COURSE OVERVIEW IE0780
Compressor Control & Protection

Course Title
Compressor Control & Protection

Course Date/Venue
October 19-23, 2025/ChitChat Meeting Room,
Safir Fintas Kuwait Hotel, Kuwait

Course Reference
IE0780

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 delegates with a detailed and up-to-date overview of Compressor Control and Protection. It covers the various types of compressors and the characteristics of surge; the advanced compressor control and the effect of operating conditions; the types, advantages, application and operation principle of turbine; the control system loops and control system modes as well as the main parts of the control system panel; and the main CPU processors, I/O packs-terminal boards, internal network communication devices and power distribution.

During this interactive course, participants will learn the integrated turbine and compressor control approaches covering the upcoming technologies in turbine control; the control system and protection devices covering major control loops, start-up control, speed control, temperature control, etc; and the protection systems comprising of over speed protection, over temperature protection and vibration protection.

Course Objectives

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

- Apply and gain an in-depth knowledge on compressor control and protection
- Identify the various types of compressors and the characteristics of surge
- Employ advanced compressor control and identify the effect of operating conditions
- Recognize the types, advantages, application and operation principle of turbine
- Discuss control system loops and control system modes as well as the main parts of the control system panel
- Describe main CPU processors, I/O packs-terminal boards, internal network communication devices and power distribution
- Explain the integrated turbine and compressor control approaches covering the upcoming technologies in turbine control
- Recognize control system and protection devices covering major control loops, start-up control, speed control, temperature control, etc.
- Discuss protection systems comprising of over speed protection, over temperature protection and vibration protection

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 compressor control and protection for engineers and other technical and operation staff who are responsible for the implementation and efficient operation, control and protection of compressors.

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)

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 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.

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:

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior 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, **PLC-HMI Controls**, Total Quality Management (**TQM**), Internal Audit Techniques in **TQM**, Quality Management System (**QMS**), **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**), **Waste Water System** Planning & Design, **Network Management & Supervision**, **Leakage Prevention & Control**, **Water Leak Detection**, Waste Water Treatment, **Water Utility Regulation and Economics**, **Water Network Systems**, **Health & Safety Rules & Regulations**, Safety Procedures in **Water Networks**, **Safety Management**, Principles of **Routine** and **Preventive Maintenance**, **Accident Investigation**, **Operation** & **Maintenance of Sewerage System**, 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.

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, 19th of October 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Compressors*** *Compressor Definition ● General Types ● Centrifugal Compressors ● Axial Compressors*
0930 – 0945	*Break*
0945 – 1145	***Overview of Surge*** *Surge versus Stall ● Static Instability ● Dynamic Instability ● Characteristics of Surge ● Consequences of Surge*
1145 – 1230	***Compressor Control Introduction & Principals*** *Defining Compressor Surge & its Consequences ● Anti-Surge Protection & Prevention ● Surge Detection & Recovery ● Compressor Control ● Performance Control*
1230 – 1245	*Break*
1245– 1420	***Case Studies***
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, 20th of October 2025***

0730 – 0930	***Advanced Compressor Control*** *The Surge Parameter ● Changing Parameter Considerations ● Compressor Load Sharing ● Anti-Surge Control Challenges & Solutions*
0930 – 0945	*Break*
0945 – 1100	***Effect of Operating Conditions*** *Surge Curve Plotting Method ● Suction Pressure ● Suction Temperature● Molecular Weight ● Specific Heat Ratio*
1100 – 1230	***Effect of Operating Conditions (cont'd)*** *Compression Ratio● Speed ● Vane Position*
1230 – 1245	*Break*
1245 – 1420	***Case Studies***
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, 21st of October 2025**

0730 – 0930	***Turbine Control Objectives & Principals*** *Turbine Definition ●Turbine Types ●Advantages & Applications of Turbine ● Thermodynamic Principles ● Operation Principle of Turbine*
0930 – 0945	*Break*
0945 – 1100	***Turbine Control Objectives & Principals (cont'd)*** *Turbine Systems P&ID*
1100 – 1230	***Control System Applied to Turbine*** *Control System History ● Control System Definition ● Control System Loops ● Control System Modes*
1230 – 1245	*Break*
1245 – 1420	***Case Studies***
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, 22nd of October 2025**

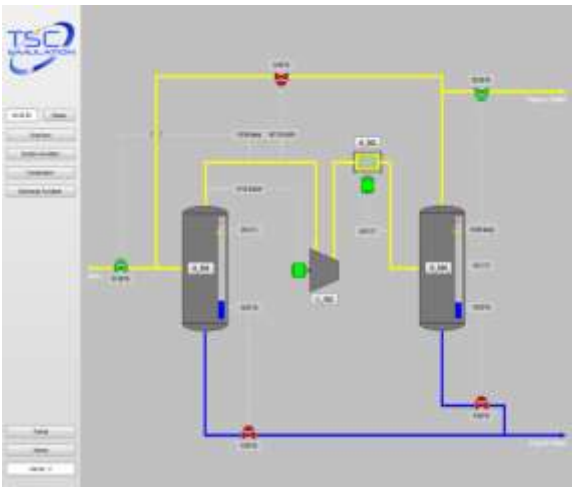
0730 – 0930	***Turbine Control System Panel*** *Main Parts of the Control System Panel ● Main CPU Processors (Controller) ● I/O Packs -Terminal Boards (T.B) ● Internal Network Communication Devices ● Power Distribution*
0930 – 0945	*Break*
0945 – 1100	***Turbine Control System Software*** *HMI Screen ● Turbine Software with Practical Session on Software*
1100 – 1230	***Integrated Turbine & Compressor Control Approaches*** *Technology Update: Upcoming Technologies in Turbine Control*
1230 – 1245	*Break*
1245 – 1420	***Case Studies***
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, 23rd of October 2025**

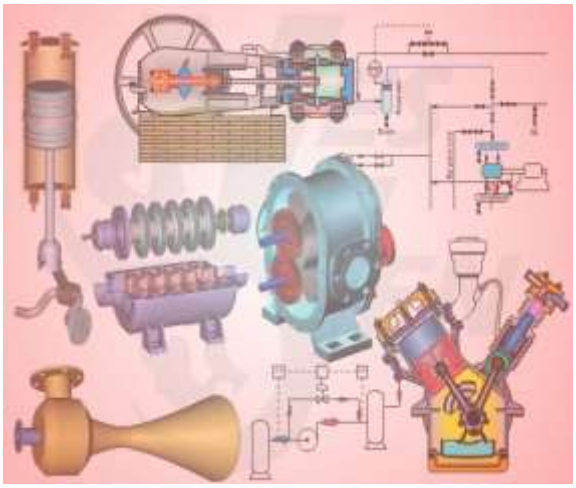
0730 – 0830	***Control System & Protection Devices*** *Major Control Loops ● Start- Up Control ● Speed Control ● Temperature Control*
0830 – 0930	***Control System & Protection Devices (cont'd)*** *Fuel Valves Control ● Trip Oil Circuit*
0930 – 0945	*Break*
0945 – 1215	***Protection Systems*** *Over Speed Protection ● Over Temperature Protection ● Vibration Protection*
1215 – 1230	*Break*
1230 – 1345	***Practical Sessions***
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)

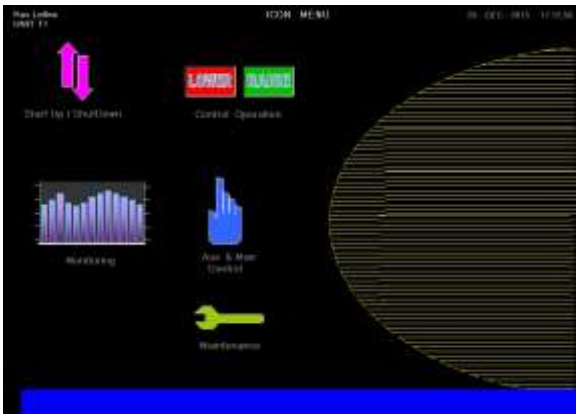
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators "SIM 3300 Centrifugal Compressor", "CBT on Compressors" and "MARK V" video simulator.



SIM 3300 Centrifugal Compressor Simulator



CBT on Compressors



Course Coordinator

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