CUSTOMER CASE STUDY

San Jose Water optimizes pump performance with AVEVA™ PI System™

Company name - San Jose Water
Industry - Water

Goals

- Improve the cost-to-production ratio and overall efficiency of pumps to reduce energy costs and reach sustainability goals
- Move from reaction-based maintenance strategies to condition-based asset management by improving monitoring and visualization capabilities
- Reduce greenhouse gas (GHG) emissions by 50% by 2030

Challenges

- The field efficiency tests previously used to prioritize pump operations were costly and time-consuming to perform and offered static results that could be years old
- The inability to view real-time asset information led to unexpected asset failures and costly downtime

Solution

- AVEVA PI System
- AVEVA™ PI Vision™
- AVEVA™ System Platform
- AVEVA™ InTouch HMI
- AVEVA™ Historian

Result

- Operators can make informed decisions that improve overall pump efficiency, prevent pump failure, and reduce the costs of pump operation
- The company reduced energy costs to save $143,000 annually
- The company reduced its carbon footprint by 206 tons per year

When over a million people depend on a utility company to deliver water reliably and affordably, it needs to operate as efficiently as possible. One utility in California wanted to reduce energy costs, lower carbon emissions, and improve the performance of assets to keep water flowing to customers sustainably. To accomplish this, it relied on AVEVA for operations control and industrial data solutions.

San Jose Water (SJW) is an investor-owned water utility serving over one million customers in the San Francisco Bay Area. It has a complex distribution system, with over 100 pressure zones that may range from a few service connections to as many as tens of thousands of service connections. SJW has numerous critical assets to monitor, with 84 stations for groundwater extraction and inter-zone pumping, 229 booster pumps, and 89 groundwater well pumps.

Some assets, like pumps, consume large amounts of electricity. Pump operation alone represented 92% of the utility's $9.3M annual energy costs. The utility wanted to control these costs and meet net-zero emission goals, but it lacked the data management tools to effectively monitor how much energy its equipment consumed. To improve its monitoring capabilities, it needed a data infrastructure for aggregating and analyzing operations and asset data in one place. SJW hoped that with a real-time view of operations, it could identify ways to improve pump performance and lower energy costs. To further incentivize energy conservation, the company set an ambitious goal to reduce greenhouse gas (GHG) emissions by 50% by 2030. To hit this target, it would have to dramatically reduce its energy consumption, and more efficient pump operations represented the largest opportunity to lower emissions.

"We're trying to move towards more condition-based maintenance rather than reactive maintenance. We're looking at improving our operating efficiency, reducing electrical costs and lowering our carbon footprint [at] the same time."

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Ethan Smith, EIT
Capital Planning, San Jose Water

Bringing data sources together to understand pump performance

The biggest initial challenge SJW faced was a lack of visibility into its operations. It had data in many places, but no single repository where it could view all operations at once. It also had limited monitoring capabilities for its pumps. Pump sensors could collect and send data, but there was no place to display the information. Because the utility couldn't reliably monitor real-time pump performance, it relied on reactive maintenance practices to service pumps. Reactive practices often led to system strain, service interruptions, and costly repairs. Assets sometimes failed unexpectedly because there was no interface where operators could track asset life cycles and monitor performance, leading to expensive downtime.

It was also a challenge to decide which pumps to operate throughout the day. With energy rates rising as much as 30% during peak hours, it was imperative to use pumps when they were the most affordable to operate. The utility originally prioritized pumps based on the results of field efficiency tests, which offered static information and were time-consuming and costly to perform. SJW conducted field tests infrequently, so the test results could be two to five years old. Without tools to visualize and analyze real-time asset performance and energy consumption, SJW couldn't identify more efficient pump schedules.

The "magic" of asset hierarchies helps operators view data with context

The water utility began to improve efficiency by aggregating data that was originally siloed in disparate systems in AVEVA PI System. AVEVA Historian collected data from assets like station flow meters, pressure monitors, and level transducers, and sent the information to AVEVA PI Server. Next, SJW incorporated its SCADA and HMI data from AVEVA System Platform and AVEVA InTouch HMI into the solution. AVEVA PI System's open, vendor-neutral setup enabled SJW to use APIs to add third-party information, such as electricity billing and electrical consumption data.

SJW refers to AVEVA PI System's asset framework as "the magic of AVEVA PI System." It used the asset framework to create a hierarchical view of operations, with stations and pressure zones at the highest level. The level below displays individual assets within a station, like boosters, well pumps, tanks, or reservoirs. Each of those assets also displays its attributes, like power flow, pressure, or status. SJW monitors asset performance in AVEVA PI Vision dashboards.

However, to fully understand how well its pumps were performing, the utility needed additional resources to analyze its data. SJW invited Casne Engineering to help develop key performance indicators (KPIs) for its pumps. Casne Engineering used asset analytics in AVEVA PI Server to determine how pumps should perform under ideal conditions. With KPIs for benchmarks, AVEVA PI Server generates actionable notifications to warn operators when assets don't meet KPI targets, or when assets are at risk of failure. These notifications alert operators to pump degradation or inform maintenance crews how long a pump has run since its last service. Early warnings about underperforming assets allow SJW to use condition-based maintenance practices to mitigate asset performance issues before they require costly repairs or replacements.

With AVEVA PI System, SJW receives information on the real-time cost of operating its pumps per million gallons of water. Dashboards update automatically as energy rates change throughout the day, and the system associates each pump with an energy-use rate that informs operators how much it costs to run the pump. When a control variable, such as a low tank, requires a pump, the solution uses real-time energy rates and SCADA data to identify the most efficient pump associated with that control variable and automatically turns it on.

SJW also uses the solution to monitor its electricity consumption and electricity costs across the business. Using analytics from AVEVA PI System, SJW compares its estimated electricity costs to its actual bill. If the difference between actual and estimated costs exceeds the predefined threshold, AVEVA PI System sends an alert to operators.

"AVEVA PI System provides that central system where we can see all our data. We can synthesize data from multiple systems in a quick and reliable manner."

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Ethan Smith, EIT
Capital Planning, San Jose Water

Using data to identify hidden costs and capture efficiency gains

When the company first began analyzing electricity costs compared to estimates, it quickly identified a 5% overcharge from the electric utility. After exploring the energy consumption data, SJW realized the electric utility was charging a higher rate for electricity than SJW had agreed to pay. Upon further investigation, SJW discovered it had paid higher rates for the previous 12 months. Armed with AVEVA PI System data, SJW reduced their annual electricity costs and recovered the overcharged amount.

SJW estimates that adopting AVEVA solutions will deliver a return on investment in under one year. By tracking energy rates, SJW ensures pumps only operate during off-peak rate hours, which has decreased its energy use by 30% and saves the company $53 per million gallons of water, or $143,000 per year. By consuming less energy, the utility has also reduced its carbon footprint by 206 tons per year, bringing it closer to its target of 50% lower GHG emissions by 2030. SJW also recuperated around $320,000 in excess charges from its electricity provider. It estimates that discovering the overcharge and adjusting the rates it pays the electric utility saves it an additional $440,000 each year.

"With AVEVA PI System, we have increased efficiency and decreased costs. We estimate we'll see a return on investment in less than one year."

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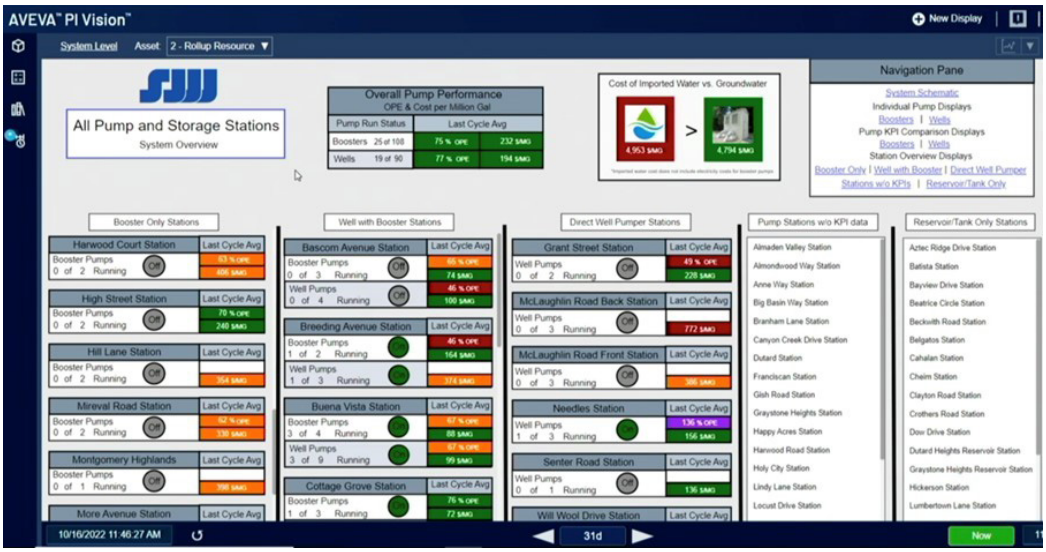
Blake Chetcuti
Operations Supervisor, San Jose Water



SJW's view in AVEVA PI Vision of asset performance across the utility's entire distribution.

Now that the company has brought its data into a centralized location where it can view and measure asset performance against KPIs, it's making plans to take the system to the next stage. SJW is currently adopting a system for enterprise asset management (EAM). It plans to integrate the EAM solution with AVEVA PI System to further improve its asset management capabilities.

Currently, asset management plans rely primarily on the manufacturer's recommended lifecycle. SJW hopes to use real-time data on asset degradation, runtimes, and efficiency to automate work orders and optimize how it manages its assets.

Click here to watch the full presentation

For more information about AVEVA PI System please click here.

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