COURSE OVERVIEW ME0217
Turbine: Major Inspection and Overhaul

Course Title
Turbine: Major Inspection and Overhaul

Course Date/Venue
Session 1: April 13-17, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: September 15-19, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
ME0217

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

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide delegates with a detailed and up-to-date knowledge on turbine overhauling. It covers gas and steam turbines including their design and construction range; maintenance and overhaul considerations; proper maintenance, overhaul differences and the needs for internal, external turbine parts and supporting systems; major turbine components; major external components and supporting systems; turbine component characteristics; failure mechanisms; equipment monitoring; operations and training infrastructure; and steam turbine availability.

At the completion of the course, participants will be able to carry out scheduled maintenance and overhaul practices; inspect combustion; apply risk based methodologies, reliability centered or condition based maintenance; identify the issues with the new steam turbine technologies and applications; recognize associate jobs with overhaul and inspections; repair strategy optimization for gas turbine based on equivalent operating hour (EOH) analysis; and perform and maintain continuous improvement of gas turbines.

Course Objectives

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

- Apply systematic techniques on turbine overhauling
- Describe gas and steam turbines including their design and construction range
- Discuss maintenance and overhaul considerations covering steam turbine design/construction, arrangements, application and industry, gas quality, steam quality, plant infrastructure from monitoring, operations and maintenance
- Recognize the proper maintenance, overhaul differences and the needs for internal, external turbine parts and supporting systems
- Identify major turbine components comprising of steam/gas, major internal components, rotating blading and discs, shafts, rotors, bearings and seals, stationary blading and diagrams, shells, blade rings and casings
- Enumerate the major external components and supporting systems
- Describe turbine component characteristics and failure mechanisms
- Implement equipment monitoring, operations and training infrastructure
- Identify and maintain steam turbine availability and share failure experience
- Determine steam turbine availability and failure experience
- Carryout scheduled maintenance and overhaul practices as well as the annual and multiple year steam turbine maintenance frequencies and task
- Inspect combustion and discuss the approaches, methodologies and criteria for establishing longer time intervals between major overhauls as well as management directed intervals, process and criticality driven intervals and turbine manufacturer driven intervals
- Discuss risk based methodologies, reliability centered or condition based maintenance
- Identify the issues with the new steam turbine technologies and applications
- Issue tender documents for major overhaul and inspect gas turbines
- Recognize associate jobs with overhaul and inspections and repair strategy optimization for gas turbine based on equivalent operating hour (EOH) analysis
- Perform and maintain continuous improvement of gas turbines

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 covers systematic techniques and methodologies on turbine overhauling for mechanical engineers, supervisors, foremen, team leaders, plant operators and other technical staff who are responsible for the day-to-day operations of a gas turbine. Maintenance personnel who are involved in the troubleshooting of operational problems will also find this course extremely useful.

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.

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: -

- 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.

- 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. 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, **Process Safety** Design, Certified **Process Plant** Operations, Control & Troubleshooting, **Operator** Responsibilities, **Storage Tanks Operations** & Measurements, **Tank Design**, Construction, Inspection & Maintenance, **Atmospheric Tanks**, **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, **Plant & Equipment Integrity**, **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 (**AACE-PSP**), **Material Cataloguing**, Specifications, Handling & Storage, **Steam Trap** Design, Operation, Maintenance & Troubleshooting, **Steam Trapping & Control**, **Column**, **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps** Troubleshooting, **Pumps** Design, Selection & Operation, **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**, Environmental Management System (**EMS**), Supply Chain, Purchasing, Procurement, **Logistics** Management & **Transport** & **Warehousing** & **Inventory**, **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 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*** *Gas & Steam Turbines ● Design & Construction Range*
0930 – 0945	*Break*
0945 – 1100	***Maintenance & Overhaul Considerations*** *Steam Turbine Design/Construction ● Arrangements ● Application & Industry ● Gas Quality ● Steam Quality ● Plant Infrastructure from Monitoring ● Operations & Maintenance*
1100 – 1215	***Maintenance, Overhaul Differences & Needs for Internal & External Turbine Parts & Supporting Systems***
1215 – 1230	*Break*
1230 – 1420	***Major Turbine Components*** *Steam/Gas ● Major Internal Components ● Rotating Blading & Discs ● Shafts ● Rotors ● Bearings & Seals ● Stationary Blading & Diagrams ● Shells ● Blade Rings & Casings*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Major External Components/Supporting Systems*** *Main Stop ● Trip & Throttle ● Intercept Valves ● Governor/Control Valves ● Admission ● Extraction, Steam & Drain Connections ● Overspeed Connection System ● Lubrication System ● Electrohydraulic System ● Water/Steam Chemistry Controls ● Turbine Control System ● Compressor*
0930 – 0945	*Break*
0945 – 1100	***Turbine Component Characteristics & Failure Mechanisms*** *Detectable Problems ● Gas Path Analysis ● Turbine Blade Distress ● Compressor Fouling ● Combustor Distress & Plugged Fuel Nozzles ● Foreign/Domestic Object Damage ● Worn Air/Oil Seals ● Fuel Control Problems*
1100 – 1215	***Equipment Monitoring*** *Water & Steam Purity Monitoring ● Water Induction Monitoring ● Condition Monitoring ● Management*
1215 – 1230	*Break*
1230 – 1420	***Operations & Training Infrastructure***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Steam Turbine Availability & Failure Experience***
0930 – 0945	*Break*
0945 – 1100	***Scheduled Maintenance & Overhaul Practices (US, European, Japanese)***

1100 – 1215	***Annual Steam Turbine Maintenance Frequencies & Tasks (US, European, Japanese)***
1215 – 1230	*Break*
1230 – 1420	***Multiple-Year Steam Turbine Maintenance Frequencies & Tasks (US, European, Japanese)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

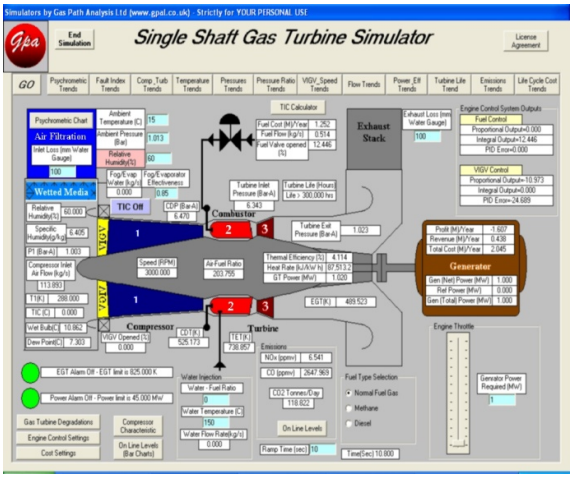
0730 – 0830	***Combustion Inspection*** *Removing the Parts ● Turbine Compartment ● Opening the Combustion Cans ● Re-Installation of the Parts*
0830 – 0930	***Case Studies*** *Gas Turbine Inspection ● Inspection Frequency ● Combustion Inspection ● Hot/Gas Path Inspection ● Major Inspection*
0930 – 0945	*Break*
0945 – 1000	***Approaches/Methodologies/Criteria for Establishing Longer Time Intervals between Major Overhauls***
1000 – 1130	***Management Directed Intervals***
1130 – 1215	***Process & Criticality Driven Intervals***
1215 – 1230	*Break*
1230 – 1300	***Turbine Manufacturer's Intervals***
1300 – 1420	***Risk-Based Methodologies***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

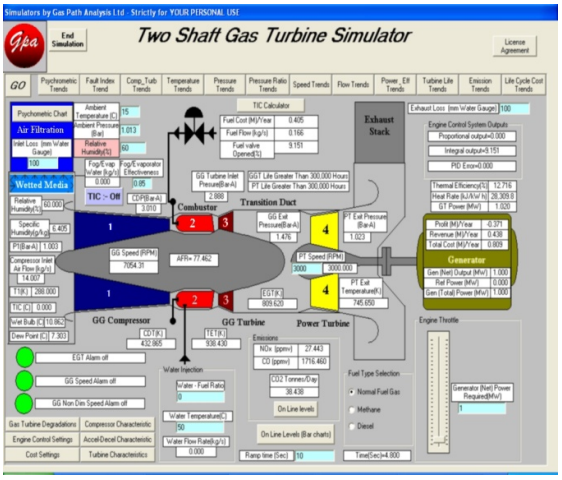
0730 – 0830	***Reliability Centered or Condition Based Maintenance***
0830 – 0930	***Issues with New Steam Turbine Technologies & Applications***
0930 – 0945	*Break*
0945 – 1100	***Tender Documents for Major Overhaul, Inspection Gas Turbines & Other***
1100 – 1215	***Associated Jobs with Overhaul & Inspections, Repair Strategy Optimization for Gas Turbine Based on Equivalent Operating Hour (EOH) Analysis***
1215 – 1230	*Break*
1230 – 1345	***Gas Turbines Performance & Maintenance Continuous Improvement***
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

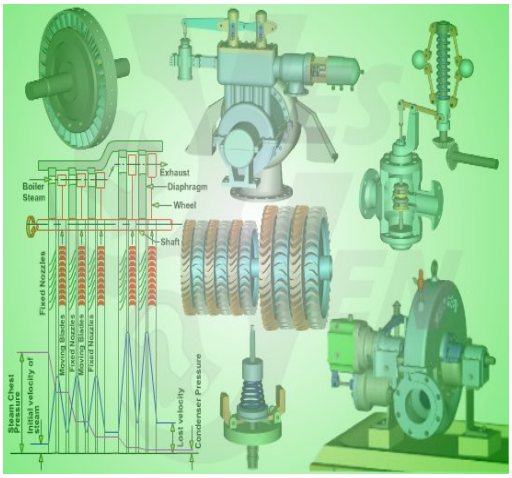
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Single Shaft Gas Turbine Simulator", "Two Shaft Gas Turbine Simulator", and "Steam Turbines & Governing System CBT".



Single Shaft Gas Turbine Simulator



Two Shaft Gas Turbine Simulator



Steam Turbines & Governing System CBT

Course Coordinator

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