



**COURSE OVERVIEW ME0240-4D**  
**Advanced Valve Technology**

*Design, Selection, Installation, Applications, Sizing, Inspection, Maintenance & Troubleshooting*

**Course Title**

Advanced Valve Technology  
*Design, Selection, Installation, Applications, Sizing, Inspection, Maintenance & Troubleshooting*



**Course Date/Venue**

October 07-10, 2024/Club B Meeting Room,  
Ramada Plaza by Wyndham Istanbul City Center,  
Istanbul, Turkey

**Course Reference**

ME0240-4D



**Course Duration/Credits**

Four days/2.4 CEUs/24 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 Valve industry has become increasingly digital during the last ten years. Even a casual examination of available smart or intelligent positioners reveals significant differences in design philosophies, on-board intelligence, and application options being employed by manufacturers. This course will focus on the new process plant applications for smart valve technology found since 1998. Further, this course offers complete coverage of the operation, application, and pros and cons of today's newest smart valves with digital positioners and actuators. Also includes updates on HART and FieldBus valve technology.



The course will cover the latest spectrum of available valves from gate, plug, butterfly, check, pressure-relief, globe valves to control valves equipped with microprocessors, which provide single-loop control of the process. Further, the course will cover valve materials: steel, iron, plastic, brass, bronze, and a number of special alloys.



Today the global valve industry involves hundreds of global manufacturers who produce thousands of designs of manual, check, pressure-relief and control valves. In addition to the traditional manufacturers in North America and Europe, the course will discuss the emerging Asian market, Japan, Korea, Taiwan, and China.

This course is offering everything the professional and the novice need to know about designing, selecting, installation, application, sizing, maintaining, and troubleshooting of nowadays valves. In addition to serving as an invaluable update for the experienced engineer, this course provides the beginner with a solid understanding of modern valve technology.

### **Course Objectives**

This AVT (Advanced Valve Technology) course encourages attendees to advance from basic installation and maintenance to selection, upgrading and troubleshooting of valve failures. It includes modern technology of new materials that have been made available recently. Upon the successful completion of this AVT course, each participant will be able to:-

- Apply advanced techniques in design, selection, installation, sizing, inspection, maintenance and troubleshooting of valves
- Apply knowledge on control valve theory including cavitation, flashing, choked flow and sizing and identify the various types, features and functions of control valves
- Determine the characteristics of valves and recognize the concept of trims including low noise trim, diffusers & trim selection
- Classify manual valves and identify its components and functions
- Recognize the process considerations for valve technology including pressure classes, materials selection, leakage rates and international standards
- Implement the process of actuator selection by considering the various types and accessories used in valve technology and apply the principle of field communication as applied in valve technology
- Develop knowledge on Smart valves and positioners as well as the Smart partial valve stroke test devices used in valves
- Manage asset of field mounted devices and recognize its importance in advanced valve technology
- Develop in-depth knowledge on check valves, pressure relief valves and fire safe valves by identify their types, features and application in the industry
- List the common valve problems that are encountered including water hammer effects, high noise levels & fugitive emissions and determine how to prevent valve failures
- Apply proven methodology of assessing the valve failures in the oil & gas sector and explain how it affects the maintenance and troubleshooting processes of valves
- Acquire an overview of plant valve management and regulators that are used in valve technology and an overview of extended valve components, hardide & coatings and composite valves including their design, installation, application and sizing
- Apply the proper procedure for corrosion, galling and water testing and carryout proper methodology of valve sizing & selection using the various programs and applications

**Who Should Attend**


This course provides an overview of all significant aspects and considerations of valve for those who are involved in the design, selection, installation, applications, sizing, inspection, maintenance and troubleshooting of such equipment. This includes maintenance, application, inspection, electrical, mechanical, control, instrumentation, production, wellhead and drilling engineers, designers and other technical staff. Likewise, it is beneficial for users, distributors, purchasers or buyers of this equipment for them to understand the design and manufacturing principles that dictates faster delivery of safer quality product.

**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:-


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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 **2.4 CEUs (Continuing Education Units)** or **24 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. Manuel Dalas (Emmanouil Amygdalas)**, 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 **Root Cause Failure Analysis**, Rotating Equipment Maintenance & **Failure Analysis**, **Failure Analysis Methodologies** for Mechanical Engineers, **Reliability Centered Maintenance & Root Cause Failure Analysis**, **Machinery Failure Analysis**, Prevention & Troubleshooting, **Machinery Failure Analysis**, **Machinery Root Cause Failure Analysis (RCFA)**, **Machinery Diagnostics & Root Cause Failure Analysis**, **Water Well, Transfer & Network Systems Operation**,

**Water Network Systems & Pumping Stations**, **Instrument, Control & Protection Systems**, **Plumbing Network Systems & Building**, **Water Distribution & Pump Station**, **Boiler Operation & Water Treatment**, **Pipeline Simulations**, **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**, **Plant Reliability & Maintenance Strategies**, **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**, **FRP Pipe Maintenance & Repair**, **Centrifugal & Positive Displacement Pump Technology Troubleshooting & Maintenance**, **Rotating Machinery Best Practices**, **Diesel Engine Operations**, **Maintenance & Troubleshooting**, **PD Compressor & Gas Engine Operation & Troubleshooting**, **Hydraulic Tools & Fitting**, **Mass & Material Balance 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**, **Safety Relief Valve**, **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**, **Water Network Systems Engineer**, **Maintenance Engineer** and **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 Fee

**US\$ 5,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

### 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: Monday, 07<sup>th</sup> of October 2024**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0915	<b>Control Valve Theory</b> Introduction • Definition of a Control Valve • Types of Energy • What is Happening Inside a Control Valve • Cavitation • Flashing • Choked Flow • Control Valve Sizing • Turndown vs. Range ability
0915 – 0930	<b>Video Presentation</b> Cavitation
0930 – 0945	Break
0945 – 1030	<b>Control Valve Types</b> Rotary Valves • Linear Valves • Valve Selection • How to Choose the Right Valve • Selection Guidelines • Application Comparisons

1030 – 1100	<b>Video Presentation</b> Control Valve Body Assembly
1100 – 1215	<b>Characteristics &amp; Trims</b> Valve Characteristics • Application Examples • Cavitation Control • Anti-Cavitation Trim • High Pressure Drop-Applications • Low Noise Trim • Diffusers • Trim Selection
1215 – 1230	Break
1230 – 1330	<b>Manual Valves</b> Classification of Manual Valves • Rotating Manual Valves • Stopper Valves • Sliding Valves • Flexible Valves
1330 – 1420	<b>Process Considerations</b> End Connections • Pressure Classes • Face to Face Criteria • Materials Selection • Modes of Failure • Leakage Rates • International Standards
1420 – 1430	<b>Recap</b> 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: Tuesday, 08<sup>th</sup> of October 2024**

0730 – 0900	<b>Actuator Selection</b> Types of Actuators • Linear Actuators • Rotary Actuators • Actuator Forces • Positioners • Fail Safe Systems • Auxiliary Hand wheels • Valve Accessories
0900 – 0930	<b>Video Presentation</b> Actuator Assembly
0930 – 0945	Break
0945 – 1030	<b>Field Communications</b> Analogue Signals • Digital Communications • Fieldbus Technologies
1030 – 1100	<b>Video Presentation</b> HART Protocol
1100 – 1215	<b>Smart Valves &amp; Positioners</b> Introduction • Development • Digital Valve Controllers • Future Development
1215 – 1230	Break
1230 – 1330	<b>Smart Partial Valve Stroke Test Devices</b> Overview
1330 – 1420	<b>Asset Management of Field Mounted Devices</b> Maximizing Asset Uptime
1420 – 1430	<b>Recap</b> 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: Wednesday, 09<sup>th</sup> of October 2024**

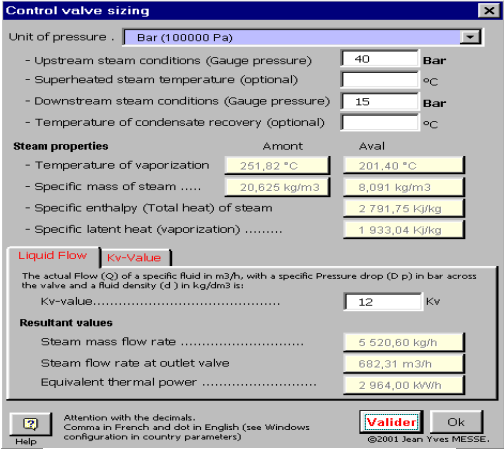
0730 – 0930	<b>Check Valves</b> Introduction to Check Valves • Lift Check Valves • Swing Check Valves • Tilting Disc Check Valves • Double Disc Check Valves
0930 – 0945	Break
0945 – 1100	<b>Pressure Relief Valves</b> Introduction • Principles of Operation • Standards (ASME, National Board, etc.) • Applications • Installation • Testing • Assembly • Repair • Troubleshooting • VR Accreditation
1100 – 1215	<b>Fire Safe Valves</b> Overview
1215 – 1230	Break
1230 – 1330	<b>Common Valve Problems</b> Water hammer Effects • High Noise Levels • Noise Attenuation • Fugitive Emissions • How to Prevent Valve Failures • Installation Issues • Practical Problems • Maintenance Considerations
1330 – 1420	<b>Assessment of Valve Failure in the Oil &amp; Gas Sector</b> Overview
1420 – 1430	<b>Recap</b> 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: Thursday, 10<sup>th</sup> of October 2024**

0730 – 0830	<b>Plant Valve Management</b> Overview
0830 – 0930	<b>Regulators</b> Overview
0930 – 0945	Break
0945 – 1030	<b>Extended Valve Components, Hardide &amp; Coatings</b> Overview
1030 – 1100	<b>Composite Valves</b> Overview
1100 – 1215	<b>Corrosion, Galling &amp; Water Testing</b> Overview
1215 – 1230	Break
1230 – 1345	<b>Valve Sizing &amp; Selection</b> Computer Program • Liquid & Gas Applications • Linear & Rotary Valves • Actuator Sizing
1345 – 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	<b>POST-TEST</b>
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 simulators “Valve Sizing Simulator”, “Valve Simulator 3.0”, “Valvestar 7.2 Simulator” and “PRV2SIZE Simulator”.



**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 <sup>3</sup>	8,091 kg/m <sup>3</sup>
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 m<sup>3</sup>/h, with a specific Pressure drop (D p) in bar across the valve and a fluid density (d) in kg/dm<sup>3</sup> is:

Kv-value: 12

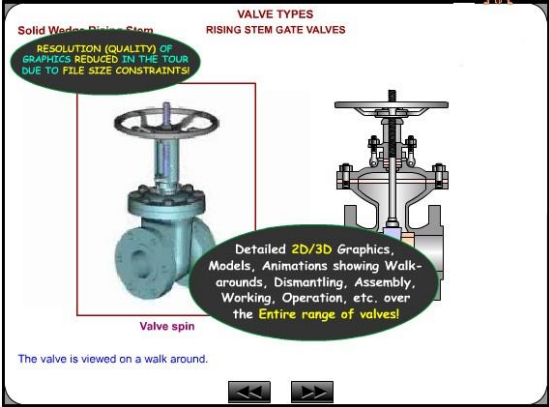
**Resultant values**

Steam mass flow rate: 5 520,60 kg/h

Steam flow rate at outlet valve: 682,31 m<sup>3</sup>/h

Equivalent thermal power: 2 964,00 kW/h

Validater | Ok



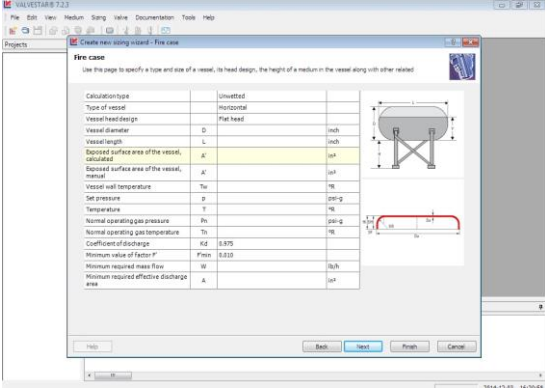
**VALVE TYPES**  
RISING STEM GATE VALVES

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


Valve spin

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

The valve is viewed on a walk around.



**Valvestar 7.2 Simulator**



**PRV<sup>2</sup>SIZE Simulator**

### Course Coordinator

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