COURSE OVERVIEW ME0007
Vapor Recovery Unit System

Course Title
Vapor Recovery Unit System



Course Date/Venue
Session 1: March 21-25, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: July 18-22, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar

Course Reference
ME0007

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

Course Description







This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and an up-to-date overview of vapor recovery engineering. It covers the vapor control systems and how equipment works; the hydro-carbon vapor adsorption-absorption process with dry vacuum pump, absorber tanks, piping, venting systems and condensate collection; the liquid ring VRU systems, vacuum booster blower and equipment failure patterns; the various approaches to machinery troubleshooting, troubleshooting faults and applying corrective action; and the product loading pumps, dry vacuum pump, rich absorbent return pump and liquid ring vacuum pump.

During this interactive course, participants will learn the seal fluid cooler, separator, packing, mechanical seals and seal support systems; the mechanical seal failure analysis, troubleshooting, maintenance and repair as well as bearing care and maintenance; the couplings and alignment, electrical components and operation and instrumentation of VRU's; and the continuous emission monitoring system and vapor watch-enhanced maintenance package records system and preventive maintenance for lubrication.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply systematic techniques on the operation, maintenance and troubleshooting of vapor recovery unit (VRU) system
- Discuss vapor control systems and how equipment works
- Determine hydro-carbon vapor adsorption-absorption process with dry vacuum pump as well as absorber tanks, piping, venting systems and condensate collection
- Recognize liquid ring VRU systems, vacuum booster blower and equipment failure patterns
- Carryout various approaches to machinery troubleshooting, troubleshooting faults and applying corrective action
- Identify product loading pumps, dry vacuum pump, rich absorbent return pump and liquid ring vacuum pump
- Explain seal fluid cooler, separator, packing, mechanical seals and seal support systems
- Employ mechanical seal failure analysis, troubleshooting, maintenance and repair as well as bearing care and maintenance
- Describe couplings and alignment, electrical components and operation and instrumentation of VRU's
- Apply continuous emission monitoring system and vapor watch-enhanced maintenance package records system as well as preventive maintenance for lubrication

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 vapor recovery unit system for engineers, operators, regulatory personnel and other technical staff who deal with vapor recovery or vapor combustion equipment for petroleum distribution facilities in their daily operation.

Accommodation

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

Course Fee

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.

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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **Energy Efficient Operation** of **District Cooling Plants**, **Piping & Pipeline**, Maintenance, Repair, **Shutdown**, **Turnaround & Outages**, **Maintenance & Reliability** Management, **Mechanical Maintenance** Planning, Scheduling & Work Control, Advanced Techniques in **Maintenance** Management, **Predictive & Preventive** Maintenance, **Maintenance & Operation Cost Reduction** Techniques, Reliability Centered Maintenance (**RCM**), **Machinery Failure** Analysis, **Rotating Equipment Reliability** Optimization & Continuous Improvement, **Material Cataloguing**, **Mechanical & Rotating Equipment** Troubleshooting & Maintenance, **Root Cause Analysis & Reliability** Improvement, **Condition** Monitoring, **Root Cause Failure Analysis** (RCFA), **Steam Generation**, **Steam Turbines**, **Power Generator Plants**, **Gas Turbines**, **Chiller Equipment**, **Trane Chiller Diagnostics Troubleshooting**, **Combined Cycle Plants**, **Boilers**, **Process Fired Heaters**, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, **Heat Exchangers**, Heat Transfer, Coolers, **Power Plant** Performance, Efficiency & Optimization, **Storage Tank** Design & Fabrication, **Thermal Power Plant** Management, **Boiler & Steam** System Management, **Pumps & Compressors**, **Pump** Operation & Maintenance, **Chiller & Chiller Plant** Design & Installation, **Pressure Vessel**, **Safety Relief Valve** Sizing & Selection, **Valve** Disassembling & Repair, Pressure Relief Devices (**PSV**), **Hydraulic & Pneumatic** Maintenance, Advanced **Valve** Technology, **Pressure Vessel** Design & Fabrication, **Pumps**, Turbo-Generator, Turbine **Shaft Alignment**, **Lubrication**, Mechanical **Seals**, Packing, **Blowers**, **Bearing** Installation, **Couplings**, **Clutches** and **Gears**. Further, he is also versed in **Wastewater Treatment** Technology, **Networking** System, **Water Network Design**, Industrial **Water Treatment** in Refineries & Petrochemical Plants, **Piping** System, Water Movement, Water Filtering, Mud Pumping, **Sludge Treatment** and **Drying**, **Aerobic Process** of **Water Treatment** that includes **Aeration**, **Sedimentation** and **Chlorination Tanks**. His strong background also includes **Design** and **Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps**, **Filters**, **Metering Pumps**, **Aerators** and **Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager**, **Plant Manager**, **Area Manager - Equipment Construction**, **Construction Superintendent**, **Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design**, **Plant Operation**, **Write-up** of **Capital Proposal**, **Investment Approval**, **Bid Evaluation**, **Technical Contract Write-up**, **Construction** and **Sub-contractor Follow up**, **Lab Analysis**, **Sludge Drying** and **Management** of **Sludge Odor** and **Removal**. He has worked in various companies worldwide in the **USA**, **Germany**, **England** and **Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has a **Master** and **Bachelor** degrees in **Mechanical Engineering** with **Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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*** *Overview of Vapor Control Systems● Understanding How Equipment Works*
0930– 0945	*Break*
0945 – 1030	***Hydro-Carbon Vapour Adsorption-Absorption Process with Dry Vacuum Pump***
1030 – 1130	***Absorber Tanks-Piping- Venting Systems***
1130 – 1230	***Condensate Collection***
1230 – 1245	*Break*
1245 – 1420	***Liquid Ring VRU Systems*** *Adsorption – Absorption Process with Liquid Ring Pump*
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Vacuum Booster Blower Overview*** *Rotors ● Balancing ● Rotor Dynamics ● Impellers ● Casings ● Troubleshooting & Preventive Maintenance for Compressors ● Bearings ● Seals: Labyrinths, Oil Seals & Self Acting Gas Seals ● Couplings ● Controls*
0930 – 0945	*Break*
0945 – 1100	***Equipment Failure Patterns*** *Materials Selection ● Types of Corrosion ● Bath-Tub Curve ● Actual Equipment Failure Patterns ● Actions to Minimize Failure Effect*

1100 – 1200	***Basic Approaches to Machinery Troubleshooting*** *Examples from Recent Failure Incidents Attributed to Design Defects ● Processing & Manufacturing Deficiencies*
1200 – 1230	***Case Studies***
1230 – 1245	*Break*
1245 – 1315	***Troubleshooting Faults & Applying Corrective Action*** *Equipment Performance Monitoring ● Vibration Analysis ● Fast Fault Finding*
1315 – 1400	***Product Loading Pumps Overview*** *Centrifugal Pump Theory ● Operating Characteristics ● Centrifugal ● Pump Operation ● Cavitation & NPSH*
1400 – 1420	***Dry Vacuum Pump***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Rich Absorbent Return Pump***
0930 – 0945	*Break*
0945 – 1030	***Liquid Ring Vacuum Pump***
1030 – 1100	***Seal Fluid Cooler***
1100 – 1130	***Seperator***
1130 – 1230	***Packing & Mechanical Seals*** *Compression Packing ● Molded (Automatic) Packing ● Basic Principles of Mechanical Seals ● Face Materials ● Secondary Seal Materials ● Single Mechanical Seals ● Single Mechanical Seal ● Flushing Plans*
1230 – 1245	*Break*
1245 – 1420	***Seal Support Systems*** *Dual Sealing Systems & Flushing Plans ● API 682 Reference Guide ● Gas Barrier Seal Technology for Pumps ● Support Systems for Dry Gas (Self Acting) Compressor Seals ● Mechanical Seal Selection Strategies*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Mechanical Seal Failure Analysis & Troubleshooting*** *Failure Analysis ● Mechanical Seal Troubleshooting ● Determining Leakage Rates ● Ascertaining Seal Stability*
0930 – 0945	*Break*
0945 – 1100	***Mechanical Seal Maintenance & Repair*** *Bellows Seal Repair ● Cartridge Seal Installation & Management ● Seal Face Care*
1100 – 1230	***Bearing Care & Maintenance*** *Basic Bearing Concepts ● Bearing Classifications ● Bearing Care & Maintenance ● Lubrication Management Break*
1230 – 1245	*Break*
1245 – 1315	***Couplings & Alignment*** *Purpose of Couplings ● Types of Couplings ● Alignment Methods ● Foundation & Grouting Guidelines*
1315 – 1400	***Electrical Components & Operation***
1400 – 1420	***Instrumentation of VRUs***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Continuous Emission Monitoring System***
0830 – 0930	***Vapor Watch-enhanced Maintenance Package Records System Data*** *Pressures, Temperatures, Flows & other Vapor Control Parameters & can be Configured to Output Useful Reports on System Performance.*
0930 – 0945	*Break*
0945 – 1100	***Preventive Maintenance-Lubrication*** *Comparative Viscosity ● Classifications*
1100 – 1230	***Preventive Maintenance-Lubrication (cont'd)*** *Cost of Poor Lubrication ● Fundamentals-Oil & Grease ● Storage & Handling Methods*
1230 – 1245	*Break*
1245 – 1345	***Preventive Maintenance*** *General Philosophy ● Equipment Sparing Factor & Maintenance Approach*
1345 – 1400	***Course Conclusion***
1400 - 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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