Distributed generator management with WinCC OA

The system integrator DMC, Inc., works extensively with a manufacturer of heat and power cogeneration systems used in a wide variety of industries from oil production sites to hospitals. The complexity of these systems and their frequent installation at remote and un-manned facilities caused the manufacturer to enlist DMC to provide a new SCADA system approach. It had to be capable of supporting remote monitoring and data collection, while providing a high level of scalability and flexibility to interface with a large installed base and create mechanisms for ongoing growth. Kristie Shea, project manager at DMC explains how the project has been unfolding.

System integrator
DMC Inc.
DMC is WinCC OA Solution Partner in Chicago, USA

About the project
Manufacturers in competitive industries understand how flexibility and agility can give them an edge in difficult markets. So, when a builder of heat and power cogeneration systems needed a single cohesive control system environment, it turned to automation system integrator DMC, Inc. DMC's engineers knew the answer would be a proven high-end SCADA system.

“One problem out of the gate was that the user had several external solutions stapled together, leading to three or four disjointed applications just for monitoring,” said Shea. “The user also had none of the source code, so it was more challenging to do upgrades. As a result, they didn’t have the flexibility needed to make modifications for a growth plan to build a system for new business opportunities.”

For the manufacturer to grow, it needed to make a smart upgrade. It outlined basic project requirements, necessitating support of new designs so it could jump into additional business opportunities while retaining the ability to view and manage 250 scattered legacy sites.

A single vendor was preferred. Thus, it was critical that they select a vendor with global presence, a solution that was highly flexible, and an offering with the latest technology. “We worked with the automation lead and the end-user to define the hardware and software needed based on their process designs,” Shea explained. “Our primary concerns when defining the hardware for the solution were the cost, timing and process for integrating the technology the design team selected.”
For this solution, DMC and the client selected SIMATIC WinCC Open Architecture (WinCC OA), zeroing-in on eight specific capabilities.

Shea said the customer’s headquarters wanted to use a distributed architecture for a single glimpse into all its clients throughout a region. “The system is easily scalable and was designed to add hundreds of sites without a problem. The bandwidth made it was easy to have lots of I/O distributed around remote sites,” said Shea. “In addition, if one site wanted a specific upgrade, they could provide it without affecting any other site. Conversely, if they wanted to make a global change for a feature roll out, they could do that too.”

A distributed and scalable architecture for production efficiency

Once the company understood how the scalability could be leveraged, it opened new possibilities for migrating legacy locations with minimal downtime.

“The next solution will be focused on upgrading the customer’s legacy sites,” Shea added. “With the data they are currently collecting, we will virtualize it into the WinCC OA environment so none of the existing hardware will need to be changed, avoiding a big cost. This way, customers can install new features for regulatory and safety requirements while maintaining visibility into their systems and with low migration costs. It will give us the ability to future-proof even the oldest legacy installations.”

This scalable approach particularly benefits the oil and gas industry. “In well sites, you can have a single remote site and any number of stations,” she said. “Drilling at the stations can be tagged back and relayed to the site. As a result, headquarters is updated on each station and every site can have a unique configuration. Similarly, WinCC OA’s object-oriented and modular platform
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allows customers to have a template for different types of trucks and skids at a fracking sites to easily reconfigure each based on that site’s unique needs.”

Auto generation of new sites
Since the manufacturer plans to build many new sites, easy configurability for new locations is paramount. Shea described the tool as a wizard — the user selects the types of generators, the type of PLC from a manufacturer, the IP address and gives it facing information about site specifics.

Then, the system automatically creates all the data collection points and the graphics for that particular site. When the remote site is programmed and scripted it seeks out headquarters. Headquarters responds by making a new connection automatically polling for needed information. Finally, it rebuilds all its data points and graphics to have full visibility into the site. That is all through the configuration tool — you don’t have to go back and manually create any new screens.

All new well sites can be added without any changes to the server, regardless of the kind of device. At fracking sites, this capability extends to when new trucks arrive. Siemens' WinCC OA team has done a proof of concept illustrating that a new truck driving onto a site can connect automatically to the network for visibility into operations. This ultimately delivers production efficiencies for customers.

Remote monitoring for meeting regulatory requirements and more
The manufacturer’s headquarters wanted visibility in the field, and that meant remote monitoring.

“In phase one we created configurations where managers could sort, rearrange, zoom in, zoom out — basically get any view they wanted,” Shea explained. “The screen was extremely dynamic, capable of zooming in on an individual generator. The customer’s design team wanted simultaneous visibility for a particular generator at a particular site so headquarters could have details on any generator at any time.”

In the next phase, DMC plans on integrating the solution into a GIS (Geographical Information System) viewer so they can look at a map, which would be color coded for running or not running; verify operations are in compliance with regulatory requirements, or monitor other safety and performance measures. Shea said the customer will be able to click on a site, pull up views and then aggregate data for specific operations or business needs.

In an oil and gas industry context, a GIS viewer can indicate a well’s status, color code it, and create views all the way down to a particular actuator at any site. With proper permissions, a supervisor can make adjustments remotely, perhaps in anticipation of a weather event or preparation for a maintenance crew. When used at a fracking site, this technology can create a layout of a skid that has an overview of the data truck to provide a comprehensive view of
what is going on. The same approach is well suited to a pipeline where there can be thousands of stations condensed into prioritized views.

**Data for performance**
Collecting data to get performance information so it can be integrated with billing is ideal for power generation customers. This typically extends to usage, faults, maintenance, regulatory compliance and various more specialized items that are included in reports. All of it is backed-up at headquarters where invoicing can be completed.

“In oil and gas, data collection is imperative,” Shea added. “Data processing onsite reduces traffic, so customers can host robust data collection with a connection to headquarters that does not need to be active at all times. The system buffers data to send it up on demand, which enables fast access when needed for production decisions. High speed is available, up to 15 milliseconds collection, which is really fast.” With a look toward the future, Shea said DMC looked at the customer’s tools and configuration needs: “We created an architecture, based on the customer’s requirements, focusing on the tools they thought they would most likely need in the future. New site deployment was one, adding new sites and generator parameter assignment, and doing it through a configuration tool. The expectation was that collecting more data would provide more insight into new things they wanted to collect or change.”

This approach was practical and easy to implement because systems shipped to the field had pre-set components built in ready to pick up. With scripted tools, it was possible to avoid downtime and the need to bring in integrators was reduced. In many cases, changes could be made remotely from headquarters. The tools allow changes to be made and saved without interrupting operation, which permits automated startups at sites.

Another key aspect in setting up a large distributed solution is accommodating the number of developers working on a project. WinCC OA helps in that area because it is geared toward a multi-user, reusable environment.

“The developer environment is object-oriented and easy to use, which cuts down on development time,” Shea said. “You can make a lot of bulk edits, export your tag generation, and then build on it. Multi-user development is also key. One case in point is an oil and gas environment, where one operator is really knowledgeable in pumps and the other knowledgeable in compressors. They can work separately in their own environments and then easily merge their logic back into the system.”

At a site, it is not always possible to have sophisticated capabilities on hand to view and diagnose issues, so that is where using Ultralight clients or having a solid web user interface comes into play. With a web-based user interface, it is possible to view the asset’s details on a tablet or smartphone. “For our customer, the next phase will incorporate mobile data,” Shea said. “A large site may have generators scattered around and there is not always an HMI at every
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station. This way, technicians can utilize a tablet to see what’s happening while they are standing next to equipment. This can be very useful around pipelines where you don’t have to have an HMI in your truck. It enables data to become available when operators are walking around and frees them from fixed stations.”

The sites where these systems are installed rely on them for dependable energy delivery, either heat or electric power, so that capability is always foremost for users. It must also be delivered safely, efficiently and in compliance with all regulatory requirements. Adding a supportive environment using WinCC OA helps users get the highest performance possible. Successful installations also reflect well on DMC.

“Success to me is delivering the data, productivity and safety that my clients need, and growing our business with that client,” Shea reflected. “This starts with automation products that are simple to program and intuitive in their design, and ends with the operations team accepting our work after dynamic testing. Our goal is to work with automation manufacturers that provide good information and education, marketing support and a product that our clients want.”

**Technical data**

For this solution, DMC and the client selected WinCC OA, zeroing-in on eight specific capabilities:

- Distributed architecture
- Scalability
- Auto generation for new sites
- Remote monitoring
- Data collection
- Custom tools and configuration aids
- Multi-user reusable development
- Ultralight client and web user interfaces

DMC used these features to create a flexible system that would produce immediate benefits for the client. WinCC OA works well in distributed architectures and it is easily scalable so a system can start small and expand into more sites. It is also PLC platform independent, allowing integration with multiple technology platforms and legacy systems.
Special features / options
In addition to the features already mentioned, there are other benefits well suited to an oil and gas solution, such as safety. WinCC OA is SIL 3 certified, and it is the only OEM SCADA platform that has such a certification. The system also has video integration, which is similar to a DVR video capture.

“It is the only SCADA system like it in the market,” said Kristie Shea, project manager at DMC. “You can loop your feed over two to three minutes and then when a system event is triggered, it stops overwriting and captures the feed for a specified amount of time. Given all the isolated sites with no people around, it provides a very robust way to go back and look at what happened.”