



COURSE OVERVIEW IE0190

PLC & SCADA for Automation & Process Control

Course Title

PLC & SCADA for Automation & Process Control

Course Date/Venue

September 20-24, 2020/Boardroom 3, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

IE0190

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description

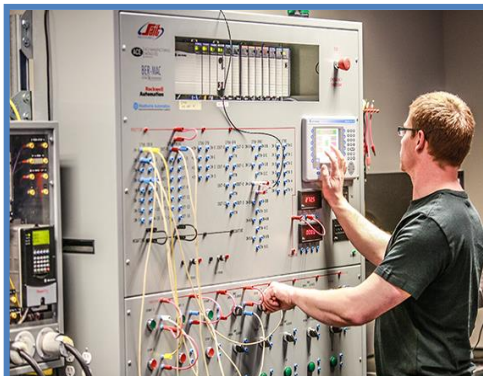


This hands-on, highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using one of our state-of-the-art simulators.

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 Telemecanique 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, sample of video clips of the instructor’s actual lectures & practical sessions during the course 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 Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations


Certificates are accredited by the following international accreditation organizations

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USA International Association for Continuing Education and Training (IACET)

Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, Virginia 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 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 1-2013 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 Association 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 **3.0 CEUs** (Continuing Education Units) or **30 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.

Course Fee

US\$ 5,500 per Delegate + **5% VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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. Pan Marave, PE, MSc, BEng, is a **Senior Electrical & Instrumentation Engineer** with over **40 years** of extensive experience in **Oil, Gas, Petrochemical, Refinery & Power** industries. His expertise includes Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD); **DCS, SCADA & PLC; Measurement (Flow, Temperature, Pressure); Process Analyzers & Analytical Instrumentation; Process Control, Instrumentation & Safeguarding; Process Controller, Control Loop & Valve Tuning; Industrial Distribution Systems; Industrial Control & Control Systems, Power Systems Protection & Relaying; Earthing, Bonding, Grounding, Lightning & Surge Protection; Electric Power Substation & Systems; Electrical Engineering Principles; Motor Control Circuit; Electrical Fault Analysis; Electrical Networks & Distribution Cables; Circuit Breakers, Switchgears, Transformers, Hazardous Areas Classification and Detailed Engineering Drawings, Codes & Standards.** Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (ISO 9000:2000), ISO 9002, Quality Assurance, and Projects & Contracts Management.

Presently, Mr. Marave is the **Technical Advisor of Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor, Engineering Manager, Electronics & Instruments Head, Electrical, Electronics & Instruments Maintenance Superintendent, Assistant General Technical Manager and Engineering Supervisor** of various international companies such as the **Alumil Mylonas, Athens Papermill, Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master and Bachelor** degrees in **Electrical Engineering** from the **Polytechnic Institute of New York and Pratt Institute of New York (USA)** respectively. 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 **Technical Chamber** and the **Institute of Electrical and Electronics Engineer (IEEE)** in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops worldwide.

Training Methodology

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

- 30% Lectures
- 20% Workshops & Work Presentations
- 20% Case Studies & Practical Exercises
- 30% Videos, Software & Simulators

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: Sunday, 20th of September 2020

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	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
0930 – 0945	Break
0945 – 1200	Fundamentals of PLC Hardware Block Diagram of Typical PLC • PLC Processor Module, Memory Organization • Input and Output Modules, Types, Power Supply • Power Supplies
1200 – 1230	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
1230 – 1245	Break
1245 – 1330	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
1330 – 1420	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
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Monday, 21st of September 2020

0730 – 0900	PLC Programming System Introduction • Basics Functions • DC Motor Run/Jog • Tools, Forcing and Toggling, On-line Changes
0900 – 0930	PRACTICAL SESSION #1
0930 – 0945	Break





0945 – 1045	Lab Programming on Siemens SIMATIC & WinCC Timers and Counters • Motor Forward/Reverse • Pipeline Pumping Station • Data Operations • Tracking Numbers in Storage
1045 – 1100	PRACTICAL SESSION #2
1100 – 1200	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
1200 – 1230	PRACTICAL SESSION #3
1230 – 1245	Break
1245 – 1400	Lab Programming on Siemens SIMATIC & WinCC (cont'd) Motor Sequencing • Motor Sequencing 2 • Fault References and PLC Troubleshooting • Time of Day Display • Fault References
1400 – 1420	PRACTICAL SESSION #4
1420 - 1430	Recap
1430	Lunch & End of Day Two

Day 3: Tuesday, 22nd of September 2020

0730 – 0930	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
0930 – 0945	Break
0945 – 1015	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
1015 – 1100	Object Linking and Embedding in Process Control (OPC) Introduction to OPC Standards • Confirmed and Developing Specifications • Practical Control System Benefits from OPC Compliance
1100 – 1200	Operator Interfaces (OIU) Status and Alarm Messages • Operator Control Actions • Linking Displays to the PLC • PLC Manufacturer or Third Party – Depend on Connectivity
1200 – 1215	Break
1215 – 1300	Operator Interface Programming System Introduction • Configuration
1300 – 1400	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
1400 – 1420	PRACTICAL SESSION #5
1420 - 1430	Recap
1430	Lunch & End of Day Three





Day 4: Wednesday, 23rd of September 2020

0730 – 0830	Fundamentals of SCADA Concept, Terminology and Components • SCADA System Hardware • Communication Architecture • Radio and Wireless Basics • SCADA and Telemetry
0830 – 0930	SCADA Software Configuration of SCADA Systems • Best Practice Configuration of Alarms • Rules for SCADA Design • SCADA and OPC • Security and Risk Management
0930 – 0945	Break
0945 – 1045	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
1045 – 1130	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
1130 – 1215	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
1215 – 1230	Break
1230 – 1300	PRACTICAL SESSION #6
1300 – 1400	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
1400 – 1420	PRACTICAL SESSION #7
1420 – 1430	Recap
1430	Lunch & End of Day Four

Day 5: Thursday, 24th of September 2020

0730 – 0830	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
0830 – 0900	PRACTICAL SESSION #8
0900 – 0915	Break
0915 – 1015	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





1015 – 1045	PRACTICAL SESSION #9
1045 – 1145	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
1145 – 1215	PRACTICAL SESSION #10
1215 – 1230	Break
1230 – 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



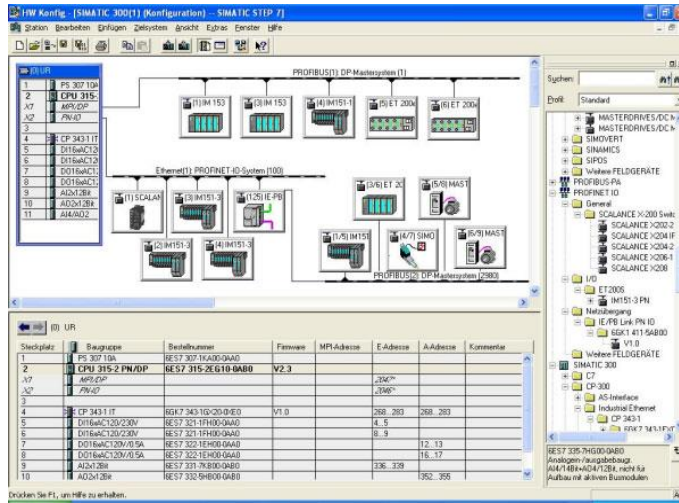
Siemens S7-200 Simulator



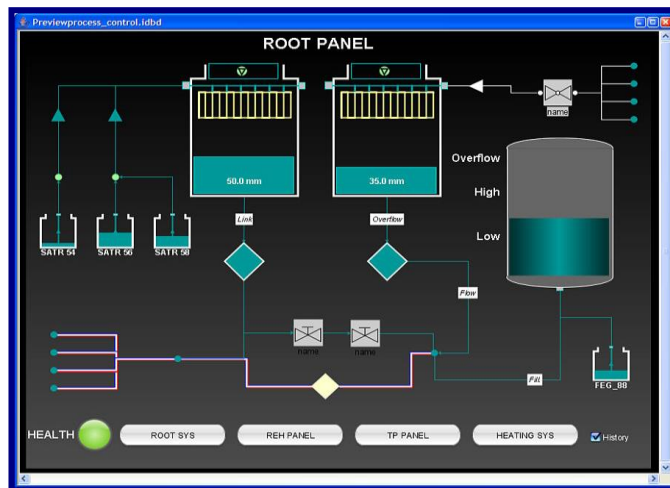
GE Fanuc Series 90-30 PLC Simulator



Schneider Electric Magelis HMISTU



Siemens SIMATIC Step 7 Professional Software



HMI SCADA

Course Coordinator

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