COURSE OVERVIEW TE0303
Advanced Water Transport & Distribution

Course Title
Advanced Water Transport & Distribution

Course Date/Venue
Session 1: July 21-25, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: November 17-21, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
TE0303

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 Advanced Water Transport & Distribution. It covers the water transport systems and its purpose and significance in the water supply chain; the water distribution networks, water treatment, transport integration and hydraulic principles in water transport; the energy efficiency in water transport, regulatory standards and guidelines and hydraulic modeling; and designing efficient water distribution systems, pressure management and control, leak detection and management.

Further, the course will also discuss the flow rates in distribution systems and optimizing flow through hydraulic modeling; the role of valves and flow meters in system control; the techniques for improving flow distribution across a network; the advanced control strategies for water distribution and asset management in water distribution; the water loss control and reduction, water quality control and monitoring; and the emergency response and crisis management in water distribution.

During this interactive course, participants will learn the large-scale water transport systems, optimizing pumping stations and booster systems and advanced pipe network design; designing water storage facilities and the impact of storage tanks on distribution efficiency; the elevation and pressure regulation in reservoirs and maintaining and operating challenges in large reservoirs; reducing environmental impact in water transport projects; the sustainable materials and energy solutions for water transport; minimizing carbon footprint in water system design and addressing climate change and water scarcity through system optimization; the smart water networks and IoT integration, automation in water transport and water-energy nexus; and the emerging technologies in water treatment and transport; adapting water distribution systems to climate change and designing systems to withstand extreme weather conditions; and the water conservation strategies in drought-prone areas.

Course Objectives

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

- Apply and gain an advanced knowledge on water transport and distribution
- Discuss water transport systems and its purpose and significance in the water supply chain
- Illustrate water distribution networks, water treatment and transport integration and hydraulic principles in water transport
- Apply energy efficiency in water transport, regulatory standards and guidelines and hydraulic modeling
- Design efficient water distribution systems and employ pressure management and control, leak detection and management
- Measure and analyze flow rates in distribution systems, optimize flow through hydraulic modeling as well as identify the role of valves and flow meters in system control and apply techniques for improving flow distribution across a network
- Carryout advanced control strategies for water distribution and asset management in water distribution
- Apply water loss control and reduction, water quality control and monitoring and emergency response and crisis management in water distribution
- Design large-scale water transport systems, optimize pumping stations and booster systems and illustrate advanced pipe network design
- Design water storage facilities, discuss impact of storage tanks on distribution efficiency, elevate and pressure regulation in reservoirs and maintain and operate challenges in large reservoirs
- Reduce environmental impact in water transport projects and identify sustainable materials and energy solutions for water transport
- Minimize carbon footprint in water system design and address climate change and water scarcity through system optimization
- Discuss smart water networks and IoT integration, automation in water transport, water-energy nexus and the emerging technologies in water treatment and transport
- Adapt water distribution systems to climate change, design systems to withstand extreme weather conditions and apply water conservation strategies in drought-prone areas

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 water transport and distribution for project senior water control engineers, managers, water engineers and superintendents.

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$ 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.

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: -

- 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.

- 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. Andrew Ladwig is a **Senior Process & Mechanical Engineer** with over **25 years** of extensive experience within the **Oil & Gas**, **Refinery**, **Petrochemical & Power** industries. His expertise widely covers in the areas of **Ammonia Manufacturing & Process Troubleshooting**, **Distillation Towers**, **Crude Oil Distillation**, **Fundamentals of Distillation** for Engineers, **Distillation** Operation and Troubleshooting, **Advanced Distillation** Troubleshooting, **Distillation** Technology, Vacuum **Distillation**, **Ammonia Storage & Loading** Systems, **Ammonia Plant** Operation, Troubleshooting & Optimization, **Ammonia Recovery**, **Ammonia Plant Safety**, Hazard of **Ammonia Handling**, Storage & Shipping, **Operational Excellence** in **Ammonia Plants**, **Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer Manufacturing** Process Technology, **Sulphur Recovery**, Phenol Recovery & Extraction, **Wax Sweating & Blending**, **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Refining Process & Petroleum Products**, **Refinery Planning & Economics**, Safe **Refinery Operations**, **Hydrotreating & Hydro-processing**, **Separators** in **Oil & Gas** Industry, **Gas Testing & Energy** Isolations, Gas Liquor Separation, **Industrial Liquid Mixing**, **Wax Bleachers**, **Extractors**, **Fractionation**, Operation & Control of **Distillation**, Process of **Crude ATM & Vacuum Distillation** Unit, **Water Purification**, **Water Transport** & Distribution, **Steam & Electricity**, **Flame Arrestors**, **Coal Processing**, **Environmental Emission Control**, R&D of **Wax Blending**, **Wax** Molding/Slabbing, **Industrial Drying**, Principles, Selection & Design, **Process Safety** Design, Certified **Process Plant** Operations, Control & Troubleshooting, **Operator** Responsibilities, **Storage Tanks Operations** & Measurements, **Tank Design**, Construction, Inspection & Maintenance, **Atmospheric Tanks**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant Performance**, Efficiency & Optimization, Continuous Improvement & Benchmarking, **Process Troubleshooting** Techniques, Oil & Gas Operation/Introduction to **Surface Facilities**, **Pressure Vessel** Operation, **Plant & Equipment Integrity**, **Process Equipment** Performance & Troubleshooting, **Plant Startup & Shutdown**, **Startup & Shutdown** the Plant While Handling Abnormal Conditions, **Flare & Relief** System, **Process Gas Plant** Start-up, Commissioning & Problem Solving, **Process Liquid** and **Process Handling & Measuring** Equipment. Further, he is also well-versed in **Compressors & Turbines** Operation, Maintenance & Troubleshooting, **Heat Exchanger** Overhaul & Testing Techniques, Balancing of **Rotating Machinery** (**BRM**), **Pipe Stress** Analysis, **Valves & Actuators** Technology, Inspect & Maintain **Safeguarding Vent & Relief System**, Certified Inspectors for **Vehicle & Equipment**, Optimizing **Equipment Maintenance** & Replacement Decisions, Certified Maintenance Planner (**CMP**), Certified Planning and Scheduling Professional (**AACE-PSP**), **Material Cataloguing**, Specifications, Handling & Storage, **Steam Trap** Design, Operation, Maintenance & Troubleshooting, **Steam Trapping & Control**, **Column**, **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps** Troubleshooting, **Pumps** Design, Selection & Operation, **Pump & Exchangers**, Troubleshooting & Design, **Rotating Equipment** Operation & Troubleshooting, **Control & ESD** System, **Detailed Engineering Drawings**, Codes & Standards, **Budget** Preparation, Allocation & Cost Control, Root Cause Analysis (**RCA**), **Production Optimization**, Permit to Work (**PTW**), Project Engineering, **Data** Analysis, **Process Hazard** Analysis (**PHA**), **HAZOP** Study, Sampling & Analysis, **Training** Analysis, **Job Analysis** Techniques, Storage & Handling of **Toxic Chemicals & Hazardous Materials**, **Hazardous Material** Classification & Storage/Disposal, **Dangerous Goods**, Environmental Management System (**EMS**), Supply Chain, Purchasing, Procurement, **Logistics** Management & **Transport** & **Warehousing** & **Inventory**, **Risk** Monitoring Authorized Gas Tester (**AGT**), Confined Space Entry (**CSE**), Personal Protective Equipment (**PPE**), Fire & Gas, First Aid and Occupational Health & Safety.

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer**, **Project Engineer**, **Reliability & Maintenance Engineer**, **Maintenance Support Engineer**, **Process Engineer**, **HSE Supervisor**, **Warehouse Manager**, **Quality Manager**, **Business Analyst**, **Senior Process Controller**, **Process Controller**, **Safety Officer**, **Mechanical Technician**, **Senior Lecturer** and **Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's** degree in **Chemical Engineering** and a **Diploma** in **Mechanical 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, workshops, seminars, courses and conferences internationally.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Water Transport Systems*** *Purpose & Significance in the Water Supply Chain • Key Components: Pipelines, Pumps & Valves • Types of Water Transport Systems (Gravity-Fed versus Pumped Systems) • Challenges in Water Transport: Pressure Management & Leak Prevention*
0930 – 0945	*Break*
0945 – 1030	***Water Distribution Networks*** *Network Design & Layout Considerations • Types of Distribution Systems: Radial, Looped & Mixed • Standard Distribution Network Components: Pipes, Pumps & Tanks • Optimizing Water Flow & Minimizing Losses*
1030 – 1130	***Water Treatment & Transport Integration*** *Water Treatment Process Overview • Integration with Transport Systems • Quality Control During Transport • Challenges in Maintaining Water Quality During Transport*
1130 – 1215	***Hydraulic Principles in Water Transport*** *Pressure, Flow & Velocity in Pipeline Systems • Bernoulli's Principle Applied to Water Transport • Head Loss & Friction in Pipelines • Pumping Systems & their Role in Maintaining Flow*
1215 – 1230	*Break*
1230 – 1330	***Energy Efficiency in Water Transport*** *Power Consumption in Pumping Stations • Energy-Saving Strategies for Water Transport Systems • Pump Efficiency & Selection • Use of Renewable Energy in Water Transport (Solar, Wind)*
1330 – 1420	***Regulatory Standards & Guidelines*** *International & Local Standards (ISO, ANSI, AWWA) • Compliance with Safety & Environmental Regulations • Water Quality & Distribution Guidelines • Monitoring & Reporting Requirements*
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

0730 – 0830	***Basics of Hydraulic Modeling*** *Importance of Modeling in Design & Optimization • Overview of Hydraulic Modeling Software (e.g., EPANET) • Types of Hydraulic Models: Steady-State versus Dynamic Models • Model Calibration & Validation Techniques*
0830 – 0930	***Designing Efficient Water Distribution Systems*** *Pipe Sizing & Layout Considerations • Designing for Peak Demand & Pressure Requirements • Minimizing Energy Consumption in System Design • Storage Tank Design & Integration*

0930 – 0945	*Break*
0945 – 1100	***Pressure Management & Control*** *Understanding Pressure Zones in Distribution Networks • Pressure Control Devices: Valves & Regulators • Strategies for Pressure Management: Pump Control, Tank Levels • Challenges with Fluctuating Pressures & their Impact on Infrastructure*
1100 – 1215	***Leak Detection & Management*** *Methods for Detecting Leaks in Pipelines • Importance of Leak Detection for System Integrity • Technologies Used in Leak Detection (Acoustic, Flow Monitoring) • Minimizing Water Loss & Reducing Operational Costs*
1215 – 1230	*Break*
1230 – 1330	***Flow Analysis & Optimization*** *Measuring & Analyzing Flow Rates in Distribution Systems • Optimizing Flow through Hydraulic Modeling • the Role of Valves & Flow Meters in System Control • Techniques for Improving Flow Distribution Across a Network*
1330 – 1420	***Case Study: Successful Hydraulic Models*** *Review of a Real-World Hydraulic Model Case Study • Lessons Learned from the Case Study • Application of Modeling Techniques to Large-Scale Projects • Best Practices for Model Implementation*
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

0730 – 0830	***Advanced Control Strategies for Water Distribution*** *SCADA Systems & their Role in Water Distribution • Real-Time Monitoring & Automated Control • Remote Control Technologies & Smart Valves • Data Integration & Cloud-Based Systems for Enhanced Management*
0830 – 0930	***Asset Management in Water Distribution*** *Life-Cycle Management of Water Infrastructure • Asset Monitoring & Predictive Maintenance • Using GIS & Asset Management Software for Tracking • Condition Assessment & Repair Prioritization*
0930 – 0945	*Break*
0945 – 1100	***Water Loss Control & Reduction*** *Types of Water Losses: Real versus Apparent Losses • Techniques for Reducing Non-Revenue Water • Managing Illegal Connections & Unauthorized Usage • Smart Meters & Data Analytics for Water Loss Management*
1100 – 1215	***Water Quality Control & Monitoring*** *Techniques for Monitoring Water Quality in the Distribution System • Ensuring Compliance with Water Quality Standards • Chlorine Dosing & Residual Management • Addressing Contamination Risks in Distribution Networks*
1215 – 1230	*Break*

1230 – 1330	***Emergency Response & Crisis Management in Water Distribution*** *Planning for System Failures & Emergency Scenarios • Communication Protocols During Crises • Contingency Planning for Infrastructure Failures • Water Quality Assurance During Emergency Events*
1330 – 1420	***Case Study: Advanced Distribution Management Solutions*** *Reviewing the Implementation of Advanced Technologies in Distribution • Real-Life Case Studies of Smart Water Networks • Benefits & Challenges Faced by Utilities in Adopting Advanced Management Techniques • Key Takeaways & Future Trends in Water Distribution Management*
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

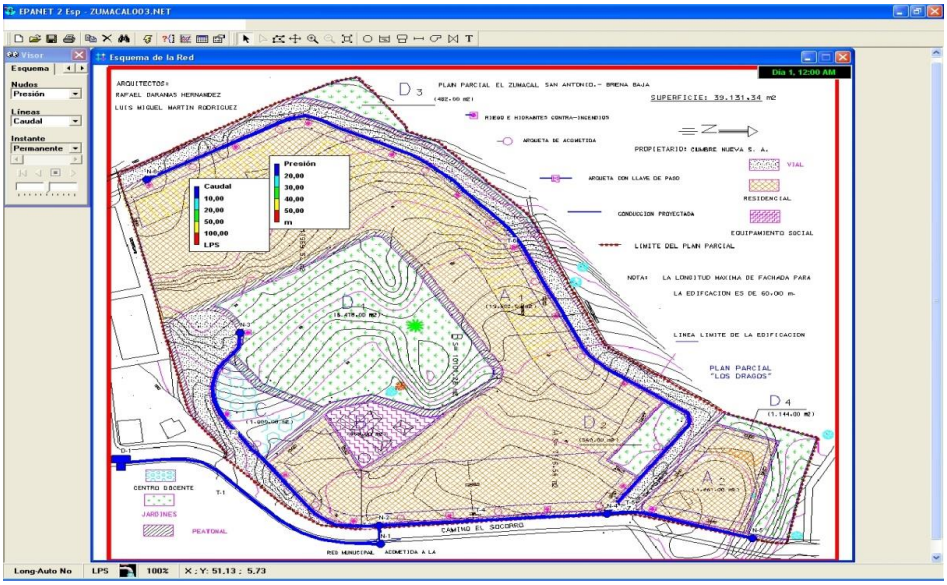
0730 – 0830	***Designing Large-Scale Water Transport Systems*** *Planning for Long-Distance Water Transport Systems • Hydraulics of Large-Scale Pump Stations & Pipelines • Impact of Terrain & Geography on Transport Design • Infrastructure Resilience & Redundancy Planning*
0830 – 0930	***Optimizing Pumping Stations & Booster Systems*** *Selecting Appropriate Pumps for Large-Scale Systems • Understanding Booster Stations & their Role in System Optimization • Strategies for Pump Control & Monitoring • Energy-Efficient Operation of Pumping Stations*
0930 – 0945	*Break*
0945 – 1100	***Advanced Pipe Network Design*** *Trenchless Technologies & Pipeline Installation Methods • Materials Selection for Pipes (Steel, Plastic, Concrete) • Managing Corrosion & Wear in Pipes • Pipe Alignment & Elevation Control*
1100 – 1215	***Water Storage & Reservoir Systems*** *Sizing & Designing Water Storage Facilities • Impact of Storage Tanks on Distribution Efficiency • Elevation & Pressure Regulation in Reservoirs • Maintenance & Operational Challenges in Large Reservoirs*
1215 – 1230	*Break*
1230 – 1330	***Environmental & Sustainability Considerations*** *Reducing Environmental Impact in Water Transport Projects • Sustainable Materials & Energy Solutions for Water Transport • Minimizing Carbon Footprint in Water System Design • Addressing Climate Change & Water Scarcity through System Optimization*
1330 – 1420	***Simulation & Performance Testing*** *Testing Water Transport System Designs Before Implementation • Using Simulations for Performance Analysis • Case Studies of Design Optimization through Simulation • Post-Implementation Testing & Adjustments*
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

0730 – 0830	***Smart Water Networks & IoT Integration*** *Overview of Smart Water Systems & IoT Technology • Benefits of IoT for Real-Time Monitoring & System Optimization • Smart Meters & Intelligent Sensors in Water Systems • Big Data & Analytics for Predictive Maintenance*
0830 – 0930	***Automation in Water Transport*** *Role of Automation in Enhancing Efficiency & Reliability • Automated Valve & Pump Control Systems • Remote Sensing & Monitoring Technologies • Integration of Automation with Existing Infrastructure*
0930 – 0945	*Break*
0945 – 1030	***Water-Energy Nexus: Reducing Energy Consumption in Water Distribution*** *Relationship Between Water Transport & Energy Use • Energy Recovery in Water Systems (Hydropower, Pressure-Reducing Valves) • Renewable Energy Solutions for Water Transport • Energy-Efficient Design Principles for Water Infrastructure*
1030 – 1130	***Emerging Technologies in Water Treatment & Transport*** *Next-Generation Desalination Technologies • Advances in Filtration & Membrane Technologies • Role of Nanotechnology in Water Transport & Treatment • Innovations in Energy-Efficient Pumping Technologies*
1130 – 1230	***Climate Change & Water Distribution Resilience*** *Adapting Water Distribution Systems to Climate Change • Designing Systems to Withstand Extreme Weather Conditions • Water Conservation Strategies in Drought-Prone Areas • Planning for Flooding & Other Climate-Related Risks*
1230 – 1245	*Break*
1245 – 1345	***Case Studies: Innovative Water Transport Projects*** *Review of Cutting-Edge Water Transport Projects Around the World • Lessons from Successful & Failed Water Transport Systems • Insights on Future Trends in Water Transport & Distribution • Collaborative Efforts in Advancing Water Infrastructure Technologies*
1345 – 1400	***Course Conclusion*** *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 latest revision of “EPANET” simulator.



EPANET Simulator

Course Coordinator

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