COURSE OVERVIEW IE0090

PLC for Process Control & Automation

Course Title
PLC for Process Control & Automation

Course Reference
IE0090

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	January 28-February 01, 2024	Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey
2	February 18-22, 2024	The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE
3	March 03-07, 2024	Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar

Course Description

This practical 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 PLCs to the automation and process control of plants and factories. It is suitable for people who have little or no exposure to PLCs, but expect to become involved in some or all aspects of PLC installation. 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.

While the course is ideal for electricians, technicians and engineers who are new to PLCs, much of the course and additional material in the extensive manual will be of value to those who already have some basic skills, but need a wider perspective for larger and more challenging tasks ahead. The accompanying manual includes contributions from a number of experts and will become a valuable reference document in your work.

The information contained in this course advances from the basics to challenge even the most experienced engineer in the industry today. You will undertake a series of practical hands-on sessions, ranging from elementary to advanced, based on the PLCs supplied. Full working solutions will be distributed to you after you have attempted the practicals.

Course Objectives

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

- Apply and gain a basic knowledge on PLC for process control and automation
- Identify PLC hardware and softwares and familiarize the input/output section related to module types and the different methods of representing logic
- Gain knowledge in PLC programming
- Apply concepts on ladder logic, FBS in line with looking ahead and how will programs be maintained based on practical exercises carried out during the course
- Recognize several techniques on good installation practice in accordance with location of hardware, good wiring practice, earthing and grounding
- Discuss the aspects of advanced control with PLC's by being aware of the uses of advanced programming functions and matrix logic
- Determine elements of batch processes and sequential control by remembering the programs state and creating a "stepper"
- Characterize the aspects of analog control through various PID control algorithm
- Avoid the consequences of hardware failure by enhancing the security and familiarizing the strategies to reduce the risks
- Evaluate functions of operator interfaces related to alarm handling, operator actions and linking displays to the PLC
- Identify the interface standards and protocols of data communications

Who Should Attend

This course provides an overview of all significant aspects and considerations of Practical Programmable Logic Controllers (PLC's) for engineering managers, instrumentation and control engineers, process control and automation engineers, design engineers and consulting engineers, process control engineers, electrical engineers, management, engineering and supervision staff who are responsible on PLC, superintendents, supervisors, DCS, SCADA and PLC personnel, process control staff, trades staff working with or near PLC's and other technical staff.

Course Fee

Istanbul	**US$ 6,000** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	**US$ 5,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Doha	**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 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.

Course Accreditations

Certificates are accredited by the following international accreditation organizations: -

- 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.

- 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.

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 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:

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior Electrical & Instrumentation Engineer** with **35 years** of extensive experience within the **Oil**, **Gas**, **Power**, **Petroleum**, **Petrochemical** and **Utilities** industries. His experience widely covers in the areas of Advanced Distributed Control System (**DCS**), **DCS** Operation & Configuration, **DCS** Troubleshooting, **DCS Yokogawa** ProSafe-RS Safety Instrumented System, **DCS Yokogawa** Centum VP, **DCS Emerson** DeltaV, **DCS GE Mark VI**, Programable Logic Controller (**PLC**), Supervisory Control & Data Acquisition (**SCADA**) Systems, Siemens **PLC Simatic S7-400/S7-300/S7-200**, **Siemens SIMATIC S7** Maintenance & Configuration, **Siemens WINCC**, SCADA System: Siemens **SIMATIC & WinCC**, **Process Control**, **Control Systems & Data Communications**, **Instrumentation**, **Automation**, **Valve Tuning**, Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**), **Telemetry** Systems, **Boiler Control & Instrumentation**, Advanced Process Control (**APC**) Technology, Practical **Fiber-Optics** Technology, **Compressor** Control & Protection, **GE Gas Turbines**, **Alarm** Management Systems, **Engine** Management System, **Fieldbus** Systems, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Safety**, **Electrical Hazards** Assessment, **Electrical Equipment**, Electrical Transient Analysis Program (**ETAP**), Power **Quality**, Power **Network**, Power **Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, **Power System** Harmonics, **Power System** Planning, Control & Stability, **Power Flow** Analysis, **Smart Grid & Renewable** Integration, **Power System Protection & Relaying**, Economic Dispatch & Grid Stability Constraints in Power Plants, Electrical Demand Side Management (DSM), Electrical **Substations**, **Substation Automation** Systems & Application (IEC 61850), **Distribution Network** System Design, **Distribution Network Load**, Electrical **Distribution** Systems, **Load Forecasting** & System Upgrade (Distribution), **Overhead Power Line** Maintenance & Patrolling, High Voltage **Switching** Operations, Industrial **UPS Systems & Battery** Power Supplies, Electric **Motors & Variable Speed Drives**, **Generator** Maintenance & Troubleshooting, **Generator** Excitation Systems & AVR, **Transformer** Maintenance & Testing, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces and **Earthing & Grounding**, He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of Power **Transmission Distribution** & **High Voltage** Systems and he further takes part in the Load Records Evaluation & Transmission Services Pricing.

During his career life, Dr. Ahmed has been actively involved in different Power System Activities including Roles in Power System Planning, Analysis, Engineering, **HV Substation** Design, Electrical Service Pricing, Evaluations & Tariffs, Project Management, Teaching and Consulting. His vast industrial experience was honed greatly when he joined many International and National Companies such as **Siemens**, **Electricity Authority**, Egyptian Electricity Holding, Egyptian Refining Company (ERC), **GASCO**, Tahrir Petrochemicals Project, and **ACETO** industries as the **Instrumentation & Electrical Service Project Manager**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **Project Coordinator**, **Project Assistant and Managing Board Member** where he focused more on dealing with Technology Transfer, System Integration Process and Improving Localization. He was further greatly involved in manufacturing some of **Power System** and **Control & Instrumentation Components** such as Series of Digital Protection **Relays**, MV **VFD**, **PLC** and **SCADA** System with intelligent features.

Dr. Ahmed has **PhD**, **Master** & **Bachelor** degrees in **Electrical Engineering** from the **University of Wisconsin Madison**, **USA** and **Ain Shams University**, respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), an active member of IEEE and ISA as well as numerous technical and scientific papers published internationally in the areas of Power Quality, Superconductive Magnetic Energy Storage, SMES role in Power Systems, Power System **Blackout** Analysis, and Intelligent Load Shedding Techniques for preventing Power System Blackouts, HV **Substation Automation** and Power System Stability.

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 - 0745	*Registration & Coffee*
0745 - 0800	*Welcome & Introduction*
0800 - 0815	***PRE-TEST***
0815 - 0930	***Introduction*** *Introduction to PLC'S ● A Brief History of PLC'S ● Alternative Control Systems – Where do PLC'S Fit In ● Why PLC'S have become so Widely Accepted ● Lingering Concerns about PLC'S.*
0930 - 0945	*Break*
0945 – 1115	***Fundamentals of PLC Hardware*** *Block Diagram of Typical PLC ● PLC Processor Module – Memory Organisation ● Input /Output Section – Module Types ● Power Supplies*
1115 – 1130	*Break*
1130 - 1300	***Fundamentals of PLC Software (cont'd)*** *Methods of Representing Logic ● Fundamental File Block ● Comparison of Different Manufacturers*
1300 - 1420	***PLC Programming***
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 - 0930	***PLC Programming (cont'd)***
0930 - 0945	*Break*
0945 - 1100	***Practical Exercise on Ladder Logic, FBS*** *Keeping Track of Addresses and Data Used ● Looking Ahead – How will Programs be Maintained*
1100 - 1230	***Practical Exercise on Ladder Logic, FBS (cont'd)*** *Practical Methods to Improve Program Quality ● Keeping Track of Addresses and Data Used*
1230 - 1245	*Break*
1245 - 1420	***Practical Exercise on Ladder Logic, FBS (cont'd)*** *Looking Ahead – How will Programs be Maintained ● Practical Methods to Improve Program Quality*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***PRACTICAL SESSION***
0930 – 0945	*Break*
09415 – 1100	***Good Installation Practice*** *Location of Hardware ● Good Wiring Practice ● Reducing Noise and Interference ● Screening and Shielding ● Earthing and Grounding*
1100 – 1230	***PRACTICAL SESSION***
1230- 1245	*Break*
1245 – 1420	***Advanced Control with PLC's*** *The Concept of Reusable Logic - Examples: Drive Logic, Alarm Handling ● Use of Advanced Programming Functions ● Matrix Logic ● Table Functions and Indirect Addressing*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Batch Processes & Sequential Control*** *Remembering the Program State ● Creating a "Stepper" ● Step Advance ● Fault Detection and Recovery ● Operator Intervention ● Multiple Recipes or Alternate Paths ● Sequential Function Charts*
0930 – 0945	*Break*
0945 – 1100	***Analog Control*** *Discontinuous Vs Continuous Control ● The PID Control Algorithm ● The Importance of Timing and Scan Time ● When PID is not always Appropriate*
1100 – 1230	***Enhanced Security*** *The Consequences of Hardware Failure ● Strategies to Reduce the Risks ● Hardware options*
1230 – 1245	*Break*
1245– 1420	***PRACTICAL SESSION***
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Operator Interfaces*** *Alarm Handling ● Operator Actions ● Linking Displays to the PLC ● PLC Manufacturer or Third Party*
0930 – 0945	*Break*
0945 – 1100	***Data Communications*** *Interface Standards ● Protocols (Modbus / DH+) ● Local Area Network (Ethernet and Token Bus) ● Monitoring Communications Links (& simple watchdog timer)*
1100 – 1230	***PRACTICAL SESSION***
1230 – 1245	*Break*

1245– 1345	***System Checkout and Testing*** *Development and Verification of Code ● Factory Acceptance Testing ● Testing Procedures ● Emulating Missing Hardware ● Emulating Process Responses*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
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", "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

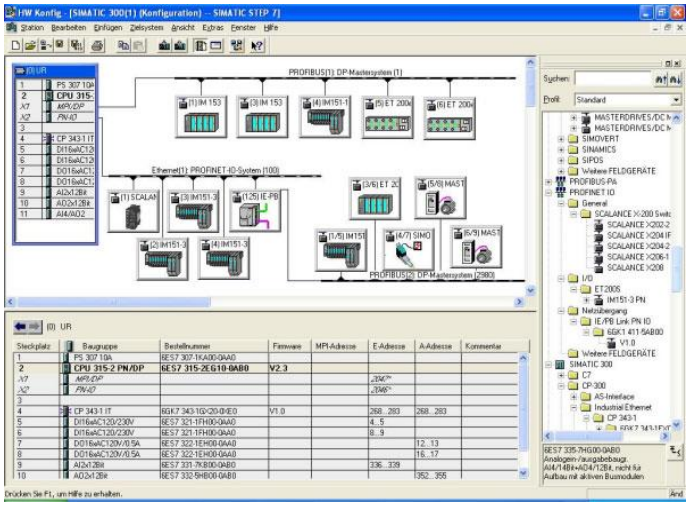
Siemens S7-1200 Simulator

Siemens S7-400 Simulator

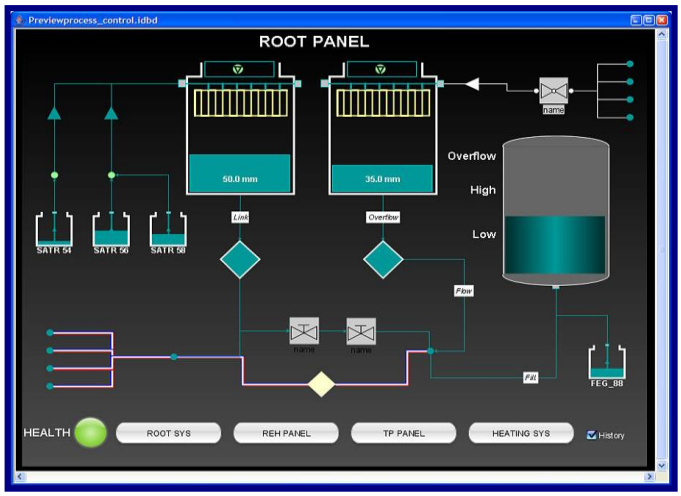
Siemens SIMATIC S7-300

Siemens S7-200 Simulator

GE Fanuc Series 90-30 PLC Simulator



Siemens SIMATIC Step 7
Professional Software



HMI SCADA

Course Coordinator
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