# COURSE OVERVIEW GE0200

# Detailed Engineering Drawings, Codes & Standards

*P&ID Reading, Interpretation & Developing*

**Course Title**

Detailed Engineering Drawings, Codes & Standards: *P&ID Reading, Interpretation & Developing*

**Course Date/Venue**

July 20-24, 2025/Meeting Plus 9, City Centre Rotana, Doha, Qatar

**Course Reference**

GE0200

**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs

***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 Detailed Engineering Drawings, Codes & Standards: P&ID Reading, Interpretation & Developing. It covers the engineering drawing types, drawing standards and codes, line types, symbols and abbreviations; the title blocks and revisions, scale, dimensions, projections and process flow diagrams (PFDs); the purpose and structure of P&IDs, piping system representation and equipment representation on P&IDs; the valves and fittings on P&IDs and instrumentation symbols and tagging; and the legend sheets and line lists.

During this interactive course participants will learn the control loop interpretation, process safety representation and alarm and shutdown systems; the cause and effect diagram, instrument and loop diagrams (ILDs) and interfacing mechanical and electrical systems; the P&ID review and verification techniques; the piping isometric drawing interpretation, loop checking and pre-startup validation; the QA/QC in drawing preparation; the isolation planning and LOTO procedures; the maintenance tagging, temporary modifications and bypasses and documenting field changes and redlines; the MOC process integration and impact of changes on drawings; and the approvals and revision tracking and operational accuracy.

## Course Objectives

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

- Apply and gain an in-depth knowledge on detailed engineering drawings, codes and standards including P&ID reading and interpretation
- Discuss the engineering drawing types, drawing standards and codes, line types, symbols and abbreviations
- Recognize title blocks and revisions, scale, dimensions and projections and process flow diagrams (PFDs)
- Explain the purpose and structure of P&IDs, piping system representation and equipment representation on P&IDs
- Identify valves and fittings on P&IDs, instrumentation symbols and tagging, legend sheets and line lists
- Apply control loop interpretation and process safety representation and identify alarm and shutdown systems
- Illustrate cause and effect diagram as well as instrument and loop diagrams (ILDs) and interfacing mechanical and electrical systems
- Interpret multi-disciplinary drawing sets and carryout P&ID review and verification techniques and piping isometric drawing interpretation
- Apply loop checking and pre-startup validation as well as QA/QC in drawing preparation
- Determine the P&ID role in design and engineering and P&ID use in commissioning and operations
- Carryout isolation planning and LOTO procedures, maintenance tagging, temporary modifications and bypasses and documenting field changes and redlines
- Apply MOC process integration, reviewing impact of changes on drawings, approvals and revision tracking and ensuring operational accuracy

## 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 advanced materials for construction and repair of concrete for civil engineers, structural engineers, material specialists, quality control and quality assurance experts, construction supervisors, engineers and contractors.

## 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

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 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.

**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. Tony Dimitry**, PhD, MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **35 years** of industrial experience within the **Petroleum**, **Oil & Gas**, **Petrochemical**, **Nuclear & Power** industries. His expertise covers Revising **Engineering Drawings**, **Engineering Drawings & Diagrams**, **AutoCAD & GIS Support**, Retailed **Engineering Drawings**, Codes & Standards, **Mechanical Diagrams** Interpretation, Reading **Engineering Drawings**, **Process & Project Drawings**, **Engineering Drawings** Interpretation, **Piping Layouts & Isometrics**, **P&ID** Reading & Interpretation, Glass Reinforced Epoxy (**GRE**), Glass Reinforced Pipes (**GRP**), Glass Reinforced Vent (**GRV**), **Mechanical Pipe Fittings**, **Flange Joint Assembly**, Adhesive Bond Lamination, **Butt Jointing**, **Joint & Spool Production**, **Isometric Drawings**, **Flange Assembly** Method, **Fabrication & Jointing**, Jointing & Spool Fabrication, **Pipe Cuttings**, **Flange Bolt Tightening** Sequence, **Hydro Testing**, **Failure Analysis Methodologies**, Machinery Root Cause Failure Analysis (**RCFA**), **Preventive Maintenance** & **Condition Monitoring**, Reliability Centred Maintenance (**RCM**), Risk Based Inspection (**RBI**), Root Cause Analysis (**RCA**), **Planning & Managing Plant Turnaround**, **Scheduling Maintenance**, **Data Archive Maintenance**, **Master Milestone Schedule** (**MMS**), Piping & Mechanical **Vibration Analysis**, Preventive & Predictive Maintenance (**PPM**) **Maintenance**, Condition Based Monitoring (**CBM**), Risk Based Assessment (**RBA**), Planning & Preventive Maintenance, **Maintenance** Management (**Preventive**, **Predictive**, **Breakdown**), **Reliability** Management, Rotating Equipment, Scheduling & Cost Control, **Maximo** Foundation, **Maximo** Managing Work, **Asset Management Best Practices**, **Resource Management**, **Inventory Set-up & Management**, **Work Management**, Automatic & Work Flows & Escalations, **Vibration Analysis**, **Heat Exchanger**, **Siemens**, **Gas & Steam Turbine Maintenance**, **Pumps & Compressors**, **Turbo-Expanders**, **Fractional Columns**, **Boilers**, **Cryogenic Pumps** for **LNG**, **Electromechanical Maintenance**, **Machinery Alignment**, **Lubrication Technology**, **Bearing & Rotary Machine**, **Blower & Fan**, **Shaft Repair**, **Safety Relief Valves**, **Pipelines**, **Piping**, **Pressure Vessels**, **Process Equipment**, **Diesel Engine & Crane Maintenance**, **Tanks & Tank Farms**, **Pneumatic System**, **Static Equipment**, **FMEA**, **Corrosion**, **Metallurgy**, **Thermal** and **Electrical Modelling** of **Battery Problems**. He is also well-versed in various simulators such as i-**Learn Vibration**, **AutoCAD**, **Word Access**, **Aspen One**, **Fortran**, **VB**, **C ANSYS**, **ABAQUS**, **DYNA3D**, **Ceasar**, **Caepipe**, **MS Project**, **Primavera**, **MS Excel**, **Maximo**, **Automation Studio** and **SAP**. Currently, he is the **Maintenance Manager** of the PPC Incorporation wherein he is responsible for the maintenance and upgrading of all **Power Station** components.

During his career life, Dr. Dimitry held a significant positions such as the **Operations Engineers**, **Technical Trainer**, **HSE Contracts Engineer**, **Boilers Section Engineer**, **Senior Engineer**, **Trainee Mechanical Engineer**, **Engineer**, **Turbines Section Head**, **Professor**, **Lecturer/Instructor** and **Teaching Assistant** from various multinational companies like **Chloride Silent Power Ltd.**, **Technical University of Crete**, **National Nuclear Corporation**, **UMIST Aliveri Power Station** and **HFO Fired Power Station**.

Dr. Dimitry has **PhD**, **Master** and **Bachelor** degrees in **Mechanical Engineering** from the **Victory University of Manchester** and the **University of Newcastle**, **UK** respectively. Further, he is a **Certified Instructor/Trainer,** a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and an associate member of the American Society of Mechanical Engineers (**ASME**) and Institution of Mechanical Engineers (**IMechE**). He has further delivered various trainings, seminars, courses, workshops and conferences internationally.

## 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 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, 20th of July 2025***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Introduction to Engineering Drawing Types***<br>*Block Diagrams, PFDs, P&IDs, Isometrics • General Arrangement (GA) & Layout Drawings• Electrical & Instrumentation Drawings • Fabrication & Shop Drawings* |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Drawing Standards & Codes Overview***<br>*ASME Y14.5 (Geometric Dimensioning & Tolerancing) • ISO 14617: Graphical Symbols for Diagrams • ANSI/ISA 5.1 – Instrumentation Symbols & Identification • API, IEC & Company-Specific Drafting Practices* |
| *1030 – 1130* | ***Line Types, Symbols & Abbreviations***<br>*Process Lines, Utility Lines & Signal Lines • Standard Legend Symbols for Valves, Equipment & Piping • Reading Line Weights, Dashes & Connection Indicators • Standardized Abbreviations & Codes* |
| *1130 – 1215* | ***Understanding Title Blocks & Revisions***<br>*Drawing Title & Numbering Systems • Revision History & Change Control • Approval Workflow & Sign-Offs • Drawing Status: Preliminary, Issued for Review, Construction* |
| *1215 – 1230* | *Break* |
| *1230 – 1330* | ***Scale, Dimensions & Projections***<br>*Orthographic versus Isometric Projections • Units & Dimensional Tolerances • Use of Scales & Dimension Annotations • Pipe Routing & Elevation Considerations* |
| *1330 – 1420* | ***Basics of Process Flow Diagrams (PFDs)***<br>*Purpose & Structure of PFDs • Major Equipment & Control Logic • Basic Flow Representation & Simplification • Linking PFDs to P&IDs* |
| *1420 – 1430* | ***Recap***<br>*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, 21st of July 2025 |
|---|---|
| 0730 – 0830 | ***Purpose & Structure of P&IDs***<br>*Role in Engineering & Operations • Integration with Other Engineering Documents • Lifecycle of a P&ID • Key Differences Between PFDs & P&IDs* |
| 0830 – 0930 | ***Piping System Representation***<br>*Pipe Classes & Specifications • Primary & Secondary Process Lines • Utility & Drain Lines • Pipe Sizes & Insulation/Tracing Indication* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Equipment Representation on P&IDs***<br>*Vessels (Tanks, Columns, Drums) • Pumps, Compressors, Turbines • Heat Exchangers, Filters, Reactors • Equipment Tags & Numbering Systems* |
| 1100 – 1215 | ***Valves & Fittings on P&IDs***<br>*Valve Types: Gate, Globe, Ball, Butterfly, Control, Check • Valve Actuation Types & Symbols • Flanges, Reducers, Strainers, Drains • Valve Numbering & Line Identifiers* |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Instrumentation Symbols & Tagging***<br>*ISA S5.1 Instrumentation Symbol Structure • Tagging Conventions for Transmitters, Indicators & Controllers • Control Loop Identification • Instrument Line Types (Pneumatic, Hydraulic, Electrical)* |
| 1330 – 1420 | ***Legend Sheets & Line Lists***<br>*Standardization of Legend & Symbol Sheets • Use of Line List Documents • Piping Class & Material Specification Reference • Line List Components & Linking to Drawings* |
| 1420 – 1430 | ***Recap***<br>*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, 22nd of July 2025 |
|---|---|
| 0730 – 0830 | ***Control Loop Interpretation***<br>*Closed & Open Loop Systems • Controllers, Setpoints & Feedback Mechanisms • Control Logic Representation • Integration with DCS/PLC Systems* |
| 0830 – 0930 | ***Process Safety Representation***<br>*Safety Relief Valves & Rupture Disks • Interlocks & Emergency Shutdown Systems • Instrumented Protective Functions (IPFS) • Fire & Gas System Integration* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Alarm & Shutdown Systems***<br>*High-High, Low-Low Alarms • Shutdown Trips & Permissives • Instrument Trip Logic • Annunciators & Alarm Panels* |
| 1100 – 1215 | ***Cause & Effect Diagram Overview***<br>*Relationship with P&IDs • Mapping of Initiating Events to Outputs • Safety System Logic Development • SIL-Rated Instrument Integration* |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Instrument & Loop Diagrams (ILDS)***<br>*Wiring from Field Instruments to Control System • Loop Drawing Structure & Identification • Termination Details & Junction Boxes • Cross-Reference with P&IDs* |

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| *1330 – 1420* | ***Interfacing Mechanical & Electrical Systems***<br>*Motor Control Centers (MCCs) in P&IDs • Instrument Power Supply Notations • Solenoid & Relay Representation • Interface Between Mechanical Equipment & Control Logic* |
| *1420 – 1430* | ***Recap***<br>*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:*** ***Wednesday, 23rd of July 2025***

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| *0730 – 0830* | ***Interpreting Multi-Disciplinary Drawing Sets***<br>*Linking P&IDs with GA, Piping Layouts & Isometrics • Coordination with Civil/Structural & Electrical Layouts • Equipment Layout & Access Requirements • Matching Equipment & Instrument Tags Across Disciplines* |
| *0830 – 0930* | ***P&ID Review & Verification Techniques***<br>*P&ID Walkdown Procedures • Redline Mark-Ups & As-Built Updates • Pre-Commissioning Verification • P&ID Audit Checklists* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Piping Isometric Drawing Interpretation***<br>*Dimensioning Conventions in Isometrics • Pipe Supports & Hanger Locations • Spool Numbers & Fabrication Breakdown • Bill of Materials & Weld Map* |
| *1100 – 1215* | ***Loop Checking & Pre-Startup Validation***<br>*Instrument Loop Verification Based on P&IDs • Mechanical Completion Tracking • Punch Listing & System Readiness • Startup Interlock Testing* |
| *1215 – 1230* | *Break* |
| *1230 – 1330* | ***QA/QC in Drawing Preparation & Review***<br>*Document Control & Drawing Issuance • Quality Review Procedures • Engineering Deliverable Verification • Client & Regulatory Compliance* |
| *1330 – 1420* | ***Hands-On P&ID Exercises***<br>*Reading Real P&ID Examples • Finding Discrepancies & Missing Links • Matching Legends with Symbols • Group Discussions & Findings* |
| *1420 – 1430* | ***Recap***<br>*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:*** ***Thursday, 24th of July 2025***

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| *0730 – 0830* | ***P&ID Role in Design & Engineering***<br>*Conceptual & Detailed Design Applications • Equipment Sizing & Process Control Input • Basis for HAZOP & SIL Studies • Link to Control Philosophy* |
| *0830 – 0930* | ***P&ID Use in Commissioning & Operations***<br>*Loop Testing & Pre-Commissioning • Operator Training & Simulations • Troubleshooting & Incident Investigation • Modifications & Field Changes* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***P&IDs in Maintenance & Turnarounds***<br>*Isolation Planning & LOTO Procedures • Maintenance Tagging • Temporary Modifications & Bypasses • Documenting Field Changes & Redlines* |

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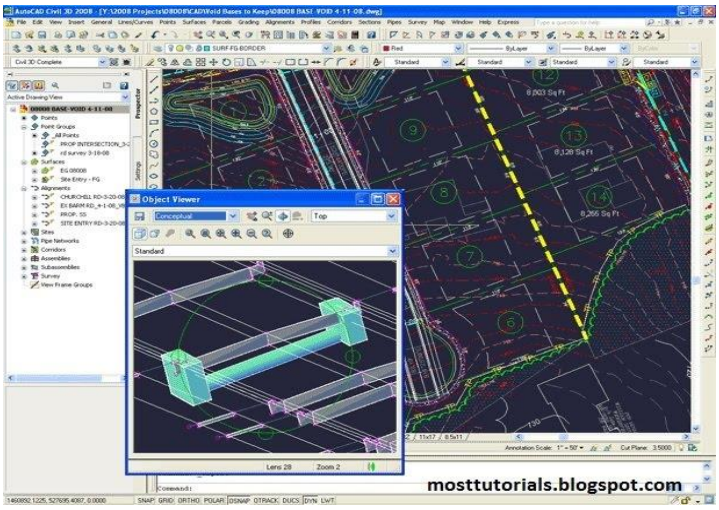
| *1100 – 1230* | ***Management of Change (MOC) & P&IDs***<br>*MOC Process Integration • Reviewing Impact of Changes on Drawings • Approvals & Revision Tracking • Ensuring Operational Accuracy* |
| *1230 – 1245* | *Break* |
| *1245 – 1345* | ***Case Studies in P&ID Misinterpretation***<br>*Valve Misplacement Causing Operational Issues • Incorrect Instrumentation Tag Causing Alarm Failure • Real Incidents from Industry Audits • Lessons Learned & Preventive Practices* |
| *1345 – 1400* | ***Course Conclusion***<br>*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* |

## 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.




**AutoCAD**

## Course Coordinator

Reem Dergham, Tel: +974 4423 1327, Email: reem@haward.org