PLANNED TUTORIALS FOR THE
2011 CLIENT COMMITTEE MEETINGS & CONFERENCE
UPDATED JULY 8, 2011

TUTORIAL: On-Line Bushing Tests Tutorial
Sponsored by the Bushings, Insulators and Instrument Transformer Committee
Sunday, September 18, 1:30 PM - 5:30 PM

It has become ever more difficult to remove apparatus from service for testing due to cost, manpower availability, customer convenience, and regulations. As a result, there is an increasing interest in knowing the status of one's apparatus without removing them from service. Bushings are a critical component of some of the most expensive apparatus, and therefore on-line tests to determine their condition has become more and more attractive, especially at critical points in an electrical system. This tutorial reviews the various monitoring techniques available.

Infrared Testing
Robert Madding, PhD; RPM Energy Associates, LLC

Infrared thermographers have been using IR thermography in substations and switchyards with good success for over twenty years. This presentation highlights some of the author's successes as well as those of cited references. Thermographers have found and documented problems with connections, primarily, both directly viewed as well as hidden, such as in load tap changers and lightning arresters. We've also been able to detect oil levels in bushings and problems with transformer cooling systems. Environmental conditions are understood with wind being a major deleterious factor to finding problems. The author has developed an Excel™ workbook macro that estimates the change in temperature rise of a problem as the load changes. Also, the relatively new technology of infrared optical gas imaging for SF6 leak detection is presented.

On-line Monitoring of Power Factor and Capacitance
Robert Brusetti & Sue Oxford; Doble Engineering

With the number of bushings being monitored on-line, numbering in the tens of thousands, one can conclude the technology has gained broad acceptance. While the first documented attempt to evaluate bushings while in service dates back to the middle nineteen sixties, it has been changes in the way the industry manages its resources over the last decade that has driven the need for this technology. Efforts have focused on replicating traditional off line tests, primarily Capacitance/Power Factor and Partial Discharge. This presentation will discuss the obstacles that need to be addressed when attempting to capture information while the bushing is in service. It will attempt to set reasonable expectation by covering the advantage and limitation of various technology as well as showing why traditional off line criteria my not be applicable. A number of case studies will be used to highlight this subject matter.

Manitoba Hydro's Suspension Insulator On-Line Maintenance Program

Reg Gamblin; Manitoba Hydro

Manitoba Hydro's overhead transmission system operates at voltages of 66kV to 500kV with over eighty thousand kilometers of lines with each kilometer of conductor supported by hundreds of suspension insulators. Maintenance on this overhead system includes periodic testing of insulator strings for defective units and investigations into the conductivity of their surface contamination. Initially, on-line testing of strain insulators consisted of ringing them out with a wrench but about 30 years ago improved to testing their insulating ability by buzzing them using an arc-gap. More recently, an electronic insulator tester applies a voltage across the insulator and a graduated rating of the leakage current is displayed, indicating defective units. Additionally, insulator string surface conductivity is measured by swabbing their surfaces and comparing the collected materials conductivity to that of an equivalent salt-density. These techniques will be presented and discussed.

On-Line Monitoring of Bushings and Instrument Transformers Case Studies from the UK

Richard Heywood; Doble Engineering, UK

Case studies are presented from the experience in the United Kingdom at monitoring bushings and instrument transformers using partial discharge techniques including RFI, UHF, UV and acoustic monitoring devices. An important aspect of the cases is that complementary techniques are used to ensure that the real activity is verified and it's not due to "interference" of a "normal" nature.

Included is also a case study where PD monitoring using the bushing test tap was used offline to determine the suitability of a transformer for returning to service after a period of storage.

Detection of Corona In Bushings With Ultrasonic and Ultraviolet Techniques

Evro T. Wee Sit; Sage Technologies

This presentation explains the mechanism of corona and its characteristics that allow for detection. Examples of detrimental effects of corona such as degradation of insulators, radio interference, and ozone production are illustrated. Two popular detection methods, ultraviolet imaging and ultrasound, will be explained and compared.

FREE THURSDAY TUTORIAL:
Partial Discharge Training

Thursday, September 22, 8:00 AM – 10:00 AM
Manchester GHI

Partial Discharge (PD) is not well understood by the average test technician or engineer in the field. Furthermore, the term "PD" is often used generically but really encompasses several type of sensing and modes of transmission. The necessary equipment and knowledge for Partial Discharge (PD) detection and monitoring play an important role in a thorough condition-based maintenance program. This seminar will take a look at testing procedures for transformers, rotating machines and HV/MV cables. We'll walk you through the process from set-up through data review.

as of September 2, 2011