



COURSE OVERVIEW ME0075 Control Valves Fundamentals

Course Title

Control Valves Fundamentals

Course Date/Venue

December 16-20, 2024/Fujairah Meeting Room,
Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference

ME0075

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.



It is claimed that the majority of control valves throughout the world have not been correctly sized and that large numbers operate on manual mode. Whether this is true or not is difficult to establish but we do know that the method of sizing and selecting a control valve for a specific application is generally not well understood. Although there are many factors that need to be taken into account the subject is not difficult to understand if dealt with in a logical manner. We also find that many maintenance problems result from people treating the symptoms of a problem rather than tackling the true cause – a basic understanding of the principles is all that is usually needed to solve the problem for good.



This course is designed to provide participants with a detailed and an up-to-date overview of control valve sizing, selection, operation, testing, maintenance and troubleshooting. It covers the valve characteristics and trim selection; the process of control valve sizing; the control valve accessories such as auxiliary hand-wheels, pressure regulators, position transmitters, volume booster, limit switches and solenoid valves; and the process of control valve selection.



Further, the course will also discuss the control valve performance which includes process variability, actuator-positioner design, valve type, sizing, response and characterization; the common valve problems and its solutions; the use of system approach to prevent the occurrences of the problems; the different operational issues of control valves and actuators; the various control valve failures and their potential causes; the field communications and its importance; the practical application on control valves and actuators; the development, features and functions of smart valves and positioners; the diagnostic testing in valves; and the fire safe valves.

Course Objectives

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

- Apply systematic techniques in the sizing, selection, operation, testing, maintenance and troubleshooting of control valves
- Discuss the valve characteristics and trim selection and illustrate the process of control valve sizing
- Recognize the process consideration in control valves and actuators particularly the materials selection, modes of failure, leakage rates and international standards
- Identify the control valve accessories such as auxiliary hand-wheels, pressure regulators, position transmitters, volume booster, limit switches and solenoid valves and describe the process of control valve selection
- Employ control valve performance which includes process variability, actuator-positioner design, valve type, sizing, response and characterization
- Analyze common valve problems and present various solutions and use system approach to prevent the occurrences of the problems
- Review and improve the different operational issues of control valves and actuators and determine the various control valve failures and their potential causes
- Recognize field communications and its importance and employ practical application on control valves and actuators
- Identify development, features and functions of smart valves and positioners and apply diagnostic testing in valves
- Explain fire safe valves by discussing its standards, examples, sealing and leakage

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 provides an overview of all significant aspects and considerations of control valves and actuators for those involved in the sizing, selection, operation, testing, maintenance and troubleshooting of such equipment. This includes control valve and plant safety specialists, instrumentation and control engineers, electrical engineers, project engineers, process control engineers, consulting engineers, maintenance engineers, maintenance planners and systems engineers.

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\$ 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 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 **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.

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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. Andrew Ladwig is a **Senior Mechanical & Maintenance Engineer & HSE Consultant** with over **25 years** of extensive experience within the **Oil & Gas, Refinery, Petrochemical & Power** industries. His expertise widely covers in the areas of Best Practice In **Maintenance Management, Maintenance Troubleshooting, Preventive Maintenance & Corrective Maintenance, Maintenance Planning, Scheduling, Management & Work Control**, Certified Maintenance Planner (**CMP**), Certified Planning & Scheduling Professional (**AACE-PSP**), **Maintenance Optimization**

& Best Practices, **Engine Construction & Maintenance, Process Plant Shutdown & Turnaround, Maintenance Auditing & Benchmarking, Machinery Lubrication, Machinery Failure Analysis, Reliability, Availability & Maintainability (RAM), Reliability-Centered Maintenance (RCM), Reliability Engineering Analysis (RE), Root Cause Analysis (RCA), Asset Integrity Management (AIM), Reactive & Proactive Maintenance, Compressors & Turbines Operation, Maintenance & Troubleshooting, Reciprocating & Centrifugal Compressors, Screw Compressor, Compressor Control & Protection, Gas & Steam Turbines, Turbine Operations, Gas Turbine Technology, Centrifugal Pumps, Bearings, Couplings, Screw Compressors & Heat Exchangers** Operation, Maintenance, Inspection, Troubleshooting, Lubrication & Shaft Alignment, **Gas Turbine Operating & Maintenance, Pressure Safety Relief Valve Repair & Recalibration, PSV/PRV Troubleshooting, Valve Testing & Inspection, Control Valves & Actuators, Boiler Inspection & Maintenance, Boiler Systems, Boiler instrumentation & Controls, Boiler Start-up & Shutdown, Boiler Operation & Steam System Management, Heat Recovery Steam Generating (HRSG), Impulse Tube Installation & Inspection, Pipes & Fittings, Tank Design & Engineering, Tank Shell, Tanks & Tank Farms, Bearings & Lubrication** and **Advanced Machinery Dynamics**. Further, he is also well-versed in **Hazardous Materials & Chemicals Handling, Hazardous Materials (HAZMAT), Hazard Identification & Operability (HAZOP), Professional HAZOP/PHA Leader: Advanced Process Hazard Analysis (PHA) Methods & Leadership (HAZOP, What-if, FMEA), Process Safety Management (PSM), Layer of Protection Analysis (LOPA), Behavioural Based Safety (BBS), Job Safety Analysis (JSA), Permit to Work (PTW), Authorized Gas Tester (AGT), Confined Space Entry & Rescue, Pre-Startup Safety Reviews (PSSR), Safety in Process Plants, Risk Assessment, Risk Management, Emergency Planning, Emergency Response & Crisis Management Operations** and **Incident Investigation Advanced & HSE Reporting**. During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer, Project Engineer, Reliability & Maintenance Engineer, Maintenance Support Engineer, Process Engineer, HSE Supervisor, Warehouse Manager, Quality Manager, Business Analyst, Senior Process Controller, Process Controller, Safety Officer, Mechanical Technician, Senior Lecturer and Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few. Mr. Ladwig has a **Bachelor's degree in Chemical Engineering** and a **Diploma in Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and has delivered various trainings, workshops, seminars, courses 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: Monday, 16th of December 2024

0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
0830 - 0900	Review of Course Objectives of Course • Timetables
0900 - 0915	Break
0915 - 1030	Control Valve Theory - Basic Principles Introduction • Definition of a Control Valve • Types of Energy • What is Happening Inside a Control Valve • Choked Flow • Cavitation • Flashing
1030 - 1100	Video Presentation
1100 - 1200	Control Valve Types Rotary • Linear
1200 - 1230	Video Clips
1230 - 1245	Break
1245 - 1330	Characteristics & Trims Valve Characteristics • Application Examples • Cavitation Control • Anti-Cavitation Trim • High Pressure Drop-Applications • Low Noise Trim • Diffusers
1330 - 1420	Control Valve Sizing General • Valve Coefficient (Cv) • Simplified Sizing Equation • Comparison of Valve Types • Turndown vs Rangeability
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: Tuesday, 17th of December 2024

0730 - 0900	Process Considerations End Connections • Face to Face Criteria • Materials Selection • Modes of Failure • Leakage Rates • International Standards
0900 - 0915	Break
0915 - 0945	Video Clips
0945 - 1100	Actuators & Positioners Types of Actuators • Linear Actuators • Rotary Actuators • Actuator Forces • Positioners • Fail Safe Actuators
1100 - 1230	Video Clips
1230 - 1245	Break
1245 - 1315	Accessories Auxiliary Hand-wheels • Pressure Regulators • Lock-up Valves • ON-OFF Valve • Position Transmitters • Volume Boosters • Limit Switches • Solenoid Valves
1315 - 1400	Control Valve Selection Introduction • Decision Criteria • Materials of Construction • Valve Characteristics • Actuator Considerations • Price Comparison • Selection Guidelines • Application Comparisons • Computer Sizing Programmes • Summary





1400 - 1420	Video Clip
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: Wednesday, 18th of December 2024

0730 - 0800	Operational Issues General Review • Installation • Maintenance • Troubleshooting • Corrosion • Galling
0800 - 0900	Operation Checks Control Valve Performance Characteristics - Dead Band • T63 • Response • Dead • Dynamic Time
0900 - 0915	Break
0915 - 1100	Control Valve Performance Process Variability • Dead Band • Actuator/Positioner Design • Valve Response Time • Valve Type & Characterisation • Valve Sizing
1100 - 1230	Common Valve Problems Water Hammer Effects • High Noise Levels • Noise Attenuation • Fugitive Emissions
1230 - 1245	Break
1245 - 1330	Control Valve Failures & Potential Causes Introduction • Physical Failures • Velocity Problems • Erosion by Cavitation • Erosion by Abrasion • Noise • Vibration
1330 - 1420	The Three Approaches to Control Valve Maintenance Reactive • Preventive • Predictive
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: Thursday, 19th of December 2024

0730 - 0800	Immediate Maintenance or Repairing Action in Case of Any Discrepancies Disassembly Protocols • Critical Inspection • Lapping & Grinding • Assembly Clearances Setting • Pressure Testing & Sealing
0800 - 0900	Field Communications Analogue Signals • Digital Communications • Fieldbus Technologies
0900 - 0915	Break
0915 - 0945	Video Presentation
0945 - 1230	SMART Valves & Positioners Introduction • Development • Digital Valve Controllers • Case Study • Future Development
1230 - 1245	Break
1245 - 1420	Proof Testing & Diagnostic Safety Instrumented Systems - An Overview • Proof Testing • Partial Valve Stoking • Diagnostics
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



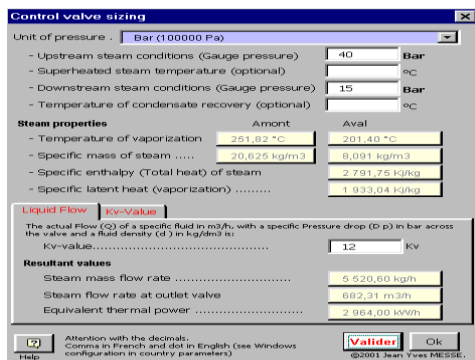


Day 5: Friday, 20th of December 2024

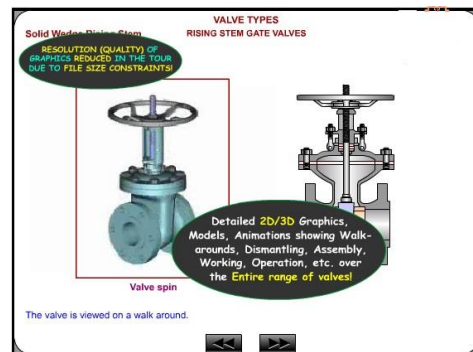
0730 – 0900	Fire Safe Valves Introduction • Requirements • Sealing & Leakage • Design Standards & Testing • Examples
0900 – 0915	Break
0915 – 1100	Addendum Typical Example • Choke Valve • Other Subjects
1100 – 1230	Practical Exercises
1230 – 1245	Break
1245 – 1345	Computer Sizing Programme Simple Water • Simple Air • High Pressure Drop Water • H2SO4
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

Simulators (Practical Sessions)

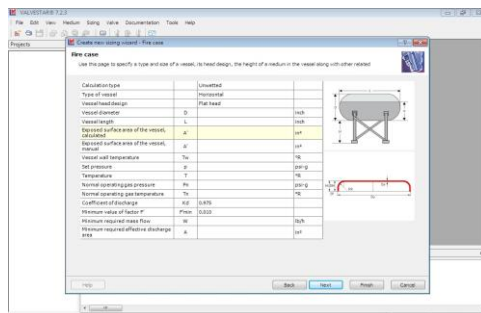
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators “Valve Sizing Software”, “Valve Software 3.0”, “Valvestar 7.2 Software” and “PRV2SIZE Software”.



Valve Sizing Software



Valve Software 3.0



Valvestar 7.2 Software



PRV²SIZE Software

Course Coordinator

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