Case Study: Modernizing Data Acquisition in the Oilfield

How Deep Well Services scaled real-time well data

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CASE STUDY: MODERNIZING DATA ACQUISITION IN THE OILFIELD

How Deep Well Services scaled real-time well data

A Deep Well Services' remote well pad

If you've ever tried to manage operations in the oil and gas field—especially during completions—you know how hard it is to get a clear, real-time view of what is happening on the well pad.

Completions come after the drilling and fracking phases. They involve clearing plugs, flushing debris, and opening the wellbore so hydrocarbons can flow freely. These operations move quickly and often rely on mobile units and multiple service providers working in tandem.

For many teams, visibility into this critical stage is limited. With siloed systems and fragmented data from different vendors, teams are often flying blind. In a high-cost, high-stakes environment like completions, those blind spots don't just slow things down—they increase the risk of expensive delays, miscommunication, or preventable safety incidents.

That was exactly the situation facing Deep Well Services™ in 2022. Unless someone was physically present on the

pad, it was almost impossible to know what was happening at any given moment.

WHO IS DEEP WELL SERVICES?

Founded in 2008 and based in Pennsylvania, Deep Well Services (DWS) is a specialized oilfield services provider focused on completions and well intervention. Their core offerings include hydraulic completion units (HCUs), pump packages, and chemical injection skids—equipment essential for clearing and preparing wells after the drilling and fracking stages.

Serving major energy companies across North and South America, and with growing interest in international markets like the Middle East, DWS has built a

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reputation for safety, field expertise, and more recently, for pioneering advanced data acquisition (DAQ) in environments where real-time visibility was once out of reach.

THE PROBLEM: DISCONNECTED SYSTEMS AND LIMITED VISIBILITY

Traditionally, DWS—and the completions sector in general—relied heavily on manual processes. Field crews recorded job functions by hand, filled out spreadsheets, and sent logs via email. There was no internet connectivity to field equipment, and data acquisition systems were either non-existent or limited to single-unit setups.

Supervisors could not verify activity in real time or catch mistakes before they escalated. If torque values spiked, if a valve failed, or if flow rates dropped unexpectedly, off-site teams would not know until hours later—if at all.

For field crews, the lack of real-time context made transitions between shifts clumsy and error-prone. And when customers requested post-job reviews or raised concerns about equipment usage, the only records available were disconnected spreadsheets and handwritten logs—insufficient for proving performance or defending decisions.

Previous attempts to solve these issues using third-party vendors had failed to deliver. Available systems weren't


A technician manually operates snubbing equipment

designed for the rugged, mobile, and fast-paced nature of completions work, where equipment is frequently powered down and redeployed across regions every few days.

A NEW DIRECTION: BUILDING DAQ IN-HOUSE

The push toward modernization started with CEO Mark Marmo, whose forward-thinking approach set the stage for digital transformation. In 2022, DWS brought in principal engineer Sean Peck to lead a small internal team focused on designing and deploying a reliable, scalable data acquisition (DAQ) system that could survive the realities of field work.
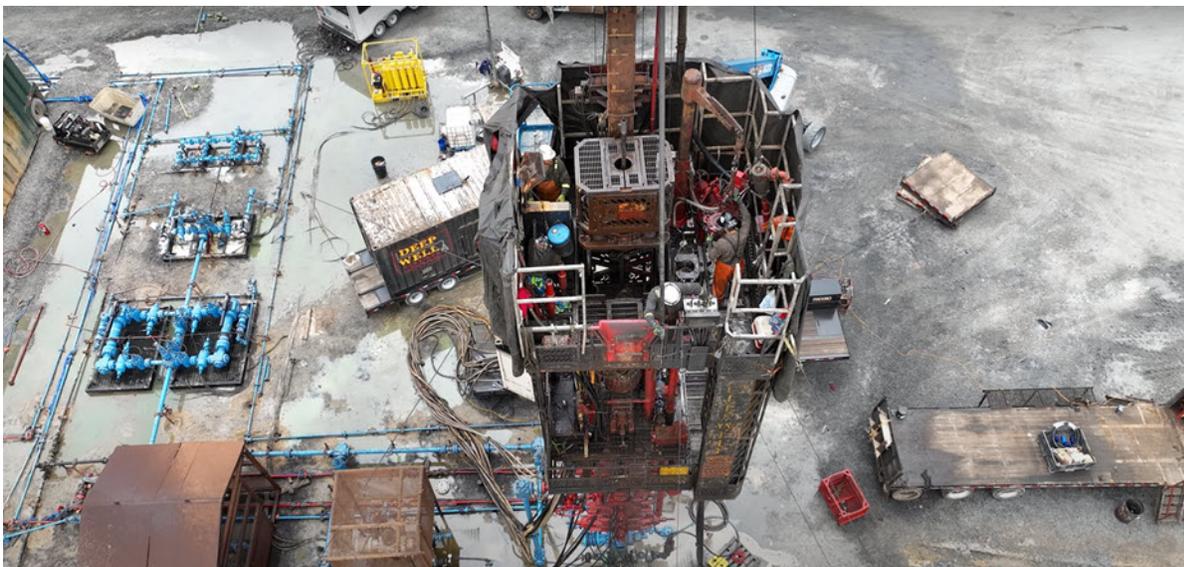
Top-down view of an active snubbing unit

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Peck began exploring alternatives to the expensive and rigid platforms DWS had previously tested—many of which relied on LabVIEW® and required specialized integration support.

Opto 22's *groov* EPIC is a central part of the DAQ system for Deep Well Services

While researching flexible, industrial-grade options, he came across Opto 22's *groov* EPIC [**E**dge **P**rogrammable **I**ndustrial **C**ontroller] on YouTube® in a video case study on Pioneer Energy®—featuring a mobile flare gas recovery unit. The edge-processing capabilities, integrated visualization tools, and rugged design of EPIC caught his attention.

"It was affordable, adaptable, and most importantly, designed for environments like ours," says Peck, "so we pivoted to building the DAQ internally—with *groov* EPIC central to the design."

INSIDE THE DAQ SYSTEM

The team selected the GRV-EPIC-PR2 as the backbone controller. It provided a reliable edge platform with a built-in touchscreen and integrated security, local visualization, and remote management—all critical for mobile units in harsh, disconnected environments. To complete the chassis, they deployed:

- GRV-IMAI-8 analog input modules, which connect to 4–20 mA sensors used to monitor pressure, temperature, and other critical well data. These modules simplify wiring by supplying loop power and converting analog signals directly into process data for the control system—reducing installation and debugging time.
- GRV-IRTD-8 modules for temperature inputs where required
- GRV-EPIC-PSDC and GRV-EPIC-CHS4 for power and compact housing

To complement the new hardware, *groov* Manage (*groov*'s built-in management software) and *groov* View (the web-based HMI software included with every *groov* EPIC) made commissioning, troubleshooting, and HMI access quick and convenient.

Field techs could use *groov* Manage to verify I/O status and troubleshoot, and *groov* View provided real-time data. Techs can access both programs on any authorized mobile device or computer, or directly on the EPIC's built-in touchscreen—a rare feature in the PLC world.
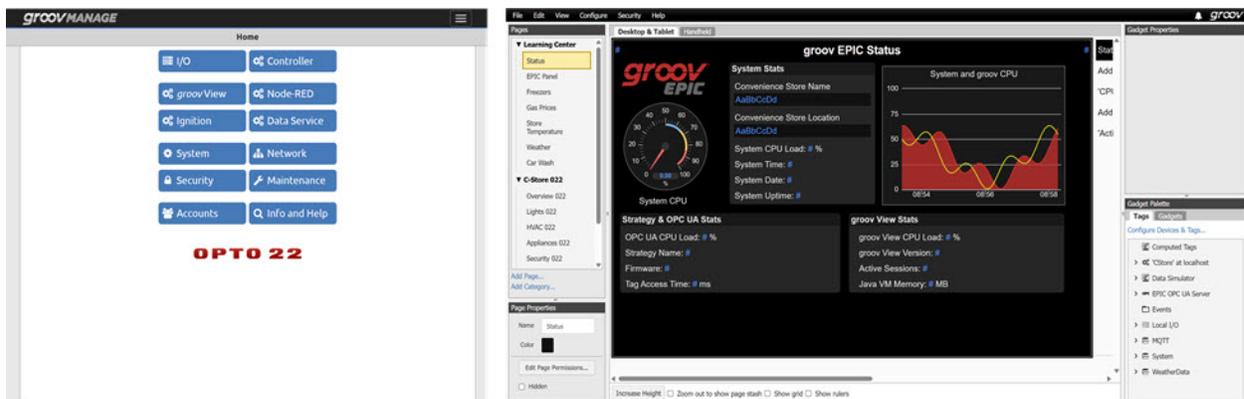
Opto 22's *groov* EPIC comes with *groov* Manage software and free HMI software *groov* View

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Supervisor analyzes historical well performance from inside monitoring trailer

The modular, plug-and-play design of the system—combined with DWS' streamlined in-house build process—meant they could install and commission a fully functional unit in as little as two days. The architecture was compact, repeatable, and well-suited to the mobile, harsh conditions of completions work.

UNIFIED DATA ACROSS THE PAD

With a strong hardware foundation in place, DWS built out the rest of the system architecture using a ruggedized Industrial PC (IPC) integrated into each completion unit. The IPC hosts BoreSite®—a custom-built web portal developed internally by DWS' software engineers.

While early prototypes ran Node-RED directly on the EPIC, the team eventually offloaded heavier applications and elected to run them on the IPC, using Opto 22's free

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>
> **- Sean Peck, Deep Well Services**

Node-RED *groov* I/O nodes, which poll the EPIC's I/O using the OptoMMP protocol to collect process data.

BoreSite has become the unifying interface that ties everything together—bringing structured insight to a pad previously defined by disconnected gear. The software aggregates data not just from DWS' own equipment, but also from third-party systems commonly found on a completions site—including chemical injection units, flowback systems that capture and measure fluids returning from the well after fracking, and pit level monitors that track fluid levels in on-site storage tanks or containment pits.

All data is collected over wireless links and securely transmitted to the BoreSite portal, making edge devices easily viewable. With Starlink®, the system delivers both local and remote access—even in areas with no traditional connectivity.

RESULTS IN THE FIELD

"The impact has been substantial. What started as a small internal deployment—built by just a handful of engineers and techs—has grown into a core platform used across the fleet," says Peck.

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From 2022 to 2025, DWS scaled from a single pilot system to more than 20 *groov* EPIC-based units in the field, with another 10 kept in inventory for rapid replacement. The team's ability to deploy and commission new systems within two weeks helped support this expansion without slowing field operations.

BoreSite, layered on top of this hardware foundation, is now deployed on more than 30 client sites. DWS' competitors have even requested BoreSite on their own equipment.

According to DWS, their teams can finish a drill out 1 to 1.5 days faster than the competition—an enormous advantage when each day on a wellpad can cost upwards of $200,000.

Advanced analytics features, such as torque and drag modeling, allow engineers to correlate wellbore friction factors with real-time data. This enables customers to optimize how long they clean the wellbore after milling—avoiding unnecessary steps and saving additional time and money.

The system has also proven valuable in root cause analysis. When equipment is damaged or performance issues arise, BoreSite provides the hard data needed to verify operational parameters and defend against costly claims.

> **"It's been one of the fastest and easiest system deployments I've been a part of. And the fact that our customers now want it on their other providers' equipment says a lot."**
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> **- Sean Peck, Deep Well Services**

LOOKING FORWARD

As DWS continues to replace legacy systems across its fleet, its engineering team is exploring new capabilities. One area of interest is integrating Ignition Edge® by Inductive Automation® for advanced SCADA functionality and greater visibility across the enterprise—from pad to executive dashboard.

The team credits the success of the initiative not only to the reliability of their chosen hardware and software stack but also to the accessible design tools, strong vendor support, and the ability to test and troubleshoot with minimal friction.

"It's been one of the fastest and easiest system deployments I've been a part of," said Peck. "And the fact that our customers now want it on their other providers' equipment says a lot."
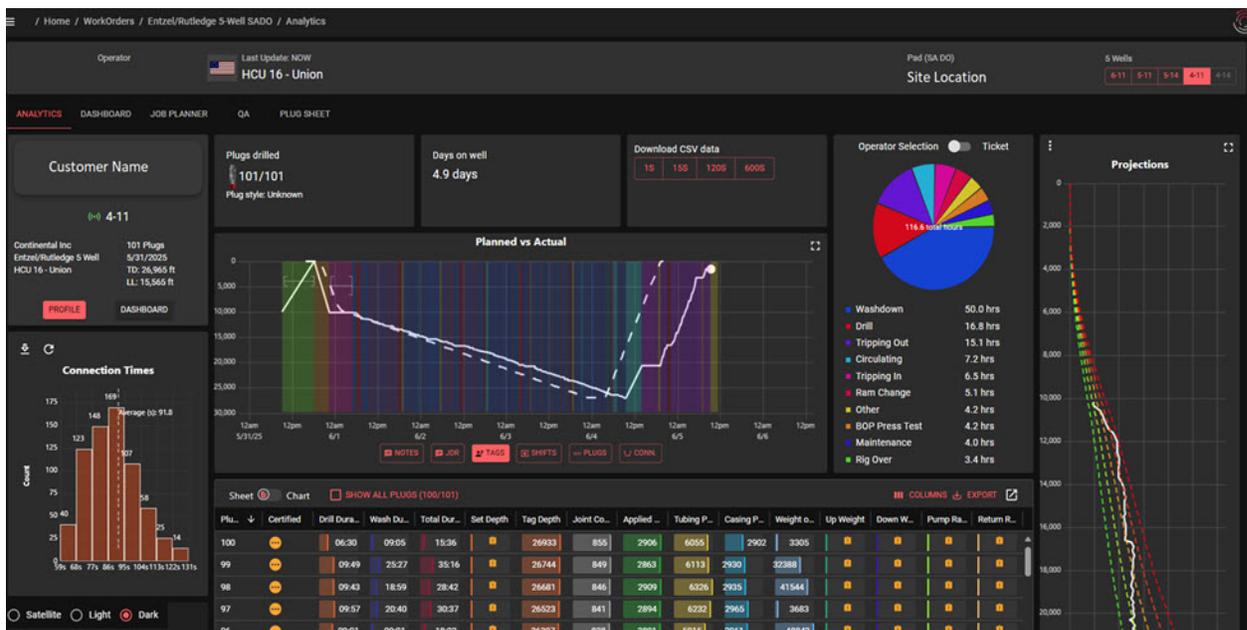
Viewing analytics on DWS' BoreSite portal

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ADVICE TO OTHERS

For others in oil and gas—or any sector with remote, analog operations—DWS recommends starting small, learning from available resources like technical webinars and video case studies, and designing for modularity and redeployment.

Their experience shows that it's not just possible, but practical, to bring modern DAQ to the field without massive engineering overhead or long implementation cycles. The key is picking the right people, the right tools, and building a solution that fits the reality of field work—not the other way around.

"We didn't wait around for the perfect off-the-shelf solution," says Peck. "We built what we needed with the people we had—and because of that, we understand every wire, every line of code, every field condition it was built to survive. That's what makes it work."

ABOUT DEEP WELL SERVICES

Deep Well Services (DWS) is a technology and training company that specializes in high-pressure, long lateral, and multi-well completion and intervention operations. Based in Pennsylvania, they are a premier oilfield services (OFS) company for over 70 different Exploration and Production (E&P) companies across North and South America. An American Petroleum Institute (API)/Q2-registered company, they are committed to continuous improvement while mitigating risk and increasing efficiency.

Driven by patented data analytics systems, DWS is focused on the continued development and innovation of the most advanced Hydraulic Completion Service on the market today. In fact, they completed 964 wells in 2024 alone!

For more information, please visit: https://deepwellservices.com

ABOUT OPTO 22

Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable.

DWS headquarters in Zelienpole, PA

Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company developed the red-white-yellow-black color-coding system for input/output (I/O) modules and the open Optomux® protocol, and pioneered Ethernet-based I/O.

Famous worldwide for its reliable industrial I/O, the company in 2018 introduced *groov* EPIC® (edge programmable industrial controller). EPIC has an open-source Linux® OS and provides connectivity to PLCs, software, and online services, plus data handling and visualization, in addition to real-time control.

groov RIO Ethernet-based edge I/O modules, introduced in 2020, include I/O and IIoT software in a compact industrial package that goes anywhere.

All Opto 22 products are manufactured and supported in the U.S.A. Most solid-state SSRs and I/O modules are guaranteed for life.

The company is especially trusted for its continuing policy of providing free product support, free online training, and free pre-sales engineering assistance.

For more information, visit opto22.com or contact **Opto 22 Pre-Sales Engineering**:

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