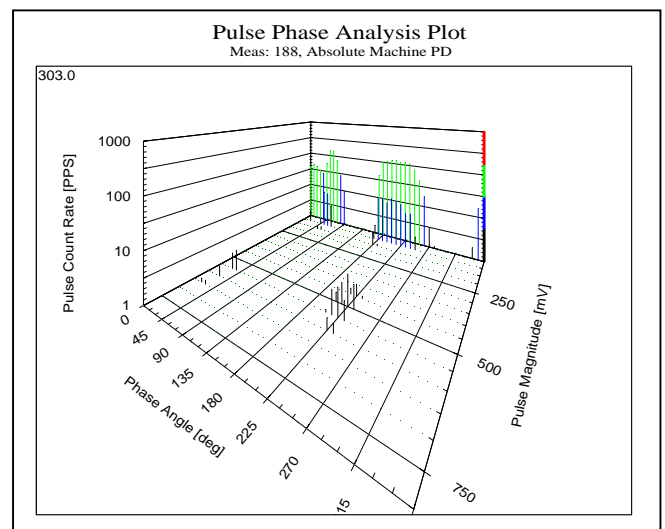
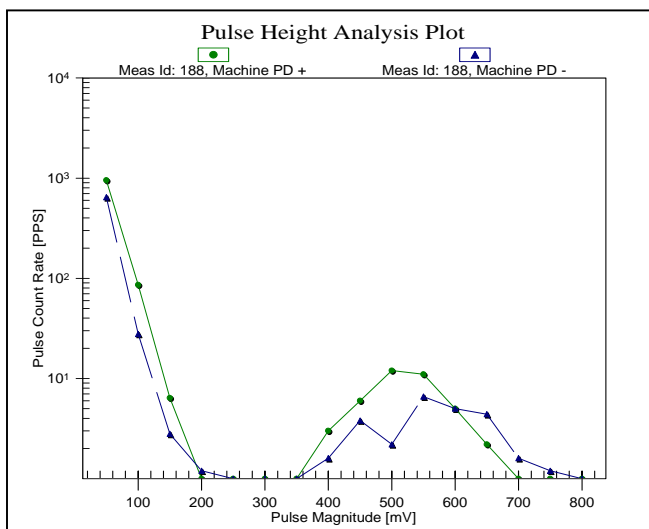


CASE STUDY: Warning Given Of Serious PD Problems On Large Motor, Followed By In-Service Stator Failure.

Company: Saudi Aramco
Plant: Confidential
Unit: Confidential
Ratings: 19,000HP, 13.2kV, 1800RPM, Epoxy-Mica insulation
Manufacturer: Confidential
Related Info: Motor Installed in 1979. Long stator leads between motor and sensors.
PD Sensors: RFCT's on surge-capacitor leads.

Details: The 2-D plot below illustrates extensive PD activity with high magnitudes up to 800mV. There is a 'hump' in the graph. This is indicative of activity in the endwinding area. The high magnitude was also indicative of conductive contamination in this area. Side-by-side comparisons with an identical machine with much shorter stator leads had shown that the sensitivity of the sensors was sharply reduced due to the attenuation in the stator leads. It was found that a correction factor of 5 was in order. Applying this correction factor showed PD levels in the range of 4000mV instead of 800mV. Plant Operations was alerted to shut down the unit as soon as reasonable for inspection of the endwindings. Unfortunately, operational demands prevented the machine from being taken down for inspection and the stator winding failed during a start within a year. Inspection of the failed motor revealed that the high PD activities occurred at the coil connection-bracing ring. Close inspection showed the PD was due to the loose bracing of the endwindings. Inspection also indicated that the failed coil lifted at the edge of the core due to the electromagnetic forces due to the fault current. The rotor came in contact with the lifted coil, exposing the conductor and leading to a flashover. Re-bracing the coils, cleaning the coils, and epoxy coating the endwindings would have ensured no coil movement and thus could have prevented this failure and extended the motor's life. Had the inspection been done when first suggested, these minor repairs might have been done with substantial repair and downtime cost savings.



Reference: O.M. Nasser, T.S. Al-Anizi, "Saudi Aramco Experience with PD On-Line Motor Monitoring Equipment", IRMC, June 1998.