Tackling Lift Station Challenges with Digital Tools (Digital Twin & AI)

Aquasight's digital tools empower wastewater utilities to proactively manage lift stations, offering real-time monitoring, predictive maintenance, and energy savings, while reducing failures and improving operational efficiency through data-driven insights.

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Understanding the Key Challenges in Lift Station Management

Wastewater utility professionals have long recognized that traditional methods of managing lift stations are not enough to prevent failures or ensure operational efficiency. The following are the key challenges facing wastewater lift stations today:

- **Limited Monitoring Capabilities**: Most lift stations operate with basic Supervisory Control and Data Acquisition (SCADA) systems that primarily offer control functions and alarms. However, they lack the ability to measure throughput, efficiency, or detect subtle signs of wear and tear on equipment. Without flow meters, operators can't track the volume of wastewater being pumped, leaving them blind to potential blockages, leaks, or declining pump efficiency.

- **Operator Knowledge is Key**: Many utilities rely heavily on the experience and intuition of seasoned operators. While SCADA systems offer some data, operators are often left to piece together a lift station's health based on their own understanding of how it "should" be working. As a result, inconsistent maintenance and reactive troubleshooting can leave utilities vulnerable to surprise failures.

- **Reactive Maintenance**: Maintenance in many wastewater utilities is reactive, occurring either when something breaks or when equipment reaches the end of its life. This "break/fix" approach is not only costly but leads to unplanned outages, which are more expensive and disruptive than scheduled maintenance.

- **Costly Design Upgrades**: Upgrading lift stations to include comprehensive monitoring systems or capacity enhancements is typically seen as a significant investment. As a result, utilities often defer these upgrades until they face critical breakdowns, further increasing operational risks.

How Aquasight's ACE™ Solves Lift Station Challenges

To address the key issues utilities face, Aquasight developed **ACE**— a comprehensive digital platform designed to give wastewater professionals deeper insights and control over lift station operations. ACE offers a proactive, data-driven approach to managing lift stations, helping utilities optimize performance, prevent failures, and ensure system reliability.

1. Real-Time Monitoring with the Operational Cockpit

ACE provides wastewater utility teams with a real-time operational cockpit that consolidates critical lift station data into a single, intuitive dashboard. Operators can monitor flows, levels, and pump performance in real-time, enabling immediate visibility into potential issues like efficiency drops, blockages, or impending mechanical failures.

For instance, ACE can detect anomalies such as pump ragging or suboptimal cycling patterns, which may not trigger SCADA alarms but could cause long-term damage if unaddressed. By providing real-time alerts, ACE enables operators to address these issues before they escalate into costly failures.

2. Virtual Flow Meters for Accurate Throughput Measurement

One standout feature of ACE is its virtual flow meter capabilities. While traditional flow meters are costly to install and maintain, ACE uses advanced algorithms to estimate real-time flows without the need for additional hardware. This allows utilities to monitor Inflow & Infiltration (I&I) hotspots, detect illegal dumping, and better understand lift station capacity.

In **Hull, MA**, for example, ACE detected a stuck pipe fragment

that was causing pump recirculation. The system alerted operators early enough to resolve the issue before it resulted in continuous pump operation, saving both energy and operational costs.

3. Predictive Maintenance with Advanced Analytics

ACE empowers utilities to transition from reactive to predictive maintenance. By continuously monitoring pump performance, runtime profiles, and cycling behavior, ACE detects signs of wear and tear before a pump fails. This helps utilities perform maintenance before a failure occurs, reducing emergency repairs and extending the life of critical assets.

4. Energy Efficiency and Cost Savings

Wastewater utilities can significantly reduce energy consumption with ACE. By analyzing diurnal flow patterns and giving pump operation recommendations in real-time, ACE helps utilities optimize energy usage. This leads to substantial savings on operational costs while extending the life of equipment.

For example, utilities using ACE have reported up to 25% energy savings, as seen in **Central San, CA**. In **Columbus, OH**, ACE enabled a reduction in energy consumption by 11%, thanks to optimized pump scheduling and adjustments to wet well set points.

Success Stories: ACE in Action

Aquasight's ACE platform is already delivering results for wastewater utilities across the U.S. These case studies showcase how ACE's real-time insights and predictive analytics are transforming lift station management:

- **CWS, OR:** Identified and mitigated forced main surge and water hammer risks, preventing costly damage.
- **GLWA, MI:** Resolved air entrapment issues in pumps, restoring efficiency during operations.
- **LMSD, KY:** Optimized operations by addressing excessive pump cycling caused by suboptimal PID control.

- **Hull, MA:** Pinpointed I&I hotspots and illegal septage dumping, improving flow management.
- **Central San, CA:** Achieved up to 25% energy savings through optimized pump selection and diurnal flow patterns.

What's Required to Implement ACE?

Transitioning to ACE does not require a complete overhaul of existing infrastructure. ACE integrates seamlessly with SCADA and requires minimal investment in new hardware. At a foundational level, utilities will need sensors (such as for wet well levels, pump status, and pressure), and reliable data transmission networks. ACE is designed for rapid deployment and scalability, making it suitable for both large utilities and smaller municipalities. Its ease of configuration ensures

that utilities can quickly begin gaining actionable insights, moving from reactive to proactive management.

Conclusion: Embracing the Future of Lift Station Management with ACE

The wastewater industry faces increasing regulatory pressures and aging infrastructure, making smarter lift station management essential. ACE by Aquasight empowers utilities with real-time monitoring, predictive analytics, and proactive maintenance, ensuring **greater efficiency** and **fewer costly failures**. As a trusted leader in digital wastewater solutions, Aquasight is dedicated to helping utilities optimize their lift stations.