



COURSE OVERVIEW IE0190-4D

PLC & SCADA for Automation & Process Control

Course Title

PLC & SCADA for Automation & Process Control

Course Date/Venue

August 05-08, 2024/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Reference

IE0190-4D

Course Duration/Credits

Four days/2.4 CEUs/24 PDHs



Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using one of our state-of-the-art simulators.

This course is designed to benefit you with practical up-to-date information on the application of PLC's and SCADA to the automation and process control of plants and factories. It is suitable for people who have little or no exposure to PLC and SCADA but expect to become involved in some or all aspects of PLC and SCADA installation and Programming.



While the course is ideal for people who are new to PLC and SCADA, it will be of value to those who already have the basic skills, but need to refresh and update their basic knowledge. It aims to give practical advice from experts in the field, to assist you to correctly plan, program and install a PLC with a shorter learning curve and more confidence.

A selection of real world case studies is used to illustrate the key concepts with examples of real world working PLC and SCADA systems in process, utilities and manufacturing industries. The course will be an excellent opportunity to network with your peers as well as gain significant new information and techniques.



This course will cover most popular PLC's used in the industry, such as Quantum, Allen Bradley, Siemens, Bristol, Emersons, Omron and Telemechanique Shneider Modicon with extended case studies for Allen Bradley and Siemens.





Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply a comprehensive knowledge on Programmable Logic Controllers (PLC), telemetry and employ SCADA programming in process control
- Analyze the system parts and power supplies of a PLC hardware including the block diagram of a typical PLC, PLC processor module and memory organization
- Discover the underlying principles of a PLC software including the programming devices, number systems, memory components, data structures, operating modes and limitations
- Discuss the PLC systems design, installation and maintenance and review the documentation and troubleshooting techniques used in the system
- Practice PLC programming using Allen Bradley and Siemens Simulators
- Apply the concepts and common elements of IEC 1131-3 including its programming languages, instruction list, function block diagram and sequential function chart
- Employ the principles of data communications, object linking and embedding in Process Control (OPC) and be able to recognize their importance in PLC and SCADA systems
- Implement the concept of Operator Interfaces (OIU) and describe the operator interface programming such as its configuration, graphical languages, good and bad parts
- Determine the concept, terminology and components of SCADA system and increase in-depth knowledge on SCADA software
- Implement the complete procedures and requirements in SCADA programming and be able to practice how to create and configure a SCADA system using the various utilities, process control, commands and system components

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides an overview of all significant aspects and considerations of PLC and SCADA for those who have little or no exposure to PLC and SCADA but expect to become involved in some or all aspects of PLC and SCADA. Further, the course will be of value to those who already have the basic skills but need to refresh and update their basic knowledge.

Course Fee

US\$ 4,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.






Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations


Certificates are accredited by the following international accreditation organizations

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **2.4 CEUs** (Continuing Education Units) or **24 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)



This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Sydney Thoresson, PE, BSc, is a **Senior Electrical & Instrumentation Engineer** with over **40 years** of extensive experience within the **Petrochemical, Utilities, Oil, Gas and Power** industries. His specialization highly evolves in **Process Control Instrumentation, Process Instrumentation & Control, Process Control, Instrumentation, Troubleshooting & Problem Solving, Instrumentation Engineering, Process Control (PCI) & Safeguarding, Instrument Calibration & Maintenance,**

Instrumented Safety Systems, High Integrity Protection Systems (HIPS), Process Controller, Control Loop & Valve Tuning, Compressor Control & Protection, Control Systems, Programmable Logic Controllers (PLC), SCADA System, PLC & SCADA - Automation & Process Control, PLC & SCADA Systems Application, Technical DCS/SCADA, PLC-SIMATIC S7 300/400: Configuration, Programming and Troubleshooting, PLC, Telemetry and SCADA Technologies, Cyber Security of Industrial Control System (PLC, DCS, SCADA & IED), Basics of Instrumentation Control System, DCS, Distributed Control System - Operations & Techniques, Distributed Control System (DCS) Principles, Applications, Selection & Troubleshooting, Distributed Control Systems (DCS) especially in Honeywell DCS, H&B DCS, Modicon, Siemens, Telemecanique, Wonderware and Adrioit, Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD), Emergency Shutdown System, Variable Frequency Drive (VFD), Process Control & Safeguarding, Field Instrumentation, Instrumented Protective Devices Maintenance & Testing, Instrumented Protective Function (IPF), Refining & Rotating Equipment, Equipment Operations, Short Circuit Calculation, Voltage Drop Calculation, Lighting Calculation, Hazardous Area Classification, Intrinsic Safety, Liquid & Gas Flowmetering, Custody Measurement, Ultrasonic Flowmetering, Loss Control, Gas Measurement, Flowmetering & Custody Measurement, Multiphase Flowmetering, Measurement and Control, Mass Measuring System Batching (Philips), Arc Furnace Automation-Ferro Alloys, Walking Beam Furnace, Blast Furnace, Billet Casting Station, Cement Kiln Automation, Factory Automation and Quality Assurance Accreditation (ISO 9000 and Standard BS 5750). Further, he is also well-versed in **Electrical Safety, Electrical Hazards Assessment, Electrical Equipment, Personal Protective Equipment, Log-Out & Tag-Out (LOTO), ALARP & LOPA Methods, Confined Workspaces, Power Quality, Power Network, Power Distribution, Distribution Systems, Power Systems Control, Power Systems Security, Power Electronics, Electrical Substations, UPS & Battery System, Earthing & Grounding, Power Generation, Protective Systems, Electrical Generators, Power & Distribution Transformers, Electrical Motors, Switchgears, Transformers, AC & DC Drives, Variable Speed Drives & Generators and Generator Protection. He is currently the **Projects Manager** wherein he manages projects in the field of electrical and automation engineering and in-charge of various process hazard analysis, fault task analysis, FMEA and HAZOP study.**

During Mr. Thoresson's career life, he has gained his thorough and practical experience through various challenging positions and dedication as the **Contracts & Projects Manager, Managing Director, Technical Director, Divisional Manager, Plant Automation Engineer, Senior Consulting Engineer, Senior Systems Engineer, Consulting Engineer, Service Engineer and Section Leader** from several international companies such as **Philips, FEDMIS, AEG, DAVY International, BOSCH, Billiton and Endress/Hauser.**

Mr. Thoresson is a **Registered Professional Engineering Technologist** and has a **Bachelor's degree in Electrical & Electronics Engineering** and a **National Diploma in Radio Engineering.** Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and an active member of the **International Society of Automation (ISA)** and the **Society for Automation, Instrumentation, Measurement and Control (SAIMC).** He has further delivered numerous trainings, courses, seminars, conferences and workshops worldwide.

Training Methodology





All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Monday, 05th of August 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0900	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
0900 – 0930	Fundamentals of PLC Hardware Block Diagram of Typical PLC • PLC Processor Module, Memory Organization • Input and Output Modules, Types, Power Supply • Power Supplies
0930 - 0945	Break
0945 – 1030	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
1030 – 1100	Fundamentals of PLC Software (cont'd) 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
1100 – 1200	PLC Systems Design, Installation and Maintenance Process and Mechanical Control Diagrams • Process and Machine Control Descriptions • Selection of PLC and Modules • 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
1200 - 1230	PLC Programming System Introduction • Basics Functions • DC Motor Run/Jog • Tools, Forcing and Toggling, On-line Changes





1230 – 1245	Break
1245 – 1315	PRACTICAL SESSION #1
1315 – 1345	Lab Programming on Siemens SIMATIC & WinCC Timers and Counters • Motor Forward/Reverse • Pipeline Pumping Station • Data Operations • Tracking Numbers in Storage
1345 – 1420	PRACTICAL SESSION #2
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Tuesday, 06th of August 2024

0730 – 0830	Lab Programming on Siemens SIMATIC & WinCC (cont'd) 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
0830 – 0930	PRACTICAL SESSION #3
0930 – 0945	Break
0945 – 1030	Lab Programming on Siemens SIMATIC & WinCC (cont'd) Motor Sequencing • Motor Sequencing 2 • Fault References and PLC Troubleshooting • Time of Day Display • Fault References
1030 – 1100	PRACTICAL SESSION #4
1100 – 1200	Introduction to IEC 1131-3 Concepts • Common Elements • Top-Bottom and Bottom-Up Approaches • Programming Languages: Structured Text • Instruction List • Function Block Diagrams • Sequential Function Chart • Ladder Diagrams
1200 – 1230	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
1230 – 1245	Break
1245 – 1315	Object Linking and Embedding in Process Control (OPC) Introduction to OPC Standards • Confirmed and Developing Specifications • Practical Control System Benefits from OPC Compliance
1315 – 1345	Operator Interfaces (OIU) Status and Alarm Messages • Operator Control Actions • Linking Displays to the PLC • PLC Manufacturer or Third Party – Depend on Connectivity
1345 – 1420	Operator Interface Programming System Introduction • Configuration
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3: Wednesday, 07th of August 2024

0730 – 0830	Operator Interface Programming (cont'd) Graphical Language • PLC Connection • Operator's Push Button • DC Motor Run/Jog • Operator's Indication • DC Motor Running • Good Parts/Bad Parts
0830 – 0930	PRACTICAL SESSION #5
0930 – 0945	Break





0945 – 1030	Fundamentals of SCADA Concept, Terminology and Components • SCADA System Hardware • Communication Architecture • Radio and Wireless Basics • SCADA and Telemetry
1030 – 1100	SCADA Software Configuration of SCADA Systems • Best Practice Configuration of Alarms • Rules for SCADA Design • SCADA and OPC • Security and Risk Management
1100 – 1200	Introduction to GE Cimplicity 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
1200 – 1230	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
1230 – 1245	Break
1245 – 1315	SCADA Programming 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
1315 – 1345	PRACTICAL SESSION #6
1345 – 1420	SCADA Programming (cont'd) 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
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 5: Thursday, 08th of August 2024

0730 – 0830	PRACTICAL SESSION #7
0830 - 0930	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 Wizards • 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 Tables • Logging Alarms and Events
0930 - 0945	Break
0945 – 1030	PRACTICAL SESSION #8
1030 – 1100	SCADA Programming (cont'd) 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
1100 – 1130	PRACTICAL SESSION #9



1130 - 1200	SCADA Programming (cont'd) Using the Import/Export Command Utility • Using the IDTPOP Utility to View Tables in the Database • Using Process Control to Display Project Processes, Start/Stop Processes • Opening Project Status Logs to View Project and System Error Messages • Accessing the Windows NT Performance Monitor and Create a Graphic Display, View Running Applications and Processes • Accessing the Point Cross Reference Tool to View the Use and Locations of Pints in the Project
1200 - 1230	PRACTICAL SESSION #10
1230 - 1245	Break
1245 - 1315	SCADA Programming (cont'd) 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
1315 - 1345	PRACTICAL SESSION #11
1345 - 1400	Course Conclusion
1400 - 1415	POST-TEST
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course



Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators “Allen Bradley SLC 500”, “AB Micrologix 1000 (Digital or Analog)”, “AB SLC5/03”, “AB WS5610 PLC”, “Siemens S7-1200”, Siemens S7-400” “Siemens SIMATIC S7-300”, “Siemens S7-200” “GE Fanuc Series 90-30 PLC”, “Schneider Electric Magelis HMISTU”, “Siemens SIMATIC Step 7 Professional Software”, and “HMI SCADA”.



Allen Bradley SLC 500 Simulator



Allen Bradley Micrologix 1000 Simulator (Digital)



Allen Bradley Micrologix 1000 Simulator (Analog)



Allen Bradley SLC 5/03



Allen Bradley WS5610 PLC Simulator PLC5



Siemens S7-1200 Simulator



Siemens S7-400 Simulator



Siemens SIMATIC S7-300



Siemens S7-200 Simulator

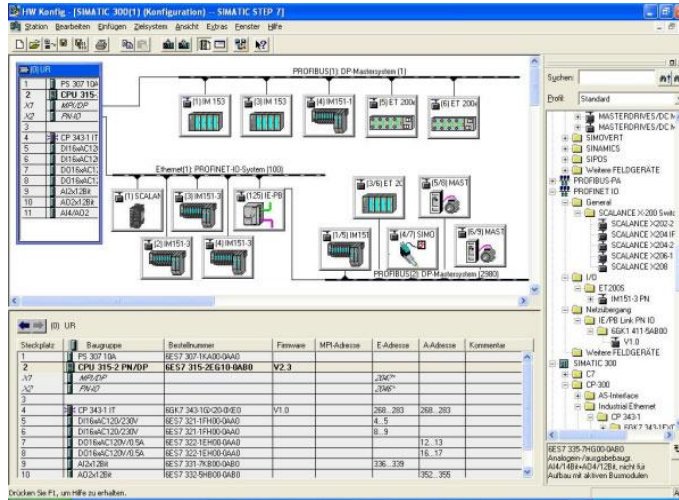


GE Fanuc Series 90-30 PLC Simulator

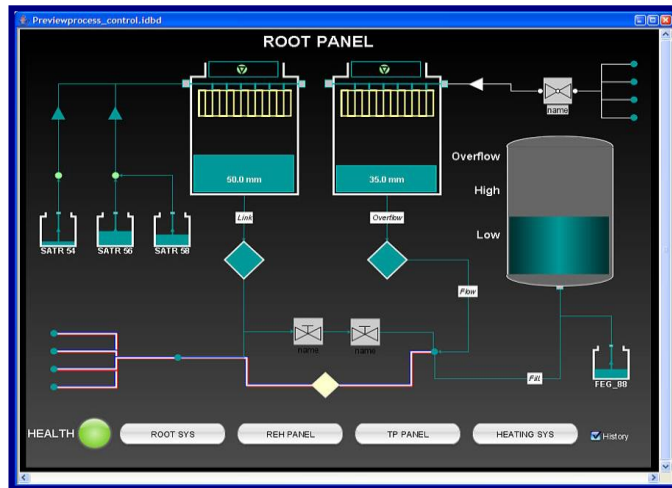


Schneider Electric Magelis HMISTU





Siemens SIMATIC Step 7 Professional Software



HMI SCADA

Course Coordinator

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