COURSE OVERVIEW EE0790
Overhead Lines: Maintenance and Construction

Course Title

Overhead Lines: Maintenance and Construction

Course Date/Venue

Session 1: January 12-16, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Session 2: July 14-18, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

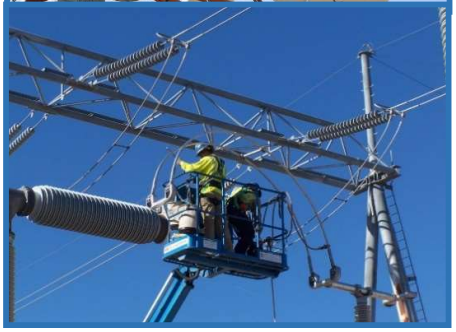
Course Reference

EE0790

Course Duration/Credits

Five days/3.0 CEUs/30.0 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 participants with a detailed and up-to-date overview of HV overhead power line construction, commissioning, testing, maintenance and patrolling. It covers the process of transmission and distribution of energy including generation stations, switchgear, control devices, etc; the traditional and current design practices in transmission line structures as well as the improved design approaches; the various types of insulators and their accessories and function; and the proven methods used for improving insulator performance.

Further, the course will also discuss the tools and equipment used in transmission line construction, maintenance and its step-by-step procedure; the typical insulated power cables for high-voltage applications and their testing, troubleshooting and fault location; the transmission line parameters; the characteristics of overhead conductors; the sag and tension of conductor and the procedure of its calculations; the corona and noise in overhead lines and its main effects in the construction, maintenance

and patrolling; and the geomagnetic disturbances and impacts on power system operation.

During this interactive course, participants will learn the need for reactive power compensation by identifying the application of static VAR control (SVC) and series capacitor bank; troubleshooting of the overhead line and how to narrow down the possible causes or locations of the problem; the purpose of patrolling, documenting the problem and the action taken; and troubleshooting safety techniques, obtaining clearance or work instructions and confirming information or instructions.

Course Objectives

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

- Apply systematic techniques on HV overhead power line construction, commissioning, testing, maintenance and patrolling
- Discuss the process of transmission and distribution of energy including generation stations, switchgear, control devices, etc
- Practice the traditional and current design practices in transmission line structures as well as the improved design approaches
- Identify the various types of insulators and explain their accessories and function
- Implement the proven methods used for improving insulator performance
- List down the tools and equipment used in transmission line construction and maintenance and explain its step-by-step procedure
- Describe the typical insulated power cables for high-voltage applications and discuss their testing, troubleshooting and fault location
- Determine the transmission line parameters and identify the characteristics of overhead conductors
- Explain the sag and tension of conductor and learn the procedure of sag-tension calculations
- Introduce corona and noise in overhead lines and recognize its main effects in the construction, maintenance and patrolling
- Describe the geomagnetic disturbances and impacts on power system operation
- Identify the need for reactive power compensation by knowing the application of static VAR control (SVC) and series capacitor bank
- Troubleshoot the overhead line and know how to narrow down the possible causes or locations of the problem
- Recognize the purpose of patrolling, documenting the problem and the action taken

- Apply troubleshooting safety techniques, obtaining clearance or work instructions and confirming information or instructions

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 overhead power line for engineers and other technical staff who are in charge of the HV overhead line construction, commissioning, testing, maintenance and patrolling in transmission and distribution utilities and companies.

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 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. Ahmed Abozeid is a **Senior Electrical Engineer** with over **25 years** of **Onshore** & **Offshore** experience within the **Oil** & **Gas, Refinery**, **Petrochemical** and **Power** industries. His wide expertise covers **HV Cable** Design, **Cable** Splicing & Termination, **Cable** Jointing Techniques, **High Voltage** Electrical Safety, **HV/MV Cable Splicing**, **High Voltage Circuit Breaker** Inspection & Repair, **High Voltage Power System** Safe Operation, High Voltage Safety, **High Voltage Transformers**, Safe Operation of **High Voltage & Low Voltage Power Systems**, **Electric Distribution System Equipment**, Practical Troubleshooting of **Electrical Equipment & Control Circuits**, **Electrical & Control System** Testing & Commissioning, **LV/MV/HV Circuit Breakers** Inspection & Maintenance, Electrical **Power Substation** Maintenance, Practical **High Voltage Safety Operating Procedures**, Modern Power System **Protective Relaying**, **Electrical & Control System** Testing, **Design**, **Commissioning**, **Operation** and **Maintenance** of **Switchgears**, **Transformers**, **Substations**, **Medium & High Voltage Equipment** and **Circuit Breakers**, **Electrical Motors & Variable Speed Drives**, **Motor** Speed Control, Power Electronic Converters, AC Converters Section, Electromagnetic Compatibility (**EMC**), **Motor** Failure Analysis & Testing, **Machinery** Fault Diagnosis, **Bearing** Failure Analysis **Process Control & Instrumentation**, **Process Control Measurements**, **Control System Commissioning & Start-Up**, **Control System & Monitoring**, **Power Station Control System**, **Instrumentation Devices**, **Process Control & Automation**, **PID Controller**, Distributed Control Systems (**DCS**), Programmable Logic Controllers (**PLC**), **ABB PLC & DCS System**, **Gas Analyzers**, **Simulation Testing**, **Load Flow**, **Short Circuit**, **Smart Grid**, **Vibration Sensors**, **Cable Installation & Commissioning**, **Calibration Commissioning** and **Site Filter Controller**. Further, he is also well-versed in **Fundamentals of Electricity**, **Electrical Standards**, **Electrical Power**, **PLC**, **Electrical Wiring**, Machines, **Transformers**, **Motors**, **Power Stations**, **Electro-Mechanical Systems**, **Automation & Control Systems**, **Voltage Distribution**, **Power Distribution**, **Filters**, **Automation System**, **Electrical Variable Speed Drives**, **Power Systems**, **Power Generation**, **Power Transformers**, **Diesel Generators**, **Power Stations**, **Uninterruptible Power Systems** (**UPS**), **Battery Chargers** and **AC** & **DC Transmission**. He is currently the **Project Manager** wherein he manages, plans and implements projects across different lines of business.

Mr. Ahmed worked as the **Electrical Manager**, **Assistant General Technical Manager**, **Electronics & Instruments Head**, **Electrical Power & Machine Expert**, **Electrical Process Leader**, **Team Leader**, **Electrical Team Leader**, **Electronics & Instruments Maintenance Superintendent**, **Engineering Supervisor**, **Technical Instructor** and **Instructor/Trainer** from various companies such as the Lafarge Nigeria, Egyptian Cement Company, ECC Training Center, Alrajhi Construction & Building Company and Ameria Cement Company, just to name a few.

Mr. Ahmed has a **Bachelor** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, seminars, courses, workshops and conferences internationally.

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

0830 – 0845	*Registration & Coffee*
0845 – 0900	*Welcome & Introduction*
0900 – 0915	***PRE-TEST***
0915 – 0930	***Concept of Energy Transmission & Distribution*** *Generation Stations ● Switchgear*
0930 – 0945	*Break*
0945 – 1030	***Concept of Energy Transmission and Distribution (cont'd)*** *Control Devices ● Concept of Energy Transmission and Distribution*
1030 – 1230	***Transmission Line Structures*** *Traditional Line Design Practice ● Current Deterministic Design Practice ● Improved Design Approaches*
1230 – 1245	*Break*
1245 – 1320	***Insulators & Accessories*** *Electrical Stresses on External Insulation ● Ceramic (Porcelain and Glass) Insulators*
1320 – 1330	***Recap***
1330	*Lunch & End of Day One*

Day 2

0830 – 0930	***Insulators & Accessories (cont'd)*** *Nonceramic (composite) insulators ● Insulator Failure Mechanism ● Methods for Improving Insulator Performance*
0930 – 0945	*Break*
0945 – 1030	***Transmission Line Construction & Maintenance*** *Tools ● Equipment*
1030 – 1230	***Transmission Line Construction & Maintenance (cont'd)*** *Procedures ● Helicopters*
1230 – 1245	*Break*
1245 – 1320	***Insulated Power Cables for High-Voltage Applications*** *Typical Cable Description ● Overview of Electric Parameters of Underground Power Cables*
1320 – 1330	***Recap***
1330	*Lunch & End of Day Two*

Day 3

0830 – 0930	***Insulated Power Cables for High-Voltage Applications (cont'd)*** *Underground Layout and Construction ● Testing, Troubleshooting and Fault Location*
0930 – 0945	*Break*
0945 – 1030	***Transmission Line Parameters*** *Equivalent Circuit ● Resistance ● Current-Carrying Capacity (Ampacity)*
1030 – 1230	***Transmission Line Parameters (cont'd)*** *Inductance and Inductive Reactance ● Capacitance and Capacitive Reactance ● Characteristics of Overhead Conductors*

1230 – 1245	*Break*
1245 – 1320	***Sag & Tension of Conductor*** *Catenary Circuit ● Approximate Sag-Tension Calculations ● Numerical Sag-Tension Calculations*
1320 – 1330	***Recap***
1330	*Lunch & End of Day Three*

Day 4

0830 – 0930	***Sag & Tension of Conductor (cont'd)*** *Ruling Span Concept ● Line Design Sag-Tension Parameters ● Conductor Installation*
0930 – 0945	*Break*
0945 – 1030	***Corona & Noise*** *Corona Modes ● Main Effects of Discharges on Overhead Lines ● Impact on the Selection of Line Conductors*
1030 – 1230	***Geomagnetic Disturbances & Impacts upon Power System Operation*** *Power System Reliability Threat ● Transformer Impacts Due to GIC*
1230 – 1245	*Break*
1245 – 1320	***Geomagnetic Disturbances & Impacts upon Power System Operation (cont'd)*** *Magneto-Telluric Climatology & the Dynamics of Geomagnetic Superstorm ● Satellite Monitoring & Forecast Models Advance Forecast Capabilities*
1320 – 1330	***Recap***
1330	*Lunch & End of Day Four*

Day 5

0830 – 0930	***Reactive Power Compensation*** *The Need for Reactive Power Compensation ● Application of Shunt Capacitor Banks in Distribution Systems – A Utility Perspective ● Static VAR Control (SVC) ● Series Compensation ● Series Capacitor Bank*
0930 – 0945	*Break*
0945 – 1015	***Overhead Line Troubleshooting*** *Purpose of Troubleshooting ● Troubleshooting Steps ● Gathering Information ● Narrowing Down the Possible Causes or Locations of the Problem ● Locating the Problem ● Isolating & Correcting the Problem ● Documenting the Problem & the Action Taken*
1015 – 1045	***Patrolling*** *Purpose of Patrolling ● Problems that may be Encountered*
1045 – 1100	*Break*
1100 - 1145	***Troubleshooting Safety*** *Reporting the Location ● Obtaining Clearance or Work Instructions ● Confirming Information or Instructions ● Knowing the Consequences of Actions*
1145 - 1200	***Course Conclusion***
1200 – 1215	***POST-TEST***
1215 – 1230	*Presentation of Course Certificates*
1230	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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