How to Connect with Your On Load Tap Changers and Save $?

TIC Advanced CPD Course - Power Transformer Tap Changers - Design, Maintenance and Retrofit 24-25 February 2020

The University of Queensland's, Australasian Transformer Innovation Centre(TIC) is proud to announce the first advanced CPD course for 2020, which will be held in Sydney.

The course will deliver theoretical background information with "hands on" practical 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:

i Manufacturers of tap changers including ABB and Reinhausen.
ii Transmission and distribution companies.
iii Service and testing and companies
iv Researchers from University of Queensland.

Dr Thomas Smolka MR detailing tap changer operation

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.

Rob Milledge ABB discussing tap changer case study

PRICING TIC MEMBERS

PLATINUM

Platinum Attendee Complimentary (Conditions Apply)
Additional Platinum Member Attendees…. See website for details.

PRICING NON TIC MEMBERS

ONE ATTENDEE…. See website for details.
Three or more Attendees…. See website for details.

The Tap Changer course was initially delivered in June 2018.
23 delegates from transmission/distribution/generation/renewables/mining/service attended the 2 day advanced course.
100% of the attendees rated the course "excellent" or "good".

What delegates said:
I would highly recommend this course.
Great technical and experience sharing across utilities manufacturers, vendors. Real experience shared by asset owners.
Great tap changer principle explanation.
Excellent course for entry level education on tap changers.
Fantastic frontline material Case studies were excellent.
Great open discussion, more than 80% of topics are directly relevant to me and my team. Course materials relevant, knowledge of presenters excellent. T&D

Register your interest by contacting:
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The online registration will be posted on the TIC website:
http://www.itee.uq.edu.au/tic-cpd

If you want to learn more about TIC and the benefits of becoming a member, visit: http://www.itee.uq.edu.au/tic or contact:
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The Impact of High Penetrations of Rooftop PV on OLTC

The grid was originally set up to transfer energy from large fossil fuelled generators to the consumer. With many homeowners choosing to install rooftop PV how should the utility adapt their grid, in the most cost-effective manner, to operate with high penetrations of this new technology?

By Dr. Dan Martin, Judith Marks, Dr. Olav Krause, the University of Queensland, Dr. Thomas Smolka, Reinhausen Australia

The focus of this concept project is to evaluate the ability of a zone substation to maintain downstream voltages within specified limits, and to analyse any further usage of the online tap changer of a power transformer. When should a utility start to consider the use of other regulating technologies such as a voltage regulating distribution transformer?

Over the past few years there has been an extremely rapid uptake of rooftop PV by the utility's customers, which will continue into the future. A current pressing concern is to keep electricity networks reliable while being affordable. Consequently, there is much focus on understanding how extra rooftop PV will affect network infrastructure.

LOCALISED VOLTAGE RISES

There has been much concern of localised voltage rises caused by rooftop PV. Consequently, the intention of this concept project has been to understand the role of the zone substation in controlling the voltage of distribution networks with high levels of rooftop PV. Furthermore, what extra maintenance could be required within a substation due to more voltage-controlling operations?

In this case, voltage control is performed using an on-load-tap-changer (OLTC). Possible problems if the rooftop PV is too high include the OLTC reaching its last position and being unable to buck the voltage, or more tappings caused by transient weather and the rooftop PV ramping up and down. Consequently, the focus is on the behaviour of an OLTC in networks with very high levels of PV.

OLTCs switching under oil (OILTAP® technology) can require an inspection every 70,000 operations. However, older designs may require more frequent inspection and maintenance. For CIDER, A case study was presented on a system with a very high level of rooftop PV. The power flowing through a 66/11 kV 15/20/25 MVA power transformer becomes negative at noon because the penetration of rooftop PV was so high. In the evening there was approximately 9 MVA of load, and there was around 10 MW of rooftop PV generation. The voltage of the distribution network, 11 kV, was investigated along with the behaviour of the OLTC, which was an OILTAP® V-type model manufactured by Maschinenfabrik Reinhausen.

The investigated transformer was in a tropical savannah climate where the weather is mostly excellent for rooftop PV, however storms occur which interrupt solar generation, and may cause voltage movements due to the ramping up and down of rooftop PV. Even with this level of rooftop PV there was only a very minor increase in number of daily tap changer operations (one extra per day average over a year). During stormy weather the number of daily tap changers could double from six to twelve. However, within the maintenance intervals and OLTC lifetime, this increase is minor. Into the future for this transformer there is likely to be:

- Even more rooftop PV
- A large-scale battery being connected by the DNSP
- Household battery installation uptake increasing due to newly announced government subsidies

Consequently, of interest is to be able to predict how an OLTC will respond, whether any changes to the control will be required, and if there is an impact on the maintenance intervals of the OLTC. This work is ongoing and is focussing on how to predict when daily voltage fluctuations become large enough to cause significantly more operations.

Even though the OLTC is behaving perfectly in the regulation of medium voltage levels, downstream there will be localised voltage rises. Consequently, the next phases of the project are to investigate technologies such as voltage regulating distribution transformers (VRDT), which are effectively a VACUTAP® OLTC in a distribution transformer.

As more and more rooftop PV is integrated into the grid the industry will require solutions to control any subsequent voltage rise. Projects with VRDT have been rolled out in Australia already. T&D

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To learn more about this project or TIC in general, including the benefits of becoming a member contact:
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