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*News From
Your Machine
Condition
Monitoring
Partner*



VibroSystM Annual Workshop at Waterpower XVI in Spokane

We wish to extend our thanks and appreciation to all the participants who attended our Annual Machine Condition Monitoring Workshop, held during HydroVision 2008 in Sacramento, California.

Over the years, we have earned a sound reputation for technical leadership throughout the power generation industry. We are still involved as actively as ever in the advancement of information technology related to condition monitoring of large rotating machines. We look forward to meeting you again next year, in Spokane, Washington, on **July 27, 2009**, during WaterPower XVI, and invite you to mark your calendar for our **8th Annual Workshop**, where we will discuss monitoring issues, as well as operation & maintenance problems observed on hydroelectric machines. More details to come on our website at www.vibrosystem.com

VibroSystM Monitoring System at the Astoria Power Plant

Black-out in Manhattan - End-winding vibrations on an air-cooled generator at the source of a major outage at the Astoria power plant.

Astoria is a 500 MW natural-gas fired, combined-cycle generating plant located in the Bowery Bay/Steinway industrial complex of Astoria. This facility delivers power to New York City and the Borough of Queens. After a catastrophic shut-down caused by end-winding vibrations on an air-cooled generator, VibroSystM was appointed for installation of one of its monitoring systems based on Fiber Optic Accelerometers FOA™ sensors and PCU protection instrumentation. VibroSystM sent one of its expert technicians,



FOA-100™ being installed on an air-cooled unit at the Astoria power plant



Astoria power plant, New-York, U.S.A.

Mr. Alain Fiola, to proceed with the installation of 24 FOA-100™ sensors, and 3 PCU monitoring and protection units at the Astoria Power Plant. VibroSystM was recommended by one of its clients who owns a 875-megawatt combined-cycle gas-fired facility in South Carolina. After the installation was completed, all sensors were successfully tested. Under the safeguard of our system, the Astoria power plant now has the capacity to prevent similar unscheduled and costly shutdowns in the future. ✎

*Monitoring Solutions
for Every Type of
Large Rotating
Machine*

VibroSystM Products for Large Rotating Machines

Protecting your investment with unique and complete monitoring solutions since 1986.

- Air Gap
- Rotor/Stator Shape
- Rotor Bowing/Rim Movement
- Rotor Mechanical Unbalance
- Rotor Pole Face/Joint/ Circuit Temperature
- Amortisseur Winding Temperature
- Isolated Phase Bus Temperature
- End-Winding & Brushgear Temperature
- Slip-Ring Temperature
- Slow Rotor Motion (Creep)
- Rotor Speed
- End-Winding Vibration
- In-Slot Stator Bar/Winding Vibration
- Magnetic Flux
- Stator Core/Winding Temperature
- Stator Winding Temp. and Vibration
- Shaft Vibration
- Oil Film Thickness
- Turbine Clearance
- Broken Shear Pin Detection
- Overall Dynamic Machine (ZOOM®)
- Results Interpretation Service
- On-line Remote Monitoring Service

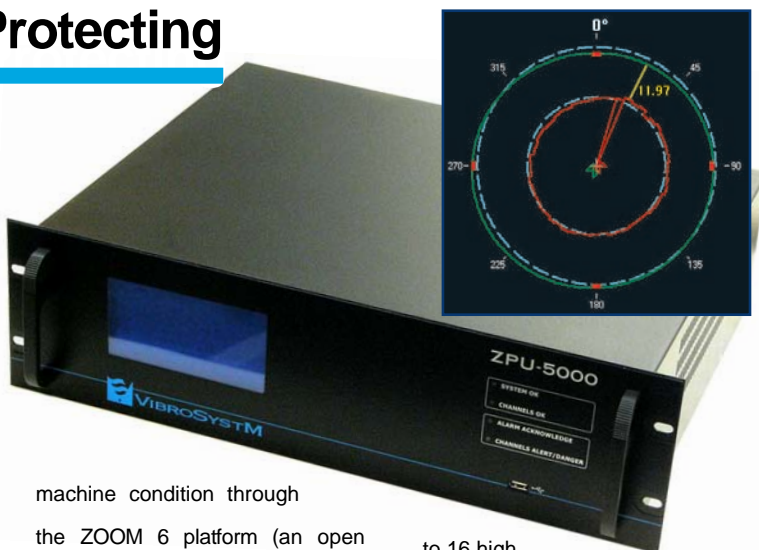
www.vibrosystm.com

Monitoring & Protecting

ZPU-5000 Multi-Channel Processing Unit

What does our new ZPU-5000 unit have to offer? Complete on-line monitoring, real-time analysis, protection, alarm management, trending of large rotating machines... **These are just some of the features now available.**

The new ZPU-5000 (ZOOM® Processing Unit) simultaneously monitors multiple parameters on large rotating machines. It performs various types of measurements in automatic and test modes, processes data, checks alarm conditions and transmits data to the ZOOM Controller for a quick and efficient data interpretation of



machine condition through the ZOOM 6 platform (an open architecture software for on-line monitoring of large rotating machines). This platform also allows notification, alarm, and **conditional measurement** and alarms (single or multiple conditions), which represents a significant breakthrough in air gap monitoring. The ZPU-5000 can synchronize acquisition of all parameters with the passing of each rotor pole for salient pole machines, or use an external acquisition trigger for non-salient pole machines. It tracks up

to 16 high speed inputs (a mix of pressure, displacement, vibration, etc) from standstill to over-speed conditions of the machine under study. Additional ZPUs can be connected to extend monitoring range and capabilities. The ZPU-5000 is rack-mountable and uses a high speed TCP/IP communication. A communication plug-in is available for easy interface with the Plant Supervisory Control System (SCADA). ✎



End-Winding Vibration Monitoring

FOA-100™E: *Extended Frequency Range*

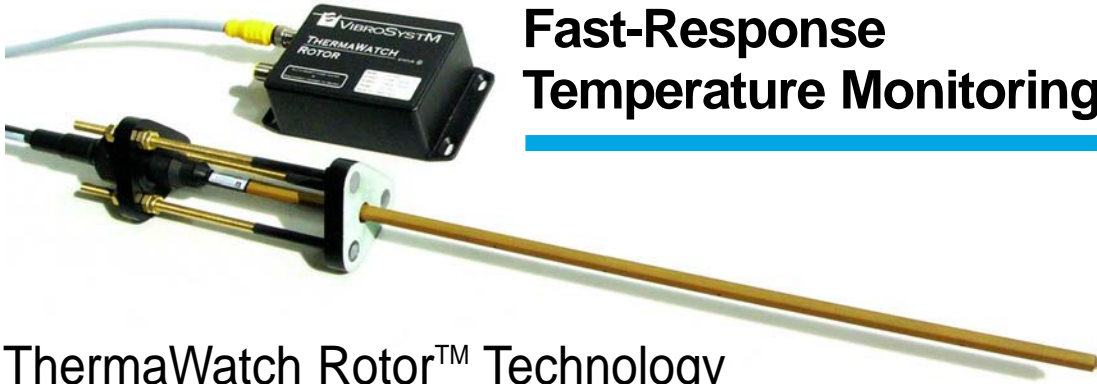
Our optical accelerometer family has grown with the addition of an *extended frequency range* single-axis accelerometer: FOA-100™ E.

Our new FOA-100™E is based on our highly renowned FOA-100™ and provides an extended frequency range of **10-1000 Hz** for end-winding vibration measurement in turbo, hydrogenerators, and large electric

motors. Extremely robust, it is designed for high temperature (**up to 180°C/356°F**) in harsh environments. A distinct feature of all our optical accelerometers: **a completely metal-free sensor head.** The optical fibers of the cable are embedded and protected by an integral tubing. The sealed feedthrough connector houses the opto-electronics and conditioning circuitry. Our FOA-100E is highly

insulated, possesses noise immunity, is transparent to machine operation and safe to personnel. Our optical accelerometers are extensively used for end-winding monitoring of hydrogen and air-cooled generators since 1996. A dual-axis model is also available from VibroSystM. ✎

Non-Contact Fast-Response Temperature Monitoring



ThermaWatch Rotor™ Technology

It is now possible to obtain accurate temperature measurements on the whole surface of each rotor pole and interpole, from the stator, and without any contact with the rotor.

VibroSystM's ThermaWatch Rotor™ probe and signal conditioner provide a fast-response, on-line temperature reading from salient and non-salient field poles on large rotating machines. Its 4-20 mA output can be

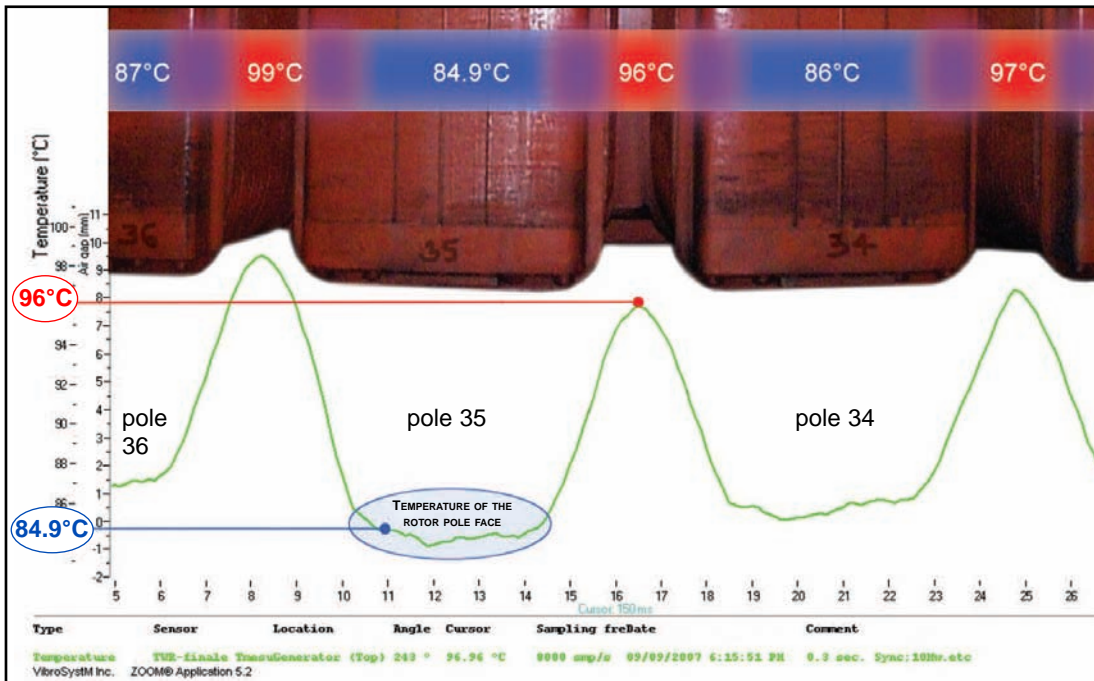
connected to VibroSystM's ZOOM® on-line monitoring system or to any other instrumentation. Because of its small size (*probe tip: 5.9 mm/ 0.2 in.*), the ThermaWatch Rotor is easy to install through a stator core ventilation hole or at any other location where the sensor tip can be positioned in front of a rotor pole, rotor pole circuit, joint or rotor pole amortisseur bar. An overheating rotor – a condition which may occur for a variety of reasons including pole overheating, coil winding issues, magnetic flux variance,

and pole connector & amortisseur bar overheating - can now be detected early. ThermaWatch Rotor is a solution for monitoring rotor pole face and winding temperature without affecting rotor integrity. When combined with MFM™, AGMS®, and ZOOM® software, it provides a comprehensive and reliable diagnosis of machine condition. ✓



Rotor pole joint failure

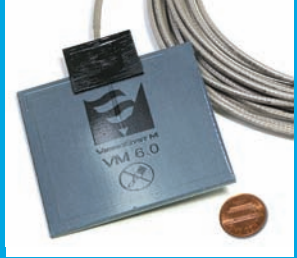
Rotor Pole Temperature Measurements using ZOOM® Software at the Mercier Hydroelectric Power Plant, QC, Canada



Interpole temperature is higher than rotor pole temperature due to coils heating.

New VM 6.0 Air Gap Capacitive Sensor

Over 20 years
of field experience



VM 6.0 Features:

- Minimal amount of stator ventilation holes blocked (the VM 6.0 is smaller than usual capacitive air gap sensor)
- Range: 3 to 30 mm (118 to 1181 mils)
5 to 50 mm (197 to 1968 mils)
- Highly immune to deposits of oil and carbon dust, and strong magnetic fields
- Easy to install on stator wall without removing the rotor or poles
- Non-contact, non-intrusive sensor
- Used with LIN-300 Series Linearization Module and ZOOM® Processing Unit or PCU Programmable Monitor



VM 6.0 sensor installed in tight space on hydro-generator stator wall at Wanapum Dam, Wa, USA.

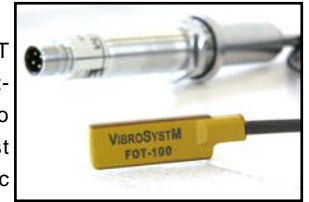
Highlights From Around The World

■ KOREA: Ulchin and Kori Nuclear Power Plants Monitoring with VibroSystM technology

Ulchin and Kori nuclear power plants have opted for our reliable patented technology to monitor vibrations. An end-winding monitoring system based on FOA-200™ (dual-axis Fiber Optic Accelerometers), a VibraWatch™ System, and ZOOMLook® have been installed on Ulchin Unit 3. Our renowned FOA-100™ (single-axis Fiber Optic Accelerometers), VibraWatch™ System and ZOOMLook® will be installed on both Kori-2 and Kori-4.

■ THAILAND: Breakthrough for the Fiber Optic Temperature Sensor (FOT)

The Khanom Power Plant, in Thailand, has chosen our revolutionary FOT sensors to monitor switchgears and circuit breakers, and prevent overheating. The FOT is a **high voltage isolated, high temperature** (up to 200°C/392°F), **non-metallic** fiber optic temperature sensor. By its robust design and optical technology, the FOT is immune to electromagnetic interferences and represents a rugged solution for industrial applications.



VibroSystM Fiber Optic Temperature Sensor (FOT)

■ INDONESIA: PT Inco includes VibroSystM in LARONA hydropower station renovation plans

PT International Nickel Indonesia Tbk (PT Inco) has selected VibroSystM for supply of an air gap monitoring system (AGMS®), stator bar vibration monitoring (SBV™), and vibration monitoring (VibraWatch™). The Larona hydropower plant is one of three (3) power stations supplying the energy needed by PT Inco for ore processing and nickel matte production.

■ COLOMBIA: Air Gap Monitoring and VibraWatch Systems

VibroSystM will supply its new VM 6.0 Air Gap Monitoring System (AGMS®) and VibraWatch™ System on (4) generators of an hydroelectric power plant in Colombia, which will have an installed capacity of 660 MW. This power plant is expected to begin operations in 2010.

■ AUSTRALIA: FOA and ZPU Technologies for Gladstone Power Station

The Gladstone Power Station is Queensland's largest coal-fired power station, with a capacity of 1 680 MW. VibroSystM instrumentation (ZPU-500 and ZOOM® software) has been selected for condition monitoring of (6) units. FOA-100™ single-axis fiber optic accelerometers have also been installed for end-winding vibration monitoring.

■ VENEZUELA: VibroSystM takes part in the modernization project at the Guri hydroelectric plant

The Guri hydroelectric plant is comprised of 20 generation units, for a total capacity of 10 000 MW. VibroSystM has already supplied Air Gap Monitoring (AGMS®), VibraWatch™, and Magnetic Flux Measurement (MFM™) systems for all the hydrogenerators. Six (6) units of the first powerhouse will also be equipped with ThermaWatch Rotor™ (non-contact rotor pole temperature monitoring) and ThermaWatch Stator™ (thermal mapping of stator core and windings).

■ SOUTH AFRICA: 3-Axis End-Winding Vibration Monitoring at Komati Coal-Fired Power Station

The Komati coal-fired power station has an installed capacity of 1 000 MW. Three (3) of its 6 units are now protected by VibroSystM ZoomLook® monitoring software and its renowned FOA-100™ (single-axis) and FOA-200™ (dual-axis) fiber optic accelerometers for 3-axis end-winding vibration monitoring.



Production

During 2008, the additional space provided by our new building expansion was put to good use by the production team, with the assembly of several ZOOM®/ZPU-5000 monitoring cabinets to be installed on 8 units of the Subansiri hydroelectric project, in India, totaling 2000 MW.



VibroSystM Sales Representatives Team



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U.S. Patents 7,064,559; 6,307,385; 6,552,667; 6,075,464; 5,990,807; 5,182,612; 60/794,115; 60/617,063.

