

Training Title

ADVANCED TROUBLESHOOTING OF INSTRUMENTATION AND CONTROL SYSTEM

Training Duration

5 days

Training Date & Venue

REF IC021	Advanced Troubleshooting of Instrumentation & Control System	5	17 – 21 June	\$5,000	Dubai, UAE
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In any of the 5 star hotels. Exact venue will be informed upon finalizing.

Training Fees

- 4,250 US\$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

Language: English

TRAINING DESCRIPTION:

This 5 days 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.

WHO SHOULD ATTEND?

- 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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TRAINING OBJECTIVES:

Upon completion of this course, participants will gain the following:

- 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

THIS COURSE WILL COVER:

- Introduction: Purpose of Troubleshooting | Reasons for Troubleshooting
- Approaches to Troubleshooting: Equipment History | Input/Output (Serial) | Shotgun Approach | Logical Analysis
- Logical Analysis Troubleshooting: Verify | Identify | Repair | Test | Follow-up on Problems
- Review Standard Diagrams and Symbols: Process and Instrument Drawings | Loop Drawings | Safety Logic
- 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 | Tuning Review

TRAINING METHODOLOGY:

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. 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.

Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises

- 20% Videos& General Discussions

COURSE OUTLINES:

Chapter 1: Troubleshooting

- 1.1) Purpose of Troubleshooting
- 1.2) Troubleshooting Reasons
- 1.3) Bottom Line
- 1.4) What Are You Expected to Troubleshoot?
- 1.5) Troubleshooting Skills Dependent On
- 1.6) Approaches to Troubleshooting
- 1.7) Equipment History Approach
- 1.8) Input/Output (Serial) Approach
- 1.9) Input/Output Approach
- 1.10) Shotgun Approach
- 1.11) Steps to Logical Analysis Troubleshooting
- 1.12) Verify Something Is Wrong
- 1.13) Identify and Locate the Cause of the Problem
- 1.14) Fix the Problem
- 1.15) Verify the Problem Is Corrected
- 1.16) Follow Up to Minimize Future Problems
- 1.17) Pneumatic Test Equipment
- 1.18) Electronic Test Equipment
- 1.19) Digital Test Equipment

Chapter 2: Review of Diagrams & Symbols

- 2.1) Process Control Defined
- 2.2) Other Instruments in a Feedback Control Loop
- 2.3) Instrument Line Symbols
- 2.4) General Instrument or Function Symbols
- 2.5) Identification Letters
- 2.6) Control Valve Body Symbols
- 2.7) Actuator Symbols
- 2.8) Typical Tag Numbers
- 2.9) Actuator Symbols Fail Safe
- 2.10) Instrument Identification

Chapter 3: Common Problems

- 3.1) Pressure Measurement-Common Problems

- 3.2) Level Measurement-Common Problems
- 3.3) Flow Measurement-Common Problems
- 3.4) Temperature Measurement-Common Problems
- 3.5) Common Problems: Pneumatic Transmitters
- 3.6) Common Problems: Transmitter Installation
- 3.7) Common Problems: Electronic Transmitters
- 3.8) Common Problems: Control Valves
- 3.9) Flow Problem Discussion
- 3.10) Temperature Problem Discussion
- 3.11) Level Loop Problem Discussion
- 3.12) Pressure Loop Problem Discussion

Chapter 4: System Tuning Review

- 4.1) Ziegler/Nichols Closed Loop Tuning
- 4.2) Formulas for Open Loop (in Manual)
- 4.3) Alternate Process for Open Loop
- 4.4) Procedure 1 (Closed Loop) Discussion
- 4.5) Procedure 2 (Closed Loop) Discussion
- 4.6) Procedure 3 (Open Loop) Discussion

Chapter 5: Start-Up

- 5.1) Safety Start-up Concerns
- 5.2) Start Up Documentation
- 5.3) Process Start-Up Familiarity

Chapter 6: Multi-Loop Control Systems

- 6.1) Ratio Control Defined
- 6.2) Ratio Control (Two Controlled Streams)
- 6.3) Wild Stream Ratio Control
- 6.4) General Features of a Cascade Control System
- 6.5) Heat Exchanger: Single Loop
- 6.6) Heat Exchanger: Cascade Control
- 6.7) Ratio Control Problem Discussion
- 6.8) Cascade Control Problem Discussion
- 6.9) Three Element System Problem Discussion

Chapter 7: Digital Control Introduction

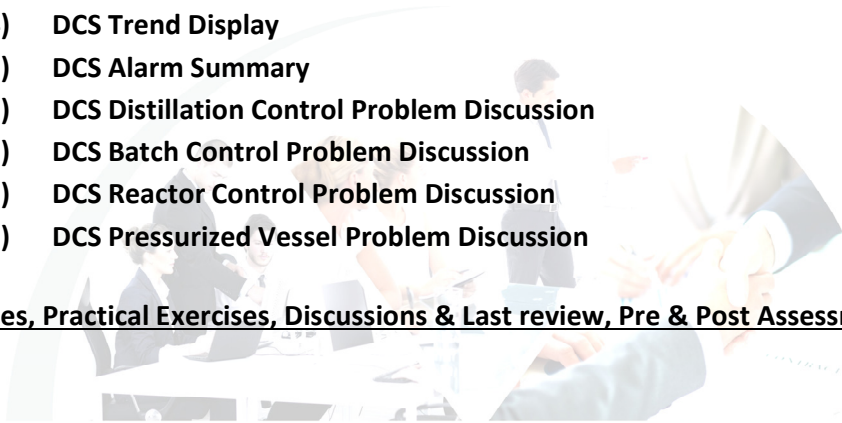
- 7.1) How the Computer Works....

- 7.2) Electronic Language - The Binary System*
- 7.3) A Comparison!
- 7.4) Advantages of Digital Control Systems
- 7.5) Direct Digital Control (DDC)

Chapter 8: Troubleshooting DCS

- 8.1) Distributed Control System
- 8.2) Elements of a Distributed Control System
- 8.3) DCS Graphic Display
- 8.4) DCS Trend Display
- 8.5) DCS Alarm Summary
- 8.6) DCS Distillation Control Problem Discussion
- 8.7) DCS Batch Control Problem Discussion
- 8.8) DCS Reactor Control Problem Discussion
- 8.9) DCS Pressurized Vessel Problem Discussion

Case Studies, Practical Exercises, Discussions & Last review, Pre & Post Assessments will be carried out



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