

CUTSFORTH CONDITION BASED MONITORING

This paper may be used in conjunction with Cutsforth™ Monitoring Professional Development Webinar series from 2020. You can find the recordings at [Cutsforth.com](https://www.cutsforth.com)

⚡ INTRODUCTION

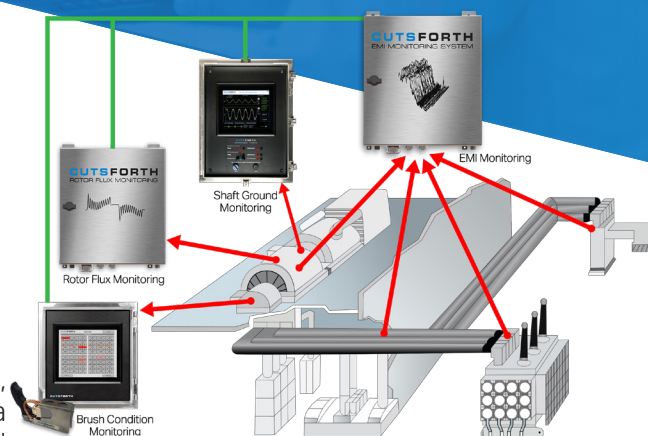
This paper is intended for power generation facilities looking for more information about generator monitoring systems.

The following addresses commonly asked questions regarding Cutsforth™ Monitoring Suite.

If you have more questions contact us @ [Cutsforth.com](https://www.cutsforth.com)

⚡ BRUSH CONDITION MONITORING

Brush Condition Monitoring (BCM) measures brush wear rate, length, vibration, and temperature. Trending this data gives plants a better tool for maintenance planning, ultimately preventing forced outages as a result from ring fires. Learn more @ [Cutsforth.com/BCM](https://www.cutsforth.com/BCM)



How are the brush vibration, temperature, and wear rate measured?

There is a sensor inside the spring, which measures temperature at the point of the spring. Vibration is measured via an accelerometer. The sensor is paired to a specific brush position monitoring the wear rate for that specific brush.

Are the sensors wireless?

Yes, sensors wirelessly transmit the data to the control room, and a touchscreen user interface near the generator. A sensor's life ranges from two to four years, if measuring once an hour. An alarm will alert 30 days before sensors need to be changed.

How long does an installation take?

Installations can take a few hours to a couple days. Since, some work occurs within the dog house, a short outage is required.

⚡ SHAFT GROUND MONITORING

Shaft Ground Monitoring (SGM) tracks and trends voltage and grounding current reducing bearing and shaft ground failures. Learn more @ [Cutsforth.com/SGM](https://www.cutsforth.com/SGM)

Does the system monitor at the turbine end and the exciter end?

Cutsforth™ encourages monitoring voltage and current at the turbine and voltage at the exciter end to better acquire a more complete data set to fully understand what is occurring on the unit.

Is there enough contact on the braided ropes to properly ground and monitor the shaft?

Yes. Though the ropes provide a smaller contact area, the friction that is present and the pulling of the rope around the shaft result in a more defined contact point and current flow. The ropes work in pairs; one is always grounding while the other is monitoring. When changing out one of the ropes, the second rope grounds the shaft.



ROTOR FLUX MONITORING

Rotor Flux Monitoring (RFM) measures the magnetic flux within a generator to indicate deterioration of winding insulation. The system helps to prevent forced outages resulting from shorted turns. Learn more @ Cutsforth.com/RFM

What are 'shorted turns'?

Shorted turns occur in the windings of the coil, which are normally surrounded by insulation. As the insulation breaks down, the current, instead of traveling the entire length of the winding, will start to skip over to the next winding. This results in increased amperage from the remaining windings, leading to an increase in the excitation system to maintain generator output.

What is the recommended threshold level of alarming?

Generators can typically still operate with some shorted turns. OEMs usually give general 'rules of thumb,' but plants will have to determine how many are acceptable within their own generators. RFM allows plants to trend and archive the data, and can set specific alerts (i.e. alert if more than two shorted turns are occurring, or if over 10% shorted turns are present).

What are the installations like?

No outage is required to install RFM, and should take no longer than two days. Cutsforth™ does not sell flux probes, but the system works with most, if not all, probes in the industry.

ELECTRO - MAGNETIC INTERFERENCE MONITORING

Electro - Magnetic Interference (EMI) Monitoring tracks and detects potential failures related to arcing, coronal discharges, gap discharges, partial discharges, and sparking. Learn more @ Cutsforth.com/EMI

What is the difference between Partial Discharge (PD) Monitoring and Online EMI Monitoring?

These monitoring systems are complimentary technologies. PD only measures partial discharge impulses while discriminating out other sources of noise. Whereas, EMI monitoring is broader, measuring for more potential failures within generators.

How can plants determine which EMI waveforms correspond to which failures?

Cutsforth™ provides subject matter expert help and training. EMI trending helps to show a generator's operational base line and anomalies over time. Once engineers are familiar with the former, they'll be able to detect the latter.

Are installations intrusive?

Installations are non - intrusive, and do not require outages.

CONCLUSION

Why should plants monitor generators?

Monitoring determines the health of the generators, and corresponding equipment. These monitoring programs can be used as long term planning tools. The tracking and trending capabilities allow plants to determine when to schedule maintenance outages by basing decisions on condition of the equipment rather than a calendar. This ultimately saves plants money on O&M budgets, and frees up resources for other projects.

If plants are just beginning a generator monitoring program, with which system should they start?

Brush Condition Monitoring is a good program to start. With BCM, plants notice results quickly. The system has a direct impact to routine maintenance, and greatly reduces the risk of ring fires by measuring brush length, temperature, and vibration.

"If [plants] don't have generator monitoring systems installed today, [they] will in five years, and will for sure in ten years."

- Bill Woyshner, President, WSC, Inc.