

GE  
Measurement & Control

# CONTROL UPGRADES

AN EXAMPLE OF HOW GE HELPS CUSTOMERS IN THE POWER GENERATION INDUSTRY

**GE's Control Solutions reduces costly repairs and downtime.**

"The new digital control system and its simple-to-use ToolboxST\* software tools are more accurate and dependable, easier to maintain, and—best of all—more efficient, allowing additional kilowatt hours of electricity to be generated each year. The system and software ushers in a new era of power generation for this valuable company asset."

– Dan Sargent, Project Manager, McBryde Resources Inc.

**PROBLEM**

Located on the north shore of Kauai, the Wainiha power plant's two 1906-era Pelton hydroelectric turbines have been in continuous operation for over 100 years. The 4 MW plant supplies McBryde Resources Inc.'s power operating needs, while also providing 6% of the island's total power generation. Keeping the over 100-year old fly-ball governors running efficiently and correctly became increasingly difficult in recent years, with malfunctions resulting in costly repairs and downtime. Legacy controls on the dual needle impulse turbines created an imbalance on needle position that resulted in lost efficiency, continuous vibration, and wear. McBryde Resources Inc. needed an upgrade solution that could update the governors to a modern digital control and support the continued life and maintainability of this important company asset. In addition, the plant was experiencing reliability issues with an aging excitation system.

**SOLUTION**

GE's Control Solutions business upgraded the legacy mechanical control to a state-of-the-art Mark VIe digital control with a modern Hydraulic Pressure Unit. Upgrading the legacy control to an electrical interface was accomplished by adding an electro hydraulic interface proportional valve. The team also replaced the original servos with new high-pressure cylinders, provided a closed-loop Hydraulic Pressure Unit oil system, and added feedback sensors for needle and deflector position. In addition, GE replaced the old excitation system with the EX2100, solving the reliability issues and providing improved performance, diagnostics, and usability. The new system completely automates all of the plant functions and allows for touch screen operator interface, automatic online synchronization, and remote monitoring of all associated field devices.

**PAYBACK**

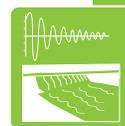
The new Mark VIe is more dependable, easier to maintain, and more efficient, allowing hundreds of thousands of additional kilowatt-hours of electricity to be generated each year. Combined with reduced start-up time, overall power production at the plant increased by five to ten percent. The plant also benefited from an 10% efficiency gain with the new EX2100 excitation system. Excess power is sold to the local utility on Kauai and is an important source of revenue for the company. The Wainiha plant staff also benefits from the ability to remotely monitor and easily troubleshoot the new system, contributing to plant productivity, maintainability, and ease of operator training. The new remote monitoring capabilities decrease the number of 90-minute trips from the main office to the plant needed for maintenance, and allow staff to quickly identify problems before traveling to the site.

**BENEFITS**

- Reduced incidences of costly repairs and downtime
- Increased power production at times of lower water levels
- Decreased start-up time from four hours to less than 10 minutes
- Modern maintenance tools and diagnostics allowing troubleshooting in real-time
- Increased plant automation and remote monitoring capability



Mark\* VIe Control System and EX2100 Excitation System



Hydro Control



Hydraulic Power Unit



Remote Monitoring and Diagnostic

