHODOLOGY

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions