COURSE OVERVIEW IE0755
CCC Compressor Control

Course Title
CCC Compressor Control

Course Date/Venue
May 17-21, 2026/TBA Meeting Room, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
IE0755

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 CCC Compressor Control. It covers the types of turbomachinery, compressor types and configurations and compressor performance fundamentals; the mechanical components, instrumentation basics and control systems; the surge phenomenon and risks, anti-surge control and anti-surge control loop design; the CCC anti-surge controller, anti-surge valves and hardware and testing and commissioning; the compressor performance control concepts and capacity control methods; and the CCC performance control features covering performance control modules, constraint control logic, efficiency optimization tools and operator tuning capabilities.

During this interactive course, participants will learn the energy efficiency optimization, advanced control strategies and troubleshooting performance issues; the principles of load sharing, CCC load sharing systems and multi-compressor control challenges; the control integration with plant systems, diagnostics and monitoring and preventive maintenance for CCC systems; troubleshooting control systems and valve and actuator maintenance; the compressor protection systems, emergency shutdown systems (ESD) and overspeed protection; and the vibration and temperature trips and safety compliance requirements.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on CCC compressor control
- Identify the types of turbomachinery, compressor types and configurations and compressor performance fundamentals
- Discuss mechanical components, instrumentation basics and control systems
- Apply surge phenomenon and risks, anti-surge control and anti-surge control loop design
- Recognize CCC anti-surge controller, anti-surge valves and hardware and testing and commissioning
- Carryout compressor performance control concepts and capacity control methods
- Identify CCC performance control features covering performance control modules, constraint control logic, efficiency optimization tools and operator tuning capabilities
- Apply energy efficiency optimization, advanced control strategies and troubleshooting performance issues
- Explain the principles of load sharing, CCC load sharing systems and multi-compressor control challenges
- Apply control integration with plant systems, diagnostics and monitoring and preventive maintenance for CCC systems
- Troubleshoot control systems and apply valve and actuator maintenance
- Recognize compressor protection systems covering emergency shutdown systems (ESD), overspeed protection, vibration and temperature trips and safety compliance requirements

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 CCC compressor control for control and instrumentation engineers, process engineers, rotating equipment engineers, maintenance and reliability engineers, dcs engineers, plant operators and other technical staff.

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 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

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.

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. Andrew Ladwig is a **Senior Process & Mechanical Engineer** with over **25 years** of extensive experience within the **Oil & Gas**, **Refinery**, **Petrochemical & Power** industries. His expertise widely covers in the areas of **Pressure Safety Relief Valve** Repair & Recalibration, **Safety Relief Valves**, Strainers & Steam Traps, Surge **Relief Valves**, **Safe Isolation & Inspection**, **PSV/PRV** Troubleshooting, **PRV** Testing & Repair, **PSV** Inspection, **Process Control Valves**, **Valve** Testing & Inspection, **Valve** Sealing, **Valve** Calibration, **Control Valves & Actuators**, **Rotating Equipment** Start-up & Operation, **Rotating Equipment** Selection, **Rotating Equipment** Operation & Maintenance, **Rotating Equipment** Design, Selection & Troubleshooting, **Rotating Machinery** Best Practices, **Alignment of Rotating Equipment**, Operation & Maintenance of **Rotating Equipment**, **Reciprocating & Centrifugal Compressors**, **Compressor** Control, **Centrifugal Gas** Compressors, **Centrifugal Compressor** Operation, **Screw Compressor**, **Compressor** Control & Protection, **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps** Troubleshooting, **Pumps** Design, Selection & Operation, **Boiler** Inspection & Maintenance, **Boiler** instrumentation & Controls, **Boiler** Start-up & Shutdown, **Boiler** Operation & Steam System Management, **Boiler** Water Chemistry & Treatment, **Boiler** Efficiency & Waste Heat Recovery, **Boiler** Inspection & Testing, **Boiler** Troubleshooting & Safety, **Boiler** Emissions & Pollution Control, **Diesel Engine**, **Engine Cycles**, **Vehicle & Equipment** Inspection, **Crankshafts** & Maintenance, **Engines/Drivers**, **Motor** Failure Analysis & Testing, **Motor** Predictive Maintenance, **Engine** Construction & Maintenance, **Gas & Steam Turbine** Operation & Maintenance, **Gas Turbine** Technology, **Tank** Design & Engineering, **Tanks & Tank Farms**, **Vacuum Tanks**, **CAESAR II**, **Pipe Stress** Analysis, **Piping Stress** Analysis, **Piping Dynamic**, **Static** & Other Special Analysis, **Process/Static Equipment** Mechanical Design, **Piping Mechanical Design** & Specification, **Pipe Cuttings**, **Mechanical Pipe Fittings**, **Parker Compression Fittings**, **Pipes & Fittings**, **Flange Joint Assembly**, Adhesive Bond Lamination, **Butt Jointing**, **Joint & Spool Production**, **Isometric** Drawings, **Flange Assembly** Method, **Fabrication & Jointing**, Jointing & Spool Fabrication, **Flange Bolt Tightening** Sequence, **Hydro Testing**, **HVAC & Refrigeration** Systems, Direct Digital Control (**DCC**), **Vapor Recovery** Engineering, **Cooling Water & Compressed Air** Systems, **Fan** Coolers, **Chiller & Chiller Plant** Design, Heat Recovery Steam Generating (**HRSG**), **Heat Exchangers**, **Shell & Tube Heat Exchanger** Maintenance & Troubleshooting, **Combustion** Analysis & Tuning Procedures, **Combustion** Techniques, **Water Treatment** Technology, **Plant Upset & Abnormalities**, **Impulse Tube** Installation & Inspection, **Root Cause Failure** Analysis & Reliability, **Lubrication** System Troubleshooting & Maintenance, **Fired Equipment** Maintenance, Layout of **Piping Systems & Process** Equipment, **Process Heaters**, Glass Reinforced Epoxy (**GRE**), Glass Reinforced Pipes (**GRP**), Glass Reinforced Vent (**GRV**), **Bearings & Lubrication**, **Machinery Vibration & Condition** Monitoring, Advanced **Machinery Dynamics** and **Machinery** Troubleshooting.

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer**, **Project Engineer**, **Reliability & Maintenance Engineer**, **Maintenance Support Engineer**, **Senior Process Engineer**, **Senior Process Controller**, **Process Engineer**, **Process Controller**, **Warehouse Manager**, **Quality Manager**, **Business Analyst**, **HSE Supervisor**, **Safety Officer**, **Senior Lecturer** and **Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's** degree in **Chemical Engineering** and a **Diploma** in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, workshops, seminars, courses 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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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:	***Sunday, 17th of May 2026***
0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Turbomachinery*** *Types of Turbomachinery (Centrifugal, Axial, Reciprocating) • Applications in Refinery and Process Plants • Key Components and Terminology • Operating Principles and Energy Transfer*
0930 – 0945	*Break*
0945 – 1030	***Compressor Types & Configurations*** *Centrifugal Compressor Design and Stages • Axial Compressor Characteristics • Multi-Stage versus Single-Stage Compressors • Integrally Geared versus Straight-Through Compressors*
1030 – 1130	***Compressor Performance Fundamentals*** *Pressure, Flow, and Head Relationships • Compressor Maps and Curves • Efficiency Definitions (Isentropic, Polytropic) • Impact of Gas Properties on Performance*
1130 – 1215	***Mechanical Components Overview*** *Bearings and Lubrication Systems • Seals (Dry Gas Seals, Oil Seals) • Rotors and Impellers • Casings and Diaphragms*
1215 – 1230	*Break*

1230 – 1330	***Instrumentation Basics*** *Pressure, Temperature, and Flow Transmitters • Vibration Monitoring Systems • Speed and Position Sensors • Signal Conditioning and Calibration Basics*
1330 – 1420	***Basics of Control Systems*** *Open Loop versus Closed Loop Control • Basic Control Elements (PID Controllers) • Control Valves and Actuators • Overview of DCS/PLC 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 One*

Day 2: ***Monday, 18th of May 2026***

0730 – 0830	***Surge Phenomenon & Risks*** *Definition and Causes of Surge • Effects on Compressor and Process • Surge Cycle Characteristics • Real-Life Case Studies*
0830 – 0930	***Anti-Surge Control Theory*** *Surge Line and Control Line Concepts • Safety Margin and Control Margin • Surge Avoidance Strategies • Dynamic versus Static Surge Protection*
0930 – 0945	*Break*
0945 – 1100	***Anti-Surge Control Loop Design*** *Flow Measurement Techniques • Pressure Ratio Calculations • Control Algorithm Fundamentals • Tuning Parameters and Response Time*
1100 – 1215	***CCC Anti-Surge Controller Overview*** *CCC Controller Architecture • Key Modules and Functions • Operator Interface Overview • Integration with Plant Systems*
1215 – 1230	*Break*
1230 – 1330	***Anti-Surge Valves & Hardware*** *Valve Sizing and Selection • Actuator Response Characteristics • Valve Stroking Speed Requirements • Maintenance and Troubleshooting*
1330 – 1420	***Testing & Commissioning*** *Loop Checking Procedures • Functional Testing of Anti-Surge System • Simulation of Surge Conditions • Common Commissioning Issues*
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, 19th of May 2026***

0730 – 0830	***Compressor Performance Control Concepts*** *Throughput Control Strategies • Pressure versus Flow Control Modes • Interaction with Process Demands • Stability Considerations*
0830 – 0930	***Capacity Control Methods*** *Inlet Guide Vanes (IGV) • Variable Speed Drives • Recycle Control • Throttling Methods*
0930 – 0945	*Break*

0945 – 1100	***CCC Performance Control Features*** *Performance Control Modules • Constraint Control Logic • Efficiency Optimization Tools • Operator Tuning Capabilities*
1100 – 1215	***Energy Efficiency Optimization*** *Minimizing Recycle Losses • Operating Near Best Efficiency Point (BEP) • Impact of Control on Energy Consumption • Monitoring KPIs and Performance Indicators*
1215 – 1230	*Break*
1230 – 1330	***Advanced Control Strategies*** *Feedforward Control • Cascade Control Systems • Model-Based Control Concepts • Adaptive Control Techniques*
1330 – 1420	***Troubleshooting Performance Issues*** *Identifying Inefficiencies • Diagnosing Control Instability • Data Analysis Techniques • Corrective Maintenance Actions*
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, 20th of May 2026***

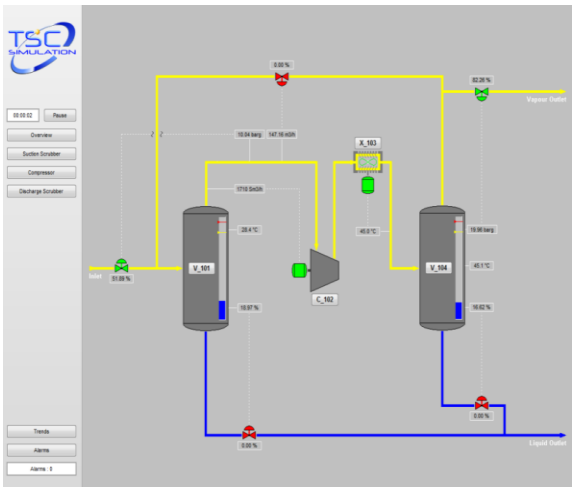
0730 – 0830	***Principles of Load Sharing*** *Parallel Compressor Operation • Load Balancing Strategies • Master-Slave versus Distributed Control • Stability Considerations*
0830 – 0930	***CCC Load Sharing Systems*** *CCC Load Sharing Architecture • Communication Between Controllers • Control Modes and Transitions • System Configuration*
0930 – 0945	*Break*
0945 – 1100	***Multi-Compressor Control Challenges*** *Surge Interaction Between Units • Flow Distribution Issues • Pressure Control Conflicts • Startup and Shutdown Coordination*
1100 – 1215	***Control Integration with Plant Systems*** *DCS Integration • Interlocks and Permissives • Safety Instrumented Systems (SIS) • Alarm Management*
1215 – 1230	*Break*
1230 – 1330	***Diagnostics & Monitoring*** *Real-Time Performance Monitoring • Fault Detection Techniques • Trend Analysis • Predictive Maintenance Concepts*
1330 – 1420	***Case Studies & Practical Scenarios*** *Refinery Compressor Networks • Common Operational Issues • Lessons Learned from Failures • Best Practices for Reliability*
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, 21st of May 2026**

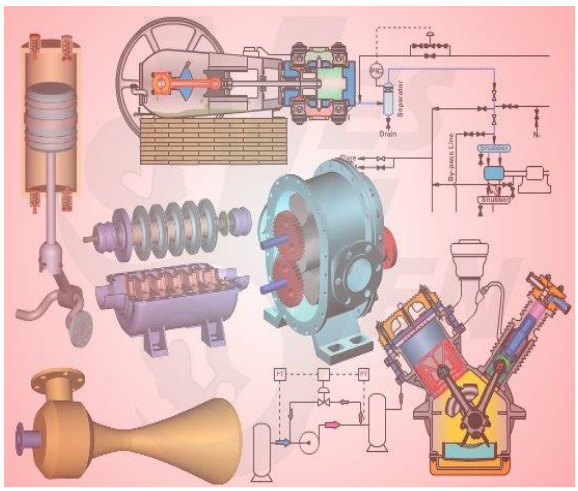
0730 – 0830	***Preventive Maintenance for CCC Systems*** *Routine Inspection Procedures • Calibration of Instruments • Controller Health Checks • Documentation and Record Keeping*
0830 – 0930	***Troubleshooting Control Systems*** *Identifying Control Loop Problems • Signal and Wiring Issues • Software and Configuration Errors • Systematic Troubleshooting Approach*
0930 – 0945	*Break*
0945 – 1100	***Valve & Actuator Maintenance*** *Inspection and Servicing Procedures • Diagnosing Valve Performance Issues • Actuator Calibration • Spare Parts Management*
1100 – 1230	***Compressor Protection Systems*** *Emergency Shutdown Systems (ESD) • Overspeed Protection • Vibration and Temperature Trips • Safety Compliance Requirements*
1230 – 1245	*Break*
1245 – 1345	***Simulation & Hands-On Training*** *CCC System Simulation Exercises • Anti-Surge Response Testing • Load Sharing Scenarios • Performance Tuning Exercises*
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" and "CBT on Compressors".



SIM 3300 Centrifugal Compressor Simulator



CBT on Compressors

Course Coordinator

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