

COURSE OVERVIEW ME0616
Compressors Operation & Maintenance

Course Title

Compressors Operation & Maintenance

Course Date/Venue

January 21-25, 2024/Meeting Plus 2, City Centre Rotana Doha, Doha, Qatar

Course Reference

ME0616

Course Duration/Credits

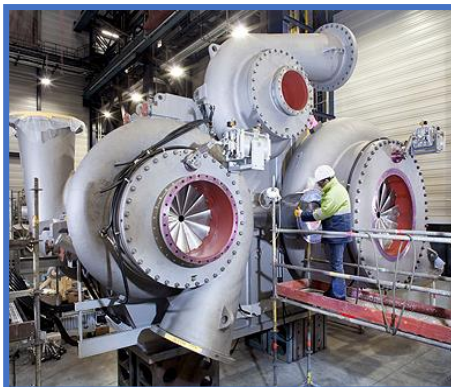
Five days/3.0 CEUs/30 PDHs



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 good working knowledge on the Compressors Operation & Maintenance. It covers the common types, ranges of application, limitation and functions of compressors; the principles of equipment failure patterns; the common factors of why equipment fails; the different aspects of machinery corrosion; and the correct selection of materials for a given application.



At the completion of the course, participants will be able to apply basic approaches to machinery troubleshooting; troubleshoot most possible faults and failures of pumps and compressor; carryout various approaches to be considered in applying corrective action; and employ the principles of dry gas, packing and mechanical seals.

The course will also cover the components and functions of compressors; the features of dry gas seal for centrifugal gas compressor; the troubleshooting of mechanical seal failure; the various maintenance and repair methods used; and the basic concept of bearing care, maintenance, bearing classification and lubrication management.

Course Objectives

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

- Apply systematic techniques in the compressors operation and maintenance
- Identify the common types of compressors and the ranges of application and limitation and have an overview of centrifugal compressors including its type and function
- Recognize the principles of equipment failure patterns including its type and review the common factors of why equipment fails
- Differentiate between the different aspects of machinery corrosion and to make the correct selection of material for a given application
- Determine the basic approaches to machinery troubleshooting and troubleshoot most possible faults and failures of pumps and compressors and discover the various approaches to be considered in applying corrective actions
- Employ the principles of dry gas, packing and mechanical seals and recognize their components and functions
- Explain the features of dry gas seal for centrifugal gas compressor
- Analyze and troubleshoot mechanical seal failure and identify the various maintenance and repair methods used
- Discuss the basic concept of bearing care and maintenance, bearing classification and lubrication management

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 covers systematic techniques and methodologies on the compressors operation and maintenance for those who work with mechanical and rotating equipment at industrial plants, petrochemical plants, process plants, utilities, production oil/gas field, or manufacturing facilities. General maintenance personnel, first line supervisors and engineers will find this course extremely useful. Attendees come from a wide variety of industries, skill-levels, company sizes, and job titles.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Fee

US\$ 5,500 per Delegate. 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

Certificates are accreditation by the following international accreditation organizations:-


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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.

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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.

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 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. Den Bazley, PE, BSc, is a Senior Mechanical Engineer with over 30 years of industrial experience in Oil, Gas, Refinery, Petrochemical, Power and Utilities industries. His wide expertise includes Pumps & Compressors Maintenance & Troubleshooting, Centrifugal Pump Design, Hydraulic Turbines, Axial Flow Compressor, Centrifugal Pump Installation & Operation, Centrifugal Pump Maintenance & Troubleshooting, Centrifugal & Positive Displacement Pump Technology, Pumps & Valves Operation, Bearings, Seals & Couplings, Compressors & Turbines Maintenance & Troubleshooting, Gas Turbine Design & Maintenance, Gas Turbine Troubleshooting, Pressure Vessel Design, Fabrication & Testing, Tank & Tank Farms, Heat Exchangers Operation & Maintenance, Boilers & Steam System Management, Re-tubing & Tube Expanding Technology, Propylene Compressor & Turbine, Valve Installation & Repair, Safety Relief Valve Sizing & Troubleshooting, Dry Gas Seal Operation, Mechanical Seal Installation & Maintenance, Industrial Equipment & Turbomachinery, Pumps, Compressors, Turbines & Motors, Boiler & Steam System Management, Tune-Up, Heat Recovery & Optimization, Bearing & Lubrication, Installation & Failure Analysis, Boiler Operation & Maintenance, Process Control Valves, Steam Turbine Operation, Bearing Mounting/Dismounting, Valve Types, Troubleshooting & Repair Procedure, Pressure Vessels & Heat Exchangers, Corrosion Inspection, PSV Maintenance & Testing, Pump Maintenance, Machinery Troubleshooting, Valves, Safety Relief Valves, Strainers & Steam Traps, Pipeline Rules of Thumb, Analytical Prevention of Mechanical Failure, Gear Boxes Troubleshooting & Repair, Piping & Pipeline Design & Inspection, Pigging & Integrity Assessment, Process Piping Design, Pipeline Operation & Maintenance, Welding & Fabrication, Brazing, Fitness-for-Service (FFS), Process Plant Equipment, Pressure Vessels, Piping & Storage Facilities, Layout of Piping Systems & Process Equipment, Pipe Work Design & Fabrication, Mechanical Integrity & Reliability, Mechanical Rotating Equipment & Turbomachinery, Motors & Variable Speed Drives, Mechanical Engineering Design, Process Plant Shutdown, Turnaround & Troubleshooting, Mechanical Alignment, Laser & Dial-Indicator Techniques, Material Cataloguing, Condition Based Monitoring, Maintenance Management, Reliability Management, Reliability Centred Maintenance (RCM), Total Plant Maintenance (TPM) and Reliability-Availability-Maintainability (RAM), Engineering Drawings, Codes & Standards, P&ID Reading, Interpretation & Developing, Maintenance & Reliability Best Practices, Maintenance Auditing, Benchmarking & Performance Improvement, Excellence in Maintenance & Reliability Management, Preventive & Predictive Maintenance & Machinery Failure Analysis (RCFA), Total Plant Reliability Centered Maintenance (RCM), Rotating Equipment Reliability Optimization, Machinery Failure Analysis, Prevention & Troubleshooting, Maintenance Planning, Scheduling & Work Control and Maintenance Planning & Cost Estimation.

During his career life, Mr. Bazley has gained his practical and field experience through his various significant positions and dedication as the **General Manager, Branch Manager, Refinery Chairman, Engineering Manager, Maintenance Engineer, Construction Engineer, Project Engineer, Mechanical Engineer, Associate Engineer, Oil Process Engineer, Mechanical Services Superintendent, Quality Coordinator, Planning Coordinator, Consultant/Instructor, Lecturer/Trainer and Public Relations Officer** for numerous international companies like **ESSO, FFS Refinery, Dorbyl Heavy Engineering (VECOR), Vandenberg Foods (Unilever), Engen Petroleum, Royle Trust and Pepsi-Cola.**

Mr. Bazley is a **Registered Professional Engineer** and has a **Bachelor's degree in Mechanical Engineering**. Further, he is a **Certified Engineer** (Government Certificate of Competency GCC Mechanical Pretoria), a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management (ILM)**, an active member of the **Institute of Mechanical Engineers (IMechE)** and has delivered numerous trainings, courses, seminars and workshops 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: Sunday, 21st January 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction Overview of Rotating Equipment • Understanding How Equipment Works
0930 – 0945	Break
0945 – 1100	Compressor Types & Terminology Centrifugal • Axial • Reciprocating • Helical Screw • Ranges of Application and Limitations
1100 – 1215	Centrifugal Compressors Overview Rotors • Balancing • Rotor Dynamics • Impellers • Casings
1215 – 1230	Break
1230 – 1420	Centrifugal Compressors Overview (cont'd) Troubleshooting and Preventive Maintenance for Compressors • Bearings • Seals: Labyrinths, Oil Seals & Self Acting Gas Seals • Couplings • Controls
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, 22nd January 2024

0730 – 0930	Equipment Failure Patterns Materials Selection • Types of Corrosion • Bath-Tub Curve • Actual Equipment Failure Patterns • Actions to Minimize Failure Effect
0930 – 0945	Break
0945 – 1100	Basic Approaches to Machinery Troubleshooting Examples from Recent Failure Incidents Attributed to Design Defects • Processing and Manufacturing Deficiencies
1100 – 1215	Troubleshooting Faults & Applying Corrective Action Equipment Performance Monitoring • Vibration Analysis • Fast Fault Finding • Acoustical Troubleshooting • Infra-red Inspection • Oil Analysis
1215 – 1230	Break
1230 – 1300	Vibration Analysis DVDs
1300 – 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, 23rd January 2024

0730 – 0830	Introduction to Dry Gas Seals Principle of Operation • Materials of Construction • Manufacturing and Verification Testing
0830 – 0930	Packing & Mechanical Seals Compression Packing • Molded (Automatic) Packing • Basic Principles of Mechanical Seals • Face Materials • Secondary Seal Materials • Single Mechanical Seals • Single Mechanical Seal • Flushing Plans
0930 – 0945	Break
0945 – 1045	Flowserve DVD
1045 – 1215	Case Studies
1215 – 1230	Break
1230 – 1330	Seal Support Systems Dual Sealing Systems and Flushing Plans • API 682 Reference Guide • Gas Barrier Seal Technology for Pumps • Support Systems for Dry Gas (Self Acting) Compressor Seals • Mechanical Seal Selection Strategies
1330 – 1420	Dry Gas Seal for Centrifugal Gas 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 Three

Day 4: Wednesday, 24th January 2024

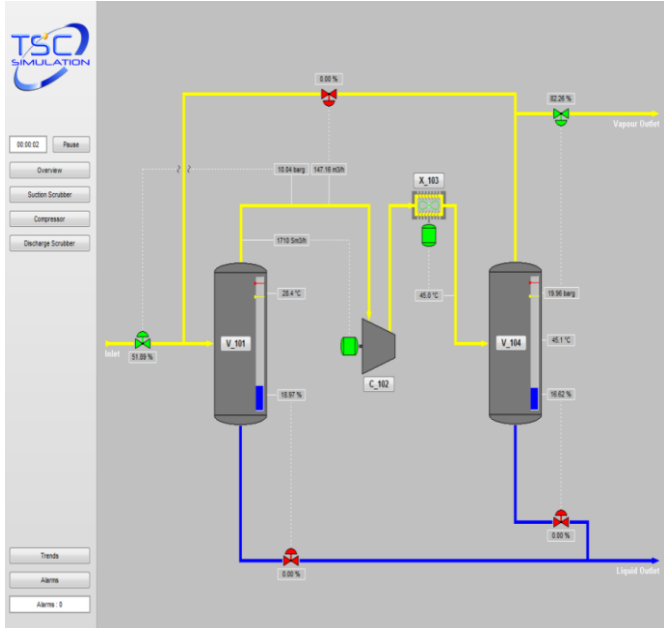
0730 – 0930	Mechanical Seal Failure Analysis & Troubleshooting Failure Analysis • Mechanical Seal Troubleshooting • Determining Leakage Rates • Ascertaining Seal Stability
0930 – 0945	Break
0945 – 1100	Mechanical Seal Maintenance & Repair Bellows Seal Repair • Cartridge Seal Installation and Management • Seal Face Care
1100 – 1215	Bearing Care & Maintenance Basic Bearing Concepts • Bearing Classifications • Bearing Care and Maintenance • Lubrication Management Break
1215 – 1230	Break
1230 – 1315	Flowserve DVD
1315 – 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, 25th January 2024

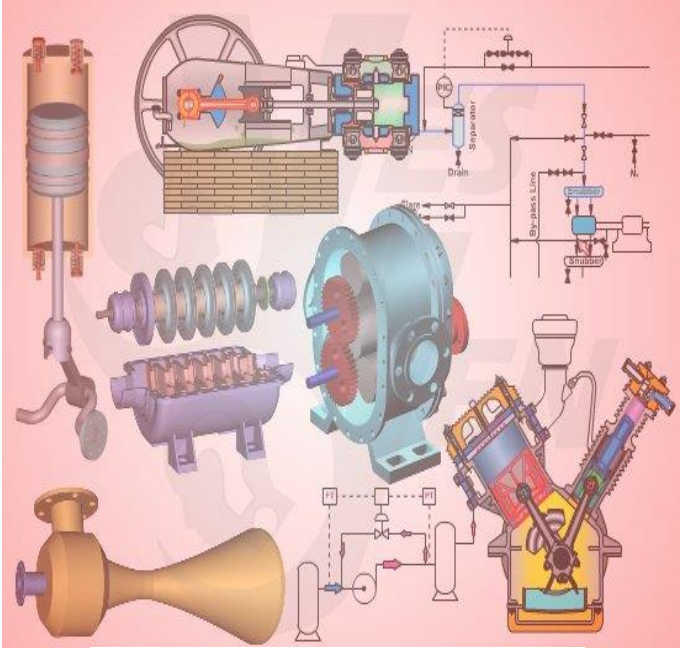
0730 – 0900	Preventive Maintenance-Lubrication <i>Cost of Poor Lubrication • Fundamentals-Oil & Grease • Storage & Handling Methods</i>
0900 – 0930	Flowserve DVD
0930 – 0945	Break
0945 – 1100	Preventive Maintenance-Lubrication (cont'd) <i>Comparative Viscosity • Classifications</i>
1100 – 1215	Lubrication DVD
1215 – 1230	Break
1230 – 1345	Preventive Maintenance <i>General Philosophy • Equipment Sparing Factor and Maintenance Approach</i>
1345 – 1400	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

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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