

COURSE OVERVIEW ME0027 Centrifugal Pump Selection, Construction, Operation, Maintenance, Repair & Troubleshooting

Course Title

Centrifugal Pump Selection, Construction, Operation, Maintenance, Repair & Troubleshooting

Course Date/Venue

January 28-February 01, 2024/Zumrut Meeting Room, Divan Istanbul Sisli, Istanbul, Turkey

Course Reference

ME0027

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.

This course is designed to provide participants a detailed and up-to-date overview of centrifugal pump selection, construction, operation, maintenance, repair and troubleshooting. It covers the pump types and terminology; the operating characteristics of centrifugal pumps; the centrifugal pump specification and selection; the pump and system hydraulics; the pump construction; the packing and mechanical seals; and the mechanical seal systems.

At the completion of the course, participants will be able to apply proper mechanical seal failure analysis and troubleshooting: mechanical seal maintenance and repair; bearing care and maintenance; couplings and alignment; and centrifugal pump maintenance and repair.

The course will also cover the pump reliability including the systematic approach, predictive/preventive, addressing pump vibrations, building availability data, analyzing pump costs and initiating pump reliability improvement program.



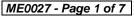




















Course Objectives

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

- Apply and gain an in-depth knowledge on the selection, construction, operation, maintenance, repair and troubleshooting of centrifugal pumps
- Discuss the different types of pumps, terminology, specifications and standards
- Identify the pump and system hydraulics and classify the hydraulic components in pump construction
- Properly maintain bearings and describe the importance of couplings, mechanical seals. alignment and various maintenance and reliability programs to analyze and minimize pump costs and improve its reliability

Who Should Attend

This course provides an overview of all significant aspects and considerations of centrifugal pump for those who are involved in the selection, construction, operation, maintenance, repair and troubleshooting. Plant and maintenance engineers, process engineers, maintenance personnel, supervisors and reliability specialists working in a wide variety of process plant environments such as petrochemical, plastics, power utilities, oil, gas, refineries, water utilities and wastewater treatment facilities will definitely benefit from the practical approach of this course. Further, the course is highly valuable to senior maintenance technical staff involved with pump operation, maintenance troubleshooting.

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 + VAT. This rate includes Participants Pack (Folder, Manual, Handouts, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

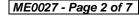




















Course Certificate(s)

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:-



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.



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.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

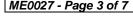




















Course Instructor(s)

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. Saleh Aich is a Senior Mechanical & Maintenance Engineer with over 20 years of extensive experience within the Oil & Gas, Petrochemical and Refining industries. His expertise widely covers in the areas of Combustion Techniques, Combustion System Performance, Pump Operation & Maintenance, Compressor Maintenance & Troubleshooting, Gas Turbine Control & Protection Systems, Valve Troubleshooting &

Maintenance, Vibration Analysis, Oil Analysis, Dry Gas Seals, Packing & Mechanical Seals, Seal Support Systems, Mechanical Seal Failure Analysis & Troubleshooting, Seal Maintenance & Repair, Bearing Care & Maintenance, Couplings & Alignment, Alignment Methods, Troubleshooting Piping & Pipe Support Systems, Heat Exchangers Maintenance & Inspection, Pressure Vessel Design, Fabrication & Testing, Burners, Blowers, Piston & Plunger Gearboxes, Fin-Fans, Separators, Expansion Drums, Filters, Molecule Sieve, Tanks, Fittings, Root Cause Failure Analysis (RCFA), Computerized Maintenance Management System (CMMS), Maintenance Management, Planning & Scheduling Work Management, Parts & Inventory Management, Turnaround & Shutdowns, Condition Monitoring, Regeneration Unit, NGL & Condensate, Furnace Operation & Troubleshooting, Performance Measure & Indicators, Total Productive Maintenance (TPM), Preventive & Predictive Maintenance Analysis, Rotating & Static Equipment, Machinery & Equipment Failure Analysis, Gas & Steam Turbines, Boilers, Coolers, Diesel & Gas Engines, Heaters, Separators, Storage Tanks, H₂S and ISO 9001:2008 Internal Quality Management System.

During his career life, Mr. Saleh has gained his practical and field experience through his various significant positions and dedication as the Maintenance Instructor, Mechanical Supervisor, Maintenance Engineer, Mechanical Engineer, Contract Engineer, Planning Engineer and Senior Instructor/Lecturer for various multi-national companies such as the ADNOC Gas Processing (GASCO), ConocoPhillips and Syrian Gas Company.

Mr. Saleh has a Bachelor degree in Mechanical Engineering. Further, he is a Certified Instructor/Trainer and has acquired various certifications and has further delivered numerous training, courses, workshops, seminars and conferences worldwide.























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:

Sunday, 28th of January 2024 Dav 1:

Day I.	Sunday, 20 Or January 2024
0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
0020 0020	Pump Types and Terminology
0830 – 0930	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
	Centrifugal Pump Specification and Selection
1100 - 1200	Selecting a Pump Vendor • Industry Standards • API vs. ANSI Standards •
	Driver Size Selection
1200 – 1215	Break
1215 - 1420	Centrifugal Pump Specification and Selection (cont'd)
	Variable Speed Drive Selection • Pump Design Audit/Review
1420 - 1430	Recap
1430	Lunch & End of Day One

Monday, 29th of January 2024

Day 2:	Monday, 29 th of January 2024
	Pump and System Hydraulics
0730 - 0930	Elements of Required Head • Calculation of System-Head Curves • Pump
	Performance Curves • Affinity Law
0930 - 0945	Break
	Pump and System Hydraulics (cont'd)
0945 - 1100	Specific Speed Concept • Rating Curves • Limitation of Suction Conditions •
	Effect of Viscosity on Pump Performance
	Pump and System Hydraulics (cont'd)
1100 – 1200	Operation at Off-Design Conditions • Internal Recirculation in Impeller •
	Pumps and Energy Conservation
1200 – 1215	Break
	Pump Construction
	Basic Configurations and Classification • Hydraulic Components (Impellers,
1215 – 1420	Collectors, Wearing Rings, Axial Thrust Balancing) • Pressure Containment
	(Casings, Shaft Seals) • Rotor Support (Shafts, Bearings, Bearing Housings) •
	Turning Gear • Jacking Oil System • Lubrication System • Governing Valves
1420 – 1430	Recap
1430	Lunch & End of Day Two

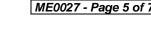




















Tuesday, 30th of January 2024 Dav 3:

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Pump Construction (cont'd)
Emergency Stop Valves • Reheat Emergency Stop Valves • Intercept Valves •
Feedwater Heating • Open or Direct-Contact Feedwater Heaters • Closed-Type
Feedwater Heater with Drains Cascaded Backwards • Efficiency and Heat Rate of
Power Plants
Break
Pump Construction (cont'd)
Supercritical Plants • Maintenance of Steam Power Plants • Co-Generation •
Types of Co-Generation • Topping and Bottoming Cycles • Arrangements of
Co-Generation Plants • Economics of Co-Generation
Packing and 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
Break
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
Recap
Lunch & End of Day Three

Day 4: Wednesday, 31st of January 2024

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0730 – 0930	Mechanical Seal Failure Analysis and Troubleshooting
	Failure Analysis • Mechanical Seal Troubleshooting • Determining Leakage Rates
	• Ascertaining Seal Stability • Troubleshooting Hydraulic Instability
0930 - 0945	Break
0945 - 1100	Mechanical Seal Maintenance and Repair
	Bellows Seal Repair • Cartridge Seal Installation and Management • Seal Face Care
	• Seal Consolidation and Standardization Programs
1100 – 1200	Bearing Care and Maintenance
	Basic Concepts of Bearings • Bearing Classifications • Bearing Care and
	Maintenance • Lubrication Management
1200 – 1215	Break
1215 – 1330	Couplings and Alignment
	Purpose of Couplings • Types of Couplings • Alignment Methods • Foundation
	and Grouting Guidelines • Inlet Piping Configuration and Piping Installation
	Guidelines
1330 – 1420	Centrifugal Pump Maintenance and Repair
	Parts of Centrifugal Pumps • Bearing Basics • Balancing Criteria • Installation
	and Startup
1420 – 1430	Recap
1430	Lunch & End of Day Four

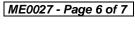


















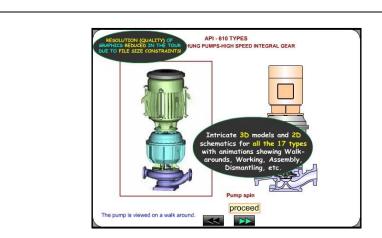


Day 5: I nursgay. 01° of February 2024	Day 5:	Thursday, 01 st of February 2024
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	Centrifugal Pump Maintenance and Repair (cont'd)
0730 - 0930	Troubleshooting Centrifugal Pumps • Inspecting Centrifugal Pump Components for
	Wear • Centrifugal Pump Overhaul • Case Studies
0930 - 0945	Break
0945 - 1100	Pump Reliability
	A Systems Approach to Pump Reliability • Predictive/Preventive
1100 – 1200	Pump Reliability (cont'd)
	Addressing Pump Vibrations - Mechanical & Hydraulic • Fifty Upgrading
	Opportunities for Centrifugal Pumps
1200 - 1215	Break
1215 - 1345	Reliability Programs
	Building Availability Data • Availability and Reliability Goals • How to Analyze
	Pump Costs • How to Initiate a Pump Reliability Improvement Program
1345 - 1400	Course Conclusion
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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