COURSE OVERVIEW EE1110
Power Station

Course Title
Power Station

Course Date/Venue
Session 1: May 19-23, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: September 22-26, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE1110

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 Power Station. It covers the types, key components and systems of power stations and its role in national grid and load balancing; the thermodynamic principles in power generation, boiler systems in power plants, steam turbine basics and power plant generators; the electrical basics in power stations, auxiliary mechanical systems, high voltage switchgear systems and transformers in power stations; the instrumentation and control systems, turbine and generator protection, cabling and wiring systems; and the operation philosophy of power stations.

Further, the course will also discuss the water and steam cycle management covering feedwater system, condensate extraction and return, deaerator operation and steam quality control; the cooling water systems, performance monitoring, power quality and grid compliance; the emergency systems and black start comprising of emergency diesel generators, UPS and battery backup, fire suppression, safety circuits and black start sequence logic; the maintenance strategies in power plants and troubleshooting of major components; and the reliability and asset management and risk and safety management.

During this interactive course, participants will learn the NOx, SOx and CO_2 emissions control, continuous emission monitoring systems (CEMS), ash and sludge disposal and regulatory compliance in UAE; the noise and vibration exposure, thermal stress and confined space, PPE selection, safety audits and reporting; the integrated water and power plant (IWPP) operation, desalination technologies in power stations, digitalization and smart plants; and the energy transition and decarbonization.

Course Objectives

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

- Apply and gain an in-depth knowledge on power station
- Identify the types, key components and systems of power stations and its role in national grid and load balancing
- Discuss thermodynamic principles in power generation, boiler systems in power plants, steam turbine basics and power plant generators
- Recognize electrical basics in power stations, auxiliary mechanical systems, high voltage switchgear systems and transformers in power stations
- Explain instrumentation and control systems, turbine and generator protection, cabling and wiring systems and operation philosophy of power stations
- Describe water and steam cycle management covering feedwater system, condensate extraction and return, deaerator operation and steam quality control
- Discuss cooling water systems, performance monitoring, power quality and grid compliance
- Identify emergency systems and black start comprising of emergency diesel generators, UPS and battery backup, fire suppression and safety circuits and black start sequence logic
- Employ maintenance strategies in power plants, troubleshooting of major components, reliability and asset management and risk and safety management
- Discuss NOx, SOx and CO_2 emissions control, continuous emission monitoring systems (CEMS), ash and sludge disposal and regulatory compliance in UAE
- Interpret noise and vibration exposure, thermal stress and confined space, PPE selection and use and safety audits and reporting
- Apply integrated water and power plant (IWPP) operation, desalination technologies in power stations, digitalization and smart plants and energy transition and decarbonization

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 power station for electrical engineers and technicians, power plant operators and supervisors, maintenance and operation personnel, project managers and planners and other technical staff.

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. Shane Verster, PEng, PTech, is a **Senior Electrical Engineer** with over **20 years** of extensive experience within the **Oil**, **Gas**, **Petrochemical**, **Utilities** & **Power** industries. His specialization includes **Cables & Connectors**, **Joints & Terminations**, **Power System Design** & **Analysis**, Electrical & Industrial **Networks & Protection**, Electric **Distribution System Equipment**, Power **Generation**, Power **Distribution**, **Steam** & **Hydroelectric Generation Systems**, **Boilers**, **Pump Stations**, **Power Supply**, **Transformers**, **Motors**, **Generators**, **Protective Devices**, **Circuit Breakers** & **Switchgears**, **Chillers**, **HVAC**, **HSE** Management, **Project** Management and **Facility** Management. Further, he is well-versed in **NEC**, **NESC**, **OHSA**, **ISO** and **NOSA standards**. He is currently the **Director** of **HyGen Group** that specializes in the design, installation and operation of **hydroelectric projects** worldwide.

During Mr. Verster's career life, he has acquired his thorough and practical experience by holding various challenging and key positions such as the **Director**, **Head of Technical Services**, **Co-Generation Manager**, **Operations Manager**, **Senior Project Manager**, **Project Manager**, **Engineering Contract Manager**, **Project Engineer**, **Electrical & Plant Engineer** and **Electrical Technician** for numerous international companies like the HyGen Group, FM Solutions, Illovo Swaziland, Johnson Controls (Glaxo Smith Kline UK), Skanska UK, Gillete UK, BFP Electrical UK, Radiant Processes and Sappi SAICCOR.

Mr. Verster is a **Registered Professional Engineer & Technologist** and has a **Bachelor** degree and a **National Diploma** in **Electrical Engineering** from the **Technikon Natal**. Further, he is a registered member of the Engineering Council of South Africa (**ECSA**) and has obtained various awards internationally in the field of electrical engineering.

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 Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop 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 to Power Stations*** *Types: Thermal, Nuclear, Renewable, Hybrid • Role in National Grid and Load Balancing • Key Components and Systems • Station Classification by Fuel Source*
0930 – 0945	*Break*
0945 – 1030	***Thermodynamic Principles in Power Generation*** *First and Second Law of Thermodynamics • Heat and Work Conversions • Rankine and Brayton Cycles • Energy Flow in a Power Station*
1030 – 1130	***Boiler Systems in Power Plants*** *Boiler Classifications and Functions • Fuel-to-Steam Conversion Process • Combustion Control and Optimization • Boiler Water Treatment Essentials*
1130 – 1215	***Steam Turbine Basics*** *Impulse versus Reaction Turbines • Governing Systems • Efficiency Parameters • Turbine Protection Systems*
1215 – 1230	*Break*
1230 – 1330	***Power Plant Generators*** *Principles of Electromagnetic Induction • Rotor/Stator Design • Cooling and Excitation Systems • Synchronization with Grid*
1330 – 1420	***Electrical Basics in Power Stations*** *Voltage Levels and Frequency • Power Factor and Reactive Power • Switchgear and Transformers Overview • Grounding and Earthing*
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 – 0830	***Auxiliary Mechanical Systems*** *Pumps and Compressors • Heat Exchangers and Cooling Towers • Lube Oil and Seal Oil Systems • Ash and Dust Handling Systems*
0830 – 0930	***High Voltage Switchgear Systems*** *GIS and AIS Switchgear • Circuit Breakers and Relays • Busbar Arrangements • Maintenance Practices*
0930 – 0945	*Break*

0945 – 1100	***Transformers in Power Stations*** *Step-Up and Auxiliary Transformers • Cooling Methods (ONAN, ONAF, OFAF) • Protection Schemes • Tap Changers*
1100 – 1215	***Instrumentation & Control Systems*** *Sensors and Transmitters • DCS and SCADA Systems • PID Control Loops • Alarm and Interlock Logics*
1215 – 1230	*Break*
1230 – 1330	***Turbine & Generator Protection*** *Differential Protection • Over-Speed Trip Systems • Generator Grounding and Neutral Protection • Protection Relays and Logic Schemes*
1330 – 1420	***Cabling & Wiring Systems*** *Power versus Control Cables • Cable Routing and Tray Systems • Insulation Types and Rating • Cable Testing and Commissioning*
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 – 0830	***Operation Philosophy of Power Stations*** *Base Load versus Peaking Plants • Start-up and Shut-Down Sequences • Load Dispatching and Balancing • Safety Interlocks in Operations*
0830 – 0930	***Water & Steam Cycle Management*** *Feedwater System • Condensate Extraction and Return • Deaerator Operation • Steam Quality Control*
0930 – 0945	*Break*
0945 – 1100	***Cooling Water Systems*** *Closed versus Open Loop Systems • Sea Water Intake and Treatment • Condenser Performance • Fouling and Corrosion Issues*
1100 – 1215	***Performance Monitoring*** *Heat Rate and Plant Efficiency • Key Performance Indicators (KPIs) • Thermodynamic and Electrical Losses • Use of Digital Twins*
1215 – 1230	*Break*
1230 – 1330	***Power Quality & Grid Compliance*** *Harmonics and Flicker • Voltage and Frequency Regulation • Islanding and Black Start Capability • EWEC-Specific Grid Code Requirements*
1330 – 1420	***Emergency Systems & Black Start*** *Emergency Diesel Generators • UPS and Battery Backup • Fire Suppression and Safety Circuits • Black Start Sequence Logic*
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

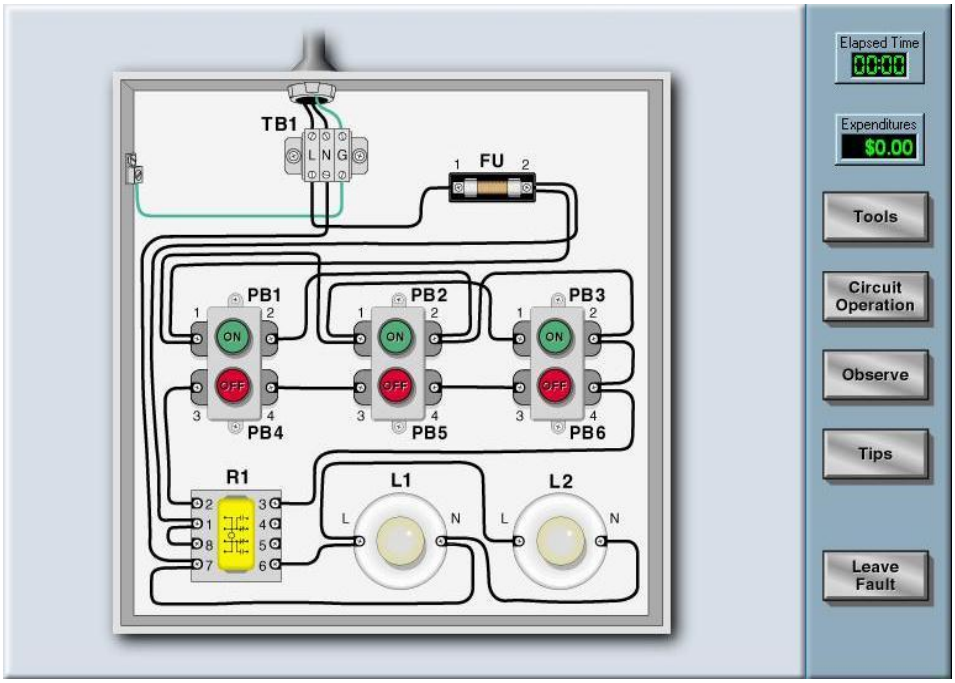
0730 – 0830	***Maintenance Strategies in Power Plants*** *Preventive and Predictive Maintenance • Condition-Based Maintenance • Outage and Turnaround Planning • Maintenance Scheduling Tools*
0830 – 0930	***Troubleshooting of Major Components*** *Boiler Flame Failure • Turbine Vibration Issues • Generator Overheating • Electrical Faults and Tripping*
0930 – 0945	*Break*
0945 – 1100	***Reliability & Asset Management*** *Failure Modes and Effects Analysis (FMEA) • Mean Time Between Failures (MTBF) • Root Cause Analysis (RCA) • Asset Performance Management (APM)*
1100 – 1215	***Risk & Safety Management*** *HAZOP and SIL Studies • Permit to Work (PTW) System • Lockout-Tagout (LOTO) Procedures • Emergency Response Planning*
1215 – 1230	*Break*
1230 – 1330	***Environmental Compliance*** *NOx, Sox and CO_2 Emissions Control • Continuous Emission Monitoring Systems (CEMS) • Ash and Sludge Disposal • Regulatory Compliance in UAE*
1330 – 1420	***Occupational Health & Safety*** *Noise and Vibration Exposure • Thermal Stress and Confined Space • PPE Selection and Use • Safety Audits and Reporting*
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*

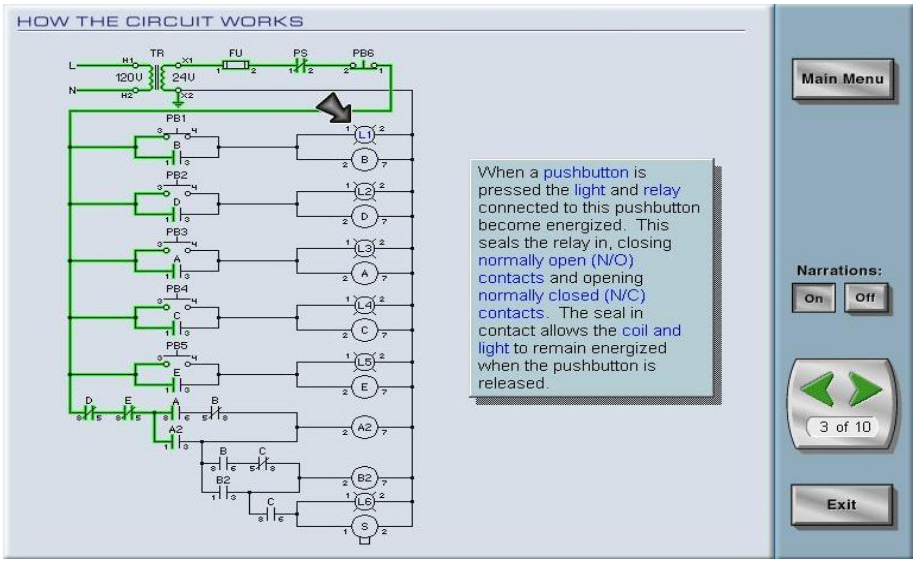
Day 5

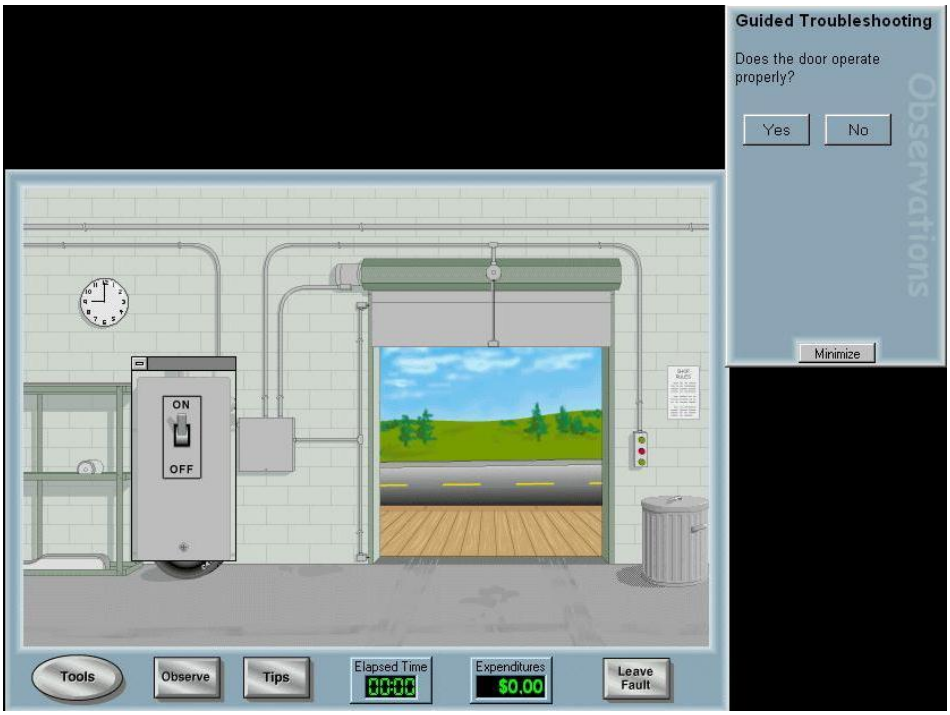
0730 – 0830	***Integrated Water & Power Plant (IWPP) Operation*** *IWPP Layout and Concept • Steam Extraction for Desalination • Shared Auxiliary Systems • Load Management Between Water and Electricity*
0830 – 0930	***Desalination Technologies in Power Stations*** *Multi-Stage Flash (MSF) • Multi-Effect Distillation (MED) • Reverse Osmosis (RO) • Integration with Power Steam Cycles*
0930 – 0945	*Break*
0945 – 1100	***Digitalization & Smart Plants*** *IoT in Power Stations • Predictive Analytics Using AI • Remote Control and Data Visualization • Cybersecurity in Power Plants*
1100 – 1215	***Energy Transition & Decarbonization*** *Hydrogen and Ammonia as Fuels • Carbon Capture and Storage (CCS) • Renewables Integration into Grid • Emission Reduction Targets for UAE*
1215 – 1230	*Break*
1230 – 1345	***Emergency Case Studies & Simulation*** *Real-Life Incident Analysis • SCADA/DCS Simulation Exercises • Plant Upset and Recovery Scenarios • Operator Decision-Making Drills*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t 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 sessions 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 our state-of-the-art simulator "Simutech Troubleshooting Electrical Circuits V4.1".







Simutech Troubleshooting Electrical Circuits V4.1

Course Coordinator

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