COURSE OVERVIEW ME0681
Pipeline Hydraulics & Surge Analysis

Course Title
Pipeline Hydraulics & Surge Analysis

Course Date/Venue
April 27-May 01, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference
ME0681

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 pipeline hydraulics and surge analysis. It covers the liquid pipeline hydraulic comprising of the steady and transient state transportation of liquids in pipelines; the basics of fluid mechanics as it applies to in real world pipeline design; the common formulas and equations and how they are applied in resolving actual pipeline transportation problems; the liquid properties and how they vary with temperature and pressure; and the multiple pump stations and hydraulic pressure gradient in long distance pipelines.

During this interactive course, participants will learn the impact of liquid specific gravity and viscosity on pump performance; the liquid pipeline surge theory and concept as well as methods of analysis; the surge concepts in frictionless flow, slow closure of valves and surge concepts in flow with friction; the column separation and criteria for conducting transient analysis; the hydraulic transient control strategies, pumps control and control tanks; the valves for transient control and containment of transients; the surge control for water pumping stations and pipeline design; and the computer analysis and transients in distribution systems.

Course Objectives

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

- Apply and gain an in-depth knowledge on pipeline hydraulics and surge analysis
- Discuss the liquid pipeline hydraulic covering the steady and transient state transportation of liquids in pipelines
- Discuss the basics of fluid mechanics as it applies to real world pipeline design
- Identify the common formulas and equations and how they are applied in resolving actual pipeline transportation problems
- Describe the liquid properties and how they vary with temperature and pressure
- Use darcy equation for determining pressure drop due to friction in liquid flow
- Recognize multiple pump stations and hydraulic pressure gradient in long distance pipelines
- Determine pumping horsepower and pressure required to transport liquid through a pipeline
- Explain the impact of liquid specific gravity and viscosity on pump performance
- Apply liquid pipeline surge theory and concept as well as methods of analysis
- Discuss surge concepts in frictionless flow, slow closure of valves and surge concepts in flow with friction
- Carryout column separation and criteria for conducting transient analysis
- Employ hydraulic transient control strategies, pumps control and control tanks
- Explain valves for transient control and containment of transients
- Illustrate surge control for water pumping stations and pipeline design
- Carryout computer analysis and recognize transients in distribution systems

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 pipeline hydraulics and surge analysis piping and pipeline engineers, maintenance engineers, mechanical engineers, civil engineers, water engineers, engineering managers, designers and consultants, utility managers, superintendents, supervisors, foremen and other technical staff.

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 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 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 Engineer** with over **30 years** of industrial experience. His expertise covers **Pumps, Compressors, Turbines & Troubleshooting**, **Centrifugal Pumps**, Maintenance of **Gas Compressors**, **Compressor & Steam Turbine**, **Pressure Safety Relief Valve** Repair & Recalibration, **PSV/PRV** Troubleshooting, **PRV** Testing & Repair, **Valve** Testing & Inspection, **Valve** Sealing, **Valve** Calibration, **Process Equipment**, **Vibration Analysis**, **Heat Exchanger**, **Siemens Steam Turbine Maintenance**, **Electromechanical Maintenance**, **Machinery Alignment**, **Lubrication Technology**, **Compressors**, **HVAC & Refrigeration Systems**, **Piping System**, **Blower & Fan**, **Shaft Repair**, **Control Valve & Actuator**, **Safety Relief Valves**, **Pipelines**, **Piping Vibration Analysis**, **Pressure Vessels**, **Dry Gas Seal**, **Process Equipment**, **Diesel Engine & Crane Maintenance**, **Maintenance Management** (**Preventive**, **Predictive**, **Breakdown**), **Reliability Management**, **Condition-Based Monitoring**, **Rotating Equipment**, **Tanks & Tank Farms**, **Pneumatic System**, **Static Equipment**, **Failure Analysis**, **FMEA**, **Corrosion**, **Metallurgy**, Planning, Scheduling, Cost Control, Preventive and Predictive Maintenance. Currently, he is the Maintenance Manager of the PPC Incorporation wherein he is responsible for the maintenance and upgrade of all plant components, monitoring the thermal stresses and the remaining life of steam pipes, turbine casing, mills, fans and pumps. He is in-charge of the metallurgical failure analysis and the usage of fracture mechanics for determining crack propagation in impellers of turbines, assessing all alterations and developments for upgrading the plant.

During his career life, Dr. Dimitry was a **Senior Engineer** in **Chloride Silent** (**UK**) wherein he was responsible for the mechanical, thermal and electrical modelling of battery problems for electric vehicles and satellites as well as an **Operations Engineer** of the **National Nuclear Corporation** (**UK**) wherein he was responsible for the optimization of the plant. Prior to this, he was a **Professor** at the **Technical University of Crete** and an Assistant **Professor** of the **University of Manchester** (**UK**).

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.

Accommodation

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

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, 27th of April 2025***

0730 – 0800	*Registration and Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Liquid Pipeline Hydraulic Covering the Steady and Transient State Transportation of Liquids in Pipelines***
0930 – 0945	*Break*
0945 – 1100	***Basics of Fluid Mechanics as it is Applied to Real World Pipeline Design***
1100 – 1230	***Common Formulas & Equations & How They are Applied in Resolving Actual Pipeline Transportation Problems***
1230 – 1245	*Break*
1245 – 1330	***Liquid Properties & How they Vary with Temperature & Pressure***
1330 – 1420	***Darcy Equation for Determining Pressure Drop Due to Friction in Liquid Flow***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 28th of April 2025***

0730 – 0930	***Multiple Pump Stations & Hydraulic Pressure Gradient in Long Distance Pipelines***
0900 – 0915	*Break*
0945 - 1100	***Pumping Horsepower & Pressure Required to Transport Liquid through a Pipeline***
1100 - 1230	***Impact of Liquid Specific Gravity & Viscosity on Pump Performance***
1230 – 1245	*Break*

1245 - 1330	***Liquid Pipeline Surge Theory & Concept***
1330 – 1420	***Methods of Analysis***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: ***Tuesday, 29th of April 2025***

0730 – 0900	***Surge Concepts in Frictionless Flow***
0900 – 0915	*Break*
0915 – 1100	***Slow Closure of Valves***
1100 – 1230	***Surge Concepts in Flow with Friction***
1230 – 1245	*Break*
1245 – 1330	***Column Separation***
1330 – 1420	***Case Study***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday, 30th of April 2025***

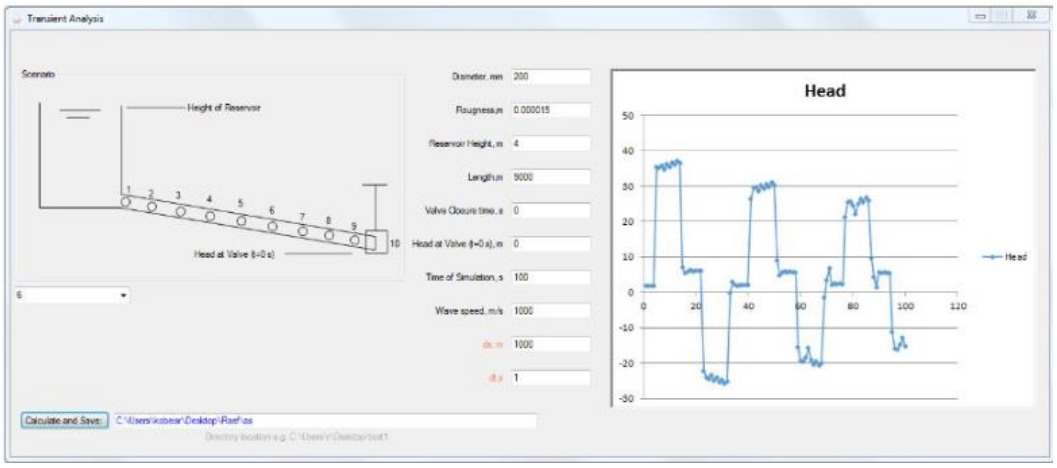
0730 – 0830	***Criteria for Conducting Transient Analysis***
0830 - 0930	***Overview of Hydraulic Transient Control Strategies***
0930 - 0945	*Break*
0945 - 1100	***Control of Pumps***
1100 - 1230	***Control Tanks***
1230 – 1245	*Break*
1245 - 1330	***Valves for Transient Control***
1330 - 1420	***Case Study***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: ***Thursday, 01st of May 2025***

0730 – 0900	***Containment of Transients***
0900 - 0930	***Surge Control for Water Pumping Stations***
0930 - 0945	*Break*
0945 - 1100	***Pipeline Design***
1100 - 1230	***Computer Analysis***
1230 - 1245	*Break*
1245 - 1330	***Transients in Distribution Systems***
1330 – 1345	***Case Study***
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulators (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 our state-of-the-art "Surge Analysis Software".



Surge Analysis Software

Course Coordinator

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