COURSE OVERVIEW ME0541
Control Valve Engineering

Course Title
Control Valve Engineering

Course Date/Venue
December 15-19, 2024/Lotus Meeting Room, Carlton Downtown Hotel, 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: -

- 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 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. Pan Marave, PE, MSc, BEng, is a **Senior Electrical & Instrumentation Engineer** with over **45 years** of extensive experience in **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise includes **Control Valve** Engineering, **Control Loop & Valve Tuning**; Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**); **DCS**, **SCADA** & **PLC**; **Measurement** (**Flow**, **Temperature**, **Pressure**); **Process Analyzers** & **Analytical Instrumentation**; **Process Control**, **Instrumentation** & **Safeguarding**; **Process Controller**, Industrial **Distribution Systems**; Industrial **Control & Control Systems**, Power Systems **Protection & Relaying**; **Earthing**, **Bonding**, **Grounding**, **Lightning & Surge Protection**; Electric Power **Substation** & **Systems**; Electrical Engineering Principles; **Motor Control Circuit**; **Electrical Fault Analysis**; Electrical Networks & Distribution **Cables**; **Circuit Breakers**, **Switchgears**, **Transformers**, **Hazardous Areas Classification** and **Detailed Engineering Drawings**, **Codes** & **Standards**. Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (**ISO 9000:2000**), **ISO 9002**, Quality Assurance, and Projects & Contracts Management.

Presently, Mr. Marave is the **Technical Advisor** of **Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor**, **Engineering Manager**, **Electronics & Instruments Head**, **Electrical**, **Electronics & Instruments Maintenance Superintendent**, **Assistant General Technical Manager** and **Engineering Supervisor** of various international companies such as the **Alumil** Mylonas, **Athens Papermill**, **Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master's** and **Bachelor's** degrees in **Electrical Engineering** from the **Polytechnic Institute of New York** and **Pratt Institute of New York** (**USA**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and an active member of the **Technical Chamber** and the Institute of Electrical and Electronics Engineer (**IEEE**) in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops worldwide.

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: ***Sunday, 15th of December 2024***

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: ***Monday, 16th of December 2024***

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: ***Tuesday, 17th of December 2024***

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: Wednesday, 18th of December 2024

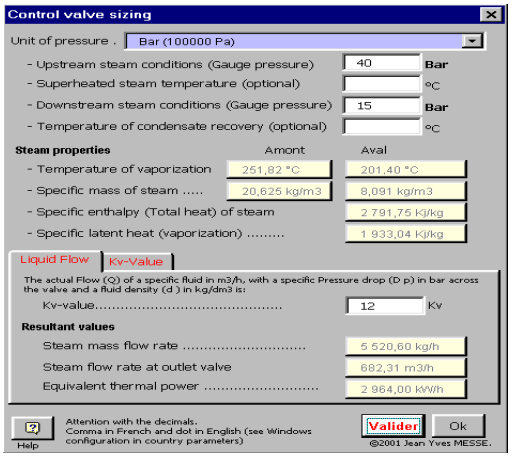
0730 – 0830	***Installation Best Practices:*** *Guidelines for Proper Installation of Control Valves to Ensure Optimal Performance*
0830 – 0930	***Commissioning & Calibration:*** *Procedures for Commissioning New Valves & Calibrating them for the Process*
0930 – 0945	*Break*
0945 – 1100	***Operating 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: Thursday, 19th of December 2024

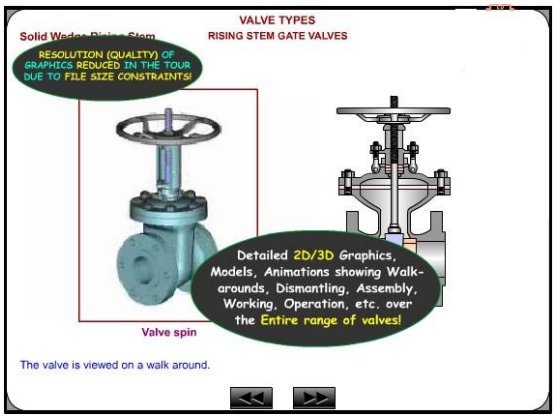
0730 – 0830	***Severe Service Applications:*** *Discussion on Control Valves in Severe Service Applications (e.g., High Pressure, High Temperature, Corrosive Environments)*
0830 – 0930	***Innovations in Valve Design:*** *Recent Innovations in Control Valve Design & Materials*
0930 – 0945	*Break*
0945 – 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)

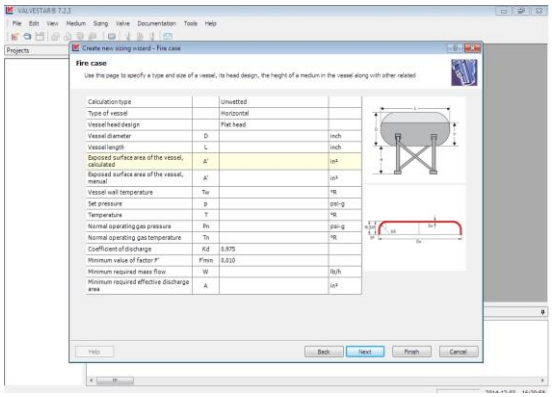
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art "Valve Sizing Software", "Valve Software 3.0", "Valvestar 7.2 Software" and "PRV2SIZE Software".



Valve Sizing Software



Valve Software 3.0



Valvestar 7.2 Software

PRV²SIZE Software

Course Coordinator

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