

COURSE OVERVIEW ME0973
Gas Compressors: Selection and Design

Course Title

Gas Compressors: Selection and Design

Course Date/Venue

Session 1: January 12-16, 2025/Boardroom 1,
 Elite Byblos Hotel Al Barsha,
 Sheikh Zayed Road, Dubai, UAE
 Session 2: July 14-18, 2025/Fujairah Meeting
 Room, Grand Millennium Al
 Wahda Hotel, Abu Dhabi, UAE



Course Reference

ME0973

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



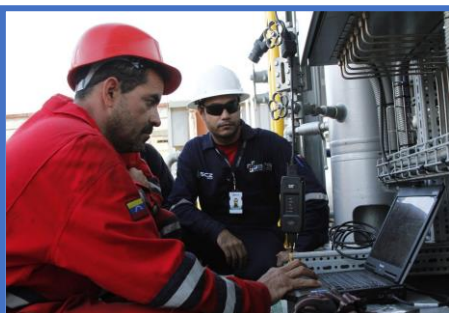
Course Description



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 gas compressors selection and design. It covers the various types and application of compressors including shaft and impellers/blades, balance drum, thrust collar, casing and diaphragm bundle/stator, journal and thrust bearings; the oil seals, gas path, fluid flow and axial thrust; the compressors material selection and testing; and the selection criteria of dynamic and positive displacement compressors.



During this interactive course, participants will learn the compressor thermodynamics, operating characteristics, performance curves and off-design evaluations; the key compressor components, other auxiliary systems and equipment specifications; the compressor selection, sizing, commissioning and start-up; the use of compressor controls and monitoring devices; the driver and gear involvement; the installation, operation, maintenance practices and troubleshooting; the economic considerations; the compressor maintenance and troubleshooting; the mechanical seals, couplings, alignment and causes of failure; and system resistance curve modification.

Course Objectives

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

- Apply and gain in depth knowledge on gas compressors selection and design
- Provide detailed understanding of many types of gas compressors
- Specify procedures for selection, sizing, commissioning and start-up
- Apply predictive maintenance procedure for compressors as well as achieve reduced costs of operation and maintenance with increase in efficiency
- Identify the various types and application of compressors including shaft and impellers/blades, balance drum, thrust collar, casing and diaphragm bundle/stator, journal and thrust bearings
- Recognize oil seals, gas path, fluid flow and axial thrust
- Carryout compressors material selection and testing as well as discuss selection criteria of dynamic and positive displacement compressors
- Describe compressor thermodynamics and operating characteristics, performance curves and off-design evaluations
- Recognize key compressor components, other auxiliary systems and equipment specifications
- Apply compressor selection, sizing, commissioning and start-up as well as use compressor controls and monitoring devices
- Determine driver and gear involvement and employ installation, operation, maintenance practices and troubleshooting
- Discuss economic considerations and apply compressor maintenance and troubleshooting
- Identify mechanical seals, couplings, alignment and causes of failure
- Explain duty/standby change-over philosophy, compressor performance curves and regulations, design and efficiency considerations, operating planes and system resistance curve modification

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 gas compressors selection and design for mechanical, facilities, plant, or pipeline engineers and technicians needing an in-depth understanding of the different types 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 Fee

US\$ 5,500 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 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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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.

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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.



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 **Ammonia Manufacturing & Process Troubleshooting, Distillation Towers, Crude Oil Distillation, Fundamentals of Distillation** for Engineers, **Distillation** Operation and Troubleshooting, **Advanced Distillation** Troubleshooting, **Distillation** Technology, **Vacuum Distillation, Ammonia Storage & Loading** Systems, **Ammonia Plant** Operation, Troubleshooting & Optimization, **Ammonia Recovery, Ammonia Plant Safety, Hazard of Ammonia Handling, Storage & Shipping, Operational Excellence in Ammonia Plants, Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer**

Manufacturing Process Technology, **Sulphur Recovery, Phenol Recovery & Extraction, Wax Sweating & Blending, Petrochemical & Fertilizer Plants, Nitrogen Fertilizer Production, Petroleum Industry Process Engineering, Refining Process & Petroleum Products, Refinery Planning & Economics, Safe Refinery Operations, Hydrotreating & Hydro-processing, Separators in Oil & Gas Industry, Gas Testing & Energy Isolations, Gas Liquor Separation, Industrial Liquid Mixing, Wax Bleachers, Extractors, Fractionation, Operation & Control of Distillation, Process of Crude ATM & Vacuum Distillation Unit, Water Purification, Water Transport & Distribution, Steam & Electricity, Flame Arrestors, Coal Processing, Environmental Emission Control, R&D of Wax Blending, Wax Molding/Slabbing, Industrial Drying, Principles, Selection & Design, Process Safety Design, Certified Process Plant Operations, Control & Troubleshooting, Operator Responsibilities, Storage Tanks Operations & Measurements, Tank Design, Construction, Inspection & Maintenance, Atmospheric Tanks, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Performance, Efficiency & Optimization, Continuous Improvement & Benchmarking, Process Troubleshooting Techniques, Oil & Gas Operation/Introduction to **Surface Facilities, Pressure Vessel Operation, Plant & Equipment Integrity, Process Equipment Performance & Troubleshooting, Plant Startup & Shutdown, Startup & Shutdown** the Plant While Handling Abnormal Conditions, **Flare & Relief System, Process Gas Plant Start-up, Commissioning & Problem Solving, Process Liquid and Process Handling & Measuring** Equipment. Further, he is also well-versed in **Compressors & Turbines** Operation, Maintenance & Troubleshooting, **Heat Exchanger Overhaul & Testing** Techniques, Balancing of **Rotating Machinery (BRM), Pipe Stress Analysis, Valves & Actuators** Technology, Inspect & Maintain **Safeguarding Vent & Relief System, Certified Inspectors for Vehicle & Equipment, Optimizing Equipment Maintenance & Replacement** Decisions, Certified Maintenance Planner (**CMP**), Certified Planning and Scheduling Professional (**AACE-PSP**), **Material Cataloguing, Specifications, Handling & Storage, Steam Trap Design, Operation, Maintenance & Troubleshooting, Steam Trapping & Control, Column, Pump Technology, Pump Selection & Installation, Centrifugal Pumps Troubleshooting, Pumps Design, Selection & Operation, Pump & Exchangers, Troubleshooting & Design, Rotating Equipment Operation & Troubleshooting, Control & ESD System, Detailed Engineering Drawings, Codes & Standards, Budget Preparation, Allocation & Cost Control, Root Cause Analysis (RCA), Production Optimization, Permit to Work (PTW), Project Engineering, Data Analysis, Process Hazard Analysis (PHA), HAZOP Study, Sampling & Analysis, Training Analysis, Job Analysis** Techniques, Storage & Handling of **Toxic Chemicals & Hazardous Materials, Hazardous Material Classification & Storage/Disposal, Dangerous Goods, Environmental Management System (EMS), Supply Chain, Purchasing, Procurement, Logistics Management & Transport & Warehousing & Inventory, Risk Monitoring Authorized Gas Tester (AGT), Confined Space Entry (CSE), Personal Protective Equipment (PPE), Fire & Gas, First Aid and Occupational Health & Safety.****

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, Process Engineer, HSE Supervisor, Warehouse Manager, Quality Manager, Business Analyst, Senior Process Controller, Process Controller, Safety Officer, Mechanical Technician, 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.





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

0730 - 0800	<i>Registration & Coffee</i>
0800 - 0815	<i>Welcome & Introduction</i>
0815 - 0830	PRE-TEST
0830 - 0930	<i>Introduction to Gas Compressors</i>
0930 - 1000	<i>Types & Application of Compressors</i>
1000 - 1015	<i>Break</i>
1015 - 1130	<i>Shaft & Impellers/Blades</i>
1130 - 1215	<i>Balance Drum & Thrust Collar</i>
1215 - 1230	<i>Break</i>
1230 - 1300	<i>Casing & Diaphragm Bundle/Stator</i>
1300 - 1420	<i>Journal & Thrust Bearings</i>
1420 - 1430	Recap
1430	<i>End of Day One</i>

Day 2

0730 - 0900	Oil Seals
0900 - 1000	Gas Path
1000 - 1015	<i>Break</i>
1015 - 1100	<i>Fluid Flow in Centrifugal Compressor</i>
1100 - 1130	Axial Thrust
1130 - 1215	<i>Compressors Material Selecting & Testing</i>
1215 - 1230	<i>Break</i>
1230 - 1300	<i>Selection Criteria of Dynamic & Positive Displacement Compressors</i>
1300 - 1420	<i>Compressor Thermodynamics & Operating Characteristics</i>
1420 - 1430	Recap
1430	<i>End of Day Two</i>

Day 3

0730 - 0900	<i>Performance Curves & Off-Design Evaluations</i>
0900 - 1000	<i>Key Compressor Components & Other Auxiliary Systems</i>
1000 - 1015	<i>Break</i>
1015 - 1100	<i>Equipment Specifications</i>
1100 - 1215	<i>Compressor Selection, Sizing, Commissioning & Start-up</i>
1215 - 1230	<i>Break</i>
1230 - 1300	<i>Compressor Controls & Monitoring Devices</i>
1300 - 1420	<i>Driver & Gear Involvement</i>
1420 - 1430	Recap
1430	<i>End of Day Three</i>

Day 4

0730 - 0900	<i>Installation, Operation, Maintenance Practices & Troubleshooting</i>
0900 - 1000	<i>Economic Considerations</i>
1000 - 1015	<i>Break</i>



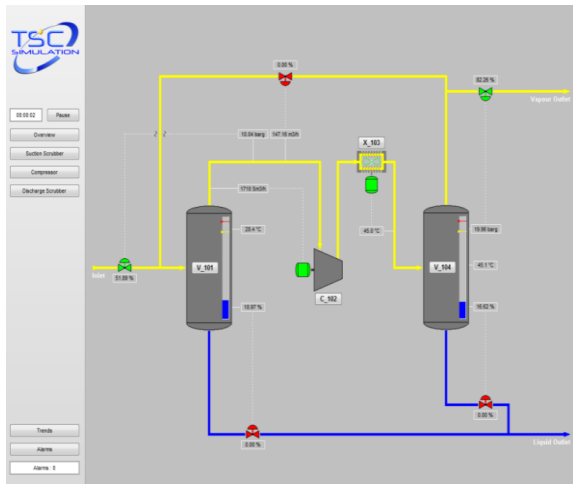
1015 - 1100	<i>Compressor Maintenance & Troubleshooting</i>
1100 - 1130	<i>Centrifugal Compressor Maintenance</i>
1130 - 1215	<i>Mechanical Seals</i>
1215 - 1230	<i>Break</i>
1230 - 1300	<i>Couplings & Alignment</i>
1300 - 1330	<i>Causes of Failure</i>
1330 - 1420	<i>Duty/Standby Change-Over Philosophy</i>
1420 - 1430	<i>Recap</i>
1430	<i>End of Day Four</i>

Day 5

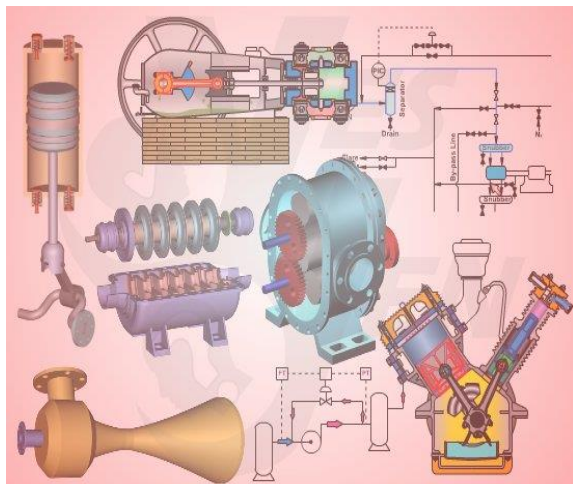
0730 - 0900	<i>Compressor Performance Curves & Regulations</i>
0900 - 1000	<i>Design Considerations</i>
1000 - 1015	<i>Break</i>
1015 - 1100	<i>Efficiency Considerations</i>
1100 - 1215	<i>Operating Planes</i>
1215 - 1230	<i>Break</i>
1230 - 1345	<i>System Resistance Curve Modification</i>
1345 - 1400	<i>Course Conclusion</i>
1415 - 1430	<i>POST-TEST</i>
1430	<i>End of Course</i>

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 the “SIM 3300 Centrifugal Compressor” and “CBT on Compressors” simulators.



SIM 3300 Centrifugal Compressor Simulator



CBT on Compressors

Course Coordinator

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