COURSE OVERVIEW IE0273-4D
Process Controller, Control Loop & Valve Tuning

Course Title
Process Controller, Control Loop & Valve Tuning

Course Date/Venue
Session 1: August 12-15, 2024/ Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA
Session 2: November 11-14, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
IE0273-4D

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.

This course is designed to provide an introduction to process control to engineers and other technical staff. It teaches the base fundamentals, as well as open and closed loop tuning methods. The course is developed with field tuning in mind, not control design.

The course will discuss the control fundamentals and terminology including the principles, control loop as well as the various types and right selection of control valve and describes the process control methods and characteristics of control valve.

It illustrates the different tuning rules available and explains the fundamentals of control systems, proper tuning of PID controllers, the concepts and application of feed forward control, auto tuning and new developments and troubleshooting tuning.

The various types of control valves, actuators and valve selection will also be discussed during the course.

Course Objectives

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

- Apply and gain a basic knowledge on process controller, control loop and valve tuning
- Discuss the control fundamentals and terminology including the principles, control loop as well as the various types and right selection of control valve
- Describe the process control methods and characteristics of control valve
- Illustrate the different tuning rules available and explain the fundamentals of control systems
- Demonstrate the proper tuning of PID controllers and the concepts and application of feed forward control
- Identify auto tuning and new developments and employ good practices and troubleshooting tuning
- Discuss the various types of control valves, actuators and valve selection

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 process controller, control loop & valve tuning for engineers and other technical staff who are willing to learn more about single loop controllers, PID and tuning. The course explains the essence of feedback control without going in-depth into math.

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 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 **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.

- 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.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

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:

Dr. Mike Tay, PhD, MSc, BSc, is a **Senior Electrical**, **Instrumentation & Communications Engineer** with over **40 years** of extensive experience. His expertise widely covers **Protective Devices** Troubleshooting, **Protective Devices** Testing & Maintenance, **Uninterruptible Power Supply** (**UPS**) Design, Industrial **UPS Systems & Battery Power Supplies** Maintenance & Troubleshooting, **UPS & Battery** System, **Battery & Battery Charger & UPS** and Measurement Devices, UPS **System & Battery Chargers** Maintenance & Troubleshooting, **UPS & Battery** Design, Operation, Maintenance & Troubleshooting, UPS **Operation & Alarm Panel** Reading, **Process Control & Instrumentation**, **Process Control** Troubleshooting & Problem Solving, **Process Control System**, Advanced Process Control (**APC**) Technology, **Process Control & Loop Tuning**, **Process Control & Automation**, **Data Accuracy & System Function**, **Control System Interface**, **Artificial Intelligence** Application, **Data Analytics and its Importance**, **AI is Used in Exploration and Production**, **AI for Reservoir Management**, Distributed Control Systems (**DCS**), Programmable Logic Controller (**PLC**), Interruptible Power Systems (**UPS**), Supervisory Control and Data Acquisition (**SCADA**), **Network** Comprehensive, Systems Analysis, **SCADA Security**, ESD System Function, Analysis & Control, Modern **Power Systems Protective Relaying**, **Custody Measurement & Loss Control**, **Fiber Optics** Access Network Planning, **Process Analyzer** & Analytical Instrumentation, **HV/MV Substation** Design & Maintenance, **Combined Cycle Power Generation**, **PLC & SCADA Automation**, Advanced **Online Analyzer**, **Protection Relay** Maintenance, Power System Faults, Current & Voltage **Transformers**, Power System Neutral Grounding, Feeder Overcurrent Protection, **Electrical Protection Systems**, Bus Protection, Motor Protection, **Transformer Protection**, **Generator Protection**, Numerical Relays, **ESD System Analysis** & **Control**, **Custody Measurement**, Safety Instrumented System (**SIS**), Safety Integrity Level (**SIL**), **Power System**, **Power Supply** Design Management, **Diesel Generator**, **Electric Motors** and Basic **Electricity** & **Electrical Codes**. Further, he is also well-versed in **Communications**, **Telecommunications**, Mobile Protocols, 4G LTE, GSM/UMTS, CMDA2000, **WIMAX** Technology, HSPA+, **Alarm** Management System, **Computer Architecture**, Logic & Microprocessor Design, Embedded Systems Design plus **Computer Networking** with **CISCO**, **Network Communication**, **Industrial Digital Communication**, Designing **Telecommunications Distribution System**, Electrical Engineering, **WiMAX Broadband Wireless System**, TT Intranet & ADSL Network, TT Web & Voicemail, Off-site ATM Network, IT Maintenance, Say2000i, IP Phone, National Address & ID Automation, Electricity Distribution Network, Customs Network & Maintenance, **LAN** & **WAN Network**, UYAP Network, **Network Routing Protocols**, Multicast Protocols, Network Management Protocols, Mobile & Wireless Networks and Digital Signal Processing.

During his career life, Dr. Tay worked with various universities and institutions such as the KOC Sistem, Meteksan Sistem, Altek BT, Yasar University, Dokuz Eylul University and METU and occupied significant positions being the **Aegean Region Manager**, **Group Leader**, **Technical Services Manager**, **Field Engineer**, **Instrumentation & Control Engineer**, **Research Assistant**, **Instructor**, **Instrumentation & Control Instructor**, **Technical Advisor**, **Technical Consultant** and **Senior Instructor/Lecturer**.

Dr. Tay has **PhD**, **Master** and **Bachelor** degrees in **Electrical & Electronics Engineering** from the **Dokuz Eylul University** and the **Middle East Technical University** (**METU**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), a **Certified CISCO** (**CCSP**, **CCDA**, **CCNP**, **CCNA**, **CCNP**) **Specialist**, a **Certified CISCO IP Telephony Design Specialist**, **CISCO Rich Media Communications Specialist**, **CISCO Security Solutions** & **Design Specialist** and **Information Systems Security** (**INFOSEC**) **Professional**. He has further hold certification in Fundamentals of Process Control and Understanding Process Control: An Overview and delivered and presented innumerable trainings, courses, workshops, seminars and conferences worldwide.

Course Fee

US$ 4,500 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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Control Fundamentals*** *Terminology ● Principles of Control ● Basic Control Loop*
0930 – 0945	*Break*
0945 – 1100	***Control Fundamentals (cont'd)*** *Advanced Control Loop ● Control Algorithm ● Control System*
1100 – 1215	***Control Valve Types*** *Butterfly ● Eccentric ● Rotary Plug ● Ball ● Plug ● Linear Valves ● Globe ● Cage ● Double Port ● How to Select the Right Valve?*
1215 – 1230	*Break*
1230 – 1420	***Process Control Methods*** *Open Loop ● Process Behaviour ● Time Lags ● Selection of Type of Controller ● Proportional ● Integral ● Derivative ● Feedback ● Cascade ● Ratio ● Feed Forward*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Control Valve Characteristics*** *Selection of Flow Characteristics ● Sizing Steps ● Classification*
0930 – 0945	*Break*
0945 – 1100	***Control Valve*** *Cavitation ● Flashing ● Noise*
1100 – 1215	***Different Tuning Rules Available*** *Overshoot ● Lambda Tuning ● Trial Tuning ● Cohen Coon Tuning ● Process Controlability ● Suggestions & Rules of Thumb*
1215 – 1230	*Break*
1230 – 1420	***Fundamentals of Control Systems*** *On-Off Control ● Cascade ● Ratio ● FF ● FB ● Prop. Band ● Integral ● Derivative ● Direct/Reverse*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

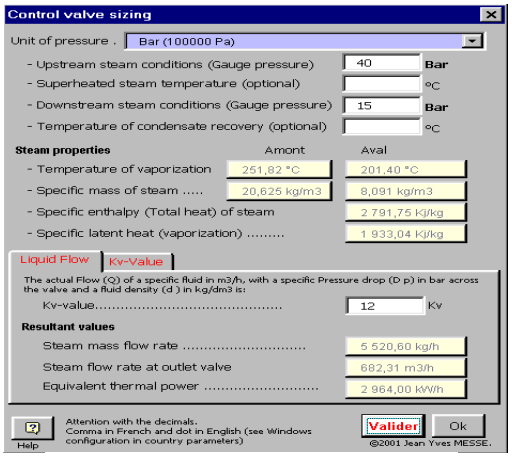
0730 – 0930	***Tuning of PID Controllers*** *Open Loop ● Ziegler Nichols*
0930 – 0945	*Break*
0945 – 1100	***Tuning of PID Controllers (cont'd)*** *Continuing Cycling Method ● Response Lags ● Closed Loop Control*
1100 – 1215	***VIDEO Presentation*** *Control Tuning*
1215 – 1230	*Break*
1230 – 1420	***Concepts & Application of Feed Forward Control***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 4

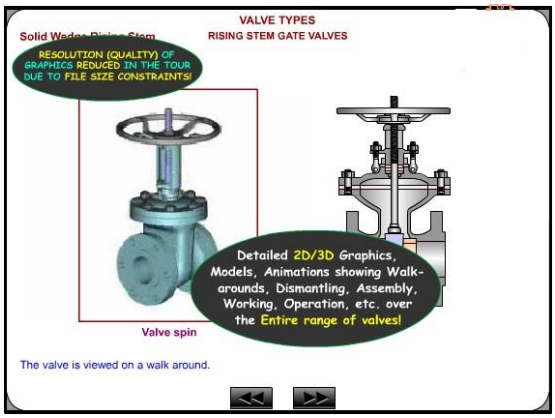
0730 – 0930	***Auto Tuning & New Developments***
0930 – 0945	*Break*
0945 – 1100	***Good Practices & Troubleshooting Tuning***
1100 – 1215	***Good Practices & Troubleshooting Tuning (cont'd)***
1215 – 1230	*Break*
1230 – 1345	***Types of Control Valves, Actuators & Valve Selection***
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

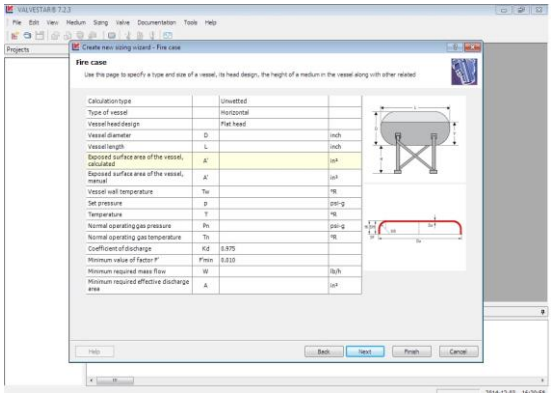
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators "Valve Sizing Software", "Valve Software 3.0", "Valvestar 7.2 Software" and "PRV2SIZE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



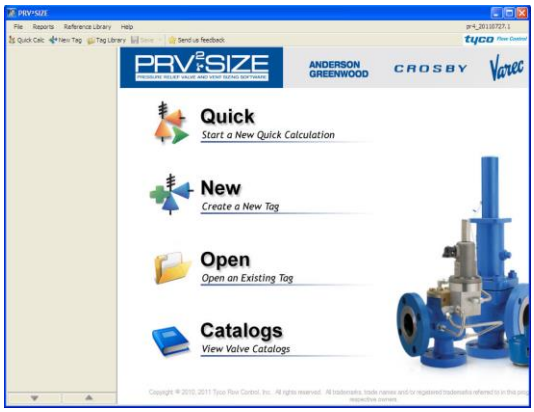
Valve Sizing Software



Valve Software 3.0



Valvestar 7.2 Software



PRV²SIZE Software

Course Coordinator

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