

Client Reference

In-time Condition Monitoring for Water Utilities

In-time condition monitoring will enhance the reliability of the old Medium Voltage assets. These components should be in-time monitored to ensure operation within safe limits and early warning of imminent failure. Using the right cost effective in-time monitoring system, will facilitate better efficiency and integrated support by cross platform applications, devices, sensors, machines, and human intervention. Proactive maintenance will also be possible using a combination of technologies.



Client background

The client is the largest bulk water utility in Africa and one of the largest globally, providing bulk potable water to more than 11 million people in four South African provinces. The water utility Medium Voltage (MV) electrical network must be kept to a high reliable and maintainable standard to prevent premature failure. Failure of critical assets such as MV switchgear supplying and controlling the MV motors, which pump the water to maintain the water levels in the reservoirs, can cause significant water unavailability to a vast group of residents. The client can also incur exorbitant costs on reactive maintenance work. Recently the client experienced a catastrophic failure on the MV switchgear because of electrical discharges within the insulation system that had deteriorated over time. The resulted downtime and lack of water supply caused a major upset and unhappiness amongst the client's customers which needed to be rectified urgently.

Key challenges

- The absence of technology to support continuous in-time monitoring linked to suitable follow-up workflow processes on the critical asset.
- Due to the lack of technology, no early warning triggers were available to proactively caution the client to perform predictive maintenance on the assets and avoid costly failure and downtime.

Further challenges:

- Although Martec succeeded in quickly restoring the equipment under breakdown situations and prevented the reservoirs from running dry, there is still a risk for further downtime due to the condition of some of the switchgear components after the failure. These components must be closely monitored to ensure operation within safe limits and early warning of imminent failure until they can be replaced.

Value add during repairs

- Martec supplied the client with engineering and technical knowledge to conduct the repairs under quality assurance processes.
- Offline and online condition assessments were conducted during the repair process to validate that the workmanship was successfully implemented to the correct standards.
- The repairs and commissioning were executed within limited time to rectify water supply to the reservoirs.

Value add after repairs

- Martec supplied the client with engineering and technical knowledge to conduct the repairs under quality assurance processes.
- Offline and online condition assessments were conducted during the repair process to validate that the workmanship was successfully implemented to the correct standards.
- The repairs and commissioning were executed within limited time to rectify water supply to the reservoirs.

Martec intervention

Martec intervention to rectify the breakdown

Investigate the root cause of the failure and submit a scope of work to return the plant to service, preventing the reservoirs from running dry.

Conducted quality assurance and condition assessment of all the repair work.

Assisted with the commissioning of the plant after the completion of all the repair work.

Martec intervention to prevent similar failures in the future

Implement a proof of concept Industrial Internet of Things (IIoT) solution to demonstrate value-add

Enable In-time monitoring of the Medium Voltage electrical network

Analyse trends of time series data that will indicate the assets' health status.

Provide threshold detection (warning and alarm limits) of specified parameters which will raise alarms to notify relevant personnel of potential defects ahead of time and before failure.

Create an extendable IIoT framework that can seamlessly integrate new devices and platforms to scale across the plant in the future easily.

Tools and technology

- Continuous in-time monitoring of the Medium Voltage assets by measuring, temperature and partial discharges.
- Raptor IoT Gateway receiving data from the sensors and devices, filtering and aggregating it to be sent to the Cloud platform and control centre with early warning systems.
- Commander IoT Real-time platform.