

COURSE OVERVIEW ME0616-4D
Compressor Operation & Maintenance

Course Title

Compressor Operation & Maintenance

Course Date/Venue

Session 1: July 22-25, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Session 2: October 14-17, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



Course Reference

ME0616-4D

Course Duration/Credits

Four days/2.4 CEUs/24 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 operation, maintenance and troubleshooting of compressors. 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 operation, maintenance and troubleshooting of compressors
- 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, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course covers systematic techniques and methodologies on the operation, maintenance and troubleshooting of compressors 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.

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 **2.4 CEUs** (Continuing Education Units) or **24 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.

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. Karl Thanasis, PEng, MSc, MBA, BSc, is a **Senior Engineer** with over **30 years** of practical experience within the **Oil, Gas, Refinery** and **Petrochemical** industries. His wide expertise includes **Process Fired Heaters, Boilers, Oil & Gas Processing, Oil Field Operation, Production Operation, Plant Operation & Commissioning, Crude Oil Desalting Process, Gas Conditioning, NGL Recovery & NGL Fractionation, Plant Shutdown, Flare System, Pre-Settling & Storage Tanks, Water**

Desalination Technology, Water Treatment Technology, Boiler Water Treatment, MED, MSF, RO, Oily Water Treatment, Oily Water Settling Process, Plant Auxiliary & Utility System, Vacuum De-aerator, Water Filtration System, Oil Recovery System & Chemical Injection, Propylene Compressor & Turbine, Process Plant Optimization Technology & Continuous Improvement, Process Engineering Calculations, Coke Cooler, Process Plant Start-up & Commissioning, Principles of Operations Planning, Operations Abnormalities & Plant Upset, Process Equipment Design, Process Plant Performance & Efficiency, Gas Sweetening & Sulphur Recovery, Process Plant Performance & Efficiency, Distillation-Column Operation, Oil Movement & Troubleshooting, Process Plant Operations & Control, Process Equipment Operation, Fired Heaters & Air Coolers, Heat Exchangers, Pumps, Compressors, Crude Desalter, Pressure Vessels & Valves, Process Plant Start Up & Commissioning, Process Plant Optimization Technology & Continuous Improvement, Pressure Relief Devices (PSV), Pumps & Valve Maintenance & Troubleshooting, Centrifugal Compressors, Reciprocating Air Compressors, Vibration Analysis, Turbomachinery, Mechanical Alignment, Rotating Equipment, Diesel Generators, Heat Exchangers, Lubrication Technology, Bearing, Predictive Maintenance and Root Cause Analysis.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction** and **Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal**. He has worked in various companies worldwide in the **USA, Germany, England** and **Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has a **Master** and **Bachelor** degrees in **Mechanical Engineering with Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** and a **Certified Instructor/Trainer**.

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\$ 4,500 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 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 – 0900	Introduction <i>Overview of Rotating Equipment • Understanding How Equipment Works</i>
0900 – 0930	Compressor Types & Terminology <i>Centrifugal • Axial • Reciprocating • Helical Screw • Ranges of Application and Limitations</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Centrifugal Compressors Overview <i>Rotors • Balancing • Rotor Dynamics • Impellers • Casings • Troubleshooting and Preventive Maintenance for Compressors • Bearings • Seals: Labyrinths, Oil Seals & Self Acting Gas Seals • Couplings • Controls</i>
1100 – 1215	Equipment Failure Patterns <i>Materials Selection • Types of Corrosion • Bath-Tub Curve • Actual Equipment Failure Patterns • Actions to Minimize Failure Effect</i>
1215 – 1230	<i>Break</i>
1230 – 1330	Basic Approaches to Machinery Troubleshooting <i>Examples from Recent Failure Incidents Attributed to Design Defects • Processing and Manufacturing Deficiencies</i>



1330 – 1420	Troubleshooting Faults & Applying Corrective Action Equipment Performance Monitoring • Vibration Analysis • Fast Fault Finding • Acoustical Troubleshooting • Infra-red Inspection • Oil Analysis
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	Vibration Analysis DVDs
0930 – 0945	Break
0945 – 1100	Case Studies
1100 – 1215	Introduction to Dry Gas Seals Principle of Operation • Materials of Construction • Manufacturing and Verification Testing
1215– 1230	Break
1230 – 1300	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
1300 – 1420	Flowserve DVD
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	Case Studies
0930 - 1030	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
1030 - 1045	Break
1045 - 1130	Dry Gas Seal for Centrifugal Gas Compressors
1130 - 1230	Mechanical Seal Failure Analysis & Troubleshooting Failure Analysis • Mechanical Seal Troubleshooting • Determining Leakage Rates • Ascertaining Seal Stability
1230 - 1245	Break
1245 - 1345	Mechanical Seal Maintenance & Repair Bellows Seal Repair • Cartridge Seal Installation and Management • Seal Face Care
1345 - 1420	Bearing Care & Maintenance Basic Bearing Concepts • Bearing Classifications • Bearing Care and Maintenance Lubrication Management Break
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

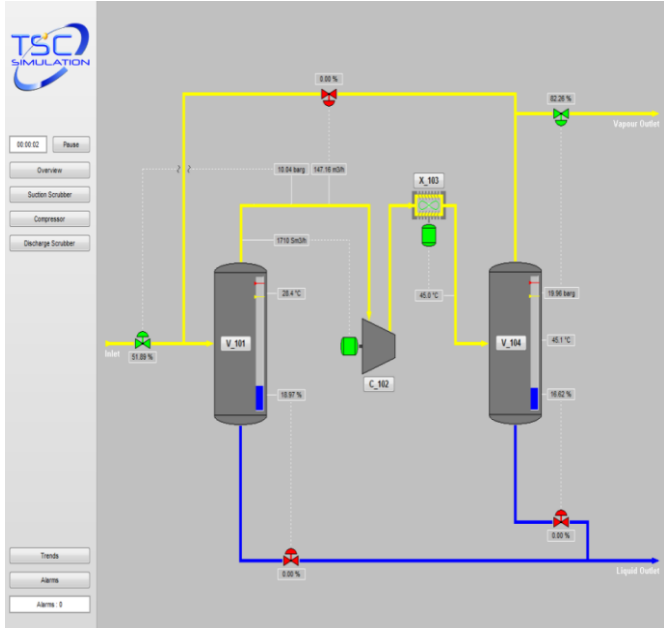


Day 4

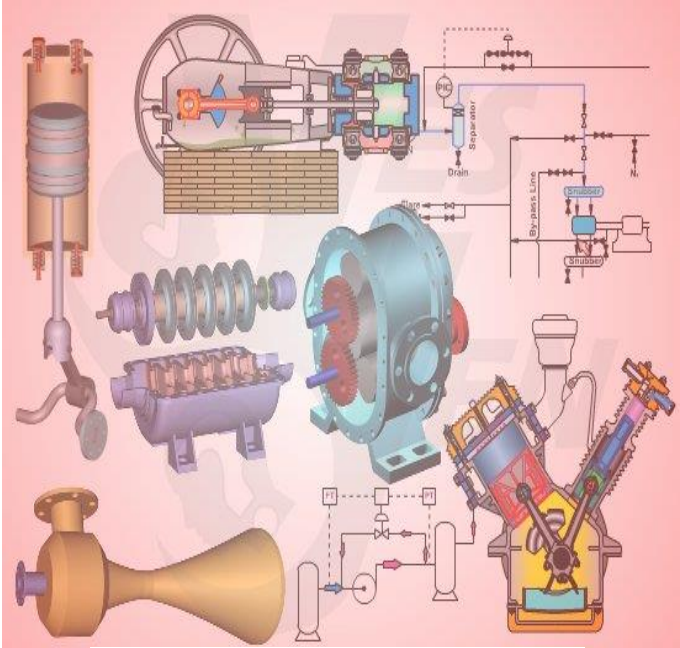
0730 – 0900	Flowserve DVD
0900 – 0930	Case Studies
0930 – 0945	<i>Break</i>
0945 – 1100	Preventive Maintenance-Lubrication <i>Cost of Poor Lubrication • Fundamentals-Oil & Grease • Storage & Handling Methods • Comparative Viscosity • Classifications</i>
1100 – 1215	Flowserve DVD
1215 – 1230	<i>Break</i>
1230 – 1300	Lubrication DVD
1300 – 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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