COURSE OVERVIEW ME0562-3D
Pump Selection, Installation, Performance & Control

Course Title
Pump Selection, Installation, Performance & Control

Course Date/Venue
July 26-28, 2020/Boardroom 3, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
ME0562-3D

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 simulator.

This course is designed to provide delegates with a detailed and up-to-date overview on the proper selection, installation, performance and control of pumps. It covers pump construction covering centrifugal pump, pump curves, characteristics, most common end-suction and in-line pump types, impeller and casing types, single-stage and multistage pumps, long coupled and close-coupled pumps as well as various types of pumps and mechanical shaft seals including its components, functions and factors affecting the seal performance.

The course will enable the participants to describe motors, liquids and materials and employ proper installation of pumps as well as analyze pump performance, system characteristics and pumps connected in series and parallel. Participants will be able to adjust pump performance and describe speed controlled pump solutions for constant pressure and temperature control, constant differential pressure in a circulating system and flow compensated differential pressure control.

Further, the advantages of speed control and pumps with integral frequency converter as well as its basic function, characteristics, components and special conditions will be discussed and lifecycle costs equation and calculation will be illustrated during the course.

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, installation, performance and control of various types of industrial pumps
- Recognize pump construction covering centrifugal pump, pump curves, characteristics, most common end-suction and in-line pump types, impeller and casing types, single-stage and multistage pumps as well as long coupled and close-coupled pumps
- Identify the various types of pumps and mechanical shaft seals including its components, functions and factors affecting the seal performance
- Describe motors, liquids and materials as well as employ proper installation of pumps
- Analyze pump performance, system characteristics and pumps connected in series and parallel
- Adjust pump performance and describe speed controlled pump solutions for constant pressure and temperature control, constant differential pressure in a circulating system and flow compensated differential pressure control
- Explain the advantages of speed control and pumps with integral frequency converter
- Enumerate the basic function, characteristics, components and special conditions of frequency converter
- Illustrate life cycle costs equation and calculation

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 in the selection, installation, performance and control of pumps for 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, water utilities, wastewater etc. The course is also highly valuable to senior maintenance technical staff who are involved with pumps, their operation and their maintenance.

Course Fee

US$ 3,750 per Delegate + **5% 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.

Certificate Accreditations
Certificates are accredited by the following international accreditation organizations:-

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association 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 1-2013 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 1-2013 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 Association 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.

- 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.

Training Methodology
This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Workshops & Work Presentations
20% Case Studies & Practical Exercises
30% Videos, Software & Simulators

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

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. Dimitry Rovas, CEng, MSc, PMI-PMP, is a **Senior Mechanical Engineer** with extensive industrial experience in **Oil**, **Gas**, **Power** and **Utilities** industries. His expertise includes **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps & Troubleshooting**, **Reciprocating & Centrifugal Compressors**, **Compressor** Control & Protection, **Gas & Steam Turbines**, **Turbine** Operations, **Gas Turbine** Technology, **Valves**, **Bearings & Lubrication**, Advanced **Machinery Dynamics**, **Rubber Compounding**, **Elastomers**, **Thermoplastic**, **Industrial Rubber Products**, **Rubber** Manufacturing Systems, **Heat Transfer**, **Vulcanization Methods**, **Process Plant Shutdown & Turnaround**, **Maintenance Optimization & Best Practices**, **Maintenance Auditing & Benchmarking**, **Reliability** Management, **Rotating Equipment**, **Energy Conservation**, **Energy Loss Management** in Electricity Distribution Systems, **Energy Saving**, **Thermal Power Plant** Management, **Thermal Power Plant** Operation & Maintenance, **Heat Transfer**, **Machine Design**, **Fluid Mechanics**, **Heating & Cooling Systems**, **Heat Insulation Systems**, **Heat Exchanger & Cooling Towers**, **Mechanical Erection**, **Heavy Rotating Equipment**, Material Unloading & Storage, Commissioning & Start-Up. Further, he is also well-versed in MS project & AutoCAD, EPC Power Plant, Power Generation, Combined Cycle Powerplant, Leadership & Mentoring, Project Management, Strategic Planning/Analysis, Construction Management, Team Formation, Relationship Building, Communication, Reporting and Six Sigma. He is currently the **Project Manager** wherein he is managing, directing and controlling all activities and functions associated with the domestic heating/cooling facilities projects.

During his life career, Mr. Rovas has gained his practical and field experience through his various significant positions and dedication as the **EPC Project Manager**, **Field Engineer**, **Preventive Maintenance Engineer**, **Researcher**, **Instructor/Trainer**, **Telecom Consultant** and **Consultant** from various companies such as the Podaras Engineering Studies, Metka and Diadikasia, S.A., **Hellenic Petroleum Oil Refinery** and COSMOTE.

Mr. Rovas has **Master** degrees in **Mechanical Engineering** and **Energy Production & Management** from the **National Technical University of Athens**. Further, he is a **Certified Instructor/Trainer**, a **Certified Project Management Professional** (**PMP**), **Certified Six Sigma Black Belt** and a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**). Moreover, he is an active member of Project Management Institute (**PMI**), Technical Chamber of Greece and Body of Certified Energy Auditors. He has further received various recognition and awards and delivered numerous trainings, seminars, courses, workshops 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, 26th of July 2020***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 - 0900	***Pump Construction*** *The Centrifugal Pump ● Pump Curves ● Characteristics of the Centrifugal Pump ● Most Common End-Suction and In-Line Pump Types ● Impeller Types (Axial Forces) • Casing Types (Radial Forces) ● Single-Stage Pumps ● Multistage Pumps ● Long-Coupled and Close-Coupled Pumps*
0900 - 0930	***Types of Pumps*** *Standard Pumps ● Split-Case Pumps ● Hermetically Sealed Pumps ● Sanitary Pumps ● Wastewater Pumps ● Immersible Pumps ● Borehole Pumps ● Positive Displacement Pumps*
0930 - 0945	*Break*
0945 - 1015	***Mechanical Shaft Seals*** *The Mechanical Shaft Seal's Components and Function ● Balanced and Unbalanced Shaft Seals ● Types of Mechanical Shaft Seals ● Seal Face Material Combinations ● Factors Affecting the Seal Performance*
1015 - 1145	***Motors*** *Standards ● Motor Start-Up ● Voltage Supply ● Frequency Converter ● Motor Protection*
1145 - 1200	*Break*
1200 - 1230	***Liquids*** *Viscous Liquids ● Non-Newtonian Liquids ● The Impact of Viscous Liquids on the Performance of a Centrifugal Pump ● Selecting the Right Pump for a Liquid with Antifreeze ● Calculation Example ● Computer Aided Pump Selection for Dense and Viscous Liquids*
1230 - 1420	***Materials*** *What is Corrosion? ● Types of Corrosion ● Material and Metal Alloys ● Ceramics ● Plastics ● Rubber ● Coatings*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 27th of July 2020***

0730 - 0815	***Pump Installation*** *New Installation ● Existing Installation-Replacement ● Pipe Flow for Single-Pump Installation ● Limitation of Noise and Vibrations ● Sound Level (L)*
0815 - 0900	***Pump Performance*** *Hydraulic Terms ● Electrical Terms ● Liquid Properties*
0900 - 0915	*Break*
0915 - 1000	***System Characteristics*** *Single Resistances ● Closed and Open Systems*
1000 - 1215	***Pumps Connected in Series and Parallel*** *Pumps in Parallel ● Pumps Connected in Series*

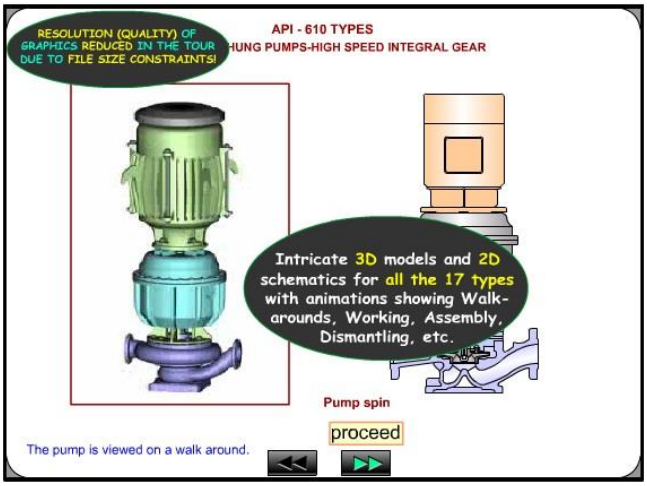
1215 - 1230	Break
1230 - 1300	***Adjusting Pump Performance*** Throttle Control ● Bypass Control ● Modifying Impeller Diameter ● Speed Control ● Comparison of Adjustment Methods • Overall Efficiency of the Pump System ● Example: Relative Power Consumption when the Flow is Reduced by 20%
1300 - 1330	***Speed-Controlled Pump Solutions*** Constant Pressure Control ● Constant Temperature Control • Constant Differential Pressure in a Circulating System ● Flow-Compensated Differential Pressure Control
1330 - 1420	***Advantages of Speed Control***
1420 – 1430	***Recap***
1430	Lunch & End of Day Two

Day 3: ***Tuesday, 28th of July 2020***

0730 - 0915	***Advantages of Pumps with Integral Frequency Converter*** Performance Curves of Speed-Controlled Pumps ● Speed-Controlled Pumps in Different Systems
0915 - 0930	Break
0930 - 1000	***Frequency Converter*** Basic Function and Characteristics ● Components of the Frequency Converter ● Special Conditions Regarding Frequency Converters
1000 - 1300	***Life Cycle Cost Equation*** Initial Costs & Purchase Price (Cic) ● Installation and Commissioning Costs (Cin) ● Energy Costs (Ce) ● Operating Costs(Co) ● Environmental Costs (Cenv) • ● Maintenance and Repair Costs (Cm) ● Downtime Costs, Loss of Production (Cs) ● Decommissioning and Disposal Costs (co)
1300 - 1315	Break
1315 - 1345	***Life Cycle Costs Calculation-An Example***
1345 - 1400	***Course Conclusion***
1400 - 1415	***POST-TEST***
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

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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