COURSE OVERVIEW RE0956
Static Equipment: Maintenance & Troubleshooting

Course Title
Static Equipment: Maintenance & Troubleshooting

Course Date/Venue
December 09-13, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
RE0956

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 up-to-date overview of static equipment or pipe and fitting. It covers the static equipment basics; the types of equipment, materials, welding, painting and protective coating; the flow diagrams of static equipment and operation of static equipment; the pressure vessels and piping system; the pipe supports and pressure and leak testing of piping systems; the various types and functions of valves; and the operation, maintenance and troubleshooting of control valves and actuators.

During this interactive course, participants will learn the static and stationary equipment failure modes; the discontinuity origination; the pressure vessel maintenance, standards and good practices; and the proper inspection, basic NDT methods, specialty testing methods and stationary predictive maintenance.

Course Objectives

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

- Apply systematic techniques on the maintenance of static mechanical equipment
- Discuss static equipment basics covering the types of equipment, materials, welding, painting and protective coating, flow diagrams of static equipment and operation of static equipment
- Identify pressure vessels that include drums, columns and reactors as well as heat exchangers, non pressure components, storage tanks, boilers and burners
- Describe piping system covering piping components, piping materials, fabrication and installation of piping, bolted joints and piping layout
- Carryout pipe supports and pressure and leak testing of piping systems
- Identify the various types and functions of valves as well as operate, maintain and troubleshoot control valves and actuators
- Determine static and stationary equipment failure modes
- Discuss discontinuity origination that include flaw types, inherent flaws, manufacturing flaws and in service flaws
- Employ pressure vessel maintenance and review standards and good practices as per API 510, API 653 and API 570 standards
- Implement proper inspection including the basic NDT methods, specialty testing methods and stationary predictive maintenance

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 covers systematic techniques and methodologies of static mechanical equipment maintenance for managers, operation managers, section heads, planners, maintenance and reliability engineers, plant superintendents and supervisors, and senior process engineers.

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 **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 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.

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. Den Bazley, PE, BSc, is a **Senior Pipeline & Mechanical Maintenance Engineer** with **40 years** of industrial experience in **Oil**, **Gas**, **Refinery**, **Petrochemical**, **Power** and **Utilities** industries. His wide expertise includes **Pipeline & Piping Design**, **Process Piping** Design & Mechanical Integrity, **Piping & Pipeline** Maintenance & Repair, **Pipeline** Operation & Maintenance, **Pigging**, **Integrity** Assessment, Layout of **Piping Systems & Process Equipment**, **Pipe Work** Design & Fabrication, **Mechanical Piping** Systems Design & Specification, **Piping & Storage** Facilities, **Fitness for Service** for Petrochemical Plants, **Pipeline** Equipment Operation, **Pipeline** Rules of Thumb, **Welding** Technology, **Welding & Fabrication**, **Welding & Brazing**, **Mechanical Integrity & Reliability**, Advanced Integrity Management, **Root Cause** Analysis on Technical Failure Investigation Pertaining to Asset Integrity/Engineering, **Pressure Vessel** Fabrication & Testing, **Vacuum** Systems, **Mechanical Rotating Equipment & Turbomachinery**, Centrifugal **Pump & Compressors**, **Pump** Maintenance, **Propylene Compressor & Turbine**, **Safety Relief Valve** (PRV-PSV) Inspection & Testing, **Process Control Valves**, **Valve** Troubleshooting & Repair Procedure, Advanced **Valve Technology**, **Pressure Vessels & Heat Exchangers** Design, **Strainers & Steam Traps**, Advanced **Boiler** Operation & Maintenance, **Gas & Steam Turbine** Operation, Process Design Parameters for **Gas Compressor/Turbines**, **Boilers & Steam System** Management, **Dry Gas Seal** Installation & Commissioning, **Tank** Installation & Maintenance, **Bearing** Mounting/Dismounting, **Mechanical Seals** & Systems, **Gear Boxes** Selection & Inspection, **Machinery** Troubleshooting, **Machinery** Failure Analysis & Troubleshooting, **Rotating Machinery** Best Practices, **Predictive** Maintenance, **Maintenance Planning Scheduling & Work Control**, Maintenance Strategy Development & Cost-Effective Implementation, Alignment & Troubleshooting of **Rotating Machinery**, Planning Managing **Shutdowns & Turnarounds**, **Reliability Centered Maintenance & Total Productivity Maintenance**, Analytical Prevention of Mechanical Failure, Maintenance Planning and Scheduling & Cost Estimation.

During his career life, Mr. Bazley has gained his practical and field experience through his various significant positions and dedication as the **General Manager**, **Branch Manager**, **Refinery Chairman**, **Engineering Manager**, **Maintenance Engineer**, **Construction Engineer**, **Project Engineer**, **Mechanical Engineer**, **Piping Engineer**, **Pipeline Engineer**, **Associate Engineer**, **Oil Process Engineer**, **Mechanical Services Superintendent**, **Quality Coordinator**, **Planning Coordinator**, **Consultant/Instructor**, **Lecturer/Trainer** and **Public Relations Officer** for numerous international companies like **ESSO**, **FFS Refinery**, Dorbyl Heavy Engineering (**VECOR**), Vandenbergh Foods (**Unilever**), **Engen Petroleum**, Royle Trust and **Pepsi-Cola**.

Mr. Bazley is a **Registered Professional Engineer** and has a **Bachelor's** degree in **Mechanical Engineering**. Further, he is a **Certified Engineer** (Government Certificate of Competency GCC Mechanical Pretoria SA), **Certified Instructor/Trainer**, a **Certified Internal Verifier/Trainer/ Assessor**, an active member of the **Institute of Mechanical Engineers** (**IMechE**) and has delivered numerous trainings, courses, seminars and workshops 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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Static Equipment Basics*** *Types of Equipment ● Materials, Welding ● Non Destructive Examination ● Painting & Protective Coating ● Flow Diagrams of Static Equipment ● Operation of Static Equipment: Drums, Columns, Reactors, Storage Tanks, Heat Exchangers, Boilers, Pressure Vessels & Piping System ● Understanding Static Equipment Drawings: Drafting Exercises*
0930 – 0945	*Break*
0945 – 1100	***Pressure Vessels (Drums, Columns, Reactors)*** *Introduction ● Internal Pressure, External Pressure ● Nozzle: WRC 107 & 297 for Local Loads ● Pressure Vessels Internals (Most Typical) ● Fabrication & Erection of Pressure Vessels ● Fitness for Purpose of Pressure Vessels (ASME FFS/API 579) ● Repairs of Pressure Vessels with ASME PCC2 ● Heat Exchangers*
1100 – 1215	***Heat Exchangers*** *Introduction & Definition of Heat Transfer Coefficients ● Types of Heat Exchangers ● Workshop Practical Session ● Industrial Features & Additional Information ● Heat Exchanger Analysis is Detail*
1215 – 1230	*Break*
1230 – 1420	***Heat Exchangers (cont'd)*** *Counter Flow, Cross Flow & Multipass Heat Exchangers ● Shell & Tube Heat Exchangers ● Heat Exchanger Maintenance (Planning, Precaution Required, Plugging, Ferruling) ● Heat Exchanger Maintenance (Sleeving, Shell Side Repairs) ● Heat Exchanger Maintenance (Re-Tubing)*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Non Pressure Components*** *Introduction ● Loads (Wind & Seismic) ● Skirt Calculations ● Base Ring & Anchor Bolts ● Tall Towers Maintenance*
0930 – 0945	*Break*
0945 – 1100	***Storage Tanks*** *Introduction ● Roof Types ● API 650 & API 620 ● Fabrication of Storage Tanks ● Fitness for Service of Storage Tanks*
1100 – 1215	***Boilers & Burners*** *Types of Boilers ● Configurations & Characteristics of Each Type ● Circulation of Boiler Water ● Boiler Fluid Flow Paths*
1215 – 1230	*Break*

1230 – 1420	***Boilers & Burners (cont'd)*** *Feedwater ● Steam or Hot Water ● Gas Burners ● Oil Burners ● Combination Gas/Oil Burners ● Boiler Maintenance & Protection*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Piping System*** *Introduction to Piping ● Piping Components ● Piping Materials ● Fabrication & Installation of Piping*
0930 – 0945	*Break*
0945 – 1100	***Piping System (cont'd)*** *Bolted Joints ● Piping Layout ● Piping Supports ● Pressure & Leak Testing of Piping Systems*
1100 – 1215	***Valves*** *Valve Theory ● Valve Types ● Applications ● Functions ● Operations ● Maintenance ● Troubleshooting ● Control Valves & Actuators*
1215 – 1230	*Break*
1230 – 1420	***Static Equipment Failure Modes*** *How to Determine What Failure Modes Each Technology can Detect ● How to Identify the Common Traps of Each Technology ● How to Build a Stationary Asset Health Matrix*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Static Equipment Failure Modes (cont'd)*** *How to Balance Workflow Maturity with Coverage ● How to Apply Benchmark Data & Asset Criticality to "Design the Coverage" Model*
0930 – 0945	*Break*
0945 – 1100	***Discontinuity Origination*** *Flaw Types ● Inherent Flaws ● Manufacturing Flaws ● In Service Flaws*
1100 – 1215	***Pressure Vessel Maintenance*** *Failure Modes ● Inspections & Tests ● Maintenance ● Case Studies of Actual Failures*
1215 – 1230	*Break*
1230 – 1420	***Standards & Good Practices*** *Corrosion Mechanisms ● Vocabulary & Definitions ● API 510 ● API 653 Tanks ● API 570 Piping*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Inspection Programs*** *MIP Implementation by Phase ● Risk-Based Inspection*
0930 – 0945	*Break*
0945 – 1100	***Basic NDT Methods*** *Visual Inspection ● Liquid Penetrant Testing ● Magnetic Particle Testing ● Radiographic Testing ● Ultrasonic Testing, RFET, IRIS ● Spark Testing ● Eddy Current Testing*
1100 – 1215	***Specialty Testing Methods*** *Leak Detection ● Positive Materials Identification ● Magnetic Flux ● Leakage Testing ● Coupons ● Scopes ● TI Paints*
1215 – 1230	*Break*
1230 – 1345	***Static Equipment Predictive Maintenance*** *Infrared Thermography ● LIDAR ● Airborne/Structure-Borne Ultrasound*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
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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