



# Generator Condition Monitoring

## Partial Discharge and Rotor Flux Density

### The Benefits of Condition Monitoring...

- Maximized Productivity:**
  - Provides a look within your machine while Online
- Improved Maintenance Cycles**
  - Planned maintenance
  - Reduction of forced outages
  - Translates to less expensive more efficient maintenance and repairs
- Increased Machine Life**
- Partial Discharge**
  - Identifies risks of Insulation failure in the Stator Windings
  - Principle Cause of forced outages
- Rotor Flux**
  - Flux variations are the result of degradation in rotor winding insulation
  - Critical for planned maintenance and verifying rotor integrity

### Condition Monitoring Program

**Come talk to us about :**

- Building an annual condition monitoring program that can increase the reliability and lifecycle of your machine
- Systems readily available to fit your specific Machine with options and Enhancements for various means of data collection and monitoring
- Our Installation Experience which provides the Owners Best Project Cost and Schedule

**TDS offers installation options unique to your machine that can be installed by TDS during your next Minor or Major Outage.**

TDS provide services to include the installation of system sensors, test instruments, and diagnostic software with Engineering experience in analysis needed to ensure your condition monitoring program provides the information required for you to understand the health of your turbine generators, prioritize corrective measures and plan maintenance outages prior to failures.

#### Overview

During normal Generator operations the stator and field rotor regularly must withstand significant stress conditions. Over the lifecycle of the Generator this repeated stress causes degradation of insulation and if left unchecked could result in expensive, unplanned outages with increased down time and loss of revenue. Regularly monitoring the health of the Generator insulation can provide insight on current conditions within the machine while the machine is online and running providing no requirement to cease regular operations of the plant. This capability can be used to predict where the machine is currently at in its expected lifecycle and used to improve machine cycle times and plan major overhauls.

#### Partial Discharge Monitoring

Stator insulation failure is one of the leading causes of forced outages for generators. Partial discharge occurs when a small electrical current spark happens between high voltage insulation within the stator whenever gaps or voids are present. As a stator winding deteriorates partial discharge activity increases and can be used to determine the current state of the insulation. Having access to this information can generally give a two or more year warning before machine failure.

#### Rotor Flux Density Monitoring

Rotor flux monitoring is a powerful means to determine if turn to turn shorts have occurred within the rotor windings. Having access to this information is vital in planning long term maintenance, abnormal operating conditions and verifying new or rewind rotors. A turn to turn short is the most common and frequent rotor insulation failure.

Partial Discharge and Rotor Flux monitoring can be performed while the machine is online during normal operating conditions and requires no change to the day to day operations at a site in order to conduct this condition based monitoring.

Turbine Diagnostic Services, Inc. (TDS) is a recognized national service organization specializing in turbine generator maintenance, controls, and diagnostic services and whose headquarters is located in the Tampa, FL, area. Turbine Diagnostic Services has provided a full range of turbine generator services to the Power Generation Industry since 1998 and has responded to countless emergency service calls from our customers. We are established and known in the industry, by many, as "The Turbine Doctor".

TDS can provide equipment installation packages or upgrades to existing condition monitoring systems that are unique to your machine and site. With specific hands-on experience, our engineers will design and install your upgrade based around your specific needs.

There are different equipment packages available for condition monitoring of the generator. One package offers the ability for an engineer to come onsite and collect data for analysis while the machine is online during day to day operations through preinstalled probes and sensors. Another package allows condition monitoring data to be stored at the site locally providing a broader range of data through daily changes and can be linked to the site DCS. This package requires collection from the site and analysis.

## Epoxy Mica Couplers



Epoxy Mica Couplers (EMCs) are permanent sensors used to detect PD activity while not affecting the operation of the machine. These are used to only allow high frequency (>40Mhz) signals to pass through, collected and analyzed.

## Flux Probe



The Flux Probe is a non metallic sensor installed within the stator that detects the magnetic field emanated from each rotor pole. This is used to determine if there is a presence and the severity of failures.

## Guard II+ Continuous Monitor



A continuous online monitoring solution of Partial Discharge, Rotor magnetic flux, Stator end-winding vibration and shaft voltage.

Monitoring and diagnostic capabilities for up to 4 technologies including:

Partial Discharge (PD)

Rotor magnetic flux

Stator end winding vibration

Shaft voltage and current monitoring

Data can be collected from multiple rotating machines which can be monitored continuously at a given time.

Modbus over Ethernet protocol included for interfacing to third party applications

**Turbine Diagnostic Services, Inc. (TDS)** is a full service turbine generator field service organization based in Odessa, Florida. **TDS** specializes in conducting steam & gas turbine generator planned & emergency maintenance controls troubleshooting, and vibration analysis & balancing services.

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