Detection of Failing Motor Leads & Monitoring of the Effectiveness of the Repair

Company: BOC Gases

Plant: Buffalo, NY

Unit: CP-11 (13.8kV; 4,000HP) & CP-70/79 (13.8kV; 11,000HP) Motors

PD Sensors: One 80pF coupler per machine installed single ended

Date: June 2002

CASE HISTORY

Two similar BOC Gases motors located at the Buffalo NY plant were periodically monitored for partial discharge. These 13.8kV motors, designated CP-11 and CP-70/79 are rated 4000HP and 11,000 HP respectively. The motor CP-70/79 exhibited significant PD readings, which were much higher than expected for this manufacture, voltage class, and vintage of machine, and much higher than for the CP-11 motor. A third party laboratory was contracted to make measurements on these motors utilizing an Iris PDA-IV instrument. Data collected on all three phases of CP-70/79 showed that Phase A (T1) exhibited very high activity with peak magnitudes reaching about 2750mV. These readings are higher than 99% of similar machines in the Iris database, and were much higher than the PD on the other motor.

The 3D PD plots for all three phases also showed some shift in PD phase position, which is not typical of PD occurring within the stator winding slot (Figure 1). This type of PD is more typical of phase-to-phase PD. As a result of these tests, an inspection of the termination box and easily exposed sections of the endwinding was initiated.

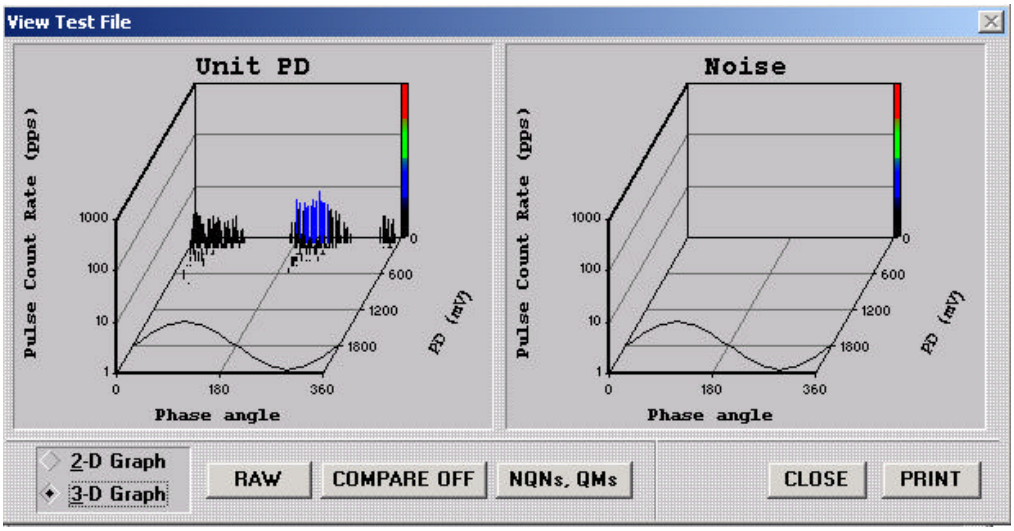

Figure 1: Pulse Phase Plot of Phase A on CP-70/79

THE SOLUTION

During the inspection of the motor termination box, several PD related sites were identified. Following the inspection of the termination box, repairs of the offending areas were initiated. Following the repair, an on-line PD test of the motor was taken and is shown in Figure 2.

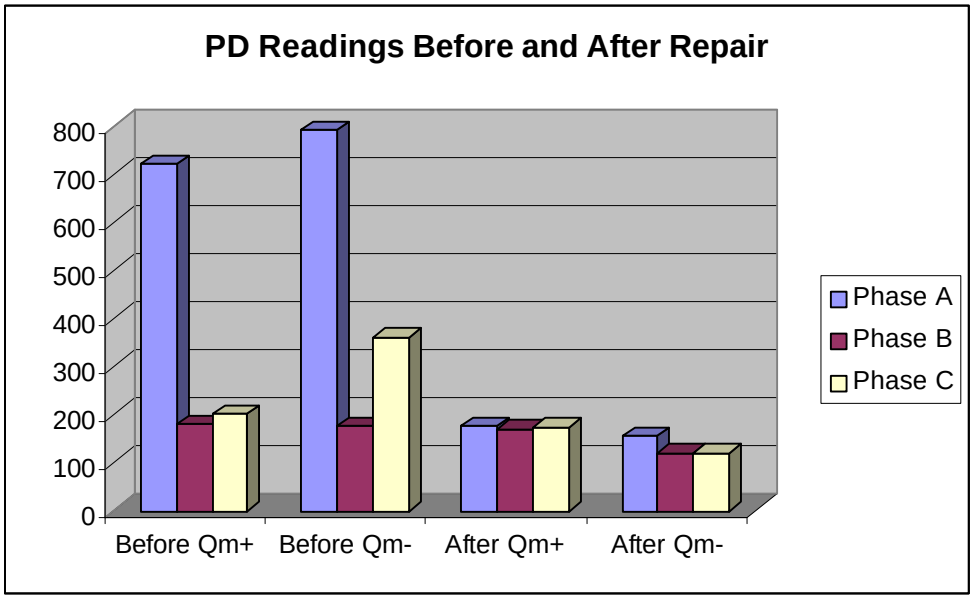

Figure 2: PD Qm readings before and after repair

As can be seen from Figure 2 the PD levels for all three phases decrease significantly after repairs were completed. Based on Iris's database of some 43,000 PD tests, and assuming all the measured PD is now coming from the stator winding, this motor is in the normal range for machines of the same insulation and voltage class.

CONCLUSION

Periodic or continuous PD testing is a cost effective method of determining motor and generator stator winding conditions and obtaining early warning of developing problems. If the problem with the CP-70/79 motor had not been found using the PD test, the motor may have failed in service, with consequently high outage costs. PD testing directly detected the problem with this motor, which required an inexpensive repair at a convenient time. At the same time, PD testing has proven cost effective by indicating there was no need for any maintenance to the stator winding of CP-11.

Reference

Arya, N. Pete. Partial Discharge Detection of Failing Motor Leads. Presented at IRMC 2001