



COURSE OVERVIEW TE0180 **Hydraulic Modelling Fundamentals (EPANET)**

Course Title

Hydraulic Modelling Fundamentals (EPANET)

Course Date/Venue

August 31-September 04, 2026/Delma Meeting Room, Royal Rose Abu Dhabi, a Curio Collection by Hilton Affiliated Hotel, Abu Dhabi, UAE

Course Reference

TE0180

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.

The course is designed to provide delegates with a detailed and up-to-date overview on the systematic hydraulic modeling techniques for water network design.



Participants will be provided with knowledge and skills to analyze the hydraulics of water distribution systems, correct design criteria for planning a water distribution system and perform hydraulic designs of pipeline system, pump system and water distribution storage tanks as well as build and run a hydraulic simulation.

The course will discuss how to handle mapping, graphing and reporting the simulation results; allocate water demand and calibrate static and dynamic models; prepare a water master plan including future demand projection, water network analysis and existing system rehabilitation; apply advanced modeling tools and generate water quality modeling; and optimize models for operations and calibrate hydraulic network models.

Participants are encouraged to bring their own laptops for the practical sessions. A copy of the hydraulic modelling simulator will be given to each participant for free.



Course Objectives/Outcomes & Benefits for the Participants

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

- Apply systematic hydraulic modeling techniques for water network design
- Analyze the hydraulics of water distribution systems
- Employ the correct design criteria for planning a water distribution system
- Perform hydraulic designs of pipeline system, pump system and water distribution storage tanks
- Build and run a hydraulic simulation
- Handle mapping, graphing and reporting the simulation results
- Allocate water demand and calibrate static and dynamic models
- Prepare a water master plan including future demand projection, water network analysis and existing system rehabilitation
- Apply advanced modeling tools and generate water quality modeling
- Optimize models for operations and calibrate hydraulic network models

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 covers systematic techniques and methodologies on hydraulic modelling for water network design for utility, municipal, water and hydraulic engineers, developers, planners, designers and other technical staff who are responsible for or oversee water distribution facilities. The course is also suitable for civil and mechanical engineers.

Accommodation

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

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.

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. Henry Beer is a **Senior Water Engineer** with over **30 years** of in-depth industrial experience within the **Petrochemical, Oil & Gas** and **Refinery** industries. His wide expertise covers in the areas of **Hydraulic Modelling Fundamentals** for Water Distribution Systems, **EPANET-Based Water Distribution Network Modelling**, Water Distribution Network **Hydraulic** Analysis, **Hydraulic** Simulation of Water Distribution Networks, Water Network **Modelling & Simulation**, **Water Distribution** System Flow Analysis, **Hydraulic** Network Analysis & Performance

Evaluation, **Water Distribution** Network Calibration & Model Validation, Pressure & Flow Analysis in **Water Distribution** Systems, Water Distribution Network Design & **Hydraulic** Assessment, **Hydraulic Modelling** for Water Supply Systems, **Water Network** Demand Analysis & **Hydraulic** Simulation, **Water Distribution System** Pressure Management, **Water Network** Flow, Pressure & Velocity Analysis, **Hydraulic** Performance Assessment of Water Distribution Networks, **Digital Transformation** in **Water & Utilities** including **Smart Water Networks**, **SCADA-based** Monitoring & Control Systems, **Water Data Acquisition & Analytics**, **Asset Performance** Management, **Predictive Maintenance** Concepts, **Digitalization** of **Water Distribution Systems**, **Process Automation**, Remote Monitoring of **Utility Operations** and **Operational Efficiency** Optimization, **Digital Transformation** Strategy Development, **Smart Metering** Systems, **Water Hydraulic Modelling**, **Water Distribution System**, **Water Analysis & Quality Control**, **Water Sampling**, **Water Resources Hydraulic**, **Water Hydraulic** Operation & Troubleshooting, **Crude Oil & Water Testing**, **Crude Oil Testing**, **Crude Stabilization** Operations, **Crude Oil Storage** Handling, **Crude Oil & Water Sampling** Procedures, **Equipment Handling** Procedures, **Crude Oil Testing** Procedures, **Water Analysis**, **Process Systems** Foundations, **Gas Processing Plant** Operations & Control, **Gas Processing** Monitoring & Troubleshooting, **Chemical Engineering**, **Process Equipment Design & Troubleshooting**, **Polymers & Polymerization**, Applied **Process Engineering**, **Process Plant** Optimization, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant** Performance & Efficiency, **Flare Blowdown & Pressure Relief Systems**, **Polypropylene** Manufacturing, **Polyethylene** & Process Troubleshooting, **Process Operation** Troubleshooting, **Fluidized Bed Reactor**, **Oil Movement & Storage**, **Power Plant Chemistry**, **Catalyst** Manufacturing Techniques, **Fuel Systems** Management, **Process Design & Optimization**, **Aviation Fuel**, **Diesel Engine**, **Jet Fuel**, **Petrol**, **IP Octane**, **Cetane** Control, **Pipeline Distribution**, **Boiler** Fundamental Preparation, **Flocculation** Sedimentation, **Hotline** Water Softening Processes, **Desalination Processes**, **Reverse Osmosis**, **Molecular Sieves**, **Loop** Water Management System, **Sludge Removal**, **Cooling Water System**, **Tank Farms** and **Hydrocarbons**. Currently, he is the **Director** and **Senior Technical Consultant** wherein he is deeply involved in developing new industrial process and designing new process plants and equipment.

During his career life, Mr. Beer has gained his practical and field experience through his various significant positions and dedications as the **Global Commissioning Manager**, **Senior Business Analyst**, **Water Engineer**, **Process Engineer**, **Chemical Engineer**, **Technical Sales Engineer**, **Senior Technician**, **Entrepreneur**, **Financial Consultant**, **Business Analyst**, **Business Financial Planner**, **Independent Financial Planner**, **Investment Independent Financial Advisor**, **Financial Broker**, **Trainer/Instructor** and **Technical Consultant** for various international companies such as the **Sasol**, **TAG Solvents**, **Virgin Solvent Products**, **RFS Financial Services (Pty) Ltd**, **FNB** and **GHC Trading**.

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

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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: Monday, 31st of August 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Water Distribution System Background • Historical Aspects of Water Distribution • Modern Water Distribution Systems
0930 – 0945	Break
0945 – 1100	Hydraulics of Pressurized Flow Importance of Pipeline Systems • Numerical Models: Basis for Pipeline Analysis • Modeling Approach • System Capacity: Problems in Time & Space • Steady Flow • Quasi-Steady Flow: System Operation • Unsteady Flow: Introduction of Fluid Transients
1100 – 1215	Hydraulics of Water Distribution Systems Steady-State Hydraulic Analysis • Unsteady Flow in Pipe Network Analysis • Computer Modeling of Water Distribution Systems
1215 – 1230	Break
1230 – 1420	Water Distribution System Planning Water Demands • Planning & Design Criteria • Peaking Coefficients • Computer Models & System Modeling
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: Tuesday, 01st of September 2026

0730 – 0930	Hydraulic Design of Pipeline System <i>Alignment • Subsurface Conflicts • Rights-of-Way • Piping Materials • Internal Pressures • Loads on Buried Pipe • Thrust Restraint • Distribution & Transmission System Valves</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Hydraulic Design of Pump System <i>Pump Types & Definitions • Pump Hydraulics • Concept of Specific Speed • Net Positive Suction Head • Corrected Pump Curves • Hydraulic Considerations in Pump Selection • Application of Pump • Hydraulic Analysis to Design of Pumping Station Components • Implications of Hydraulic Transients in Pumping Station Design</i>
1100 – 1215	Hydraulic Design of Water Distribution Storage Tanks <i>Basic Concepts • Design Issues • Location • Tank Levels • Tank Volume • Other Design Considerations</i>
1215 – 1230	<i>Break</i>
1230 – 1420	Introduction to Computer Models <i>Need for Computer Models • Uses of Computer Models • Simulator Program Features • Simulator User Interface • Simulator Solver Module • Simulator Programmer's Toolkit</i>
1420 - 1430	Recap <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 & End of Day Two</i>

Day 3: Wednesday, 02nd of September 2026

0730 – 0930	Use of a Computer Model <i>Network Representation • Compilation of Data • Estimation of Demand • Operating Characteristics • Reaction-Rate Information • Model Calibration</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Computer Model Internals <i>Input Processing • Topological Processing • Hydraulic Solution Algorithms • Linear-Equation Solver • Extended-Period Solver • Water-Quality Algorithms • Output Processing</i>
1100 – 1215	Building & Running a Hydraulic Simulation <i>Building a Model • Create Network Components • Operation Data Tools • Run a Hydraulic Simulation • Steady-State Simulation • Extended Period Simulation</i>
1215 – 1230	<i>Break</i>
1230 – 1420	Mapping, Graphing & Reporting Simulation Results <i>Output Graphs • Output Reports • Additional Reporting Tools</i>
1420 - 1430	Recap <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 & End of Day Three</i>



Day 4: Thursday, 03rd of September 2026

0730 – 0930	Demand Allocation & Model Calibration Steps for Demand Allocation (Existing and Future Scenarios) • Demand Allocation Methods (Pros and Cons) • Demand Projections • Steps for Model Calibration
0930 – 0945	Break
0945 – 1100	Demand Allocation & Model Calibration (cont'd) Types of Calibration (Static or Dynamic) Including Limitations • Matching Tank Levels, Flows, Pressures • Calibration Tolerances (Agreement Between Model and Field)
1100 – 1215	Water Master Planning & Modeling Reasons for Preparing a Master Plan • How to Prepare a Water Master Plan • Future Demand Projections • Water Network Analysis • System Deficiencies • Replacement of Existing Infrastructure • Identify System Deficiencies • Evaluate Operating Strategies • Assess Rehabilitation Methods • Using Model to Evaluate Alternatives
1215 – 1230	Break
1230 – 1420	Advanced Modeling Tools Logical Controls • Variable Speed Pumps • Pump Costing & Energy Simulation • Network Connectivity and Tracing Tools
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

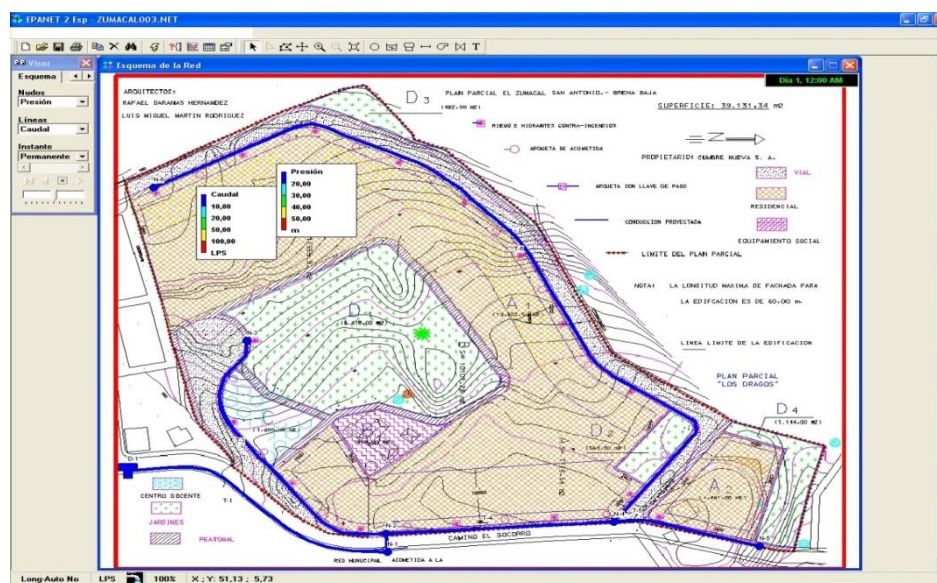
Day 5: Friday, 04th of September 2026

0730 – 0930	Water Quality Modeling-Case Studies Design of Distribution Systems • Water Quality in Networks • Hydraulic & Water-Quality Models • Early Applications of Water-Quality Modeling • Evolution of Water Quality Modeling • Modeling Propagation of Contaminants • Current Trends in Water-Quality Modeling
0930 – 0945	Break
0930 – 1100	Hydraulic Transient Design for Pipeline Systems Water hammer • Surging • Hydraulic Characteristics of Valves • Hydraulic Characteristics of Pumps • Surge Protection and Surge Control Devices • Design Considerations • Negative Pressures & Water Column Separation in Networks • Time Constants for Hydraulic Systems • Case Studies
1100 – 1230	Optimization Models for Operations Formulations for Minimizing Energy Cost • Formulations to Satisfy Water Quality • Solution Methods & Applications for Water-Quality Purposes • Optimal Scheduling of Booster Disinfection
1230 – 1245	Break

1245 – 1345	Calibration of Hydraulic Network Models <i>Identify the Intended Use of the Model • Determine Estimates of the Model Parameters • Collect Calibration Data • Evaluate the Results of the Model • Perform a Macro-Level Calibration of the Model • Perform a Sensitivity Analysis • Perform a Micro-Level Calibration of the Model • Future Trends</i>
1345 – 1400	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & 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 latest revision of EPANET Simulator.



EPANET Simulator

Course Coordinator

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