CUSTOMER CASE STUDY

Tendeka uses real-time telemetry data to improve clients' operating efficiency

Tendeka - www.tendeka.com
Industry - Oil and gas

Goals

- Provide oil and gas customers with an ongoing stream of real-time data and continuous visibility into well conditions.
- Capture high-frequency data and offer interim storage and processing in locations where traditional data solutions are impractical.
- Help oil and gas customers reduce cost and downtime by improving performance and operational efficiencies.

Challenges

- A failed downhole valve required operators to shut a well down and halt operations, costing the company hundreds of thousands of dollars a month.
- Existing intervention tool designs were outdated and rife with technological problems.
- Harsh conditions of oil extraction environments make secure data transmission untenable with traditional data storage and processing technology.

Results

- Tendeka's innovative smart valve allows operators to monitor well conditions and shut down valves from the surface.
- Local operators have continuous visibility into downhole conditions, and the ability to perform pressure tests and confirm valve operability without shutting down well production.
- The customer's well is not only back online, but producing at ten times its previous rate.

Oil and gas producers face serious consequences if a downhole safety valve fails. In many cases, both company policy and government regulations require the well to be shut in for safety and environmental reasons. Some intervention-based tools allow the well to return to production, but unfortunately these tool designs, often decades old, are fraught with technical challenges, which can diminish the total production potential of the compromised well and the range of the well's functionality.

Tendeka, a provider of completions technology to the oil industry, developed an innovative smart valve that relays information bi-directionally from downhole to the surface and can also be controlled wirelessly from the surface. The valve transmits regular wireless signals to the surface, which convey important information about downhole conditions and well operations. The valve allows wells to be returned to production during testing, while also providing the required downhole closure capability, should it become necessary to shut in the well. With this deployment of Electronic Ambient Valve (EAV) and Edge Data Storage (EDS) technology, Tendeka wanted to prove that continuous monitoring of the valve function could be conducted by both the operator and Tendeka personnel in headquarters.

"We at Tendeka can now see what's going on with the unit that was deployed at the customer [site]. We now have data we can analyze and compare. We can offer insight to them, perhaps detect the potential for early failures or problems that might occur or see events they might not otherwise be able to see."

-

Andy Nelson,
Senior Software Engineer, Tendeka

A new opportunity

Recently, an oil and gas client contacted Tendeka with a serious problem. A faulty downhole safety valve at one of their wells in Alaska's Prudhoe Bay had failed and the client attempted to restore production with an ambient valve. However, it was repeatedly closing unexpectedly, shutting down production at the well and costing the company about 400 barrels a day – a loss that quickly mounted to hundreds of thousands of dollars a month.

The valve needed to be replaced – and soon. But rather than simply restoring the old system, Tendeka advised the company to consider a smarter solution: an ongoing stream of real-time telemetry data and continuous visibility into well conditions. The solution was based on Tendeka's PulseEight EAV system. With PulseEight, a valve installed in the wellbore communicates wirelessly with a gauge at the surface via pressure pulses. Sensors in the valve can detect unusual drops in pressure, which may signal a ruptured casing or a blowout above. Sensors can also shut off oil flow before leaks become major disasters. From the surface, operators can intelligently manage the flow of fluid in the bore or shut down the valve if necessary. PulseEight technology might have prevented the sort of valve failure that shut down the Prudhoe Bay well.

Rescuing stranded data

The new monitoring solution relied on data management software from OSIsoft, now part of AVEVA. In harsh or remote environments – like a wellbore deep underground in the Alaskan wilderness – it can be difficult to gather and analyze data in real time. There is no room on the rig to deploy complex data storage and processing systems. Valuable data can easily get "stranded" in the field because of connectivity issues and the difficulty of collecting data far from the central network.

EDS was designed to help companies overcome challenges associated with data from industrial IoT devices. EDS captures high-frequency data at the source and offers interim storage and local processing in locations where a traditional data storage and processing solution would be unfeasible or too costly. Local operators can use EDS to spot trends or anomalies, anticipate problems before they escalate, and fine-tune systems to achieve optimal efficiency.

On site in Prudhoe Bay, Tendeka installed a new PulseEight EAV system to replace the failed valve and configured it to send telemetry data to EDS at the surface. Local operators then had continuous visibility into downhole conditions and the ability to perform pressure testing without taking the well offline. A month later, the system was fully operational and state regulators approved the well to be put back into full production.

"Before installing the new valve and edge data monitoring system, this client had little visibility into what was going on downhole. They would either know it's working or it's not working, but they wouldn't know until they had a problem. Now they have this insight into well performance and environmental conditions every 24 hours"

-

Andy Nelson,
Software Engineer, Tendeka

More data, more production

One of the key benefits of the new system is that there is no need to shut down well production to confirm continued operability of the valve.

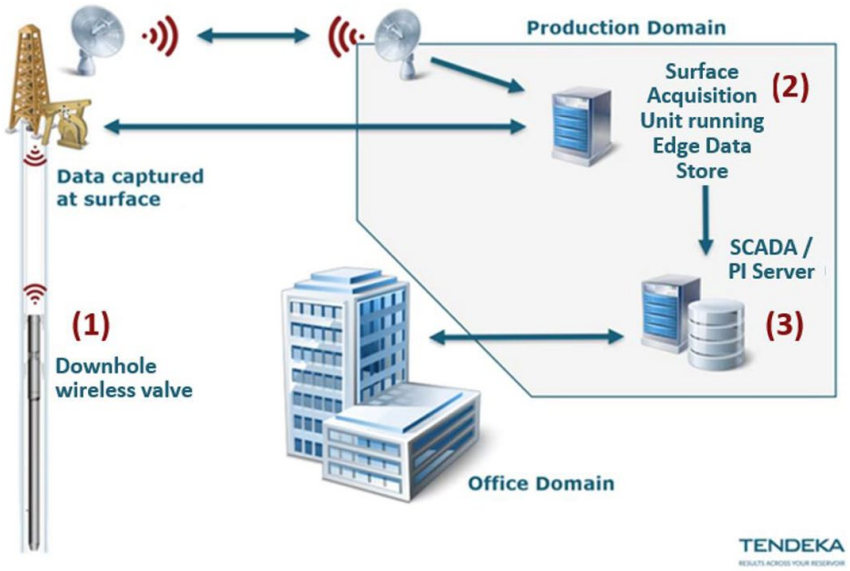
For an ordinary ambient valve, regulators can require monthly testing. Now, having access to a constant stream of performance data about the continued functionality of the valve means that the well no longer needs to be shut down for testing as frequently. Any problems that arise can be found and fixed sooner, so production can continue uninterrupted.

"Before installing the new valve and edge data monitoring system, this client had little visibility into what was going on downhole," said Andy Nelson, senior software engineer at Tendeka.

"They would either know it's working or it's not working, but they wouldn't know until they had a problem," Nelson said. "Now they have this insight into well performance and environmental conditions every 24 hours."

Robust IoT devices are critical to gathering data in rugged environments, but they're only half the battle. To make intelligent use of smart devices, you need a data system that can reliably collect sensor data in real time and run without IT support on low-cost devices. Crucially, you need be able to transmit the data securely to your central operations data store. EDS is well-suited to the sometimes-harsh environments of oil extraction.

PulseEight wireless interval control valve



A diagram of the data system that relays information from (1) a wireless-enabled valve in the wellbore, to (2) a Surface Acquisition Unit running Edge Data Store in the field, and then to (3) a centralized PI Server data store.

While testing data transmission between EDS on the surface unit and the client's central PI Server, Nelson decided to conduct a stress test. Under ordinary conditions, EDS is set to relay telegram data every 30 minutes. Nelson set it to 30 seconds, to see if EDS could handle a firehose of data.

The result?

"EDS is capable of handling a lot of data," Nelson said. "Basically, about every 12 seconds per gauge, I'm reading about 17,000 data points, and then I'd write instructions back every 30 seconds as well, and then synchronize that data with PI Server. And it just worked flawlessly."

Now back in service, the client's failed well is producing again at nearly tenfold its pre-shutdown rate and production is expected to rise further.

Data sharing enables new services

In addition to making well data available in the field, EDS can securely transmit data to an integrated, cloud-based data management platform called OSIsoft Cloud Services (OCS). OCS gives authorized Tendeka experts the ability to view and analyze client data, so Tendeka can deliver customized asset monitoring services. Combining the wireless PulseEight system with the data management capabilities of EDS and OCS allows Tendeka to deepen customer relationships and provide new value-added services.

"Basically, about every 12 seconds per gauge, I'm reading about 17,000 data points, and then I'd write instructions back every 30 seconds as well, and then synchronize that data with PI Server. And it just worked flawlessly."

-

Andy Nelson,
Software Engineer, Tendeka