



COURSE OVERVIEW IE0783 **PC304 - AE Compressor Control**

Course Title

PC304 - AE Compressor Control

Course Date/Venue

November 01-05, 2026/Boardroom 2, Elite Byblos
Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

IE0783

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. It covers the compressor control systems and its role in process and industrial facilities; the compressor types, operating characteristics, performance parameters, performance maps and operating envelope; the fundamentals of process control applied to compressors, compressor instrumentation and measurement systems; the compressor capacity control strategies, pressure and flow control strategies and centrifugal compressor anti-surge control; the anti-surge control strategy selection, reciprocating compressor control strategies, multiple compressor and load-sharing control; and the compressor control system architecture, compressor control loops and anti-surge control system.



During this interactive course, participants will learn the compressor recycle and control valve systems; the start-up, shutdown and sequencing controls; the interlocks, trips and protective functions; the advanced anti-surge control concepts, compressor speed, driver control and compressor control loop tuning; the control strategy interaction and override control; the compressor energy efficiency and optimization, compressor control system testing and validation; troubleshooting systematic compressor control and the surge, anti-surge problems, pressure, flow and capacity control; and troubleshooting instrumentation, final control elements, compressor sequences, trips and interlocks.

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 compressor control
- Discuss the compressor control systems and its role in process and industrial facilities
- Recognize compressor types, operating characteristics, performance parameters, performance maps and operating envelope
- Explain the fundamentals of process control applied to compressors including compressor instrumentation and measurement systems
- Apply compressor capacity control strategies, pressure and flow control strategies and centrifugal compressor anti-surge control
- Employ anti-surge control strategy selection, reciprocating compressor control strategies and multiple compressor and load-sharing control
- Identify compressor control system architecture and implement compressor control loops and anti-surge control system
- Illustrate compressor recycle and control valve systems, start-up, shutdown and sequencing controls and interlocks, trips and protective functions
- Carryout advanced anti-surge control concepts, compressor speed and driver control and compressor control loop tuning
- Apply control strategy interaction and override control, compressor energy efficiency and optimization and compressor control system testing and validation
- Troubleshoot systematic compressor control, surge and anti-surge problems, pressure, flow and capacity control, instrumentation and final control elements as well as compressor sequences, trips and interlocks

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 AE compressor control for process control and instrumentation engineers.

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 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.

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. Mohamed Fawzi is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience. His expertise widely covers **Compressor Control, Process Control & Instrumentation** Simulation, Process Operation Simulator, **Pipeline** Simulator, **Control Logix** Fundamentals & Troubleshooting, **Instrument Test** Equipment, Instrument Connection, Industrial Process **Measurement**, Industrial **Analyzer Measurement**, Fire & Gas Measurement & Troubleshooting, **Advanced Instrumentation** Documents, **Pneumatic Instrumentation**, Programming Logic Controller (**PLC**), Distributed Control System (**DCS**) Principles, **Instrumentation & Distributed Control System, PLC, DCS & SCADA** Systems, **Final Control Elements** Operation & Maintenance, **Final Control Elements** Accessories, **Motorized Control Valves** System Operation, **Control Valve** Types, **Calibration & Testing**, Control Valve Sizing & Selections, Machine Monitoring System (**Bentley Nevada 3500**), Automatic Boiler Control (**ABC**), Burner Management System (**BMS**), **Turbine Control** Systems, **Instrumentation & Hazardous** Area Classification, **Instrumentation** for Operation & Maintenance staff, Foundation Fieldbus Instrumentation, **C.C.C Control** System Operation, **Pipeline & Terminal** Automation, Advanced Instrumentation Specifications, Design & Selection, **Analog & Digital** Electronic Instrumentation, Instrument Calibration, **Transmission & Communication**, Smart Transmitter & Instrumentation, Principles of Feedback Control, **Process Control** Strategies, Process Control & **PID** Controller, Discrete Process **Measurement & Control Elements**, Safety Instrumented System (**SIS**), Oil & Gas Process Control Applications, Process Control Improvement, Instrumental Spectrophotometer, Piping & Instrument Diagram (**P&ID**), **Process Measurement** Parameter, Basic Instrumentation & Control, Test, Calibration; Maintenance of Pressure, Temperature & Flow Measuring Instrument, Plant Instrumentation & Control Principles, Control System Communication Protocols & Foundation Fieldbus, Safety Instrumented System Design & Applications, Liquid Coriolis Flowmeter & Custody Metering System Calibration, Control Valves Sizing and Selection, Fire & Gas Detection System, **Electric Power** Systems for Industrial Plants, Fundamentals of **Power System** Equipment's, **Power System** Stability, **Power System Protection**, Power System Planning & Economics, Power System Analysis, Power System Control & Stability, Power Systems in Emergencies, Power System Troubleshooting & Maintenance, Power System Protective Relaying **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 Equipment** Inspection & Maintenance, **HV Switchgear** Operation & Maintenance and Safety and Technical Awareness Programs.

During Mr. Mohamed career life, he has gained his practical experience through several significant positions and dedication as the **Lead I&C PMC Engineer, Senior IPMT Instrumentation Engineer, Instrumentation & Control Engineer, Senior Consultant, I&C Maintenance Manager, Instrument Engineer** and **Senior Instructor/Lecturer** for **ADNOC**, Worley/Suez, Worley Korea, PETROMAINT/MIDOR Refinery, Saline Water Conversion Cooperation and Amirah Refinery Petroleum Company.

Mr. Mohamed has a **Bachelor's** degree in **Electronic Engineering**. Further, he is a **Certified Instructor/Trainer** and delivered numerous trainings, courses, workshops, seminars and conferences internationally.



Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

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, 01st of November 2026

0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Compressor Control Systems <i>Role of Compressors in Process & Industrial Facilities • Objectives of Compressor Control: Capacity, Pressure, Stability & Protection • Interaction Between Compressor, Process System & Control System • Overview of Compressor Control Architectures & Major Control Functions</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Compressor Types & Operating Characteristics <i>Centrifugal, Axial, Reciprocating & Rotary Compressor Principles • Dynamic versus Positive-Displacement Compressor Characteristics • Compressor Stages, Impellers, Diffusers, Cylinders & Associated Components • Selection of Compressor Types According to Process Requirements</i>
1030 – 1130	Compressor Performance Parameters <i>Suction & Discharge Pressure, Temperature, Flow & Compression Ratio • Head, Power, Efficiency & Gas Property Relationships • Polytropic & Isentropic Compression Concepts • Influence of Molecular Weight, Temperature & Pressure on Performance</i>



1130 – 1215	Compressor Performance Maps & Operating Envelope Interpretation of Compressor Performance Curves & Maps • Speed Lines, Efficiency Islands, Surge Line & Choke/Stonewall Limits • Normal Operating Point & Safe Operating Envelope • Effects of Process Disturbances on Compressor Operating Points
1215 – 1230	Break
1230 – 1330	Fundamentals of Process Control Applied to Compressors Pressure, Flow, Temperature & Speed Control Loops • Feedback, Feedforward, Cascade & Ratio Control Concepts • PID Controller Behavior, Tuning Parameters & Control Response • Process Dynamics, Dead Time & Compressor Control-Loop Interaction
1330 – 1420	Compressor Instrumentation & Measurement Systems Pressure, Differential Pressure, Temperature & Flow Instrumentation • Speed, Vibration, Axial Position & Condition-Monitoring Measurements • Transmitter Installation, Signal Conditioning & Measurement Accuracy • Instrument Validation, Calibration, Redundancy & Fault Detection
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, 02nd of November 2026

0730 – 0830	Compressor Capacity Control Strategies Capacity Control Requirements Under Changing Process Demand • Suction Throttling & Discharge Throttling Methods • Variable-Speed Control & Speed Manipulation • Inlet Guide Vane & Variable Geometry Control
0830 – 0930	Pressure & Flow Control Strategies Suction Pressure Control Strategies • Discharge Pressure Control Strategies • Compressor Flow & Capacity Control • Selection of Controlled & Manipulated Variables
0930 – 0945	Break
0945 – 1100	Centrifugal Compressor Anti-Surge Control Mechanism, Causes & Consequences of Compressor Surge • Surge Control Line, Surge Limit Line & Control Margin • Recycle/Bypass Valve Operation & Anti-Surge Control Loop • Selection of Measurements & Control Variables for Surge Prevention
1100 – 1215	Anti-Surge Control Strategy Selection Reduced Flow, Head & Pressure-Ratio Approaches • Calculation & Representation of Compressor Operating Points • Dynamic Response Requirements for Anti-Surge Protection • Control Strategy Selection for Different Compressor Applications
1215 – 1230	Break
1230 – 1330	Reciprocating Compressor Control Strategies Compressor Loading & Unloading Principles • Clearance Pockets, Valve Unloaders & Bypass Control • Step Capacity versus Continuously Variable Capacity Control • Suction/Discharge Pressure & Load-Control Considerations



1330 – 1420	Multiple Compressor & Load-Sharing Control Parallel Compressor Operation & System Characteristics • Load Sharing Between Multiple Compressor Trains • Lead-Lag, Sequencing & Load-Balancing Strategies • Preventing Control-Loop Interaction & Compressor Instability
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, 03rd of November 2026

0730 – 0830	Compressor Control System Architecture DCS, PLC & Dedicated Compressor Control Platforms • Control System Hierarchy & Signal Architecture • Controller, I/O, Communication & Interface Requirements • Integration with Process Control, SIS & Machinery Protection Systems
0830 – 0930	Implementation of Compressor Control Loops Translating Control Philosophy into Control Logic • PID, Cascade, Override & Selector Control Implementation • High/Low Signal Selection & Constraint Control • Controller Modes, Bumpless Transfer & Initialization
0930 – 0945	Break
0945 – 1100	Anti-Surge Control System Implementation Anti-Surge Controller Configuration & Calculations • Surge Control Line Definition & Safety Margin Implementation • Fast-Opening Recycle Valve Control Logic • Controller Response During Rapid Process Disturbances
1100 – 1215	Compressor Recycle & Control Valve Systems Recycle Valve Sizing & Performance Requirements • Valve Characteristics, Actuator Selection & Stroking Speed • Positioners, Solenoids & Pneumatic Control Accessories • Diagnosing Valve Stiction, Hysteresis & Inadequate Response
1215 – 1230	Break
1230 – 1330	Start-Up, Shutdown & Sequencing Controls Compressor Start-Up Permissives & Readiness Checks • Start-Up Sequence & Transition to Normal Process Control • Normal Shutdown, Emergency Shutdown & Trip Sequences • Recycle Valve, Loading, Speed & Process Coordination During Transitions
1330 – 1420	Interlocks, Trips & Protective Functions Alarm, Permissive, Interlock & Trip Philosophy • High Discharge Pressure/Temperature & Low Suction Pressure Protection • Overspeed, Vibration, Lubrication & Seal-System Protection • Relationship Between Basic Process Control & Compressor Protection 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 Three



Day 4: Wednesday, 04th of November 2026

0730 – 0830	Advanced Anti-Surge Control Concepts Surge Detection & Response to Rapidly Approaching Surge • Adaptive Surge Margin & Dynamic Compensation Concepts • Recycle Trip, Kickback & Safety-Response Functions • Managing Anti-Surge Control During Transmitter or Signal Failure
0830 – 0930	Compressor Speed & Driver Control Variable-Speed Compressor Control Principles • Steam Turbine, Gas Turbine & Electric Motor Driver Considerations • Speed Reference, Governor & Process Controller Coordination • Speed Limitations, Acceleration Control & Operating Constraints
0930 – 0945	Break
0945 – 1100	Compressor Control Loop Tuning Identification of Compressor Control-Loop Dynamics • PID Tuning for Pressure, Flow, Speed & Recycle Control • Recognizing Oscillation, Excessive Gain & Poor Controller Response • Practical Tuning Approaches for Stable Compressor Operation
1100 – 1215	Control Strategy Interaction & Override Control Interaction Between Capacity & Anti-Surge Controllers • Override, Constraint & Minimum/Maximum Selector Control • Preventing Competing Controllers & Unnecessary Recycle • Managing Transitions Between Normal & Protective Control Modes
1215 – 1230	Break
1230 – 1330	Compressor Energy Efficiency & Optimization Effect of Control Strategy on Compressor Energy Consumption • Minimizing Recycle & Throttling Losses • Optimizing Speed, Pressure Setpoints & Compressor Loading • Performance Monitoring, Efficiency Trending & Degradation Detection
1330 – 1420	Compressor Control System Testing & Validation Control Narrative, Cause-&-Effect & Logic Review • Loop Checking & Instrument Function Testing • FAT, SAT & Functional Performance Testing Principles • Testing Trips, Permissives, Sequences & Anti-Surge Functions
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

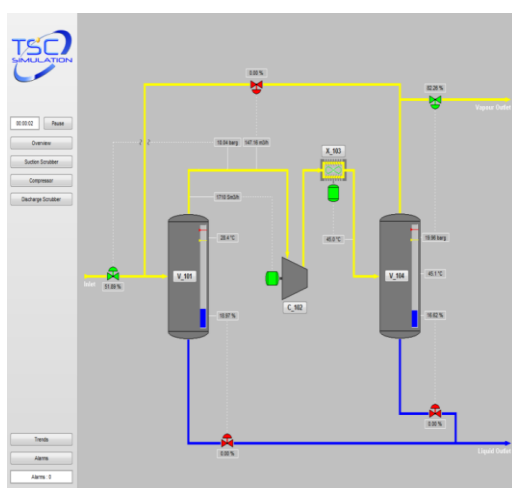
Day 5: Thursday, 05th of November 2026

0730 – 0830	Systematic Compressor Control Troubleshooting Structured Troubleshooting Methodology & Fault Isolation • Separating Process, Mechanical, Instrumentation & Control Problems • Using Trends, Alarms, Event Logs & Operating Data • Establishing Root Causes Rather Than Treating Symptoms
0830 – 0930	Troubleshooting Surge & Anti-Surge Problems Identifying Surge Events from Process & Control-System Data • Incorrect Surge-Line Configuration & Inadequate Control Margin • Flow/Pressure Measurement Errors & Transmitter Problems • Recycle Valve Response, Controller Tuning & Logic Deficiencies
0930 – 0945	Break

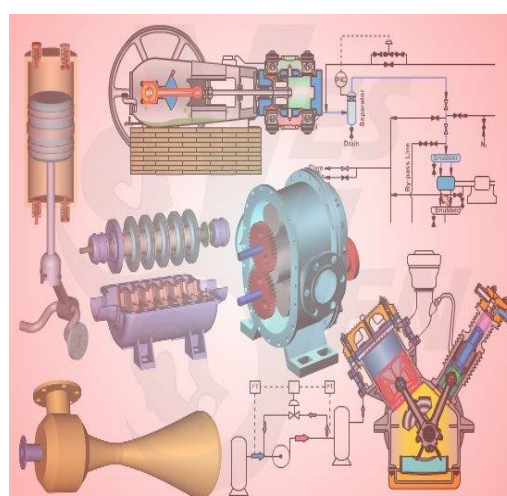
0945 – 1030	Troubleshooting Pressure, Flow & Capacity Control Unstable Suction & Discharge Pressure Control • Flow-Loop Oscillation & Capacity-Control Problems • Incorrect Controller Tuning, Range or Action • Process Disturbances & Compressor/Controller Interactions
1030 – 1130	Troubleshooting Instrumentation & Final Control Elements Transmitter Drift, Impulse-Line Problems & Signal Failures • Control Valve Stiction, Deadband & Slow Response • Positioner, Actuator & Instrument-Air Problems • Signal Validation, Redundancy & Instrument Fault Diagnosis
1130 – 1230	Troubleshooting Compressor Sequences, Trips & Interlocks Nuisance Alarms, Trips & Shutdown Events • Start-Up Permissive & Sequencing Failures • Diagnosing Logic, Communication & I/O Problems • Event-Sequence Analysis & Safe Restoration of Operation
1230 – 1245	Break
1245 – 1345	Practical Case Studies & Compressor Control Problem Solving Case Study: Centrifugal Compressor Approaching Surge • Case Study: Unstable Discharge-Pressure & Recycle Control • Case Study: Compressor Load-Sharing & Control-Loop Interaction • Development of Corrective Actions, Control Improvements & Preventive Measures
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)

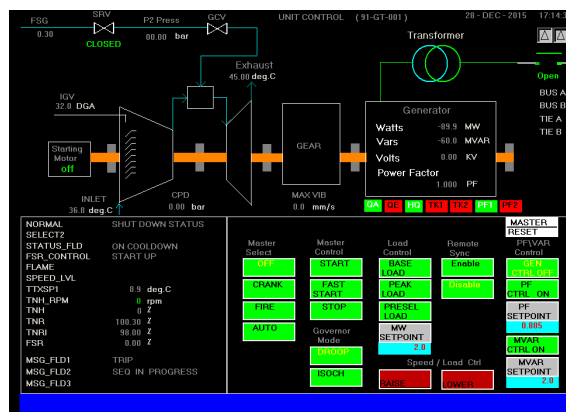
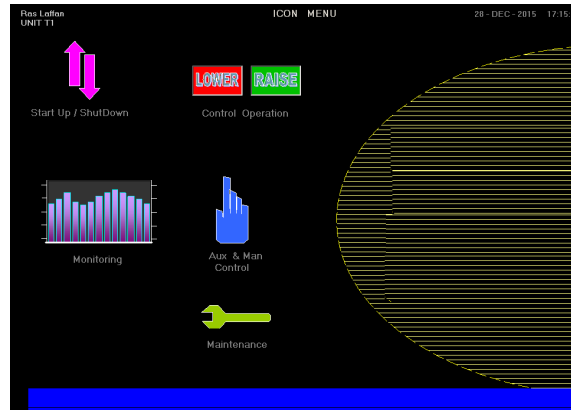
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators “SIM 3300 Centrifugal Compressor”, “CBT on Compressors” and “MARK V” video simulator.



SIM 3300 Centrifugal Compressor Simulator



CBT on Compressors



Course Coordinator

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