COURSE OVERVIEW ME0140
Mechanical Seals and Balancing

Course Title
Mechanical Seals and Balancing

Course Date/Venue
Session 1: June 15-19, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: November 10-14, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

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, labrynth, 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 hydraunics 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.

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 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 **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. Manuel Dalas MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **25 years** of industrial experience in **Oil**, **Gas**, **Refinery**, **Petrochemical**, **Power** and **Nuclear** industries. His wide expertise includes **Gas Turbines & Compressors** Troubleshooting, **Gas Turbines** Performance, Maintenance & Testing, **Gas Turbine Performance** and Optimization, **Gas Turbine Control** Systems, **Advanced Gas Turbine**, **Gas Turbine Design** and **Analysis**, **Air Compressor** & **Gas Turbines** Selection and Design, **Material Cataloguing**, **Maintenance Planning & Scheduling**, Reliability Centered Maintenance (**RCM**), **Reliability Maintenance**, **Condition Based Maintenance & Condition Monitoring**, **Asset & Risk** Management, **Vibration Condition Monitoring & Diagnostics** of Machines, **Vibration & Predictive** Maintenance, Reliability Improvement & Vibration Analysis for Rotating Machinery, Effective Maintenance **Shutdown & Turnaround** Management, **Engineering Codes & Standards**, **Rotating Equipment** Maintenance, **Mechanical** Troubleshooting, **Static Mechanical Equipment** Maintenance, **Machinery** Failure Analysis, **Machinery Diagnostics & Root Cause Failure** Analysis, **Plant Reliability & Maintenance** Strategies, **Boiler** Operation & Water Treatment, **Pumps** Maintenance & Troubleshooting, **Fans**, **Blowers & Compressors**, **Process Control Valves**, Piping Systems & Process Equipment, Advanced **Valve** Technology, **Pressure Vessel** Design & Analysis, **Steam & Gas Turbine**, **High Pressure Boiler** Operation, **FRP Pipe** Maintenance & Repair, **Centrifugal & Positive Displacement Pump** Technology Troubleshooting & Maintenance, **Rotating Machinery** Best Practices, **PD Compressor & Gas Engine** Operation & Troubleshooting, **Hydraulic Tools & Fitting**, **Mass & Material Balance**, **Water Distribution & Pump Station**, **Tank Farm & Tank Termina**l Safety & Integrity Management, **Process Piping** Design, Construction & **Mechanical Integrity**, **Stack & Noise** Monitoring, **HVAC & Refrigeration** Systems, BPV Code, Section VIII, Division 2, **Facility Planning & Energy** Management, Hoist - Remote & Basic **Rigging & Slinging**, **Mobile Equipment** Operation & Inspection, **Heat Exchanger**, **Safety Relief Valve**, **PRV & POPRV/PORV**, **Bearing & Lubrication**, **Voith Coupling** Overhaul, **Pump & Valve** Technology, **Lubrication** Inspection, **Process Plant** Optimization, Rehabilitation, Revamping & Debottlenecking, Engineering Problem Solving and **Process Plant** Performance & Efficiency. Currently, he is the **Technical Consultant** of the **Association of Local Authorities of Greater Thessaloniki** where he is in charge of the mechanical engineering services for piping, pressure vessels fabrications and ironwork.

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager**, **Project Engineer**, **Safety Engineer**, **Deputy Officer**, **Instructor**, **Construction Manager**, **Construction Engineer**, **Consultant Engineer** and **Mechanical Engineer** for numerous multi-billion companies including the **Biological Recycling Unit** and the **Department of Supplies** of **Greece**, **Alpha Bank Group**, **EMKE S.A**, **ASTE LLC** and **Polytechnic College of Evosmos**.

Mr. Dalas has a **Master's** degree in **Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor's** degree in **Mechanical Engineering** from the **Mechanical Engineering Technical University of Greece** along with a **Diploma** in **Management & Production Engineering** from the **Technical University of Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified Project Manager Professional** (**PMI-PMP**), a **Certified Instructor/Trainer**, a **Certified Energy Auditor** for **Buildings**, **Heating & Climate Systems**, a **Member** of the **Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops internationally.

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.

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	***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

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

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

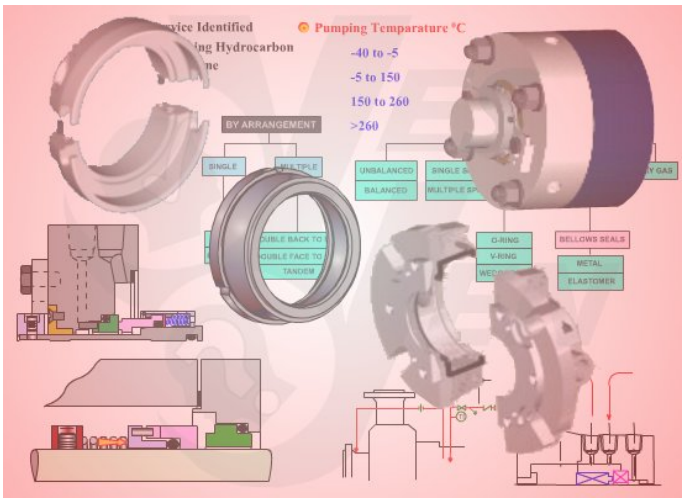
0730 – 0930	***Seal Handling & Installation*** *General Considerations ● Seat Squareness*
0930 – 0945	*Break*
0945 – 1100	***Seal Failures*** *Factors Influencing Seal Life ● Factors Affecting Seal Performance ● Seal Malfunction and Probable Causes*
1100 – 1230	***Seal Failures (cont'd)*** *Friction and Wear ● Adhesion, Abrasion ● Corrosion and Surface Fatigue*
1230 – 1245	*Break*
1245 – 1330	***Seal Selection & Standards*** *Seal Selection Guides ● Standards-ISO, British, DIN, ASME*
1330 – 1420	***Practical Session***
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

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

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