COURSE OVERVIEW IE0918
ENRAF Tank Gauging System

Course Title
ENRAF Tank Gauging System

Course Date/Venue
Please refer to page 2

Course Reference
IE0918

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 our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of ENRAF Tank Gauging System. It covers the s tank gauging systems, components of Enraf tank gauging system and working principles of tank gauging; the applications of tank gauging systems, regulations and standards for tank gauging and Enraf tank gauging technologies; planning tank gauging system installation and installing radar transmitter and level gauges including pressure and temperature sensors; the wiring and electrical connections, configuring tank gauging system and troubleshooting common installation issues; and the tank gauging system calibration and radar transmitters calibration.

During this interactive course, participants will learn the pressure and temperature sensors calibration and system accuracy maintenance; troubleshooting calibration issues and the system health and performance monitoring; the tank gauging data acquisition, data display and user interface; integrating tank gauging system with SCADA systems and data logging and historical data access; the alarm management and notifications, system security and data protection and advanced troubleshooting techniques; and optimizing system performance, upgrading and expanding tank gauging system and troubleshooting calibration failures.

Course Objectives

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

- Apply and gain a comprehensive knowledge on Enraf tank gauging system
- Discuss tank gauging systems, components of Enraf tank gauging system and working principles of tank gauging
- Describe the applications of tank gauging systems, regulations and standards for tank gauging and Enraf tank gauging technologies
- Plan tank gauging system installation and install radar transmitter and level gauges including pressure and temperature sensors
- Identify wiring and electrical connections, configure tank gauging system and troubleshoot common installation issues
- Apply tank gauging system calibration, radar transmitters calibration, pressure and temperature sensors calibration and system accuracy maintenance
- Troubleshoot calibration issues and apply system health and performance monitoring and tank gauging data acquisition
- Recognize data display and user interface, integrate tank gauging system with SCADA systems and apply data logging and historical data access
- Apply alarm management and notifications, system security and data protection and advanced troubleshooting techniques
- Optimize system performance, upgrade and expand tank gauging system and troubleshoot calibration failures

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 ENRAF tank gauging system for instrumentation engineers and technicians, control and automation engineers, operations and production personnel, maintenance engineers and supervisors, process engineers, project engineers and managers, SCADA / DCS operators and engineers and other technical staff.

Course Date/Venue

Session(s)	Date	Venue
1	June 22-26, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	August 25-29, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	October 26-30, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
4	December 15-19, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

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:

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 **Flow Measurement** Devices, **Water Network** Pipe Materials & Fittings, **Mapping & Inventory** of Pipes & Fittings in the Water Supply System, **Water Distribution System** Operator, **Sewer System and Sewage Flows**, **Ultrasonic Inspection**, and **Advanced Visual Techniques** of Predictive Maintenance, Water Meter Reading (**MMR**), **Network Management & Supervision**, **Leakage Prevention & Control**, Waste Water Treatment, **Water Utility Regulation and Economics**, **Health & Safety Rules & Regulations**, **Safety Management**, **Accident Investigation**, 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, **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's** & **Bachelor's** degree 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.

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.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

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 Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop 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	***Overview of Tank Gauging Systems*** *Definition and Role of Tank Gauging • Importance in Storage Tank Management • Types of Tank Gauging Systems (e.g., Radar, Servo, etc.) • History and Evolution of Tank Gauging Systems*
0930 – 0945	*Break*
0945 – 1030	***Components of ENRAF Tank Gauging System*** *Radar Transmitter • Servo Motor and Level Gauge • Pressure and Temperature Sensors • System Controller and Interfaces*
1030 – 1130	***Working Principles of Tank Gauging*** *Operation of Radar-Based Systems • How Servo-Based Systems Function • Role of Pressure and Temperature Compensation • Conversion of Data to Tank Measurements*
1130 – 1215	***Applications of Tank Gauging Systems*** *Applications in the Petroleum Industry • Chemical and Food Industries • Environmental Monitoring • Safety and Compliance Benefits*
1215 – 1230	*Break*
1230 – 1330	***Regulations & Standards for Tank Gauging*** *API Standards and Guidelines • Local and International Regulatory Frameworks • Industry Best Practices • Calibration and Accuracy Standards*

1330 – 1420	***Introduction to ENRAF Tank Gauging Technologies*** *Overview of ENRAF as a Leading Tank Gauging Technology Provider • ENRAF System Components and Features • Basic Understanding of System Design • Advantages of ENRAF Systems over Competitors*
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	***Planning for Tank Gauging System Installation*** *Site Assessment and System Requirements • Identifying Tank Types and Sizes • Choosing Appropriate Tank Gauging System (Radar vs. Servo) • System Layout and Installation Considerations*
0830 – 0930	***Installing Radar Transmitter and Level Gauges*** *Mounting Radar Transmitters on Tanks • Configuring and Calibrating Radar Sensors • Mounting Level Gauges and Ensuring Alignment • Integration with Control Systems*
0930 – 0945	*Break*
0945 – 1100	***Installation of Pressure & Temperature Sensors*** *Types of Pressure and Temperature Sensors • Correct Placement and Installation Techniques • Calibration of Pressure and Temperature Devices • Ensuring System Accuracy Post-Installation*
1100 – 1215	***Wiring & Electrical Connections*** *Electrical Wiring Guidelines • Power Supply Requirements and Backup Systems • Grounding and Electrical Safety Measures • Ensuring Signal Integrity and System Stability*
1215 – 1230	*Break*
1230 – 1330	***Configuring the Tank Gauging System*** *Setting Up the ENRAF System Controller • Configuring Communication Protocols (Modbus, Profibus, etc.) • Network Setup for Multiple Tanks • Initial System Tests and Diagnostics*
1330 – 1420	***Troubleshooting Common Installation Issues*** *Identifying and Resolving Wiring Problems • Dealing with Communication Errors • Common Installation Mistakes and How to Avoid Them • Ensuring Proper Data Transmission from Sensors to Controllers*
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	***Tank Gauging System Calibration Fundamentals*** *The Importance of System Calibration • Types of Calibration (Static and Dynamic) • Calibration Procedure Overview • Calibration Tools and Software*
0830 – 0930	***Calibration of Radar Transmitters*** *Step-by-Step Calibration of Radar Sensors • Adjusting for Environmental Factors • Performing Test Measurements • Verifying Accuracy Post-Calibration*
0930 – 0945	*Break*

0945 – 1100	***Calibration of Pressure & Temperature Sensors*** *Calibration Techniques for Pressure Sensors • Calibrating Temperature Compensation Devices • Using Calibration Equipment • Validation of Sensor Calibration Results*
1100 – 1215	***Maintaining System Accuracy*** *Regular Maintenance Routines for Sensors • Cleaning and Protecting Radar and Servo Components • Replacing Damaged Parts • Monitoring System Performance over Time*
1215 – 1230	*Break*
1230 – 1330	***Troubleshooting Calibration Issues*** *Identifying Inaccurate Readings • Adjusting Settings to Improve Accuracy • Handling Environmental Interferences • Corrective Actions for Faulty Sensors*
1330 – 1420	***System Health & Performance Monitoring*** *Using Diagnostic Tools and Software • Tracking System Performance Trends • Identifying Signs of Wear and Tear • Establishing Preventive Maintenance Schedules*
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	***Tank Gauging Data Acquisition*** *Understanding Data Flow in Tank Gauging Systems • Key Data Points (Level, Temperature, Pressure, etc.) • Data Formats and Units of Measurement • Monitoring System Outputs in Real Time*
0830 – 0930	***Data Display & User Interface*** *Understanding the User Interface (UI) of ENRAF Systems • Navigating the ENRAF System Software • Displaying Data in Graphical or Tabular Format • Customizing Data Presentation*
0930 – 0945	*Break*
0945 – 1100	***Integrating Tank Gauging System with SCADA Systems*** *Overview of SCADA (Supervisory Control and Data Acquisition) • How ENRAF Integrates with SCADA • Setting up Communication Protocols • Sending Real-Time Data to Control Systems*
1100 – 1215	***Data Logging & Historical Data Access*** *Configuring Data Logging Functions • Retrieving Historical Data • Analyzing Trends and Performance over Time • Storing and Archiving Data for Compliance*
1215 – 1230	*Break*
1230 – 1330	***Alarm Management & Notifications*** *Setting up Alarms for Threshold Violations • Configuring Notification Systems (Email, SMS, etc.) • Ensuring Safety-Critical Alerts Are Triggered • Managing Alarm History and Escalation Procedures*

1330 – 1420	***System Security & Data Protection*** *Securing Communication Lines between Devices • Implementing Password Protection and Access Controls • Encryption of Sensitive Tank Data • Preventing Unauthorized Access to Tank Gauging Data*
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	***Advanced Troubleshooting Techniques*** *Diagnosing Common System Failures • Understanding System Logs and Diagnostics Tools • Using Advanced Test Equipment (e.g., Multimeters, Oscilloscopes) • Resolving Communication Breakdowns between Components*
0830 – 0930	***Optimizing System Performance*** *Improving System Accuracy through Fine-Tuning • Maximizing Data Precision by Recalibrating Sensors • Addressing Interference from Environmental Factors • Enhancing Signal Integrity and Reducing Noise*
0930 – 0945	*Break*
0945 – 1100	***Upgrading & Expanding the Tank Gauging System*** *Adding New Tanks to an Existing System • Upgrading Radar Sensors and Controllers • Integrating Additional Pressure/Temperature Sensors • Expanding System Capabilities to Meet Operational Needs*
1100 – 1215	***Troubleshooting Calibration Failures*** *Recognizing Calibration Errors in Readings • Re-Calibrating or Replacing Faulty Sensors • Correcting Signal Transmission Problems • Ensuring System Consistency during Re-Calibration*
1215 – 1230	*Break*
1230 – 1345	***Case Studies & Real-World Applications*** *Reviewing Common Case Studies from the Industry • Discussing Troubleshooting Examples • Analyzing System Failures and Successes • Learning from Industry Best Practices*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t 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

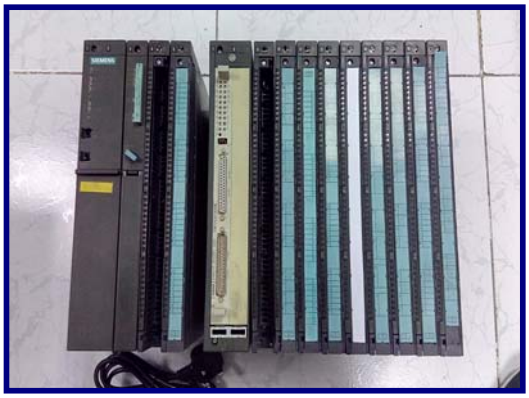
Allen Bradley Micrologix 1000 Simulator (Digital)

Allen Bradley Micrologix 1000 Simulator (Analog)

Allen Bradley SLC 5/03

Allen Bradley WS5610 PLC Simulator PLC5

Siemens S7-1200 Simulator

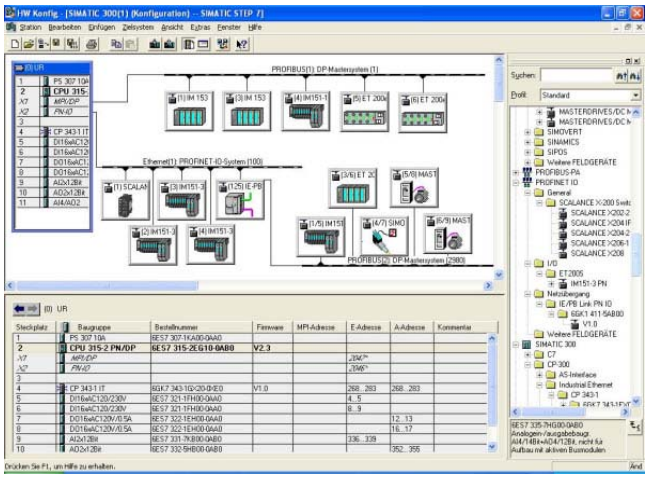


Siemens S7-400 Simulator

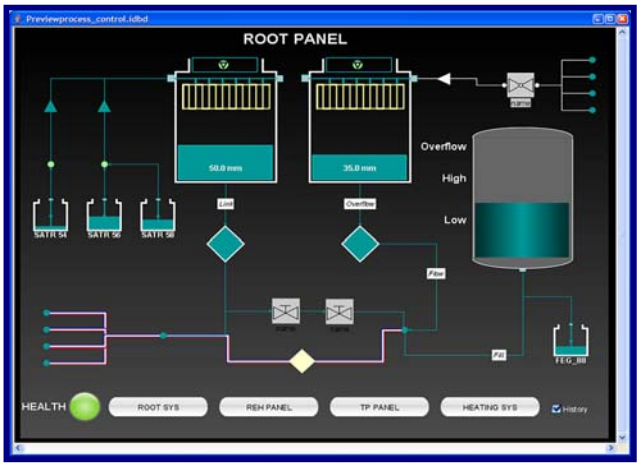
Siemens SIMATIC S7-300

Siemens S7-200 Simulator

GE Fanuc Series 90-30 PLC Simulator



Siemens SIMATIC Step 7
Professional Software



HMI SCADA

Course Coordinator
Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org