

COURSE OVERVIEW ME0541
Control Valve Engineering

Course Title

Control Valve Engineering

Course Date/Venue

Session 1: September 29-October 03, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Session 2: December 15-19, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE



Course Reference

ME0541



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.



This course is designed to provide participants with a detailed and up-to-date overview of Control Valve Engineering. It covers the importance and basic terminology of control valves in process control; the types of control valves covering ball, butterfly, gate, globe and diaphragm valves; the valve components and materials comprising of body, actuator, positioner and materials used for construction; the concepts of valve sizing, flow coefficients (Cv) and the factors affecting valve selection; the standards and specifications of industry like ANSI, ISA and ASME relevant to control valves; the mechanical operation of valves including stem movement, seating mechanisms and flow characteristics; the advanced valve sizing for liquid, gas and steam applications; and the valve flow characteristics and their impact on process control.



Further, the course will also discuss the actuators types and selection, valve positioners, solenoids, limit switches and other accessories; the valve materials for corrosive applications; the causes and effects of noise and cavitation in control valves and mitigation strategies; the performance criteria and testing and techniques for diagnosing valve problems and monitoring valve condition; the common issues like sticking, leakage and improper sizing; and the preventive and predictive maintenance strategies for control valves and smart valves and digitalization.

During this interactive course, participants will learn the guidelines for proper installation of control valves; the procedures for commissioning new valves; the best practices for operating control valves and routine and emergency maintenance; the safety practices for handling valves; the importance of maintaining accurate records for installation, maintenance and performance data; the control valves in severe service applications and innovations in valve design; and the predictive analytics for valve maintenance, energy efficiency, sustainability, regulatory, compliance issues and future trends in control valve technology.

Course Objectives

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

- Apply and gain an in-depth knowledge on control valve engineering
- Discuss the importance and basic terminology of control valves in process control
- Recognize the types of control valves covering ball, butterfly, gate, globe and diaphragm valves
- Identify valve components and materials comprising of body, actuator, positioner and materials used for construction
- Explain the concepts of valve sizing, flow coefficients (Cv) and the factors affecting valve selection
- Review the standards and specifications of industry like ANSI, ISA and ASME relevant to control valves
- Apply the mechanical operation of valves including stem movement, seating mechanisms and flow characteristics
- Carryout advanced valve sizing for liquid, gas and steam applications and explain the valve flow characteristics and their impact on process control
- Recognize the actuators types and selection, valve positioners, solenoids, limit switches and other accessories
- Select the valve materials for corrosive applications and discuss the causes and effects of noise and cavitation in control valves and mitigation strategies
- Illustrate the performance criteria and testing and techniques for diagnosing valve problems and monitoring valve condition
- Identify and solve common issues like sticking, leakage and improper sizing
- Employ preventive and predictive maintenance strategies for control valves and discuss the smart valves and digitalization
- Explain the guidelines for proper installation of control valves and apply procedures for commissioning new valves
- Apply best practices for operating control valves and routine and emergency maintenance
- Employ safety practices for handling valves and discuss the importance of maintaining accurate records for installation, maintenance and performance data
- Discuss control valves in severe service applications and innovations in valve design
- Apply predictive analytics for valve maintenance, energy efficiency, sustainability, regulatory, compliance issues and future trends in control valve technology

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 valve engineering for mechanical engineers, control engineers, electrical engineers, project engineers, process control engineers, consulting engineers, maintenance engineers and other technical staff.

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 Process & Mechanical Maintenance Engineer** with over **25 years** of extensive experience within the **Oil & Gas, Refinery, Petrochemical & Power** industries. His expertise widely covers in the areas of **Maintenance Planning, Maintenance & Reliability Management, Material Cataloguing, Equipment Maintenance, Root Cause Failure Analysis (RCFA), Rotating Machinery Troubleshooting, Maintenance Auditing & Benchmarking, Condition Monitoring Techniques, Machinery Lubrication Technology, Lubricant Oil & Grease Testing & Analysis, Crude Oil Storage & Management, Ammonia Manufacturing & Process Troubleshooting, Crude Oil Distillation, Distillation Operation and Troubleshooting, Ammonia Storage & Loading Systems, Fertilizer Storage Management (Ammonia & Urea), Sulphur Recovery, Nitrogen Fertilizer Production, Refining Process & Petroleum Products, Safe Refinery Operations, Hydrotreating & Hydro-processing, Fractionation, Process Plant Operations, Storage Tanks Operations & Measurements, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Performance, Process Troubleshooting Techniques, Pressure Vessel Operation, Process Equipment Performance & Troubleshooting, Plant Startup & Shutdown and Flare & Relief System.** Further, he is also well-versed in **Compressors & Turbines Maintenance, Heat Exchanger Overhaul & Testing Techniques, Balancing of Rotating Machinery (BRM), Pipe Stress Analysis, Valves & Actuators Technology, Control Valve Engineering, Tank Design, Material Cataloguing, Specifications, Handling & Storage, Steam Trap Design, Operation, Maintenance & Troubleshooting, Steam Trapping & Control, Column, Pump & Exchangers, Troubleshooting & Design, Detailed Engineering Drawings, Codes & Standards, Production Optimization, Permit to Work (PTW), Project Engineering, Data Analysis, Process Hazard Analysis (PHA), HAZOP Study, Sampling & Analysis, Training Analysis, Job Analysis Techniques, Storage & Handling of Toxic Chemicals & Hazardous Materials, Hazardous Material Classification & Storage/Disposal, Dangerous Goods, Environmental Management System (EMS), Supply Chain, Purchasing, Procurement, Logistics Management & Transport & Warehousing & Inventory, Risk Monitoring Authorized Gas Tester (AGT), Confined Space Entry (CSE), Personal Protective Equipment (PPE), Fire & Gas, First Aid and Occupational Health & Safety.**

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 workshop 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	Overview of Control Valves: Introduction to Control Valves, their Importance in Process Control & Basic Terminology
0930 – 0945	Break
0945 – 1030	Types of Control Valves: Different Types of Control Valves (e.g., Ball, Butterfly, Gate, Globe & Diaphragm Valves) & their Applications
1030 – 1130	Valve Components & Materials: Components of Control Valves (e.g., Body, Actuator, Positioner) & Materials Used for Construction
1130 – 1215	Valve Sizing & Selection Criteria: The Concepts of Valve Sizing, Flow Coefficients (Cv) & the Factors Affecting Valve Selection
1215 – 1230	Break
1230 – 1330	Standards & Specifications: Overview of Industry Standards (e.g., ANSI, ISA, ASME) Relevant to Control Valves
1330 – 1420	Basic Valve Mechanics: The Mechanical Operation of Valves, including Stem Movement, Seating Mechanisms & Flow Characteristics
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2

0730 – 0830	Advanced Valve Sizing: The Methods for Sizing Valves Accurately for Liquid, Gas & Steam Applications
0830 – 0930	Flow Characteristics & Rangeability: Valve Flow Characteristics (Linear, Equal Percentage, Quick Opening) & their Impact on Process Control
0930 – 0945	Break
0945 – 1100	Actuators Types & Selection: Different Types of Actuators (Pneumatic, Hydraulic, Electric) & Criteria for Selecting the Appropriate Actuator
1100 – 1215	Positioners & Accessories: Valve Positioners, Solenoids, Limit Switches & other Accessories
1215 – 1230	Break
1230 – 1330	Material Selection for Corrosive Applications: Guidelines for Selecting Valve Materials Based on Process Fluid Properties & Environmental Conditions
1330 – 1420	Noise & Cavitation: The Causes & Effects of Noise & Cavitation in Control Valves & Mitigation Strategies
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 – 0830	Performance Criteria & Testing: Overview of Performance Criteria for Control Valves & Standard Testing Procedures
0830 – 0930	Valve Diagnostics & Condition Monitoring: Techniques for Diagnosing Valve Problems & Monitoring Valve Condition
0930 – 0945	Break

0945 – 1100	Troubleshooting Common Valve Problems: Identifying & Solving Common Issues such as Sticking, Leakage & Improper Sizing
1100 – 1215	Maintenance Strategies: Preventive & Predictive Maintenance Strategies for Control Valves
1215 – 1230	Break
1230 – 1330	Smart Valves & Digitalization: Smart Valves & the Impact of Digitalization on Valve Diagnostics & Maintenance
1330 – 1420	Case Studies: Analysis of Real-World Case Studies to Illustrate Common Valve Problems & Solutions
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4

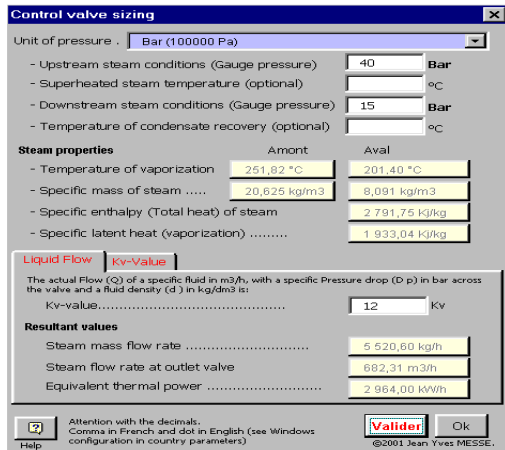
0730 – 0830	Installation Best Practices: Guidelines for Proper Installation of Control Valves to Ensure Optimal Performance
0830 – 0930	Commissioning & Calibration: Procedures for Commissioning New Valves & Calibrating them for the Process
0930 – 0945	Break
0945 – 1100	Operating Guidelines: Best Practices for Operating Control Valves to Maintain Process Control & Valve Longevity
1100 – 1215	Routine & Emergency Maintenance: Procedures for Conducting both Routine Maintenance & Handling Emergency Valve Failures
1215 – 1230	Break
1230 – 1330	Health, Safety & Environmental Considerations: Safety Practices for Handling Valves, including Lockout/Tagout Procedures & Environmental Compliance
1330 – 1420	Documentation & Record Keeping: Importance of Maintaining accurate Records for Installation, Maintenance & Performance Data
1420 – 1430	Recap
1430	Lunch & End of Day Four

Day 5

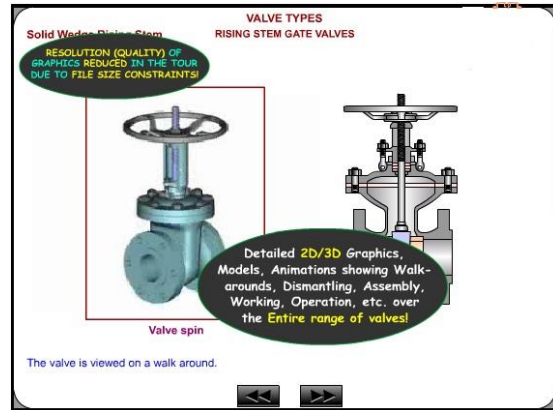
0730 – 0830	Severe Service Applications: Discussion on Control Valves in Severe Service Applications (e.g., High Pressure, High Temperature, Corrosive Environments)
0830 – 0930	Innovations in Valve Design: Recent Innovations in Control Valve Design & Materials
0930 – 0945	Break
0945 – 1030	Predictive Analytics for Valve Maintenance: The Use of Predictive Analytics in Maintenance Planning
1030 – 1130	Energy Efficiency & Sustainability: Strategies for Optimizing Control Valve Selection & Operation for Energy Efficiency & Sustainability
1130 – 1230	Regulatory & Compliance Issues: The Impact of Regulatory & Compliance Issues on Control Valve Engineering
1230 – 1245	Break
1245 – 1345	Future Trends in Control Valve Technology: Exploration of Emerging Technologies & Trends in the Field of Control Valve Engineering
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (Hands-on Practical Sessions)

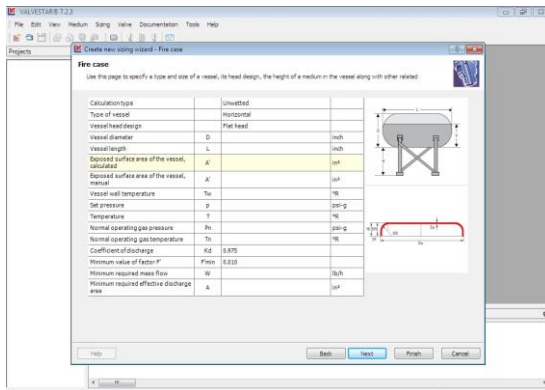
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art “Valve Sizing Software”, “Valve Software 3.0”, “Valvestar 7.2 Software” and “PRV2SIZE Software”.



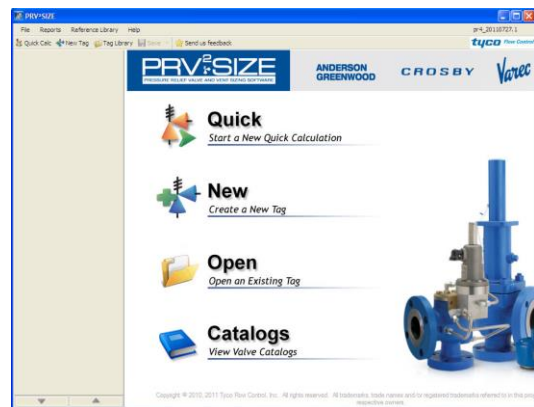
Valve Sizing Software



Valve Software 3.0



Valvestar 7.2 Software



PRV²SIZE Software

Course Coordinator

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