NEW RESEARCH CUTS TRANSFORMER LIFE CYCLE COSTS

Power generation is shifting from traditional coal to large-scale PV and wind. A difficulty the utilities are facing is how to minimise the costs involved in reworking the existing electricity network to accommodate these new energy sources because they will not be in the same location as the ones which are retired. Power transformers cost up to millions of dollars, and so it is desirable when integrating solar and wind farms to retain existing units if possible.

The challenge is how should a utility evaluate the changes in the lifecycle costing of power transformers when a connection agreement is submitted for a new solar or wind site? A utility could purchase a new power transformer, or if possible retain the existing ones and defer capital expenditure.

Transformers often operate in pairs, however, if they are subjected to the same stresses they may degrade and fail together affecting the reliability of supply. Changes to condition monitoring might be required to provide the data necessary to either make an investment decision, or track the changes expected in residual life. If online monitoring is to be used then what type of data should be collected, and analysed, to improve the efficiency of transformer maintenance and operation?

Therefore, the goal of this project, lead by the Australasian Transformer Innovation Centre (TIC) based at The University of Queensland, is to create a framework which will guide the utilities on how to determine the best economic option on retaining, upgrading or replacing the power transformers.

RECENT COURSE COMPLETED - POWER TRANSFORMER HV BUSHINGS - DESIGN, MAINTENANCE AND RISK MITIGATION HELD ON 12-13 FEBRUARY 2018

This was the second course of a series being delivered at TIC, which was conceived in conjunction with the centre's industrial partners to fill a gap in the training market. A unique feature was that, from the beginning, a balance between industry practicality and academic fundamental theoretical background was to be struck. This was considered necessary to bring the respective advantages of industrial experience with scientific understanding in a successful learning environment.

Nine industry and university presenters took part in the two-day course, helping provide the desired balance. The course was sectioned into areas of HV bushing design, mechanisms of failure, maintenance, failure statistics, maintenance factory and site testing, maintenance, detection of failures using offline techniques, detection of bushing failures and condition using online techniques, implementation of life cycle oriented maintenance by transmission and distribution utilities. In addition, group sharing sessions amongst delegates was also facilitated over the two days. As this was the first advanced continuing professional development course that the Centre has hosted, the goal was to provide practical training on topics which were aimed at procurement, maintenance, testing and asset management.

Karl Haubner Doble Australia highlighting HV bushing test preparations.

Rob Milledge ABB Australia explains intricacies of HV Bushing Design.

Of the 18 delegates who attended the TIC course, 100 per cent said they would recommend the course to others and 100 per cent rated the course either 'excellent' or 'good'.

What delegates said:

Snowy Hydro Ltd *"Provided excellent quality information."*
Energy Queensland *"Well organised, relevant to the topic, excellent speakers."*
Stanwell Corporation Ltd *"Very good information on design/ maintenance practices", "Great course, high quality."*
SA Power Networks *"Significant learnings."*

NEXT CPD COURSE - POWER TRANSFORMER TAP CHANGERS - DESIGN, MAINTENANCE AND RETROFIT 27-28 JUNE 2018

The next advanced CPD course will be held at the University of Queensland St Lucia campus in Brisbane.

The course will deliver theoretical background information with hands-on experiences suited to procurement, asset strategies, operations and maintenance managers and engineers in generation, transmission and distribution, renewables, manufacturing, mining, industrial and infrastructure organisations.

The speakers will include industry experts from:

- Manufacturers of tap changers including ABB and Reinhausen,
- Transmission and distribution companies,
- Service and testing and companies,
- Researchers from The University of Queensland.

Key Learning Outcomes:

- Understand the basic principles of tap changers, including oil, vacuum.
- Learn the basic arrangement of regulating windings, benefits and issues of oil and vacuum diverters. Tap changer considerations for renewables and grid integration.
- Understand tap changer designs and applications, differences between diverter and selector type, Loading capability, the effects on transformer windings.
- Become familiar with OLTC maintenance for oil and vacuum types. Learn about the steps to take for high diverter moisture content.
- Participate in a forum for OLTC fault investigation and emergency supply restoration.
- Understand retrofit options where oil diverters are replaced by vacuum.
- Understand the benefits of dynamic resistance tests.
- Be informed of innovative condition assessment of tap-changers using acoustic measurements, signal processing techniques used and results from field trials, case study.
- Be exposed to how some utilities are implementing life cycle oriented maintenance of tap changers.
- Moisture tolerance, life extension.
- Learn about OLTC failures due to silver sulphide formation.

The course details and online registration link can be found on the TIC website www.itee.uq.edu.au/TIC-cpd

Transformer Innovation Centre

The University Of Queensland AUSTRALIA

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