COURSE OVERVIEW IE1112
Industrial Automation & Automatic Control Systems

Course Title
Industrial Automation & Automatic Control Systems

Course Date/Venue
July 13-17, 2025/Meeting Plus 9, City Centre Rotana, Doha, Qatar

Course Reference
IE1112

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

Course Description

This practical and highly-interactive course includes 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 knowledge of Industrial Automation & Automatic Control Systems. It covers the evolution from manual to automatic control, benefits and challenges of automation and types of industrial automation; the elements of a control system, types of control systems and process variables and measurements; the industrial communication basics, automation system architecture, PLC hardware and architecture, PLC programming languages, logic development and control tasks and PLC inputs and output.

During the course, participants will be able to the troubleshooting and diagnostics in PLCs and PLC application examples and HMI systems, SCADA system architecture, HMI/SCADA screen development, alarm and event management, data logging and reporting and remote access and cybersecurity; the industrial sensors and transducers, actuators and final control elements and PID control and tuning techniques; the advanced control strategies and instrument loop diagrams and wiring, calibration and maintenance of instruments and system integration and commissioning; the fieldbus and industrial ethernet, preventive and predictive maintenance in automation and energy management and efficiency.

Course Objectives

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

- Apply and gain an in-depth knowledge on industrial automation and automatic control systems
- Explain the evolution from manual to automatic control, benefits and challenges of automation and types of industrial automation
- Identify the elements of a control system, types of control systems and process variables and measurements
- Discuss industrial communication basics, automation system architecture, PLC hardware and architecture, PLC programming languages, logic development and control tasks and PLC inputs and output
- Perform troubleshooting and diagnostics in PLCs and PLC application examples as well as discuss HMI systems, SCADA system architecture, HMI/SCADA screen development, alarm and event management, data logging and reporting and remote access and cybersecurity
- Describe industrial sensors and transducers, actuators and final control elements and PID control and tuning techniques
- Apply advanced control strategies and carryout instrument loop diagrams and wiring, calibration and maintenance of instruments and system integration and commissioning
- Discuss fieldbus and industrial ethernet, preventive and predictive maintenance in automation and energy management and efficiency

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 industrial automation and automatic control systems for electrical engineers, instrumentation and control engineers, automation engineers, control system technicians, instrumentation technicians, technical trainers, engineering managers and those who involved in the design, operation, maintenance, or management of automation and control systems in industrial environments.

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 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.

- 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 **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

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: ***Sunday, 13th of July 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Industrial Automation*** *Evolution from Manual to Automatic Control • Benefits and Challenges of Automation • Types of Industrial Automation (Fixed, Programmable, Flexible) • Applications in Various Industries*
0930 – 0945	*Break*
0945 – 1030	***Elements of a Control System*** *Sensors and Transducers • Controllers and Actuators • Feedback and Feedforward Loops • Human-Machine Interface (HMI)*
1030 – 1130	***Types of Control Systems*** *Open-Loop versus Closed-Loop Systems • Batch, Continuous and Discrete Control • Centralized versus Distributed Control • Supervisory versus Direct Control*
1130 – 1215	***Process Variables & Measurements*** *Pressure, Temperature, Flow and Level Fundamentals • Signal Types (Analog versus Digital) • Signal Conditioning and Noise Reduction • Calibration Principles and Standards*
1215 – 1230	*Break*
1230 – 1330	***Industrial Communication Basics*** *Analog versus Digital Signal Transmission • Common Communication Protocols (4-20mA, HART, Modbus) • Introduction to Fieldbus, Ethernet/IP • Communication Interface Standards (RS-232, RS-485)*
1330 – 1420	***Automation System Architecture*** *Overview of Automation Pyramid (Field, Control, Supervisory) • PLC, DCS and SCADA Hierarchy • Control Room Layout and Operator Console Overview • Redundancy and Fail-Safe Concepts*
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: Monday, 14th of July 2025

0730 – 0830	***PLC Hardware & Architecture*** *Power Supply, CPU, I/O Modules • Modular versus Compact PLCs • Rack Configuration and System Bus • Wiring and Field Signal Interfacing*
0830 – 0930	***PLC Programming Languages*** *IEC 61131-3 Programming Standards • Ladder Logic Diagram (LD) Basics • Function Block Diagram (FBD), Structured Text (ST) • Instruction List and Sequential Function Chart*
0930 – 0945	*Break*
0945 – 1100	***Logic Development & Control Tasks*** *Basic Logic Gates (AND, OR, NOT) • Latching, Timers and Counters • Interlocking and Sequencing Operations • PID Control Blocks in PLC*
1100 – 1215	***PLC Inputs & Output*** *Digital I/O Configuration and Scaling • Analog Input/Output Signal Processing • Scaling and Resolution of Analog Values • Integration with Field Devices (Sensors, Actuators)*
1215 – 1230	*Break*
1230 – 1330	***Troubleshooting & Diagnostics in PLCs*** *Online Monitoring and Debugging Tools • Error Codes and Fault Isolation • Simulation and Testing of Logic • Communication Diagnostics and LED Indicators*
1330 – 1420	***PLC Application Examples*** *Conveyor and Motor Control • Batch Mixing System Logic • Pump Start/Stop and Level Control • Temperature Control Loops*
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: Tuesday, 15th of July 2025

0730 – 0830	***HMI Systems*** *Purpose and Benefits of HMI • Types of HMI (Text, Graphical, Touch-Screen) • Hardware and Software Platforms • Design Principles for Operator Friendliness*
0830 – 0930	***SCADA System Architecture*** *Centralized Control System Overview • SCADA Components: RTUs, PLCs, Master Stations • Data Acquisition and Historian Systems • SCADA Communication with Control Systems*
0930 – 0945	*Break*
0945 – 1100	***HMI/SCADA Screen Development*** *Process Graphics and Mimic Displays • Alarm Banner and Alarm Logging • Trending and Historical Data Display • Navigation and Layout Best Practices*
1100 – 1215	***Alarm & Event Management*** *Alarm Priority and Classification • Deadbands and Filtering Techniques • Alarm Management Philosophy • Root Cause versus Nuisance Alarms*
1215 – 1230	*Break*
1230 – 1330	***Data Logging & Reporting*** *Tag Configuration and Database Linking • Historical Data Logging Techniques • Report Generation and Export Formats • Connectivity with Third-Party Databases*

1330 – 1420	***Remote Access & Cybersecurity*** *Web-Based SCADA and Remote Operation • Role-Based Access Control • Secure Communication Protocols • Firewall and Intrusion Detection Systems*
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: Wednesday, 16th of July 2025

0730 – 0830	***Industrial Sensors & Transducers*** *Temperature (RTDs, Thermocouples) • Pressure (Strain Gauge, Capacitive) • Flow (Ultrasonic, Magnetic, Turbine) • Level (Float, Ultrasonic, Radar)*
0830 – 0930	***Actuators & Final Control Elements*** *Control Valves: Types and Characteristics • On/Off versus Modulating Actuators • Motorized Actuators and VFDs • Pneumatic versus Electric Actuators*
0930 – 0945	*Break*
0945 – 1100	***PID Control & Tuning Techniques*** *Proportional, Integral, Derivative Functions • Tuning Methods (Ziegler-Nichols, Manual Tuning) • Cascade and Feedforward Control • Common Loop Performance Issues*
1100 – 1215	***Advanced Control Strategies*** *Ratio and Override Control • Split-Range Control and 3-Element Control • Adaptive and Fuzzy Logic Control • Model Predictive Control Basics*
1215 – 1230	*Break*
1230 – 1330	***Instrument Loop Diagrams & Wiring*** *Reading and Interpreting Loop Drawings • Cable Schedules and Terminal Diagrams • Junction Box and Marshalling Panel Layouts • Tagging and Instrument Identification Standards*
1330 – 1420	***Calibration & Maintenance of Instruments*** *Calibration Procedure for Field Transmitters • As-Found versus As-Left Calibration • Loop Checking and Signal Simulation • Maintenance Best Practices for Sensors and Valves*
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: Thursday, 17h of July 2025

0730 – 0830	***System Integration & Commissioning*** *Interfacing PLC, HMI, SCADA and DCS • Cold Loop versus Hot Loop Testing • I/O Validation and FAT/SAT • Commissioning Checklists*
0830 – 0930	***Fieldbus & Industrial Ethernet*** *Profibus, DeviceNet, Foundation Fieldbus Overview • Ethernet/IP, Profinet, Modbus TCP • Topologies and Node Addressing • Troubleshooting Network Issues*
0930 – 0945	*Break*
0945 – 1030	***Preventive & Predictive Maintenance in Automation*** *Maintenance Planning and CMMS Link • Sensor Calibration Cycles • Condition Monitoring and Predictive Tools • Smart Diagnostics and IoT Sensors*

1030 – 1230	***Energy Management & Efficiency*** *Energy Monitoring Devices • Demand Management and Control Strategies • Load Shedding and Process Optimization • Integrating Automation with Energy Systems*
1230 – 1245	*Break*
1245 – 1345	***Real-World Applications & Case Studies*** *Tank Farm Automation • Building Automation Integration • Remote Pipeline Monitoring • Food Processing Plant Control System*
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", "Siemens S7-200", "AB Micrologix 1000 (Digital or Analog)", "AB SLC5/03", "AB WS5610 PLC" and "HMI SCADA".

Allen Bradley SLC 500 Simulator

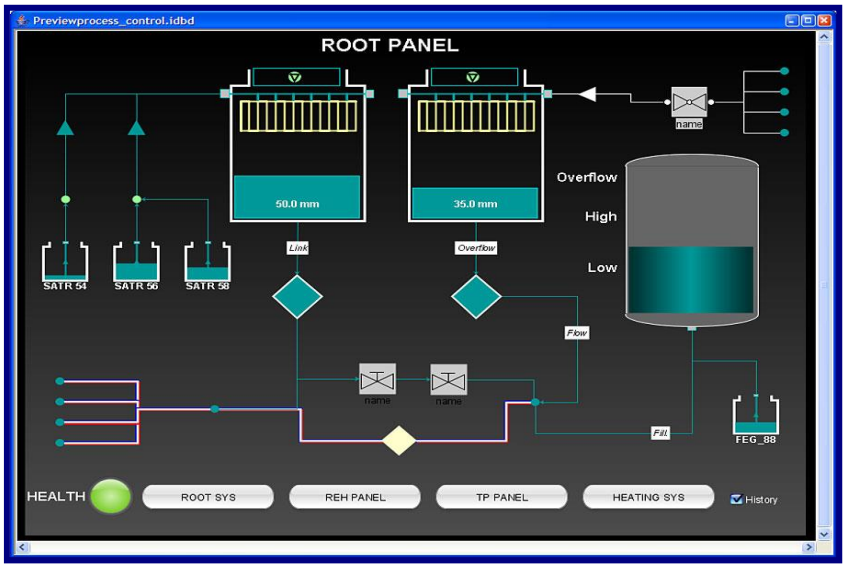
Siemens S7-200 Simulator

Allen Bradley Micrologix 1000 Simulator (Digital)

Allen Bradley Micrologix 1000 Simulator (Analog)

Allen Bradley SLC 5/03

Allen Bradley WS5610 PLC Simulator PLC5



HMI SCADA

Course Coordinator
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