KOENIG
step forward

KOENIG SOLUTIONS · COURSE OUTLINE

DCS: HMI, Fieldbus & SCADA Integration

Learn to configure, operate and troubleshoot DCS systems, integrating HMI, fieldbus networks and SCADA for industrial process control.

5 Days
DURATION

40
TOPICS

COURSE OVERVIEW

This course provides a comprehensive exploration of Distributed Control Systems (DCS) within the context of industrial process control, offering hands-on insights into system architecture, configuration, operation, and maintenance. Emphasizing both foundational and advanced DCS principles, participants will develop an understanding of sensors, control algorithms, human-machine interfaces (HMI), network communication standards, and maintenance troubleshooting. The course also introduces the latest trends in DCS, including integration with the Internet of Things (IoT) and cloud processing for real-time remote monitoring.

WHO THIS COURSE IS FOR

This course is designed for engineers, technicians, and professionals working in process control, automation, and instrumentation fields

It is also beneficial for those involved in DCS operation, maintenance, and system integration within industries such as oil & gas, manufacturing, and chemical processing

PREREQUISITES

- Participants should have a fundamental understanding of process control principles and basic knowledge of industrial control systems, including sensors, instrumentation, and PLCs.

LEARNING OBJECTIVES

Upon completion of this course, participants will be able to:

- Understand and apply core process control algorithms, including PID control
- Identify and analyze the structure, configuration, and functions of DCS
- Set up and configure DCS components for various industrial processes
- Operate and troubleshoot DCS systems, ensuring optimal functionality
- Apply alarm management, record logging, and trend analysis within DCS environments
- Leverage advanced control methods and understand modern DCS integration with IoT and cloud-based systems

COURSE SYLLABUS

40 Topics

DAY 1 Review of Process Control and Introduction to DCS

TOPICS

- Overview of Sensors, Instrumentation, and Process Control Systems
- **Control Algorithms:** P, PI, PID

INTRODUCTION TO DISTRIBUTED CONTROL SYSTEMS (DCS)

- Overview, Features, Advantages, and Applications
- DCS Functions, Architecture, I/O, Components, Hardware, and Software
- Brief Overview of Programmable Logic Controllers (PLC) and Supervisory Control
- Supervisory Control and Data Acquisition (SCADA) Basics
- **Comparison:** DCS, PLC, and SCADA

DAY 2 DCS Configuration and Networking

TOPICS

- DCS Structure and Configuration
- DCS Block Diagrams, Redundancy Concepts

DCS HARDWARE AND SOFTWARE INTERNALS

- Process Variables, Software Variables, Tags
- Human-Machine Interface (HMI)
- Alarms, Trends, Databases
- Basic DCS Controller Configuration for Batch and Continuous Processes
- Hierarchical Control Structures: ISA-95
- Data Communications and Networking, Signal Transmission
- Network Structures, Communication Standards
- **Fieldbus Operation:** Foundation Fieldbus, Profibus
- Wide Area Network (WAN) Communication: Modbus
- Control in the Field (CIF)
- DCS Applications and Case Study (Oil & Gas)

DAY 3 HMI, Alarms, and DCS Operation

TOPICS

- **Human-Machine Interfaces (HMI):** Introduction and Requirements
- Plant Mimic and Animation in DCS
- DCS Operator Stations and Interface Categories
- Recorders, Loggers, Trend Displays, and Data Archiving
- HMI for Control Room and Field Devices
- **Alarm Management:** Requirements and Functions
- Alarm Philosophy, Control, and Management
- DCS Operation and Operator Role
- Integration and Optimization of DCS
- DCS Configuration and Integration Techniques

DAY 4 Maintenance and Troubleshooting

TOPICS

- Maintenance Considerations and Requirements for DCS Systems
- Control Loop Calibration Procedures
- Tools and Equipment for Troubleshooting
- Troubleshooting Methods for Communication Malfunctions and Faults
- Diagnostics through DCS Modules, Programs, and Internal Variables
- Communication Fault Diagnostics

DAY 5 Advanced Process Controllers

TOPICS

- **Advanced Control Methods:** Feedforward, Cascade, and Statistical Process Control
- Basics of Advanced Process Control and Optimization
- **Latest Trends in DCS:** Field Monitoring, Industrial Internet, IoT, Mobile Devices
- **Cloud Processing:** Monitoring and Control in the Cloud

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

Classroom Training | Live Online Classes (ILO) | Fly-Me-A-Trainer (FMAT) | Flexi (Self-Paced) | 1-on-1 Training

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Talk to a learning advisor about schedules, group training and customised delivery.

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