COURSE OVERVIEW ME0780-3D

Reciprocating Compressor: Maintenance and Troubleshooting

Course Title

Reciprocating Compressor: Maintenance and Troubleshooting

Course Reference

ME0780-3D

1.8 CEUs (18 PDHs) AWARD

Course Duration/Credits

Three days/1.8 CEUs/18 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	May 05-07, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	July 06-08, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE
3	September 08-10, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	November 02-04, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

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 aim of this course is to provide delegates with a detailed and up-to-date overview of fundamentals and practice of reciprocating compressors. Many present-day compressors are likely to have been designed with the emphasis on reduced weight, less floor space and less initial cost. Today, it is also necessary to consider aspects of maintainability and life cycle cost. So the course looks at issues of design, operation, preventative maintenance, overhaul and repair, troubleshooting and safety in operation.

At the completion of the course, participant will be able to identify the various applications of reciprocating compressor; recognize the design and materials for compressor components; review and improve the operation and maintenance of reciprocating compressors; carryout overhauling and repairing techniques of reciprocating compressors; apply troubleshooting to various compressor problems; identify the importance of preventive maintenance of reciprocating compressors; and emphasize the safety in the operation and maintenance and reciprocating compressors.

Course Objectives

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

- Apply and gain an in-depth knowledge on reciprocating compressors and their various applications
- Recognize the design and materials for compressor components
- Review and improve the operation and maintenance of reciprocating compressors
- Carryout overhauling and repairing techniques of reciprocating compressors
- Employ troubleshooting to various compressor problems
- Identify the importance of preventive maintenance for reciprocating compressors
- Emphasize the safety in the operation and maintenance of reciprocating compressors

Who Should Attend

This course provides an overview of all significant aspects and considerations of reciprocating compressors for engineers, managers and other technical staff in all industries using reciprocating compressors.

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**.*

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 **1.8 CEUs** (Continuing Education Units) or **18 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 Maintenance 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**, **Ammonia Storage & Loading** Systems, **Operational Excellence** in **Ammonia Plants**, **Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer Manufacturing** Process Technology, **Sulphur Recovery**, Phenol Recovery & Extraction, **Refining Process & Petroleum Products**, **Refinery Planning & Economics**, **Hydrotreating & Hydro-processing**, **Separators** in **Oil & Gas** Industry, **Gas Testing & Energy** Isolations, **Industrial Liquid Mixing**, **Extractors**, **Fractionation**, **Water Purification**, **Water Transport** & Distribution, **Environmental Emission Control**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant Performance**, **Plant Startup & Shutdown**, **Process Troubleshooting** Techniques and Oil & Gas Operation/Surface Facilities. Further, he is also well-versed in **Rotating Machinery** (**BRM**), **Rotating Equipment** Operation & Troubleshooting, Root Cause Analysis (**RCA**), **Process Plant** Shutdown, Turnaround & Troubleshooting, Planning & Scheduling **Shutdowns & Turnarounds**, Optimizing **Equipment Maintenance** & Replacement Decisions, **Maintenance Planning & Scheduling**, **Material Cataloguing**, Maintenance, Reliability & Asset Management Best Practices, **Storage Tanks Operations** & Measurements, **Tank** Inspection & Maintenance, **Pressure Vessel** Operation, **Flare & Relief** System, **Flaring System** Operation, **PSV** Inspection & Maintenance, **Centrifugal & Reciprocating Compressor**, **Screw Compressor** Troubleshooting, **Heat Exchanger** Overhaul & Testing, **Pipe Stress** Analysis, **Control Valves & Actuators**, **Vent & Relief System**, **Centrifugal & Reciprocating Pump** Installation & Repair, **Heat Exchanger** Troubleshooting & Maintenance, **Steam Trapping & Control**, **Control & ESD** System and Detailed Engineering Drawings, Codes & Standards.

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 Fee

US$ 3,750 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 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	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Reciprocating Compressors and their Applications*** *Introduction ● What is a Compressor? ● How Compressors Work ● Methods of Compression ● Types of Compressors ● Compressor ● Definitions*
0930 – 0945	*Break*
0945 – 1100	***Reciprocating Compressors and their Applications (cont'd)*** *Pressure ● Pressure Definitions Associated with Compressors ● Theory of Reciprocating Compressors ● Characteristics of Reciprocating Compressors ● Compressor Type Selection ● Reciprocating Compressor Cylinder Arrangements*
1100 – 1230	***Design and Materials for Compressor Components*** *Materials of Construction ● Non-Lubricated or Oil-Free Cylinder Construction ● Piston Rod Column or Frame Loading ● Disturbing or Shaki Forces*
1230 – 1245	*Break*
1245 – 1420	***Design and Materials for Compressor Components (cont'd)*** *Foundations for Reciprocating Compressors ● Compressor Piping and Pulsation ● Design Overview of Labyrinth ● Piston Compressors*
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

0730 – 0930	***Operation and Maintenance of Reciprocating Compressors*** *Lubrication of Reciprocating Compressors ● Operational Problems and Maintenance of Compressor Valves ● Compressor Piston Rod Packing ● Compressor Control Systems ● Compressor Cylinder Cooling ● Non-Lubricated Compressor Maintenance ● Labyrinth-Piston Compressors*
0930 – 0945	*Break*

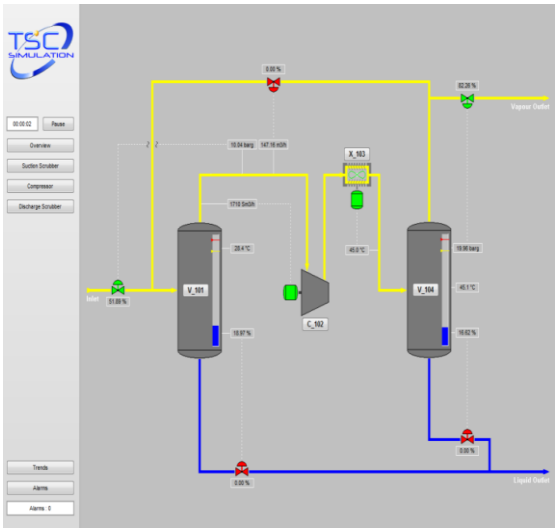
0945 – 1100	***Overhaul and Repair of Reciprocating Compressors*** *Rule of Thumb for General Running Clearances ● Compressor Alignment ● Web Deflection Measurements ● Compressor Cylinder Alignment ● Foundation Problems and Repairs ● Compressor Bearing Maintenance and Replacement*
1100 – 1230	***Overhaul and Repair of Reciprocating Compressors (cont'd)*** *Cylinder Repair and Maintenance ● Compressor Piston Maintenance ● Rebuilding Compressor Pistons ● Installing Pistons on Piston Rods ● Other Compressor Component Repairs ● Compressor Part Replication*
1230 – 1245	*Break*
1245 – 1420	***Troubleshooting Compressor Problems*** *Introduction ● Compressor Problems ● Typical Compressor Problems ● Troubleshooting Lubrication Systems ● Significance of Inter-Cooler Pressures ● Inter-Stage Pressures ● Belt Drives ● Motor Controls ● Diagnostic Tests ● Evaluating Reciprocating Compressor Condition Using Ultrasound and Vibration Patterns ● Compressor Service Technician Reports ● Basic Air Compressor System Evaluation*
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

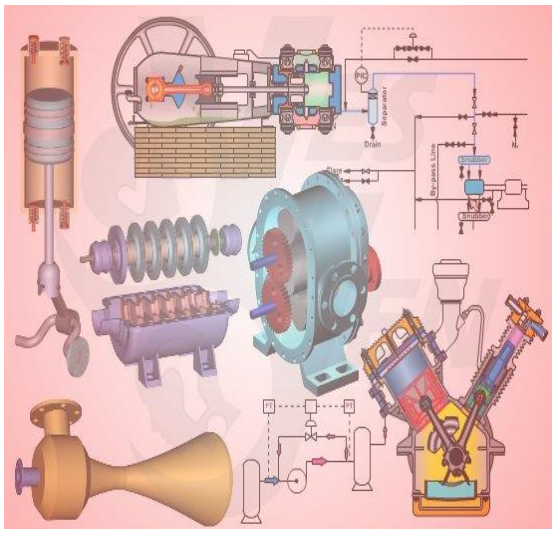
0730 – 0930	***Preventive Maintenance for Reciprocating Compressors*** *Introduction ● Compressor Maintenance ● Emergency Repairs should be Minimized ● Effectiveness of Preventive Maintenance ● Compressor Preventive Maintenance Program*
0930 – 0945	*Break*
0945 – 1100	***Preventive Maintenance for Reciprocating Compressors (cont'd)*** *Spare Parts Vendor Selection ● Personnel Training ● Maintenance Contractors ● Predictive Maintenance ● Integrated Condition Monitoring Systems*
1100 – 1230	***Safety in Operation and Maintenance*** *Basic Safety Rules ● Lock-Out/Tag-Out Program ● Safe Maintenance Procedures Restated*
1230 – 1245	*Break*
1245 – 1345	***Safety in Operation and Maintenance (cont'd)*** *Valve Installation ● Fires and Explosions ● Summary ● Air Piping*
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 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 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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