



COURSE OVERVIEW EE1045-3D

Partial Discharge Measurement, Analysis for Switchgear, Cables & High Voltage Motors

Course Title

Partial Discharge Measurement, Analysis for Switchgear, Cables & High Voltage Motors

Course Date/Venues

October 14-16, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference

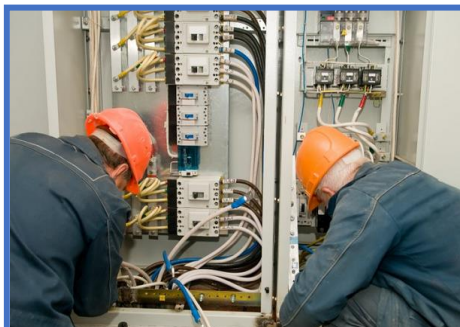
EE1045-3D



Course Duration/Credits

Three days/1.8 CEUs/18 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 electrical equipment partial discharge monitoring. It covers the fundamentals of transformer, switchgear and cable; the parts/design and failure mechanisms; the PD theory, PD as a symptom, partial discharge or corona, void formation and electrical discharges; the insulation types and causes of deterioration including the dielectric stress, capacitive coupling and causes of PD; and the types of PD, controlling stress, preventing PD and PD monitoring and detection.



Further, this course will also discuss the test equipment, PD emissions and radio waves; the physical signs of PD, basic wave theory and types, electromagnetic wave theory, acoustic waves, ultrasound and transient Earth voltage principles; the airborne and contact mode, TEV generation and ultrasonic generation, propagation and detection; and the signal attenuation, surface and internal discharges, directional antennas, noise cancellation, PD pattern and time of flight.





During this interactive course, participants will learn the PD detection in cables, PD detection in transformers airborne and PD detection instruments; the UltraTev, UltraTev Plus+, UltraTEV locator and PD hawk; the accessory package, noise, background interference and substation environments; the different types of PD test and survey; and the data interpretation, applicable standards, data presentation, trend analysis, polarity predominance, load effect and temperature effect.

Course Objectives

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

- Apply and gain an in-depth knowledge on electrical equipment partial discharge monitoring
- Discuss the fundamentals of transformer, switchgear and cable as well as the parts/ design and failure mechanisms
- Explain PD theory, PD as a symptom, partial discharge or corona, void formation and electrical discharges
- Identify the insulation types and causes of deterioration including the dielectric stress, capacitive coupling and causes of PD
- Classify the types of PD and control stress, prevent PD and apply PD monitoring and detection
- Use test equipment and recognize PD emissions including radio waves
- Identify the physical signs of PD, basic wave theory and types, electromagnetic wave theory, acoustic waves, ultrasound and transient Earth voltage principles
- Discuss airborne and contact mode as well as TEV generation and ultrasonic generation, propagation and detection
- Determine signal attenuation, surface and internal discharges, directional antennas, noise cancellation, PD pattern and time of flight
- Recognize PD detection in cables, PD detection in transformers airborne and PD detection instruments
- Differentiate UltraTev, UltraTev Plus+, UltraTEV locator and PD hawk
- Describe accessory package, noise, background interference and substation environments
- Identify the different types of PD test and survey as well as apply data interpretation, applicable standards, data presentation, trend analysis, polarity predominance, load effect and temperature effect

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Howard Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend


This course provides an overview of all significant aspects and considerations of electrical equipment partial discharge monitoring for condition monitoring engineers, condition monitoring supervisors and condition monitoring technicians.

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: -

- 
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 **1.8 CEUs** (Continuing Education Units) or **18 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.

- 
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.



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 Engineer** with over **25 years** of **Onshore & Offshore** experience within the **Oil & Gas** and **Power** industries. His wide expertise covers **Transformer Operation, Maintenance, Diagnosis, Testing & Lifetime, Electrical Inspection and Testing Extension, Electrical Maintenance and Troubleshooting, Power Generation Operation & Control, Switchgear Operation & Maintenance, Process Control, Instrumentation, Safeguarding & Security, Advanced Instrumentation & Control, Process Control & Mechanical Engineering, Installation, Calibration** and Maintenance of Electronic Instruments, **Firefighting System Operation & Maintenance, Water Based Systems, Hydraulic, Fire Pump Set, Fire Alarm System, Stand Pipe System, Hose Reel & Landing Valve, Fire Hydrant System, Deluge Foam System, Electrical Hazard Protection, Maintenance Planning & Scheduling, Shutdown & Turnaround, Spareparts & Inventory Management, Pump Selection, Gas Turbine Failure Analysis, Rotating Equipment Failure Analysis & Reliability Optimization, Reactive & Proactive Maintenance, Vibration Condition Monitoring & Diagnostics** of Machines, **Pressure Safety Valve (PSV), Pressure Relief Valve (PRV), Safety Relief Valves, Relief Valve Theory & Maintenance, Security Valves, PRV & POPRV Operation, PRV Repair & Disassembly, Valve Components, Valve Troubleshooting, Valve Actuators, Valve Seals & Packing, Control Valves, Pumps, Compressors, Turbines, Motors, Turbo-expanders, Gears, Steam Turbine, Heat Exchanger, Variable Speed Drives, Seals, Advanced Valve Technology, Dry Seal, Fired Heaters, Air Coolers, Crude Desalter, Process Vessels & Valves, Piping, Pipelines, Valves, Lubrication Technology, Vibration Analysis, Power System Hydraulics, Security Detection Systems & Operation, Process Plant Equipment and Troubleshooting Process Operations**. Further, he is also well-versed in **Smart Meters, Fiber Optic, Protective Relaying Systems, Process Control & Instrumentation, PID Controller, Distributed Control Systems (DCS), Programmable Logic Controllers (PLC), ABB PLC & DCS System, Electrical Standards, Electrical Power, Electrical Wiring, Transformers, Electro-Mechanical Systems, Automation & Control Systems, Power Distribution, Transformers, Diesel Generators, 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, Electrical Power & Machine Expert, Electrical Process Leader, Team Leader, Electrical Team Leader, 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's** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, seminars, courses, workshops and conferences internationally.





Course Fee

US\$ 3,750 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.

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: Monday, 14th of October 2024

0730 – 0745	Registration & Coffee
0745 – 0800	Welcome & Introduction
0800 – 0815	PRE-TEST
0815 – 0830	Fundamentals of Transformer, Switchgear & Cable
0830 – 0815	Parts/Design
0815 - 0830	Failure Mechanisms
0900 - 0930	PD Theory
0930 - 0945	Break
0945 – 1000	PD as a Symptom
1000 – 1030	Partial Discharge or Corona
1030 – 1100	Void Formation
1100 -1130	Electrical Discharges
1130 - 1200	Insulation Types
1200 - 1230	Causes of Deterioration
1230 – 1245	Break
1245 – 1300	Introduction to Dielectric Stress
1300 – 1315	Capacitive Coupling
1315 - 1330	Causes of PD
1330 – 1400	Classification of Types of PD
1400 - 1420	Controlling Stress & Preventing PD
1420 - 1430	Recap
1430	Lunch & End of Day One





Day 2: Tuesday, 15th of October 2024

0730 – 0830	<i>PD Monitoring & Detection (Hands on Training)</i>
0830 – 0900	<i>Usage of Test Equipment</i>
0900 – 0930	<i>PD Emissions Including Radio Waves</i>
0930 – 0945	<i>Break</i>
0945 – 1000	<i>Physical Signs of PD</i>
1000 – 1030	<i>Basic Wave Theory & Types</i>
1030 - 1100	<i>Electromagnetic Wave Theory</i>
1100 – 1115	<i>Acoustic Waves</i>
1115 – 1130	<i>Ultrasound & Transient Earth Voltage Principles</i>
1130 - 1145	<i>Airborne & Contact Mode</i>
1145 - 1200	<i>TEV Generation, Propagation & Detection</i>
1200 - 1215	<i>Ultrasonic Generation, Propagation & Detection</i>
1215 - 1230	<i>Signal Attenuation</i>
1230 – 1245	<i>Break</i>
1245 – 1300	<i>Surface & Internal Discharges</i>
1300 - 1315	<i>Directional Antennas - PD Hawk</i>
1315 - 1330	<i>Noise Cancellation</i>
1330 - 1400	<i>PD Pattern</i>
1400 - 1420	<i>Time of Flight</i>
1420 - 1430	<i>Recap</i>
1430	<i>Lunch & End of Day Two</i>

Day 3: Wednesday, 16th of October 2024

0730 – 0800	<i>PD Detection in Cables</i>
0800 – 0830	<i>PD Detection in Transformers Airborne</i>
0830 – 0900	<i>PD Detection Instruments</i>
0900 - 0930	<i>UltraTev</i>
0930 – 0945	<i>Break</i>
0945 – 1000	<i>UltraTev Plus+</i>
1000 – 1045	<i>UltraTev Locator</i>
1045 – 1100	<i>PD Hawk</i>
1100 – 1115	<i>Accessory Package is Covered</i>
1115 - 1130	<i>Noise, Background Interference & Substation Environments</i>
1130 – 1145	<i>The Different Types of PD Test & Survey</i>
1145 – 1200	<i>Data Interpretation</i>
1200 – 1215	<i>Applicable Standards</i>
1215 - 1230	<i>Data Presentation</i>
1230 - 1245	<i>Break</i>
1245 – 1300	<i>Trend Analysis</i>
1300 – 1315	<i>Polarity Predominance</i>
1315 - 1330	<i>Load Effect</i>
1330 – 1345	<i>Temperature Effect</i>
1345 – 1400	<i>Course Conclusion</i>
1400 – 1415	<i>POST-TEST</i>
1415 - 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>





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

