



VIBROSYSTEM^{MD}

INFORMATION TO BETTER MANAGE YOUR MACHINES



ZOOM[®]

Software Suite

Zero **O**utage **O**nline **M**onitoring



VibroSystM's ZOOM® (Zero Outage Online Monitoring) system is based on nearly 30 years of experience in the collection and interpretation of data from different types of machines, located in a variety of environments. VibroSystM has always worked with and for machine owners by delivering unbiased information on the condition of their machine which will allow them to better manage their assets. The accuracy of its systems has been proven many times over as even major machine manufacturers trust in VibroSystM's systems to assist them in the design of new machines.



To SCADA/PLC

Bi-directional communication Services

ZOOM Software can be complemented by Modbus® and OPC® bi-directional communication services that collect and send data to and from **the plant's control system.**

ZOOM®
Software Suite:

Implemented by the world's largest electric utilities



Hydro

Bulb
Francis
Kaplan
Pelton

[Complete monitoring solutions for the hydro industry](#)



Turbo

Hydrogen Cooled
Air Cooled

[Complete monitoring solutions for the turbo industry](#)



Mining

Gearless SAG/Ball Mills
Gear-driven SAG/Ball Mills

[Complete monitoring solutions for the mining industry](#)



To consult the ZOOM datasheet, please visit vibrosystem.com

Clearance



Generator Shapes & Gap

Rotor shape and position inside stator shape. Quickly identify critical air gap locations and associate its values to industry standards

Turnkey Monitoring System

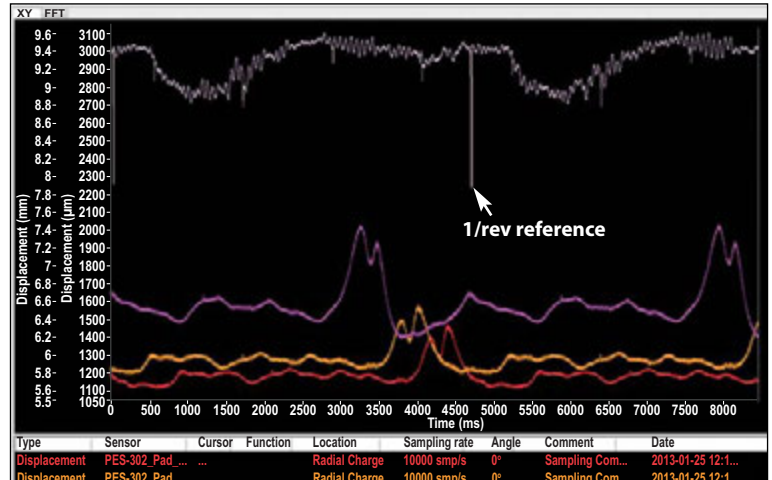
As VibroSystM recognizes the importance of knowing the true condition of a unit, **the ZOOM system provides its users with independent analyses of their machines allowing them to optimize their performance and reliability.**

This unique tool is a turnkey solution consisting of the right equipment, the most reliable information and first-rate support.



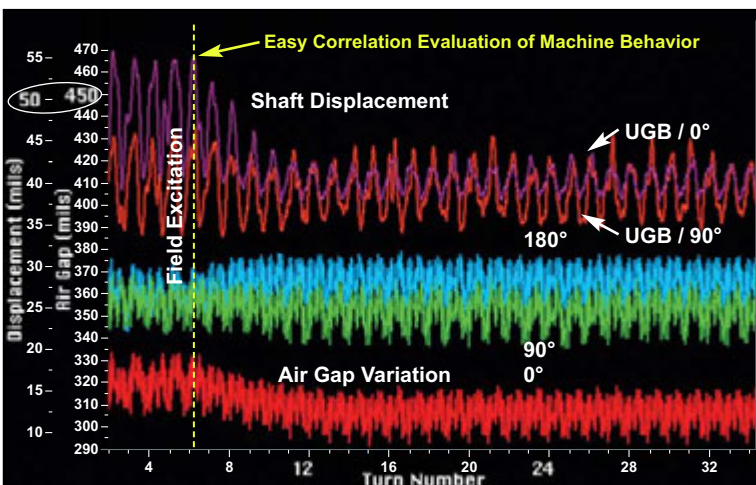
Turbine Blade Tip Clearance

Turbine position inside discharge ring. View of blade gap and discharge ring shape

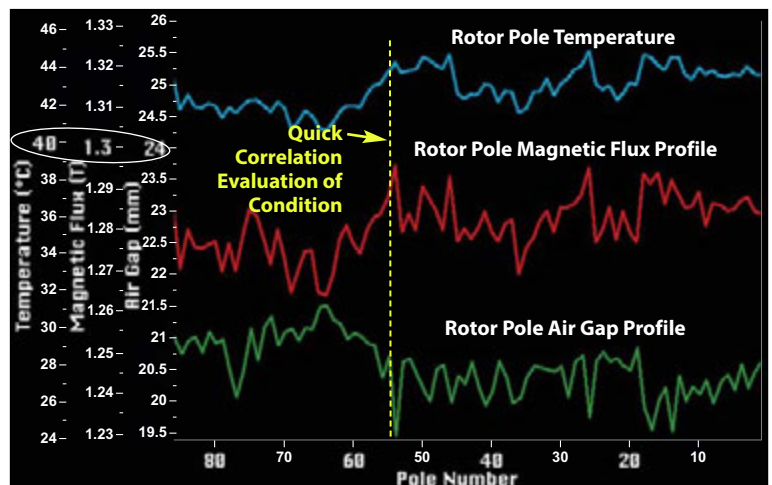


Oil Film Clearance

Monitoring of oil film thickness on radial bearing pads

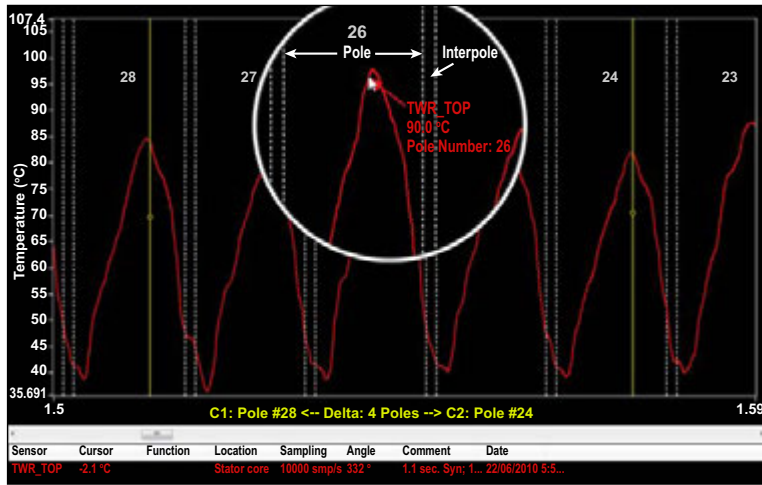


Machine Behavior Over Multiple Rotations Shaft displacement & air gap variation vs. turn/pole number. Extend measurements over many turns to see dynamic behavior during transient operating modes



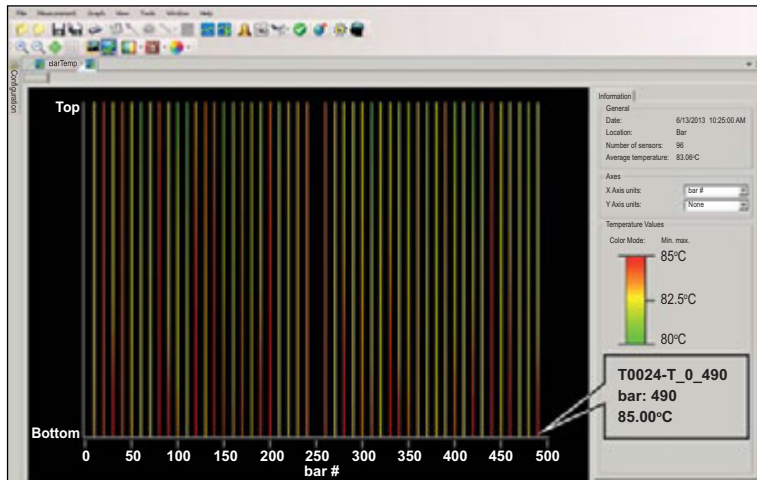
Machine Condition Over One Rotation Pole temperature, magnetic flux and air gap vs. pole number. Compare results with our exclusive pole-reference method for easy correlation and accurate diagnosis

Temperature



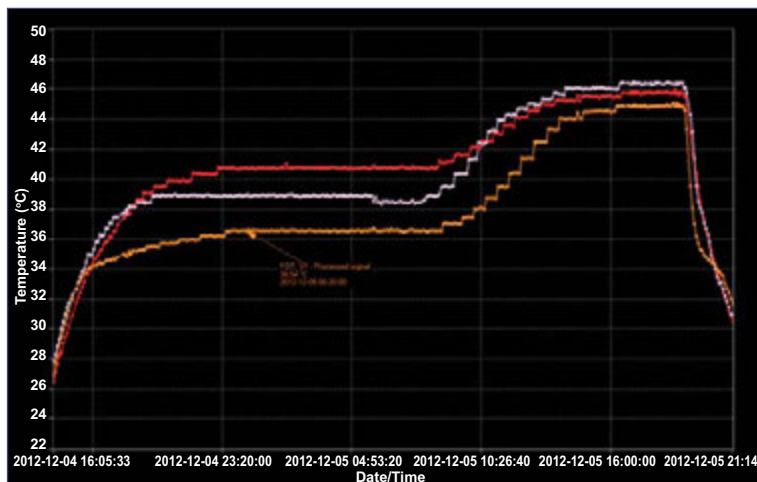
Rotor Temperature Monitoring

Online rotor pole and interpole temperature measurements



Stator Bar Temperature Monitoring

Temperature measurements of the stator bars

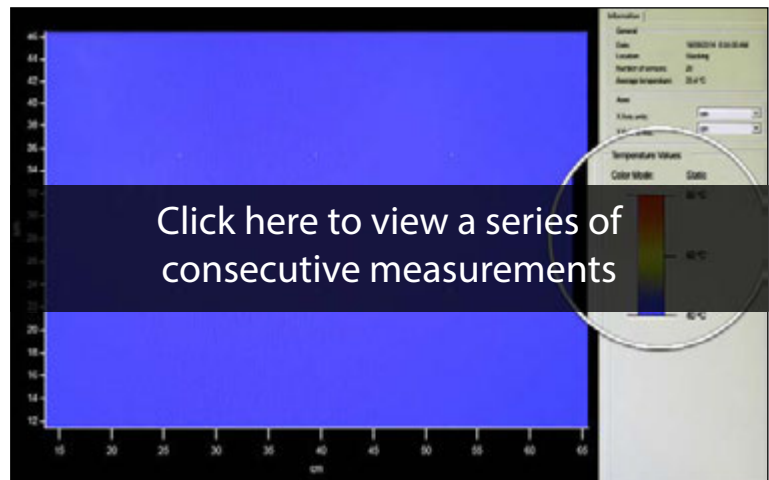


High Voltage Temperature Monitoring

Temperature trend of a switchgear contact point

Correlation of Multiple Parameters

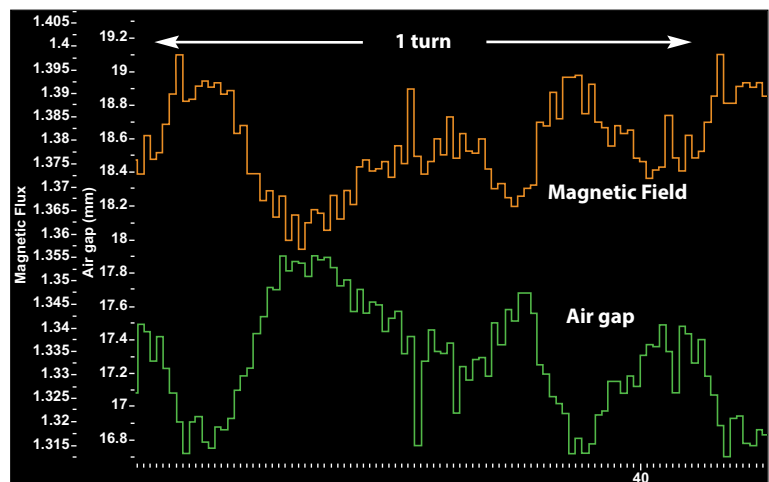
VibroSystM's ZOOM software provides its users with a **clear, real-time picture on the condition of their machine in any operating mode.** The ZOOM software suite is the only one on the market that can be tailored to your specific needs. It is composed of various acquisition services, which gives its users the possibility of choosing the parameters to be monitored on their machines.



Stator Thermal Mapping

Provides valuable information about the thermal behavior of a stator core, especially the hot spots or shorted laminations

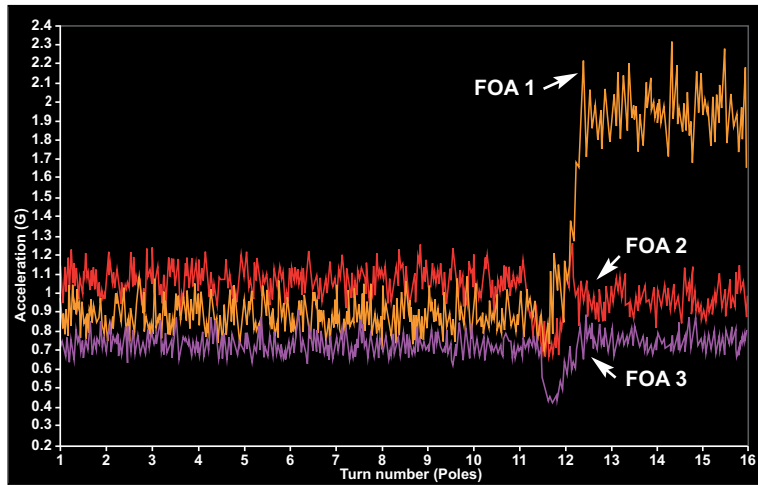
Magnetic Flux



Magnetic Flux Monitoring

Comparison of magnetic field and air gap profiles

Absolute Vibration

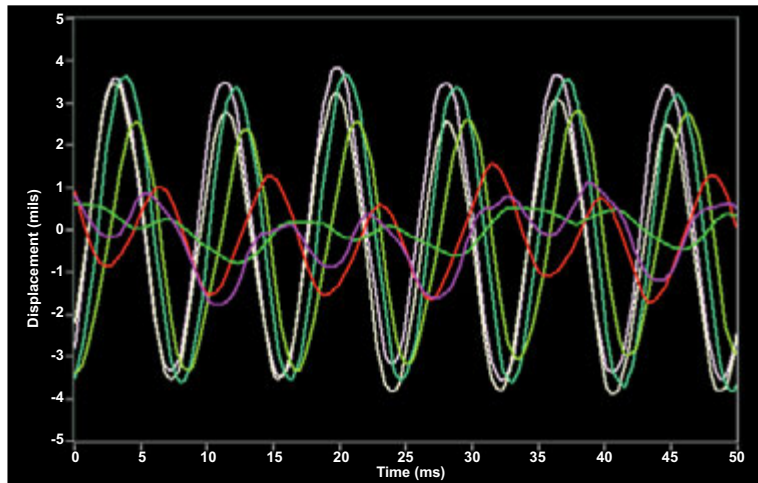


End-Winding Vibration Monitoring

End-winding vibration behavior during load increase

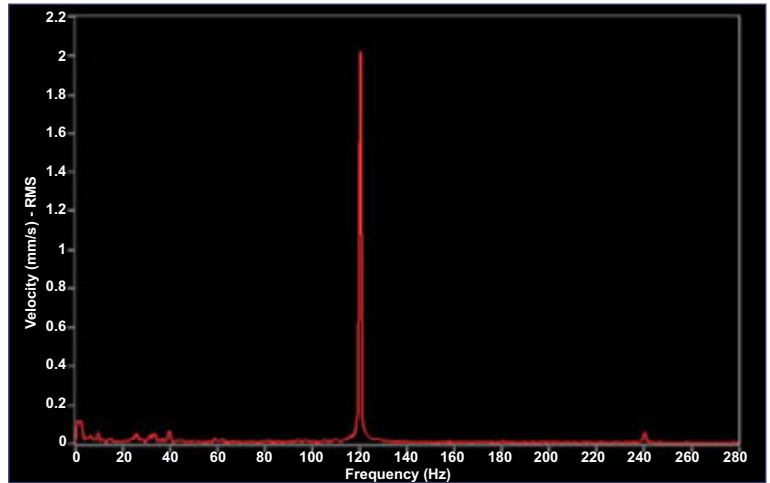
ZOOM® Software Suite

User-friendly and adaptable to our clients' specific needs, the ZOOM Software Suite incorporates a variety of software applications and services that allow for manual, automatic and conditional measurements of multiple parameters. Users are able to collect indispensable data for the monitoring of air gap, axial & radial vibration, axial & radial shaft displacement, end-winding & stator bar vibration, magnetic flux, stray flux, temperature, partial discharge, oil film thickness, blade tip clearance and broken gear tooth detection.



End-Winding Vibration Monitoring

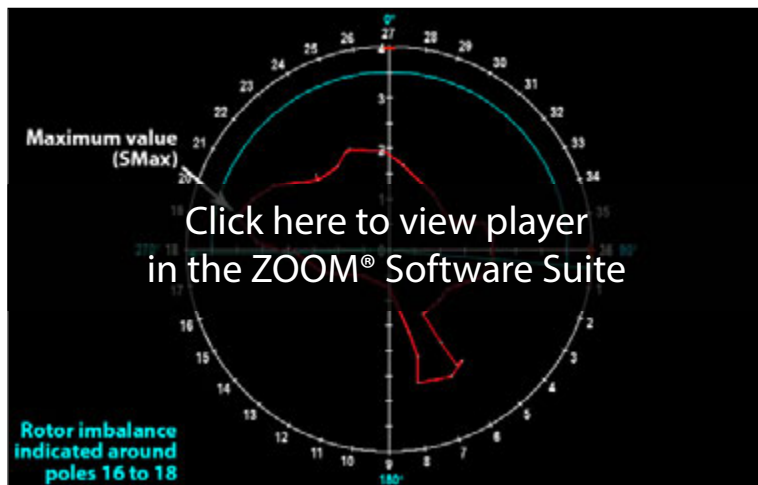
Raw acceleration signals from different sensors, at various amplitudes, during normal operation



Absolute Vibration Monitoring (Velocity)

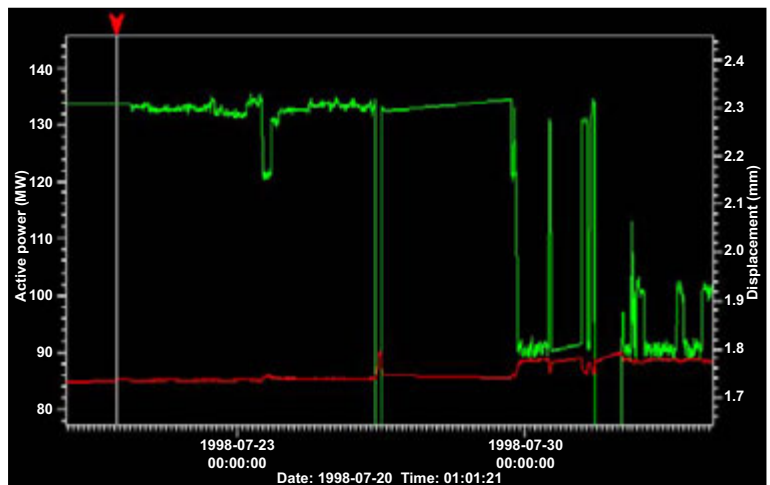
Spectrum graph of stator core vibration

Relative Vibration



Shaft Orbit & Displacement

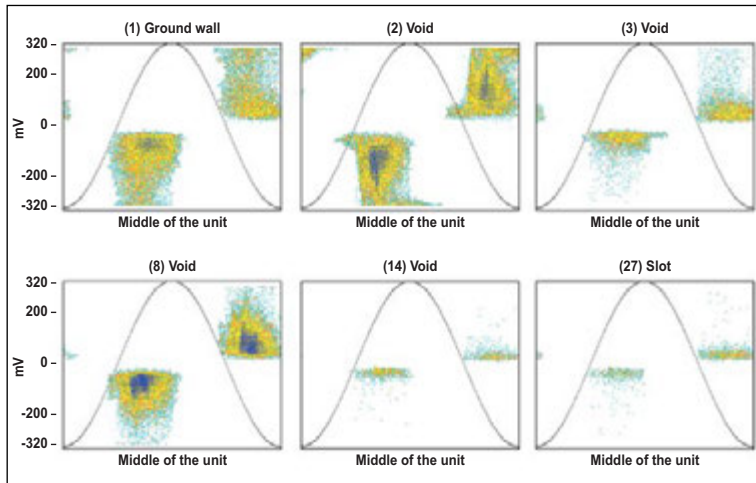
Shaft orbit relative to rotor pole position. Indicates that the pole position confirms the imbalance



Correlation of Bar Position & Active Power (MW)

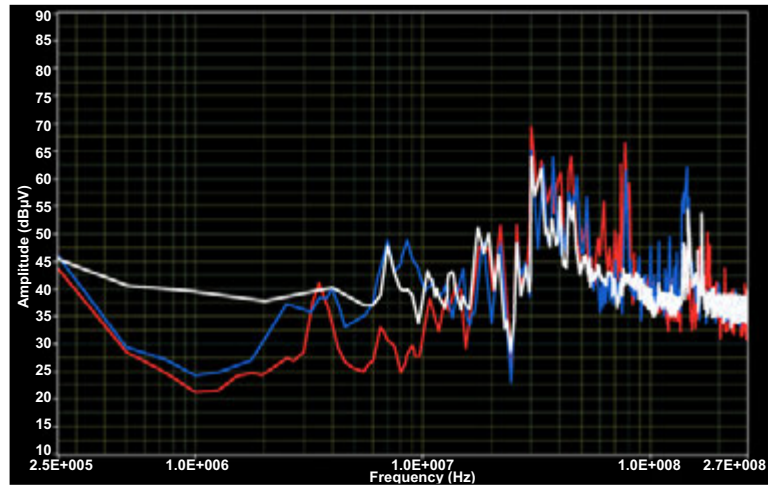
Graph shows that bar is magnetically pulled towards the rotor as load is increased

Partial Discharge Analysis and EMI



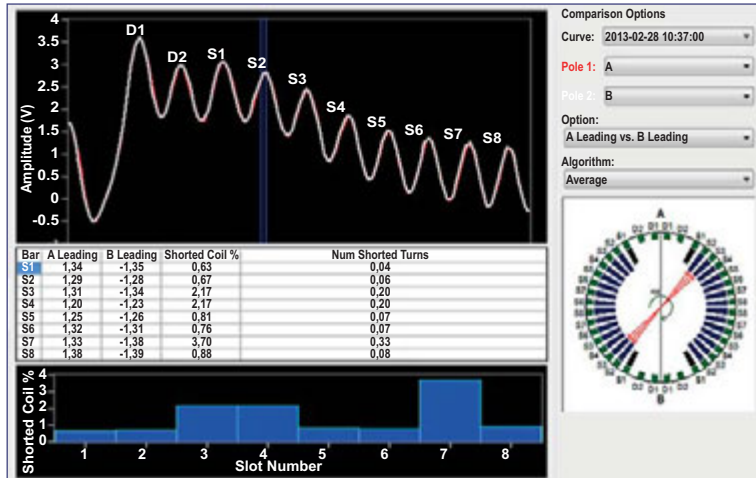
Fault diagnostics using PD pattern recognition

Real-time processing and display, separate scatter plot for each category & ability to show/hide only relevant scatter plots



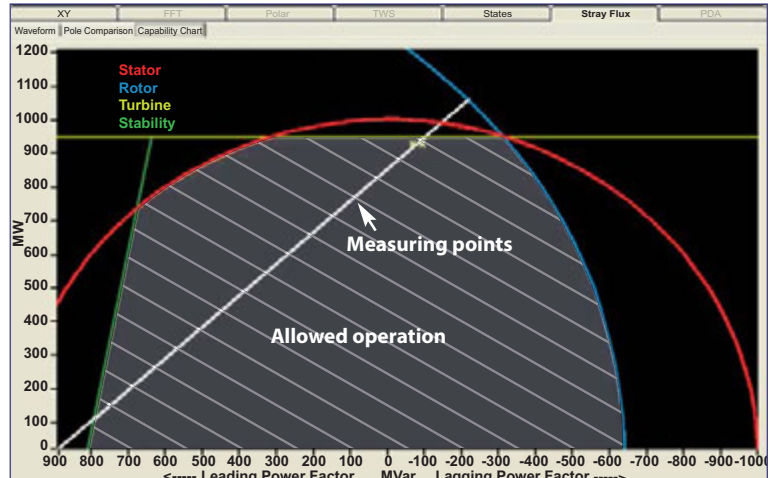
EMI Electromagnetic interference is continuously measured and displayed. EMI detection helps identify frequency bands corresponding to faults in specific equipment

Stray Flux Analysis



Stray Flux Pole Comparison View

Visual representation of shorted turns. Allows for all combinations in a single click



Capability Chart

Visual representation showing both regions of allowed operation (inside the curve) and forbidden operation (outside the curve)

Remote Monitoring

Improving machine reliability and performance does not always require on-site verifications.

The implementation of the ZOOM monitoring system allows for remote health analysis verifications through a variety of different data transfer platforms, such as a **secure VPN connection, FTP, email or through remote access.**

When remote access is required, VibroSystM certified technicians are able to collect real-time data in order to detect anomalies in the monitored parameters and act accordingly or simply verify the system's proper working condition. VibroSystM's remote monitoring service is one of many VibroSystM solutions that allows for the proactive monitoring of critical parameters on any machine.



of many VibroSystM solutions that allows for the proactive

In combination with the one-of-a-kind ZOOM Software Suite, **VibroSystM's Results Interpretation Service** puts decades of experience to work, allowing our clients to extract the most out of their monitoring systems. The data collected by the ZOOM system is analyzed by our expert data interpretation specialists whose vast knowledge allows them to identify patterns and anomalies that are both meaningful and informative. A variety of analyses are performed and compiled into a detailed results interpretation report that will give machine owners **a clear picture of the condition of their machine.**

Analyses performed on hydro generators

- Full Load - Hot performance analysis of the Unit. All monitored parameters are analyzed.
- Rotor/stator performance under all recorded operating conditions.
- Stator thermal expansion.
- Rotor expansion due to mechanical, electromagnetic and thermal forces.
- Rotor pole radial positions.
- Shaft relative vibration behavior under all recorded operating conditions. This analysis is done in the frequency domain, as well as in Orbital format.
- Guide bearing absolute vibration behavior, including the head cover.
- Absolute vibration behavior of end-windings.
- Relative vibration behavior of stator bars.
- Electromagnetic behavior of each individual pole under all operating conditions.
- Structural behavior of the turbine (Kaplan and Francis).
- Axial behavior of the Unit.
- Absolute vibration behavior of the stator core and stator frame.
- Unit behavior under stable and transient conditions (for all the monitored parameters).



Analyses performed on turbo generators

- Full Load - Hot performance analysis of the Unit. All monitored parameters are analyzed.
- Absolute vibration behavior of end-windings.
- Absolute vibration behavior of the stator core and stator frame.
- Relative vibration behavior of stator bars.
- Stray flux results.
- Rotor pole radial positions.
- Partial discharge.



Analyses performed on ball mills and SAG mills

- Full Load - Hot performance analysis of the Unit. All monitored parameters are analyzed.
- Rotor/stator performance under all recorded operating conditions.
- Stator thermal expansion.
- Rotor expansion due to mechanical, electromagnetic and thermal forces.
- Rotor pole radial positions.
- Absolute vibration behavior of end-windings.
- Relative vibration behavior of stator bars.
- Electromagnetic behavior of each individual pole under all operating conditions.
- Oil film thickness (pads).
- Absolute vibration behavior of the stator core and stator frame.
- Relative vibration for motors in gear-driven ball mills.
- Absolute vibration for motors in gear-driven ball mills.



VibroSystM provides independent and trustworthy information on the condition of your machine

Data Analysis & Diagnostics Courses



VibroSystM's data analysis and diagnostics courses, presented by our Results Interpretation Specialists, will give you the skills necessary to analyze the results that your new system has compiled, which will ultimately save you time and money.

Whether on site or at VibroSystM headquarters, **our in-depth courses on machine condition monitoring and diagnostics enable you to maximize the usage of your ZOOM System.**

Our experience in condition monitoring and data interpretation is a tool that we pass on to our clients and that is often solicited by industry experts such as CIGRÉ, IEEE® and EPRI®.

We have the most experience in data interpretation.

VibroSystM® After Sales Support



VibroSystM technicians travel the world installing ZOOM monitoring systems and showing its users how they can actively monitor their machines. Nonetheless, VibroSystM goes beyond the delivery and installation of monitoring equipment. **We establish a long-term after sales partnership with each and every client that includes ongoing support and assistance worldwide.**

Whether on site or through our remote verification services, VibroSystM technicians are dedicated to providing and delivering specialized, high quality services and assistance before, during and after the client's requirements are met.

Visit our website and see what nearly 30 years of monitoring experience can do for you.

www.vibrosystem.com

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