COURSE OVERVIEW ME0007
Vapor Recovery Unit Operations

Course Title
Vapor Recovery Unit Operations

Course Date/Venue
Session 1: August 19-23, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 16-20, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

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

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, sample video clips of the instructor's actual lectures & practical sessions during the course 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.

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.

Accommodation

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

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 **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.

Course Instructor

This course will be conducted by the following instructor. However, we have the right to change the course instructor prior to the course date and inform participants accordingly:

Mr. Dimitry Rovas, CEng, MSc, PMI-PMP, SMRP-CMRP is a **Senior Mechanical & Maintenance Engineer** with extensive industrial experience in **Oil**, **Gas**, **Power** and **Utilities** industries. His expertise includes **Boiler** Inspection & Maintenance, **Boiler** Systems, **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** Maintenance, **Boiler** Troubleshooting & Safety, **Boiler** Emissions & Pollution Control, **Combustion** Analysis & Tuning Procedures, **Water Treatment** Technology, Heat Recovery Steam Generating (**HRSG**), **Impulse Tube** Installation & Inspection, **Parker Compression Fittings**, **Pipes & Fittings**, **PSV Inspection**, **Root Cause Failure Analysis**, **Tank** Design & Engineering, **Tank Shell**, **Tanks & Tank Farms**, **Vacuum Tanks**, **Gas Turbine** Operating & Maintenance, **Diesel Engine**, **Engine Cycles**, **Governors & Maintenance**, **Crankshafts** & Maintenance, **Lubrication** System Troubleshooting & Maintenance, **Engines/Drivers**, **Motor** Failure Analysis & Testing, **Motor** Predictive Maintenance, **Engine** Construction & Maintenance, **HP Fuel Pumps & Maintenance**, **Fired Equipment** Maintenance, Combustion **Techniques**, **Process Heaters**, Glass Reinforced Epoxy (**GRE**), Glass Reinforced Pipes (**GRP**), Glass Reinforced Vent (**GRV**), **Mechanical Pipe Fittings**, **Flange Joint Assembly**, Adhesive Bond Lamination, **Butt Jointing**, **Joint & Spool Production**, **Isometric Drawings**, **Flange Assembly** Method, **Fabrication & Jointing**, Jointing & Spool Fabrication, **CAESAR**, **Pipe Stress Analysis**, **Pipe Cuttings**, **Flange Bolt Tightening** Sequence, **Hydro Testing**, **Pump** Technology, Fundamentals of **Pumps**, **Pump** Selection & Installation, **Centrifugal Pumps & Troubleshooting**, **Reciprocating & Centrifugal Compressors**, **Screw Compressor**, **Compressor** Control & Protection, **Gas & Steam Turbines**, **Turbine** Operations, **Gas Turbine** Technology, **Valves**, **Process Control Valves**, **Bearings & Lubrication**, Advanced **Machinery Dynamics**, **Rubber Compounding**, **Elastomers**, **Thermoplastic**, **Industrial Rubber Products**, **Rubber** Manufacturing Systems, **Heat Transfer**, **Vulcanization Methods**, **Process Plant Shutdown & Turnaround**, **Professional Maintenance Planner**, Advanced **Maintenance Management**, **Maintenance Optimization & Best Practices**, **Maintenance Auditing & Benchmarking**, **Material Cataloguing**, **Reliability** Management, **Rotating Equipment**, **Energy Conservation**, **Energy Loss Management** in Electricity Distribution Systems, **Energy Saving**, **Thermal Power Plant** Management, **Thermal Power Plant** Operation & Maintenance, **Heat Transfer**, **Machine Design**, **Fluid Mechanics**, **Heating & Cooling Systems**, **Heat Insulation Systems**, **Heat Exchanger & Cooling Towers**, **Mechanical Erection**, **Heavy Rotating Equipment**, Material Unloading & Storage, Commissioning & Start-Up. He is currently the **Project Manager** wherein he is managing, directing and controlling all activities and functions associated with the domestic heating/cooling facilities projects.

During his life career, Mr. Rovas has gained his practical and field experience through his various significant positions and dedication as the **EPC Project Manager**, **Maintenance Manager**, **Mechanical Engineer**, **Field Engineer**, **Preventive Maintenance Engineer**, **Lead Rotating Equipment Commissioning Engineer**, **Construction Commissioning Engineer**, **Offshore Lead Maintenance Engineer**, **Researcher**, **Instructor/Trainer**, **Telecom Consultant** and **Consultant** from various companies such as the Mytilineos Aluminium Group, Podaras Engineering Studies, Metka and Diadikasia, S.A., **Hellenic Petroleum Oil Refinery** and COSMOTE.

Mr. Rovas has **Master's** degrees in **Energy Production & Management** and **Mechanical Engineering** from the **National Technical University of Athens** (**NTUA**), **Greece**. Further, he is a **Certified Instructor/Trainer**, a **Certified Maintenance and Reliability Professional** (**CMRP**) from the Society of Maintenance & Reliability Professionals (**SMRP**), **Certified Project Management Professional** (**PMI-PMP**), **Certified Six Sigma Black Belt**, **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), **Certified Construction Projects Contractor**, **Certified Energy Auditor** and a **Chartered Engineer**. Moreover, he is an active member of **American Society for Quality**, Project Management Institute (**PMI**), **Body of Certified Energy Auditors** and **Technical Chamber of Greece**. He has further received various recognition and awards and delivered numerous trainings, seminars, courses, workshops and conferences internationally.

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*** *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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org