COURSE OVERVIEW EE0184
Power Generation system

Course Title
Power Generation System

Course Date/Venue
Session 1: July 07-11, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 14-18, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
EE0184

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 with a detailed and up-to-date overview of power generation comprising of gas turbines, co-generation, combined cycle plants, wind power generation and solar power. It covers the thermodynamics principle, steam power plants, steam turbines and auxiliaries, gas turbines and current and future gas turbine technologies; the concepts of combined cycles and the turbine governing system; the gas turbine instrumentation and control systems, gas turbine emission guidelines and control methods as well as lubrication and fuel systems; the economics of power generation, co-generation and combined-cycle plants; the transformers and interconnection with grid, transformer components and synchronous generators; the components, generator excitation, AVR and PSS; and the generator operation, testing, inspection and maintenance.

During this interactive course, participants will learn the solar, wind and bio energy; the battery life, solar panel life and wind unit life maintenance; the cost benefit analysis of solar, wind and bio energy; the solar radiation and its influence on position of the solar plates; the minimum solar energy/sunlight/wind requirement and efficiency of solar and wind power generation; and the practical example and economics of latest development in the area of wind and solar energy power generation units.

The course includes an e-book entitled "*Power Generation Technologies*", published by Newnes, which will be given to the participants to help them appreciate the principles presented in the course.

Course Objectives

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

- Apply and gain an in-depth knowledge on power generation covering gas turbine, co-generation, combined cycle plants, wind power generation and solar power
- Review thermodynamics principles and discuss steam power plants, steam turbines and auxiliaries, gas turbines and current and future gas turbine technologies
- Distinguish the concepts of combined cycles and the turbine governing system
- Recognize gas turbine instrumentation and control systems gas turbine emission guidelines and control methods as well as lubrication and fuel systems
- Review the economics of power generation, co-generation and combined-cycle plants
- Illustrate the applications of co-generation and combined-cycle plants
- Identify transformers, interconnection with grid and transformer components, synchronous generators and operation and generator components
- Recognize generator excitation, AVR and PSS as well as employ generator operation, testing, inspection and maintenance
- Discuss solar, wind and bio energy including the total mechanism of energy generation, transfer and storage
- Carryout battery life, solar panel life and wind unit life maintenance
- Review cost benefit analysis of solar, wind and bio energy
- Install and evaluate technology providers and identify the latest technology available and the providers
- Identify solar radiation and its influence on position of the solar plates
- Recognize minimum solar energy/sunlight/wind requirement and efficiency of solar and wind power generation
- Discuss practical example and economics of latest development in the area of wind and solar energy power generation units

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 all technical staff who are working in power generation comprising gas turbines, co-generation, combined cycle plants, wind power generation and solar power. This includes energy manager, environmental engineer (operator and supervisor), fresh-graduate engineers, under-development engineers and engineers who have limited experience in power generation. Further, this course is suitable for all experienced technical personnel in power generation field who have no engineering degrees or formal training in engineering. Managers and engineers of different disciplines might find this course very useful as an awareness course in power generation.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course 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. Pan Marave, PE, MSc, BEng, is a **Senior Electrical & Instrumentation Engineer** with over 3**0 years** of extensive experience in **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise includes **Electrical Safety**, **Power System Equipment**, **Electrical Drawing**, **Transmission Networks**, **Substation**, **Cable & Over Head Line**, **Substation Automation Systems & Application**, **Distribution Networks**, **Circuit Breaker**, **HV Switchgear Maintenance**, **HV/LV Electrical** Authorisation, Basic **Electricity**, **Electrical & Special Hazards**, **Personnel Protection**, **HV/LV Equipment**, **Motor Controllers**, **Electrical Switching** Practices, Uninterruptible Power Supply (**UPS**), **UPS and Battery System**, Preventive Maintenance of **Battery Charger and UPS System**, **UPS, DC System & Battery Design**, **Operation, Maintenance & Troubleshooting**, **Emergency Planning**, **Safety Management**, Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**); **Electrical Installation**, Maintenance & Troubleshooting, **Electrical Inspection & Testing**, Electrical Measurements, Power Flow Analysis of **Electrical Power Systems**, Electrical Fundamentals, **Basic Electricity** & Electrical Codes, **DCS**, **SCADA** & **PLC**; **Measurement** (**Flow**, **Temperature**, **Pressure**); **Process Analyzers** & **Analytical Instrumentation**; **Process Control**, **Instrumentation** & **Safeguarding**; **Process Controller**, **Control Loop & Valve Tuning**; Industrial **Distribution Systems**; Industrial **Control & Control Systems**, Power Systems **Protection & Relaying**; **Earthing**, **Bonding**, **Grounding**, **Lightning & Surge Protection**; Electric Power **Substation** & **Systems**; Electrical Engineering Principles; **Motor Control Circuit**; **Electrical Fault Analysis**; Electrical Networks & Distribution **Cables**; **Circuit Breakers**, **Switchgears**, **Transformers**, **Hazardous Areas Classification** and **Detailed Engineering Drawings**, **Codes** & **Standards**. Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (**ISO 9000:2000**), **ISO 9002**, Quality Assurance, and Projects & Contracts Management.

Presently, Mr. Marave is the **Technical Advisor** of **Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor**, **Engineering Manager**, **Electronics & Instruments Head**, **Electrica**l, **Electronics & Instruments Maintenance Superintendent**, **Assistant General Technical Manager** and **Engineering Supervisor** of various international companies such as the **Alumil** Mylonas, **Athens Papermill**, **Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master's** and **Bachelor's** degree in **Electrical Engineering** from the **Polytechnic Institute of New York** and **Pratt Institute of New York** (**USA**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and an active member of the **Technical Chamber** and the Institute of Electrical and Electronics Engineer (**IEEE**) in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops 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 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 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 – 0900	***Review of Thermodynamics Principles***
0900 - 0930	***Steam Power Plants***
0930 – 0945	*Break*
0945 – 1115	***Steam Turbines & Auxiliaries***
1115 – 1200	***Gas Turbines***
1200 - 1230	***Current & Future Gas Turbine Technologies***
1230 – 1245	*Break*
1245 – 1315	***Combined Cycles***
1315 – 1400	***Combined Cycles Concepts***
1400 - 1420	***The Turbine Governing System***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0800	***Gas Turbine Instrumentation & Control Systems***
0800 – 0930	***Gas Turbine Emission Guidelines & Control Methods***
0930 – 0945	*Break*
0945 – 1045	***Gas Turbines Lubrication & Fuel Systems***
1045 – 1145	***Economics of Power Generation***
1145 - 1230	***Economics of Co-Generation & Combined-Cycle Plants***
1230 – 1245	*Break*
1245 - 1330	***Applications of Co-Generation & Combined-Cycle Plants***
1330 - 1420	***Transformers***
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0800	***Interconnection with Grid & Transformer Components***
0800 - 0930	***Synchronous Generators***
0930 – 0945	*Break*
0945 – 1045	***Synchronous Generator Operation***
1045 – 1145	***Generator Components***
1145 - 1230	***Generator Excitation, AVR & PSS***
1230 – 1245	*Break*
1245 - 1330	***Generator Operation, Testing, Inspection & Maintenance***
1330 - 1420	***Summary, Open Forum & Closing***
1420 - 1430	***Recap***
1430	*Lunch & End of Course*

Day 4

0730 – 0800	***Solar, Wind & Bio Energy***
0800 – 0930	***Total Mechanism of Energy Generation, Transfer & Storage***
0930 – 0945	*Break*
0945 – 1100	***Battery Life, Solar Panel Life, Wind Unit Life & Maintenance***
1100 – 1230	***Cost Benefit Analysis of Solar, Wind & Bio Energy***
1230 – 1245	*Break*
1245 - 1420	***Installation & Evaluation of Technology Providers***
1420 - 1430	***Recap***
1430	*Lunch & End of Course*

Day 5

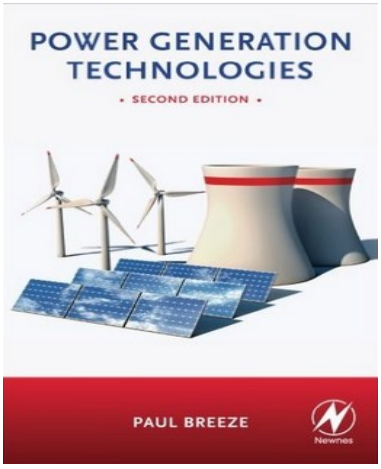
0730 – 0830	***Latest Technology Available & the Providers***
0830 – 0930	***Solar Radiation & its Influence on Position of the Solar Plates***
0930 – 0945	*Break*
0945 – 1130	***Minimum Solar Energy/Sunlight/Wind Requirement & Efficiency of Solar & Wind Power Generation***
1230 – 1245	*Break*
1245 – 1345	***Practical Example & Economics of Latest Development in the Area of Wind & Solar Energy Power Generation Units***
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:-

Book(s)s

As part of the course kit, the following e-book will be given to all participants:



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Course Coordinator

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