Workshop on Transformer: Selection, Operation & Troubleshooting

January 5 – 9, 2026, 1st Run: Lagos & Port Harcourt

July 6 – 10, 2026, 2nd Run: Lagos & Abuja

For Tutor -Led Class: 9am – 4:30pm

Workshop fee: **Lagos:** N350, 000,

Abuja / Port Harcourt: N400, 000 per Participant

Delivery Mode: In-person / Live Virtual / Hybrid

Online course fee: N300, 000 per Participant

Available for In-plant Training

700 U$D for foreign Participants

Course overview

Electrical transformers are machines that transfer electricity from one circuit to another with changing voltage level but no frequency change. Today, they are designed to use AC supply, which means that fluctuation in supply voltage is impacted by the fluctuation in the current. So, an increase in current will bring about an increase in the voltage and vice versa.

Transformers help improve safety and efficiency of power systems by raising and lowering voltage levels as and when needed. They are used in a wide range of residential and industrial applications, primarily and perhaps most importantly in the distribution and regulation of power across long distances. The program is designed to highlights the necessary safety procedures relating to Transformer Isolations, energizing, Testing and maintenance of transformers.

For whom:

This program is designed for skilled trades, supervisors, and Engineers involved in the maintenance of industrial power circuit breakers. Engineers and technicians from electricity supply companies, manufacturing, importing and distributing Power and Distribution Transformers, in power utilities, co-generation operators, petrochemical plants, service managers of buildings and hospitals will also benefit from this program.

Learning objectives:

At the end of the program, participants will be able to:

- describe the basic operation of a transformer as a main component in any electrical network;
- describe the principles of construction and operation of the various types of transformers;
- explain transformer winding connections, and cooling systems for effective maintenance;
- identify the different transformer components and how they fail;
- describe turns ratios and calculate terminal voltage and current;
- describe terminal markings for various single phase and three phase wiring schemes;
- ensure safety practices are adhered to when carrying out electrical installation activities;
- comprehend site acceptance tests for newly installed transformers;
- carry out electrical testing performed on transformers such as insulation resistance testing, excitation, power factor testing and insulating oil tests;
- carry out safe and proper maintenance and troubleshooting procedures on power transformer; and
- develop a safe maintenance procedure for transformers.
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Course outline:

Day 1 –Understanding the Basics and theory of transformers

- Magnetic field
- Magnetic and electric fields
- Electromagnetism

- Electromagnetic induction
- Generating electrical current
- Three phase systems
- Worldwide AC voltages and frequencies
- Per-unit values

Transformer Theory

- Purpose and Scope
- Types of transformers
- Transformer applications
- Magnetic and electric circuits of a transformer
- Winding, current and voltage ratios
- Laws of transformer
- Principle of operation of a transformer
- Transformer equivalent circuit and transformer losses
- Efficiency and why is transformer efficiency usually high?
- Regulation and transformer's voltage per turns
- Significance of volts per hertz

Transformer Construction

- Core material
- Core configurations
- Transformer core types
- Transformer windings
- Bushings
- Tank and Transformer tank fittings

Day 2: Transformer cooling and Performance

Cooling arrangement

  - ONAN type cooling
  - ONAF type cooling
  - OFAF type cooling
  - OFWF type cooling

- Gas insulated transformer
- Comparisons
- Temperature gauges and Oil level gauge
- Thermal time constant of power transformer
- Power transformer sealing systems
- Effect of oil expansion
- Silica gel breather and moisture

Transformer Performance

- Nameplate data
- Transformer parameters
- Three phase transformers
- Auto-transformer
- Transformer tap changer
- Parallel operation
- Maximum efficiency
- Dry type transformer
- Transformer noise
- Permissible loading of oil-immersed transformers
- Special transformers

Day 3: Transformer Power Factor and Harmonics

- Causes of low power factors

LOCATIONS

1 - HCA Learning Centre. Acme House 2nd Floor, 23, Acme Road, Ogba, Industrial Scheme, Ikeja, Lagos, Nigeria

2 – FAB By Toprank Hotel, Opposite Old Federal Secretariat Area 1, Garki, Abuja.

3 – Pakiri hotel Ltd., 4 Okwuruola Street, off Stadium Road, Rumuola, Port Harcourt, Rivers State.

Open Course Fee: N350, 000
In-plant Fee Negotiable

WORKSHOP FEE:
Workshop fee: **Lagos: N350, 000 per Participant, VAT-N26,250**
Abuja / Port Harcourt: N400, 000 per Participant, VAT-N30,000
Note: this covers Workshop Fee, Tea/coffee break, Lunch, course materials and certificate of attendance.
Payment should be made into our Accounts:
Account Name: Human Capital Associates Global Consult Ltd.
Union Bank of Nig. PLC: Account No: 0097961537
First Bank of Nig. PLC: Account No: 2033683960
Keystone Bank Ltd.: Account No: 1007150325

For Booking / Enquiry, Call: 234-8051365946, 234-7087578814
24/7 Lines: 234-8068933608, 234-8029170491, 234-8145745664, & 234-9112830607

- Known loads power factors
- Annual power factor penalty
- Unfavorable effects of low power factor load
- Capacitor price simple payback
- Power factor improvement
- Power factor improvement for power transformer
- Transformer reactance
- Capacitor sizes required to compensate the no-load reactive power of transformers
- Voltage rise
- Harmonics and Waveform
- Useful parameters
- Sources of harmonics
- Problems created by harmonics
- Third harmonics generate large neutral currents
- Third harmonic filter and Installation of THF in different networks
- Active filter (power quality filter)
- K-rated transformer

Day 4: Transformers Protection

- Transformer faults
- Differential relays
- Biased differential relays
- Restricted earth fault protection
- Over current protection
- Overload protection
- Gas operated (Buchholz) relay
- Sudden pressure relay
- The internal fault detector
- Explosion vents
- Temperature indicator
- Tank earth protection

Day 5: Maintenance and Troubleshooting

- Developing operating and maintenance instructions
- Preventative maintenance and predictive maintenance
- Gas in oil analysis
- Water in oil analysis
- Drying techniques
- Oil dielectric tests
- Sample transformer maintenance checklist
- Problem and failure investigations
- Problem analysis after severe operating conditions where no failure is involved - failure investigations

Training Methodology

Lectures, discussions, exercises, and case studies will be used to reinforce these teaching/learning methods.