

COURSE OVERVIEW ME0375

Practical Pump Technology: Selection, Operation & Maintenance

Course Title

Practical Pump Technology: Selection, Operation & Maintenance

Course Date/Venue

September 22-26, 2024/Meeting Plus 8, City Centre Rotana Doha Hotel, Doha, Qatar

Course Reference

ME0375

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 provide an in-depth perspective of centrifugal pump technology in terms of selection, operation, performance, control, maintenance and repair. Topics covered include pump types and terminology, packing, mechanical seals and sealing systems, bearings, couplings and other vital components. In addition, various pump types will be examined as to how they perform in their respective operating systems and advantages/disadvantages of various pump types will be discussed. Centrifugal pump operation, troubleshooting and maintenance will be dealt with in depth.



The course will provide participants with a complete and up-to-date knowledge of pumps and their systems. Further, participants will learn more about selection, operation and maintenance strategies which will assist in increasing pump availability and reliability. Upon the completion of this course, participants will be able to troubleshoot all types of pump problems.

Course Objectives

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

- Apply proper techniques in selection, installation, operation, performance, control, maintenance and troubleshooting of various types of centrifugal pumps used in process industry
- Maintain and troubleshoot all types of pumps including the failure analysis and troubleshooting of packing and mechanical seals
- Properly maintain pump bearings and describe the importance of couplings and alignment
- Implement the maintenance and reliability programs to analyze and minimize pump costs and improve its reliability

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 centrifugal pumps for those who are involved in the selection, installation, operation, performance, control, maintenance and troubleshooting of pumps. This includes plant and maintenance engineers, process engineers, maintenance technical staff, production & operation staff and reliability specialists working in a wide variety of process plant environments such as petrochemical, plastics, fertilizers, power utilities, oil, gas and water utilities.

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\$ 6,000 per Delegate. 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.

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 **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.

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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. 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.

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, 22nd September 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Pump Types & Terminology Pumps • Pump Terminology • Nomenclature and Definitions • Pump Types
0930 – 0945	Break
0945 – 1100	Centrifugal Pumps Centrifugal Pump Theory • Operating Characteristics • Centrifugal Pump Operation • Cavitations and NPSH • Elements of Minimum Continuous Safe Flow (MCSF) • How to Calculate MCSF • Types of Centrifugal Pumps
1100 – 1200	Centrifugal Pump Specification & Selection Selecting a Pump Vendor • Industry Standards • API vs. ANSI Standards • Driver Size Selection
1200 – 1215	Break
1215 – 1420	Centrifugal Pump Specification & Selection (cont'd) Variable Speed Drive Selection • Pump Design Audit/Review
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, 23rd September 2024

0730 – 0930	Centrifugal Pump Maintenance & Repair Parts of Centrifugal Pumps • Bearing Basics • Balancing Criteria • Installation and Startup
0930 – 0945	Break
0945 – 1100	Centrifugal Pump Maintenance & Repair (cont'd) Troubleshooting Centrifugal Pumps • Inspecting Centrifugal Pump Components for Wear • Centrifugal Pump Overhaul • Case Studies
1100 – 1200	Positive Displacement Pumps Reciprocating Pumps • NPSH Requirement for Reciprocating Pumps • Rotary Pump Theory and Operation • PD Pumps in the Operating System • How to Select Progressing Cavity Pumps
1200 – 1215	Break
1215 – 1420	Special Purpose PD Pumps Fluid Metering System Design and Options • PD Metering Pumps, Plunger Pumps, Diaphragm Pumps, Rotary Metering Pumps • Controlling Pulsation and Surge
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, 24th September 2024

0730 – 0930	Selection of PD Pumps Selecting Reciprocating (Power) Pumps • Selecting Rotary Gear Pumps • Selecting Screw Pumps • Handling Abrasives and Corrosives with PD Pumps
0930 – 0945	Break
0945 – 1100	Positive Displacement Pump Operation, Maintenance & Repair Operation • Reciprocating (Power) Pump Liquid End Maintenance • Reciprocating Pump Valve Repair
1100 – 1200	Positive Displacement Pump Operation, Maintenance & Repair (cont'd) Power End Maintenance • Stuffing Box Design and Upgrading • Case Studies
1200 – 1215	Break
1215 – 1420	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
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, 25th September 2024

0730 – 0930	Mechanical Seal Systems Dual Sealing Systems and Flushing Plans • API 682 Reference Guide • Gas Barrier Seal Technology • Tough Applications: Slurries, Pulp and Paper, Abrasives, Crystallizing Fluids, High Temperature Fluids, Autoclaves, Mixers and Reactors • Mechanical Seal Selection Strategies
0930 – 0945	Break
0945 – 1100	Mechanical Seal Failure Analysis & Troubleshooting Failure Analysis • Mechanical Seal Troubleshooting • Determining Leakage Rates • Ascertaining Seal Stability • Troubleshooting Hydraulic Instability
1100 – 1200	Mechanical Seal Maintenance & Repair Bellows Seal Repair • Cartridge Seal Installation and Management • Seal Face Care • Seal Consolidation and Standardization Programs
1200 – 1215	Break
1215 – 1420	Bearing Care & Maintenance Basic Concepts of Bearings • Bearing Classifications • Bearing Care and Maintenance • Lubrication Management
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: Thursday, 26th September 2024

0730 – 0930	Couplings & Alignment <i>Purpose of Couplings • Types of Couplings • Alignment Methods • Foundation and Grouting Guidelines • Inlet Piping Configuration and Piping Installation Guidelines</i>
0930 – 0945	Break
0945 – 1100	Pump Maintenance & Reliability <i>A Systems Approach to Pump Reliability • Predictive/Preventive</i>
1100 – 1200	Pump Maintenance & Reliability (cont'd) <i>Addressing Pump Vibrations - Mechanical & Hydraulic • Fifty Upgrading Opportunities for Centrifugal Pumps</i>
1200 – 1215	Break
1215 – 1345	Reliability Programs <i>Building Availability Data • Availability and Reliability Goals • How to Analyze Pump Costs • How to Initiate a Pump Reliability Improvement Program</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 simulator “Centrifugal Pumps and Troubleshooting Guide 3.0”.

Centrifugal Pumps and Troubleshooting Guide 3.0

Course Coordinator

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