COURSE OVERVIEW IE0916
Control Logix Fundamentals and Troubleshooting

Course Title
Control Logix Fundamentals and Troubleshooting

Course Reference
IE0916

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

Course Date/Venue

Session(s)	Date	Venue
1	May 12-16, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	July 27-31, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	September 15-19, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	November 09-13, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Description

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

This course is designed to provide participants with a detailed and up-to-date overview of Control Logix Fundamentals and Troubleshooting. It covers the hardware components and communication protocols; the programming environment, control logix memory, data types and system diagnostics and monitoring; the basic programming and input and output configuration; the control logix data handling, functions and blocks; troubleshooting programming errors and control logix faults, controller faults and recovery; and the I/O module troubleshooting, communication recovery, performance monitoring and tuning and troubleshooting best practices.

During this interactive course, participants will learn the advanced data handling and manipulation, advanced communication techniques, safety systems integration and real-time control and monitoring; the control logix system upgrades, preventive maintenance plan and routine diagnostics, checks and tools for predictive maintenance; the system slowdowns, system resources, control loop performance and troubleshooting system crashes; and the recovery from communication failures, hardware fault isolation recovery, software crash recovery and handling unexpected shutdowns.

Course Objectives

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

- Apply and gain a basic knowledge on control logix and troubleshooting
- Discuss hardware components and communication protocols of control logix
- Recognize programming environment, control logix memory and data types and system diagnostics and monitoring
- Identify basic programming and apply input and output configuration
- Carryout control logix data handling and identify control logix functions and blocks including control logix sequencers and state machines
- Troubleshoot programming errors and identify control logix faults, controller faults and recovery
- Apply I/O module troubleshooting, communication recovery, performance monitoring and tuning and troubleshooting best practices
- Employ advanced data handling and manipulation, advanced communication techniques, safety systems integration and real-time control and monitoring
- Apply control logix system upgrades, troubleshoot motion control systems and simulate control logix faults
- Develop a preventive maintenance plan and apply routine diagnostics and checks and tools for predictive maintenance
- Identify system slowdowns, optimize system resources, analyze control loop performance and troubleshoot system crashes
- Apply recovery from communication failures, hardware fault isolation and recovery, software crash recovery and handling unexpected shutdowns

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 control logix fundamentals and troubleshooting for controls or automation engineers, electricians, instrumentation technicians, maintenance technicians, system integrators, supervisors or managers, new hires in automation roles an othr technical staff.

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.

Certificate Accreditations
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**. 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.

  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.

- 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.

Course Fee
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.

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 **Circuit Breaker**, **HV Switchgear Maintenance**, **HV/LV Electrical** Authorisation, Basic **Electricity**, **Electrical & Special Hazards**, **Personnel Protection**, **HV/LV Equipment**, **Motor Controllers**, **Electrical Switching** Practices, **Emergency Planning**, **Safety Management**, 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's** and **Bachelor's** 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

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Control Logix Overview*** *Introduction to Control Logix Controllers • System Architecture and Components • Key Features of Control Logix • Applications of Control Logix in Automation*
0930 - 0945	*Break*
0945 – 1045	***Hardware Components of Control Logix*** *PLC Processor • I/O Modules and Expansion Options • Communication Modules • Power Supplies and Chassis*
1045 - 1145	***Control Logix Communication Protocols*** *EtherNet/IP • ControlNet • DeviceNet • Serial Communication (DF1)*
1145 - 1230	***Programming Environment*** *Overview of RSLogix 5000 • Setting Up a Project • Creating a New Controller • Software Configuration Options*
1230 – 1245	*Break*
1245 – 1330	***Control Logix Memory & Data Types*** *Memory Allocation (Program, Data, and I/O Memory) • Data Types and Structures • Tags and Addresses • User-Defined Data Types*
1330 - 1420	***System Diagnostics & Monitoring*** *Basic Diagnostic Tools • System Health Check • Troubleshooting Using RSLogix 5000 • Monitoring Control Process Performance*
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 – 0830	***Programming Basics*** *Ladder Logic Programming Overview • Basic Ladder Logic Instructions • Timers, Counters, and Comparisons • Data Handling Instructions*
0830 – 0930	***Input & Output Configuration*** *Configuring Digital Inputs and Outputs • Analog Input and Output Setup • Discrete versus Analog I/O • Configuring Remote I/O Devices*
0930 - 0945	*Break*
0945 – 1130	***Control Logix Data Handling*** *Working with Tags and Arrays • Communication with Remote Devices • Structuring Data Tables and Arrays • Complex Data Handling Techniques*
1130 - 1230	***Control Logix Functions & Blocks*** *Function Block Diagram (FBD) Programming • Structured Text Programming • Synchronous and Asynchronous Blocks • Custom Function Block Creation*

1230 - 1245	*Break*
1245 - 1330	***Control Logix Sequencers & State Machines*** *Introduction to Sequencers • Programming with State Machines • Implementing Sequence Control Logic • Troubleshooting State Machine Logic*
1330 - 1420	***Troubleshooting Programming Errors*** *Common Programming Mistakes • Logic Errors Detection • Using Online Monitoring Tools • Debugging Techniques*
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 – 0830	***Understanding Control Logix Faults*** *Types of Faults in Control Logix Systems • Fault Diagnostic Tools • Fault History and Log Management • Troubleshooting Error Codes*
0830 – 0930	***Controller Faults & Recovery*** *Common Processor Faults • Fault Isolation and Identification • Controller Reset Procedures • Controller Status Monitoring*
0930 - 0945	*Break*
0945 – 1130	***I/O Module Troubleshooting*** *Diagnosing Digital I/O Issues • Troubleshooting Analog I/O • Identifying and Resolving Communication Issues • Replacing I/O Modules*
1130 - 1230	***Communication Faults & Recovery*** *Troubleshooting Communication Failures • Network Configuration Issues • Tools for Diagnosing Communication Faults • Resolving EtherNet/IP and ControlNet Issues*
1230 - 1245	*Break*
1245 - 1330	***Performance Monitoring & Tuning*** *Identifying Performance Bottlenecks • Optimizing Scan Times • System Performance Tracking • Resolving Performance Issues*
1330 - 1420	***Troubleshooting Best Practices*** *Step-by-Step Troubleshooting Procedures • Using Documentation and Manuals Effectively • Collaborating with Remote Teams for Support • Case Study: Analyzing a Control System Failure*
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 – 0830	***Advanced Data Handling & Manipulation*** *Handling Large Arrays and Structures • Interfacing with External Databases • Multi-Axis Motion Control Integration • Data Logging and Analysis*
0830 – 0930	***Advanced Communication Techniques*** *Advanced EtherNet/IP Configurations • Bridging Networks (ControlNet, DeviceNet) • Redundancy and Failover Systems • Security Measures for Communication*

0930 - 0945	Break
0945 – 1130	***Safety Systems Integration*** *Safety-Rated I/O and SIL Levels • Implementing Safety in Control Logix Systems • Troubleshooting Safety System Issues • Certification and Compliance*
1130 - 1230	***Real-Time Control & Monitoring*** *Real-Time System Optimization • HMI Integration for Monitoring • Remote Diagnostics • Case Study: Real-Time Failure Recovery*
1230 - 1245	Break
1245 - 1330	***Control Logix System Upgrades*** *Firmware Updates and Patch Management • Replacing Obsolete Hardware • Backward Compatibility and Migration Paths • Troubleshooting During Upgrades*
1330 - 1420	***Troubleshooting Motion Control Systems*** *Overview of Motion Control in Control Logix • Troubleshooting Axis and Motor Faults • Encoder and Feedback Device Issues • Synchronization Problems*
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 – 0830	***Simulating Control Logix Faults*** *Setting Up Fault Conditions in a Simulated Environment • Identifying Faults Using Software Tools • Practical Fault Isolation Techniques • Real-World Examples of Troubleshooting*
0830 – 0930	***Preventive Maintenance Strategies*** *Developing a Preventive Maintenance Plan • Routine Diagnostics and Checks • Keeping Logs for Maintenance Activities • Tools for Predictive Maintenance*
0930 - 0945	Break
0945 – 1100	***System Performance Diagnostics*** *Identifying System Slowdowns • Optimizing System Resources • Analyzing Control Loop Performance • Troubleshooting System Crashes*
1100 – 1230	***Fault Recovery Strategies*** *Recovery from Communication Failures • Hardware Fault Isolation and Recovery • Software Crash Recovery • Handling Unexpected Shutdowns*
1230 - 1245	Break
1245 – 1345	***Training on Practical Troubleshooting Tools*** *Using Diagnostic Software Tools • Understanding Diagnostic LED Indicators • Analyzing System Logs and Reports • Remote Monitoring Tools and Software*
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", "HMI SCADA" and "PLCLogix 5000 Software".

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

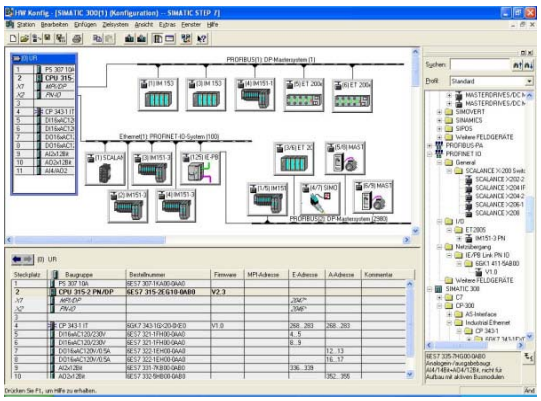
Siemens S7-1200 Simulator

Siemens S7-400 Simulator

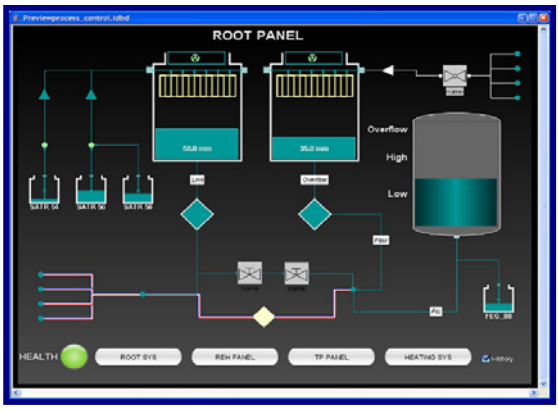
Siemens SIMATIC S7-300

Siemens S7-200 Simulator

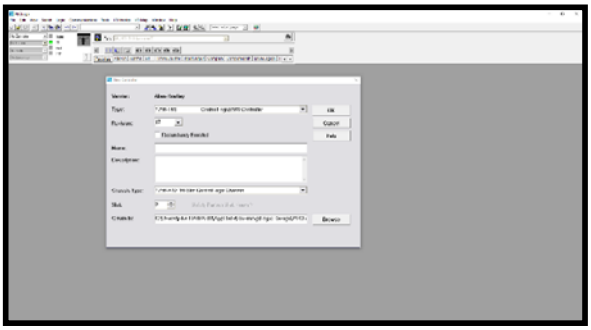
GE Fanuc Series 90-30 PLC Simulator

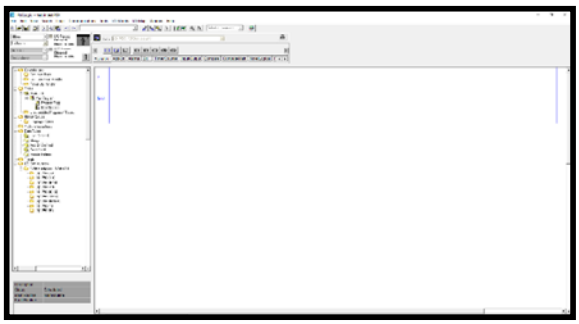


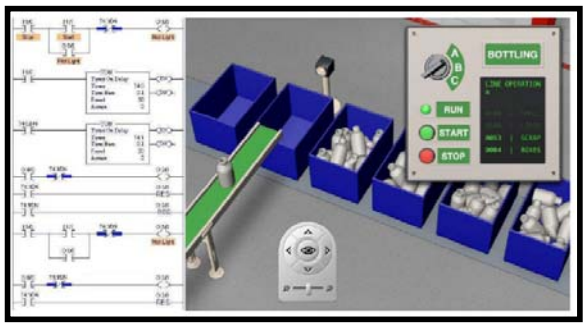
Siemens SIMATIC Step 7 Professional Software

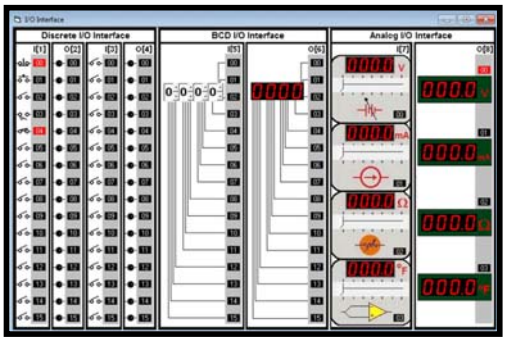


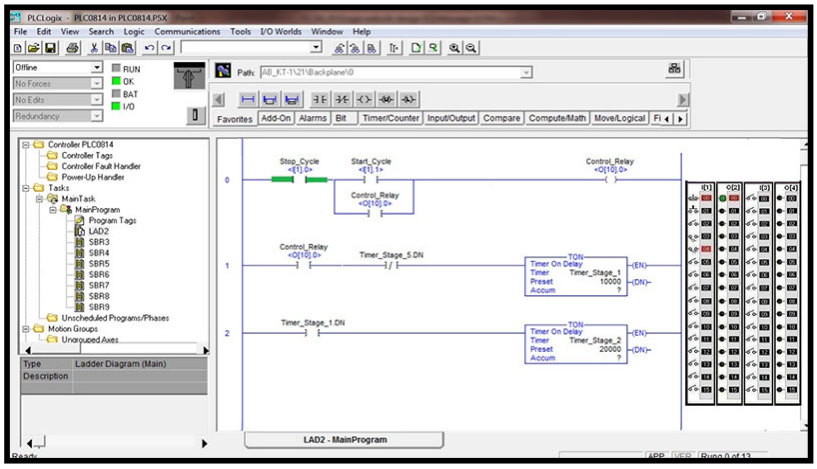
HMI SCADA











PLCLogix 5000 Software

Course Coordinator

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