CHALLENGE

An oil sands producer in Northern Canada uses gas turbine generators to produce electricity and steam at the same time. The producer had been using a rotating machine monitor (RMM) to monitor the partial discharge (PD) levels for years.

The RMM was using two types of sensors to collect data: coupling capacitors and resistive temperature devices (RTDs) which see deeper into the winding.

Data collected by the RMM showed a flat response in PD captures from coupling capacitors but had fast increases in PD levels from multiple RTDs. The producers decided to obtain a second opinion, considering the importance of the generator to their business. A third party came to perform online PD testing. This test used only coupling capacitors for PD testing. These coupling capacitors didn't pick up signals from deep within the windings and concluded that PD levels were normal.

Figure 1

Figure 2

The producer now had two independent systems showing different results. The one that used coupling capacitors alone for measurement showed no abnormality in the generator winding condition whereas the one that used RMM with RTDs detected several defects in the winding.

SOLUTION

The RMM data collected by the RTD showed phase B as the most affected. Using PD captures from RTDs (Figure 1) and knowledge of the position of the RTDs in the stator wiring, defect areas were mapped.

To resolve the dilemma, the producer took a full outage on the generator and performed a corona probe inspection test. The corona probe test took 2 days to complete and the results showed the faults pinpointed during this test (Figure 2) matched with the faults found by the RMM with RTDs.

RESULTS

Since this experience, the customer has been fully invested in the RMM with RTDs to detect PD. The coupling capacitors alone did not give them an accurate picture of what was going on deep within the windings. Unlike corona probe testing, the RMM solution doesn't require a generator outage to map PD levels and their severity. Knowing the status of the stator winding in real-time allows better asset management decisions.
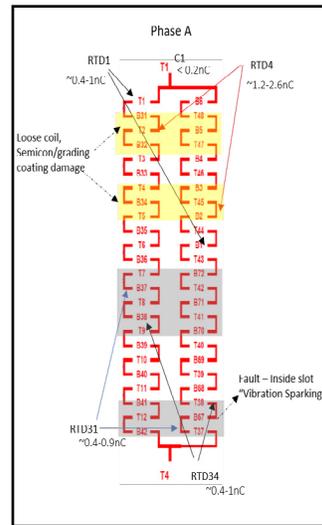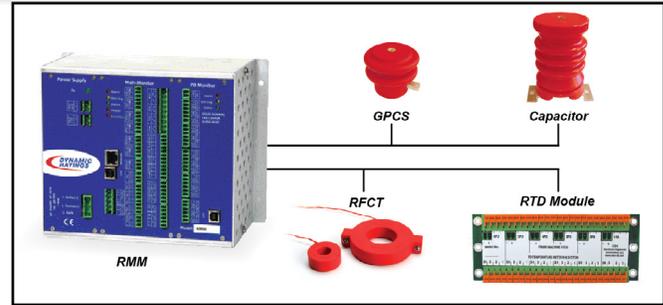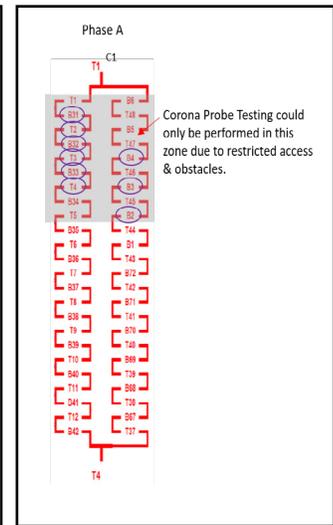
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