

## CASE STUDY: Detection and confirmation of endwinding problem in a rewind, large, hydrogen cooled turbo generator.

**Company:** A midwest U.S. utility

**Ratings:** 690MW Turbine Generator, 3600RPM, 20kV, Hydrogen cooled @ 59 PSI

**Manufacturer:** Confidential

**Related Info:** Installed in 1984, rewind in 2000

**PD Sensors:** SSC's and two 80pF couplers per phase installed in 1999-2000

**Details:** After a rewind, periodic online testing utilizing both SSC's and 80pF EMC's revealed two trends; an overall downward trend in slot PD, an expected result following a rewind, and an alarmingly sharp rise in endwinding activity on C phase. A  $Q_m$  of 177 mV is higher than 98% of similar machines in the Iris database. The activity was suspected to be a single point of phase to ground activity on C phase that was also coupling to the other phases. In December 2001, a recommendation for close monitoring and visual inspection at the earliest convenience was made. In March 2002, Iris Power Engineering was requested by the customer to perform a visual inspection and off-line PD testing as required on the unit. During the offline testing a site of visible, high PD activity was quickly located using a Corona probe in conjunction with a stator wiring diagram.

The source of high PD activity was identified and verified as occurring between the phase lead on C phase in slot 36 and the second coil leg down (top bar) on the A phase in slot 35. The plots below illustrate the 2D test results for Endwinding and Slot discharges acquired with the SSC in slot #36.

