



View inside the wet-well at the pumping station

Going with the flow

ABB's ACQ580 water drives are helping to reduce the occurrence of pump blockages at the Unitywater Deception Bay pumping station

Unitywater provides water and sewerage services across south-east Queensland, Australia. It owns and operates 17 sewerage treatment plants within the Moreton Bay, Sunshine Coast and Noosa regions, supporting more than 820,000 people in the state of Queensland.

It provides its customers with a high-quality, safe and reliable water and

sewerage service that is economically and environmentally sustainable.

When a series of pump blockages at the Deception Bay pumping station led to a significant increase in maintenance costs, Unitywater engaged ABB Value Provider, Control Logic, to come up with an innovative technology-based solution to help get back its wastewater flow.

At a facility that pumps more than 1.2 million litres of wastewater a day, the manual removal of blockages and monthly cleaning was becoming a regular occurrence.

Due to the immense size and weight of the submersible pumps, specialised lifting equipment had to be employed to replace the pumps each time a blockage occurred. If both pumps were to fail simultaneously, additional pumping equipment would have to be transported to the site to ensure that flow continued, thereby incurring additional costs.

The pumping station comprises of two 160 kW submersible pumps with a weight of 1.6 tonnes each. A variable speed drive was housed within an outdoor motor control centre enclosure coupled to each pump and controlled by a SCADA system.

Remote terminal units connected the drive into the SCADA system and provided a 4-20 mA speed reference and start-stop commands. The pumps were set up in a duty standby arrangement to ensure continuity of operation in the event of either pump failing.

Each pump was pumping water into a single pipeline with a head of 70 metres and expected flow rate of 100 litres per second (l/s).



Arthur Steel, Unitywater, checking the parameters on the ACQ580 dedicated water drive



ABB ACQ580 dedicated water drive installed at the Unitywater Deception Bay pumping station

Pump cleaning function clears blockages without disruption

ABB Value Provider Control Logic recommended the ABB ACQ580 water dedicated drive to help Unitywater eliminate unplanned stoppages and maintain wastewater flow at this critical pumping station.

The ACQ580 features a built-in pump clean function that automatically clears blockages in pumps by using a series of rapid forward and reverse pumping sequences.

Control Logic worked closely with Unitywater to fine-tune the trigger points and cleaning profiles to maximise the effectiveness of the solution.

"Torque was used as a reference point for activating the pump clean function," said Glenn Pike of Control Logic. "Torque measurements were programmed into the drive via the built-in software feature to create a virtual known pump curve. Trigger points above and below the virtual pump curve were then established and fine-tuned to signal a blockage in the pump. Over time, as system efficiency improved, Control Logic worked closely with Unitywater to reprogramme the drive to activate the trigger points from the newly improved system curve."

One of the challenges to be addressed was taking into consideration the nearby proximity of a non-return reflux valve.

The reverse speed of the cleaning cycle was managed very carefully to avoid damaging the valve.

"Control Logic worked seamlessly alongside the Unitywater team, to fine-tune the system. This resulted

in a technical solution that has delivered a result that has greatly exceeded our expectations," added Arthur Steel, electrical maintenance manager at Unitywater.

A return on investment of less than six months

In addition to significantly reducing the manual pump cleaning requirements at the site, the ACQ580 water drive installed into the system also led to a doubling of water flow at the pump station.

Unitywater also recorded significant energy usage savings.

After running the pump clean function manually through four cycles, the water flow increased from 98 l/s to 145 l/s, while running at the same pump speed. The automatic pump clean functionality was then activated.

After one month, the water flow increased to 178 l/s, without the need

for manual intervention. A further two months later, the water flow increased once again to 201 l/s.

Leaving the automatic pump clean function activated eliminated the need for regular manual cleaning of the pump, thereby contributing to a significant reduction in maintenance costs of over \$26,000 (€16,900) per annum.

While it was not the original purpose of the trial to reduce the dynamic head, this unexpected consequence also led to further energy and cost savings. In Queensland, reducing peak average demands on the electrical network leads to a reduction in the utility demand charge component of the tariff. Further reductions in billing costs were also achieved through intelligent drive control. ■

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View out to Moreton Bay from near the Unitywater Deception Bay pumping station, Queensland, Australia