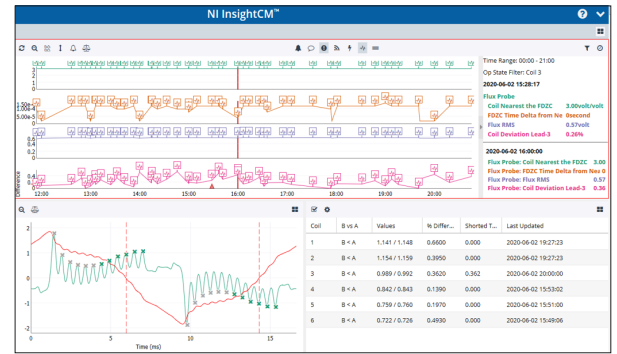


# Best of Both Worlds



## GENERATOR FIELD MONITORING PREMIUM SHAFT GROUNDING + ROTOR FLUX

Cutsforth has combined their premium ground monitoring and rotor flux systems into one powerful generator field monitoring system. By combining the functionality into a single platform, customers can better access important trend data, better manage outages, and their O&M budgets.

### Premium Shaft Ground Monitoring:

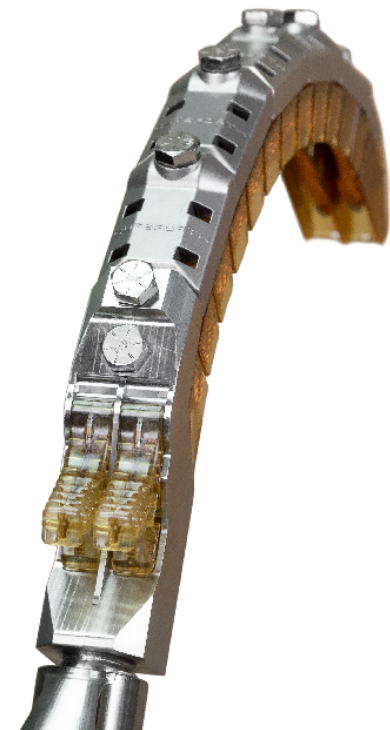
The Cutsforth™ Shaft Ground Premium Monitoring measures shaft voltage and current; in addition, it offers high fidelity waveform capture and multi - feature alarm conditions. The system utilizes Cutsforth™ patented braided copper ropes for best in class grounding and data collection. The system design is straight forward:

- The Shaft Grounding Assembly (SGA) is mounted on the unit's drive end A
- Shaft Contact Assembly (SCA) is mounted near the collector
- The Monitoring System can be mounted in a convenient location
- The system passes all data to National Instruments InsightCM data platform
- Lengthens time between maintenance

The Premium system requires NI InsightCM®. It measures voltage and current that provides the following measurements: RMS (root mean squared), zero to peak, and peak counts. Wave forms are collected on a periodic basis as well as when fault conditions trigger an alarm. The waveforms are time synchronized for better analysis of operating conditions

Some Failure Modes identified through Shaft Voltage and Current Waveform Analysis:

- Poor Shaft Contact
- Bearing Failure
- Stator Insulation Failure
- Exciter Insulation Failure
- Ground Neutral Failure



Cutsforth™ Shaft Grounding Assembly (SGA) installs in one-day and pairs with the Premium Monitoring System



## Rotor Flux Monitoring:

Variances in the magnetic flux within a generator indicate deterioration of winding insulation. Whether a result of thermal wear, large variation on load, contamination, or other causes, the impact to efficient generation is significant. Imbalances within the rotor damage insulation, which in turn degrades the generator's output capacity and increases vibrations, further damaging the insulation, which ultimately leads to a forced outage.

### Features:

- Continuous monitoring is better than periodic measurements
- Plants own their own data
- Eliminates annual outsource expenses
  - » One less vendor onsite, saving costs
- Real time information
- Allows for better maintenance planning
- Real time status alarms
  - » Multiple parameter alarms



### AUTOMATED CYCLE FINDING (TWO POLE MACHINES)

#### ANALYSES PERFORMED:

- High-speed samples identify shorted turns and flux density zero cross (FDZC)
- Flux waveforms and generator loads are archived for historical trend analysis
- Waveforms are collected periodically
- Data sets are collected using three dimensions: Time (periodically), Alarms, and when FDZC crosses a coil

#### USER DEFINED THRESHOLDS FOR ALARM LEVELS:

- Alarms can be associated with multiple features
- Full data sets are collected on alarms
- Operating states can be configured using National Instruments InsightCM

#### REQUIRES A NATIONAL INSTRUMENTS INSIGHTCM LICENSE

#### SYSTEM CALCULATES:

- Maximum Flux Deviation
- The percent deviation associated with an FDZC
- A table calculates deviation and number of shorted turns per coil on FDZC
  - » These values are trended over time
- System plots FDZC for each coil over time

#### SYSTEM APPROXIMATES SHORTED TURNS ON INACCESSIBLE COILS

#### CREATES A GENERATOR HEALTH TREND:

- Critical for identification of worsening shorts indexed against time and changing load conditions
- Featured trends provide early indication conditions leading to rotor ground faults
- Manage the Maintenance Cycle through real-time measurements

#### EASY TO INSTALL AND DOES NOT REQUIRE AN OUTAGE