Water treatment analytics
A road map to greater efficiency

How modular data management solutions help achieve better asset optimization

Measurement made easy

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Modular data management solutions tailored to the unique requirements of water treatment operations

Overview

From the largest metropolitan water treatment plant (WTP) or wastewater treatment plant (WWTP) operations to the smallest rural systems, the goals are essentially the same — achieve regulatory compliance and the most efficient results at the lowest practical cost. The most feasible (i.e., affordable) control solutions vary by process, plant size, and budgetary limitations. Here are several high-level guidelines to achieving a common strategy that works across virtually all applications: good data, properly analyzed, yields good results.

Prepare to maximize results at every level of performance

Gaining optimum control over an entire facility requires multiple levels of analytic instrumentation and software systems working in concert. At the most basic levels, it involves analyzing the chemistry of source water entering a plant and effluent leaving it.

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Solutions that provide real-time, in situ sampling and share data automatically with plant control systems provide tangible benefits

At higher levels, it means applying discrete measurements taken from multiple in-line instruments and analyzers to drive treatment processes for more cost-effective performance. At the highest levels, it extends to managing not only the process flow of a facility, but also asset maintenance and management.

- **Instrumentation** – balancing chemical compositions and reactions in the water flow depends upon accurate readings from a variety of measurement and analysis instruments (e.g., flow meters, turbidity analyzers, pH analyzers, dissolved oxygen [DO] sensors, etc.). Whenever possible, choose designs that maintain tight tolerances, offer robust design to withstand harsh water conditions, provide reliable readings in real time, and interface well with higher-level control systems.

- **Asset optimization** – producing the best possible outcome from a treatment process involves exploiting the accurate, real-time data provided by in-line instrumentation. Look for system solutions that offer maximum flexibility for the nature of the process, the work environment, and the people who need to monitor and interact with it.

- **Asset management** – once control systems are fine-tuned to optimize process efficiency, it pays to focus attention on higher-level analytics to derive maximum value from plant infrastructure. This means monitoring and managing equipment for long, trouble-free performance life, a high Return On Investment (ROI), and lowest Total Cost of Ownership (TCO).

Target essential analytic and control goals

Varying source water profiles – in terms of total organic carbon (TOC), pH, turbidity, etc. – provide different water treatment challenges. Whatever the water chemistry being measured or the sensing technology used, solutions that provide real-time in situ sampling and share data automatically with plant control systems provide tangible benefits:

- **Speed of response** – choosing instrumentation that provides the quickest access to data that defines process flow conditions and enables the quickest decision-making for maximum efficiency is the first step to cost efficiency.

- **Continuous regulatory compliance** – knowing the composition of source water and treated water is critical wherever water chemistry adjustments are needed to meet compliance guidelines, avoid penalties for noncompliance, or simply provide the best looking, best tasting water quality practical.

- **Efficient and effective energy end chemical use** – even with the best instrumentation providing the most accurate, up-to-the-minute readings, waiting to identify and react to real-world conditions after the fact can let some opportunities for efficiency slip through the cracks. Enterprise software for distributed control and asset management can react to the slightest changes in water chemistries, as well as project future trends in equipment life, to guide optimal decision-making for overall best control and operating efficiency.

Follow data to its logical conclusion

Knowing process characteristics on the spot is critical to producing quality outcomes, but tracking the long-term performance of both water quality and plant efficiency is crucial for managing long-term operations most effectively. Modular data management solutions tailored to the unique requirements of water treatment operations enable users to answer key questions about process throughput to achieve better asset optimization:

- Are these pumps operating at optimum efficiency right now?
- Is it possible to squeeze a bit more capacity from existing assets?
- Are there evolving patterns or trends developing – such as increased capacity running through remote lift stations as a storm front moves through – that can warn of the need to clear out tanks and ramp up capacity in a short period of time?

The benefits of automated operation and higher-level analysis do not stop at process control, however. They can extend to structural and financial analyses that impact the long-term viability of WTP and WWTP infrastructure. As historic process performance data is gathered and analyzed, plant managers are able to answer a broader set of questions about maintenance and repair for long-term infrastructure asset management:

- Is there an increased frequency of alarms from one aspect of a process?
- Are specific pieces of equipment generating excess vibration?
- Is this a routine maintenance issue or an equipment breakdown?
- Can the equipment be fixed or does it need to be replaced?

Just as PID controls or DCS systems close the control loop on plant processes, analytical software closes the loop between operations and asset management, enabling plant operators to evolve from reactive maintenance to more predictive maintenance.

In fact, by employing aspects of machine learning, asset optimization software can actually help plant operators arrive at the most efficient solutions sooner, based on normalized data and pattern recognition from historical performance, past reactions, and resulting outcomes.

Plan a road map to greater efficiency

Learn more about mapping out analytic strategies for WTP and WWTP applications in future Water Online articles on water analysis instrumentation and performance analytics software. In the interim, more insight about each topic is available by visiting these manufacturer web pages about analytical instrumentation efficiencies and the power of analytics for better asset performance management.
In essence, asset optimization software is programmed to harness the knowledge of experienced water plant operators, interpret sensor readings, anticipate upset conditions, and respond with automated control in the same way an experienced plant manager would run manual controls.

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