

# DCS, SCADA & FLOW COMPUTER



**ICE157**  
**Instrumentations**  
**& Control**  
**Engineering**

**COURSE TITLE****DCS, SCADA & FLOW COMPUTER****COURSE DATE/VENUE**18<sup>th</sup>-22<sup>nd</sup> Mar 24'

Singapore

**COURSE REFERENCE**

ICE157

**COURSE DURATION**

05 Days

**DISCIPLINE**

Instrumentations &amp; Control Engineering

**COURSE INTRODUCTION**

This 5 days' course will cover the practical application advantages of the modern distributed control system (DCS) and how to maximise your return on this significant investment in both hardware and software. This includes the monitoring of the effectiveness and return on the on-line process and control system performance including due diligence on system alarm management. A variety of causes and cures for how these situations occur and can be corrected will be addressed as part of the course curriculum. The course will provide you with the tools to realise how to effectively use an integrated distributed control system and consequently optimise your process and profitability.

SCADA has traditionally meant a window into the process of a plant or gathering of data from devices in the field, but now the focus is on integrating this process data into the actual business and using it in real time. The emphasis today is on using Open standards such as communication protocols (eg. IEC 60870, DNP3 and TCP/IP) and off the shelf hardware and software to keep the costs down. This course covers the essentials of SCADA systems and telemetry and radio/wireless communications.

The methods of electrical control using SCADA systems are considered one of the essential parts nowadays in most of the industries. The application of such systems of control in water facilities, electrical and of oil and gas petrochemical industries is very essential to be investigated thoroughly together with the flow computer.

### **COURSE OBJECTIVE**

**At the end of this course participants will have an understanding of:**

- Identify the main elements/ components of DCS
- Understand the architecture and operation of Distributed Control Systems (DCSs)
- Evaluate and justify potential benefits of DCS and process control system
- Specify planned DCSs
- Use your existing DCS process control capabilities more effectively
- Improve process performance for your plant
- Understand the key ergonomic issues in design of operator displays
- Apply advanced control strategies to your plant control system
- Recognize and deal with human problems in interfacing to alarm systems
- A fundamental understanding of SCADA systems
- A knowledge of the key industrial communication protocols
- How to set up industrial data communications networks
- How to troubleshoot typical SCADA and telemetry systems
- How to effectively apply SCADA System security
- Flow Computer Function
- Typical applications requiring a flow computer
- Equations come from which are solved by the flow computer
- Enhance the accuracy of flow meters
- Types of flowmeters typically use flow computers

### **COURSE AUDIENCE**

- Instrumentation and Control Engineers
- Process and Production Supervisors

- Electrical Engineers
- Consulting Engineers
- Design Engineers
- Maintenance Supervisors
- Instrumentation and Electrical Technicians

## **COURSE CONTENT**

### **Day 1:**

#### **Chapter 1: Introduction to Process Control & Instrumentation**

- Basis measurement and control concepts
- Basic performance terms and conditions
- Advanced performance terms and conditions
- Definitions
- P & ID symbols

#### **Chapter 2: Basic Control Philosophies**

- Open loops
- Closed loops
- Feed forward and ration control
- Feedback control
- Overview of different tuning rules available
- Cascade control
- Good practice in troubleshooting
- Adaptive and self-tuning controllers

### **Day 2:**

#### **Chapter 3: DCS Components & Structure**

- DCS functions and features
- Basic Elements of DCS
- DCS Components

- DCS Controllers
- Data highway & Networks
- DCS Control Console

#### **Chapter 4: DCS Configuration**

- DCS Hierarchy
- Function Blocks
- Continuous Control Loop configuration
- Digital/ Discrete Loop Configuration
- Data Hi Way Controller Configuration
- DCS Displays
- DCS Advantages and Disadvantages

#### **Chapter 5: Operator Interface**

- The operators process 'window'
- The various operator display configurations
- The requirement for keyboard entry of data
- Ergonomic requirements in the operator environment

#### **Day 3:**

#### **Chapter 6: DCS Applications/ Case Study**

- Foxboro IA Series DCS application in Oil & Gas facilities

#### **Chapter 7: BACKGROUND TO SCADA**

- Fundamentals
- Comparison of SCADA, DCS, PLC and Smart Instruments
- Typical SCADA installations
- Definition of terms

#### **SCADA SYSTEMS HARDWARE**

- Fundamentals
- Comparison of SCADA, DCS, PLC and Smart Instruments
- Typical SCADA installations
- Definition of terms
- Remote Terminal Unit (RTU) structure
- Analog and Digital input/output modules
- Application programs
- PLC's used as RTU's
- Master site structure
- Communications architectures
- Point-to-point and point-to-multipoint systems
- System reliability and availability
- Configuration of a master station

#### **Day 4:**

#### **Chapter 8: SCADA SYSTEMS SOFTWARE**

- Fundamentals
- Components of a SCADA system
- Software - Design of SCADA packages
- Configuration of SCADA systems
- Building the user interface
- Connecting to PLC's and other hardware
- SCADA system design
- The Eleven Golden Rules

#### **SCADA COMMUNICATION PROTOCOLS AND STANDARDS**

- RS-232/RS-485
- Industrial Ethernet
- Industrial Protocols such as Modbus
- TCP/IP

- IEC 60870 and DNP3 SCADA protocols
- Substation Automation protocols

### **Day 5:**

#### **Chapter 9: Flow Computer**

- Basic Technology
- What is a flow computer?
- What are the typical applications requiring a flow computer?
- What are typical uses of flow computers
- Where do the equations come from which are solved by the flow computer?
- How can you enhance the accuracy of flow meters?
- How are fluid properties determined?
- What types of flowmeters typically use flow computers?
- What other factors should be considered

#### **COURSE CERTIFICATE**

**TRAINIT ACADEMY** will award an internationally recognized certificate(s) for each delegate on completion of training.

#### **COURSE FEES**

£5,000 per Delegate. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

#### **COURSE METHODOLOGY**

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. 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.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions

