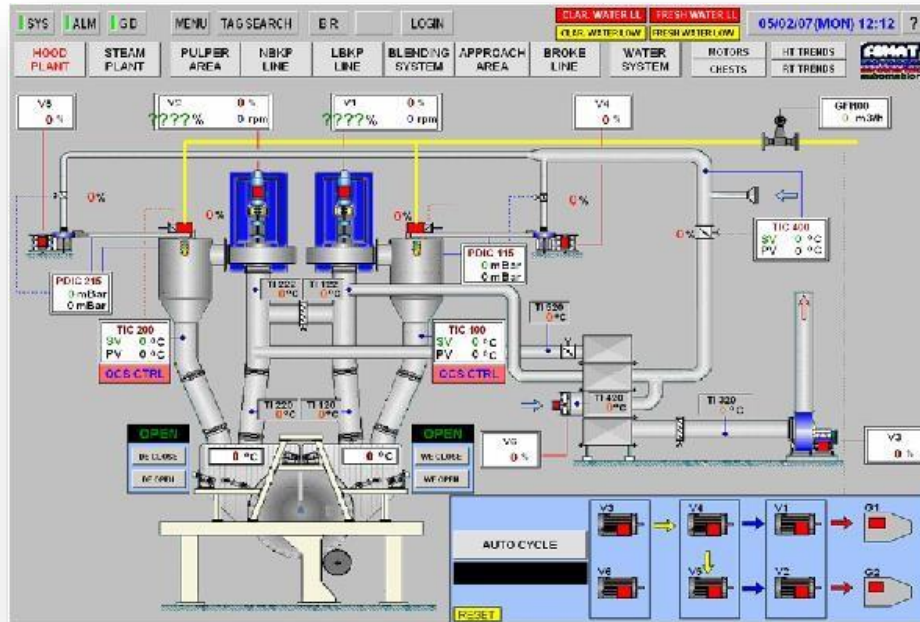




ICE058

Modern Distributed Control Systems (DCS): Practical Applications & Troubleshooting

Course Introduction:

This 5 days course will cover the **practical applications** of the modern distributed control system (DCS). Whilst all control systems are distributed to a certain extent today and there is a definite merging of the concepts of DCS, Programmable Logic Controller (PLC) and SCADA and despite the rapid growth in the use of PLC's and SCADA systems, some of the advantages of a DCS can still be said to be:

Integrity: The expected process down-time caused by a conventional DCS is significantly less than with using a SCADA/PLC. One incident in a refinery can cost more than the difference in price between a DCS and SCADA/PLC. Reasons for this would include redundancy, fault tolerance, diagnostic alarming on I/O errors, system design, and others.

Engineering time: A small SCADA/PLC system is easy to design and configure. As the system grows bigger, the effort involved to properly design and configure the system grows exponentially, and also the risks that things can go wrong. To design and implement a single loop PID controller in a SCADA/PLC is easy and quick. To design and implement the base layer control on a refinery using a SCADA/PLC can be an absolute nightmare.

This workshop examines all these issues and gives suggestions in dealing with them and whilst be no means exhaustive provides an excellent starting point for you in working with DCS's.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ A solid understanding of the architecture & operation of Distributed Control systems
- ✓ A solid understanding of the design of a simple DCS system
- ✓ Ability to design the overall DCS and process control system
- ✓ Better specification of planned DCS's
- ✓ Improved process performance for your plant
- ✓ Ability to specify, select and install DCS systems
- ✓ Understanding of the key ergonomic issues in design of operator displays
- ✓ Ability to detail the key trends underpinning modern Distributed Control Systems
- ✓ Apply advanced control strategies to your plant control system
- ✓ More effective use of your existing DCS process control capabilities
- ✓ Design and create a consistent and effective alarm philosophy for your installation
- ✓ Recognize and deal with human problems in interfacing to alarm systems
- ✓ Benchmark your alarm system performance

Who Should Attend?

This course is intended for all Process Control Engineers and Technicians, Process Control Designers and Systems Engineers, Instrumentation and control system engineers, Automation Engineers, Instrumentation Technologists and Engineers, Operations Managers, Production Engineers, Plant Engineers, Maintenance Engineers and supervisors, IT Managers working with Networks, Systems engineers, Process Engineers, Electrical engineers, Project engineers, Design engineers, Electrical and instrumentation Supervisors and technicians as well as those involved in the design, implementation and upgrading of industrial control systems who wish to gain a solid introduction to Distributed Control Systems (DCS's).

Course Outline:

Day 1:

Review of classic computer control with analog system.

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

Evolution to DCS

- DCS versus SCADA and PLC System
- The microprocessor and networking technologies

Day 2:

Basic DCS Architecture

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

Network technologies

- Polling, Token Ring
- Exception Reporting
- Others

Day 3:

Controllers

- Basic Control
 - Basic Control Theory
 - Types of DCS controller Single / Dual loop Multi loop

- Redundancy Schemes One for none for one
- Memory, Function Code libraries
- Multi-Tasking, scanning priorities, rates
- I/Q Data bus control
- Peer to peer communication
- Communication with HMI
- Control Algorithms, function codes
- Tag Driven vs. Address Driven systems
- Configuration Tools
- Controllers Maintenance
- Controllers Troubleshooting & Repair

Process Control Units

- I/Q Backplanes
- Communication Modules
- Network Redundancy
- I/Q Types
- I/Q Redundancy
- Intrinsic Safety Active & passive barriers Other techniques

Day 4:

Operator Interface (HMI)

- Process Display
- Graphic Displays
- Faceplate Displays
- Trend Displays
- Alarm Displays
- Historical Displays Operator Keyboards
- Layout, functionality
- Pointing devices Touchscreen Mouse, Trackball

Operator Interface Architecture

- Graphical configuration
- Historical Database
- Trending system (Real time, historical)
- Scanning, polling, exception reports
- Open system (Upper network connection)
- Intranet
- Internet
- Ergonomics
- Screen glare

- Operator fatigue
- Alarm management

Day 5:

Interfacing to the DCS

- Computer Interface
- Data throughput rates
- Communication standards Drivers
- PLC Interfaces Drivers OPC Standard Types of data
- Batch controller interfacing Recipes Batch languages Partitioning between computer and controller (recipe storage)
- Power system integrity Configuration retention (Nvram, eeprom, eprom, lithium cells) Initialization, synchronization of system After loss of the power

System diagnostics Error message Problem isolation

System diagnostics

Future DCS evolution and Information Technology convergence

Field controllers, Wireless communication

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods

- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per course location. This rate includes participant's manual, and-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee/Tea
08:20 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Coffee/Tea/Snacks)
13:30 - 15:00	Last Session

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