COURSE OVERVIEW PE0536
Design and Simulation of Gas Distribution Networks

Course Title
Design and Simulation of Gas Distribution Networks

Course Date/Venue
August 30-September 03, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE or Online Virtual Training

3.0 CEUs (30 PDHs) AWARD

H-STK© INCLUDED

Course Reference
PE0536

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 Design and Simulation of Gas Distribution Networks. It covers the gas distribution systems and properties of natural gas and flow behavior; the components of gas distribution networks, design codes and standards and demand estimation, load forecasting and network design philosophy; the fluid flow equations for gas systems, pressure drop and flow rate analysis; the pipe sizing methodology and pressure regulation and control; and the compressor and booster station concepts and manual network calculation techniques.

During this interactive course, participants will learn the gas network modeling, data preparation for simulation and normal operating conditions; the calibration and validation of models, network expansion, future planning and optimization techniques; the reliability and risk assessment, safety design and emergency analysis; the SCADA and monitoring integration, GIS integration and digital mapping; the operation and maintenance of gas networks and integrity management systems; and the emergency response and incident management, economic analysis of network designs and design documentation and deliverables.

Course Objectives

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

- Apply and gain an in-depth knowledge on design and simulation of gas distribution networks
- Discuss gas distribution systems, properties of natural gas and flow behavior and components of gas distribution networks
- Explain design codes and standards, demand estimation and load forecasting as well as network design philosophy
- Recognize fluid flow equations for gas systems and apply pressure drop and flow rate analysis and pipe sizing methodology
- Carryout pressure regulation and control, compressor and booster station concepts and manual network calculation techniques
- Illustrate gas network modeling, data preparation for simulation and normal operating conditions
- Employ calibration and validation of models including network expansion, future planning and optimization techniques
- Apply reliability and risk assessment, safety design and emergency analysis and SCADA and monitoring integration
- Carryout GIS integration and digital mapping, operation and maintenance of gas networks and integrity management systems
- Apply emergency response and incident management, economic analysis of network designs and design documentation and deliverables

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 design and simulation of gas distribution networks for gas network engineers and designers, mechanical, process, petroleum and chemical engineers, operations and maintenance personnel, simulation and modeling specialists, utility and energy company staff, HSE officers and safety professionals, regulators and government officials, consultants and technical advisors and other technical staff.

Accommodation

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

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

F2F Classroom: **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.

Online Virtual: **US$ 2,750** per Delegate + **VAT**.

Virtual Training (If Applicable)

If this course is delivered online as a Virtual Training, the following limitations will be applicable:-

Certificates	Only soft copy certificates will be issued to participants through Haward's Portal. This includes Wallet Card Certificates if applicable
Training Materials	Only soft copy Training Materials (PDF format) will be issued to participant through the Virtual Training Platform
Training Methodology	80% of the program will be theory and 20% will be practical sessions, exercises, case studies, simulators or videos
Training Program	The training will be for 4 hours per day starting at 0930 and ending at 1330
H-STK Smart Training Kit	Not Applicable
Hands-on Practical Workshops	Not Applicable
Site Visit	Not Applicable
Simulators	Only software simulators will be used in the virtual courses. Hardware simulators are not applicable and will not be used in Virtual Training

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:

Mr. Robert Harvey, MSc (Cum Laude), BSc is a **Senior Process & Chemical Engineer** with over **30 years** of in-depth industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical**, **Mining** and **Power** industries. His expertise widely covers in the areas of **Oil & Gas Value Chain**, **Global Energy** System, **Environmental & Social Impacts** of Oil & Gas, **Pipeline Systems & Operations**, **Operations Abnormalities & Plant Upset**, **Fertilizer Manufacturing** Process Technology, **Fertilizer Storage** Management (Ammonia & Urea), **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Process Equipment** Design & Troubleshooting, **Process Equipment & Piping Systems**, **Fertilizer** Manufacturing Process Technology, **Production** Management, **Process Plant** Optimization & Continuous Improvement, **Production Process** Optimization, **Process Analyzers**, **Process Equipment** Design, Vinyl Chloride Monomer (**VCM**) Manufacturing & Process Troubleshooting, **Cement** Manufacturing Process Technology & Standards, **Process Equipment & Piping** System, **Process Plant** Optimization & Continuous Improvement, **Process Plant** Performance & Efficiency, **Troubleshooting Process Operations**, Modern **Aluminium Production Processes**, **Cement Kiln Process**, **Process Engineer Calculations**, Steel Making Process, **Process Diagrams** Review, Process Hazard Analysis (**PHA**), Process Mapping, Strategical Process Control in Process Industry, **Revamping & Debottlenecking**, **Pressure Vessel** Operation, **Heat Mass Balance**, **Distillation-Column** Operation, & Troubleshooting, **Debottlenecking**, **Unit Performance** Optimization, Real Time Online Optimization, **Operations Planning** Optimization, **Engineering Problem Solving**, **Bag Filters** Operation & Maintenance, Chemical Reaction Engineering Application, **Phosphatic Industry**, **Diammonium Phosphate**, **Monoammonium Phosphate**, **NPK**, Troubleshooting Improvement, **Production** Management, **Distillation-Column** Operation & Troubleshooting, **Monomer** Handling Safety, Complex Operational Troubleshooting, Incident **Root Cause Analysis** & Corrective Action, **Fertilizer** Manufacturing, Continuous Improvement & Benchmarking, **Energy Efficiency** for Process Plants, **Pressure Vessel** Operation, **Reactors & Storage Tanks**, Dehydrating Columns, Heat & Material Balance, **P&ID** Reading & Interpretation, **Detailed Engineering Design**, **HAZOP** Leadership, Project HSE Review (**PHSER**), Safe Handling of **Propylene Oxide & Ethylene Oxide**, Safety in **Process & Industrial Plants**, Environmental Impact Assessment (**EIA**) and Effective **Risk Assessment & HAZOP** Studies. Further, he is also well versed in Feasibility Studies Analysis & Evaluation, Project Gate System Procedures, Change Management Skills, Change Management Strategy, Developing Commercial Contracts, Project Management Skills, Project Scheduling & Cost Control, FIDIC & Other Model Contracts, EPC & EPCM Contracts, Knowledge Management, Job Evaluation, Creative Problems Solving & Innovation Skills, Problem Solving & Decision Making, Strategic Planning & Creative Thinking and Mind Mapping.

During his career life, Mr. Harvey has gained his practical and field experience through his various significant positions and dedication as the **Commercial Director**, **Manufacturing Director**, **Chief Operating Officer**, **Head Projects Division**, **Project Leader**, **Lead Technical Advisor/Consultant** and **Project Consultant** to various international companies such as the Trade and Industrial Policy Strategies (TIPS), PGBI Johannesburg, IDC Green Industries SBU/Arengo 316 Pty Ltd, Ferrum Crescent Limited, CEF Limited, Rio Tinto Alcan, Industrial Development Corporation of SA (IDC) and AECI Limited.

Mr. Harvey has **Master** (**Cum Laude**) and **Bachelor** degrees in **Chemical 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, seminars, conferences, workshops and courses globally.

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, 30th of August 2026***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Gas Distribution Systems*** *Purpose and Scope of Gas Distribution Networks • Difference Between Transmission and Distribution Systems • High, Medium and Low-Pressure Networks • Typical Components and Layout of Urban Gas Systems*
0930 – 0945	*Break*
0945 – 1030	***Properties of Natural Gas & Flow Behavior*** *Physical Properties (Density, Viscosity, Calorific Value) • Compressibility and Real Gas Behavior • Temperature and Pressure Effects on Flow • Gas Quality Considerations in Design*
1030 – 1130	***Components of Gas Distribution Networks*** *Pipelines (Main Lines, Service Lines) • Pressure Regulating Stations • Gas Meters and Measuring Devices • Valves, Fittings and Protection Devices*
1130 – 1215	***Design Codes & Standards*** *ASME B31.8 and B31.9 Requirements • ISO 13623 and Local Authority Standards • Safety Distances and Routing Constraints • Design and Construction Compliance Requirements*
1215 – 1230	*Break*
1230 – 1330	***Demand Estimation & Load Forecasting*** *Residential, Commercial and Industrial Load Analysis • Peak versus Average Demand Calculation • Diversity and Simultaneity Factors • Growth Forecasting for Future Expansion*
1330 – 1420	***Network Design Philosophy*** *Radial versus Looped (Grid) Networks • Reliability and Redundancy Planning • Pressure Zoning Concepts • Design Margins and Contingency Planning*
1420 – 1430	***Recap*** *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, 31st of August 2026***

0730 – 0830	***Fluid Flow Equations for Gas Systems*** *Weymouth Equation • Darcy-Weisbach Formula • Panhandle A and B Equations • Selection of Appropriate Models*
0830 – 0930	***Pressure Drop & Flow Rate Analysis*** *Factors Affecting Pressure Loss • Elevation, Friction and Temperature Impact • Allowable Pressure Drop Limits • Minimum Supply Pressure Criteria*
0930 – 0945	*Break*
0945 – 1100	***Pipe Sizing Methodology*** *Determination of Pipe Diameter • Effects of Velocity and Reynolds Number • Economic Diameter Concepts • Sensitivity Analysis on Pipe Size*

1100 – 1215	***Pressure Regulation & Control*** *Pressure Reduction Stages • Control Valve Selection and Design • Safety Shut-off and Relief Devices • Pressure Zoning Design*
1215 – 1230	*Break*
1230 – 1330	***Compressor & Booster Station Concepts*** *Purpose of Boosting Stations • Types of Compressors Used in Networks • Energy Requirements and Efficiency • Location and Spacing Criteria*
1330 – 1420	***Manual Network Calculation Techniques*** *Single Pipe Analysis Method • Branch and Loop Calculations • Hardy-Cross Method for Looped Networks • Hand Calculation vs Software Analysis*
1420 – 1430	***Recap*** *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, 01st of September 2026***

0730 – 0830	***Basics of Gas Network Modeling*** *Purpose of Simulation in Design • Types of Modeling (Steady / Transient) • Benefits of Simulation Programs • Model Validation Principles*
0830 – 0930	***Data Preparation for Simulation*** *Network Layout Creation (Nodes and Pipes) • Input of Demands and Pressures • Gas Properties Assignment • Boundary Conditions Setup*
0930 – 0945	*Break*
0945 – 1100	***Gas Network Simulation Software*** *Introduction to Industry Tools (Synergi Gas, PIPESIM, etc.) • Interface and Workflow Overview • Model Creation Step-by-Step • Error Identification and Correction*
1100 – 1215	***Simulation of Normal Operating Conditions*** *Base Load Scenarios • Flow Distribution Analysis • Pressure Profiling Across Network • Identification of Weak Points*
1215 – 1230	*Break*
1230 – 1330	***Peak Demand & Worst-Case Simulation*** *Winter Peak High-Demand Conditions • Emergency or Outage Scenarios • Pressure Drop Risks • System Stress Testing*
1330 – 1420	***Calibration & Validation of Models*** *Field Data Comparison • Adjustment of Roughness Factors • Calibration Techniques • Ensuring Model Reliability*
1420 – 1430	***Recap*** *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, 02nd of September 2026***

0730 – 0830	***Network Expansion & Future Planning*** *Planning for Urban Growth • New Customer and Industrial Zone Integration • Capacity Upgrade Strategies • Long-Term Master Planning*
0830 – 0930	***Network Optimization Techniques*** *Cost Minimization Approaches • Pressure and Flow Optimization • Reducing Energy and Operating Costs • Software-Based Optimization Tools*
0930 – 0945	*Break*

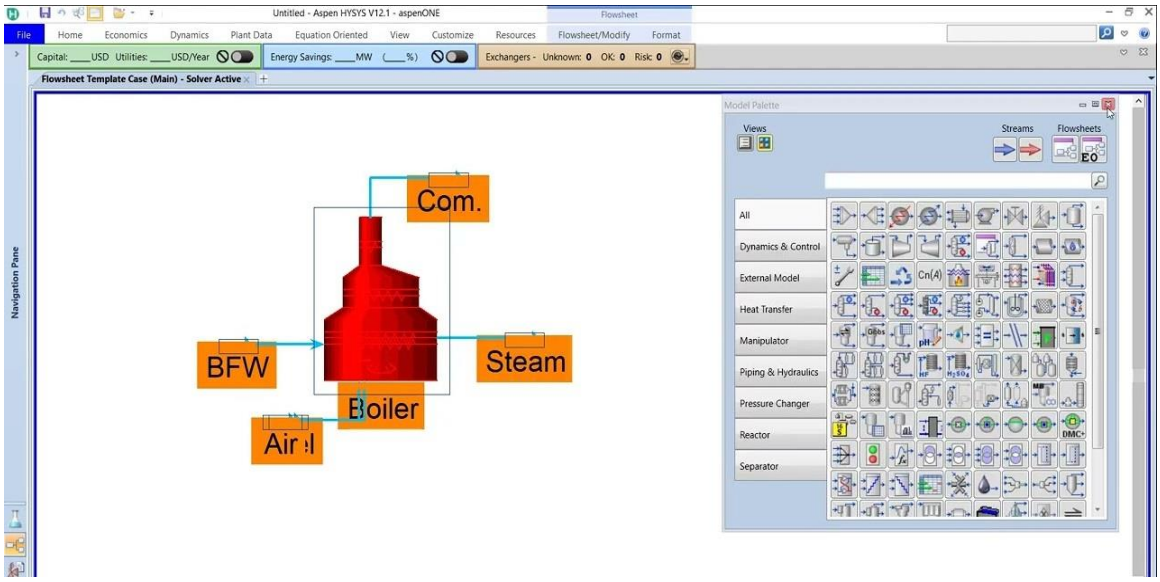
0945 – 1100	***Reliability & Risk Assessment*** *Failure Modes in Gas Networks • Redundancy Evaluation • Reliability Modeling • Risk-Based Design Decisions*
1100 – 1215	***Safety Design & Emergency Analysis*** *Gas Leak Modeling • Dispersion Analysis • Explosion and Fire Risk Assessment • Emergency Shut-Down Planning*
1215 – 1230	*Break*
1230 – 1330	***SCADA & Monitoring Integration*** *Real-Time Monitoring Systems • Sensor and Instrumentation Placement • Data Acquisition and Communication Systems • Alarm Management*
1330 – 1420	***GIS Integration & Digital Mapping*** *GIS-Based Network Modeling • Data Visualization • Asset Tagging and Management • Digital Twin Concept*
1420 – 1430	***Recap*** *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, 03rd of September 2026***

0730 – 0830	***Operation & Maintenance of Gas Networks*** *Routine Monitoring Practices • Leak Detection Methods • Maintenance Scheduling • Fault Identification and Diagnosis*
0830 – 0930	***Integrity Management Systems*** *Corrosion Control Methods • Cathodic Protection Overview • In-Line and External Inspection Methods • Rehabilitation and Replacement Planning*
0930 – 0945	*Break*
0945 – 1100	***Emergency Response & Incident Management*** *Response to Leaks and Ruptures • Isolation Strategies • Communication with Emergency Teams • Restoration of Service*
1100 – 1215	***Economic Analysis of Network Designs*** *Capital Cost Estimation • Operating and Maintenance Costs • Life-Cycle Costing • Cost-Benefit Analysis*
1215 – 1230	*Break*
1230 – 1300	***Design Documentation & Deliverables*** *Hydraulic Design Reports • Drawings and Schematics • As-Built Records • Operations Manuals*
1300 – 1345	***Case Study & Practical Application*** *Real-Life Urban Gas Network Example • Step-by-Step Design Scenario • Simulation Demonstration • Lessons Learned and Best Practices*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t 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 "ASPEN HYSYS V12.1" simulator.



ASPEN HYSYS V12.1 Simulator

Course Coordinator

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