IE034:
PLC & SCADA for Automation & Process Control
Training Description:

This course presents to give the participants the knowledge required in industrial environments. This course will provide the necessary information for Plant Operation which involves process control.

Training Objective:

By the end of the training, participants will be able to:

- Understand the operation and technical terms used in plant
- Understand basic communication method
- Identify type of SCADA used
- Understand types of PLC and its functionalities

Training Designed for:

This course is intended for Fresh Graduates, Junior Engineers, Technical Sales and Non-Technical Person.

Training Program:

**DAY ONE:**

- **PRE-TEST**
- **INTRODUCTION**
  - Goal and Plan of the Course
  - Introduction and Brief History of PLC
  - Industrial Control Systems and the PLC Part
  - Why is PLC so Widely Used?
  - PLC Concerns and Alternatives
- **FUNDAMENTALS OF PLC HARDWARE**
  - Block Diagram of Typical PLC
  - PLC Processor Module, Memory Organization
  - Input and Output Modules, Types, Power Supply
  - Power Supplies
- **FUNDAMENTALS OF PLC SOFTWARE**
  - Programming Devices, On-Line and Off-Line Programming
  - Number Systems and the Computer World
  - PLC Numbers Handling
  - Memory Components, Data Structure and Addressing
  - Methods of Representing Logic, Boolean Algebra, Instruction Code, Graphical Presentation - Functional Logic Diagrams and Ladder Logic
  - Typical Ladder Logic Instruction Set
  - Comparison of Different Manufacturers, Memory and Data Representation and Instruction Code
  - System Software, System Scanning, Watch Dog Timer, Self-Test
  - Internal Errors, Fault Table for PLC and I/O, Errors Handling
  - Operating Modes, Use and Limitations
PLC SYSTEMS DESIGN, INSTALLATION AND MAINTENANCE
- Process and Mechanical Control Diagrams
- Process and Machine Control Descriptions
- Selection of PLC and Module
- Control System Diagram
- Wiring Diagrams
- Control Panel Design, Equipment Layout, Good Installation Practice
- Programming, Start-Up, Testing, Commissioning
- Documentation, Maintenance, Troubleshooting, Techniques and Examples
- Wrap up of the PLC Basics, Specific Terminology, Practical Queries

DAY TWO:

PLC PROGRAMMING
- System Introduction
- Basics Functions
- DC Motor Run/Jog
- Tools, Forcing and Toggling, On-line Changes

LAB PROGRAMMING ON SIEMENS SIMATIC & WINCC
- Timers and Counters
- Motor Forward/Reverse
- Pipeline Pumping Station
- Data Operations
- Tracking Numbers in Storage
- Motor Demand Start
- Move Operations
- Tracking Part Number with a Shift Register
- Pulse Generator/Cookie Filling
- 16 Bit Drum Sequencing
- Bit Operations
- Good Parts/Bad Parts
- Motor Sequencing
- Motor Sequencing 2
- Fault References and PLC Troubleshooting
- Time of Day Display
- Fault References

DAY THREE:

INTRODUCTION TO IEC 1131-3
- Concepts
- Common Element
- Top-Bottom and Bottom-Up Approaches
- Programming Languages: Structured Text
- Instruction List
● Function Block Diagrams
● Sequential Function Chart
● Ladder Diagrams

❖ DATA COMMUNICATIONS
● Serial Interface Standards: RS-232C, RS-422 (RS-423) and RS-485
● Communication Links – Status, Errors, Timeout (Watchdog)
● Protocols – Proprietary and Standard, Modbus, DH+
● Local Area Network, Topology, Ethernet, Control Networks
● ISO/OSI Communications Standard

❖ OBJECT LINKING AND EMBEDDING IN PROCESS CONTROL (OPC)
● Introduction to OPC Standards
● Confirmed and Developing Specifications
● Practical Control System Benefits from OPC Compliance

❖ OPERATOR INTERFACES (OIU)
● Status and Alarm Messages
● Operator Control Actions
● Linking Displays to the PLC
● PLC Manufacturer or Third Party – Depend on Connectivity

❖ OPERATOR INTERFACE PROGRAMMING
● System Introduction
● Configuration
● Graphical Language
● PLC Connection
● Operator’s Push Button
● DC Motor Run/Jog
● Operator’s Indication
● DC Motor Running
● Good Parts/Bad Parts

DAY FOUR:

❖ FUNDAMENTALS OF SCADA
● Concept, Terminology and Components
● SCADA System Hardware
● Communication Architecture
● Radio and Wireless Basics
● SCADA and Telemetry

❖ SCADA SOFTWARE
● Configuration of SCADA Systems
● Best Practice Configuration of Alarms
● Rules for SCADA Design
● SCADA and OPC
● Security and Risk Management
INTRODUCTION TO GE CIMPACT HMI/SCADA SOFTWARE
- Modular Multitasking 32 Bit Design
- Distributed Architecture
- Microsoft Object Technology, ActiveX Controls
- Device Connectivity, Open Data Base Connectivity
- Feature Set, Options, Base

SCADA PROGRAMMING BASICS
- Creating a Project, Master and Data
- Configuration Data, ISAM Files, IDX Files
- Security, Users Roles (Privileges) and Resources (Areas)
- Devices and Points Assigning to a Resource
- System Configuration
- Creating a New Cimplicity Project
- Configuring Devices, Ports, Protocols, Users, Resources, Roles, Points, Alarm Classes, Alarm Strings and Alarms
- Example with 4 Users, 3 PLCs, Robot and Masher
- Access a Point Control Panel
- Configuring a Point Control Panel
- Modifying Points and their Alarms
- Saving a Point Control Panel as a File
- Creating and Configure a Graphic Screen
- Configuring SmartObjects, Animation
- Creating Events and Actions in Objects
- Linking SmartObjects

DAY FIVE:

SCADA PROGRAMMING (CONT’D)
- Creating Automated Events and Actions
- Displaying and Trigger Events and Actions in the BCEUI (Basic Control Engine User Interface) Configuring a Simple Script Using Wizard
- Configuring a New Button to Trigger an Event that Runs the Script
- Creating New Tables in Database Logger
- Configuring Logging and Maintenance Options in the Tables
- Adding Points to the New Table
- Logging Alarms and Events
- Executing a Quick Trend from your Project’s Workbench
- Creating an Embedded Trend Chart to display Historical Data
- Applying ActiveX Trend Methods to a Trend Chart
- Creating a Stand Alone Alarm Viewer
- Creating and Configure an Embedded Alarm Viewer
- Adding Alarm Sounds to Alarm Classes
- Configuring Project for Broadcast
- Creating a Remote Project to Enable Enterprise Server
- Configuring Text Objects for Point by Address
- Configuring Command Line Switches on Screen Shortcuts

**COURSE CONCLUSION**

**POST-TEST and EVALUATION**

**Training Requirements:**

“**Hands-on practical sessions, equipment** and **software** will be applied during the course if required and as per the client’s request.”

**Training Methodology:**

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 30% Workshops & Work Presentations, Techniques
- 20% Based on Case Studies & Practical Exercises
- 20% Videos, Software & General Discussions
- Pre and Post Test

**Training Certificate(s):**

Internationally recognized certificate(s) will be issued to each participant who completed the course.

**Training Fees:**

As per the course location - This rate includes participant’s manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

**Training Timings:**

**Daily Timings:**

- 07:45 - 08:00 Morning Coffee / Tea
- 08:00 - 10:00 First Session
- 10:00 - 10:20 Recess (Coffee/Tea/Snacks)
- 10:20 - 12:20 Second Session
- 12:20 - 13:30 Recess (Prayer Break & Lunch)
- 13:30 - 15:00 Last Session

**For training registrations or in-house enquiries, please contact:**

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