Power Transformer Testing – Cradle to Grave

TIC — 2 Day CPD Advanced Course
1 — 2 July 2019
The University of Queensland
St Lucia Campus, Brisbane
Sir Llew Edwards Building No 14 Room 219

Who Should Attend?

- Procurement, Asset Strategists, maintenance managers and engineers field staff, testing technicians.
- Generation, transmission and distribution personnel.
- Consultants, designers and operations staff in the renewables, manufacturing, mining, industrial and infrastructure organisations.

Course numbers are LIMITED.

Book NOW to secure a place.

ONLINE REGISTRATION
http://www.itee.uq.edu.au/tic-cpd

Registrations close 24/06/2019
(Unless all places filled earlier)
Send queries to r.holzheimer@uq.edu.au
COURSE OUTLINE— Transformer Oils

DAY 1—1 July  2019 (9.00am to 4.30pm) Registration from 8.30am

Transformer Testing Standards/Factory Acceptance Testing (FAT)

What are common test standards for large, medium and distribution transformers. What do they test? Learn the main differences between AS, IEC and IEEE test standards. How to test a 50 Hz Transformer at 60 Hz. What typical FAT tests are carried out for the range of transformer? Routine, Type and Special Tests—which do I choose? What is the acceptance criteria?

Common FAT HV testing— How to perform and interpret the results

LI/SI Impulse testing key points and pitfalls. AC HV testing basics. Learn lightning impulse waveshape and chopping time key issues. What are the three main high voltage AC tests, what do they stress...how does the test work?

Routine maintenance testing and diagnostic tests to find the faults- leading distribution company shares their experiences and practices.

Electrical Testings of Power transformer during routine maintenance – EQL practice. Diagnostic Testings of Power transformer for fault findings. Testings of transformers triggered by Condition (CBM). Electrical testings of Transformers to confirm suitability to re-energise after that was tripped by protection. Typical actions from Electrical Testings.

Case studies/Examples

Temperature rise testing and sound power tests

What are the test methods for temperature rise testing for different cooling modes? What is top oil rise, winding rise, winding gradient and hotspot rise and how are these used to verify acceptance. The emergency rise tests methods are commonly employed, calibration of winding temperature indicator (WTI)

Be exposed to sound power tests, be able to identify the difference between sound power level/sound pressure level/sound intensity

Learn the range of field offline electrical tests turns ratio, vector group and excitation current, DC winding resistance dynamic resistance measurement, demagnetization, short circuit impedance and FRSL (Frequency response of stray losses) SFRA (Sweep frequency response analysis) Capacitance and tan delta or ddf? DFR (Dielectric frequency response) Moisture measurement using a dielectric response measurements.

Field Diagnostic testing- which test needs to be carried out and how do I interpret the results?

What are the common field test methods and equipment used in the industry? What do they test and how does one interpret the results. What are the common online tests? Case Studies

Be exposed to a leading transmission company practices in site acceptance testing (SAT) and condition assessment program. Understand the range of tests before energizing a new/relocated power transformer Overview of condition assessment program. Learn what fault finding techniques can be applied. Case studies

Field and laboratory experience on transformer condition monitoring:

Field and research experience on FDS/PDC measurements and analysis, interpretation transformer vibration measurements, Online PD measurements using HF CT on neutrals Group Sharing experiences

Group Sharing Experiences

Case studies, technical interest items, test issues and problems shared between the course attendees.
## INDUSTRY & ACADEMIC EXPERTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Role and Contact Details</th>
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<tbody>
<tr>
<td>Craig Adams</td>
<td>Experienced Transformer test manager, high voltage &amp; power testing, production management, quality systems, transformer routine, type &amp; special tests, including investigative diagnostic techniques, failure &amp; forensic investigations.</td>
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<tr>
<td>Jayaram Baniya</td>
<td>Jay specialises in: (a) developing maintenance standards, (b) technical specifications, (c) diagnostic testings; and (d) repair, replacement or refurbishment of substation primary assets such as power transformers, tap changers, instruments transformers. His expertise includes insulating oil specifications and interpretation of Dissolved Gas Analysis (DGA) and oil test results. Jay has both a M.Sc. (Power System Engineering) and a B.E. (Electrical Engineering) and a memberships/qualifications: MIE Aust, CPEng, RPEQ</td>
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<tr>
<td>Florian Predl</td>
<td>Florian Predl commenced with OMICRON Austria in 2007 as a Technical Support Engineer. He is the convener of Australian panel of CIGRE D1, Materials and Emerging Test Techniques. Member of Australian Panel of CIGRE A2, Power Transformers and Reactors, Standards Australia panel EL-007-01, High Voltage Testing. Joe is the convener for CIGRE WG D1.71,</td>
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<tr>
<td>Joe Tusek</td>
<td>Technical Director Verico. Joe has been in the power industry for nearly 40 years and has had roles in power system transient investigations, asset management, HV testing, plant failure investigations, synchronous machine modelling, test instrumentation and measurement system design. He is the convener of Australian panel of CIGRE D1, Materials and Emerging Test Techniques. Member of Australian Panel of CIGRE A2, Power Transformers and Reactors, Standards Australia panel EL-007-01, High Voltage Testing. Joe is the convener for CIGRE WG D1.71,</td>
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<td>Troy Petersen</td>
<td>Troy joined Powerlink in 2014 after 19 years at Ergon Energy and for the last 2 years has been an integral part of Powerlink’s Primary Systems Materials Team specialising in the procurement of Power Transformers and reactive plant from domestic and international suppliers. Tim has worked at Powerlink over 9 years, in various teams. Currently his role as Substation Plant Field Support Engineer entails: investigations into HV plant failures and trips, support the filed maintenance crews by writing procedures, perform training, assisting in HV plant testing, purchase plant and equipment, provide engineering support for the live substation crews.</td>
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<tr>
<td>Tim Macklin</td>
<td>Substation Plant Field Support Engineer Powerlink</td>
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<td>Dr Chandima Ekanayake</td>
<td>Chandima Ekanayake received his B.Sc.Eng.(Hons) in 1999 from University of Peradeniya, Sri Lanka. He obtained his Tech. Lic. and PhD from Chalmers University of Technology, Sweden. In year 2008 he joined University of Queensland as a Post-Doctoral research Fellow to work on an ARC funded project on improving transformer insulation diagnostics through polarisation measurements. During his PhD studies where he engaged in research related to Diagnostics of Transformer Insulation from dielectric response measurements. Also he has carried out several dielectric response measurements at Swiss Federal Institute of Technology (ETH), He has been involving on condition monitoring activities of field installed transformers with various utilities including Powerlink, Vattenfall, Sweden and Ceylon Electricity Board, Sri Lanka. His research interests are condition monitoring of power apparatus, Alternatives for insulating oil, performance studies of HV insulators and energy related studies. Chandina is a Senior Member of IEEE.</td>
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<tr>
<td>Ray Holzheimer</td>
<td>Ray has over 40 years in the power industry, with experience in power and distribution transformer manufacturing: in design, production and test. Ray has worked in water resource as design/project engineering, and mining as project engineer. Ray has also worked at Powerlink in Transformer/Reactive Plant Procurement, Substation Design, Substation Maintenance Engineer. Currently in his TIC Manager’s role he heads the CPD course delivery and oversees the TIC research activities</td>
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