COURSE OVERVIEW IE0190

PLC & SCADA for Automation & Process Control

Course Title

PLC & SCADA for Automation & Process Control



Course Date/Venue

Session 1: July 11-15, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: November 21-25, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar

3.0 CEUs (30 PDHs) AWARD

Course Reference

IE0190

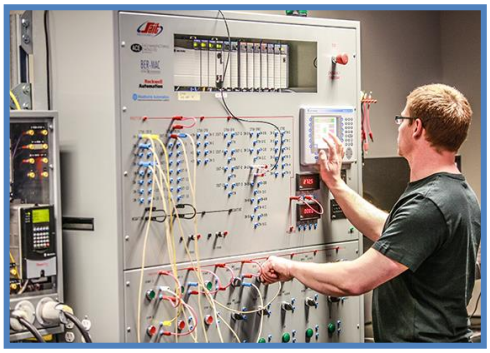
Course Duration/Credits

Five days/3.0 CEUs/30 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 PLCs 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/Outcomes & Benefits for the Participants

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 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

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 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 **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.

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 **30 years** of extensive experience within the **Power & Water Utilities** and Other **Energy Sectors**. His specialization highly evolves in **Electrical Safety**, **Power System Equipment**, **Electrical Drawing**, **Electrical Forecasting**, **Transmission Networks**, **Substation**, **Distribution Networks**, **Substation Automation Systems & Application**, **Electrical** System, **HV/LV Electrical** Authorisation, **Variable Frequency Drives** (VFD), **HV/LV Equipment**, **Circuit Breaker**, **Motor Controllers**, **Hazardous Area Classification**, **Intrinsic Safety**, **Electrical Power Systems** Quality & Troubleshooting, **Protection & Relay**, **Electric & Control** System Commissioning, **Liquid & Gas Flowmetering**, Fault Analysis in **Electrical Networks & Distribution Cables**, **Custody Measurement**, **Ultrasonic Flowmetering**, **Loss Control**, **Gas Measurement**, **Process Control Instrumentation**, **Compressor Control & Protection**, **Control Systems**, Programmable Logic Controllers (**PLC**), **SCADA**, Distributed Control Systems (**DCS**) especially in **Honeywell DCS**, **H&B DCS**, **Modicon, Siemens**, **Telemecanique**, **Wonderware** and **Adrioit**. Moreover, he has vast experience in the field of Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**), **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**).

During Mr. Thoresson's career life, he has gained his thorough and practical experience through various challenging positions such as a **Project Manager**, **Contracts 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** Instrumentation and Control, **Billiton**, **Endress/Hauser**, **Petronet**, **Iscor**, **Spoornet**, **Eskom** and **Afrox**.

Mr. Thoresson is a **Registered Professional Engineering Technologist** and has a **National Higher Diploma** (**NHD**) & a **National Diploma** in **Radio Engineering** from the **Witwatersrand Technikon**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), an active member of the International Society of Automation (**ISA**) and the Society for Automation, Instrumentation, Measurement and Control (**SAIMC**).

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Fee

US$ 6,000 per Delegate. 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 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

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 & 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

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

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 & 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

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 Cimpliciy 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

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



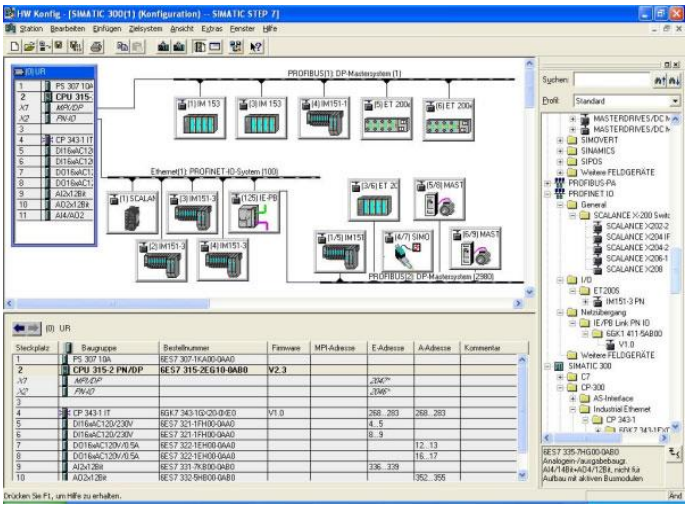
Siemens S7-200 Simulator



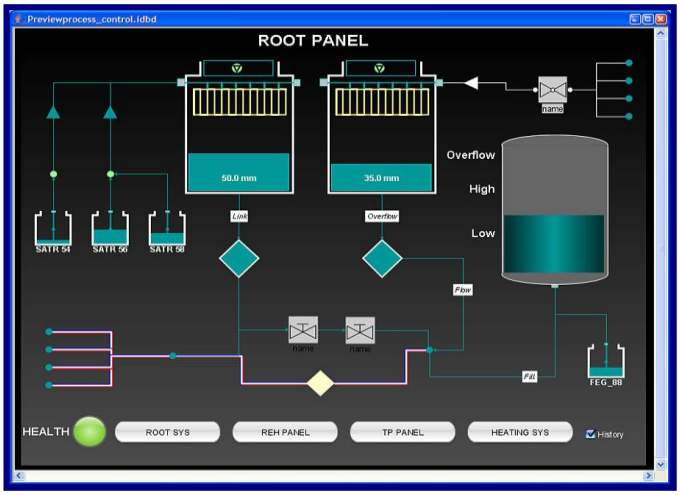
GE Fanuc Series 90-30 PLC Simulator



Schneider Electric Magelis HMISTU



Siemens SIMATIC Step 7 Professional Software



HMI SCADA

Course Coordinator

Jaryl Castillo, Tel: +974 6652 9196, Email: jaryl@haward.org