



COURSE OVERVIEW ME0397
Practical Pump & Valve Technology

Selection, Operation, Control, Maintenance & Troubleshooting

Course Title

Practical Pump & Valve Technology: *Selection, Operation, Control, Maintenance & Troubleshooting*



Course Date/Venue

February 01-05, 2026/The KooH I Noor Meeting Room, The H Hotel, Sheikh Zayed Road Trade Centre, Dubai, UAE

Course Reference

ME0397



Course Duration/Credits

Five days/3.0 CEUs/3.0 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Practical sessions will be organized during the course using our state-of-the-art simulators and our cutting-edge Virtual Reality (VR) and Augmented Reality (AR) technologies to provide participants with a highly immersive and interactive learning experience.

The aim of this course is to provide delegates with a detailed and up-to-date overview of the operating performance of valves and pumps commonly employed in process plant and the manner in which they are chosen to provide the optimum configuration.



This course will concentrate on the fundamental aspects and operating principles and practice of pumps and control valves and will address the operating problems which are often experienced by plant personnel. This course will deliver this important engineering discipline whilst reducing to the absolute minimum the level of mathematics required.



On completion of this course, participants will be able to acquire the practical engineering knowledge to enable them not only to choose the correct device or combination of devices for a particular application but also to be in a position to resolve common operating problems associated with this topic. In addition, this course addresses the importance of safety in the selection and operation of these devices.



Course Objectives

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

- Select, operate, control, maintain and troubleshoot pumps and valves used in process industry
- Solve operating problems of pumps and valves which are often experienced by plant personnel
- Apply practical engineering knowledge that is essential not only to choose the correct device or combination of devices for a particular application but also to troubleshoot such devices correctly
- Recognize design issues and installation guidance for optimum performance of pumps and valves
- Employ proper techniques in operation and maintenance of pump and valves
- Implement proven control strategies for optimum pump and valve performance including analogue and digital controls signals

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 pump and valve for project engineers, process engineers and plant engineers in the oil, chemical and other process industries, who require a wider and deeper appreciation of the operating characteristics and the procedure required for the selection of pumps and valves. No prior knowledge of the topic is required.

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
- 10% Practical Workshops & Work Presentations
- 10% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos
- 30% VR/AR Hands-on Practical Application


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

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

Haward’s certificates are accredited by the following international accreditation organizations: -

- 

British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward’s certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 

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

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. Adel Abdallah is a **Senior Process & Mechanical Engineer** with over **20 years** of extensive experience within the **Petrochemical, Refinery and Oil & Gas** industries. His expertise covers **Centrifugal Pump Maintenance, Repair & Troubleshooting, Positive Displacement & Centrifugal Pumps, Pump Selection, Installation, Performance & Control, Pumps & Valves Maintenance, Valves, Safety Relief Valves, Strainers & Steam Traps, Fundamentals of Process Operations, Crude Oil & Refinery Products, Sampling & Feed/Product Quality, Process Troubleshooting & Problem Solving, Hydro-Treating Technology, Catalysts, Distillation Column, Process Heaters/Furnaces, Reboilers, Condensers, Piping System and P&ID.** He is also well-versed in **Turbines, Fans, Blowers, Electric Motors, Gears & Transmission Equipment, Heat Exchangers, Valves, Packing & Mechanical Seal, Bearing, Couplings, Alignment, Water & Wastewater Treatment, Steam Boiler, Air Compressors** and ISO system.

During Mr. Abdallah's career life, he has handled challenging positions wherein he has acquired his wide technical and practical experience in the field of process & chemical industry such as the **Technical Instructor/Consultant, Senior Chemical Engineer, Chemical Engineer, Process Engineer, Technical Engineer** and **Production Supervisor** for various companies such as the **Jordan Petroleum Refinery, Jordanian Tunisian Chemicals Co., Al-Mas Resin Factory, Tabuk Chemical Fertilizer Factory, UIP-FCEC JV Design and Build Company, Degussa MBT** and **National Chlorine Company** in the Middle East.

Mr. Abdallah has a **Bachelor** degree in **Chemical Engineering** from the **University of Jordan**. Further, he is a **Certified Instructor/Trainer** and delivered various trainings internally in his previous companies.

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.

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: Sunday, 01st of February 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Pumps & Valves Highlighted Problem Areas
0930 – 0945	Break
0945 – 1100	General Description of Centrifugal Pumps & Turbines
1100 – 1215	Centrifugal Pumps Torque, Head and Flow Calculations
1215 – 1230	Break
1230 – 1330	Axial Flow Pumps Torque and Power Calculations
1330 – 1400	Video: Basic Pump Types & Technologies
1400 – 1420	Discussion
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Monday, 02nd of February 2026

0730 – 0830	Pump Performance Curves Centrifugal Multistage Pump • Mixed-Flow Machines • Effect of Impeller Speed and Diameter on Performance
0830 – 0930	Pump Specific Speed & Specific Radius
0930 – 0945	Break
0945 – 1100	Centrifugal Pumps Basics Types of Centrifugal Pumps • Self-Priming Pumps • Specific Speeds • Suction Specific Speed • Optimum Efficiency Point
1100 – 1215	Centrifugal Pump Design Issues Balancing Disc • Impeller NPSHR • Impeller Centre-Rib • Mechanical Seals • Velocity Head • Affinity Laws • Suction Lift • Re-Rate/Retrofit • Head-Rise • Radial/Horizontal Split Case
1215 – 1230	Break
1230 – 1400	Centrifugal Pump Installation Guidance for Optimum Performance Foundation Problems • Soft Foot • Suction Pipe • Suction Strainer
1400 – 1420	Video: Fundamentals of Pump Performance
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, 03rd of February 2026

0730 – 0930	Optimum Centrifugal Pump Operation Start-up • Minimum Flow • Maximum Pump RPM • Motor Current/Specific Gravity • Entrained Gas • Operation at Shut Off • Temperature-Rise • Thermal Shock
0930 – 0945	Break
0945 – 1100	Centrifugal Pump Maintenance Case Gasket • Checking For Wear Clearance • Oil Change • Pump Storage • Bearing Failures • Bearing Housing Oil Leakage • Cavitation Noise and Damage • Pump Vibration • Cracked Volute Tongues
1100 – 1215	Centrifugal Pump Re-Rate/Retrofit Impeller Cut • NPSH • De-Staging • Electric Motor Sizing • Effect of Viscosity Changes on Optimum Performance
1215 – 1230	Break
1230 – 1300	Video: Pump Hydraulic Loads, Critical Speed & Torque
1300 – 1330	Video: Bearings, Seals & Couplings
1330 – 1420	Discussion Forum
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, 04th of February 2026

0730 – 0830	Principles of Control Valve Technology [1] Types of Control Valves, e.g. Globe, Butterfly, Ball and Cage Valves etc. • Control Valve Flow Characteristics • Noise and Cavitation in Control Valves
0830 – 0930	Principles of Control Valve Technology [2] Actuators and Positioners • Valve Testing • Transmitters for Each of the Process Variables • Smart Transmitters • Control Loop Testing
0930 – 0945	Break
0945 – 1100	Valve Control Loops The 3-15 psi and 4 - 20 MA Control Loops • Digital Transmission and the Control Room
1100 – 1215	Control Strategies for Optimum Valve Performance Manual Control • Feedback Control • Feed Forward Control • Simple On-Off Control
1215 – 1230	Break
1230 – 1330	Other Control Strategies Proportional, Integral and Derivative Control-Valve Systems
1330 – 1420	Analogue and Digital Control Signals Direct Digital Control, Analogue/Digital Conversion, Digital/Analogue Conversion
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



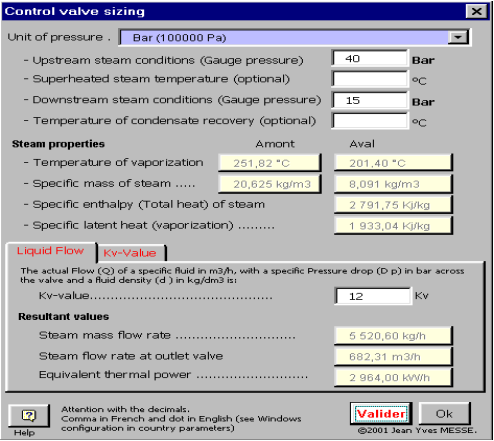
Day 5: Thursday, 05th of February 2026

0730 – 0930	Valve Safety Issues <i>Cleanliness, Fault-Finding Instrumentation, Preventive Maintenance</i>
0930 – 0945	<i>Break</i>
0945 – 1215	Centrifugal Pump Troubleshooting <i>Bearing Failures • Bearing Housing Oil Leakage • Cavitation Noise and Damage • Impeller Cavitation/Erosion • Vibration • Cracked Volute Tongues • Net Positive Suction Head</i>
1215 – 1230	<i>Break</i>
1230 – 1300	Video: Special Pump Topics
1300 – 1345	Discussion Forum
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>



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 “Valve Sizing Software”, “Valve Software 3.0”, “Valvestar 7.2 Software”, “PRV²SIZE Software” and “Centrifugal Pumps and Troubleshooting Guide 3.0” simulators.



Control valve sizing

Unit of pressure : Bar (100000 Pa)

- Upstream steam conditions (Gauge pressure) : 40 Bar

- Superheated steam temperature (optional) : °C

- Downstream steam conditions (Gauge pressure) : 15 Bar

- Temperature of condensate recovery (optional) : °C

Steam properties

Amount	Aval
- Temperature of vaporization	251.82 °C / 201.40 °C
- Specific mass of steam	20.625 kg/m ³ / 8.091 kg/m ³
- Specific enthalpy (Total heat) of steam	2 791.75 KJ/kg
- Specific latent heat (vaporization)	1 933.04 KJ/kg

Liquid Flow | Kv-Value

The actual Flow (Q) of a specific fluid in m³/h, with a specific Pressure drop (D p) in bar across the valve and a fluid density (d) in kg/dm³ is:

Kv-value: 12 Kv

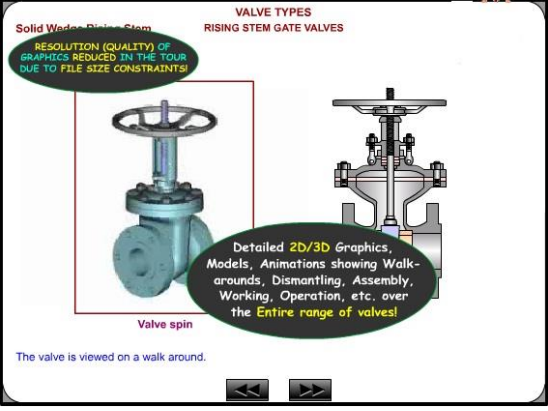
Resultant values

Steam mass flow rate	5 520,60 kg/h
Steam flow rate at outlet valve	682,31 m ³ /h
Equivalent thermal power	2 964,00 kW/h

Attention with the decimal: Comma in French and dot in English (see Windows configuration in country parameters)

Validier Ok

©2001 Jean-Yves MESSE



VALVE TYPES
RISING STEM GATE VALVES

Solid Water Rising Stem

RESOLUTION (QUALITY) OF GRAPHICS REDUCED IN THE TOUR DUE TO FILE SIZE CONSTRAINTS!

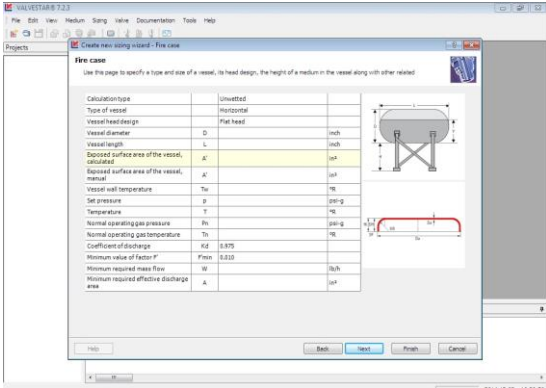
Detailed 2D/3D Graphics, Models, Animations showing Walk-arounds, Dismantling, Assembly, Working, Operation, etc. over the Entire range of valves!

Valve spin

The valve is viewed on a walk around.

Valve Sizing Software

Valve Software 3.0



VALVESTAR 7.2

File Edit View Medium Sing Valve Documentation Tools Help


Projects

Create new sizing record - File case

Use this page to specify a type and size of a vessel, its head design, the height of a medium in the vessel along with other related

Calculation type	Unsettled	
Type of vessel	Horizontal	
Vessel head design	Flat head	
Vessel diameter	D	m
Vessel length	L	m
Exposed surface area of the vessel, calculated	A _c	m ²
Exposed surface area of the vessel, nominal	A _n	m ²
Vessel wall temperature	T _w	°C
Set pressure	P	bar(g)
Temperature	T	°C
Normal operating gas pressure	P _n	bar(g)
Normal operating gas temperature	T _n	°C
Coefficient of discharge	K _d	0.975
Minimum value of factor F	F _{min}	0.020
Minimum required mass flow	W	kg/h
Minimum required effective discharge area	A	cm ²

Back Next Finish Cancel



PRV²SIZE

Anderson Greenwood Crosby Valtec tyco Flow Control

Quick Start a New Quick Calculation

New Create a New Tag

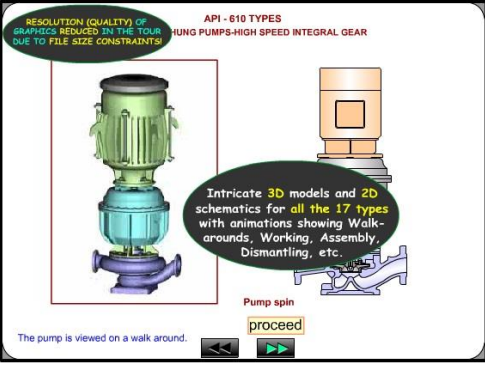
Open Open an Existing Tag

Catalogs View Valve Catalogs

Copyright © 2010, 2011 Tyco Flow Control, Inc. All rights reserved. All trademarks, trade names and/or registered trademarks referred to in this document are the property of their respective owners.

Valvestar 7.2 Software

PRV²SIZE Software



API - 610 TYPES
HUNG PUMPS-HIGH SPEED INTEGRAL GEAR

RESOLUTION (QUALITY) OF GRAPHICS REDUCED IN THE TOUR DUE TO FILE SIZE CONSTRAINTS!

Intricate 3D models and 2D schematics for all the 17 types with animations showing Walk-arounds, Working, Assembly, Dismantling, etc.

Pump spin

proceed

The pump is viewed on a walk around.

Centrifugal Pumps and Troubleshooting Guide 3.0

Virtual Reality (VR) and Augmented Reality (AR) Practical Sessions

Practical sessions will be organized during the course using cutting-edge Virtual Reality (VR) and Augmented Reality (AR) technologies to provide participants with a highly immersive and interactive learning experience. Through VR headsets and AR-enabled devices, delegates will be able to simulate real-world scenarios in a safe and controlled virtual environment, allowing them to practice the theories and techniques learned in class. Participants will engage in realistic, hands-on exercises such as operating equipment, performing inspections, troubleshooting systems and responding to simulated incidents that closely replicate actual field conditions. This advanced training approach enhances understanding, improves decision-making skills and builds confidence by bridging the gap between theoretical knowledge and real-world application.



Course Coordinator

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