COURSE OVERVIEW EE1073
Electrical Plant Fault Diagnosis -Advance

Course Title
Electrical Plant Fault Diagnosis -Advance

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
EE1073

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This interactive virtual training will feature engaging activities using technology-based tools and programs that simulate individual and group workshops and provide vibrant learning interactions among participants.

This course is designed to provide participants with a detailed and up-to-date overview of advanced electrical fault causes, analysis, detection and remedies. It covers the fault analysis and the source of fault current in an electrical installation; the common fault statistics of electrical equipment; the short-circuit rating of equipment; the correct switchgear rating for fault duties; the per-unit system and one-line diagrams; and the source of impedance data for all items of plant including the three-phase short-circuit currents.

Further, the course will also discuss the manual calculation of three-phase short-circuit current; the industrial systems and fault current analysis; the cables subjected to short-circuit currents, compliance with regulations; the unsymmetrical fault conditions and symmetrical components and faults; the consideration of various fault types; the sequence networks; the consideration of phase shift in two-winding transformers, earth impedance and three-winding transformers; the unsymmetrical faults in power systems; and the fault diagrams of electrical equipment along with interconnected sequence network.

During this interactive course, participants will learn the special considerations with reference to limitation of earth fault current; the examples based on industrial power systems; the computer-based calculation of faults; the common network faults; and the industrial standards in accordance with ANSI, NEC & NFPA 70 compliance.

Course Objectives

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

- Apply and gain an advance knowledge on the causes, analysis, detection and remedies of electrical fault
- Discuss fault analysis and the source of fault current in an electrical installation
- Identify the common fault statistics of electrical equipment and assess the short-circuit rating of equipment
- Select the correct switchgear rating for fault duties and illustrate per-unit system and one-line diagrams
- Recognize the source of impedance data for all items of plant including the three-phase short-circuit currents
- Carryout manual calculation of three-phase short-circuit current as well as industrial systems and fault current analysis
- Explain the cables subjected to short-circuit currents, compliance with regulations, unsymmetrical fault conditions and symmetrical components and faults
- Identify the consideration of various fault types, sequence networks and the consideration of phase shift in two-winding transformers, earth impedance and three-winding transformers
- Represent unsymmetrical faults in power systems and recognize fault diagrams of electrical equipment along with interconnected sequence network
- Determine special considerations with reference to limitation of earth fault current and demonstrate examples based on industrial power systems
- Apply computer-based calculation of faults and identify the common network faults
- Discuss the industrial standards in accordance with ANSI, NEC & NFPA 70 compliance

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 advanced electrical fault causes, analysis, detection and remedies for electrical supervisors, operations and maintenance engineers, plant electricians, maintenance technicians and all levels of personnel in an electrical installation.

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)

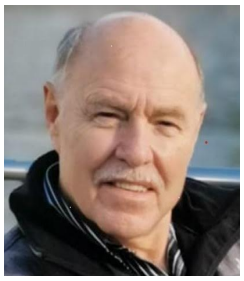
  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** 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. Fred Du Plessis is a **Senior Electrical Engineer** with over **45** years of extensive experience within the **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise widely covers in the areas of **Thermal Gas Power Generation**, **Power Station** Operations, **Power Generation Plant Outage** Management, **Power System** Analysis, **Power System** Generation & Distribution, **Electric Power System** Design, **Renewable Energy**, **Energy Storage** Technologies, Maintenance, Testing & Troubleshooting, **Transformer Protection**, **Transformer** Problem and Failure Investigations, **Power System Operation and Control**, Fault Analysis in **Power Systems**, **HV/MV Cable Splicing**, **High Voltage Electrical Safety**, **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**, ORHVS for Responsible and Authorized Person **High Voltage Regulation**, **Transformers** Maintenance, inspections & repairs, Commissioning of **LV & HV Equipment**, Oil Purification and **High Voltage Maintenance**, HT Switch Gear -Testing, Safe Operating, Maintenance, Inspection & Repairs on **LV & HT Cables** - Testing (Pulse & Megger), Line Patrol in **Low Voltage & Distribution**, **Transmission**, **Operating Principles up to 132KV**, Abnormal Conditions & Exceptions, Commissioning & Testing, **Transformer Inspections & Repairs**, **Live Line Work up to 33KV**, **Basic Power System Protection**, **High Voltage** Operating Preparedness Phasing (**110V to 132KV**), **HV Operating & Fault** Finding (up to 132KV), Maintenance & Construction Supervision, **VSD/VFD** Installations & Testing, **Electrical Panel Design**, **VSD/VFD Installations & Testing**, Instrument Installation and wiring, **AC/DC Supplies & Change Over Systems**, **AC & DC Winders** and VLF Testing, **Gas Turbines**, **Steam Turbine** with a **Station Generation**, **Project** Management & Project Controls, **Water Treatment & Reverse Osmosis** Plant Management and **Mechanical Maintenance** Management.

During Mr. Du Plessis's career life, he has gained his practical experience through several significant positions and dedication as the **Project Manager/Owner**, **Maintenance Manager**, **Project Excecution Manager**, **Commissioning & Operating Manager**, **Acting Operating Manager**, **Optimization/Commissioning Manager**, **Operating Support Manager**, **Operating Production/Shift Manager**, **Operations Lead Engineer**, **Electrical Engineer**, **Production/Maintenance Planner**, **Unit Shift Supervisor**, Principal **Plant Operator**, **Workshop & Maintenace Consultant**, Assistant **Electrical Supervisor**, Trainee **Motor Mechanic** and **Senior Instructor/Trainer** from various international **power station** companies like the Dunamis Energy, Peterhead Power Station, Lijaco Services, Eskom, Matla Power Station, Grootvlei Power Station, Ellisras Brick & Ceramic, Hlalisanani Mechanical Contractor, Matimba Power Station, Matimba Power Station, Eskom Kriel Power Station and Transvaal Provincial.

Mr. Du Plessis has a **Bachelor's** (with Honours) degree in **Operations Management**. Further, he holds certification in Red & Silver Seal Accreditation Power Generation – (ESETA), a SAMTRAC & NOSA **Auditor** – (NOSA), a **Certified Instructor/Trainer** and has further delivered various trainings, seminars, conferences, workshops and courses globally.

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. 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

0900 – 0905	*Registration & Coffee, Welcome & Introduction*
0905 – 0915	***PRE-TEST***
0915 – 0945	***Introduction to Fault Analysis***
0945 – 1015	***Source of Fault Current in an Electrical Installation***
1015 – 1020	*Break*
1020 – 1100	***Common Fault Statistics of Electrical Equipment***
1100 – 1145	***Short-Circuit Rating of Equipment***
1145 – 1230	***Selecting the Correct Switchgear Rating for Fault Duties***
1230 – 1235	*Break*
1235 – 1300	***Overview of Per-Unit System & One Line Diagrams***
1300 – 1355	***Source of Impedance Data for All Items Of Plant***
1355 – 1400	***Recap***
1400	*Lunch & End of Day One*

Day 2

0900 – 1000	***Three-Phase Short-Circuit Currents***
1000 – 1005	*Break*
1005 – 1100	***Manual Calculation of Three-Phase Short-Circuit Current***
1100 – 1145	***Industrial Systems & Fault Current Analysis***
1145 – 1230	***Cables Subjected to Short-Circuit Currents***
1230 – 1235	*Break*
1235 – 1355	***Compliance with Regulations***
1355 – 1400	***Recap***
1400	*Lunch & End of Day Two*

Day 3

0900 – 0930	***Unsymmetrical Fault Conditions***
0930 – 1000	***Overview of Symmetrical Components & Faults***
1000 – 1005	*Break*
1005 – 1100	***Consideration of Various Fault Types***
1100 – 1145	***Sequence Networks***
1145 – 1230	***Consideration of Phase Shift in Two-Winding Transformers***
1230 – 1235	*Break*
1235 – 1300	***Consideration of Earth Impedance***
1300 – 1355	***Consideration of Three-Winding Transformers***
1355 – 1400	***Recap***
1400	*Lunch & End of Day Three*

Day 4

0900 – 1000	***Representation of Unsymmetrical Faults in Power Systems***
1000 – 1005	*Break*
1005 – 1100	***Fault Diagrams of Electrical Equipment***
1100 – 1145	***Interconnected Sequence Networks***
1145 – 1230	***Special Considerations with Reference to Limitation of Earth Fault Current***
1230 – 1235	*Break*
1235 – 1300	***Demonstration Examples Based on Industrial Power Systems***
1300 – 1355	***Introduction to Fault Current Analysis Software***
1355 – 1400	***Recap***
1400	*Lunch & End of Day Four*

Day 5

0900 – 0930	***Computer Based Calculation of Faults***
0930 – 1000	***Introduction to a Scaled Down Fault Analysis Software***
1000 – 1005	*Break*
1005 – 1100	***Common Network Faults***
1100 – 1145	***Industrial Standards Namely ANSI, NEC & NFPA 70 Compliance***
1145 – 1230	***Case Studies of Faults in a High Voltage Network***
1230 – 1235	*Break*
1235 – 1340	***Case Study of Faults in a Low Voltage Network***
1340 – 1345	***Course Conclusion***
1345 – 1400	***POST-TEST***
1400	*Lunch & End of Course*

Practical Sessions

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

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org