



COURSE OVERVIEW ME0007 Vapor Recovery Unit System

Course Title

Vapor Recovery Unit System

Course Date/Venue

March 03-07, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, 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: -

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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.

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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(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 Process & 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 **Ammonia Manufacturing & Process Troubleshooting, Distillation Towers, Crude Oil Distillation, Fundamentals of Distillation** for Engineers, **Distillation Operation and Troubleshooting, Advanced Distillation Troubleshooting, Distillation Technology, Vacuum Distillation, Ammonia Storage & Loading Systems, Ammonia Plant Operation, Troubleshooting & Optimization, Ammonia Recovery, Ammonia Plant Safety, Hazard of Ammonia Handling, Storage & Shipping,**

Operational Excellence in Ammonia Plants, Fertilizer Storage Management (Ammonia & Urea), Fertilizer Manufacturing Process Technology, Sulphur Recovery, Phenol Recovery & Extraction, Wax Sweating & Blending, Petrochemical & Fertilizer Plants, Nitrogen Fertilizer Production, Petroleum Industry Process Engineering, Refining Process & Petroleum Products, Refinery Planning & Economics, Safe Refinery Operations, Hydrotreating & Hydro-processing, Separators in Oil & Gas Industry, Gas Testing & Energy Isolations, Gas Liquor Separation, Industrial Liquid Mixing, Wax Bleachers, Extractors, Fractionation, Operation & Control of Distillation, Process of Crude ATM & Vacuum Distillation Unit, Water Purification, Water Transport & Distribution, Steam & Electricity, Flame Arrestors, Coal Processing, Environmental Emission Control, R&D of Wax Blending, Wax Molding/Slabbing, Industrial Drying, Principles, Selection & Design, Certified Process Plant Operations, Control & Troubleshooting, Operator Responsibilities, Storage Tanks Operations & Measurements, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Performance, Efficiency & Optimization, Continuous Improvement & Benchmarking, Process Troubleshooting Techniques, Oil & Gas Operation/Introduction to Surface Facilities, Pressure Vessel Operation, Process Equipment Performance & Troubleshooting, Plant Startup & Shutdown, Startup & Shutdown the Plant While Handling Abnormal Conditions, Flare & Relief System, Process Gas Plant Start-up, Commissioning & Problem Solving, Process Liquid and Process Handling & Measuring Equipment. Further, he is also well-versed in **Compressors & Turbines Operation, Maintenance & Troubleshooting, Heat Exchanger Overhaul & Testing Techniques, Balancing of Rotating Machinery (BRM), Pipe Stress Analysis, Valves & Actuators Technology, Inspect & Maintain Safeguarding Vent & Relief System, Certified Inspectors for Vehicle & Equipment, Optimizing Equipment Maintenance & Replacement Decisions, Certified Maintenance Planner (CMP), Certified Planning and Scheduling Professional (ACE-PSP), Tank Design, Construction, Inspection & Maintenance, Material Cataloguing, Specifications, Handling & Storage, Steam Trap Design, Operation, Maintenance & Troubleshooting, Steam Trapping & Control, Column, Pump & Exchangers, Troubleshooting & Design, Rotating Equipment Operation & Troubleshooting, Control & ESD System, Detailed Engineering Drawings, Codes & Standards, Budget Preparation, Allocation & Cost Control, Root Cause Analysis (RCA), Production Optimization, Permit to Work (PTW), Project Engineering, Data Analysis, Process Hazard Analysis (PHA), HAZOP Study, Sampling & Analysis, Training Analysis, Job Analysis Techniques, Storage & Handling of Toxic Chemicals & Hazardous Materials, Hazardous Material Classification & Storage/Disposal, Dangerous Goods, Risk Monitoring Authorized Gas Tester (AGT), Confined Space Entry (CSE), Personal Protective Equipment (PPE), Fire & Gas, First Aid and Occupational Health & Safety.**

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 has a **Bachelor's degree in Chemical Engineering** and a **Diploma in Mechanical Engineering**. Further, he is 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 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: Sunday, 03rd of March 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 – 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: Monday, 04th of March 2024

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: Tuesday, 05th of March 2024

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: Wednesday, 06th of March 2024

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: Thursday, 07th of March 2024

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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