

COURSE OVERVIEW ME0140 **Mechanical Seal System**

Course Title

Mechanical Seal System

Course Date/Venue

October 26-30, 2025/Sur Meeting Room, Royal Tulip Muscat Hotel, Muscat, Oman

Course Reference

ME0140

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.

The course is designed to equip the participants with the proper techniques on the selection, installation, maintenance and troubleshooting of mechanical seals and packing materials. It covers seal design; seal components; seal types; materials for general consideration in seal construction; and the development of awareness on environmental considerations and control.



The course will also cover the auxiliary equipment including rotameters, flow controllers, leakage detectors, filters and strainers; as well as seal handling and installation which includes general considerations and seat squareness.



Participants of the course will be able to identify the factors influencing seal life and seal failures including factors affecting seal performance, seal malfunction; probable causes, friction, wear, adhesion, abrasion, corrosion and surface fatigue; implement seal selection standards; troubleshoot failed seals; and maximize seal life.

Course Objectives

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

- Select, install, maintain and troubleshoot mechanical seals and packing materials in a professional manner
- Introduce and perform seal design and classification which includes identifying seal components and their functions, primary sealing components-seal head, seal seat, springs for face loading, metals below, etc.
- Identify special seal types including bellows, bushing, labyrinth, diaphragm, gas, dry gas, motion, slurry, carbon seals, etc.
- List the materials for general consideration in seal construction including properties of elastomers, elastomeric materials, plastic polymers, etc. and differentiate seals for specific special applications
- Develop the awareness on environmental considerations and control
- Explain and illustrate auxiliary equipment including rotameters & flow controllers, leakage detectors, filters and strainers
- Heighten their knowledge on seal handling and installation which includes general considerations and seat squareness
- Identify the factors influencing seal life and seal failures including factors affecting seal performance, seal malfunction and probable causes, friction, wear, adhesion, abrasion, corrosion and surface fatigue
- Implement seal selection standards which includes selection guides and standards-ISO, British, DIN, ASME
- Troubleshoot failed seals and explain how to maximize mechanical seal life

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 mechanical seal and packing materials for those who are involved in the selection, installation, maintenance and troubleshooting of mechanical seals. Mechanical engineers, hydraulics and pneumatics engineers, plant engineers, machinery engineers, maintenance and materials engineers, superintendents, supervisors and other technical staff will acquire an outstanding skills and knowledge on the practical aspects of the course. Design engineers, senior design draftsmen and draftsmen will definitely benefit from the operational aspects of this course.

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.



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 **Mechanical Seals** Selection, Maintenance & Troubleshooting, **Mechanical Seals** Designs & Application, **Mechanical Seals & Systems**, **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.

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.

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 + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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, 26th of October 2025

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Fundamentals & Principles Definition of Zero Leakage • Mechanics of Sealing • Purpose of Sealing • Basics Regarding Speed and Pressure • Basic Seal Requirements
0930 – 0945	Break
0945 – 1100	Fundamentals & Principles (cont'd) Seal Friction • Wear and Seal Life • Texture • Seal Balance Criterion-Balance Ratio, Pressure Distribution • Seal Applications • Operating Capabilities, Advantages and Limitations
1100 – 1230	Seal Design & Classification Identifying Seal Components and their Function • Primary Sealing Components- Seal Head, Seal Seat, Springs for Face Loading, Metal Bellows • Secondary Sealing Components-Elastomeric O-Rings, V-Rings, U-Cup Rings, Wedge Rings • Inside and Outside Seals
1230 – 1245	Break
1245 – 1420	Seal Design & Classification (cont'd) General Arrangement Modes • Static and Dynamic Seals • Rotating and Stationary Seal Heads • Sealing Face Conditions • Seal Pre-Loading
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, 27th of October 2025

0730 – 0930	Special Seal Types Bellows • Bushing, Labyrinth, Diaphragm • Gas, Dry Gas, Motion, Slurry • Carbon Seals
0930 – 0945	Break
0945 – 1100	Special Seal Types (cont'd) Liquid Ring and Liquid Barrier Seals • Inflatable, Ferrofluidic • Positive Action Type • Self-Adhesive Compression Seals
1100 – 1230	Materials of Seal Construction General Considerations • Properties of Elastomers • Elastomeric Materials • Plastic Polymers
1230 – 1245	Break
1245 – 1420	Materials of Seal Construction (cont'd) Cemented Carbides • Miscellaneous Sealing Materials • Material Compatibility
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, 28th of October 2025

0730 – 0930	Seals for Specific/Special Applications Hydraulic • Pneumatic • High Temperature • Large Diameter
0930 – 0945	Break
0945 – 1100	Environmental Considerations & Control Abrasives, Heat, Dry Operation • Flushing, Recirculation, Quenching • Convection, Cooling, Jacketing • Buffer and Barrier Fluid • Dead End Lubrication, Grease Packing, Circulating Face Lubrication • API 610 Environmental Control Schemes
1100 – 1230	Auxiliary Equipment Cyclone Separators • Pressurization Units • Air-Coolers and Heat Exchangers
1230 – 1245	Break
1245 – 1420	Auxiliary Equipment (cont'd) Rotameters and Flow Controllers • Leakage Detectors • Filters and Strainers
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, 29th of October 2025

0730 – 0930	Seal Handling & Installation General Considerations • Seat Squareness
0930 – 0945	Break
0945 – 1100	Seal Failures Factors Influencing Seal Life • Factors Affecting Seal Performance • Seal Malfunction and Probable Causes
1100 – 1230	Seal Failures (cont'd) Friction and Wear • Adhesion, Abrasion • Corrosion and Surface Fatigue
1230 – 1245	Break

1245 – 1330	Seal Selection & Standards <i>Seal Selection Guides • Standards-ISO, British, DIN, ASME</i>
1330 – 1420	Practical Session
1420 – 1430	Recap <i>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</i>
1430	<i>Lunch & End of Day Four</i>

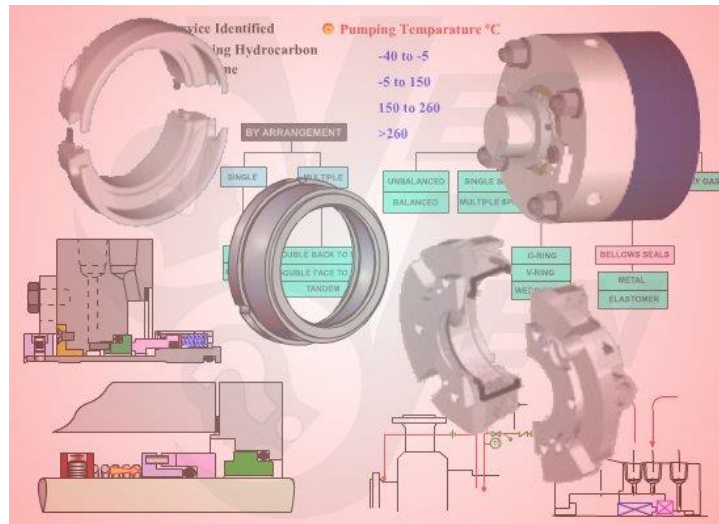
Day 5: Thursday, 30th of October 2025

0730 – 0930	Troubleshooting Failed Seals <i>At the Pumping Site • At the Equipment Teardown • Discoloration, Chipping, Cracking, Rubbing, Elastomer Swelling, Stickiness, Hardness –What do these Mean?</i>
0930 – 0945	<i>Break</i>
0945 – 1100	How To Maximize Mechanical Seal Life <i>Preparing the Pump – Mechanically, Hydraulically • Controlling Temperature in the Stuffing Box</i>
1100 – 1230	How to Maximize Mechanical Seal Life (cont'd) <i>Controlling Pressure in the Stuffing Box • What Seal to Choose?</i>
1230 – 1245	<i>Break</i>
1245 – 1345	How to Maximize Mechanical Seal Life (cont'd) <i>What Face Combination and Elastomer?</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 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 simulator “Mechanical Seals CBT”.



Mechanical Seals CBT Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org