



COURSE OVERVIEW ME0080 Hydraulic System Operation, Maintenance & Troubleshooting

Course Title

Hydraulic System Operation, Maintenance & Troubleshooting

Course Date/Venue

Session 1: May 18-22, 2025/Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA

Session 2: November 02-06, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE



Course Reference

ME0080



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.



Whatever your hydraulic applications, you can increase your knowledge of the fundamentals, improve your maintenance programs and become an excellent troubleshooter of problems in this area by attending this information packed course. Cutaways of all major components are brought to the sessions to visually demonstrate the components' construction and operation. Developing an understanding of "How" it works leads to an understanding of how and why it fails. Multimedia views of the equipment are given to give you as realistic a view of hydraulic systems as possible.



The Hydraulics course is a comprehensive, highly practical and interactive five-day course. You will have an opportunity to discuss Hydraulic Systems construction, design-applications, operations, maintenance and management issues and be provided with the most up-to-date information and Best Practice in dealing with the subject. Towards the end of the course, you will have developed the skills and ability to recognise and solve hydraulic problems in a structured and confident manner.





Course Objectives

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

- Operate, maintain and troubleshoot hydraulic panel units in a professional manner
- Work with hydraulic components and identify how hydraulic components function in a hydraulic circuit
- Discuss pressure and flow and define the limits of pressure measurement
- Determine hydraulic fluids, hydraulic pipe and hoses, hydraulic cylinders, hydraulic accessories, hydraulic pumps and hydraulic motors
- Read hydraulic schematics and work safely with hydraulic components and systems
- Troubleshoot hydraulics problems and apply a simple preventative maintenance program to lengthen hydraulic components life
- Make simple repairs to hydraulic systems and identify hydraulic systems components
- Develop an understanding of the essential hydraulic terms and their key applications and recognise the impact hydraulic fluids have on components
- Discuss the correct operation, control sequences and procedures for the safe operation of various simple hydraulic system
- Identify the control valves, direction control valves, pressure control valves and flow control valves
- Recognize electro-hydraulic systems and hydrostatic transmission
- Initiate an effective inspection and maintenance program and minimise forced outages
- Prevent serious damage to hydraulic equipment and outline the latest technologies available for electro-hydraulic systems
- Employ proper application of hydraulic circuits and troubleshooting of hydraulic systems

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 covers systematic techniques in the operation, maintenance and troubleshooting of hydraulic system for operation, maintenance, inspection & repair managers, supervisors & engineers, plant engineers, plant operations and maintenance personnel, mechanical engineers, design engineers, consulting engineers and other technical staff.




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.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.





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. Manuel Dalas MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **25 years** of industrial experience in **Oil, Gas, Refinery, Petrochemical, Power and Nuclear** industries. His wide expertise includes **Pipe Stress Analysis** using **CAESAR II, CAESAR II Application, Piping Dynamic, Static & Other Special Analysis** using **CAESAR II, Expansion Joints Design & Analysis, Impact Load Analysis, Piping Systems, Piping Codes** Used in **CAESAR II, RFP Pipe Maintenance & Repair, Relief Valve Analysis, Safety Relief Valve, Tanks & Tank Farms, Seismic Loads, Tank Shell, Tank Failure, Vacuum Tanks, Tank Design & Engineering, Tank**

Contractions, Material Cataloguing, Maintenance Planning & Scheduling, Reliability Centered Maintenance (RCM), Reliability Maintenance, Condition Based Maintenance & Condition Monitoring, Asset & Risk Management, Vibration Condition Monitoring & Diagnostics of Machines, **Vibration & Predictive Maintenance, Reliability Improvement & Vibration Analysis** for Rotating Machinery, **Effective Maintenance Shutdown & Turnaround Management, Engineering Codes & Standards, Rotating Equipment Maintenance, Mechanical Troubleshooting, Static Mechanical Equipment Maintenance, Machinery Failure Analysis, Machinery Diagnostics & Root Cause Failure Analysis, Plant Reliability & Maintenance Strategies, Boiler Operation & Water Treatment, Pumps Maintenance & Troubleshooting, Fans, Blowers & Compressors, Process Control Valves, Piping Systems & Process Equipment, Gas Turbines & Compressors Troubleshooting, Advanced Valve Technology, Pressure Vessel Design & Analysis, Steam & Gas Turbine, High Pressure Boiler Operation, Centrifugal & Positive Displacement Pump Technology Troubleshooting & Maintenance, Rotating Machinery Best Practices, PD Compressor & Gas Engine Operation & Troubleshooting, Hydraulic Tools & Fitting, Mass & Material Balance, Water Distribution & Pump Station, Tank Farm & Tank Terminal Safety & Integrity Management, Process Piping Design, Construction & Mechanical Integrity, Stack & Noise Monitoring, HVAC & Refrigeration Systems, BPV Code, Section VIII, Division 2, Facility Planning & Energy Management, Hoist - Remote & Basic Rigging & Slings, Mobile Equipment Operation & Inspection, Heat Exchanger, PRV & POPRV/PORV, Bearing & Lubrication, Voith Coupling Overhaul, Pump & Valve Technology, Lubrication Inspection, Process Plant Optimization, Rehabilitation, Revamping & Debottlenecking, Engineering Problem Solving and Process Plant Performance & Efficiency. Currently, he is the **Technical Consultant** of the **Association of Local Authorities of Greater Thessaloniki** where he is in charge of the mechanical engineering services for piping, pressure vessels fabrications and ironwork.**

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager, Project Engineer, Safety Engineer, Deputy Officer, Instructor, Construction Manager, Construction Engineer, Consultant Engineer, Mechanical Engineer and CAESAR II Application Consultant** for numerous multi-billion companies including the **Biological Recycling Unit** and the **Department of Supplies of Greece, Alpha Bank Group, EMKE S.A, ASTE LLC and Polytechnic College of Evosmos.**

Mr. Dalas has a **Master's degree in Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor's degree in Mechanical Engineering** from the **Mechanical Engineering Technical University of Greece** along with a **Diploma in Management & Production Engineering** from the **Technical University of Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management (ILM)**, a **Certified Project Manager Professional (PMI-PMP)**, a **Certified Instructor/Trainer**, a **Certified Energy Auditor for Buildings, Heating & Climate Systems**, a **Member of the Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops 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

Accommodation

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

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 Hydraulics Origin of Hydraulics & Classification • Force • Work • Power • Energy • Mass • Weight • Torque • Density • Specific Gravity • Specific Weight
0930 – 0945	Break
0945 – 1100	Pressure & Flow Definition & Units of Pressure Measurement • Pascal’s Law & Applications • Pressure-Force Relationship • Fluid flow/ Discharge • Steady & Unsteady Flows • Bernoulli’s Principle • Laminar & Turbulent Flows • Pressure- Flow Relationship
1100 – 1215	Hydraulic Fluids Cavitation • Aeration • Locations of Filters & Strainers • Filter Terminology • Measurement of Contamination Levels
1215 – 1230	Break
1230 – 1330	Hydraulic Pipes & Hoses Major Components of Hydraulic Lines • Hydraulic Hoses • Metal Tubes & Pipes • Designing Hydraulic Lines • Hose Routing & Installations
1330 – 1420	Hydraulic Cylinders Classification (Single & Double Acting) • Construction of Cylinders • Cylinder Mounting • Seals • Cylinder Design Checklist • Common Cylinder problems
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 – 0930	Hydraulic Accessories Reservoirs (Pressure & Non-Pressure Types) • Accumulators • Heat Exchangers • Hydraulic Actuators
0930 – 0945	Break
0945 – 1100	Hydraulic Pumps Principle of Pump Operation • Classification (Positive & Non-Positive Displacement) • Gear Pump • Vane Pump (Variable Volume & Pressure Compensated Variable Volume Pumps)
1100 – 1215	Hydraulic Pumps (cont'd) Piston Pump (Axial/Inline, Bent Axis, Radial, Variable Volume, Pressure Compensated & Over Center Axial Pumps) • Gerotor Pump • Rating of Pumps • Pressure, Flow & Efficiencies of Pumps
1215 – 1230	Break
1230 – 1420	Hydraulic Motors Principle of Motor Operation • Classification (Rotating & Piston Type) • Gear Motors • Vane Motors • Piston Motors • Difference Between Hydraulic Motors & Hydraulic Pumps • Specification of Hydraulic Motors • Efficiency of Hydraulic Motors • Motor Slippage
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

0730 – 0930	Control Valves Purpose • Classification (Direction, Pressure & Flow control valves) • Valve Symbols
0930 – 0945	Break
0945 – 1100	Direction Control Valves Poppet Valve • Check Valve • Spool Valve (Rotary & Sliding Valves) • Direct & Indirect Operated Valves • Valve Actuation Methods (Manual, Electrical, Pilot, Pneumatic, Electro-Hydraulic & Electro- Pneumatic)
1100 – 1215	Direction Control Valves (cont'd) 2,3- & 4-Way Direction Control Valves • Positive & Negative Overlapping • Center Conditions (Open Center, Closed Center, Tandem Center & Float Center Valves)
1215 – 1230	Break
1230 – 1420	Pressure Control Valves Relief Valves (Pressure Regulating & Emergency Relief) • Meaning of Surge Pressure • Sequence Valves • Counterbalance Valves • Pressure Reducing Valves • Unloading Valves
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

0730 – 0930	Flow Control Valves Classification (Non-Pressure Compensated & Pressure Compensated) • Location of Flow Control Valve (Meter-in, Meter-out & Bleed-off Circuits)
0930 – 0945	Break
0945 – 1100	Electro-Hydraulic Systems Proportional Solenoid • Proportional Valves (Direction Control, Flow Control & Pressure Control Valves)
1100 – 1215	Electro-Hydraulic Systems (cont'd) Servo Valves (Direction & Pressure Servo Valves, Single Stage & Multi Stage Servo Valves) • Use of Transducers in Hydraulic Systems
1215 – 1230	Break
1230 – 1420	Hydrostatic Transmission Overview of Hydrostatic Transmission • Configurations of Hydrostatic Transmission • Control of Hydrostatic Transmission • Applications of Hydrostatic Transmission
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

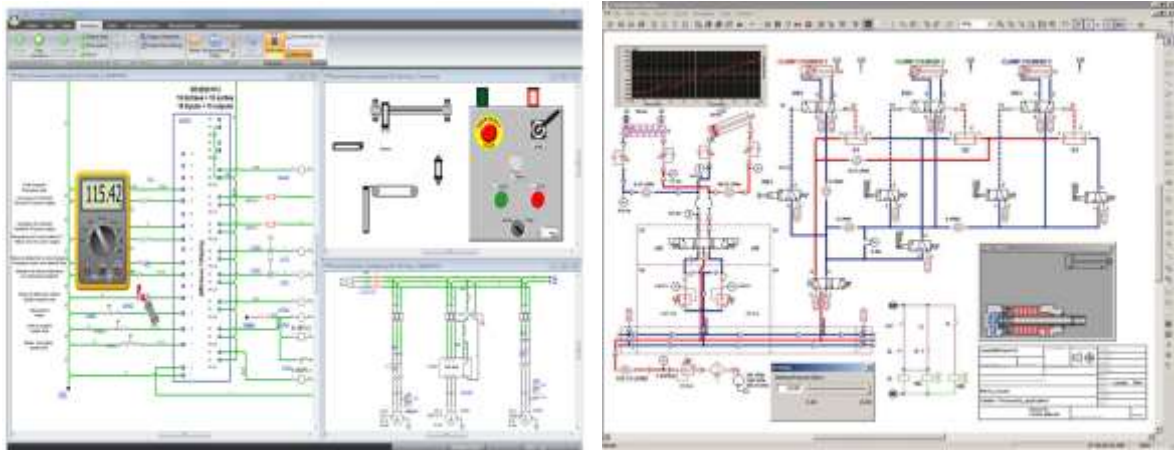
Day 5

0730 – 0930	Application of Hydraulic Circuits Symbols of Hydraulic Components • Need for Check Valve in Hydraulic Circuits • Regenerative Circuit
0930 – 0945	Break
0945 – 1100	Application of Hydraulic Circuits (cont'd) Flow Equalizer • Counterbalance Circuit • Pre-Fill & Compression Relief Circuit
1100 – 1215	Application of Hydraulic Circuits (cont'd) Decompression Circuit • Circuits of Open Center, Closed Center, Tandem Center & Indirect Control • Hydraulic Circuits of Various Machines
1215 – 1230	Break
1230 – 1345	Troubleshooting Hydraulic Systems Flow Chart Analysis of Hydraulic Circuits • Maintenance
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

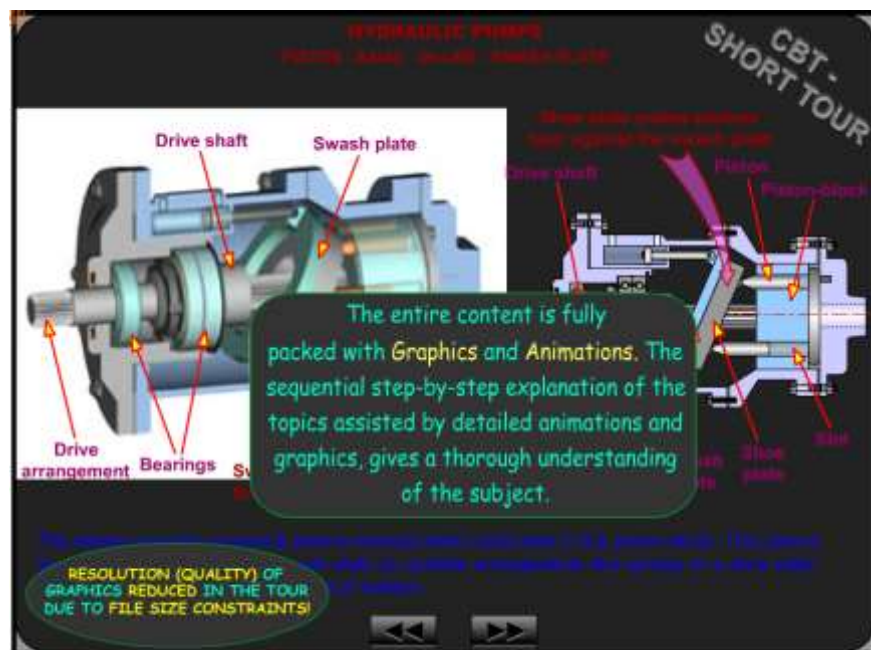


Simulator (Hands-on Practical Sessions)

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 the “Automation Studio (Hydraulic & Pneumatic Software)” and “Industrial Hydraulic Software”.



“Automation Studio (Hydraulic & Pneumatic Software)”



Industrial Hydraulics Software

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org