Machine Online Partial Discharge Testing

LIVE HV

CASE STUDY

INTRODUCTION

A pipeline across Queensland comprised of several pumping stations. The machines at six of these pumping stations were monitored, while in service, for Partial Discharge (PD) to determine their insulation condition.

KEY OUTCOMES

Six Pumps monitored in service for PD via the switchgear

Machines ranked on criticality levels

Investigation performed on at risk machine showed PD at areas identified during online testing

The condition of an at-risk machine was quickly identified with online PD monitoring. No extended outages were required, and a precise insulation condition assessment was obtained. This enabled targeted, efficient maintenance.

TESTING PROCESS

High Frequency Current Transformers (HFCT's) were placed on the cable core at the switchgear end of the cable during a temporary shutdown.

In this case access was much easier at the switchgear end of the cable as opposed to the machine end.

Because HFCT's detect lower frequencies than coupling capacitors they are suitable to be placed at either end of a cable when performing machine PD testing.

HFCT's placed on cable

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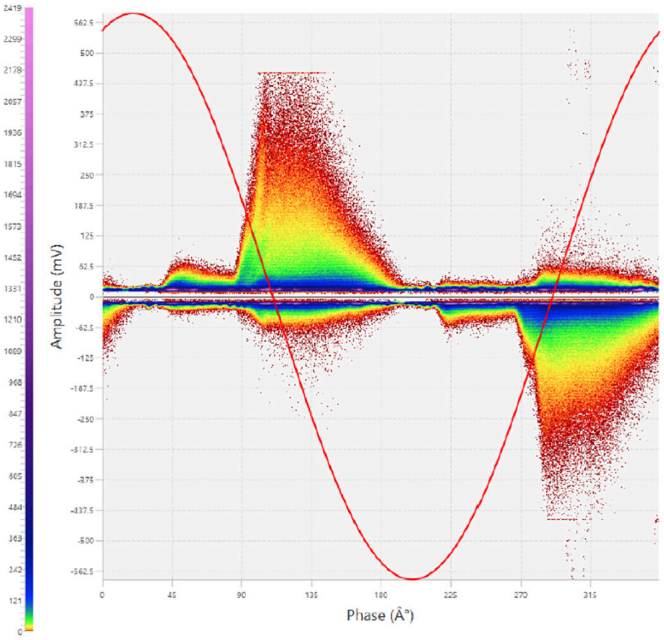
The six pumps were ranked based on their peak and cumulative PD measurements. Machines typically have a high tolerance for PD and levels can be compared with guideline tables. However, trending over time and benchmarking with homogenous machines is beneficial in determining the insulation condition.

PD phase patterns or ‘heatmaps’ are incredibly accurate at diagnosing the type of discharge within a machine, enabling focussed and efficient maintenance. In this case the PD was determined to be from the slot section and end windings.



FOLLOW UP

One machine showed significantly higher PD levels in comparison to the other pumps tested. An outage was scheduled to perform offline testing and a visual inspection of this machine.

The visual inspection and offline testing found identical issues identified during the online testing. Critical issues were rectified immediately while others were scheduled for remedy at a later date.

CONCLUSION

The condition of an at-risk machine was quickly identified with non-intrusive, online PD monitoring. No extended outages were required, and a precise insulation condition assessment was obtained. This enabled targeted, efficient maintenance to be performed on the machine.