

CASE STUDY

HURRICANE MODERNISATION, ST. GEORGE, UTAH, USA



KEY STATISTICS

Customer: Washington County Water Conservancy District

Turbine type: Twin Jet Turgo

Power (kW): 605

Net Head: 333 ft

Flow: 25 cfs

Dia: 15"

Speed: 1200

Original Installation: 1987

MODERNISATION OF EQUIPMENT

Full Control and Switching Panel suite designed to fit over existing cable ducts

Electric Spear valve actuators replacing worn out originals

Hydraulic control module for deflector control

New hydraulic actuator for Turbine deflectors

Bespoke control philosophy as dictated by operators requirements.

The Hurricane Hydro Electric Plant, which is fed from the Virgin River diversion dam was originally supplied and commissioned in 1987. Reliable operation of the plant is critical for the operators Washington County District Water Conservancy (WCWCD), as its outflow allows them to meet their obligation to provide a set flow rate in the river for downstream consumers and wildlife. Gilkes were invited to review the system with a view to upgrading the control system and governor to improve reliability following 30 years of operation.

The mechanical aspects of the turbine were found to be operating in good condition despite constant attack from the sediment laden water abstracted from the river. The Turgo turbine has a reputation for excellent abrasion resistance and this was in evidence here. Many parts that are in constant contact with the water are still originals from when the turbine was supplied. The superior resistance to wear of the Turgo compared to other turbine types and the regular inspections and maintenance from operators has meant the turbine can expect to provide reliable duty for many years to come.

The original spear valve actuators had become unreliable and frequently needed maintenance, therefore these were upgraded to modern modulating rotary actuators to provide reliable control of flow through the turbine.

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A complete new control panel suite was proposed replacing the existing control and switchgear. The suite was custom designed to fit over the existing cable ducts and to accommodate a roof mounted building services transformer, a bespoke control philosophy was also developed to meet the specific needs of WCWCD. To aid them in meeting outflow obligations, turbine flow control was largely separated from the operation of the generator, which now allows them to pass flow through the turbine while the generator is shutdown.

The deflector control arrangement was completely revised to facilitate the new control philosophy. The original electric actuator was removed and a hydraulic ram put in its place, the ram is operated by a hydraulic control module featuring an accumulator to ensure safe shut down. Control of the deflectors is by a new digital governor, which works to precisely match the generators speed to the grid prior to synchronisation. Generator start up is now possible at any turbine flow rate above the minimum flow of the system, including at full turbine flow.

The new control system is fully automated and is expected to improve the annual energy production of the generator significantly, due to higher reliability and lower operator dependence.



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