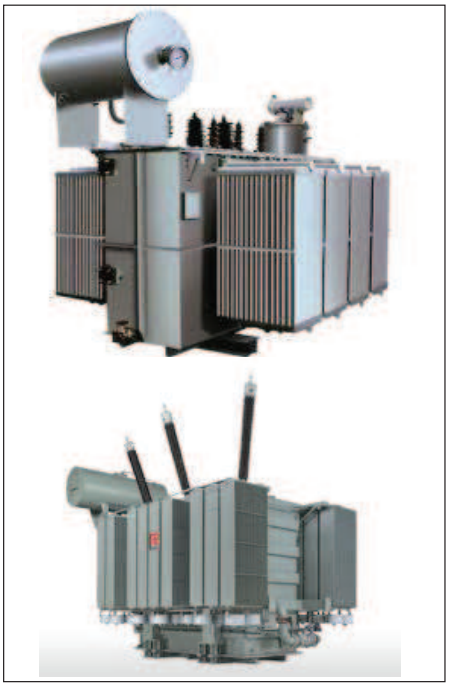
POWER TRANSFORMERS -
OPERATION, MAINTENANCE AND TESTING



WHAT YOU WILL LEARN:

- Fundamental theory and principles of the operation of power transformers
- Insight into the identification and application of transformers types
- Understand the power transformer components and their construction
- Power transformer protection
- Power transformers' oil, oil tests and interpretation of results
- The most effective power transformer electrical tests
- How to manage power transformer breakdowns to ensure a minimum disruption

WHO SHOULD ATTEND:

- Power System Engineers
- Electrical Engineers
- Consulting Engineers
- Project Engineers
- Power System Technicians
- Electrical Contractors and Technicians
- Tradesman Electricians
- Electrical Inspectors
- Utility Engineers

The Workshop

Installation of high voltage distribution and transmission equipment has increased significantly over the years due to ongoing global demand for power. As a result, the need to ensure reliability of operation of power systems is paramount. Power transformers are among the most important and most expensive components of power systems. Their failure can impose extraordinarily high costs on plants, factories and utilities of all descriptions. It is critical that all personnel operating and working with such equipment have a sound knowledge of their operational requirements and maintenance. This practical workshop provides knowledge on both the theory and operation of power transformers. The course will develop and enhance an understanding of what is involved in the maintenance of these essential components of the power systems, through the tips and tricks learnt and developed by some of the world's preeminent electrical engineers.

Pre-requisites

Some basic knowledge of electrical engineering and general knowledge of nature and operation of transformers is required. However participants do not need specific knowledge on transformers as the course will start from the basic theory.

The Program

TRANSFORMERS' MAIN FUNCTIONS AND CLASSIFICATION
- Construction (shell type and core type)
- Classification and type in relation to insulation, windings, core, cooling systems, voltage level, sizing, tank and breathing action
- Transformer parts

POWER TRANSFORMERS AND SAFETY
- How to install, operate and work with high voltage power transformers safely
- Earthing of HV transformers

TRANSFORMER THEORY
- Electrical values and their definition in a power transformer - voltage, current, umber of turns, impedance and their interrelation

OPERATION OF POWER TRANSFORMERS IN A POWER SYSTEM
- Thermal performance, loading, paralleling, tap-changing, connections and vector groups

POWER TRANSFORMER PROTECTION
- Surge protection
- Protective relaying (differential, over-current and earth fault)
- Buchholz relay and pressure relief relay
- Thermal devices and instruments (oil temperature alarm and trip, winding temperature alarm and trip)

AUTO-TRANSFORMERS
- Design criteria
- Specifications

GENERATOR TRANSFORMERS
- Design criteria
- Specifications

UNIT TRANSFORMERS
- Design criteria
- Specifications

STATION TRANSFORMERS
- Design criteria
- Specifications

POWER TRANSFORMER OIL AND OIL QUALITY
- Oil contents: water, acidity and dissolved gas
- Oil tests: dielectric breakdown, moisture, resistivity, interfacial tension, specific gravity, power factor and furan analysis.
- Recovery voltage measurement test

POWER TRANSFORMER ELECTRICAL TESTS
- AC Tests:
  - Power factor tests (insulation, oil, and bushings)
  - Single phase excitation current test
  - Transformer turns ratio test
- DC Tests:
  - Insulation resistance test
  - Dielectric absorption test
  - Polarisation index test
  - Step voltage test
  - Hi-pot test

PREVENTATIVE MAINTENANCE ON POWER TRANSFORMERS
- Techniques to improve life expectancy

SUMMARY, OPEN FORUM AND CLOSING