

DIAGNOSTIC NEWS



Norm McCracken

*General Manger, Worldwide Sales
416-620-5600 Ext. 305*

INSIDE THIS ISSUE

President's Message	Pg. 3
OPC for PDTrac	Pg. 3
Airgap Eccentricity	Pg. 4
Upcoming Events	Pg. 4

EVENTS

IRMC 2006

Toronto, Canada
June 5-9, 2006

Turbo Maintenance Course

Atlanta, GA
May

Motor Maintenance Course

Houston, TX, USA
Oct 17-19, 2006

Partial Discharge Course

New Orleans, LA, USA
Nov 14-19, 2006

NEW STATOR WINDING INSULATION STANDARDS FROM IEC

Greg Stone

In past decades, IEEE and NEMA originated most of the ideas that became the foundation for rotating machine technical standards used throughout the world. Thus many of the sections of the International Electrotechnical Commissions IEC 60034, the multi-part standard covering all aspects of rotating machine specifications, were originally based on NEMA MG1.

Nowadays, at least in the electrical insulation area, it seems that IEC is originating many of the new technical standards concerned with rotor and stator windings. Over the past 5 years Working Groups 27 and 29 of the IEC Technical Committee TC 2, which is responsible for updating and adding to rotating machine standards, have developed some brand new standards concerned with testing and inverter duty motors. In addition, a working group of IEC Technical Committee 112 has developed a partial discharge standard for insulation exposed to impulse voltages.

The following reviews the main ideas behind these three new standards.

Off-line Partial Discharge Test

Under the leadership of Dr. Martin Hoof of the University of Applied Sciences in Germany (and formerly of ABB in Switzerland), WG 29 has been developing IEC 60034 Part 27:

Partial Discharge Off-Line Measurements on the Stator Winding Insulation of Rotating Machinery. This document is IEC's first attempt to describe off-line PD testing as applied to conventional stator windings rated 50/60 Hz and 2300 V and above. It differs from the more general IEC document - IEC 60270 (and its North American relative ASTM D1868) in that it is recognized that when testing complete stator windings, the test object is both inductive and capacitive. This is important since the inductive nature of stator windings severely limits the applicability of using picoCoulombs (pC) as the measurement unit. Thus in IEC 60034 Part 27, mV are a recommended measuring unit for complete windings (pC can also be used, but the ability to compare readings between different stators is compromised). For tests on individual coils - which are capacitive in nature, pC is recommended.

IEC 60034 Part 27 describes the test apparatus and suggests different winding configurations for performing measurements. It recommends the measurement of PD magnitude as well as the PD inception and extinction voltages as test outcomes. The new standard indicates that the PD be measured with a detector with a lower cutoff frequency of a few tens of kHz, so that PD pulses deeper into the winding may be detected. If one

detects PD, for example above 40 MHz, then all the PD may not be detected in the winding, since PD can occur in all coils in an off-line test. (In contrast, in an on-line test, only the coils close to the stator terminals operate at high voltage, and thus will experience high PD.)

The new standard does not suggest pass or fail criteria - which makes it much less useful for purchasers of machines who want to ensure that a stator vendor or repair shop properly manufactures and impregnates the stator. Instead, a stator manufacturer or user needs to collect their own database of test results to determine if the PD is high or not. Although the standard will most likely be used as a quality assurance test for new or rewound stators, the procedures can also be used for off-line testing of in-service stators. Iris is modifying its 'low frequency option' for the TGA-B or PDA-IV to comply with the frequency specifications of IEC 60034 Part 27. This document is now out for voting, and will likely be published later this year. No document concerned with on-line PD testing is envisaged by IEC so far.

PD Measurement During Short Risetime Voltage Surges

Another brand new technical specification that will be published in 2006 is IEC 61934: Partial Discharges - Electrical Measurements; Short Risetime, Repetitive Voltage Impulses. This oddly titled document describes the general procedures and apparatus to measure PD while a test object (such as a coil) is subjected to high voltage impulses with risetimes less than 1 microsecond. The main application is to determine the PD inception and extinction voltage of equipment that may be energized from (for example) a modern voltage-source PWM inverter (see later).

The working group was lead by Prof Gian Carlo Montanari of the University of Bologna, Italy. The key difficulty is separating the few mV PD pulses from the thousand volt impulses created by inverter drives or surge testers, when the frequency content of the PD and the impulses are very close. The usual high pass filters (a capacitor feeding a resistor) will apply the impulse almost unattenuated to the instrument. IEC 61934 discussed how a suitable PD detector can be implemented. One realization is the Iris PDAAlert product. IEEE has no comparable document.

This new document is expected to be used as a reference by other IEC committees who must measure PD in

the presence of inverter voltage impulses.

Qualification and Testing of Stator Insulation Systems for Inverter Duty Motors

Probably the most important new technical specification concerning machine insulation systems to be developed in the past 20 years is IEC 60034 Part 18 - 41: Rotating Electrical Machines - Qualification and Type Tests for Type I Electrical Insulation Systems Used in Rotating Electrical Machines Fed from Voltage Converters. This document, which is currently being voted upon and should be published in 2006, was developed by TC 2 working group 27, under the leadership of Dr. Jeremy Wheeler now a consultant, but formerly with Alstom in the UK.

This document proposes for the first time, what tests a candidate insulation system must pass in order to be qualified as a stator winding insulation system in voltage-source PWM inverter drives. Type I refers to the fact that the insulation is not subject to PD (from the voltage surges created by the drive) during its normal operation. Type I machines usually have random wound stators rated 690 V and below. Since different drives and systems produce different voltage surges or shorter risetime surges, it was recognized in the standard that some motors are exposed to more severe surge environments than others. So just as insulation systems can have different thermal capabilities (e.g. Class B, F, H), inverter motors will be rated for the severity of the surge environment they can withstand. The document describes this classification system in detail.

To qualify an insulation system for inverter applications, the motor manufacturer will have to subject the insulation system to thermal, mechanical and contamination aging (as described in IEC 60034 Part 18-31 or IEEE 117) and ensure that the PD does not occur below a specified impulse voltage. Furthermore, some production stators must also be subject to a PD 'type' test under specified voltage impulses to ensure the inception voltage is above specified voltages. The PD testing is done using the methods described in IEC 61934 (see above).

IEC 60034 Part 18-41 will likely be published in 2006. A similar document that is relevant to Type II insulation systems (usually form-wound stators rated 2300 V and above) is still being prepared and probably will not be issued for 2 years or so.

PRESIDENT'S MESSAGE

Our Commitment to Our Clients and Our Community

Joseph Mbuyi



It has been another successful year for Iris Power. I am proud to confirm our growth continued in double digits for 2005. Over the past year we have made progress in our commitment to our clients and employees by reworking our Environmental Health and Safety Policy, and we passed a stringent corpo-

rate-wide Koch Chemical Technology Group audit that resulted in a 4 STAR rating out of a possible 5. Our spotless safety record, not to mention the fact that we continue to have no work-related lost-time injuries over the past 5 years, is a true reflection of our employee's commitment to safety. Our message to our clients and partners remains centered around quality, safety and the continuous improvement of our processes and products to ensure our customers success in managing their rotating machines.

Iris Power has always encouraged the volunteering spir-

it in its employees. You may have seen this spirit though our extensive participation in IEEE related activities around the globe i.e. IEEE IAS, IEEE ISEI, IEEE Electrical Insulation Society, IEEE Pulp and Paper. However, this year we are particularly proud of the community support our employees have demonstrated through relief efforts for the many natural disasters around the globe. This was a difficult year for many people; the natural disasters from Indonesia to the USA made us all realize that we are part of a tightly connected global community. The response from our staff was overwhelming. Donations to relief organizations were made through individual contributions as well as company-wide fund raising activities throughout the year. As a business leader, I am privileged to be part of a team of dedicated professionals who also use their talents to better their communities.

On this note, my colleagues and I wish you health and prosperity for the forthcoming year, and we look forward to hosting many of you here in Toronto this summer at the IRMC 2006.

OPC FOR PDTRAC

Pablo Rojas

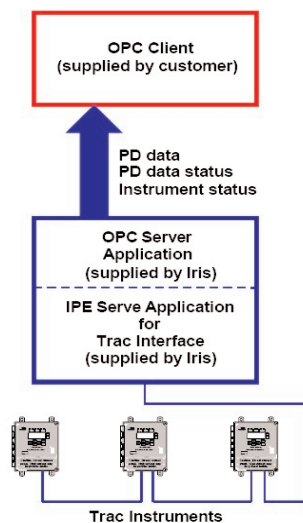
Openness, Productivity & Collaboration can be abbreviated as OPC, "open connectivity through open standards". Everyday more users embrace these standards created and maintained by the OPC Foundation.

(www.opcfoundation.org).

Iris developed the OPC server for HydroTrac monitors some years ago. The OPC server has been successfully implemented in several projects to integrate the PD data from hydro generators to a control and supervision system.

Our customers are demanding the same versatility for the PDTrac continuous monitor. In response to that demand, Iris now offers the OPC server for the popular PDTrac monitor.

The PDTrac instrument is a powerful continuous PD monitoring system for small machines connected with power cable with a length of 30 meters or longer in a configuration known as single ended (three sensors). The resulting summary numbers NQN & Qm can be used for trending and/or alarm. Applications of PDTrac monitors include oil refineries, industrial gas plants, pulp and paper, metal industries, utilities, and cement plants.



Most PDTrac instrument users display the PD data in Iris' PDView software. However, the users that prefer their own customized viewer (client) now have the following options to receive the PD data:

- Analog Signal Output Modules (ASOM)
- Digital communication within the same LAN
- FTP interface in XML format -PD data is send to a FTP
- OPC Server (NEW!)

With the OPC server, the following data can be accessed company-wide through the LAN/WAN (the Iris' OPC interface is transparent to the end-user):

- Positive NQN per phase (3)
- Negative NQN per phase (3)
- Positive Qm per phase (3)
- Negative Qm per phase (3)
- Status per phase (3)
- Sensitivity range per phase (3)
- Date (5)
- Condition parameters (3, corresponding to ambient humidity and temperature and machine parameter from Signal Input Modules).

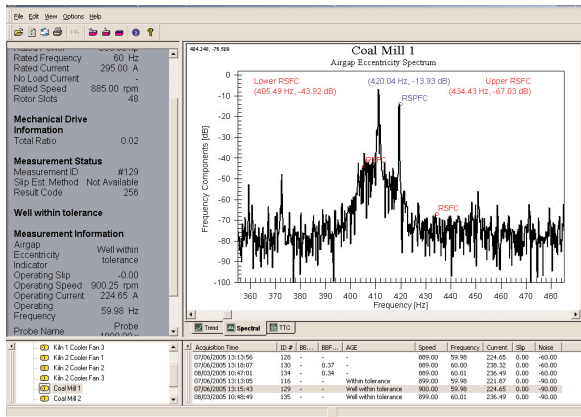
The OPC Server requires the networking option. For more details contact your sales representative.

Iris Power LP

1 Westside Drive, Unit 2, Toronto, Ontario M9C 1B2 Tel: 416-620-5600 Fax: 416-620-1995
sales@irispower.com www.irispower.com

AIRGAP ECCENTRICITY UPGRADE FOR CSMETER

Hasnain Jivajee



The hand-held CSMeter current signature analysis device is ideal for motor users in cement plants, power plants and other industrial facilities where large squirrel cage induction motors are used in fluctuating or load-cycling applications such as crushers and pulverizers, high-inertial applications such as large fans and high speed applications such as compressors where motor breakdowns can lead to costly plant shutdowns and production losses.

While the CSMeter instrument was launched in 2004 to detect cracked or broken rotor bars in fabricated rotors and casting voids in die-cast rotors, an **Airgap Eccentricity (AGE) module upgrade is now available**. With this upgrade

users now have the ability to detect abnormal levels of air gap eccentricity that could eventually lead to premature bearing wear and high vibration. Furthermore, abnormal AGE could lead to rotor-to-stator rubbing causing an eventual catastrophic failure.

As with the rest of our product line-up, the CSMeter instrument allows a non-expert to perform measurements and interpret data. The diagnosis is available instantly in the field in both text and graphical format. Data can be downloaded to a computer for trending.

The AGE upgrade is available as a software and firmware upgrade but there's no need to return the instrument to Iris. Instructions will be sent with your order. Please consult your sales representative to see if the CSMeter instrument is right for your application.

UPCOMING EVENTS

COURSES

Hydro Maintenance Course
March 21-23, 2006
Vancouver, BC, Canada

Turbo Maintenance Course
May 16 -18, 2006
Atlanta, GA, USA

Motor Maintenance Course
Oct 17-19, 2006
Houston, TX, USA

Partial Discharge Course
Nov 14-19, 2006
New Orleans, LA, USA

IRIS ROTATING MACHINE CONFERENCE (IRMC) 2006

Highlights:

- New tutorials
- A wide variety of guest speakers from around the world
- Walk-in-Clinic
- User Group Meeting

Location: Toronto, Canada

Venue: Delta Chelsea Hotel

Date: June 5-9, 2006

Cost: \$400 (CAD)

Contact: Maureen Horner
416-620-5600 Ext. 241

TRADESHOWS

WTUI
Palm Springs, CA
March 12-15, 2006

NETA
Memphis, TN
March 21, 2006

IAS/PCA Cement
Phoenix, AZ
April 9-12, 2006

Cigre 2006
Paris, France
Aug. 28 - Sep. 1, 2006

MARTS
Rosemont, IL
April 17-20, 2006

Iris Power LP

1 Westside Drive, Unit 2, Toronto, Ontario M9C 1B2 Tel: 416-620-5600 Fax: 416-620-1995
sales@irispower.com www.irispower.com