Iris Power

FALL 2006

Diagnostic News

Your Source For Monitoring the Reliability of Electrical Equipment

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Attention:
Case Studies Wanted

IRMC 2007
San Antonio, TX
June 3-7, 2007

Call for Papers

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UPCOMING TRADESHOWS

POWER-GEN,
October 25-27, 2006
New Delhi, India

Hydropower Technology & Key Equipment 2006
October 27-29, 2006
Beijing, PRC

Seatrade Cruise Shipping Convention March 12-15, 2007
Miami Beach, FL, USA

MAINTEC 2007 March 20-22, 2007 Birmingham, England

WaterPower XV
July 23-26, 2007
Chattanooga, TN, USA

IS THERE A TRUE CLASS H INSULATION SYSTEM YET?

Greg Stone

For the past 40 years or so, the dominant insulation used in stator windings rated 3.3 kV and above is based on mica bonded together by epoxy. There are many ways to process these materials - but the result is what is called a Class F (or more correctly a Class 155) insulation system. The epoxy mica insulation system has been very successful and now dominates stator winding insulation systems. Many of the earliest stator windings made from this material are still operating today, as long as the Class F materials (that are rated to survive on average for 20,000 hours at 155 C) are in a stator that normally operates at 130 C or below as measured by an embedded RTD. Although there have been some improvements to the epoxy mica insulation system and processing methods over the past decades - one wonders if there is a better insulation system that can replace it.

In fact, over the past 10 years, insulation material suppliers have been researching new materials - with a vision of developing a cost-effective Class H (or Class 180) system. A true class H insulation system would bring many benefits for end users of motors and generators. Most importantly, a Class H system will allow the operating temperature of the winding to be raised by 25C over the current operating temperatures for Class F epoxy mica systems, and still achieve the normal expected life of a winding. The consequence of this is that for a new stator, the higher operating temperature means that the copper can have a smaller cross-section, there can be less steel in the core and/or perhaps a less sophisticated stator cooling system. The bottom line will be a significantly lower cost stator since copper and steel can be removed (the cost of a motor or generator is largely determined by the mass of the copper, steel and insulating materials employed). For existing machines, a rewind using a Class H system may permit a significant uprate of the motor or generator in the same frame. Thus economics should automatically drive the introduction of a Class H insulation system - just as the Class F epoxy mica system rapidly made the Class B polyester mica and asphaltic mica systems obsolete 40 years ago.

At the 2006 IEEE International Symposium on Electrical Insulation a paper was given by Brandes et al of Von Roll on their development of a Class H system. Von Roll is one of the largest suppliers of insulation materials to all the main motor and generator OEMs around the world. Their Class H material has been commercially available for many years now, and uses a mica paper tape that is

bonded together with polyesterimide material, using a VPI process. Most of the reported tests show that the new material is truly Class H. In their testing done according to IEC 60034 Part 18 (essentially IEEE C50.12 and C50.13) thermal classification procedures, the materials show good mechanical properties when aged to qualify for a 180 C rating. So why is this new Class H material not being widely applied in new stators?

The reason for this is not clear. Perhaps the new materials are too expensive to result in a machine that is significantly lower in cost compared a conventional Class F system. It could also be that the materials are more difficult to process in normal stator manufacturing plants. From reviewing the electrical test data, it may also be that the dissipation factor vs. winding temperature is much the same for the Class H and the old Class F material. This could mean that the winding could enter thermal runaway if the machine ever saw an over-temperature transient (for example from an accidental shut down or blockage of the stator cooling system).

Although the reason for the lack of acceptance of the current Class H material is not known (at least by me) I am sure in the future success will be achieved. Class H materials should be a boon to motor and generators and when it happens users, OEMs and material suppliers will all benefit.

IRIS RECEIVES R&D 100 AWARD

R&D™ Advantage Business Media — Where Innovation Begins

Research and development continues to be an important component of Iris's corporate culture as we are continually trying to innovate and develop new products and solutions for rotating machine monitoring and diagnostics. A very successful example of this is the Hydro Flux Monitor which has been selected for a 2006 R&D 100 award by the independent judging panel and editors of R&D Magazine as one of the 100 most technologically significant products introduced into the marketplace in the past year.

The Hydro Flux Monitor was developed jointly by a team comprised of experts from Iris Power, the New

York Power Authority (NYPA) and the Electric Power Research Institute (EPRI) as a result of research funded by NYPA and EPRI in 2002 to develop an algorithm for monitoring flux in hydrogenerators. Iris Power's Steve Campbell (VP, Research) and Mark Susnik (Manager, Development) were the product's inventors and principal developers. Following the successful demonstration on several generators of the algorithm developed to detect shorted poles, the Hydro Flux Monitor instrument was designed and field-tested. Until the Hydro Flux Monitor was released, there was no available continuous, automated, on-line monitoring technology to detect the presence of installed on the rotors of hydrogenerators.

The advantages to continuous and automated monitoring are the elimination of the need for periodic portable instrument testing and expert data interpretation, and a more reliable result than testing under static conditions through time-consuming and expensive off-line pole drop tests. The Hydro Flux Monitor continuously analyzes flux patterns and provides an alarm when a shorted turn situation is detected.

Hydro Flux Monitor mounted on generator wall takes signal from the flux probe and connects to plant LAN. Installation at NYPA's St. Lawrence Power Project.

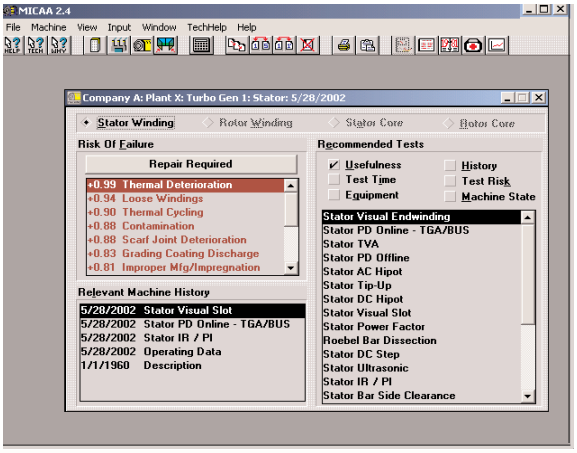
MICCA

One of the first products developed and commercialized by Iris was an expert based software program called MICAA. This program was created to guide motor and generator maintenance personnel thru the process of assessing the condition of stator and rotor windings, and laminate cores,

based on the machine design, operational, and maintenance history, as well as the results from both on and off line tests and inspections. The knowledge contained in MICAA was based on a multimillion-dollar research project by EPRI, as well as the accumulated experience of many machine designer's and large utility users or motors and generators.

MICAA has several benefits to users of the program:

1. a database for storing motor and generator machine data.
2. expertise and knowledge on the level of machine experts becomes available to less experienced staff.
3. ability to effectively allocate maintenance resources thru ranking machine condition and risk of failure.
4. a detailed technical help (like a book) includ ing photographs, test descriptions and interpretation rules, and repair advice, for various machine failure mechanisms.



Despite these capabilities, one of the main drawbacks to the commercial success of MICAA was the level of detailed information that had to be entered into the program to obtain reasonable results. Often this information was unavailable at the plant level, or at least difficult to obtain. In addition, with a large fleet of machines, the manual entry of test and inspection data can be very time consuming. MICAA is still available from Iris, but for several years has not been updated or enhanced thus the software interface and databases used are several Windows™ generations back. In addition, although the expert knowledge contained in MICAA is still highly relevant, updates to this knowledge are required to properly represent the larger air-cooled machines prevalent today, as well as to identified generic machine design problems which have come to light in the past decade.

With modern computerized test equipment capable of transferring electronically to MICAA, and better software and database tools, it may be possible to create a more useable MICAA product. Iris is interested in soliciting input from past users of MICAA, or parties interested in funding the development of a new product. It is estimated that a software development effort of several man-years will be required to modernize the MICAA software and knowledge. Parties interested in exploring this opportunity should contact Blake Lloyd at Iris (blloyd@irispower.com).

PDTRAC FEATURES

The PDTrac instrument is a continuous online partial discharge(PD) monitoring device for couplers in single ended configuration, which activates an alarm when significantly high PD activity is detected. The following are some features that make the PDTrac a first class instrument.

- Harsh environment ready: The PDTrac enclosure is NEMA 4X. It has been certified for hazardous location option (ATEX, NEC/CEC, and nuclear power generation stations).
- Robust and field hardened modules for operating conditions: it incorporates three input modules with 2500 V ac isolation, for ambient humidity and temperature, and equipment condition
- Complete standard standalone operation: PD data memory of last two years, with up to eight optional analog signal output mod ules.
- Unique compatibility: the statistics of the recognized IRIS database can be used to compare PD data.
- Built-in alarm for high PD activity with contact 1A, either ac or dc.
- Versatile networking options: Ethernet and RS485 ports, multidrop fiber optic and optic isolation available.
- Friendly software: viewing, saving and printing of 2D plots and trends.
- The best sensitivity: starting from 2 mV.
- Wide range industrial rated power supply: auto sensing 85-264 V, 50/60Hz.

UPCOMING EVENTS

Upcoming Courses
Partial Discharge Course
New Orleans, LA, Nov. 14-16, 2006
Motor Maintenance Course
Houston, TX, Oct. 17 19, 2006

Upcoming Tradeshows
Hydro 2006, September 25-28, 2006 Porto Carras, Greece
CIGRE , October 1-4, 2006 Montreal, Canada
POWER-GEN, October 25-27, 2006 New Delhi, India
1st International Conference on Hydropower Technology & Key Equipment 2006, October 27-29, 2006 Beijing, PRC

NEW PRODUCTS & SERVICES

IRIS ESTABLISHES TECHNICAL SUPPORT TEAM


Technical Support Team

Iris Power has always understood the value of supporting both its customers and potential customers to the highest degree when required. All the departments, from our research anddevelopment group to sales, manufacturing and field service have done their utmost to work with customers to solve problems and create solutions. This is the key to Iris Power's success; its dedication to providing solutions through technical know how and experience.

On Sept.5 2006, the Technical Support Team (TST) officially began its existence at Iris Power. This is a new department which takes our ability to provide support to an even higher level. Through an inter-departmental team of seasoned employees with all the aspects of the customer's technical needs taken into account, the TST enhances the company's ability to provide technical support in a more timely and coordinated manner.

Our goal is to guarantee a response to enquiries within 48 hrs. and guarantee a solution within two weeks. We intend to make technical support a key factor of our quality management system.

This group will also track problems and help implement improvements so that the company can accelerate its continuous improvement program.
The team is made up of six Iris Power staff dedicated to providing technical support. The group is as follows:

Denise Wright - *Product Specialist*

Hasnain Jivajee
Product Specialist and Application Engineer

James Thompson -
Product Support and Field Service Specialist

Janusz Kozstyla -
Senior Technologist and Manufacturing Specialist

Jeremy Russell -
Senior Technologist and Development Specialist

Pablo Rojas -
Product Specialist and Application Engineer

Paul Magder will be the manager responsible for establishing and monitoring the team.

The process for receiving technical support is still the same. Please contact James Thompson at 416-620-5600 ex.229 or email techsupport@irispower.com or contact your sales representative.