



CLIENT SOLUTION CASE STUDY

Equipment Manufacturer Upgrades to a Truly Modern Supervisory Control and Data Acquisition Systems

DIGITAL TRANSFORMATION AND MICROSOFT POWER PLATFORM

Expanding Into New Markets Requires New Innovations

An original equipment manufacturer (OEM) primarily in the military space began to find more and more demand in the oil and gas industry where there's need for engines that can be mounted on trailers. To balance their primarily military market presence with more industrial customers, this was very attractive.

The table stakes for these new oil and gas markets, however, would include remote engine performance monitoring as a standard, which was not the case in military applications. Competitors in this space already had remote monitoring solutions, commonly referred to as supervisory control and data acquisition (SCADA) systems in place for decades. The manufacturer would need to exceed these services. Though they initially considered integrating an available off-the-shelf SCADA system, their design team saw greater opportunities.

Applying Modern Tools & Techniques to Disrupt the Existing Market

The exploding variety of new tools and platforms in the IoT space and cloud computing began the design team's search for the right platform provider to help them develop a truly modern SCADA solution exceeding anything others were currently offering. The team evaluated a several different players in the field, but Microsoft was the one that attracted them most because the tools were continually evolving. They saw they could start off with a fundamental system, knowing that it would continue to grow.

Their current partner Velosio had the resources required to productively partner with their own people to apply Microsoft technology to their SCADA development.

They began by building an early proof-of-concept model to demonstrate what was possible. Upon production of their beta version, approval was obtained from the CEO to fund and proceed with the development, delivery, and continuous improvement of the remote monitoring solution.

Automated Updates Keep Team Informed and Drastically Cuts Time to Resolution

Each one of the engines has its own computer-based controller which coordinates and orchestrates all functions. Since the controller must maintain and process a large amount of data, they put an Edge device in with the controller to grab the data and immediately send it to a SQL database running in the Azure cloud service. There, the data is served up to Power BI along with streaming analytics which users can immediately consult on dashboards in the platform or use to generate reports.

Previously, alerts would come in from the field indicating anomalies or other engine problems. These would wind their way through email and messaging eventually arriving where someone would do something about them. Now, alerts go directly to the Power Apps that are controlling the resolution process, cutting resolution time to a fraction of the former time required.

The team has deployed mobile Power Apps on specific user's devices that will notify them of new data available for them to analyze, at which point they can log into Power BI to consult that data. Since it was deployed, they are successfully receiving alerts from all their engines.

Another improvement that Velosio helped them make was a connector that links the engine's hours and cycles of, recorded in the remote monitoring system and assign the values to each component installed in the engine during that period of operation. The manufacturer, as a standard procedure, resets the hour and cycle counter each time a component is replaced. This information allows us to evaluate the frequency with which these components are repaired or replaced, helping us to maintain an optimal inventory of said parts.. This proves to be a significant cost-saving feature.

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- Design Team

GPS Capabilities Provide Insight to Location When Enabled

Oil and gas companies also had another requirement that the military did not. Location. They wanted to always be able to see where their engines were currently located. For obvious reasons, that was something the military would seldom if ever want. The edge device is equipped with a GPS antenna for accurate geographical location, this feature can be easily enabled or disabled depending on the customer's operation.

When asked if this new remote monitoring tool is incorporated into the price of the engine itself, or part of a separately billed service agreement, a member of the design team replies, “We're going to make it part of the service contract, both as a standalone product for existing customers and another for new engines where we provide a warranty period. This would be part of that warranty period.”

Data Leads to Actionable Insights

Data aggregated across all of the equipment manufacturer's customers will be made available for performance comparative analysis and other evaluations against a mean. "That will be the real value to our customers," explains the team. "Right now, let's say they scheduled an inspection for the next six months. With this aggregated data for reference, we can tell a customer his engine has run 30,000 hours, but he didn't run it at full power. He only ran at part power. Therefore, we don't need to put this red line at 60,000 hours. We can put this red line at 80,000 hours and give him extended life so he can stay in service longer and not have to take his engine out of service to do an inspection that really didn't need to be done because he didn't run it that hard."

The design team is realistic about how much of the data they will be able to collect. "We want to collect a hundred percent of the industrial, marine and oil and gas operational data with our remote monitoring tool."

A Solid Foundation to Expand ML and AI Capabilities

The driver for development of this solution on the Microsoft platform was to deliver services superior to the existing competition.

"We passed what SCADA can do," exclaims one team member. "If they're just doing SCADA we've surpassed them. We're doing thermodynamics-based modeling as well as predictive maintenance tools."

We've implemented a very simplified digital twin. In theory our models will continue to improve and gain greater fidelity as we continue to receive data through our remote monitoring system."

"Our next phase of the project is going to be heavily invested in improving the predictive maintenance capabilities of the system through machine learning and AI."

Immediate Access to Data Anywhere in the World

During the pandemic, Americans could not travel to China, but one of the manufacturer's customers there had engine trouble.

Fortunately, the remote monitoring system was installed and operating on those engines. The team was able to see the data collected, download it right through Teams, make their analysis to decide what the next move should be. Then, using their edge device to log into the system in China, they were able to make all the necessary changes their engine controller, from here in the US.

The enthusiastic engineers in the equipment manufacturer's team shows up as they add, "And then we could test again 45 minutes later. Wow. The key when you're doing stuff like that is iteration. Without being on-site being able to do iteration is really difficult, but the technologies we have today really saved us in that regard. Otherwise, we'd have to wait two years to commission those engines, but we got them out there."

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