COURSE OVERVIEW ME1143-2D
Pump Mechanical Seal Failure

Course Title
Pump Mechanical Seal Failure

Course Reference
ME1143-2D

Course Duration/Credits
Two days/1.2 CEUs/12 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	June 30-July 01, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	August 17-18, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	October 20-21, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	December 21-22, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Description

This 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 detailed and up-to-date overview of Pump Mechanical Seal Failure. It covers the purpose, components, types and applications of mechanical seals; the shaft misalignment and vibration, contamination and particulate damage; the improper installation and assembly, inadequate lubrication and cooling; the abrasive wear, seal face damage, thermal overload and overheating, seal leakage, chemical attack, spring failure and loss of compression; and the decreased efficiency, increased power consumption, leakage and environmental risks, vibration and mechanical stress.

Further, the course will also discuss the impact on system reliability and maintenance costs; the visual inspection, seal face analysis, vibration monitoring and analysis; the temperature and pressure monitoring, fluid analysis and contamination testing; the proper installation procedures, shaft alignment and bearing support; the system design and material selection and monitoring and maintenance best practices; the seal performance data and failure analysis, root causes of seal failure and seal failure reports; and the historical data, thermal imaging and pressure profiling.

During this interactive course, participants will learn the right seal materials for different applications and designing seals for specific pumping conditions; replacing and upgrading mechanical seals, correcting shaft alignment and pump issues and implementing seal flush plans and cooling systems; the seal flush systems and cooling liquids and buffer and barrier fluids in double seals; monitoring seal support systems for performance; and optimizing seal support for harsh operating conditions.

Course Objectives

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

- Apply and gain an in-depth knowledge on pump mechanical seal failure
- Discuss the purpose, components, types and applications of mechanical seals
- Recognize shaft misalignment and vibration, contamination and particulate damage
- Identify improper installation and assembly, inadequate lubrication and cooling
- Discuss abrasive wear, seal face damage, thermal overload and overheating, seal leakage, chemical attack, spring failure and loss of compression
- Determine decreased efficiency, increased power consumption, leakage and environmental risks, vibration and mechanical stress and the impact on system reliability and maintenance costs
- Carryout visual inspection, seal face analysis, vibration monitoring and analysis, temperature and pressure monitoring, fluid analysis and contamination testing
- Employ proper installation procedures, shaft alignment and bearing support, system design and material selection and monitoring and maintenance best practices
- Apply seal performance data and failure analysis, identify root causes of seal failure, analyze seal failure reports and historical data and use thermal imaging and pressure profiling
- Choose the right seal materials for different applications and designing seals for specific pumping conditions
- Replace and upgrade mechanical seals, correct shaft alignment and pump issues and implement seal flush plans and cooling systems
- Recognize seal flush systems and cooling liquids as well as use buffer and barrier fluids in double seals
- Monitor seal support systems for performance and optimize seal support for harsh operating conditions

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 pump mechanical seal failure for mechanical engineers, project engineers and managers, welding engineers and inspectors, maintenance personnel and other technical staff.

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 **1.2 CEUs** (Continuing Education Units) or **12 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 Fee

US$ 2,750 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 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

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 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

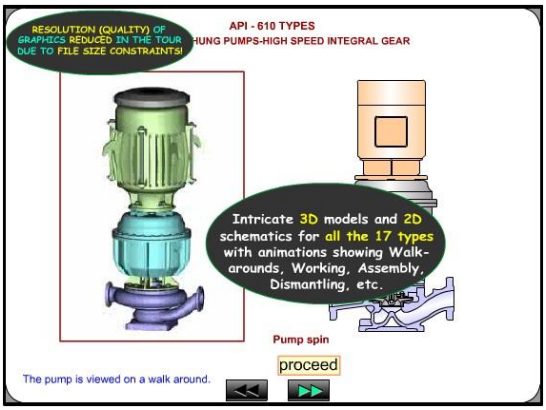
0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Pump Mechanical Seals*** *Definition & Purpose of Mechanical Seals • Components of a Mechanical Seal • Types of Pump Mechanical Seals (Single, Double, Cartridge) • Applications & Importance in Pumps*
0930 – 0945	*Break*
0945 – 1030	***Common Causes of Mechanical Seal Failures*** *Shaft Misalignment & Vibration • Contamination & Particulate Damage • Improper Installation & Assembly • Inadequate Lubrication & Cooling*
1030 – 1130	***Types of Mechanical Seal Failures*** *Abrasive Wear & Seal Face Damage • Thermal Overload & Overheating • Seal Leakage & Chemical Attack • Spring Failure & Loss of Compression*
1130 – 1230	***Effects of Mechanical Seal Failure on Pump Performance*** *Decreased Efficiency & Increased Power Consumption • Leakage & Environmental Risks • Vibration & Mechanical Stress • Impact on System Reliability & Maintenance Costs*
1230 – 1245	*Break*
1245 – 1330	***Diagnostic Methods for Mechanical Seal Failures*** *Visual Inspection & Seal Face Analysis • Vibration Monitoring & Analysis • Temperature & Pressure Monitoring • Fluid Analysis & Contamination Testing*
1330 – 1420	***Preventive Measures to Avoid Seal Failures*** *Proper Installation Procedures • Shaft Alignment & Bearing Support • System Design & Material Selection • Monitoring & Maintenance Best Practices*
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 – 0830	***Advanced Troubleshooting Techniques for Mechanical Seal Failures*** *Understanding Seal Performance Data & Failure Analysis • Identifying Root Causes of Seal Failure • Analyzing Seal Failure Reports & Historical Data • Use of Thermal Imaging & Pressure Profiling*
0830 – 0930	***Case Studies on Pump Mechanical Seal Failures*** *Case Study 1: Abrasive Damage & Seal Face Failure • Case Study 2: Thermal Overload & Seal Damage • Case Study 3: Contamination & Leakage Issues • Case Study 4: Improper Lubrication & Early Seal Failure*
0930 - 0945	*Break*
0945 – 1030	***Material Selection & Design Considerations for Mechanical Seals*** *Choosing the Right Seal Materials for Different Applications • Impact of Environmental Factors on Material Performance • Advantages of Advanced Seal Materials (Ceramics, Carbides, etc.) • Designing Seals for Specific Pumping Conditions*
1030 – 1115	***Corrective Actions & Solutions for Seal Failures*** *Replacing & Upgrading Mechanical Seals • Correcting Shaft Alignment & Pump Issues • Implementing Seal Flush Plans & Cooling Systems • Designing Seals for Extended Service Life*
1115 - 1200	***Role of Seal Support Systems in Preventing Failures*** *Seal Flush Systems & Cooling Liquids • Use of Buffer & Barrier Fluids in Double Seals • Monitoring Seal Support Systems for Performance • Optimizing Seal Support for Harsh Operating Conditions*
1200 - 1215	*Break*
1215 – 1345	***Future Trends in Pump Mechanical Seal Technology*** *Innovations in Seal Materials & Designs • Smart Seals & IoT Integration for Real-Time Monitoring • Advancements in Seal Testing & Diagnostics • Sustainable & Eco-Friendly Seal Solutions*
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*

Simulators (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 Simulator "Centrifugal Pumps and Troubleshooting Guide 3.0".



Centrifugal Pumps and Troubleshooting Guide 3.0

Course Coordinator

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