Real-Time IoT Device Improves Response Time & Operations in the Oil Field

How one water producer improved tracking and simplified reporting
By Sid Shetty
March 28, 2018

Oil field operators had a need for consistent, precise and automated pumping based on real-time fluid level to the specific target level desired over time to reduce operational cost and maximize production.

They have long recognized for that fluid level management while pumping is critical to an operation. If a pump runs dry or cavitates, it will be damaged. If a pump operates too fast, it can cause a well to sand up. Starting and stopping a pump was never a good idea, which is what pump off controllers do. Output potential from wells continuously changes, and before the introduction of a real-time Internet of Things (IoT) device in 2014, you had to continuously evaluate potential and then continuously redefine how to operate because of the dynamic nature of reservoirs. Fluid entry simply changes over time for a multitude of reasons.

Automated Lift Stations Help Control Chemical Costs

Automating artificial lift systems based on real time fluid level to the desired target will deliver a continuous pumping operation that matches inflow perfectly with pump output automatically changing over time and enabling those who manage wells, to manage more wells more effectively.

The scalability and flexibility resulting from merging multiple technologies into a universal platform enables asset managers to control and monitor assets worldwide through six forms of communication that are built-in to manage all forms of artificial lift and facility control from anywhere. Through application software, users can define screens, define and change operational parameters and set up Google-sourced field mapping.

Authorized users can view the current status of facilities, wells and inventories at a glance while the processor provides real-time decision processing at the site to control

several aspects of an operation. The processor also logs a comprehensive sensor array for analytical work and reporting. As such, the platform (a single box) provides an end-to-end solution replacing the ad hoc approach of the past.

Image 1. An IoT platform in West Texas metering flow, data logging reservoir level and controlling an electrical submersible pump (ESP) in a water well (*Courtesy of Smart Pumper*)

The use of chemicals can be a significant operating expense for both the water and oil producers and is one of the largest uncontrolled expenses. The cost to supply chemicals and refill tanks can quickly add up to tens of thousands of dollars each month. The common practice of adding chemicals using the traditional timer method can cause waste of chemicals or costs. One platform that can control artificial lift pumps can—at the same time—control multiple chemical injection pumps in sync with the artificial lift device to maintain precise injection required based on real time output. The platform can monitor tank inventory, provide alerts for low level for restocking and confirm delivery quantity. Simultaneously, the platform monitors and reacts to 38 different definable inputs to create a real smart and safe operation. This reduces health, safety and environmental (HSE) risk and reduces operational expenses.

Solution for Rising Water Demand

One project in Western Texas involves water resource management for a major water

service provider. In August 2017, the company posted an RFQ for an advanced water automation system to help them improve their accounting of water production, detail inventory from multiple locations, and gather meter data from all sources and delivery points. This last objective was critical to them and their stakeholders. Their customized view asset page now helps them visualize the status of all their assets and save their operators tremendous time through remote control.

Their accounting department appreciates the monthly reports on metered production and sales. Their operators also appreciate having parameters set to protect their pipelines through monitoring intake and discharge pressures and seeing their reservoirs and tanks levels in real time. As one of the largest water producers in the Delaware and Permian Basin, they understood these requirements well. The company is responsible for supplying clean water to more than 10 percent of the customers in that area. In order to comply with the rising water demand, they required an advanced automation solution.

Since collecting process data from disparate data sources proved challenging for the company, especially since data needed to be stored in a reliable time-series archive for analysis and reports, the universal platform proved to be the lowest cost solution. Until deployed, the previous method of managing their assets was to manually extract and organize data from various sources within their system for reporting, which was time consuming. The company needed a faster, more accurate and automated reporting system—one that could generate predetermined reports automatically and share them with authorized groups. This system also needed data validation capability as well as the ability to retain old data.

After a month of testing the first installation, the scope of work has expanded to 90 different royalty and royalty-free water sources pumping across miles of pipeline. The technology platform provides users with a secure interface to manage any asset and control any VFD from anywhere. Data is stored on a server and/or in the cloud in an SQL format to provide authorized personnel access and use through a single portal.

In the water application above, the technology platform gathers and provides the user with current flow rates, daily flow rates, weekly, monthly and cumulative data from start dates and separates all of it out by and from sources. If demand peaks, the company can remotely active water wells and transfer pumps located at reservoir points where they have established inventory. Reports that would take the better part of a week to create and several more days to validate can now be produced in a few minutes. The increased level of insight helps the operations managers incorporate production metrics into business plans to give feedback to system technicians based on real time data to more quickly resolve issues to improve operations and thereby have become a more reliable source for supply to their customers.

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Editorial

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