



Field Testing Techniques for On-Load Tap Changers

— Technical Presentation —
Thursday, April 6, 2017
Grand Ballroom ABC, 8:00-10:45am

by Marcos Ferreira, Dave Geibel, Bernhard Kurth, Raka
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1. Abstract

The testing processes for new on-load tap changers and transformers with on-load tap changers are well defined by standards. However, guidance and recommendations for field-testing OLTCs are needed. The Power Transformer Subcommittee is considering formation of a Task Force to develop a new section for C57.152, IEEE Guide for Diagnostic Field Testing of Fluid-Filled Power Transformers, Regulators and Reactors.

This presentation will cover background, the need for guidance and the history of how the industry has responded to this need to date, as well as some of the newer techniques that have been developed for the testing of on-load tap changers. Following is the agenda for the presentation:

- Basics of the need for the tutorial – Craig Stiegemeier
- IEC and IEEE efforts to develop a joint use guide on LTCs – David Geibel
- Review of traditional OLTC field tests – Shawn Weaver
 - Online Tests: Visual checks, DGA, thermal scans
 - Offline Tests: Physical measurement of contacts, winding resistance over the tap range, and TTR
- Vibro-Acoustic off-line and on-line testing – Bernhard Kurth
 - A non invasive diagnostic technique that can be performed on-line and that offers a detailed insight of the mechanical condition of the OLTC
 - Malfunctions and excessive wear can be detected by associating and analyzing the different acoustic events to the OLTC switching sequence
- Dynamic resistance measurements for on-load tap changers - Marcos Ferreira and Raka Levi
- Questions / Comments / Closing remarks
- CEU certificate signing by the presenters

We expect this tutorial will require more time than one of the traditional Committee technical presentations, so a break will be conducted from 9:15-9:30am.

2. Learning Objectives

This presentation will help users understand the need for field testing guidance and traditional techniques used to evaluate the condition of on-load tap changers as well as emerging technologies for the evaluation of on-load tap changers.

3. Learning Outcomes

As a result of attending this tutorial session, members will gain an understanding of the following:

- Joint efforts of IEC and IEEE to develop guidance for on-load tap changers.
- Traditional condition evaluation methods used for on-load tap changers.
- Newer testing processes for the evaluation of on-load tap changers.
- Understanding of the need to develop guidance for tap changer testing.

4. Presenters' Biographies

Marcos Ferreira is a Principal Electrical Engineer at Advisian.

Marc Foata is a Senior Technical Advisor at Maschinenfabrik Reinhausen GMBH.

David Geibel is the Technical Director for ABB's North American transformer components operation in Alamo, Tennessee. Dave started out his career with GE and specialized in transf. components. He moved to Westinghouse in 1987 as part of the technology transfer when GE sold its power transf. business to Westinghouse. Dave was the quality manager in the Westinghouse/Reinhausen LTC manufacturing joint venture in Alamo. He assumed the role of Senior Design Engineer for Aftermarket Service during the time of the Westinghouse/ABB joint venture. Dave moved to Alamo in 1996 as a senior product development engineer, eventually becoming a fellow engineer. He joined Delta Star as an engineering supervisor and returned to ABB after two years as the engineering manager of the transf. components division in Alamo.

Raka Levi is an Application Expert at DV-Power Sweden and the Convener of the AMforum association. He has over 30 years of asset performance and condition assessment experience, specializing in apparatus testing, monitoring and diagnostics. Seven years ago, he started within the AMforum organization in a working group on DRM test methodology for tap changers. For 20 years, he has been running committees that assemble asset managers, organizing AMforum conferences in Europe, LTC Universities in USA, and LTC Colleges in Asia.

Craig Stiegemeier is the Director of Technology for ABB's Transformer Service business unit (TRES) in North America. He is responsible for developing effective processes supporting condition evaluation and assessment tools, life extension solutions and training programs for utility and industrial users of power transformers. Craig started his career as a power transf. development engineer in 1979 and has performed a number of different roles, including shell-form transf. design engineer; program mgr. for the U.S. Navy's fleet improvement program; transf. components engineering, marketing & aftermarket service mgrs.; project mgr. for power transf. winding improvements; commercial operations manager for the St. Louis power transf. facility; and transf. service related roles, including engineering solutions manager and marketing manager.

Shawn Weaver has eight years of electrical engineering experience in the transf. industry. In 2009, he joined CG Power Systems designing medium power transf. He joined ABB Transformer Remanufacturing and Engineering Services (TRES) in 2011, performing various field service design roles. Since 2014, he has led ABB's TRES LTC Service group which focuses on on-load tap changer maintenance and retrofit opportunities.