



Instrumentation & Controls

Distributed Control System (DCS) **Application, Operation & Troubleshooting**

Course Introduction

Distributed Control Systems is being extensively used in oil and gas, petrochemicals, power, steel and cement industries for monitoring, regulatory and sequential control, interlocks, advance process control, optimization, alarms and sequence of events recording, and various other tasks. These are operated either in standalone mode and or they are interfaced with Safety Systems, SCADA, and PLC for enhanced functionality. In most of the applications today DCS is being used as an interface between plant level automation and office automation.

Maintenance engineers

The applications of DCS are ever increasing with emphasis on automation for the improvement of productivity, quality and safety. This course is developed especially for the design, project, commissioning, installation, and maintenance engineers and also for the programmers, field engineers and supervisors dealing with DCS design, operation and maintenance. This course aims to build a good understanding about the basics of DCS and it focuses on providing the practical aspects of DCS commissioning and troubleshooting. A special emphasis on real life implementations, case studies and international standards would ensure participants to co-relate the theory with their day to day practice. A brief introduction to advance process control and optimization would help the participants to enhance their exposure related to control pyramid and interface to office automation systems.

Target Audience

- Control & Instrumentation Engineer
- Controls Technologist
- Instrumentation Technician / Systems Control Tech
- Senior Control & Instrumentation Engineer
- Maintaining Equipment Engineer
- Facilities I&E / Controls Engineer

- Offshore Instrumentation Engineer

Learning Objectives

- participants will be able to understand the principles of maintenance and troubleshooting of (DCS) hardware and software, diagnose (DCS) component status, and also manage and respond to process interface including Operation and Monitoring.
- To be able to program, to develop monitoring interface system.
- Engineering programming including Function Block and Human Machine Interface , access operator interface display, to manipulate various control modules, operate system trending, manage and respond to process alarm/event, monitor process performance, view real-time and historical trend data, diagnose (DCS) component status, etc.

Course Outline

- **01 Day One**

- Module (01) Review of Classic Computer Control with Analog System:**

- 1.1 Supervisory set point control
 - 1.2 Direct Digital Control
 - 1.3 Computer /Manual & Computer /Manual /Automatic Station
 - 1.4 Pulse count / pulse Duration computer I/Q

- Module (02) Evolution to DCS:**

- 2.1 DCS versus SCADA and PLC System
 - 2.2 The microprocessor and networking technologies
 - 2.3 Evolution to DCS (continued)

- **02 Day Two**

Module (03) Basic DCS Architecture:

- 3.1 Levels of communication
- 3.2 Controllers, I/Q
- 3.3 Operator consoles (HMI)
- 3.4 Security (redundancy, single loop integrity, etc)
- 3.5 Error checking and reporting

Module (04) Network technologies:

- 4.1 Polling, Token Ring
- 4.2 Exception Reporting

• 03 Day Three

Module (05) Controllers:

- 5.1 Basic Control
- 5.2 Basic Control Theory
- 5.3 Types of DCS controller
 - 5.3.1 Single / Dual loop
 - 5.3.2 Multi loop
 - 5.3.3 Redundancy Schemes
 - 5.3.4 CPU, Memory, Function Code libraries
 - 5.3.5 Multi Tasking, scanning priorities, rates
 - 5.3.6 I/Q Data bus control
 - 5.3.7 Peer to peer communication
 - 5.3.8 Communication with HMI
 - 5.3.9 Control Algorithms, function codes
 - 5.3.10 Tag Driven vs. Address Driven systems
 - 5.3.11 Configuration Tools
 - 5.3.12 Controllers Maintenance
 - 5.3.13 Controllers Troubleshooting & Repair

Module (06) Process Control Units:

- 6.1 I/Q Backplanes
- 6.2 Communication Modules
- 6.3 Network Redundancy
- 6.4 I/Q Types
- 6.5 I/Q Redundancy
- 6.6 Intrinsic Safety
- 6.7 Active & passive barriers
- 6.8 Other techniques

• 04 Day Four

Module (07) Operator Interface (HMI):

- 7.1 Process Display
- 7.2 Graphic Displays
- 7.3 Faceplate Displays
- 7.4 Trend Displays
- 7.5 Alarm Displays
- 7.6 Historical Displays
- 7.7 Operator Keyboards
- 7.8 Layout, functionality
- 7.9 Pointing devices
- 7.10 Touchscreen
- 7.11 Mouse, Trackball

Module (08) Operator Interface Architecture:

- 8.1 Graphical configuration
- 8.2 Historical Database
- 8.3 Trending system (Real time, historical)
- 8.4 Scanning, polling, exception reports
- 8.5 Open system (Upper network connection)

• 05 Day Five

Module (09) Interfacing to the DCS:

- 9.1 Computer Interface
- 9.2 Data throughput rates
- 9.3 Communication standards
- 9.4 Drivers
- 9.5 PLC Interfaces
- 9.6 Drivers
- 9.7 OPC Standard
- 9.8 Types of data
- 9.9 Batch controller interfacing
- 9.10 Recipes
- 9.11 Batch languages
- 9.12 Partitioning between computer and controller (recipe storage)
- 9.13 Power system integrity
- 9.14 Configuration retention
- 9.15 Initialization, synchronization of system after lose of the power

Module (10) System Diagnostics:

- 10.1 Error message
- 10.2 Problem isolation
- 10.3 Error message
- 10.4 Problem isolation

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 23, 2025	June 27, 2025	5 days	4950.00 \$	Spain - Madrid
Sept. 15, 2025	Sept. 19, 2025	5 days	4250.00 \$	UAE - Dubai
Dec. 8, 2025	Dec. 12, 2025	5 days	4250.00 \$	UAE - Abu Dhabi
Feb. 10, 2025	Feb. 14, 2025	5 days	4250.00 \$	UAE - Dubai