



COURSE OVERVIEW IE0680 Process Control, Instrumentation & Safeguarding

Course Title

Process Control, Instrumentation & Safeguarding

Course Date/Venue

February 18-22, 2024/Karatas Meeting Room, Crown Plaza Harbiye, Istanbul, Turkey

Course Reference

IE0680

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.



Control systems for industrial applications have advanced dramatically during the last decade. They become more modular and more sophisticated offering a vast variety of control functions for all the systems that operate within a modern "intelligent" facility. Enhanced functionality of the automation systems also means more complexity, interactive strategies, new technologies and systems management with resulting better control and improved safety and reliability.



The ANSI SP 84 (formerly ISA 84.01) "Application of Safety Instrumented Systems for the Process Industries" standard requires that companies assign a target safety integrity level (SIL) for all safety instrumented systems (SIS) applications. The assignment of the target SIL is a decision requiring the extension of the process hazards analysis (PHA). The assignment is based on the amount of risk reduction that is necessary to mitigate the risk associated with the process to an acceptable level. All of the SIS design, operation, and maintenance choices must then be verified against the target SIL.



This course provides participants with the perfect bridge between theories and practical knowledge gained on the plant floor. It provides a thorough exposition of control components, pneumatics, actuators, and regulators and details their application to the industrial process. The course is designed for engineers and technicians in order to update them with the latest technologies in process automation, control and safeguarding. It covers the systematic method for selecting safety integrity levels (SIL's) for safety instrumented systems (SIS).

Some of the material in this course is based on the application of the safety life cycle as it is described in the international standards ANSI SP 84 "Application of Safety Instrumented Systems for the Process Industries" and EN/IEC 61508/61511. This course expands upon the framework developed in these standards. In addition to describing the tasks that users should perform during the safety life cycle, this course also provides detailed procedures for accomplishing these tasks. These procedures are based on risk analysis and reliability engineering principles from a variety of disciplines. Each topic will be discussed in a logically organized manner and contains an abundance of realistic problems, examples, and illustrations to challenge the participants to think and encourage them to apply this knowledge to the solution of practical problems.

Course Objectives

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

- Apply and gain an in-depth knowledge and skills in process control, instrumentation and safeguarding
- Practice pressure measurement, level measurement, temperature measurement & flow measurement and recognize their importance in process control
- Identify the various types of Control Valves and learn how to choose the right valve using the selection guidelines and application comparison
- List the various types of actuators and be able to demonstrate valve selection & sizing
- Illustrate field communications including their classifications and safety considerations
- Apply the basic control concepts, including variables, elements, system responses and on-off control and implement modes of control
- Discuss the principles, types, features, configurations and functions of distributed control systems (DCS), programmable logic controllers (PLC) and SCADA systems and recognize their practical applications in process control
- Apply the safety engineering principles and standards and learn the concept of safety life cycle as well as its various models and phases
- Practice hazard analysis as applied in process control safeguarding and employ the safety instrumented functions (SIF), SIS and SIL techniques
- Employ the alarm management concepts, principles, architecture, displays, functions and operator considerations
- Recognize the future trends in measurement, control system & communication technology

Who Should Attend


This course provides an overview of all significant aspects and considerations of process control, instrumentation and safeguarding for process control engineers and supervisors, instrumentation and control system engineers, automation engineers, application engineers and technologists, process engineers, electrical engineers and supervisors and those involved in the design, implementation, upgrading and safeguarding of industrial control systems.

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:

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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.

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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.

Course Fee

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.

Accommodation

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



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. Anouar Dhifallah, MSc, BSc, is a **Senior Instrumentation & Control Engineer** with over **20** years of extensive experience within the **Power & Water Utilities** and other **Energy** sectors. His expertise widely covers in the areas of **Actuators & Valve Selection, Process Control & Automation, Batch Process & Sequential Control, Analog Control, Operator Interfaces, Data Communication, Networking Design and Configurations, Instrumentation & Control, General Instrumentation & Process Control, System Checkout & Testing, Advanced Control with PLC's, Ladder Logic, Process Instrumentation & Control, Control Valve Maintenance, Process Automation & Control Instrumentation, Foxboro, ABB, Rosemount, Yokogawa, Pneumatic & Electronic, Level Measurement, HV/LV Equipment, High Voltage Electrical Safety, LV & HV Electrical System, HV Equipment Inspection & Maintenance, HV Switchgear Operation & Maintenance, LV Distribution Switchgear & Equipment, Electrical Safety, Electrical Maintenance, Inspection, Testing & Risk Assessment, Electrical Generator Protection, Electrical Generator Testing & Maintenance, Programmable Logic Controller (PLC), Distribution Control System (DCS), Temperature, Flow & Level Measurement, Pneumatic & Hydraulic Technologies, Substation Automation Systems & Application, Testing & Maintenance of Electrical Substations, Electrical Substation 33/11KV Design, Electrical Power Substation Maintenance, Electrical Equipment Inspection, Testing & Troubleshooting, Lighting Installation Design, Electric Distribution System, Load Forecasting Methods, Transmission & Distribution Analysis, Circuit Breakers Inspection & Maintenance, Protective Relaying, Electrical & Control System, Switchgears, Transformers, Medium & High Voltage Equipment, Circuit Breakers, Cable & Overhead Line Troubleshooting & Maintenance, HV/MV Cable Splicing, High Voltage Circuit Breaker Inspection & Repair, Cable & Over Head Power Line, HV Cable Design, Cable Splicing & Termination, Cable Jointing Techniques, High Voltage Power System, Electrical Standards, Electrical Drawing & Schematics, Voltage Distribution, Power Distribution, Filters, Automation System, Electrical Variable Speed Drives, Power Systems, Power Generation, Diesel Generators, Power Stations, Uninterruptible Power Systems (UPS), Battery Chargers, AC & DC Transmission, CCTV Installation, Data & Fire Alarm System, Security Systems, Evacuation Systems and Electrical Motors & Variable Speed Drives, Renewable Energy and Installation & Control of Electrical and Electronic devices.**

During Mr. Anouar's career life, he has gained his practical experience through several significant positions and dedication as the **Electrical & Instrumentation Department Head, Technical Services Manager, Field Engineer, Electrical Engineer, Electrical Instructor/Trainer, Faculty Coach** and **Instructor/Trainer** from various companies, colleges and institutes like the Technical School of Zarzis, Ambatovy Training Center, Tunisian National Oil Co., Rancho Santiago College, Al Baha Technical College, **ARAMCO, PDO**, Tunisie Telecom Co., Al Seeb Institute, Russyal Institute and Technical College of Tunisia.

Mr. Anouar has a **Master's** degree in **Electronics & Telecommunication Engineering** and a **Bachelor's** degree in **Electrical & Instrumentation Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Coach** from the International Coaching Federation (ICF) and delivered numerous trainings, courses, workshops, seminars and conferences internationally.





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, 18th of February 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0900	Review of Course Objectives of Course • Timetables
0900 – 0930	Introduction to Process Control Basic Concepts • Performance Terms • Process Control Fundamentals
0930 – 0945	Break
0945 – 1030	Pressure Measurement Bourdon Spring • Spring & Bellows Element • Diaphragm Elements • Pressure Transducers • Installation Considerations
1030 – 1100	Level Measurement Main Types • Buoyancy Tape Systems • Hydrostatic Pressure • Ultrasonic Measurement • Radar Measurement • Electrical Measurement • Installation Considerations
1100 – 1145	Video Presentation Radar Level Measurement
1145 – 1230	Temperature Measurement Thermocouples • RTD's • Installation Considerations
1230 – 1245	Break
1245 – 1330	Flow Measurement Differential Pressure Flowmeters • Oscillatory Flow Measurement • Non-Intrusive Flowmeters • Mass Flow Meters • Positive Displacement Meters • Installation Considerations • Selection Guidelines
1330 – 1420	Video Presentations Coriolis Mass Flow Measurement • Ultrasonic Flowmeter
1420 – 1430	Recap
1430	Lunch & End of Day One





Day 2: Monday, 19th of February 2024

0730 – 0815	Control Valve Types Rotary • Linear • Valve Selection • Price Comparison • How to Choose the Right Valve • Selection Guidelines • Application Comparisons
0815 – 0845	Video Clips Control Valve Assembly Break
0845 – 0930	Actuator Selection Types of Actuators • Linear Actuators • Rotary Actuators • Actuator Forces • Positioners • Fail Safe Systems
0930 – 0945	Break
0945 – 1030	Video Clips Actuator Assembly
1030 – 1100	Process Considerations End Connections • Pressure Classes • Face to Face Criteria • Materials Selection • Modes of Failure • Leakage Rates
1100 – 1130	Video Clips Valve Sealing
1130 – 1200	Practical Session Valve Selection & Sizing
1200 – 1230	Video Clips Control Valve Assembly
1230 – 1245	Break
1245 – 1315	Field Communications Introduction • Transmitter Classifications • HART and 4-2-mA • Driving the Circuit
1315 – 1400	Video Presentations HART Communications
1400 – 1420	Safety Considerations Intrinsic Safety • Explosion-Proof Approval Standards • Oxygen Service
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3: Tuesday, 20th of February 2024

0730 – 0900	Basic Control Concepts Variables • Basic Elements • Manual Control • Feedback Control • System Responses • ON-OFF Control • Three Term Control
0900 – 0930	Video Presentation Three Term Control
0930 – 0945	Break
0945 – 1100	Modes of Control Stability • Ultimate Gain • Tuning Methods • Ratio Control • Cascade Control • Application Examples
1100 – 1230	Distributed Control Systems Introduction • Traditional Process Controller • System Architecture • DCS Types





1230 – 1245	Break
1245 – 1330	Programmable Logic Controllers Introduction • History • Today's Position • Principles of Operation • System Components • I/O Interfaces • Configuration
1330 – 1420	SCADA Systems Basic Definitions • Levels of Hierarchy • SCADA Configuration
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4: Wednesday, 21st of February 2024

0730 – 0900	Safety Engineering Introduction • Standards • Basic Fundamentals • Safety Life Cycle • Hazard Analysis • Safety Requirements Specification
0900 – 0930	Video Presentation HAZOP
0930 – 0945	Break
0945 – 1100	Safety Instrumented Functions Definition • Example of a Safety Function • What a SIF is • What a SIF is not • How SIF fits with SIS and SIL • Summary • Bibliography
1100 – 1230	Safety Integrity Level Introduction • Definition • Selection Procedure • Practical Examples
1230 – 1245	Break
1245 – 1420	Safety Instrumented Systems Introduction • Probability of Failure • System Architecture • Safety PLC • Major Systems • Typical Questions & Answers
1420 – 1430	Recap
1430	Lunch & End of Day Four

Day 5: Thursday, 22nd of February 2024

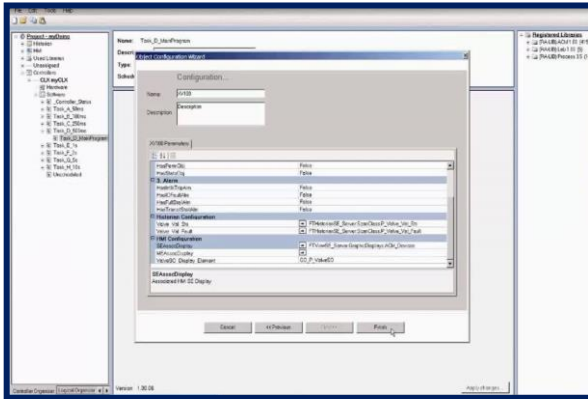
0730 – 0830	Alarm Management Introduction • Architecture • Update Times • Speed of Response • Operator Considerations • Alarm Displays • Alarm Priorities • Alarm Functions • Seven Steps to Alarm Management
0830 – 0930	Video Presentation Explosion at BP Texas City Refinery
0930 – 0945	Break
0945 – 1130	Future Trends Measurement Technology • Control System Technology • Communication Technology
1130 – 1230	Video Presentation 3 Beam Ultrasonic Flowmeter
1230 – 1245	Break
1245 – 1345	Case Studies Piper Alpha Disaster • Bhopal Gas Tragedy • Chernobyl Disaster
1345 – 1400	Addendums Review, Wrap-up Session & Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course



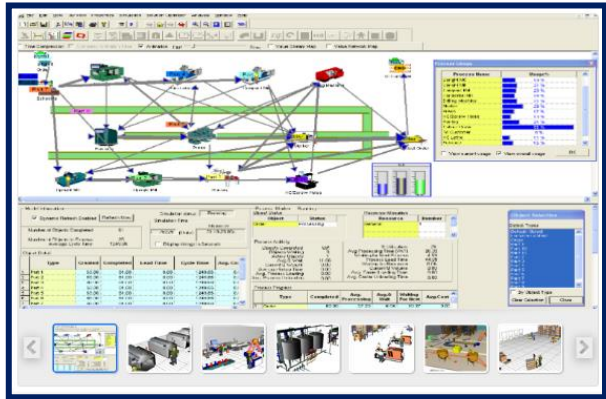


Simulator (Hands-on Practical Sessions)

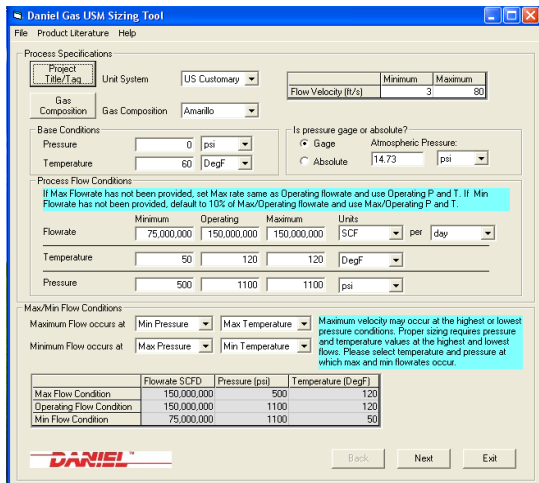
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators “RSLogix 5000”, “Automation Simulator”, “Gas Ultrasonic Meter Sizing Tool”, “Liquid Turbine Meter and Control Valve Sizing Tool”, “Liquid Ultrasonic Meter Sizing Tool” and “Orifice Flow Calculator”.



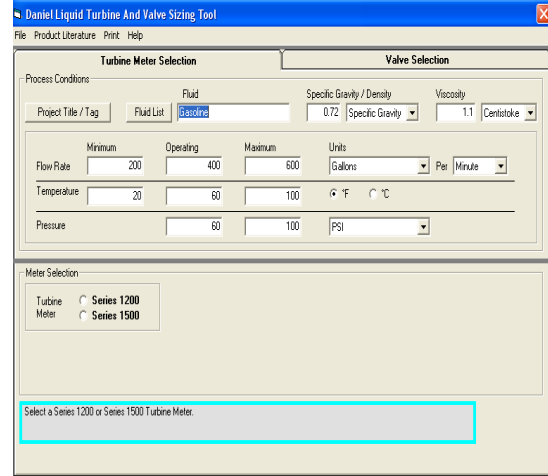
RSLogix 5000



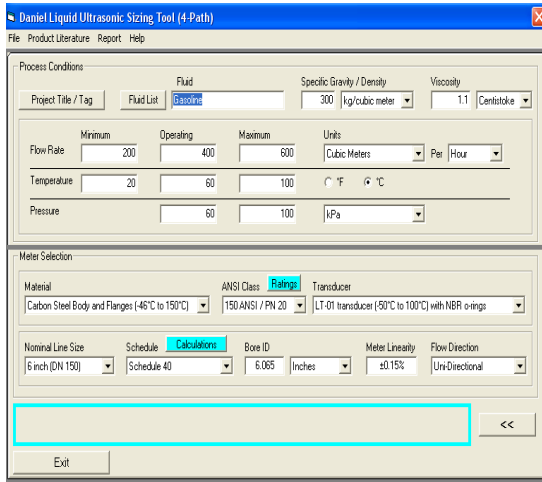
Automation Simulator



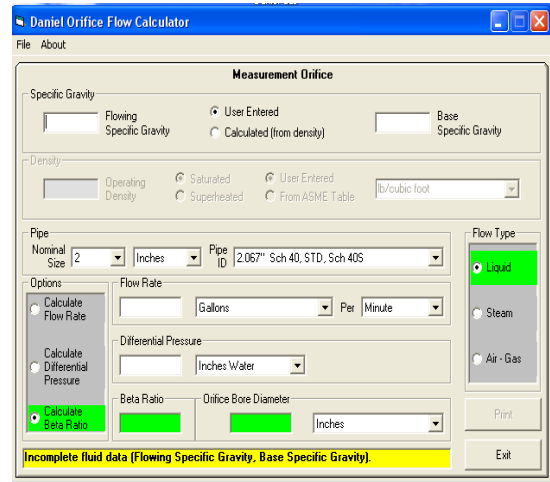
Gas Ultrasonic Meter (USM) Sizing Tool Simulator



Liquid Turbine Meter and Control Valve Sizing Tool Simulator



Liquid Ultrasonic Meter Sizing Tool Simulator



Orifice Flow Calculator Simulator

Course Coordinator

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