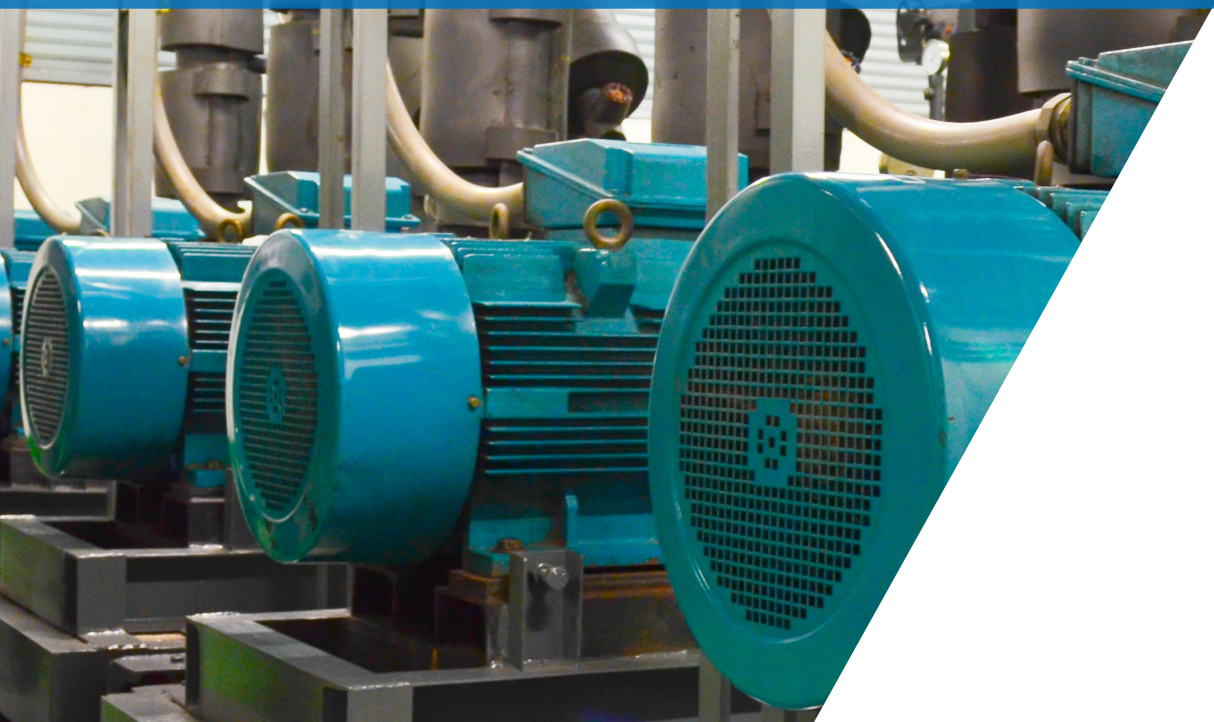
CASE STUDY

Wireless IoT Monitoring for Submersible Pump Reliability

Enhancing Safety and Efficiency in the Water Utilities Industry



Submersible pumps are critical for safe and efficient water management in municipal and industrial applications. They operate continuously to prevent flooding, maintain water circulation, and ensure proper wastewater treatment. However, harsh underwater conditions — sediment buildup, pressure fluctuations, and prolonged operation — can gradually wear down components, increasing failure risks.

To monitor component health, operators have two options: follow traditional routine maintenance schedules — potentially wasting resources and missing rapidly developing issues — or implement a condition-based monitoring system that detects early warning signs and enables smarter decision-making. This case study explores how Sensor-Works' BluVib system, featuring PCB Piezotronics' 66203PRZ1 MicroPower Embeddable ICP® Accelerometer, enables condition-based monitoring to detect early warning signs, optimize maintenance, and reduce downtime.

PCB PIEZOTRONICS
AN AMPHENOL COMPANY

CHALLENGE

A water utility facility needed a reliable way to monitor its submersible pumps and prevent unplanned downtime. Running long cables to a traditional wired monitoring system would be expensive and labor-intensive, prompting the facility to explore a more practical and efficient wireless monitoring approach. However, most off-the-shelf wireless solutions lacked a truly submersible design, offered only limited trending data, or failed to support the wide frequency range needed for early fault detection. Wireless signals also weaken significantly underwater, making conventional solutions ineffective. The facility required a purpose-built system designed for reliable underwater operation and remote analytics.

SOLUTION

Sensor-Works' BluVib system provides two flexible configurations—wired-to-wireless for submersible applications, and fully wireless for non-submersible applications—ensuring ultra-low power monitoring in even the most challenging environments.

Since wireless signals degrade quickly underwater, the wired-to-wireless configuration provided the best solution for this facility, ensuring reliable data transmission from the underwater sensor to the monitoring system. A piezoelectric vibration sensor is mounted directly to the submerged pump, where it continuously measures vibration data. A cable connects the sensor to a corrosion-resistant, ultra-low-power wireless transmitter at the surface. The transmitter then sends data to a gateway using a low-power wireless protocol. The gateway sends the data to the facility's CMMS or cloud platform, where it is processed, analyzed, and archived. This streamlined architecture removes the need for complex control cabinets and extensive cabling, simplifying both installation and long-term maintenance while providing real-time condition monitoring of pump assets.

Key to the submersible BluVib system is PCB Piezotronics' 66203PRZ1 MicroPower Embeddable ICP® Accelerometer, a highly accurate piezoelectric sensor that measures vibration signatures across a wide frequency range. This enables operators to detect early signs of pump failure—such as bearing faults—long before limited-bandwidth MEMS devices can. The accelerometer's exceptional power efficiency allows for up to five years of battery life, reducing maintenance needs. For precise alignment within the BluVib sensor system and optimal mounting to the asset, PCB custom-fit the embeddable accelerometer into a compact stainless-steel housing.

BluVib is fully customizable, allowing users to configure wake-up intervals, set real-time threshold alerts, and choose between trending data for routine monitoring or full-spectrum vibration data for deeper fault analysis.

OUTCOME

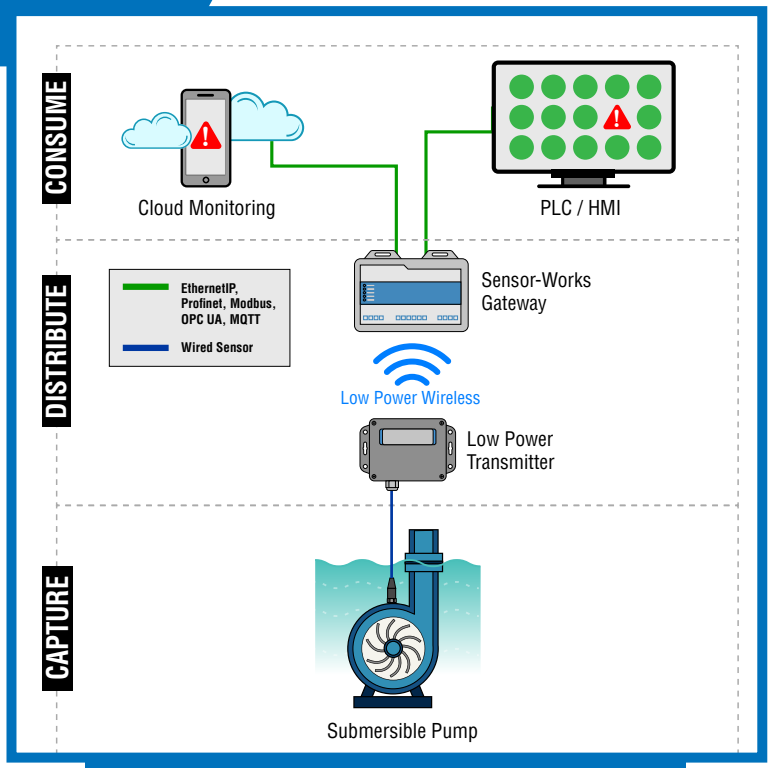
Simplified Integration: BluVib's wired-to-wireless design for underwater applications reduces complexity and installation hurdles.

Early Fault Detection: The piezoelectric technology of PCB's MicroPower accelerometer enables early detection of pump failures, covering a wide frequency range that similar MEMS devices miss.

Enhanced Data Collection: Users can track trends while still accessing full-spectrum data for detailed fault analysis.

BOTTOM LINE

Sensor-Works' BluVib system—powered by PCB's 66203PRZ1 MicroPower Embeddable ICP® Accelerometer—empowers water utilities to shift from traditional time-based maintenance schedules to a proactive, condition-based monitoring strategy. With customizable alerts, flexible data collection, and advanced analytics, the facility now has the tools to make data-driven maintenance decisions, ensuring safer and more reliable water system operations.



Eliminates the need for complex cabling

Detects early faults through high-frequency vibration alerts

Provides monitoring for up to five years on a single battery

Allows customized data collection for both trend tracking and full-spectrum analysis