COURSE OVERVIEW ME0007-4D
Vapor Recovery Unit System

Course Title
Vapor Recovery Unit System

Course Date/Venue
December 23-26, 2024/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Reference
ME0007-4D

Course Duration/Credits
Four days/2.4 CEUs/24 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

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.

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

Certificates are accredited by the following international accreditation organizations: -

- 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 **2.4 CEUs** (Continuing Education Units) or **24 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:

Dr. Tony Dimitry, PhD, MSc, BSc, is a **Senior Mechanical Engineer** with over **30 years** of industrial experience. His expertise covers **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.

Course Fee

US$ 4,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course 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: Monday, 23rd of December 2024

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 – 1015	***Hydro-Carbon Vapour Adsorption-Absorption Process with Dry Vacuum Pump***
1015 – 1100	***Absorber Tanks-Piping- Venting Systems***
1100 - 1130	***Condensate Collection***
1130 – 1230	***Liquid Ring VRU Systems*** *Adsorption – Absorption Process with Liquid Ring Pump*
1230 – 1245	*Break*
1245 – 1330	***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*
1330 - 1420	***Equipment Failure Patterns*** *Materials Selection ● Types of Corrosion ● Bath-Tub Curve ● Actual Equipment Failure Patterns ● Actions to Minimize Failure Effect*
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: Tuesday, 24th of December 2024

0730 – 0900	***Basic Approaches to Machinery Troubleshooting*** *Examples from Recent Failure Incidents Attributed to Design Defects ● Processing & Manufacturing Deficiencies*
0900 - 0930	***Case Studies***
0930 – 0945	*Break*
0945 – 1100	***Troubleshooting Faults & Applying Corrective Action*** *Equipment Performance Monitoring ● Vibration Analysis ● Fast Fault Finding*
1100 – 1200	***Product Loading Pumps Overview*** *Centrifugal Pump Theory ● Operating Characteristics ● Centrifugal ● Pump Operation ● Cavitation & NPSH*
1200 – 1230	***Dry Vacuum Pump***
1230 – 1245	*Break*
1245 – 1330	***Rich Absorbent Return Pump***
1330 - 1420	***Liquid Ring Vacuum Pump***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: Wednesday, 25th of December 2024

0730 – 0830	***Seal Fluid Cooler***
0830 - 0930	***Separator***
0930 – 0945	*Break*
0945 – 1030	***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*
1030 – 1100	***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*
1100 – 1130	***Mechanical Seal Failure Analysis & Troubleshooting*** *Fai lure Analysis ● Mechanical Seal Troubleshooting ● Determining Leakage Rates ● Ascertaining Seal Stability*
1130 – 1230	***Mechanical Seal Maintenance & Repair*** *Bellows Seal Repair ● Cartridge Seal Installation & Management ● Seal Face Care*
1230 – 1245	*Break*
1245 – 1420	***Bearing Care & Maintenance*** *Basic Bearing Concepts ● Bearing Classifications ● Bearing Care & Maintenance ● Lubrication Management Break*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: Thursday, 26th of December 2024

0730 – 0830	***Couplings & Alignment*** *Purpose of Couplings ● Types of Couplings ● Alignment Methods ● Foundation & Grouting Guidelines*
0830 – 0930	***Electrical Components & Operation***
0930 – 0945	*Break*
0945 – 1030	***Instrumentation of VRUs***
1030 – 1100	***Continuous Emission Monitoring System***
1100 – 1130	***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*
1130 – 1230	***Preventive Maintenance-Lubrication*** *Comparative Viscosity ● Classifications ● 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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