COURSE OVERVIEW ME0743
Heat Exchanger Overhaul & Testing Techniques

Course Title
Heat Exchanger Overhaul & Testing Techniques

Course Reference
ME0743

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	February 08-12, 2026	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	May 03-07, 2026	Crowne Meeting Room, Crowne Plaza Al Khobar, an IHG Hotel, Al Khobar, KSA
3	August 17-21, 2026	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	November 08-12, 2026	Meeting Plus 9, City Centre Rotana, Doha, Qata

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 heat exchanger overhaul and testing techniques. It covers the heat exchanger inspection and testing as well as inspector's qualifications and roles of code authorized inspectors and non-code inspectors; the inspection tools and instruments, inspection reports and data collection and inspection records as a maintenance tool; the maintenance inspection and testing; the safety precautions when inspecting shutdown exchangers; planning for maintenance inspections, inspecting before maintenance and inspecting during performance of maintenance work; inspecting on completion of maintenance; recording and documenting maintenance work; and assessing and inspecting mothballed and used exchangers.

During this interactive course, participants will learn the non-destructive testing (NDT) of heat exchanger and interpreting test and examination results; the heat exchanger inspection codes covering jurisdictional requirements and guide to the national board inspection code (NBIC); troubleshooting, repair and cleaning heat exchanger in a professional manner; record keeping and preparing repairs and alterations; the overhauling, plugging, ferruling and sleeving; and the shell-side repairs and alterations including retubing and rebundling.

Course Objectives

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

- Apply systematic techniques on heat exchanger overhaul and testing techniques
- Carryout heat exchanger inspection and testing as well as discuss inspector's qualifications and roles of code authorized inspectors and non-code inspectors
- Recognize inspection tools and instruments, inspection reports and data collection and inspection records as a maintenance tool
- Employ maintenance inspection and testing of heat exchangers including safety precautions when inspecting shutdown exchangers
- Plan for maintenance inspections, inspect before maintenance and inspect during performance of maintenance work
- Inspect on completion of maintenance, record and document maintenance work as well as assess and inspect mothballed and used exchangers
- Review non-destructive testing (NDT) of heat exchanger, interpret test and examination results
- Discuss heat exchanger inspection codes covering jurisdictional requirements and guide to the national board inspection code (NBIC)
- Troubleshoot, repair and clean heat exchanger in a professional manner
- Apply record keeping and prepare repairs and alterations
- Illustrate heat exchanger overhaul as well as plugging, ferruling and sleeving
- Employ shell-side repairs and alterations including retubing and rebundling

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 a wide understanding and deeper appreciation of heat exchanger overhaul and testing techniques for plant and maintenance engineers, supervisors and other technical staff.

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 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)

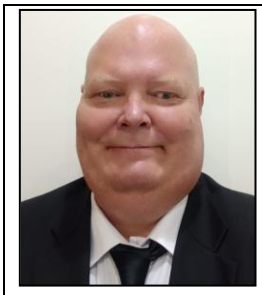
Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** 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. Andrew Ladwig is a **Senior 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 **Reciprocating & Centrifugal Compressors**, **Centrifugal Gas** Compressors, **Centrifugal Compressor** Operation, **Screw Compressor**, **Compressor** Control & Protection, **Pressure Safety Relief Valve** Repair & Recalibration, **Pressure Vessels** Fabrication, **PSV/PRV** Troubleshooting, **PRV** Testing & Repair, **PSV** Inspection, **Process Control Valves**, **Valve** Testing & Inspection, **Valve** Sealing, **Valve** Calibration, **Control Valves & Actuators**, **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps** Troubleshooting, **Pumps** Design, Selection & Operation, **Boiler** Inspection & Maintenance, **Boiler** instrumentation & Controls, **Boiler** Start-up & Shutdown, **Boiler** Operation & Steam System Management, **Boiler** Water Chemistry & Treatment, **Boiler** Efficiency & Waste Heat Recovery, **Boiler** Inspection & Testing, **Boiler** Troubleshooting & Safety, **Boiler** Emissions & Pollution Control, **Diesel Engine**, **Engine Cycles**, **Vehicle & Equipment** Inspection, **Crankshafts** & Maintenance, **Engines/Drivers**, **Motor** Failure Analysis & Testing, **Motor** Predictive Maintenance, **Engine** Construction & Maintenance, **Gas & Steam Turbine** Operation & Maintenance, **Gas Turbine** Technology, **Tank** Design & Engineering, **Tanks & Tank Farms**, **Vacuum Tanks**, **CAESAR II**, **Pipe Stress** Analysis, **Piping Stress** Analysis, **Piping Dynamic**, **Static** & Other Special Analysis, **Process/Static Equipment** Mechanical Design, **Piping Mechanical Design** & Specification, **Pipe Cuttings**, **Mechanical Pipe Fittings**, **Parker Compression Fittings**, **Pipes & Fittings**, **Flange Joint Assembly**, Adhesive Bond Lamination, **Butt Jointing**, **Joint & Spool Production**, **Isometric** Drawings, **Flange Assembly** Method, **Fabrication & Jointing**, Jointing & Spool Fabrication, **Flange Bolt Tightening** Sequence, **Hydro Testing**, **HVAC & Refrigeration** Systems, Direct Digital Control (**DCC**), **Vapor Recovery** Engineering, **Cooling Water & Compressed Air** Systems, **Fan** Coolers, **Chiller & Chiller Plant** Design, Heat Recovery Steam Generating (**HRSG**), **Heat Exchangers**, **Shell & Tube Heat Exchanger** Maintenance & Troubleshooting, **Combustion** Analysis & Tuning Procedures, **Combustion** Techniques, **Water Treatment** Technology, **Plant Upset & Abnormalities**, **Impulse Tube** Installation & Inspection, **Root Cause Failure** Analysis & Reliability, **Lubrication** System Troubleshooting & Maintenance, **Fired Equipment** Maintenance, Layout of **Piping Systems & Process** Equipment, **Process Heaters**, Glass Reinforced Epoxy (**GRE**), Glass Reinforced Pipes (**GRP**), Glass Reinforced Vent (**GRV**), **Bearings & Lubrication**, **Machinery Vibration & Condition** Monitoring, Advanced **Machinery Dynamics** and **Machinery** Troubleshooting.

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 is a **Registered SAQA Qualification** (**NQF Level 4**) in **Chemical Operations**, a **Certified Multi-Skilled** in **Instrumentation** and **Mechanical Engineering**, 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 Fee

Dubai	**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.
Doha	**US$ 6,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	**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.
Abu Dhabi	**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 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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Heat Exchanger Inspection & Testing*** *Inspector's Qualifications ● Roles of Code Authorized Inspectors & Non-Code Inspectors ● Inspection Tools & Instruments ● Inspection Reports & Data Collection ● Inspection Records as a Maintenance Tool*
0930 – 0945	*Break*
0945 – 1100	***Maintenance Inspection & Testing of Heat Exchangers*** *Safety Precautions when Inspecting Shutdown Exchangers ● Planning for Maintenance Inspections ● Inspection before Maintenance ● Inspection during Performance of Maintenance Work*
1100 – 1215	***Maintenance Inspection & Testing of Heat Exchangers (cont'd)*** *Inspection on Completion of Maintenance ● Recording & Documenting Maintenance Work ● Assessing & Inspecting Mothballed & Used Exchangers*
1215 – 1230	*Break*
1230 – 1420	***Non-Destructive Testing (NDT) of Heat Exchangers*** *Guidelines to ASME Code, Section V, "Nondestructive Examination" ● Visual Inspection (VT) ● Radiographic Examination (RT) ● Ultrasonic Examination (UT)*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Non-Destructive Testing (NDT) of Heat Exchangers (cont'd)*** *Liquid Penetrant Examination (PT) ● Magnetic Particle Examination (MT) ● Eddy-Current Examination (ET)*
0930 – 0945	*Break*
0945 – 1100	***Non-Destructive Testing (NDT) of Heat Exchangers (cont'd)*** *Leak Testing ● Pressure Testing ● Destructive Sampling & Trepanning*
1100 – 1215	***Non-Destructive Testing (NDT) of Heat Exchangers (cont'd)*** *Interpreting Test & Examination Results ● Records of Inspections & Tests ● Precautions for Hydrostatic & Pneumatic Testing*
1215 – 1230	*Break*
1230 – 1420	***Heat Exchanger Inspection Codes*** *Jurisdictional Requirements ● Guide to the National Board Inspection Code (NBIC) ● The API Inspection Code (API 510) ● How the National Board & API Codes Apply the ASME Code Rules*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Heat Exchanger Troubleshooting & Repair*** *Fouling in Heat Exchangers ● Corrosion & Erosion in Heat Exchangers ● Heat Exchanger Inspection Methods ● Operation & Troubleshooting ● Performance Monitoring & Testing*
0930 – 0945	*Break*
0945 – 1100	***Heat Exchanger Troubleshooting & Repair (cont'd)*** *Flow-Induced Vibration, Mechanisms, Vibration Prediction & Damage Numbers ● Cleaning Strategies & Methods: S&THE, PHE, ACHE ● Heat Exchanger Repairs ● Removal & Replacement of Heat Exchangers ● Cost-Effective Maintenance & Repair of Heat Exchangers*
1100 – 1215	***Cleaning of Heat Exchanger*** *Off versus On-Line Mechanical Cleaning ● Hydraulic Cleaning & Water Jetting ● Chemical Cleaning ● Deciding on Contract Cleaning Organization or Plant Maintenance Force*
1215 – 1230	*Break*
1230 – 1420	***Record Keeping: Preparing for Repairs & Alterations*** *Organizing Inspection & Maintenance Records ● Deciding Whether to Use In-Plant Maintenance Force or to Contract a Repair or Alteration Organization ● Materials Documentation ● Documentation of Procedures ● Scheduling*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Heat Exchanger Overhaul*** *Opening & Closing Quick-Opening & Nonbolted Closures ● Repairing Corroded or Damaged Gasket Surfaces ● Field Remachining Warped Flanges*
0930 – 0945	*Break*
0945 – 1100	***Heat Exchanger Overhaul (cont'd)*** *Correcting Excessive Deflection in Flat Covers ● Strategies for Dealing with Chronically Leaking Gasketed Flanged Closures ● Opening & Resealinng Diaphragm Closures*

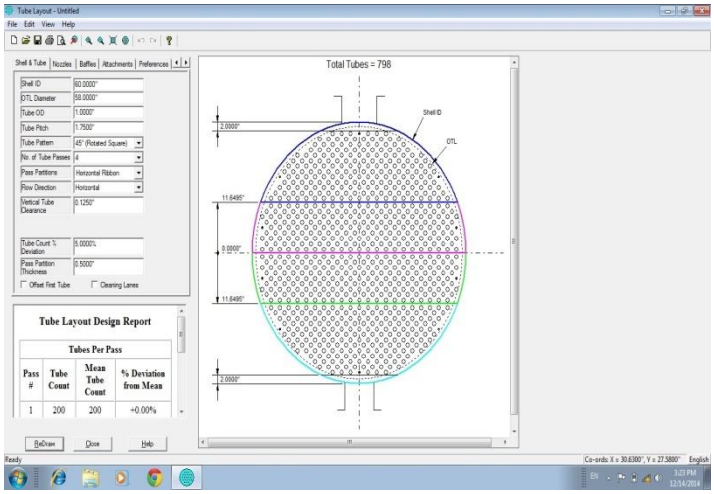
1100 – 1215	***Heat Exchanger Overhaul (cont'd)*** *How to Correct Pass-Partition Bending ● Removing & Replacing Feedwater Heater Pass-Partition Covers ● Restoring Damaged Feedwater Heater Pass Partitions*
1215 – 1230	*Break*
1230 – 1420	***Heat Exchanger Overhaul (cont'd)*** *Replacing Channels & Covers ● Repairing Eroded & Wormholed Tubesheets*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Plugging, Ferruling & Sleeving*** *Failures in Tubes & Tube-to-Tubesheet Joints ● Locating Tube Failure Positions ● Finding Tube-to-Tubesheet Joint Leaks ● Plugging Heat Exchanger Tubes ● Ferrules & Sleeves ● Heat & Erosion Shields*
0930 – 0945	*Break*
0945 – 1100	***Shell-Side Repairs & Alterations*** *Shell-Side Failures & Their Causes ● Procedures & Practices for Repairing Heat Exchangers ● Procedures & Practices for Altering Heat Exchangers ● Shell-Side Replacement*
1100 – 1215	***Retubing & Rebundling*** *General Considerations ● General Retubing Techniques & Procedures ● Parts Replacements, Repairs, Reassembly & Testing ● In-Place Retubing*
1215 – 1230	*Break*
1230 – 1345	***Retubing & Rebundling (cont'd)*** *Shop Retubing ● Retubing Closed Feedwater Heaters ● A Typical Repair of a Three Zone Closed Feedwater Heater ● Rebundling*
1345 – 1400	***Course Conclusion***
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 simulator "Heat Exchanger Tube Layout".



Heat Exchanger Tube Layout Simulator

Course Coordinator

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