COURSE OVERVIEW ME0325

Advanced Shell & Tube Industrial Heat Exchanger: Design, Applications & Maintenance

Course Title

Advanced Shell & Tube Industrial Heat Exchanger: Design, Applications & Maintenance

Course Date/Venue

Session 1: February 04-08, 2024/ Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha,Qatar

Session 2: March 03-07, 2024/The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

Course Reference

ME0325

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.

A shell and tube heat exchanger is the most common type of heat exchangers in the petroleum and petrochemical refineries. It consists of a shell (a large pressure vessel) with a bundle of tubes inside it. One fluid runs through the tubes, and another fluid flows over the tubes (through the shell) to transfer heat between the two fluids. One of the big advantages of using a shell and tube heat exchanger is that they are often easy to service, particularly with models where a floating tube bundle (where the tube plates are not welded to the outer shell) is available.

This course is designed to provide participants with a detailed and up-to-date overview of the design, applications and maintenance of advanced shell and tube industrial heat exchangers. It covers the various heat exchanger concepts and terminologies including their significance, functions and applications; the design and operation of heat exchangers; the overall heat transfer coefficients and specific considerations applicable to condensers, evaporators, etc; the design tube rules; the TEMA code, mechanical design, ASME Sec. VIII and UHX rules; and the fouling effect, prediction and techniques of control.

Course Objectives

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

- Apply and gain a good working knowledge on heat exchangers operation, control and troubleshooting
- Discuss various heat exchanger concepts & terminologies and identify their significance, functions and applications to the design & operation of heat exchangers
- Evaluate overall heat transfer coefficients and specific considerations applicable to condensers, evaporators, etc.
- Identify the design tube rules and apply TEMA code, mechanical design, ASME Sec. VIII and UHX rules
- Apply fouling effect, prediction and techniques of control

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 conveniently saved in a **Tablet PC**.*

Who Should Attend

This course covers systematic techniques on the design, applications and maintenance of advanced shell and tube industrial heat exchangers for project engineers, process engineers, plant and maintenance engineers and supervisors in the oil, chemical and other process industries that require a wider and deeper appreciation of heat exchanger design, performance, inspection, maintenance and operation, as well as to be able to solve numerical problems. It should also prove useful to those generally knowledgeable on the subject, but who may require a refresher or update. No prior knowledge of heat transfer is required. Participants will be taken through an intensive primer of heat transfer principles as they apply to shell and tube heat exchangers.

Course Fee

Doha	**US$ 6,000** per Delegate. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
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.

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:-

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association 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 1-2018 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 1-2018 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 Association 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.

- 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.

Accommodation

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

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. Adel Abdallah is a **Senior Process & Chemical Engineer** with over **20 years** of extensive experience within the **Petrochemical**, **Refinery** and **Oil & Gas** industries. His expertise covers **Process Plant** Troubleshooting, **Process Plant Optimization** Technology, **Engineering Problem Solving**, **Process Plant** Performance & Efficiency, **Process Plant** Start-up & Shutdown, **Process Plant** Commissioning, **Process Plant** Turn-around & Shutdown, **HYSYS Simulation**, **ASPEN HYSYS Process Modelling**, **HYSYS Basic**, Dynamic & Advanced **Process Simulation**, **Fundamentals of Process Operations**, **Crude Oil & Refinery Products**, **Sampling & Feed/Product Quality**, **Process Troubleshooting & Problem Solving**, **Hydro-Treating Technology**, **Catalysts**, **Distillation Column**, **Process Heaters/Furnaces**, **Reboilers**, **Condensers**, **Piping System** and **P&ID**. He is also well-versed in **Positive Displacement & Centrifugal Pumps**, **Compressors**, **Turbines**, **Fans**, **Blowers**, **Electric Motors**, **Gears & Transmission Equipment**, **Heat Exchangers**, **Valves**, **Packing & Mechanical Seal**, **Bearing**, **Couplings**, **Alignment**, **Water & Wastewater Treatment**, **Steam Boiler**, **Air Compressors** and ISO system.

During Mr. Abdallah's career life, he has handled challenging positions wherein he has acquired his wide technical and practical experience in the field of process & chemical industry such as the **Technical Instructor/Consultant**, **Senior Chemical Engineer**, **Chemical Engineer**, **Process Engineer**, **Technical Engineer** and **Production Supervisor** for various companies such as the **Jordan Petroleum Refinery**, **Jordanian Tunisian Chemicals Co.**, Al-Mas Resin Factory, **Tabuk Chemical Fertilizer Factory**, **UIP-FCEC JV Design and Build Company**, **Degussa MBT** and **National Chlorine Company** in the Middle East.

Mr. Abdallah has a **Bachelor's** degree in **Chemical Engineering** from the **University of Jordan**. Further, he is a **Certified Instructor/Trainer** and delivered various trainings internally in his previous companies.

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 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***
0930 – 0945	*Break*
0945 – 1100	***Classification Based on Application, Terminology & Typical Applications***
1100 – 1215	***Classification Based on Application, Terminology & Typical Applications (cont'd)***
1215 – 1230	*Break*
1230 – 1420	***Classification Based on Construction***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Fundamentals of Heat Transfer***
0930 – 0945	*Break*
0945 – 1100	***Concept of LMTD, Overall HT Co-Efficient, Fouling Factor***
1100 – 1215	***TEMA Classification & TEMA Types***
1215 – 1230	*Break*
1230 – 1420	***TEMA Classification & TEMA Types (cont'd)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Design of Shell & Tube Exchanger – Sizing, Pressure Drop, Considerations for Fluid Allocation (Shell Side/Tube Side), Number of Passes, Baffle Spacing***
0930 – 0945	*Break*
0945 – 1100	***Design of Shell & Tube Exchanger – Sizing, Pressure Drop, Considerations for Fluid Allocation (Shell Side/Tube Side), Number of Passes, Baffle Spacing (cont'd)***
1100 – 1215	***Uses of Kern Method & Bell (Delaware) Method***
1215 – 1230	*Break*
1230 – 1420	***Uses of Kern Method & Bell (Delaware) Method (cont'd)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Mechanical Design & Design Optimization Techniques (TEMA & UHX)*** *Mechanical Design of Shell & Tube Heat Exchangers* ● *Selection of Tubes* ● *Design of Shell*

0930 – 0945	*Break*

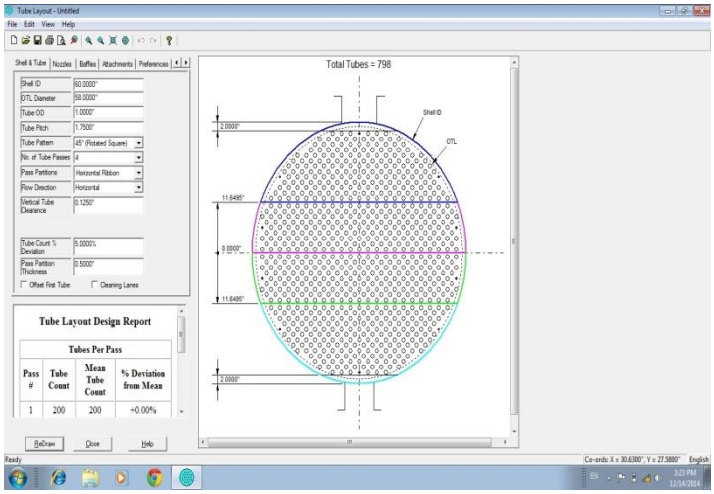
0945 – 1100	***Mechanical Design & Design Optimization Techniques (TEMA & UHX) (cont'd)*** *Baffles & Support Plates ● Design of Tube Sheet - General Requirements*
1100 – 1215	***Mechanical Design & Design Optimization Techniques (TEMA & UHX) (cont'd)*** *Tube Sheet Bending & Shear Formula ● TTS Joints – Expanded & Welded ● Design of Nozzles*
1215 – 1230	*Break*
1230 – 1420	***Mechanical Design & Design Optimization Techniques (TEMA & UHX) (cont'd)*** *Pass-Partition Plates, End Flanges & Bolting ● Mechanical Design of Components - Tube Sheet, Baffles, Bonnet/Shell Cover*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0900	***Identifying the Common Factors Affecting Thermal Performance*** *Problems with Thermal Aspects, Overall Mean Temperature Difference, Effective Heat Transfer Coefficients, Required Heat Transfer Area, Sizes & Number of Tubes ● Problems with Hydrodynamics Aspects, Pressure Drops & Pumping Power*
0900 – 0915	*Break*
0915 – 1100	***Identifying the Common Factors Affecting Thermal Performance (cont'd)*** *Investigate the Parameters that Affect Heat Transfer Coefficients ● Effects of Fouling & Remedial Measures*
1100 – 1115	*Break*
1115 – 1230	***Identifying the Common Factors Affecting Thermal Performance (cont'd)*** *Show Ways to Avoid Vibration & Velocity Related Problems*
1230 – 1345	***Operations & Control*** *Malfunctioning – Typical Causes & Remedial Measures ● Process Control & Maintenance of Heat Exchangers*
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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