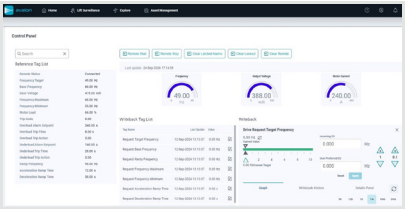
SENSIA
Rockwell Automation + SLB

+ CASE STUDY

Digital Transformation of Horizontal Multistage Surface Pumping Systems (HPS)

Cloud-Enabled Real-Time Surveillance and Remote Control for Horizontal Multistage Surface Pumping Systems (HPS)



Value Delivered

The deployment has delivered measurable benefits:

+ Human Resource Optimization: Reduced on-site personnel requirements, enabling workforce reallocation to higher-value activities.
+ Real-Time Awareness: Enabled engineers to shift from reactive to preventive operational practices, reducing response times and preemptively addressing potential issues.
+ Enhanced Safety: Minimized exposure to high-risk conditions, such as H_2S gas, by reducing personnel presence in hazardous zones.
+ Improved Decision-Making: Automation of data collection ensures that operational information is always accessible, reducing communication gaps between field engineers and head office
+ Operational Efficiency: Advanced monitoring and control capabilities have optimized system performance and reduced operational costs.

Conclusion

By transitioning from manual, reactive processes to a connected, proactive approach, Sensia's digital solution has revolutionized HPS operations. This transformation significantly improves safety, reliability, and operational efficiency, offering a sustainable and scalable solution tailored to the unique challenges of remote fluid transfer systems.

Sensia's Edge-to-Enterprise Ecosystem transformed industrial pump monitoring from manual operations requiring constant on-site personnel in hazardous conditions to a comprehensive digital solution. Leveraging the Hyperconverged Edge Controller (HCC2), INSTRUCT controller, and Avalon IIoT Platform, the implementation enables complete remote surveillance and control of pump systems. This technology shift delivered significant benefits: workforce optimization by reallocating staff to higher-value tasks, preventive rather than reactive operations, reduced exposure to hazardous environments including H_2S gas, improved decision-making through automated data collection, and increased operational efficiency with lower costs.

Context and Challenges

Horizontal Multistage Surface Pumps (HPS) are essential for fluid transfer (oil and water) in remote onshore and offshore locations. These operations face significant challenges, including difficult site access in high-risk zones and occasional exposure to H_2S gas, which increases health and safety (HSE) risks for personnel.

Traditionally, HPS systems relied on manual operation of Variable Frequency Drives (VFDs), requiring 24/7 on-site personnel to monitor and control equipment. Operational data was manually recorded in Excel sheets, often without reliable backups, resulting in inefficiencies, heightened risks of human error, and operational vulnerabilities.

Solution

Digitalization with Sensia's Edge-to-Enterprise Ecosystem.

To address these challenges, Sensia deployed a robust solution leveraging the Hyperconverged Edge Controller (HCC2), the INSTRUCT controller, and the Avalon IIoT Platform. In this setup, VFDs were connected to the INSTRUCT controller via RS485, with each HCC2 acting as a bridge between the INSTRUCT controller and Avalon. Data was transmitted to Avalon through a satellite connection provided by the customer, enabling real-time monitoring and remote control.

This cloud-enabled system allows real-time monitoring and control of HPS systems, accessible from any location through web-based dashboards and alarms. Engineers can view live operational parameters, adjust frequency settings, setpoints, and perform start/stop actions remotely, eliminating the need for constant on-site personnel.

Beyond basic monitoring, the solution provides diagnostic insights into the health and internal condition of both the VFDs and HCC2. Live and historical trends empower engineers to analyze operational data, identify optimization opportunities, and maximize performance while reducing operational expenses (OPEX). The platform supports customization, enabling engineers to create tailored dashboards and alarms for specific monitoring requirements. It is also scalable, allowing for integration with additional instrumentation, such as real-time video surveillance, for enhanced situational awareness.

Scalability and Future Enhancements

The HCC2's programmability further enhances the solution by supporting the implementation of closed-loop control and detailed logic through industry-standard control languages. This ensures high precision and reliability in operations.

Looking ahead, the next steps include integrating H_2S monitoring and real-time video surveillance, implementing EDGE control loops, developing pump performance curves to identify optimal operating points, and introducing operational and efficiency analytics. These enhancements aim to further improve safety, operational awareness, and system performance.