

Capstone Technology Serves as Catalyst for IT/OT Convergence at Specialty Chemical Manufacturer

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Overview

Converging information technology (IT) and operational technology (OT) in industrial organizations can break down siloes and help defend the organization against new challenges.

However, successful IT/OT convergence requires close cooperation and collaboration between an organization's previously separate IT and OT groups and systems (historians, LIMS, etc.).

Manufacturing companies are working to improve their processes, technologies, and business models to align IT with OT.

ARC Advisory Group observes that most forward-thinking companies today aren't just trying

to survive the changes; they're working to gain a competitive advantage, improve operational efficiency, and maximize profitability. These companies are leading the digital business transformation in manufacturing. Clearly, this shift is bringing new and challenging projects to the IT and OT professionals working within the industry, but the savviest leaders among these also know that success in this new climate means working together closer to improve collaboration.

ARC Advisory Group recently spoke with a production engineer at a large specialty chemical manufacturing facility in Maryland about how that company is using Capstone's dataPARC technology as a catalyst to accelerate IT/OT convergence leveraging existing systems. Based on the successes to

This report illustrates how a large specialty chemical manufacturing plant in Maryland is using Capstone's dataPARC technology to accelerate IT/OT convergence. The use cases illustrate how connecting manufacturing operations data sources directly to the enterprise system have improved the company's operational effectiveness and provided benefits enterprise-wide.

date, the dataPARC technology is being rolled out across the company's operations enterprise-wide. As we learned, the technology enables the company to monitor performance in real time, improve internal collaboration, and increase process visibility and production efficiency while improving product quality.

IT/OT Divergence Previously Resulted in Functional Silos

Previously, the company had a robust OT system, but no way to analyze its data. "Before we brought on dataPARC it was difficult to use the OT system because it was not intuitive. At the time, only engineering was using it, no operators, no managers – they had limited collaboration and no buy in from anyone," the production engineer told us.

The company had a lot of operations information and systems but could not manipulate the data easily or consolidate it all into one graph. Its OT systems were not integrated into its IT systems, which included the eQuill document management, GLIMS laboratory management, and SAP ERP systems. Operators manually inputted field sample data into one system, but the information was siloed and not communicated to the other systems.

Moving Towards Convergence

As we learned, the company chose the Capstone dataPARC software suite because it believed it could be implemented quickly and would be easy to use. Additionally, the software would enable the company to focus on the seven previously identified requirements for its IT/OT convergence:

- **Speed & reliability**– For fast, reliable access to real-time and historical production data to support troubleshooting
- **Compatibility** – The new technology needed to work with the company's current systems
- **Scalability** – The technology needed to be able to scale smoothly, not just across the site but also enterprise-wide
- **Advanced modeling** – Enabling the company to create models of the ideal process to see if the actual process deviated from the model process in real time and to determine predictive asset failure rates
- **Complex process analytics** – Grace wanted to be able to do more complex process analysis and create analytics that could display custom data

- **Opportunities** – The company wanted to find additional opportunities to reduce plant downtime and reduce poor quality to increase in first-pass quality (FPQ)
- **Mobile communications** – Communicating critical operations failures to anyone, anywhere, at any time, from any device

Plant Data in a Single Dashboard Enables Collaboration

dataPARC's operational intelligence capability enabled the company to combine data from multiple sites and existing data sources into a single view



dataPARC Provides Single Window into Multiple Data Sources

without double-configuration of tags or double-storing of data. This operational intelligence is now available through a common user interface for all the company's systems, eliminating the need to have to look for data in multiple databases. This intelligence helps the company improve its asset performance and process operations efficiency.

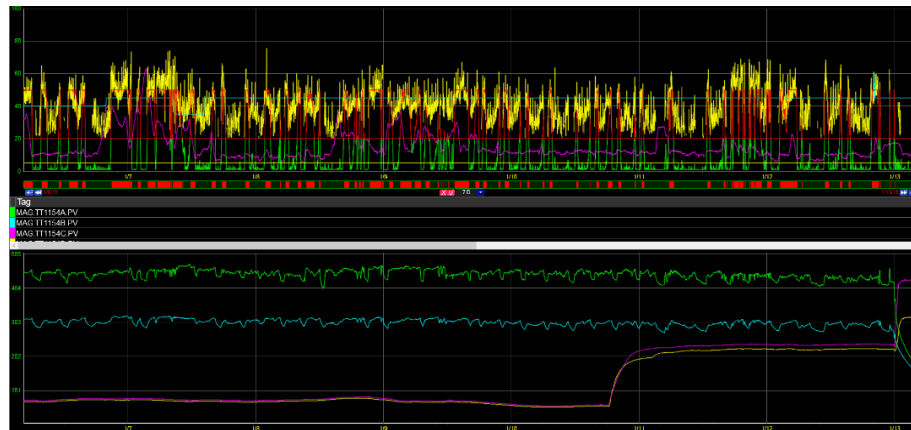
The company can now generate reports from the real-time and historical process data and use these to determine the causes of

process upsets and asset failures to improve processes and support proactive maintenance.

We learned about several examples of how the company is using the software to avoid downtime, improve quality management, improve visibility into the process, and predict process behavior.

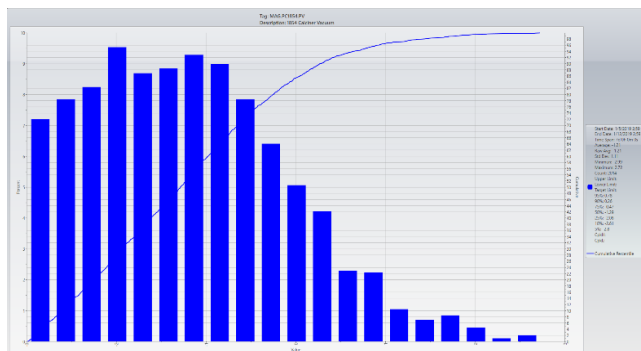
Alerts for Baghouse Deviations

In its baghouse operations, the company used the technology to create an alarm system that would send an appropriate alert or alarm notification via email, phone, etc. This notification enables employees to see and review the actual trend using a link to the operation trend. The graph illustrates a seven-day trend with the areas in the red (see chart) quickly showing when the baghouse is operating outside of normal operating limits.



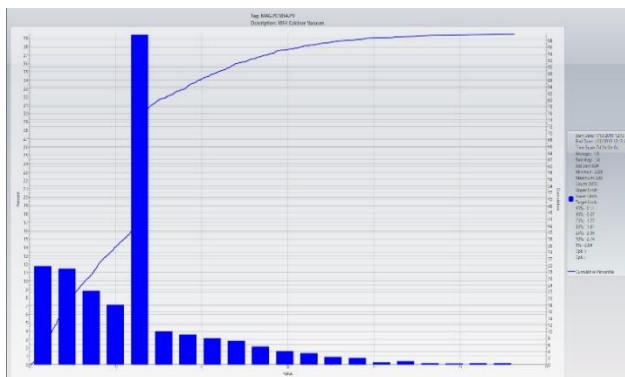
dataPARC Extended Operation Notification Trend

These data enabled the company to determine that the baghouse had a failure rate of about 28 days. This information allowed it to create a preventive maintenance plan that reflected a 28-day shutdown of that baghouse, enabling it to switch over before failures occurred.



Out-of-Control Baghouse

consistent vacuum trends across the baghouse. If the vacuum deviates from normal, the operators and workers know that the baghouse is failing, and planned maintenance is required.



Consistent Vacuum Trend in Baghouse

The company also started generating weekly reports of the baghouse that allowed it to quickly see when the baghouse was out of control. It quickly realized that when the vacuum on the equipment varied, there was a problem. The operators needed to see a consistent vacuum trend. Now, using the technology, the company is seeing more

Quality Management with “Data on the Go”

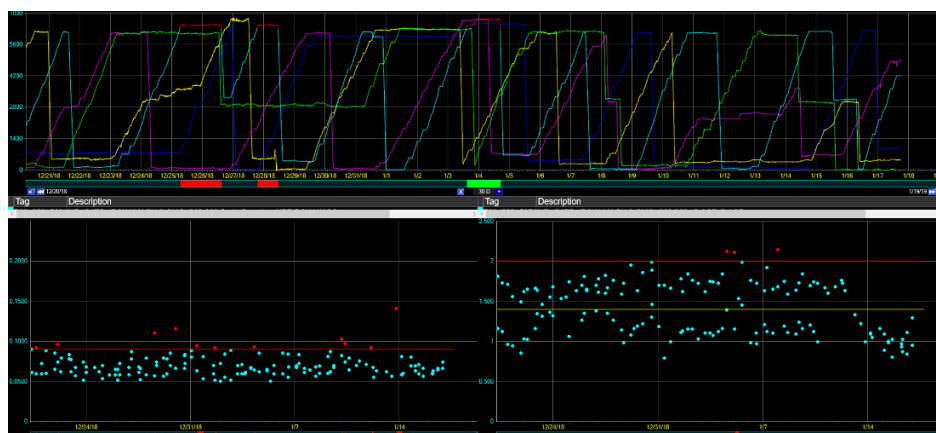
The company also used the software to provide quality management system data to users anywhere “on the go.” In 2017 before implementing dataPARC, it had experienced a product quality issue over a weekend with a manufacturing process that ran 24/7 to produce a high-demand, sold-out product. Since it did not discover

that the product was out of spec until after the weekend and the product was already packed in drums, it was too late to make modifications. This out-of-spec product cost the company \$280,000.

Now, with the dataPARC software suite, production operators get an alarm notification email or text linked to the trend so they can notify a foreman immediately before the out-of-spec product is packaged. These real-time notifications helped the company improve its bottom line by reducing the costs associated with poor product quality.

Intuitive and Centralized Digital Dashboard

The company also streamlined its process view with a centralized and simple user interface in the form of a dashboard that provides operations, maintenance, management, and other appropriate personnel with the needed information. Now, control room operators, engineers, and plant managers use the dashboard every day for reviews. The new dashboard enables them to view and obtain critical process information to be able to tell instantaneously if the process is out of range. For example, on the simple dashboard shown below, the operator can easily determine that there is an issue with the Final pH (red points in the bottom right corner). If additional information is needed, the employee can drill down on the pH using the dashboard interface.



OT Data (top) Integrated with LIMS Data (bottom)

Operators can also drill down on the raw material information and make sure all the tanks are in normal operating mode. If they determine that the pH is not the cause of the problem, they can look at the quality data from a different system on the same screen to see if the process is out of control for this one instance, whether it has been out of control for a while, and if it is a

known issue. This centralized dashboard for all plant personnel enables collaboration, helps prevent downtime, and improves production efficiency.

Data Modeling to Predict Process Behavior

We learned how the company is using the technology's modeling tool and analytics to predict steam outages on its batch dryers using historical data. Using the "best fit" model, the data is overlaid on the actual running process data to compare how the process is behaving using a root cause analysis tool. The results are used as an early warning system to determine if the process is deviating from ideal or normal behavior. An indicator or alarm notifies operators if something is going wrong early in the process so that the deviation can be minimized or prevented.

Benefits

The Capstone dataPARC software is helping the company converge its previously separate IT and OT groups and systems without costly and time-consuming rip-and-replace of legacy systems. Now laboratory scientists, engineers, operators, and managers share a single user interface and access and used the same process information from multiple systems to improve communications, collaboration, and the bottom line.

According to the company's production engineer, "IT/OT convergence is helping improve communication between operations, engineering, and management. We are seeing an increased knowledge of the technology too. The more people that understand the benefits from the IT/OT convergence path means that we will get there faster. The solution is giving us early warning systems and predictions that enable us to better understand what is happening," he said. "Additionally, the software is contributing towards employee training and learning. We all realize that there is a knowledge offset in the chemical industry. And having this kind of intuitive technology enables employee engagement and collaboration and decreases the knowledge gap."

While still a work in progress, the company believes that the dataPARC technology has put it on a path to full IT/OT convergence and is speeding its convergence journey.

Conclusions

While necessary, IT/OT convergence requires an alignment of IT and OT that involves people, processes, and technology. Different priorities, practices, teams, personalities and technologies can sometimes make it difficult for everyone to get on the same page. But it appears that new technologies such as the Capstone dataPARC software suite can help drive and even accelerate the cultural, process, and technology convergence to support the digital transformation of industry and infrastructure.

ARC recommends that industrial organizations explore the potential benefits these types of solutions could provide in their own operations, investigate potential use cases, and – if possible - request potential suppliers to provide relevant reference cases.

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