COURSE OVERVIEW ME0313-4D
Steam Turbine Operation & Maintenance

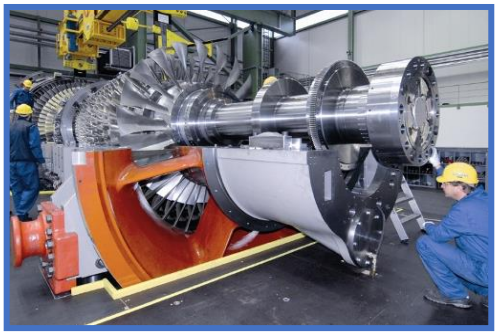
Course Title
Steam Turbine Operation & Maintenance

Course Date/Venue
Session 1: October 07-10, 2024/Boardroom, Warwick Hotel Doha, Doha, Qatar
Session 2: December 09-12, 2024/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Reference
ME0313-4D

Course Duration/Credits
Four days/2.4 CEUs/24 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 of steam turbine operation. It covers the main components in systems including lubricating oil systems, steam and water seal systems and hydraulic power units; the irregular operations within a system; the locations of the turbine supervisory instrument and their functions; the steam turbine control concepts; and the cause and effects of the thermal stress on normal turbine operations.

This course will further discuss a comprehensive coverage of the steam turbine including the various components of steam system. It has been completely revised, reorganized and updated to include the latest techniques in steam turbine design, operation, maintenance, performance, optimization, inspection, control, troubleshooting, safety and steam system management. The course utilizes actual case studies from around the world to highlight the topics discussed.

At the completion of this course, participants will be able to perform disassembling and assembling major turbine components safely; improve inspection/repair techniques; identify the different types of distress and irregular operating conditions caused by vibration of different components and potential results; as well as employ loss prevention method.

Course Objectives

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

- Apply and gain an in-depth knowledge in steam turbine operation
- Describe the main components in turbine systems including lubricating oil systems, steam and water seal systems and hydraulic power units and discuss irregular operations within a system
- Identify the locations of the turbine supervisory instrument and describe their functions
- Describe the steam turbine control concepts
- Carryout thorough examinations of the cause and effects of thermal stress on normal turbine operations
- Perform disassembling and assembling major turbine components safely, improve inspection/repair techniques and identify the different types of distress found in them
- Identify irregular operating conditions caused by vibration of different components
- Detect abnormal conditions, potential results and employ loss prevention methods

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 on the operation and maintenance of steam turbine. Rotating equipment, machinery, plant, maintenance and mechanical engineers, supervisors, foremen and other technical staff being exposed relatively recently to the turbomachinery field will gain an excellent knowledge on the practical aspects of the course. Experienced specialists, project engineers and supervisory personnel involved in management, selection, operation and maintenance of steam turbines will definitely benefit from the course.

Course Fee

Doha	**US$ 5,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	**US$ 4,500** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

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:

Mr. Ahmed Mady is a **Senior Mechanical Engineer** and **Project Manager** with over **40 years** of practical experience. His experience covers **Pump Selection, Installation, Performance & Control**, **Pump & Valve** Operation, Control, Maintenance & Troubleshooting, **Aviation Fueling Operations**, **Pumps, Compressors & Turbines** Selection, Operation, **Heat Exchanger** Design, Operation, Performance, Inspection, Maintenance & Repair, **Steam Boilers** Operation, Maintenance and Control System, **Heat Exchangers** Operations, Maintenance & Troubleshooting, **Water Tanks Filling Station** Operation, **Water Pipes Inspection & Repair**, **Water Treatment** Technology, **RO Plants**, **MSF Plants**, Industrial **Water Treatment**, **Piping System**, **Water Filtering**, **Pump** Selection, Installation, Performance & Control, **Compressors & Turbines** Selection & Operation, **Heat Exchangers** Design & Selection, **TEMA & ASME** Section VIII Requirements, **Steam Boilers** Operation & Maintenance, **Valve** Operation & Troubleshooting, **Aviation Fueling** Operations, **Maintenance** Management, **Reliability** Engineering, Maintenance **Auditing**, **Reliability Centered Maintenance**, Maintenance **Benchmarking**, Maintenance **Planning**, **Root Cause Failure Analysis**, **Lubrication** Technology, **Cost Control & Performance** Improvement.

Mr. Ahmed has travelled all over **Europe**, **Asia** and the **Americas** joining numerous conferences and workshops with international companies such as **IBM**, System Science Corporation (**SSC**) and International Air Transport Association (**IATA**).

Earlier in his career, he had occupied several challenging roles with several large Logistics and maintenance companies as a **Maintenance Manager**, **Maintenance Engineer**, **Logistics Planning Branch Chief**, **Commander** of the Air Force Logistics, **Systems Analyst**, **Training Branch Chief**, **Systems & Communication Engineer** and **Computer Programmer**.

Mr. Ahmed has a **Bachelor** degree in **Mechanical Engineering** and a **Certified Trainer/Instructor**. Further, he has gained **Diplomas** on **Civil Aviation Engineering**, **Islamic Studies** and **Information Systems & Technology**. Moreover, he is a **Certified Internal Verifier** by **City & Guilds Level 4 Certificate** in **Leading the Internal Quality Assurance of Assessment Processes & Practice** under the **IQA Qualification** (**Internal Quality Assurance**) and a **Certified Assessor** by **City & Guilds Level 3 Certificate** in **Assessing Vocational Achievement** under the **TAQA Qualification** (**Training**, **Assessment & Quality Assurance**) and a **Certified Trainer/Assurance/Internal Verifier** of the **British Institute** of **Leadership & Management** (**ILM**), **UK**. Further, he has delivered numerous trainings, workshops and conferences and projects worldwide.

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	***Steam Turbine Fundamental Review*** *Theory ● Turbine Sections ● Component Descriptions*
0930 – 0945	*Break*
0945 – 1100	***Turbine Systems*** *Lubricating Oil Systems ● Gland Steam & Water Seal Systems ● Hydraulic Power Unit ● Abnormal Operations*
1100 – 1230	***Turbine Supervisory Instrument Location & Function*** *Eccentricity ● Speed Detection ● Valve Position ● Vibration*
1230 – 1245	*Break*
1245 – 1420	***Steam Turbine Control Concepts*** *Speed Control ● Load Control ● Limiters ● Flow Control*
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	***Turbine Normal Operations*** *Thorough Examination of the Cause & Effect of Thermal Stress ● Starting & Loading Procedures*
0930 – 0945	*Break*
0945 – 1100	***Maintenance Planning, Scheduling & Decision Making*** *Understanding the Major Items that Must be Considered Prior to Commencing a Scheduled Turbine-Generator Outage ● Items that Need to be Considered When Making Repair/Replace/Reuse Decisions*
1100 – 1230	***Turbine Shells, Casings & Rotors*** *Safe and Efficient Ways Disassemble/Reassemble Major Turbine ● How to Improve Inspection/Repair Techniques, Communications on Equipment and Make Better Replace/Repair/Reuse Decisions ● Different Types of Distress Typically Found on These Components*

1230 – 1245	Break
1245 – 1420	***Journal & Thrust Bearings*** Different Types of Bearings and their Applications ● Disassembly/Reassembly Procedures ● Inspection Techniques ● Typical Types of Distress as well as Causes
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	***Couplings*** Types of Couplings Used on T-G Sets ● How Torque is Transferred ● How to Properly Disassemble/Reassemble? ● How to Inspect?, What Measurements to Take?, and What They Mean?
0930 – 0945	Break
0945 – 1100	***Steam Valve Maintenance*** Purpose of the Various Steam Turbine Valves ● How to Properly Disassemble/Reassemble?
1100 – 1230	***Alignment*** How to Properly Take Clearance/Alignment? and How to Evaluate? ● How to Calculate? and Make Moves for Stationary Equipment Such as Diaphragms and Inner Shells
1230 – 1245	Break
1245 – 1420	***Alignment (cont'd)*** How to Take Coupling Rim/Face Readings? ● How to Calculate Moves to Correct for Coupling Misalignment? ● How to Calculate and Make Moves to Bearings to Accomplish Alignment Objectives?
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

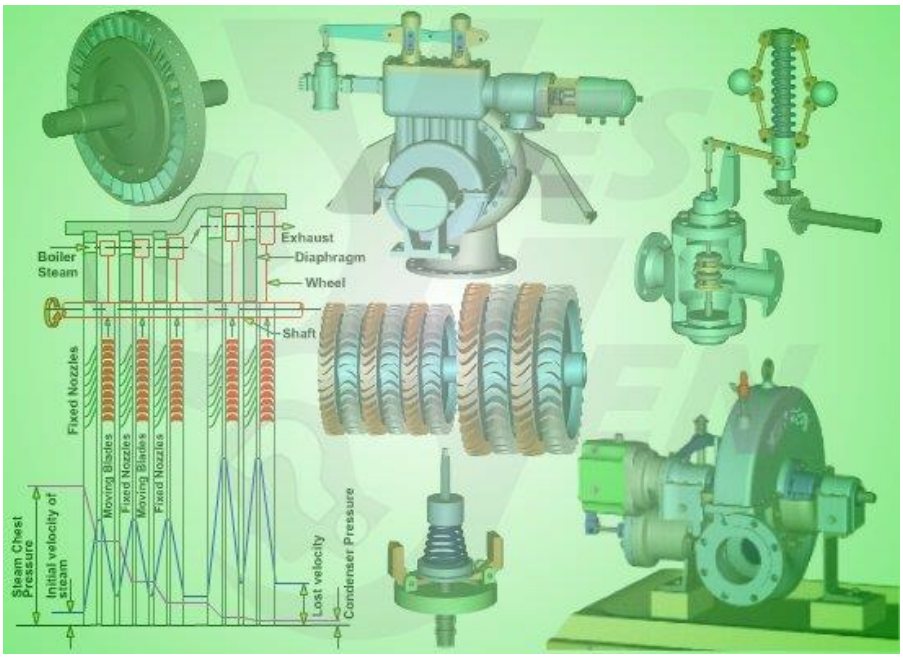
Day 4

0730 – 0930	***Vibration Analysis as an Indicator of Abnormal Operating Conditions*** Oil Whip ● Bowed Rotors ● Packing Rubs (Low Speed versus High Speed) ● Mechanical Unbalance
0930 – 0945	Break
0945 – 1100	***Vibration Analysis as an Indicator of Abnormal Operating Conditions (cont'd)*** Resonant Vibration ● Coupling Unbalance ● Cracked Rotors
1100 – 1230	***Abnormal Conditions: Detection, Potential Results & Operator Action to Prevent Loss*** Loss of Turning Gear ● Extended Turning Gear Operation ● Inability to Stay on Turning Gear During Pre-Warm ● Abnormal Cooler Discharge Oil Temperatures ● Bearing Wipes ● Water Induction ● Excessive Differential Expansion ● Axial Rubs ● Low Speed Operation ● Sling-Shot Starts ● Low Frequency Operation

1230 – 1245	*Break*
1245 – 1420	***Abnormal Conditions: Detection, Potential Results & Operator Action to Prevent Loss (cont'd)*** *High Exhaust Hood Temperatures ● Vacuum Breaking ● Over Pressure ● Over Temperature ● Loss Boiler ● Inlet Pressure Fluctuations ● Valve Oscillation ● Governor Bobble ● Full-Load Rejection ● Hot Restarts ● Feedwater Heater Removal*
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*

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 state-of-the-art simulator "Steam Turbines & Governing System CBT".



Steam Turbines & Governing System CBT

Course Coordinator

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