COURSE OVERVIEW ME1116
Evaluating Storage Tank Design and Installation

Course Title
Evaluating Storage Tank Design and Installation

Course Date/Venue
Session 1: May 25-29, 2025/Crowne Meeting Room, Crowne Plaza Al Khobar, Al Khobar, KSA
Session 2: September 28-October 02, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference
ME1116

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 Evaluating Storage Tank Design and Installation. It covers the function of storage tanks, types of fluids stored, tank applications by industry and key regulatory considerations; the types and classifications of storage tanks, basic tank components and terminology and material selection for tank construction; the API 650, API 620, API 653, ASME section VIII, NFPA, AWWA and OSHA references; the tank design parameters, loading considerations and design of tank shells; and the roof and bottom design considerations.

Further, the course will also discuss the nozzle and manway design, foundation design and considerations, seismic and wind design and designing for environmental and safety considerations; the site grading and soil compaction, underground piping considerations, space planning for maintenance access and utility and drainage routing; the tank fabrication techniques, erection and assembly of tanks; and the welding inspection, quality control and coating and corrosion protection.

During this interactive course, participants will learn the installation of appurtenances, hydrostatic and pneumatic testing and tank floor and shell inspections; the API 653 inspection guidelines, leak detection and tightness testing, commissioning of storage tanks and documentation and compliance; the common tank failures and their causes and storage tank risk assessment; the integrity management programs and retrofitting and upgrading existing tanks; and the tank decommissioning and removal.

Course Objectives

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

- Apply and gain an in-depth knowledge on evaluating storage tank design and installation
- Discuss the function of storage tanks, types of fluids stored, tank applications by industry and key regulatory considerations
- Identify the types and classifications of storage tanks, basic tank components and terminology and material selection for tank construction
- Review the codes and standards covering API 650, API 620, API 653, ASME section VIII, NFPA, AWWA and OSHA references
- Recognize tank design parameters and loading considerations, design of tank shells and roof and bottom design considerations
- Illustrate nozzle and manway design, foundation design and considerations, seismic and wind design and design for environmental and safety considerations
- Carryout site grading and soil compaction, underground piping considerations, space planning for maintenance access and utility and drainage routing
- Employ tank fabrication techniques, erection and assembly of tanks, welding inspection and quality control and coating and corrosion protection
- Apply installation of appurtenances, hydrostatic and pneumatic testing and tank floor and shell inspections
- Implement API 653 Inspection guidelines, leak detection and tightness testing, commissioning of storage tanks and documentation and compliance
- Identify the common tank failures and their causes and employ storage tank risk assessment
- Develop integrity management programs and carryout retrofitting and upgrading existing tanks as well as tank decommissioning and removal

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 evaluating storage tank design and installation for engineers, inspectors and safety personnel, operations and maintenance personnel, project and construction professionals, regulatory and compliance officers, oil and gas, petrochemical, and power plant personnel 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 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. Rod Larmour, PEng, MSc, BSc, is a **Senior Mechanical Engineer** with over **40 years** of **Onshore & Offshore** practical experience within the **Power**, **Petrochemical**, **Oil & Gas** industries. His expertise greatly covers the application of **Rotating Machinery**, **Mechanical Alignment**, **Stress Analysis**, **Thermodynamics**, **Fluid Mechanics**, **Heat & Mass Transfer Engineering**, **Air Conditioning & Refrigeration Technology**, Cooling Towers, **Gas & Steam Turbines**, **Centrifugal Compressor & Pumps** and the **design**, **failure investigation**, and **maintenance** of **Atmospheric Storage Tanks & Tank Farms** and **Bolted Flanges & Joints**.

Currently, Mr. Larmour is working with Transnet overseeing the performance and safety of several **fuel pipelines** including **pumping stations** and **inland tank farms** locally. He also takes lead in the **planning** of detailed design of a **fuel gas supply system** from a site to the **proposed new power station**, the **management** of an **EPC booster gas compressor station** including an **overland piping**, and **spearheads** the **commercial & contractual management** within the **Ilitha Process Group**.

Throughout Mr. Larmour's lengthy career, he has worked with **several international companies** like **Mobil**, **Mossgas**, **Stewarts & Lloyds** and **Ilitha** with prime positions such as **Operations Manager**, **Principal Project Manager**, **Senior Mechanical Engineer**, **Offshore Projects Manager**, **Design Manager**, **Quality Assurance Manager** and **Project Engineer**.

Mr. Larmour's experience was not only confined to the industry alone. He was also able to largely contribute his expertise and impart his knowledge in the academe. He has engaged himself with **researches** and **lectures** in for several **universities** and **companies** and has held numerous **training courses** on **Thermomechanics** & **Fluid mechanics**, **Engineering Design**, **Refrigeration & Air Conditioning** and **Heat Transfer**.

Mr. Larmour is **Registered Professional Engineer** and has **Master** & **Bachelor** degrees in **Mechanical Engineering** and has a **Diploma** in **Nuclear Science**. Further, he is a **Certified Instructor/Trainer**.

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.

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 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	***Introduction to Storage Tanks*** *Definition and Function of Storage Tanks • Types of Fluids Stored (e.g., Crude Oil, Chemicals, Water) • Overview of Tank Applications by Industry • Key Regulatory Considerations*
0930 – 0945	*Break*
0945 – 1030	***Types & Classifications of Storage Tanks*** *Atmospheric versus Pressurized Tanks • Aboveground versus Underground Tanks • Fixed-Roof, Floating-Roof, and Domed-Roof Tanks • API, ASME, and Other Classification Standards*
1030 – 1130	***Basic Tank Components & Terminology*** *Shell, Roof, Bottom and Manholes • Nozzles, Vents, and Drains • Appurtenances and Accessories • Tank Foundations and Supports*
1130 – 1215	***Material Selection for Tank Construction*** *Carbon Steel versus Stainless Steel • Linings and Coatings • Compatibility with Stored Product • Corrosion Resistance and Lifecycle*
1215 – 1230	*Break*
1230 – 1330	***Codes & Standards Overview*** *API 650 and API 620 (Design) • API 653 (Inspection, Repair, Alteration) • ASME Section VIII (Pressure Tanks) • NFPA, AWWA, and OSHA References*
1330 – 1420	***Tank Design Parameters & Loading Considerations*** *Capacity and Volume Calculations • Static and Dynamic Loads • Wind, Seismic and Settlement Effects • Temperature and Pressure Factors*
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	***Design of Tank Shells*** *Thickness Calculations • Wind Girder and Stiffener Requirements • Corrosion Allowance and Material Stress • Shell Buckling Analysis*
0830 – 0930	***Roof & Bottom Design Considerations*** *Cone versus Dome Roofs • Floating Roof Mechanics • Bottom Plate Layout and Annular Rings • Drainage and Slope Design*
0930 – 0945	*Break*
0945 – 1100	***Nozzle & Manway Design*** *Placement and Sizing of Nozzles • Reinforcement Pad Design • Manway Design and Access Safety • API Flange Requirements*
1100 – 1215	***Foundation Design & Considerations*** *Types of Foundations (Ringwall, Slab, Piles) • Settlement Types and Analysis • Load-Bearing Capacity Evaluation • Seepage and Drainage Control*
1215 – 1230	*Break*
1230 – 1330	***Seismic & Wind Design*** *Seismic Zone Determination • Anchor Bolt Design • Overturning and Uplift Calculations • Wind Load Resistance Measures*
1330 – 1420	***Designing for Environmental & Safety Considerations*** *Secondary Containment Systems • Fire Protection Systems • Leak Detection and Monitoring • Breather Valves and Emergency Vents*
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	***Site Preparation & Layout*** *Site Grading and Soil Compaction • Underground Piping Considerations • Space Planning for Maintenance Access • Utility and Drainage Routing*
0830 – 0930	***Tank Fabrication Techniques*** *Field versus Shop Fabrication • Welding Methods and Joint Types • Rolling and Assembly of Shell Courses • Plate Marking and Cutting Processes*
0930 – 0945	*Break*
0945 – 1100	***Erection & Assembly of Tanks*** *Jacking versus Scaffold Erection Methods • Roof and Bottom Sequence • Inspection Checkpoints During Erection • Alignment and Leveling Techniques*
1100 – 1215	***Welding Inspection & Quality Control*** *Visual Weld Inspection (VT) • NDT Techniques (UT, RT, MT, PT) • Welding Procedure Qualification (WPS/PQR) • Welder Qualification and Documentation*
1215 – 1230	*Break*
1230 – 1330	***Coating & Corrosion Protection*** *Surface Preparation Methods (Sandblasting, Solvent Cleaning) • Coating Types (Epoxy, Polyurethane, etc.) • Cathodic Protection System Design • Inspection of Coatings and Lining Systems*

1330 – 1420	***Installation of Appurtenances*** *Ladders, Platforms and Handrails • Level Gauges and Instrumentation • Internal Floating Roofs and Seals • Heating Systems and Insulation*
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	***Hydrostatic & Pneumatic Testing*** *Test Pressure Calculation • Filling and Venting Procedure • Monitoring and Acceptance Criteria • Safety Precautions and Documentation*
0830 – 0930	***Tank Floor & Shell Inspections*** *Magnetic Flux Leakage Testing (MFL) • Ultrasonic Thickness Gauging • Visual and Borescope Inspection • Settlement and Tilt Evaluation*
0930 – 0945	*Break*
0945 – 1100	***API 653 Inspection Guidelines*** *In-Service vs. Out-of-Service Inspections • Inspection Intervals and Triggers • Minimum Thickness Calculations • Repair and Alteration Requirements*
1100 – 1215	***Leak Detection & Tightness Testing*** *Interstitial Monitoring • Tank Tightness Testing Methods • Vapor Monitoring and Sensors • Leak Classification and Response*
1215 – 1230	*Break*
1230 – 1330	***Commissioning of Storage Tanks*** *Functional Testing of Components • Calibration of Instrumentation • Filling Procedures and Product Introduction • Final Checklist and Turnover to Operations*
1330 – 1420	***Documentation & Compliance*** *Inspection Reports and Certifications • As-Built Drawings and O&M Manuals • Regulatory Submissions • Audit Trail for Installation*
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*

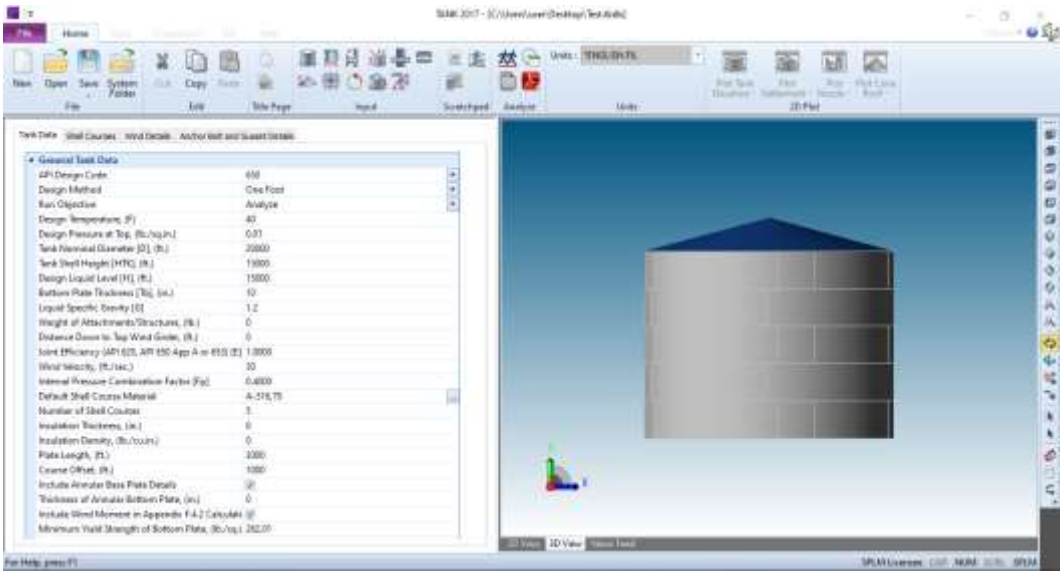
Day 5

0730 – 0830	***Common Tank Failures & Their Causes*** *Corrosion-Induced Failures • Foundation Settlement and Tilting • Roof Collapse and Shell Buckling • Seal System Failures in Floating Roofs*
0830 – 0930	***Storage Tank Risk Assessment*** *HAZOP and Risk Matrix Methods • Failure Mode and Effects Analysis (FMEA) • Environmental Impact Assessment • Financial Risk and Insurance Aspects*
0930 – 0945	*Break*
0945 – 1100	***Integrity Management Programs*** *API 653-Driven Inspection Programs • Fitness-for-Service Evaluations • Corrosion Monitoring and Maintenance • Long-Term Structural Integrity Plans*

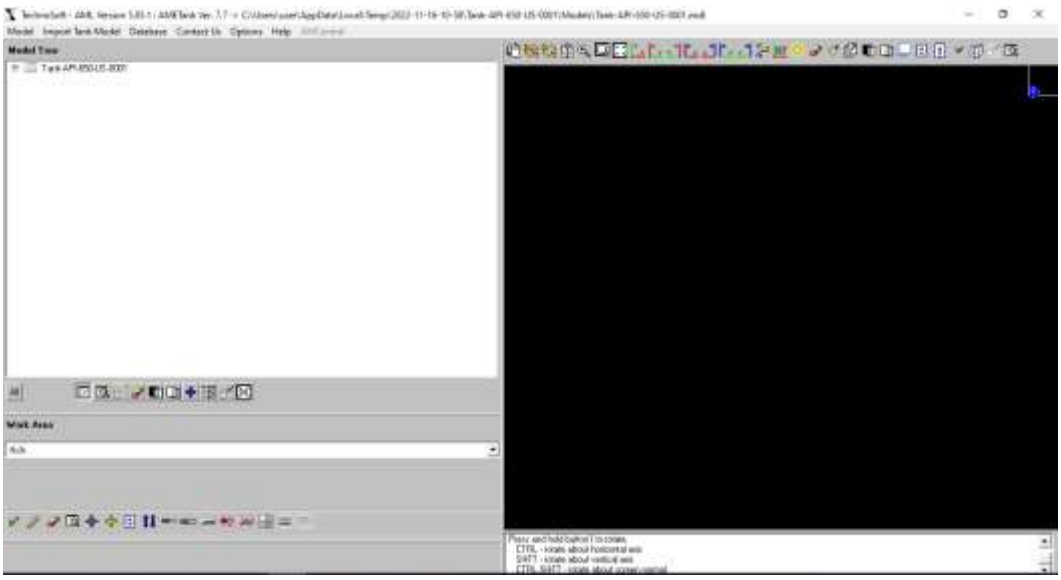
1100 – 1215	***Retrofitting & Upgrading Existing Tanks*** *Foundation and Shell Reinforcement • Adding New Nozzles and Instruments • Installing Modern Leak Detection Systems • Coating Re-Application and Lining Upgrades*
1215 – 1230	*Break*
1230 – 1300	***Tank Decommissioning & Removal*** *Cleaning and Degassing Procedures • Dismantling Strategies • Waste Disposal and Environmental Compliance • Decommissioning Reports and Clearance*
1300 – 1345	***Case Studies & Lessons Learned*** *Major Tank Failures (Causes and Responses) • Successful Tank Installations in Extreme Environments • Cost Overruns and Project Delays • Best Practices from the Oil and Gas Industry*
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)

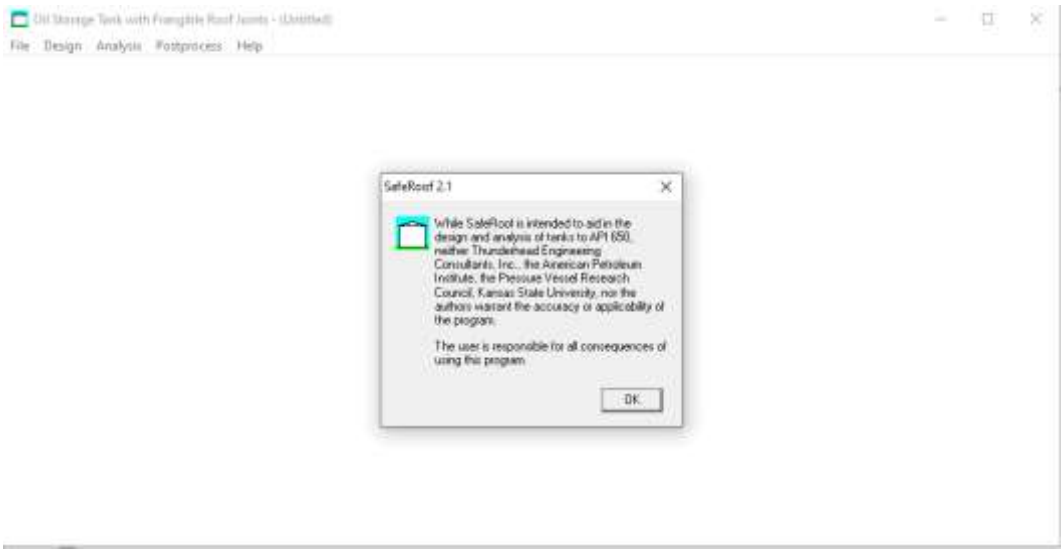
Practical sessions will be organized during the workshop for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators Hexagon PPM COADE TANK 2017 SP1 v9.00.01 (Integraph Tank)", " AME Tank v7.7" and "SafeRoof v2.1" Simulator.



Hexagon PPM COADE TANK 2017 SP1 v9.00.01 (Integraph Tank)



AME Tank v7.7



SafeRoof v2.1

Course Coordinator
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