COURSE OVERVIEW IE0360
Certified SIL Professional
Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) & Emergency Shutdown (ESD) {IEC 61511 & IEC 61508} Functional Safety

Course Title
Certified SIL Professional: Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) & Emergency Shutdown (ESD) {IEC 61511 & IEC 61508}: Functional Safety

Course Date/Venue
August 10-14, 2025/The Florentine Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

Course Reference
IE0360

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.

The course will help the participants to improve compliance and reduce costs by guiding them through the development of the safety system including safety system layout, product selection and safety analysis to help them meet machinery safety performance level (PL) requirements as outlined by global standard (EN) ISO 13849-1.

The operation of many industrial processes, especially those in the chemical or oil & gas industries, involve inherent risk due to the presence of dangerous chemicals or gases. Safety Instrumented Systems (SIS) are specifically designed to protect personnel, equipment, and the environment by reducing the likelihood or the impact severity of an identified emergency event. Explosions and fires account for millions of dollars of losses in the ch emical or oil & gas industries each year. Since a great potential for loss exists, it is common for industry to employ Safety Instrumented Systems (SIS) to provide safe isolation of flammable or potentially toxic material in the event of a fire or accidental release of fluids.

IEC 61511 has been developed as a Process Sector implementation of the international standard IEC 61508: "Functional safety of electrical / electronic / programmable electronic safety-related systems." The standard has two concepts, which are fundamental to its application; the safety lifecycle and safety integrity levels (SIL). The safety lifecycle forms the central framework which links together most of the concepts in this international standard.

It is a good engineering procedure for safety instrumented system (SIS) design. In the safety lifecycle, process risks are evaluated and SIS Performance requirements are established (availability and risk reduction). Layers of protection are designed and analyzed. Finally, a SIS (if needed) is optimally designed to meet the particular process risk. Safety integrity levels are order of magnitude levels of risk reduction. There are four SIL's defined in this standard, just as in IEC 61508. SIL1 has the lowest level of risk reduction. SIL4 has the highest level of risk reduction. The standard suggests that applications which require the use of a single safety instrumented function of SIL 4 are rare in the process industry and that they shall be avoided where reasonably practicable. The standard is primarily concerned with safety-instrumented systems for the process industry sector (sensors, logic solvers and final elements are included as part of the safety instrumented system). It also deals with the interface between safety-instrumented systems and other safety systems in requiring that a process hazard and risk assessment be carried out.

This course will explain the basic concepts, definitions and commonly used terms in Safety Instrumented Systems and provide a basic understanding of SIS related concepts.

Further, the course discusses the fundamentals of ANSI/ISA 84.00.01-2004 Parts 1-3 (IEC 61511 modified). The course content is designed to provide the participant with an understanding of how to implement the requirements of the safety instrumented system (SIS) standards, to perform layers of protection analysis, to create a design to meet the safety integrity level (SIL), and to verify that the SIL has been achieved. It will also introduce the participant to the guidance contained in draft technical report, ISA TR84.00.04, which concerns implementation of ANSI/ISA 84.00.01-2004.

Course Objectives

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

- Get Certified as a *"Certified SIL Professional"*
- Apply a comprehensive knowledge in Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) and Emergency Shutdown Systems (ESD) covering functional safety
- Emphasize the safety instrumented system management responsibilities and interpret the applicable safety standards such as IEC 61508, IEC 61511, ANSI/ISA S84.01
- Identify the phases of the safety life cycle and determine the safety requirement specification
- Carryout the various process hazard analysis namely the fault tree analysis, event tree analysis & FMEA and heighten awareness on HAZOP study

- Use a system approach on safety instrumented systems including its function and level and improve SIL determination using the ALARP method, semi quantitative methods, safety layer matrix method, risk graph method and LOPA Method
- Acquire knowledge on SIL verification and validation using a structured approach and review and improve SIS documentation
- Perform proof testing on SIS and ESD in process industry and conduct diagnostic procedures and partial valve stroking
- Perform the process of selecting sensors, final elements and logic solvers and discuss safety software models including their application
- Employ the operation and maintenance of SIS and ESD following the guidelines and procedures on planning and implementation
- Recognize the importance of SMART Safety Instrumented Systems including the intelligent field devices, digital communications, smart logic solvers and complete loop solution and implement SMART SIS

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 a complete and up-to-date overview of safety instrumented systems (SIS), safety integrity level (SIL) and emergency shutdown (ESD) for those in charge of functional safety. The course is also aimed at those involved in analyzing and controlling the ESD and those involved in the process safety, SIS, SIL, SIF, process control, process instrumentation and functional safety in process plants.

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 Certificate(s)

(1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Successful candidate will be certified as a *"Certified SIL Professional"*. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-

(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

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Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEU Official Transcript of Records

TOR Issuance Date: 12-Jan-17

HTME No. PAR213881

Participant Name: Aawad Al Jummaiah

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
IE360	Certified SIL Professional: Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) & Emergency Shutdown (ESD) {IEC 61511 & IEC 61508}: Functional Safety	January 08-12, 2017	30	3.0

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 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 Association 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 is accredited by

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | Fax: +971 2 3091 716 | E-mail: info@haward.org | Website: www.haward.org

Certificate Accreditations

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

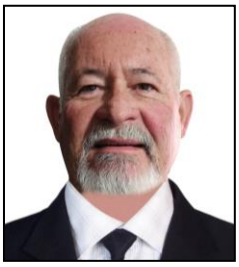
  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation 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.

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. Ken Steel is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience. His expertise widely covers **Process Control Instrumentation**, Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**), Instrumented Protective Function (**IPF**), **Process Instrumentation & Control**, **Process Control**, **Instrumentation**, , **Instrumentation** for Process Optimization and Control, Process Automation and **Instrumentation** Systems Integration, Troubleshooting in **Process Control Systems, Process Control** & Safeguarding, Troubleshooting & **Problem Solving**, **Process Instrumentation** and Control Techniques, Troubleshooting **Instrumentation** and Control Systems, GC Processes Troubleshooting and Control Systems, Programmable Logic Controllers (**PLC**), **SCADA System**, **PLC & SCADA** - Automation & Process Control, **PLC & SCADA** Systems Application, Technical **DCS/SCADA,** Distributed Control System (**DCS**) Principles, Applications, Selection & Troubleshooting**, Electrical Motors Testing**, **Heat Tracing** & Insulation Installation & Testing, **HV Terminations**, **High & Low Voltages** on Overhead Cranes, **HV/MV Cable Splicing**, **Cable & Over Head Power Line**, **HV/MV Switchgear, HV Cable** Design, **Medium & High Voltage** Equipment, **High Voltage Circuit Breaker** Inspection & Repair, **High Voltage Power** System, **HV Equipment** Inspection & Maintenance, **HV Switchgear** Operation & Maintenance, Resin / **Heat Shrink & Cold Shrink** Joints, **HV/LV Equipment**, **LV & HV** Electrical System, **Cable** Splicing & Termination, **High Voltage** Electrical Safety, **LV**, **MV & HV Cable** Installations & Properties, **LV Substation**, **MV & LV Cable**, **UPS Systems**, **MV & LV** Direct on Line Motor Drives, **MV & LV** VSD Motor Drives, **MV & LV** Soft Starter Motor Drives, **LV Two Speed Motor Drives**, Underground **Transformer Oil Containment Tank**, **Electrical & Instrumentation Construction** Installation, 1500KW, 1000KW, 1752KW **Diesel Power Plant Installation**, **110KV Overhead Line**, **110KV Outdoor Switchgear**, 110KV/10KV 6500KVA **Transformer**, **Transformer Substation**, 1600KVA 10KV/0.4KV & 2 Off 1000KVA **Diesel Generators**, 1600KVA 10KV/0.4KV & 1650KVA **Diesel Generator**, **110KV/35KV/10KV Substation**, 110KV/10KV **Transformers**,110KV & 2 Off 6KV **Overhead Lines**, 34.5KV,13.8KV ,4.16KV & 480V **Switchgear**, 4.16KV & 480V MCC, **Transformers & Motor Drives** Substations, **Diesel Driven Generators**, **Overhead Cranes**, **Overhead Cranes & HVAC Units**, **AC & DC Drives**, **Data Logger**, **Electrical, Instrumentation & Mechanical** Installation Maintenance, Slab Mills, Pre Heat Ovens, Hydraulic Shears, Stamping Machine, Gearboxes, Rollers, Pumps, Valves, Electro Magnets & Pump House Operation, Boilers Construction And Commissioning, Valve Calibration & Testing, Level Gauges, Pressure & Flow Transmitters Installation & Calibration, Pressure & Leak Testing of Boilers, Leak Testing, SMP, Elect, I&C, F&G, HVAC & Utility Services, Nitrogen Leak Test Operations, Steam Blowing Activities, SMP, Elect, I&C, F&G, HVAC & Utility Services, PTW Issue (PA/AC), Installation & Mechanical Piping and Hydro Testing & Leak Testing of Lines Installation.

During Mr. Steel's career life, he has gained his practical experience through several significant positions and dedication as the **3GP PBF & Boilers SC Commission Support**, **SC Site Execution Superintendent**, **E&I Construction Superintendent**, **High Voltage Construction Supervisor**, **Control & Power Construction Supervisor**, **Electrical & Instrumentation Supervisor**, **Electrical Technician**, **Construction Support Electrical Engineer**, **E&I Engineer**, **Electrical/Instrumentation Site Supervisor**, **Q.A/Q.C Inspector**, **Electrical/ Instrumentation Technician**, **Maintenance Fitter Instrumentation Technician**, **Millwright**, **Apprentice Millwright** and **Senior Instructor/Lecturer** for Tengiz Chevron Oil Kazakhstan, Al Jubail Saudi Arabia, Escravos Delta state Nigeria, Lurgi S.A, SuD Chemie Sasol Catalysts, J C Groenewalds Construction (LTA), Tycon (Goodyear S.A.), Dragline Construction and Iscor Vanderbijlpark.

Mr. Steel has a **Diploma** in **Electronics Mechanic**. Further, he is a **Certified Instructor/Trainer** and delivered numerous trainings, courses, workshops, seminars and conferences internationally.

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 course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 10th of August 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introductions*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Review of Course*** *Table of Contents*
0900 – 0930	***Case Studies*** *Bhopal Gas Tragedy ● Piper Alpha Disaster ● Chernobyl Catastrophe ● Bruncefield Oil Depot Explosion*
0930 – 0945	*Break*
0945 – 1030	***Safety Standards*** *Introduction ● IEC 61508 ● IEC 61511 ● ISA S84 ● Summary*
1030 – 1130	***Safety Instrumented Systems – Management Responsibilities*** *Safety Management ● Tolerable Risk ● Risk Reduction ● Risk Measurement ● Risk Management ● Layers of Production*
1130 – 1215	***Safety Life Cycle*** *Introduction ● Overview ● Phases of the Safety Life Cycle ● Safety Requirement Specification*
1215 – 1230	*Break*
1230 – 1330	***Process Hazard Analysis*** *Introduction ● HAZOP Study ● Fault Tree Analysis ● Event Tree Analysis ● Failure Mode and Effects Analysis (FMEA)*
1330 – 1420	***Video Presentation – HAZOP***
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, 11th of August 2025***

0730 – 0930	***Safety Instrumented Systems*** *Introduction ● Safety PLC ● System Architecture ● Summary*
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 – 1215	***Safety Integrity Level (SIL)*** *Introduction ● General ● SIL application ● Low Demand Mode vs Continuous Mode ● Probability of Failure on Demand ● Summary*
1215 – 1230	*Break*

1230 – 1420	***SIL Determination*** *Summary ● Introduction ● Safety Integrity Level Concepts ● ALARP Method ● Semi Quantitative Methods ● Safety Layer Matrix Method ● Risk Graph Method ● LOPA Method*
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, 12th of August 2025***

0730 – 0930	***SIL Verification & Validation*** *Introduction ● Verification ● Validation ● A Structured Approach ● Test Planning ● System Decomposition*
0930 – 0945	*Break*
0945 – 1100	***Integrated Fire & Gas Systems*** *Introduction ● Industry Safety Performance Standards ● Components of a Good Fire & Gas System ● Application ● Conclusions*
1100 – 1215	***Proof Testing Diagnostics*** *Proof Testing ● Diagnostics ● Partial Valve Stroking*
1215 – 1230	*Break*
1230 – 1300	***Selecting Sensors & Final Elements*** *Introduction ● Non-Essential Components ● Certified or Proven ● Probable Causes of Failure ● Smart Field Instruments ● Digital Valve Controller ● General Requirements for Fail Safe Operations*
1300 – 1420	***Video Presentation*** *HART Digital Communications*
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, 13th of August 2025***

0730 – 0830	***Selecting Logic Solvers*** *Preface ● Introduction ● Typical Specification ● Technologies for Logic Solvers ● Programmable Systems for Logic Solvers ● Overall PLC Reliability ● Major Systems ● Summary*
0830 – 0930	***Video Presentation*** *SIS Engineering*
0930 – 0945	*Break*
0945 – 1100	***SIS Software*** *Introduction ● Development Life Cycle ● Certified Software Models ● Asset Management Software ● Summary*
1100 – 1215	***Operation & Maintenance*** *Overview ● Planning ● Procedures ● Operations ● Maintenance ● Predictive Maintenance ● Summary*
1215 – 1230	*Break*

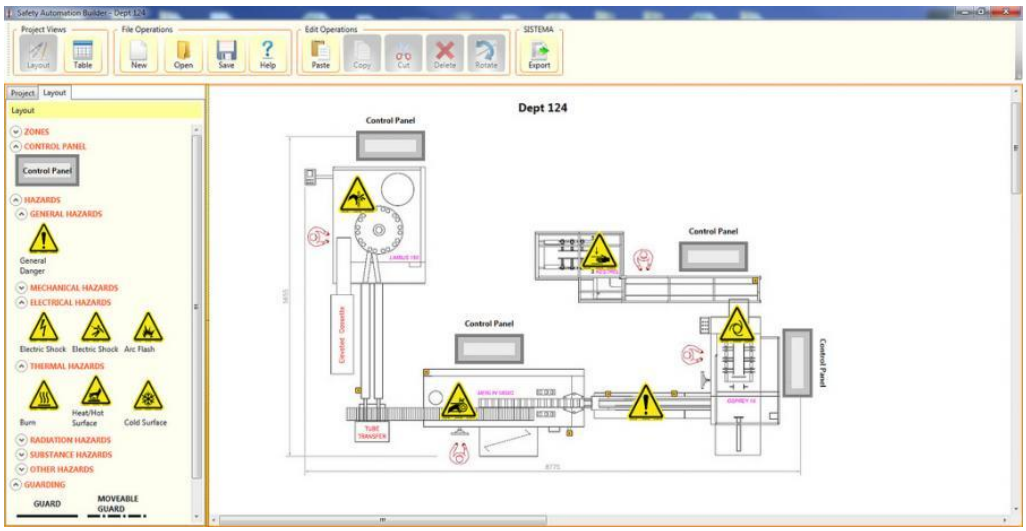
1230 – 1420	***SMART Safety Instrumented Systems*** *Overview ● Why it matters? ● What is a Smart SIS? ● Intelligent Field Devices ● Digital Communications ● Smart Logic Solvers ● Complete Loop Solution ● Lower Costs ● Smart SIS Implementation*
1420 - 1430	***Recap*** *Using this Course Overview, the 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, 14th of August 2025***

0730 – 0930	***Practical Examples*** *Determination of SIL by Risk Graph Method ● Determination of SIL by Risk Matrix Method ● Multiple Layers of Protection*
0930 – 0945	*Break*
0945 – 1045	***Frequently Asked Questions***
1045 – 1230	***Addendums*** *Explosion at BP Texas City Refinery ● Other Subjects*
1230 - 1245	*Break*
1245 - 1300	***Video Presentation*** *CSB Report on Explosion at BP Texas City Refinery*
1300 – 1315	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1315 – 1415	***COMPETENCY EXAM***
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 the "Safety Automation Builder Software (Rockwell Automation)" simulator.



Safety Automation Builder (Rockwell Automation) Simulator

Course Coordinator

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