

COURSE OVERVIEW ME0146(OX1)-3D
Mechanical Seals & Systems (John Crane)

Course Title

Mechanical Seals & Systems (John Crane)

Course Date/Venue

December 08-10, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

ME0146(OX1)-3D

Course Duration/Credits

Three days/1.8 CEUs/18 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 detailed and up-to-date knowledge on the design, application, selection, installation, troubleshooting and maintenance of mechanical seals. It covers the common pump types in the oil & gas industry; centrifugal pump build-up; seal chamber dimensions and working pressures as well as gland packing; mechanical seals; and basic seal principles that includes primary seal, secondary seal and tertiary seal.



The course will also cover the proper assembly and fitting of pusher seals, non-pusher seals and metal bellows seal. It will further cover the hydraulic balance; environment of a mechanical seal; fitting balanced seal; cartridge seals; spiral groove technology; john crane seal coding; seal materials and selection; standards for mechanical seals; and seal failure analysis.

Course Objectives

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

- Apply and gain systematic techniques on the design, application, selection, installation, troubleshooting and maintenance of mechanical seals
- Identify pumps and rotating equipment including gland packing and mechanical seals
- Discuss basic seal principles and illustrate proper assembling and fitting of pusher, non-pusher seals and metal bellows seal
- Describe hydraulic balance and the environment of a mechanical seal
- Explain cartridge seals and spiral groove technology
- Define John Crane seal coding as well as enumerate seal materials and selection
- Review ISO 21049/API 682 standards for mechanical seals and evaluate why seals fail

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 design, application, selection, installation, troubleshooting and maintenance of mechanical seals for mechanical engineers, hydraulics and hydraulics 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. Further, the course is also beneficial for mechanical/rotating/workshop technicians and engineers, control monitoring/reliability/asset integrity inspection engineers and technicians and OE specialists.

Course Fee

US\$ 3,750 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 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 accredited 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 **1.8 CEUs** (Continuing Education Units) or **18 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. However, we have the right to change the course instructor prior to the course date and inform participants accordingly:



Mr. Andrew Ladwig is a **Senior Process & Mechanical 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, Fundamentals of Distillation** for Engineers, **Distillation Operation and Troubleshooting, Advanced Distillation Troubleshooting, Distillation Technology, Vacuum Distillation, Ammonia Storage & Loading Systems, Ammonia Plant Operation, Troubleshooting & Optimization, Ammonia Recovery, Ammonia Plant Safety, Hazard of Ammonia Handling, Storage & Shipping, Operational**

Excellence in Ammonia Plants, Fertilizer Storage Management (Ammonia & Urea), Fertilizer Manufacturing Process Technology, Sulphur Recovery, Phenol Recovery & Extraction, Wax Sweating & Blending, Petrochemical & Fertilizer Plants, Nitrogen Fertilizer Production, Petroleum Industry Process Engineering, Refining Process & Petroleum Products, Refinery Planning & Economics, Safe Refinery Operations, Hydrotreating & Hydro-processing, Separators in Oil & Gas Industry, Gas Testing & Energy Isolations, Gas Liquor Separation, Industrial Liquid Mixing, Wax Bleachers, Extractors, Fractionation, Operation & Control of Distillation, Process of Crude ATM & Vacuum Distillation Unit, Water Purification, Water Transport & Distribution, Steam & Electricity, Flame Arrestors, Coal Processing, Environmental Emission Control, R&D of Wax Blending, Wax Molding/Slabbing, Industrial Drying, Principles, Selection & Design, Certified Process Plant Operations, Control & Troubleshooting, Operator Responsibilities, Storage Tanks Operations & Measurements, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Performance, Efficiency & Optimization, Continuous Improvement & Benchmarking, Process Troubleshooting Techniques, Oil & Gas Operation/Introduction to Surface Facilities, Pressure Vessel Operation, Process Equipment Performance & Troubleshooting, Plant Startup & Shutdown, Startup & Shutdown the Plant While Handling Abnormal Conditions, Flare & Relief System, Process Gas Plant Start-up, Commissioning & Problem Solving, Process Liquid and Process Handling & Measuring Equipment. Further, he is also well-versed in Compressors & Turbines Operation, Maintenance & Troubleshooting, Heat Exchanger Overhaul & Testing Techniques, Balancing of Rotating Machinery (BRM), Pipe Stress Analysis, Valves & Actuators Technology, Inspect & Maintain Safeguarding Vent & Relief System, Certified Inspectors for Vehicle & Equipment, Optimizing Equipment Maintenance & Replacement Decisions, Certified Maintenance Planner (CMP), Certified Planning and Scheduling Professional (AACE-PSP), Tank Design, Construction, Inspection & Maintenance, Material Cataloguing, Specifications, Handling & Storage, Steam Trap Design, Operation, Maintenance & Troubleshooting, Steam Trapping & Control, Column, Pump & Exchangers, Troubleshooting & Design, Rotating Equipment Operation & Troubleshooting, Control & ESD System, Detailed Engineering Drawings, Codes & Standards, Budget Preparation, Allocation & Cost Control, Root Cause Analysis (RCA), Production Optimization, Permit to Work (PTW), Project Engineering, Data Analysis, Process Hazard Analysis (PHA), HAZOP Study, Sampling & Analysis, Training Analysis, Job Analysis Techniques, Storage & Handling of Toxic Chemicals & Hazardous Materials, Hazardous Material Classification & Storage/Disposal, Dangerous Goods, Environmental Management System (EMS), Supply Chain, Purchasing, Procurement, Logistics Management & Transport & Warehousing & Inventory, Risk Monitoring Authorized Gas Tester (AGT), Confined Space Entry (CSE), Personal Protective Equipment (PPE), Fire & Gas, First Aid and Occupational Health & Safety.

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: Sunday, 08th of December 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Pumps & Rotating Equipment Common Pump Types in the Oil & Gas Industry • Centrifugal Pump Build-Up • Seal Chamber Dimensions & Working Pressures
0930 - 0945	Break
0945 – 1030	Gland Packing Brief Overview • Video: Neville & the Problem Pump
1030 – 1130	Why Mechanical Seals? Simple Seal Development
1130 – 1215	Basic Seal Principles Part 1 Primary Seal: Faces Separated by Fluid Film including Materials Used for Mating Rings & Primary Rings • Handling Seals Correctly • Lapping – Why & Practical Demonstration of Lapping & Measurement
1215 – 1230	Break
1230 – 1330	Basic Seal Principles Part 2 Secondary Seal: Seal Area in Contact with Shaft including Materials Used & Surface Finishes • Pusher & Non-Pusher Seals • Tertiary Seal: Methods Used to Prevent Mating Ring Leakage including Various Stationary Face Shapes & their Uses • Pump Assembly Checks – Tolerances to Give Extended Seal Life
1330 – 1420	Hands-on Assembly & Fitting Seals (Pusher & Non-Pusher Seals) Points to Note to Prevent Early Seal Failure
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	End of Day One

Day 2: Monday, 09th of December 2024

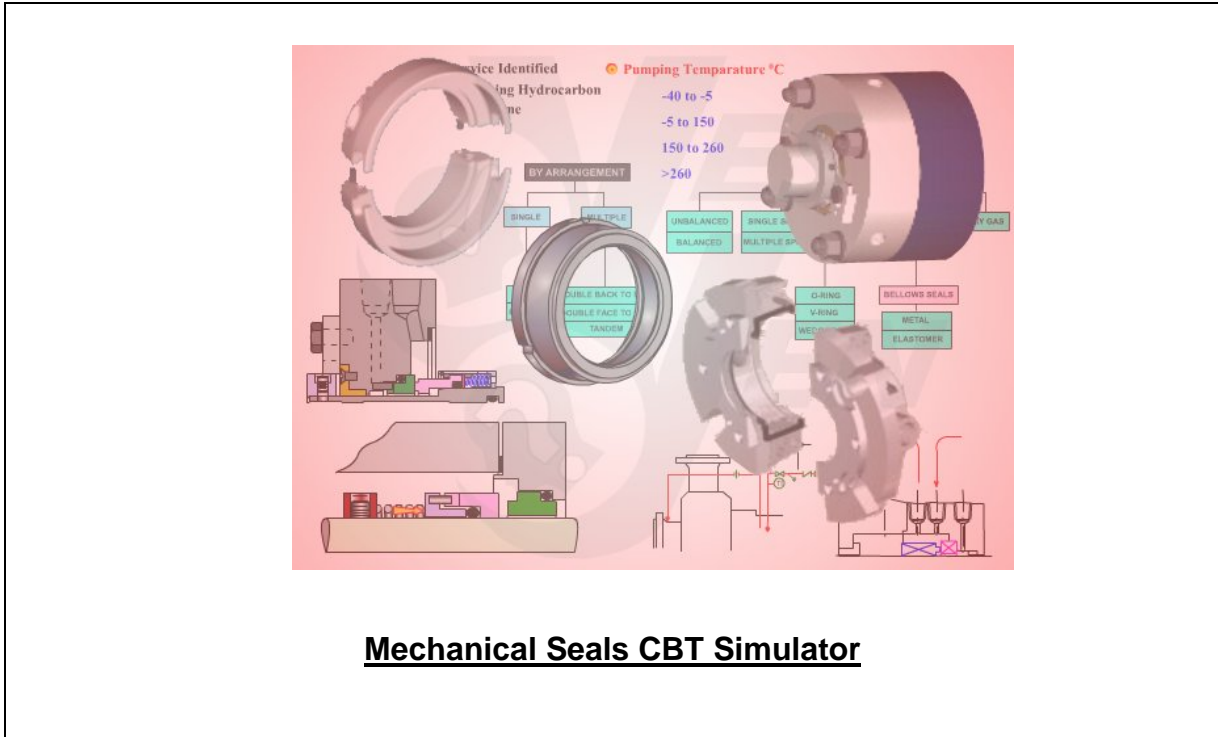
0730 – 0830	Hands-on Fitting Metal Bellows Seal
0830 – 0930	Basic Seal Principles Part 3
0930 – 0945	Break
0945 – 1030	Hydraulic Balance What is it? • Why do we do it? • How do we do it?
1030 – 1115	The Environment of a Mechanical Seal Cooling the Seal Area • Secondary Containment • Multiple Seals: Dual Pressurised & Un-Pressurised • Sealant Systems • API Flush Plans
1115 – 1200	Hands-on Fitting Balanced Seal
1200 – 1215	Break
1215 – 1300	Cartridge Seals Advantages & Fitting • Hands-on Assembly & Fitting Cartridge Seals
1300 – 1420	Basic Seal Principles Part 4
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	End of Day Two

Day 3: Tuesday, 10th of December 2024

0730 – 0830	Spiral Groove Technology Pumps • Compressors
0830 – 0930	John Crane Seal Coding Brief Overview • Material Description Code • What does 35mm T59B/QR1SH/BP mean? • Component & Material Codes
0930 – 0945	Break
0945 – 1100	Seal Materials & Selection Seal Families • Use of Seal Selection Guide • Practical Exercise with Worked Examples
1100 – 1230	ISO 21049/API 682 Standard for Mechanical Seals A Brief Overview • Meeting Emission Legislation
1230 - 1245	Break
1245 – 1345	Why Seals Fail Seal Failure Overview • Seal Failure analysis
1345 - 1400	Case Studies - Hands-on
1400 – 1415	Course Conclusion
1415 – 1430	POST-TEST
1430	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”.



Course Coordinator

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