COURSE OVERVIEW EE0683
Electrical Plant Fault Diagnosis

Course Title
Electrical Plant Fault Diagnosis

Course Date/Venue
Session 1: July 13-17, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: December 15-19, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE0683

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 Analysis of Fault & Fault Detection Techniques in Electrical Network. It covers the electrical power transmission and distribution systems; the different types, causes and consequences of electrical faults; the basic principles of fault analysis in electrical networks; the fault detection techniques, fault location estimation and relay protection; the relay characteristics, operating principles and setting criteria for different types of relays; the techniques for achieving optimal relay coordination; and the advantages of digital relays over electromechanical relays.

During this interactive course, participants will learn the features and applications of numerical relay technology; the waveform capture techniques for fault analysis; the traveling wave fault detection methods and comparative analysis with traditional fault detection techniques; integrating smart grid technologies for enhanced fault analysis; the fault data and statistical methods for fault data interpretation; the strategies for enhancing grid resilience against faults; the procedures for fault management and restoration in electrical networks; the remote monitoring and control; and the emergency response plans for electrical faults.

Course Objectives

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

- Apply and gain a comprehensive knowledge on analysis of fault and fault detection techniques in electrical network
- Discuss electrical power transmission and distribution systems including the different types, causes and consequences of electrical faults
- Explain the basic principles of fault analysis in electrical networks and apply fault detection techniques, fault location estimation and relay protection
- Recognize the relay characteristics and operating principles including the setting criteria for different types of relays
- Apply techniques for achieving optimal relay coordination and discuss the advantages of digital relays over electromechanical relays
- Identify the features and applications of numerical relay technology and utilize waveform capture techniques for fault analysis
- Carryout traveling wave fault detection methods and comparative analysis with traditional fault detection techniques
- Integrate smart grid technologies for enhanced fault analysis, analyze fault data and apply statistical methods for fault data interpretation
- Apply strategies for enhancing grid resilience against faults and procedures for fault management and restoration in electrical networks
- Employ remote monitoring and control as well as develop and implement emergency response plans for electrical faults

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 analysis of fault and fault detection techniques in electricity network for those who are involved in the field of electrical and instrumentation inspection including inspection engineers, electrical engineers, electrical inspection engineers and instrumentation engineers. Further, this course is also beneficial to those engineers who are vital participants in industrial settings and those who are familiar with electrical devices, their function and the standards of operation set by the engineering industry.

Course Fee

US$ 5,500 per Delegate. 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 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.

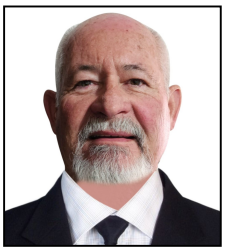
  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation 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.

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. Ken Steel is a **Senior Electrical & Instrumentation Engineer** with over **45 years** of extensive experience. His expertise widely covers **Earthing & Lightning Protection Design, Underground Equipment**, **Electrical Safety**, **Electrical Motors Testing**, **Heat Tracing** & Insulation Installation & Testing, **HV Terminations**, **High & Low Voltages** on Overhead Cranes, **HV/MV Cable Splicing**, **Cable & Over Head Power Line**, **HV/MV Switchgear, HV Cable** Design, **Medium & High Voltage** Equipment, **High Voltage Circuit Breaker** Inspection & Repair, **High Voltage Power** System, **HV Equipment** Inspection & Maintenance, **HV Switchgear** Operation & Maintenance, Resin / **Heat Shrink & Cold Shrink** Joints, **HV/LV Equipment**, **LV & HV** Electrical System, **Cable** Splicing & Termination, **High Voltage** Electrical Safety, **LV**, **MV & HV Cable** Installations & Properties, **LV Substation**, **MV & LV Cable**, **UPS Systems**, **MV & LV** Direct on Line Motor Drives, **MV & LV** VSD Motor Drives, **MV & LV** Soft Starter Motor Drives, **LV Two Speed Motor Drives**, Underground **Transformer Oil Containment Tank**, **Electrical & Instrumentation Construction** Installation, 1500KW, 1000KW, 1752KW **Diesel Power Plant Installation**, **110KV Overhead Line**, **110KV Outdoor Switchgear**, 110KV/10KV 6500KVA **Transformer**, **Transformer Substation**, 1600KVA 10KV/0.4KV & 2 Off 1000KVA **Diesel Generators**, 1600KVA 10KV/0.4KV & 1650KVA **Diesel Generator**, **110KV/35KV/10KV Substation**, 110KV/10KV **Transformers**,110KV & 2 Off 6KV **Overhead Lines**, 34.5KV,13.8KV ,4.16KV & 480V **Switchgear**, 4.16KV & 480V MCC, **Transformers & Motor Drives** Substations, **Diesel Driven Generators**, **Overhead Cranes**, **Overhead Cranes & HVAC Units**, **AC & DC Drives**, **Data Logger**, **Electrical, Instrumentation & Mechanical** Installation Maintenance, Slab Mills, Pre Heat Ovens, Hydraulic Shears, Stamping Machine, Gearboxes, Rollers, Pumps, Valves, Electro Magnets & Pump House Operation, Boilers Construction And Commissioning, Valve Calibration & Testing, Level Gauges, Pressure & Flow Transmitters Installation & Calibration, Pressure & Leak Testing of Boilers, Leak Testing, SMP, Elect, I&C, F&G, HVAC & Utility Services, Nitrogen Leak Test Operations, Steam Blowing Activities, SMP, Elect, I&C, F&G, HVAC & Utility Services, PTW Issue (PA/AC), Installation & Mechanical Piping and Hydro Testing & Leak Testing of Lines Installation.

During Mr. Steel's career life, he has gained his practical experience through several significant positions and dedication as the **3GP PBF & Boilers SC Commission Support**, **SC Site Execution Superintendent**, **E&I Construction Superintendent**, **High Voltage Construction Supervisor**, **Control & Power Construction Supervisor**, **Electrical & Instrumentation Supervisor**, **Electrical Technician**, **Construction Support Electrical Engineer**, **E&I Engineer**, **Electrical/Instrumentation Site Supervisor**, **Q.A/Q.C Inspector**, **Electrical/ Instrumentation Technician**, **Maintenance Fitter Instrumentation Technician**, **Millwright**, **Apprentice Millwright** and **Senior Instructor/Lecturer** for Tengiz Chevron Oil Kazakhstan, Al Jubail Saudi Arabia, Escravos Delta state Nigeria, Lurgi S.A, SuD Chemie Sasol Catalysts, J C Groenewalds Construction (LTA), Tycon (Goodyear S.A.), Dragline Construction and Iscor Vanderbijlpark.

Mr. Steel has a **Diploma** in **Electronics Mechanic**. Further, he is a **Certified Instructor/Trainer** and delivered numerous trainings, courses, workshops, seminars and conferences internationally.

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

0800 – 0830	*Registration & Coffee*
0830 – 0845	*Welcome & Introduction*
0845 – 0900	***PRE-TEST***
0900 - 0930	***Overview of Electrical Networks*** *Introduction to Electrical Power Transmission & Distribution Systems • Role of Kahramaa in Maintaining Electricity Networks*
0930 – 0945	*Break*
0945 – 1030	***Types of Electrical Faults*** *Understanding Different Types of Faults (Short-Circuit, Open-Circuit, Earth Fault, etc) • Causes & Consequences of Electrical Faults*
1030 - 1100	***Fault Analysis Fundamentals*** *Basic Principles of Fault Analysis in Electrical Networks • Importance of Rapid Fault Detection & Isolation*
1100 – 1145	***Fault Detection Techniques*** *Overview of Fault Detection Methods (Relay Protection, Impedance-Based Techniques, Traveling Wave Methods) • Comparison of Detection Techniques Based on Speed & Accuracy*
1145 – 1200	*Break*
1200 – 1230	***Fault Location Estimation*** *Techniques for Estimating Fault Location in Electrical Networks • Factors Affecting Accuracy in Fault Location Estimation*
1230 - 1250	***Hands-On Session: Introduction to Fault Simulation*** *Practical Simulation Exercises Using Software Tools (e.g., ETAP) • Simulating Basic Fault Scenarios & Analyzing Results*
1250 – 1300	***Recap***
1300	*End of Day One*

Day 2

0800 - 0930	***Relay Protection*** *Role of Relays in Protecting Electrical Networks • Overview of Relay Types (Overcurrent, Differential, Distance, etc.)*
0930 – 0945	*Break*
0945 - 1100	***Characteristics & Settings of Protection Relays*** *Understanding Relay Characteristics & Operating Principles • Setting Criteria for Different Types of Relays*
1100 – 1145	***Relay Coordination*** *Importance of Coordination Between Protection Relays • Techniques for Achieving Optimal Relay Coordination*
1145 – 1200	*Break*
1250 - 1250	***Digital Protective Relays*** *Advantages of Digital Relays Over Electromechanical Relays • Implementation & Communication Protocols (E G, IEC 61850)*
1250 – 1300	***Recap***
1300	*End of Day Two*

Day 3

0800 – 0900	***Case Studies: Relay Protection in Action*** *Analysis of Real-World Examples Showcasing Effective Relay Protection Schemes • Lessons Learned & Best Practices*
0900 - 1000	***Hands-On Session: Relay Configuration*** *Practical Exercises on Configuring Protection Relays for Different Fault Scenarios • Testing Relay Settings & Coordination*
1000 – 1015	*Break*
1015 - 1100	***Advanced Relay Technologies*** *Overview of Numerical Relays & Their Advantages • Features & Applications of Numerical Relay Technology*
1100 – 1145	***Fault Analysis Using Waveform Capture*** *Utilizing Waveform Capture Techniques for Fault Analysis • Case Studies on Waveform Analysis for Fault Detection*
1145 – 1200	*Break*
1200 – 1250	***Traveling Wave Fault Detection*** *Principles & Applications of Traveling Wave Fault Detection Methods • Comparative Analysis with Traditional Fault Detection Techniques*
1250 – 1300	***Recap***
1300	*End of Day Three*

Day 4

0800 – 0900	***Fault Detection in Smart Grids*** *Role of Advanced Metering Infrastructure (AMI) in Fault Detection • Integration of Smart Grid Technologies for Enhanced Fault Analysis*
0900 - 1000	***Fault Data Analysis & Interpretation*** *Techniques for Analyzing Fault Data & Identifying Patterns • Statistical Methods for Fault Data Interpretation*
1000 – 1015	*Break*
1015 - 1100	***Hands-On Session: Traveling Wave Fault Detection*** *Practical Exercises on Simulating & Analyzing Traveling Wave Faults • Interpretation of Fault Data & Troubleshooting Techniques*

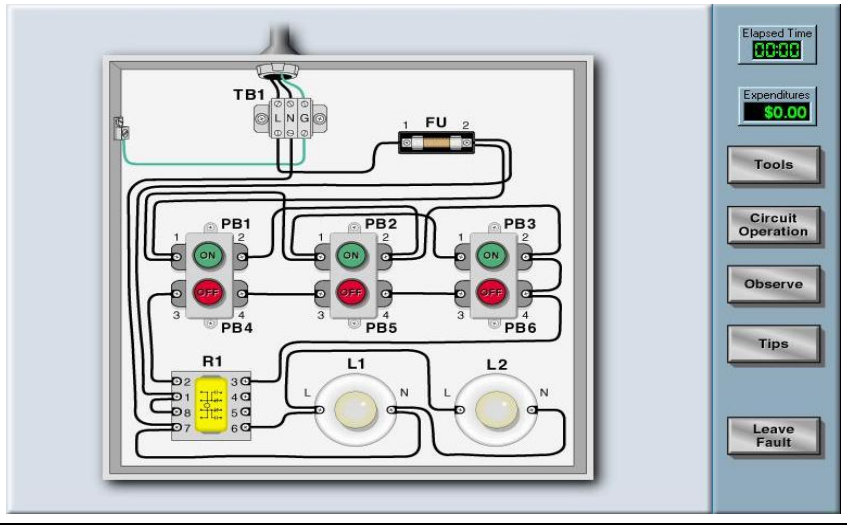
1100 – 1145	***Grid Resilience Strategies*** *Strategies for Enhancing Grid Resilience Against Faults • Importance of Redundancy & Backup Systems*
1145 – 1200	*Break*
1200 - 1250	***Fault Management & Restoration*** *Procedures for Fault Management & Restoration in Electrical Networks • Coordination Between Field Operations & Control Centers*
1250 – 1300	***Recap***
1300	*End of Day Four*

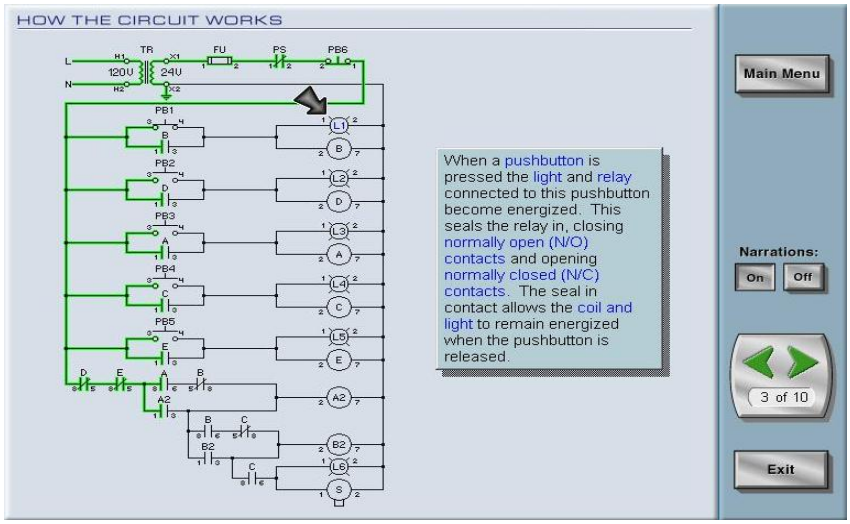
Day 5

0800 - 1000	***Remote Monitoring & Control*** *Role of SCADA Systems in Remote Monitoring of Faults • Real-Time Fault Notification & Response*
1000 – 1015	*Break*
1015 – 1100	***Emergency Response Planning*** *Developing & Implementing Emergency Response Plans for Electrical Faults • Training & Readiness Exercises*
1100 – 1130	***Case Studies: Fault Management Success Stories*** *Review of Case Studies Highlighting Successful Fault Management & Recovery Efforts • Analysis of Key Factors Contributing to Successful Outcomes*
1130 – 1145	*Break*
1145 – 1215	***Hands-On Session: Emergency Response Simulation*** *Simulation Exercise on Responding to a Simulated Electrical Fault Scenario • Role-Playing Different Stakeholders in the Emergency Response Process*
1215 – 1230	***Course Conclusion***
1230 – 1245	***POST-TEST***
1245 – 1300	*Presentation of Course Certificates*
1300	*End of Course*

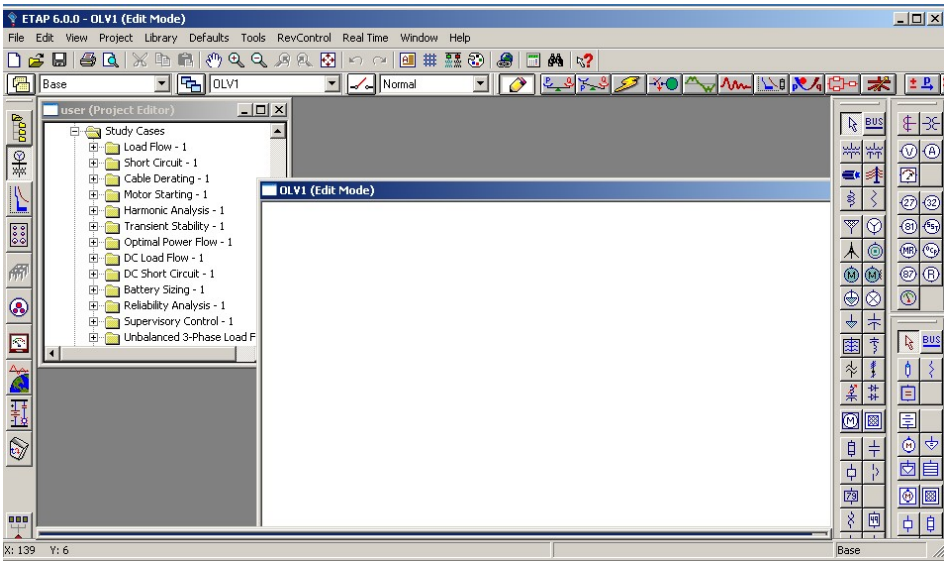
Simulator (Hands-on Practical Sessions)

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" and "ETAP" Simulators.





Simutech Troubleshooting Electrical Circuits V4.1



ETAP Software Simulator

Course Coordinator

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