



**COURSE OVERVIEW GE0017**  
**P&IDs, Pipe Sizing, Piping Layouts & Isometrics**

**Course Title**

P&IDs, Pipe Sizing, Piping Layouts & Isometrics

**Course Date/Venue**

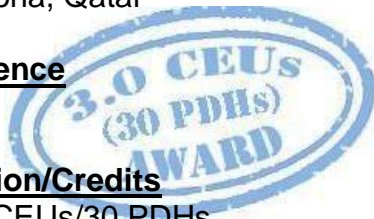
August 04-08, 2024/Boardroom, Warwick Hotel Doha, Doha, Qatar

**Course Reference**

GE0017

**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs

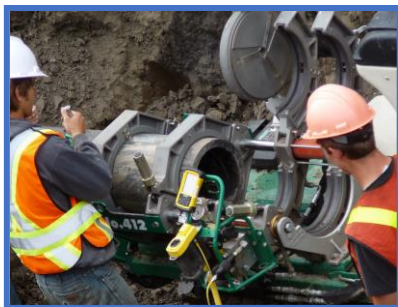


**Course Description**

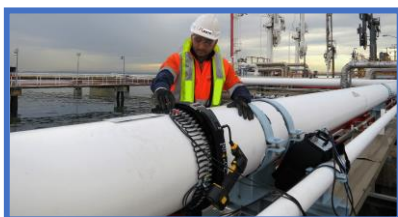


***This practical and highly-interactive course includes practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***

This course is designed to provide participants with a detailed and up-to-date overview of P&IDs, Pipe Sizing, Piping Layouts and Isometrics. It covers the purpose and importance of P&IDs and process flow diagrams in process engineering; creating P&IDs, identifying process and utility streams and selecting equipment and instrumentation; reviewing and verifying P&IDs for accuracy; the pipe sizing fundamentals and calculating pressure drop using various methods; the piping layout principles, different types of piping systems, equipment and piping arrangement considerations; the safety factors and regulatory requirements; and the efficient piping layout and routing and spacing of process and utility lines, pipe supports, expansion loops and stress analysis.



Further, the course will also discuss the clash detection and resolution in complex piping layouts including optimization techniques for minimizing pipe lengths and pressure drops; the isometric drawings, isometric symbols, annotations and dimensioning; the computer-aided design (CAD) software for isometric generation; customizing isometric drawings based on project requirements; and adding annotations, bill of materials and other details to isometrics.





During this interactive course, participants will learn the piping material specifications and standards; selecting appropriate materials based on process conditions and fluid properties; the material compatibility, corrosion resistance and temperature limitations; the welding procedures and inspection requirements; complying with industry codes and regulations in piping design; the piping documentation packages for construction and fabrication; the piping construction sequencing and project scheduling; coordinating with other engineering disciplines; and the quality control and quality assurance in piping design.

### **Course Objectives**

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

- Apply and gain an in-depth knowledge on P&IDs, pipe sizing, piping layouts and isometrics
- Discuss purpose and importance of P&IDs and process flow diagrams in process engineering
- Create P&IDs, identify process and utility streams, select equipment and instrumentation as well as review and verify P&IDs for accuracy
- Discuss pipe sizing fundamentals and calculate pressure drop using various methods
- Recognize piping layout principles, different types of piping systems, equipment and piping arrangement considerations, safety factors and regulatory requirements
- Design an efficient piping layout and illustrate routing and spacing of process and utility lines, pipe supports, expansion loops and stress analysis
- Apply clash detection and resolution in complex piping layouts including optimization techniques for minimizing pipe lengths and pressure drops
- Read and interpret isometric drawings, identify isometric symbols and annotations and illustrate dimensioning and annotation of isometric drawings
- Utilize computer-aided design (CAD) software for isometric generation, customize isometric drawings based on project requirements and add annotations, bill of materials and other details to isometrics
- Discuss piping material specifications and standards and select appropriate materials based on process conditions and fluid properties
- Determine material compatibility, corrosion resistance and temperature limitations
- Carryout welding procedures and inspection requirements and comply with industry codes and regulations in piping design
- Create piping documentation packages for construction and fabrication
- Illustrate piping construction sequencing and project scheduling
- Coordinate with other engineering disciplines and apply quality control and quality assurance in piping design



### 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 P&IDs, pipe sizing, piping layouts and isometrics for piping design engineers, process engineers, mechanical engineers, project managers, engineering drafters engineering designers, plant operators and maintenance personnel.

### 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\$ 6,000** per Delegate. 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. Karl Thanasis**, PEng, MSc, MBA, BSc, is **Senior Engineer** with over **45 years** of extensive industrial experience. His wide expertise includes **Detailed Engineering Drawings, Codes & Standards, P&ID Reading, Interpretation & Developing, Drawing Interpretation, Piping & Instrument Drawing, Piping & Pipeline, Pipe Sewer Condition, Pipe Measurement, Pipe Sizing, Pipe Layouts, Pipe Fitting, Pipeline Design & Construction, Gas Pipe Line Operation & Maintenance, Maintenance, Repair, Piping System, Power Plant Performance, Efficiency & Optimization, Storage Tank Design & Fabrication, Thermal Power Plant Management, Boiler & Steam System Management, Pump Operation & Maintenance, Chiller & Chiller Plant Design & Installation, Pressure Vessel, Safety Relief Valve Sizing & Selection, Valve Disassembling & Repair, Pressure Relief Devices (PSV), Hydraulic & Pneumatic Maintenance, Advanced Valve Technology, Pressure Vessel Design & Fabrication**. Further, he is also versed in Water Meter Reading System (MMR), Fundamentals of **Water Utility Regulation, Water Network Systems & Pumping Stations, Hydraulic Modelling for Water Network Design, Water Chemistry, Wastewater Treatment Technology, Networking System, Water Network Design, Industrial Water Treatment in Refineries & Petrochemical Plants, Water Movement, Water Filtering, Mud Pumping, Sludge Treatment and Drying, Aerobic Process of Water Treatment** that includes **Aeration, Sedimentation and Chlorination Tanks**. His strong background also includes **Design and Sizing of all Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps, Filters, Metering Pumps, Aerators and Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer and Design Engineer**. His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction and Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal**. He has worked in various companies worldwide in the **USA, Germany, England and Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA and Greece** and has a **Master's and Bachelor's degree in Mechanical Engineering with Honours** from the **Purdue University and SIU in USA** respectively as well as an **MBA** from the **University of Phoenix in USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.



### 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: Sunday, 04<sup>th</sup> of August 2024**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Introduction to P&amp;IDs &amp; Process Flow Diagrams</b> Purpose & Importance of P&IDs in Process Engineering • Symbols, Abbreviations & Conventions Used in P&IDs
0930 – 0945	Break
0945 – 1100	<b>Introduction to P&amp;IDs &amp; Process Flow Diagrams (cont'd)</b> Identifying & Interpreting Equipment, Instruments & Process Lines on P&IDs • Process Flow Diagrams (PFDs) & their Relationship to P&IDs
1100 – 1215	<b>P&amp;ID Development &amp; Documentation</b> Step-by-step Guide to Creating P&IDs • Identifying Process & Utility Streams • Equipment & Instrumentation Selection & Placement
1215 – 1230	Break
1230 – 1420	<b>P&amp;ID Development &amp; Documentation (cont'd)</b> Documentation & Annotation of P&IDs • Reviewing & Verifying P&IDs for Accuracy
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: Monday, 05<sup>th</sup> of August 2024**

0730 – 0930	<b>Pipe Sizing Fundamentals</b> Fluid Flow Principles • Pipe Sizing Criteria & Considerations • Calculation Methods for Determining Pipe Diameter
0930 – 0945	Break
0945 – 1100	<b>Pipe Sizing Fundamentals (cont'd)</b> Pressure Drop Calculations & their Impact on Pipe Sizing • Selection of Pipe Materials Based on Process Requirements
1100 – 1215	<b>Pipe Sizing Calculations &amp; Software Tools</b> Detailed Exploration of Pipe Sizing Calculations • Calculation of Pressure Drop Using Various Methods (Darcy-Weisbach, Hazen-Williams, etc.)
1215 – 1230	Break
1230 – 1420	<b>Pipe Sizing Calculations &amp; Software Tools (cont'd)</b> Optimal Pipe Sizes Based on Flow Rates & Velocities • Software Tools for Pipe Sizing & Analysis
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: Tuesday, 06<sup>th</sup> of August 2024**

0730 – 0930	<b>Piping Layout Fundamentals</b> <i>Piping Layout Principles • Different Types of Piping Systems (Single-Line, Double-Line, Grid, etc.)</i>
0930 – 0945	<i>Break</i>
0945 – 1100	<b>Piping Layout Fundamentals (cont'd)</b> <i>Equipment and Piping Arrangement Considerations • Safety Factors and Regulatory Requirements in Piping Layouts • 3D Modeling and Virtual Piping Layout Tools</i>
1100 – 1215	<b>Piping Layout Design &amp; Optimization</b> <i>Step-by-step Guide to Designing an Efficient Piping Layout • Routing and Spacing of Process and Utility Lines • Pipe Supports, Expansion Loops, and Stress Analysis</i>
1215 – 1230	<i>Break</i>
1230 – 1420	<b>Piping Layout Design &amp; Optimization (cont'd)</b> <i>Clash Detection and Resolution in Complex Piping Layouts • Optimization Techniques for Minimizing Pipe Lengths and Pressure Drops</i>
1420 – 1430	<b>Recap</b> <i>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</i>
1430	<i>Lunch &amp; End of Day Three</i>

**Day 4: Wednesday, 07<sup>th</sup> of August 2024**

0730 – 0930	<b>Piping Isometrics: Introduction &amp; Interpretation</b> <i>Piping Isometrics and their role in Construction and Fabrication • Reading and Interpreting Isometric Drawings • Identifying &amp; Understanding Isometric Symbols and Annotations</i>
0930 – 0945	<i>Break</i>
0945 – 1100	<b>Piping Isometrics: Introduction &amp; Interpretation (cont'd)</b> <i>Dimensioning and Annotation of Isometric Drawings • Isometrics for Accuracy and Consistency with P&amp;IDs</i>
1100 – 1215	<b>Isometric Generation &amp; Software Tools</b> <i>Software Tools for Generating Isometric Drawings • Utilizing Computer-Aided Design (CAD) Software for Isometric Generation</i>
1215 – 1230	<i>Break</i>
1230 – 1420	<b>Isometric Generation &amp; Software Tools (cont'd)</b> <i>Customizing Isometric Drawings Based on Project Requirements • Adding Annotations, Bill of Materials, and Other Details to Isometrics</i>
1420 – 1430	<b>Recap</b> <i>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</i>
1430	<i>Lunch &amp; End of Day Three</i>



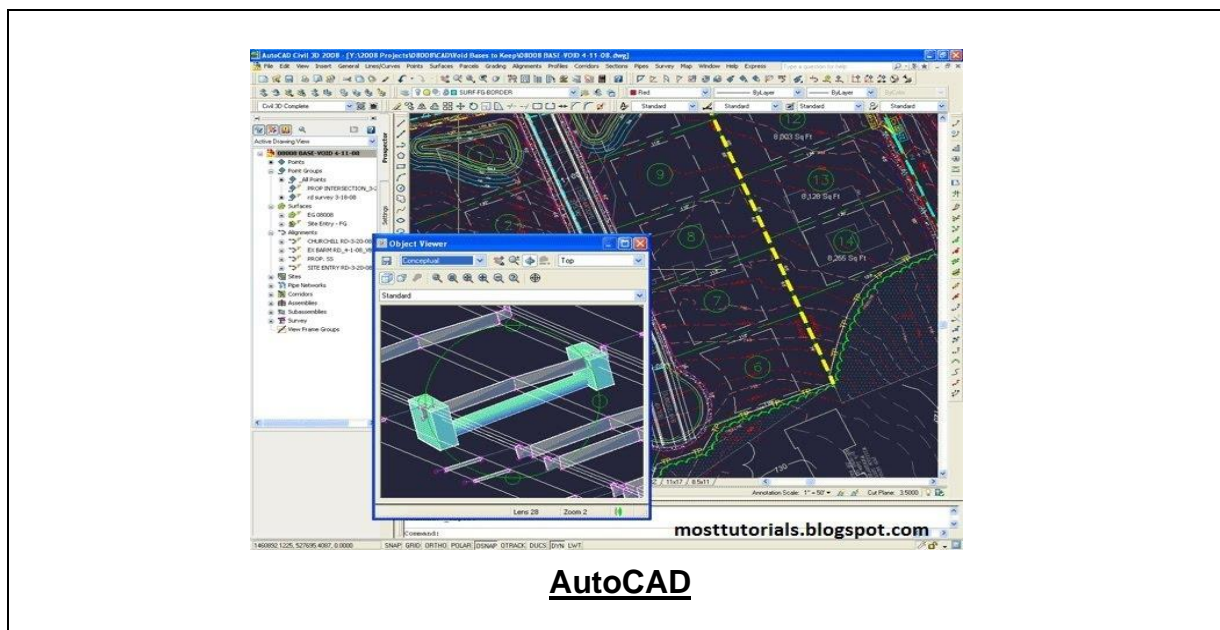


**Day 5: Thursday, 08<sup>th</sup> of August 2024**

0730 – 0930	<b>Piping Material Specifications &amp; Codes</b> <i>Piping Material Specifications and Standards (ASME B31.3, ASTM, etc.) • Selection of Appropriate Materials Based on Process Conditions and Fluid Properties</i>
0930 – 0945	<i>Break</i>
0945 – 1100	<b>Piping Material Specifications &amp; Codes (cont'd)</b> <i>Material Compatibility, Corrosion Resistance, and Temperature Limitations • Welding Procedures and Inspection Requirements • Compliance with Industry Codes and Regulations in Piping Design</i>
1100 – 1215	<b>Piping Documentation &amp; Project Management</b> <i>Creating Piping Documentation Packages for Construction and Fabrication • Piping Construction Sequencing and Project Scheduling • Coordination with Other Engineering Disciplines (Civil, Electrical, etc.)</i>
1215 – 1230	<i>Break</i>
1230 – 1345	<b>Piping Documentation &amp; Project Management (cont'd)</b> <i>Quality Control and Quality Assurance in Piping Design • Reviewing and Finalizing Piping Deliverables for Project Completion</i>
1345 – 1400	<b>Course Conclusion</b> <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch &amp; End of Course</i>

**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 “AutoCAD” software.



**Course Coordinator**

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