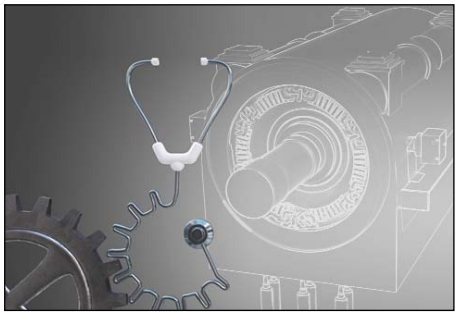


ZOOM® System for Turbo-electric Generators

VibroSystM's ZOOM system is an indispensable tool when monitoring phenomena in turbo-electric generators.

Consisting of the ZOOM® software suite, acquisition units, sensors and measuring chains, the system provides you with the information you require to adequately reduce unplanned outages and plan out your maintenance schedule.

THE ZOOM SYSTEM INCLUDES:

- **ZOOM Software Suite**

Installed on a server-type or desktop computer, the ZOOM software suite incorporates a variety of software applications and services that allow for manual, automatic, and conditional measurements of multiple parameters related to the condition of a turbo-electric unit.

This user-friendly software helps manage different parameters, set alarm thresholds, and communicate data bidirectionally with different control systems (SCADA/PLC) through Modbus® or OPC® protocols.

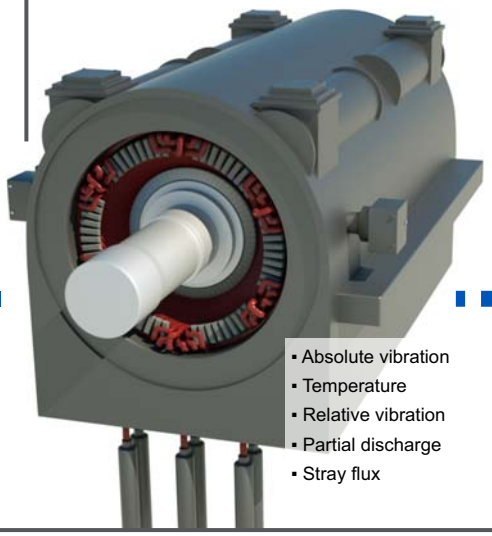
- **Acquisition Units**

Installed inside a ZOOM monitoring cabinet or wall mounted enclosure, acquisition units are designed to be configured within a network environment that includes a server. These units ensure around the clock online monitoring, analysis and protection for turbo-electric generators.

That being said, VibroSystM's acquisition units are designed to keep protecting your unit even if the network connection with the ZOOM software is lost.

- **Sensors and Measuring Chains**

From the MFM™ magnetic flux measuring chain to the cutting edge FOA™ fiber optic accelerometer, VibroSystM's vast array of high precision sensors are built and rigorously tested in-house to guarantee reliable parameter measurements in a variety of harsh environments.

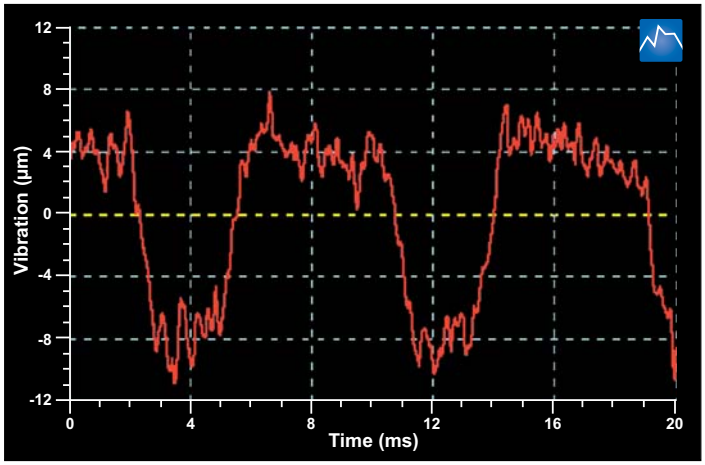


- Absolute vibration
- Temperature
- Relative vibration
- Partial discharge
- Stray flux

PHENOMENA AFFECTING TURBO-ELECTRIC GENERATORS

Drawing on its 30-year experience in unit condition monitoring, VibroSystM has compiled a list of phenomena that have a direct impact on turbo-electric generators. Thanks to the ZOOM software suite, VibroSystM's results interpretation specialists are able to observe and diagnose a particular phenomenon and provide you with detailed reports that will help you better understand your power generating assets.

LEGEND: **Graphs** **Videos**
Click on the buttons to see ZOOM software graphs and videos.



Stator bar vibration results at 120 Hz. The severity of stator bar vibration allows for the evaluation of wedge system performance.

- **Detecting Loose or Defective Wedging, End-Winding Support Systems and Stator Winding Insulation Problems**

The FOA single or dual axis fiber optic accelerometers can be installed to measure absolute vibration found in end-windings and support systems that are subjected to mechanical and electrodynamic stress.

Furthermore, inserting the SBV™-202P capacitive proximity sensor inside a stator wedge, facing the stator bars, has been proven to be the best way of measuring in-slot bar position variations and relative vibration. If not monitored, this phenomenon can lead to insulation damage and defective wedging or end-winding support systems.

FOA sensor

SBV sensor

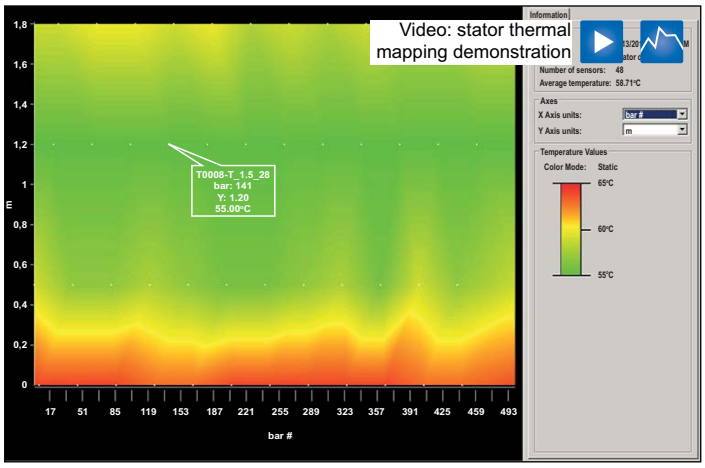

PDA acquisition unit

Click on the following links to see the data sheets.

FOA-100E

FOA-200

SBV-202P



Stator thermal mapping allows for better understanding of stator thermal behavior.

- **Detecting Stator Core Delamination, Stator Bar, and End-winding Deterioration**

In order to detect stator core delamination, stator core and/or winding temperature must be monitored. This is achieved by installing a TWS™-200 temperature sensing measuring chain around the stator core. The data collected by the TWS-200 will allow the ZOOM software to create a thermal mapping display of the stator, which in turn will allow for the detection of significant heat signatures on its surface. Observing stator core temperature is the first step in detecting cooling system deterioration and stator core delamination.

The TWS-200 measuring chain is also installed directly on the stator bars at the exit of the stator core to monitor their temperature. Since stator bar vibration leads to a deterioration of the bar's copper strands, eventually leading to excessive overheating, bar temperature must also be monitored. End-winding temperature must also be measured in turbo-electric generators to prevent catastrophic situations such as increased bar flexibility, vibration, and, in some cases, melting bars. To observe this phenomenon, the FOT-100™ fiber optic temperature sensor is installed directly on the bars at the end-winding level to monitor their temperature.

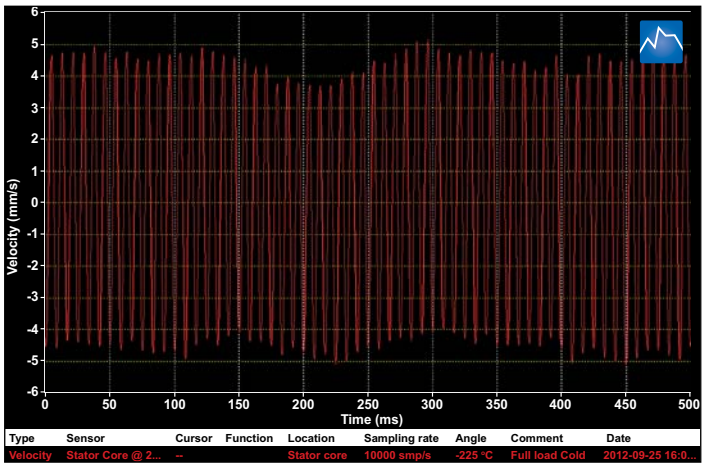
TWS sensor

FOT sensor

Click on the following links to see the data sheets.

TWS-200

FOT-100



Stator core absolute vibration as recorded by piezoelectric accelerometers.

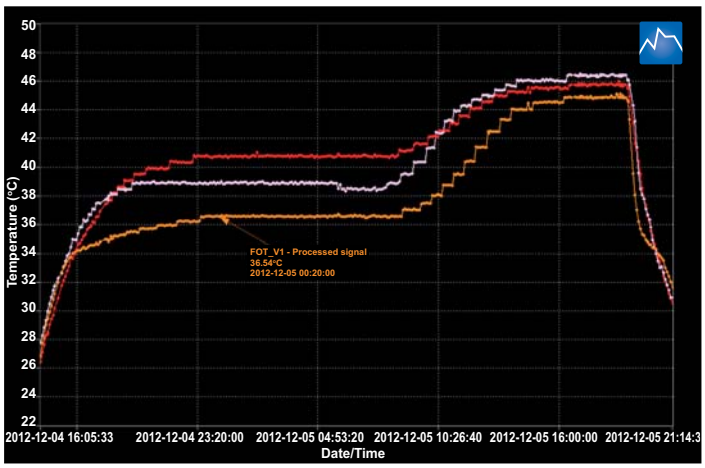
- **Detecting Early Stages of Stator Core and Frame Component Loosening**

Measuring absolute vibration by installing the VSM797S™ piezoelectric accelerometer on the stator core allows us to identify important vibration sources that can loosen stator core laminations and eventually lead to overheating and failure of the stator core itself.

VSM797S sensor

Click on the following link to see the data sheet.

VSM797S



Example of coil temperature in trending format during a short period of time.

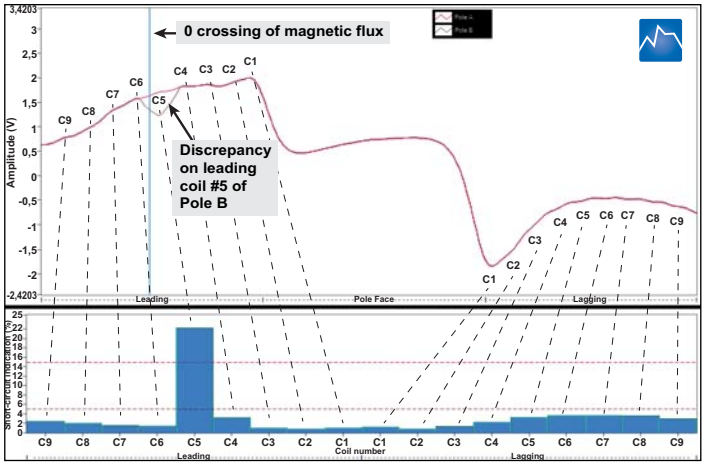
▪ Detecting Anomalies in Switchgears and Brushes

Gradual contact deterioration in switchgears and brush assemblies translates into a temperature increase over time. Even when inspection and maintenance are carried out at regular intervals, online temperature monitoring provides trend information that helps keep electrical switchgears and brush assemblies in good operating condition.

The installation of the FOT-100 fiber optic temperature sensor will allow the ZOOM software to trigger alarms when abnormally high temperature levels are detected.

FOT sensor

Click on the following link to see the data sheet.
FOT-100



The pole comparison graph superimposes the flux profiles of Poles A and B.

▪ Detecting Rotor Shorted Turns

Shorted turns in rotor windings due to insulation failure lead to unwanted vibration which affects overall rotor integrity, preventing the generator from operating at maximum power. To monitor this, the MFP™-100 magnetic flux sensor is installed to observe magnetic flux signatures within the unit. The goal is to confirm that vibration is indeed caused by shorted turns. The MFP-100, combined with the ZOOM software suite, is an effective monitoring system capable of measuring and analyzing radial flux signatures in order to preserve generator integrity.

MFP sensor

Click on the following link to see the data sheet.
MFP-100

Publication: 2016-05-30