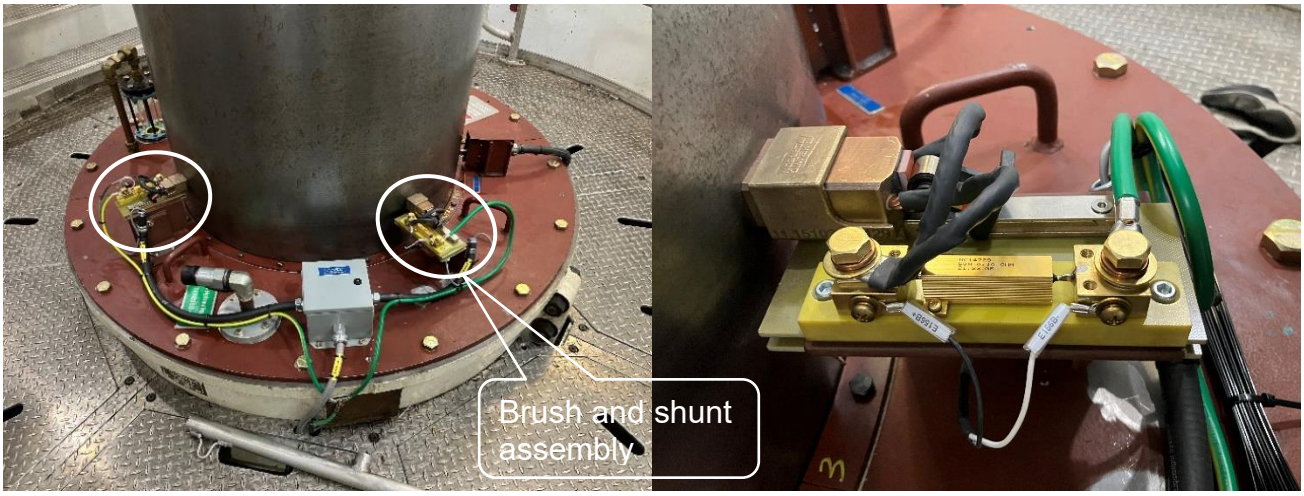
IRIS POWER CASE STUDY

CASE OF IMPROPER PROXIMITY SENSOR INSTALLATION DISCOVERED BY SHAFT CURRENT MONITORING

Company: Hydro Power Plant in Quebec, Canada
Machine: Unit 12, 13.8 kV 83.34 MW 128.6 rpm 56-pole hydro generator rewound in 2024
Summary: A shunt resistor that measures the shaft current was burnt due to high current

Background: A GuardII+ continuous monitor was installed to measure partial discharge and shaft voltage/current during the outage in 2025. Two sets of carbon brushes and resistive shunts were installed at 90° to each other on top of the turbine bearing to measure the shaft current.



End User Report: The GuardII+ monitor captured an instance of very high shaft current of 83 A peak-to-peak at both current channels, as shown in Figure 1 and Figure 2. One of the shunt resistors was found to be burnt one day later. The resistance was 0.1 Ω, which was incorrectly used for a historically low shaft current. The shunt was replaced with a 1 Ω model after the incident.

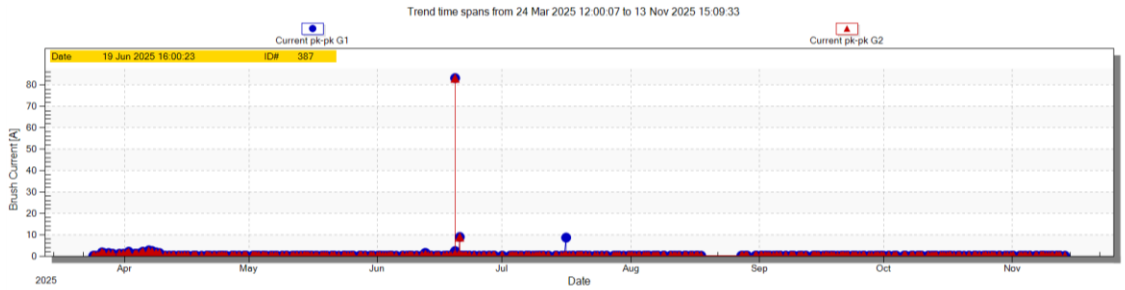


Figure 1 Shaft Current Trend of G1 (Blue) and G2 (Red) Channels

397	☑	20 Jun 2025 14:24:55	OK	0.053	0.095
396	☑	20 Jun 2025 14:23:20	OK	0.057	0.085
395	☑	20 Jun 2025 14:22:13	OK	0.054	0.096
394	☑	20 Jun 2025 14:18:28	OK	0.047	0.088
393	☑	20 Jun 2025 14:16:44	OK	0.032	0.084
392	☑	20 Jun 2025 14:15:53	OK	0.033	0.062
391	☑	20 Jun 2025 14:14:42	OK	0.035	0.051
390	☑	20 Jun 2025 14:12:52	OK	0.033	0.046
389	☑	20 Jun 2025 10:48:41	OK	0.523	0.620
388	☑	19 Jun 2025 16:30:25	OK	1.514	0.455
387	☑	19 Jun 2025 16:00:23	Alert	83.294	83.275
140	☑	19 Jun 2025 14:58:52	OK	2.312	1.238

Figure 2 Measurement List in Software Showing Very High Peak-to-peak Current

Findings and Confirmation: A proximity sensor was improperly installed at the upper guide bearing. It was in contact with the shaft and was not insulated. This formed a current loop with the shaft and therefore caused a high current as well as occasional sparking. The customer fed back that the high current has not been recorded again by the GuardII+ monitor after the sensor was removed.

Takeaway: Shaft voltage and current can be caused by multiple anomalies and faults in the generator. In this case, apart from uninsulated bearings, localized current loops along the shaft can be formed by some not so obvious ways.

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