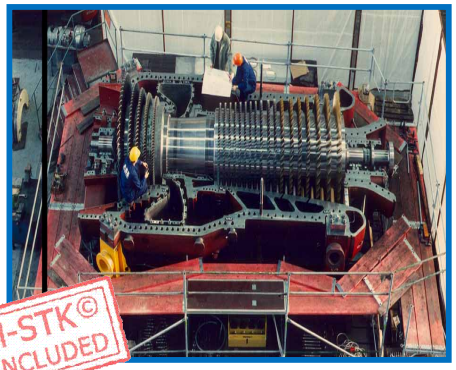
COURSE OVERVIEW ME0023(AD6)
Control & Operation of Industry Gas Turbines

Course Title
Control & Operation of Industry Gas Turbines



Course Date/Venue
Session 1: April 28-May 02, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: October 26-30, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
ME0023(AD6)

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 participants with a detailed and up-to-date overview of Control and Operation of Industrial Gas Turbines. It covers the gas turbine thermodynamic theory and principle of operations, construction, process parameters, speed pickups characteristics; the start-up/shutdown sequence, synchronizing, loading, unloading, shutdown, cool down and gas turbine operation; the control functions including fuel control valves, hydraulic systems, fuel forwarding/handling systems, generators and electricity; the performance of gas turbines, leading to the criteria; and the engine and vibration measurement.

Further, the course will also discuss the troubleshooting methods and failure causes and elements of condition monitoring; the effects of day-to-day operations; the necessary skills to successfully maintain; the gas turbine and its support equipment during all phases of operation from the engineering selection to the final maintenance evolutions; and the most common pitfalls in the plant.

During this interactive course, participants will learn the fundamentals of gas turbine technology and gas turbine systems; the gas turbine design and how it affects daily operations; to find out which factors determine sizing and efficiency; the experience with simplified starting and operating sequences; the generator or load compressor operations; troubleshooting tips to help eliminate forced outages; maintaining gas turbine and support equipment to appropriate maintenance practices; and troubleshooting methods, operating gas turbine in a safely manner, operational, maintenance procedures and overhauling.

Course Objectives

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

- Apply and gain an in-depth knowledge on control and operation of industrial gas turbines
- Discuss gas turbine thermodynamic theory and principle of operations, construction, process parameters, speed pickups characteristics, the start-up/shutdown sequence, synchronizing, loading, unloading, shutdown and cool down
- Employ gas turbine operation and identify control functions including fuel control valves, hydraulic systems, fuel forwarding/handling systems, generators and electricity
- Perform proper methods of testing to evaluate the performance of gas turbines, leading to the criteria for selection and application of the engine and vibration measurement
- Gain proficiency in troubleshooting methods and failure causes and elements of condition monitoring and maintenance with the effects of day-to-day operations
- Acquire the necessary skills to successfully maintain the gas turbine and its support equipment during all phases of operation from the engineering selection to the final maintenance evolutions
- Avoid the most common pitfalls in the plant
- Explain the fundamentals of gas turbine technology and describe gas turbine systems
- Discuss gas turbine design and how it affects daily operations
- Find out which factors determine sizing and efficiency
- Gain experience with simplified starting and operating sequences as well as with generator or load compressor operations
- Obtain troubleshooting tips to help eliminate forced outages
- Enhance each skill level to successfully maintain gas turbine and support equipment to appropriate maintenance practices including some troubleshooting methods, operating gas turbine in a safely manner, operational, maintenance procedures and overhauling

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 provides an overview of all significant aspects and considerations of control and operation of industrial gas turbines for engineers, supervisors, senior technicians and technicians involved in the control and operation of industrial gas turbines.

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.

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 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 center, 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. Mohamed Refaat, MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with almost **30 years** of extensive experience in **Rotating Equipment** and **Machinery** including **Pumps**, **Compressors**, **Turbines**, **Motors**, **Turbo-expanders**, **Gears**, etc. His wide experience also covers **Centrifugal Compressor & Steam Turbine**, **Centrifugal Pump**, **Pump** Technology, **Gas Turbine** Technology, **Heat Exchanger**, **Turbines & Motors**, **Variable Speed Drives**, **Seals**, **Control Valves**, Advanced **Valve** Technology, **Dry Seal**, **Fired Heaters**, **Air Coolers**, **Crude Desalter**, **Process Vessels & Valves**, **Industrial Equipment & Rotating Machinery**, **Mechanical** Engineering, **Mechanical Equipment & Turbomachinery**, **Piping**, **Pipelines**, **Valves**, **Lubrication Technology**, **Vibration Analysis**, **Power System Hydraulics**, **Security Detection** Systems & Operation, **Process Plant** Equipment, Troubleshooting **Process Operations**, **Maintenance Management** Best Practices, **Rotating Equipment** Reliability Optimization, Practical **Machinery Vibration**, **Vibration** Techniques, Effective **Reliability Maintenance**, Excellence in **Maintenance & Reliability** Management, **Preventive & Predictive Maintenance**, Machinery Failure Analysis (**RCFA**), **Reliability** Optimization & Continuous Improvement, **Maintenance** Planning, Scheduling & Work Control, **Maintenance Management** Strategy, **Mechanical & Rotating Equipment** Troubleshooting, Preventive Maintenance, Predictive Maintenance, Reliability Centered Maintenance (**RCM**), Condition Based Monitoring (**CBM**), **FMEA** and Troubleshooting of machinery and rotating equipment including turbines, bearings, compressors, pumps etc. He is currently the **Mechanical Maintenance Section Head** of the **Arab Petroleum Pipelines Company** where he is in charge of planning, scheduling & managing the execution of preventive & corrective mechanical maintenance activities for all equipment. He is responsible for executing the scheduled inspections & major overhauls for gas turbines, valves & pumps, carrying out off-line vibration monitoring plans, troubleshooting, fault diagnosing & investigating failures of machinery.

During his career life, Mr. Mohamed was able to modify the gas turbines self cleansing system to improve its maintainability and extend the air filters' lifetime. He was responsible for defining & updating the equipment codes and parameters for replacing the old **CMMS** with **MAXIMO**. He also worked as the Operations Supervisor wherein he was closely involved with the operation of the crude oil internal **pipeline** system between the tankers and tank farm, operation & control of the booster pumps for pumping crude oil for main pipelines and the development & implementation of the plans & procedures for draining the main terminal internal lines for maintenance purposes. He also held the position of Measurement Engineer where he was responsible for the crude oil custody transfer, performing loss control analysis and operating the crude oil automatic sampler & related equipment. Prior to that, he was the Design Engineer responsible for the design phase of the Truck Mixer Manufacturing Project of the Mechanical Design Department.

Mr. Refaat has **Master** and **Bachelor** degrees in **Mechanical Engineering** and a General Certificate of Education (**GCE**) from the **University of London**, **UK**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and a member of the Engineering Syndicate of Egypt. He has further delivered numerous training, courses, workshops, seminars and conferences worldwide.

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	***Gas Turbine Thermodynamic Theory & Principle*** *Operations ● Construction ● Process Parameters ● Speed Pickups Characteristics*
0930 – 0945	*Break*
0945 – 1100	***Gas Turbine Thermodynamic Theory & Principle (cont'd)*** *Start-up/Shutdown Sequence ● Synchronizing ● Loading ● Unloading ● Shutdown ● Cool Down*
1100 – 1230	***Gas Turbine Operation & Control Functions*** *Fuel Control Valves ● Hydraulic Systems*
1230 – 1245	*Break*
1245 – 1420	***Gas Turbine Operation & Control Functions (cont'd)*** *Fuel Forwarding/Handling Systems ● Generators ● Electricity*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Methods of Testing to Evaluate the Performance of Gas Turbines***
0930 – 0945	*Break*
0945 – 1100	***Methods of Testing to Evaluate the Performance of Gas Turbines (cont'd)***
1100 – 1230	***Criteria for Selection & Application of the Engine***
1230 – 1245	*Break*
1245 – 1420	***Vibration Measurement***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Troubleshooting Methods & Failure Causes***
0930 – 0945	*Break*
0945 – 1100	***Troubleshooting Methods & Failure Causes (cont'd)***
1100 – 1230	***Elements of Condition Monitoring & Maintenance with the Effects of Day-to-Day Operations***
1230 – 1245	*Break*
1245 – 1420	***Gas Turbine Maintenance & Its Support Equipment*** *During All Phases of Operation from the Engineering Selection ● Final Maintenance Evolutions*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

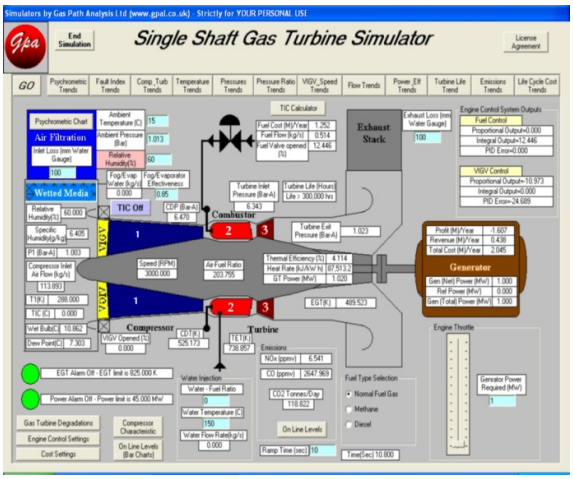
0730 – 0830	***Avoidance of the Most Common Pitfalls in the Plant***
0830 – 0930	***Fundamentals of Gas Turbine Technology***
0930 – 0945	*Break*
0945 – 1100	***General Description of the Gas Turbine Systems***
1100 – 1215	***Gas Turbine Design & How It Affects Daily Operations***
1215 – 1230	*Break*
1230 – 1420	***Factors Determining Sizing & Efficiency***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

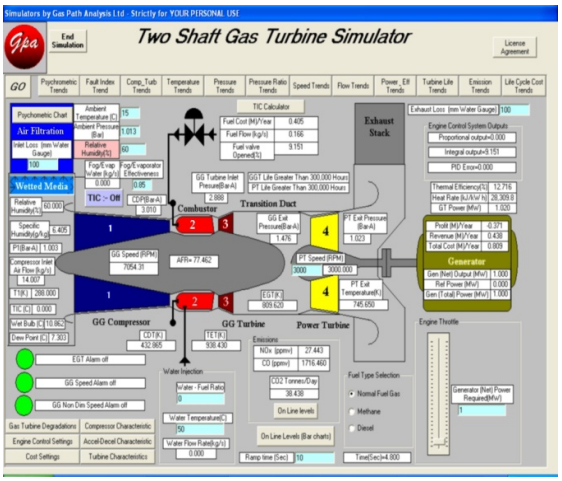
0730 – 0930	***Simplified Starting & Operating Sequences***
0930 – 0945	*Break*
0945 – 1100	***Generator or Load Compressor Operations***
1100 – 1215	***Troubleshooting Tips to Help Eliminate Forced Outages***
1215 – 1230	*Break*
1230 – 1345	***Appropriate Maintenance Practices*** *Some of Troubleshooting Methods ● How's and Why's of Safely Operating a Gas Turbine ● Operational and Maintenance Procedures & Issues ● Gas Turbine Maintenance (Monthly, Annual, Overhaul)*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

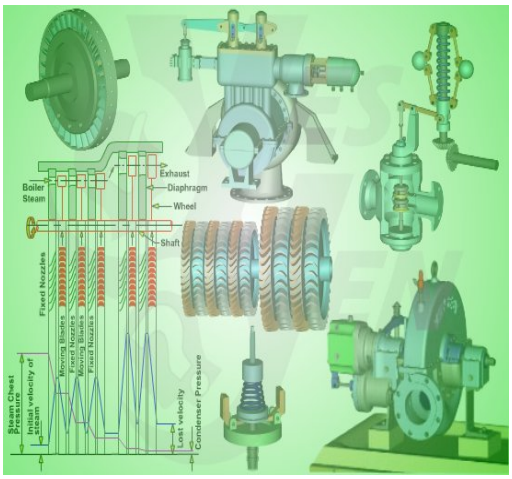
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Single Shaft Gas Turbine Simulator", "Two Shaft Gas Turbine Simulator", and "Steam Turbines & Governing System CBT".



Single Shaft Gas Turbine Simulator



Two Shaft Gas Turbine Simulator



Steam Turbines & Governing System CBT

Course Coordinator

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