

# Power & Distribution Transformers

## INTRODUCTION

- This highly participative training course is designed to provide participants with the skills to understand the requirements of a comprehensive Testing, Analysis and Troubleshooting programme to maintain and prevent major faults from occurring in Power and Distribution Transformers.
- The Power and Distribution Transformers training course is targeted at technical personnel working in the Medium to Large Power Generation and Distribution Systems, particularly in the Utilities, Oil & Gas, Mining and Minerals Processing and Heavy Industries.

This training course is interactive and encourages delegates to participate through questions and answers, along with opportunities to discuss with the presenter specific issues which may result in appropriate solutions.

Participants will learn:

- The difference between Distribution and Power Transformers
- Efficient Maintenance and Testing strategies
- The On-Line Monitoring of Power Transformers
- Maintenance Strategies – Reactive, Preventative and Conditioned Based
- The Importance of Insulating Oil Testing and Analysing the results
- The Causes and Consequences of Transformer Failure
- Importance of Dissolve Gas Analysis

## PROGRAMME OBJECTIVES

- Update and increase their knowledge of Power and Distribution Transformers
- Understand how these Transformers are utilised in Power Distribution
- Learn about Transformer Periodic and Predictive Maintenance
- Learn about the types of Tests used to determine Transformer Condition
- Understand the importance of Transformer Oil Testing and Analysis
- Learn about On line Monitoring for Power Transformers
- Understand the major causes of Transformer Failures
- Learn about minor and major Transformer Repairs and Reconditioning

## WHO SHOULD ATTEND?

- If you work in the Utilities, Oil & Gas, Minerals Processing, Mining and Heavy Industries, this training course will provide you with a detailed understanding of the critical role that the Testing, Analysis and Troubleshooting play in the maintenance and longevity of Power and Distribution Transformers.

It is specifically tailored to suit:

- Maintenance Professionals
- Maintenance Technicians
- Lead Electrical Support Engineers
- Electrical Superintendents – Testing & Protection
- Electrical Support Engineers – Maintenance Operations
- Electrical Superintendents and Lead Technicians – all above Industries
- Experienced Technicians & Electrical Technicians – all above Industries

## TRAINING METHODOLOGY

- The Power and Distribution Transformers training course will combine presentations with interactive practical exercises, supported by video materials, activities and case studies. Delegates will be encouraged to participate actively in relating their particular protection requirements at their workplace.
- There will be adequate time given for group discussion during and at the end of each session, including detailed case studies and anecdotes on based on the subject matter and the facilitator's own experience in the field.

## PROGRAMME SUMMARY

- This training course covers a wide range of topics relating to Power and Distribution Transformer testing, analysis and troubleshooting. The training course begins with a brief overview of how power and distribution transformers are constructed along with their major components, and then provides detailed information on the maintenance of these transformers, including testing, analysis of test results and troubleshooting.
- The training course is designed to be beneficial for beginners and experienced personnel alike, on the assumption that all persons will have some experience or knowledge of Power Distribution and Motor Control in Utilities, Process or Manufacturing plant environment.

## PROGRAM OUTLINE

### Major Transformer Components and Operation

- Fundamentals of Power and Distribution Transformers
- Transformer Design
- Transformer Impedance
- Transformer Cores, Windings and Terminations

## Transformer Inspections and Maintenance

- Characteristics and Maintenance Procedures for Insulating Oil
- Maintenance of Transformer Cooling Systems
- Maintenance of Bushings and Insulators
- Maintenance of Transformer Mounted Ancillary Equipment
- Temperature Gauges
- Oil Level Gauges
- Silica Gel Breathers
- Overpressure Devices
- Buchholz relay
- Maintenance and inspection of gaskets
- Detection of Leaks and Seepages

## Test Types and Methods, Interpretation of Results

- Partial Discharge On-Line Monitoring
- Oil Quality Index and the Breakdown Voltage Test
- Turn Ratio Test
- Winding Resistance Test
- Sweep Frequency Response Analysis Test
- Tan Delta Test and Polarisation Index

## Additional Maintenance and Testing of Transformers

- The Importance of Maintenance and Testing
- Dissolve Gas Analysis
- Methods and interpretation of Dissolved Gas Analysis results
- Thermography
- Transformer Noise Suppression
- Testing Transformer Protection and Controls

## Failures and Preventative Measures

- Types and Causes of Failures
- Internal Transformer Defects
- Transformer Oil Regeneration
- Insulation Drying
- Case Studies and Examples of Failures
- Discussion