

## Distributed Control System – DCS Design & Operation

### COURSE DESCRIPTION

The DCS is being extensively used in oil and gas, petrochemicals, power, steel and cement manufacturing/ production, packing, raw material processing etc. 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, PLC, and office automation for enhanced functionality. The applications of DCS are ever increasing with emphasis on automation for the improvement of productivity, quality and safety. This is an introductory course, which 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.

### COURSE OBJECTIVES

Upon Completion of this course the participant will be able to

- Understand Hierarchical Structure of Automation and Control Systems
- Learn DCS fundamentals and architectures
- Understand DCS programming for logic and front end displays
- Understand DCS communications, alarm management, data logging, trends and reports
- Develop skills on DCS operations using plant MIMIC
- Have knowledge on DCS Project Engineering, Design and Selection vis-à-vis applications
- Become expert on DCS installation and commissioning
- Master the art of DCS maintenance and troubleshooting
- Have a brief exposure to Advance Process Control and Optimization
- Know various DCS applications for Continuous and Batch Process Control

### WHO SHOULD ATTEND

Instrumentation, Electrical, Mechanical and Process Engineers, Project Engineers, Maintenance Engineers and Supervisors interested to work in the field of DCS/ Automation and Process Control. The course will also definitely be beneficial for the all the other department people concerned with the plant operations, production, maintenance and safety. It could be also useful for the procurement and quality personnel.

### Training Methodology

Training will be delivered through lectures and demonstration with emphasis on practical examples and case studies. Experienced instructor is provided to guide the participant using demonstrations and hands on lab exercises so that they are prepared to work confidently in the field of DCS based automation.

### THE INSTRUCTOR

Mr. Sudhir Panditrao

The faculty for this course, Mr. Sudhir Panditrao has done his graduation and masters in instrumentation engineering with specialization in process instrumentation.

During his professional career spanning 22 years, Mr. Panditrao has worked in the areas of instrumentation and automation design, detailed engineering, projects, installation and commissioning at site for variety of industry applications. He has experience of working in the Middle East as a profit center head that included international projects, sales and marketing in instrumentation and industrial packaging. He has worked as a consultant to various leading international organizations.

Mr. Panditrao has carried out training in the areas of instrumentation,

industrial automation, PLC, DCS, SCADA, advanced process control, automation project engineering etc. for many professionals, students and professors from several leading companies, engineering colleges and institutes. He has worked as an Asst. Professor with one of the leading technical institutes and has published many papers. He is associated with number of institutes as a visiting faculty and is a member of board of studies and postgraduate recognized teacher at University. He has presented a paper at IEEE Conference on Advance Process Control at Vancouver, Canada in May 2005.

### COURSE OUTLINE

#### Module 1

Evolution of Process Control/ Automation  
Continuous and Discrete Control  
Basic Concepts - Open /Close loop  
Control Loop Components and SMART Instruments  
Current Scenario - PLC, SCADA and DCS based automation  
Hierarchical Structure of Control Systems  
DCS Block Diagram, Components, Architectures, Redundancy Concepts  
DCS hardware configuration

#### Module 2

DCS programming Languages and IEC 61131  
Discrete Control  
Sequential Control  
Safety Interlocks  
Analog Control  
Continuous Process Control Application and Case Study

#### Module 3

Introduction to HMI and SCADA functionality  
Plant Mimic and Animations  
DCS Operator Stations and Operations  
Alarms Philosophy, Configuration and Management  
Development and Applications of Data Logs, Trends and Reports  
Security and Access Controls

#### Module 4

DCS Communications  
DCS Engineering  
Design/ Specifications and Selection  
Documentation and Project Engineering  
Panel and Field Wiring  
Installation and Commissioning

#### Module 5

DCS Diagnostics  
DCS Troubleshooting  
Basics of Advance Process Control and Optimization  
Batch Process Control Requirements as per ISA S88 and 21CFR 11  
Batch Process Control Application and Case Study