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Jayhawk Fine Chemicals **delivers best-in-class solutions with advanced batch automation**

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Nestled in the southeastern corner of Kansas along historic Route 66, Jayhawk Fine Chemicals Corporation is a small custom chemicals producer with big ambitions – and even bigger outcomes.

Throughout their 75-year history in the rural town of Galena, only a couple of miles west of the Missouri state line, Jayhawk has maintained a reputation as a leader in the niche field of fine chemical custom manufacturing. Customers spanning multiple industries come to Jayhawk with highly specialized requirements for active ingredients and advanced intermediates; Jayhawk provides the facilities and expertise to develop innovative solutions and bring them to market as quickly and cost efficiently as possible. In this way, Jayhawk serves their customers as both a business partner and an extension of their own manufacturing operations.

It's this unshakeable entrepreneurial spirit – coupled with the team's distinctly Midwestern "can-do" attitude – that captured the attention of global private equity firm Permira. In 2018 Jayhawk was acquired by Permira and integrated with CABB Group GmbH, a larger fine chemical manufacturer headquartered in Germany and with several production sites worldwide.

Permira saw the opportunity to accelerate growth by creating a transatlantic custom manufacturer with a significant asset base to support customers in multiple regions.

While mergers often herald changes in personnel and corporate culture, the integration of Jayhawk into CABB was different. The majority of Jayhawk's 120-person workforce has remained with the company, appreciative of the trust placed in employees at every level of experience and the ongoing opportunities for upward mobility.

But even for such a talented and industrious group, it's a challenge to handle an ever-increasing number of unique jobs that vary widely in size and scope. Siemens automation technology ensures flexibility, consistency and high product quality for every Jayhawk customer.

The installation at a glance

Customer: Jayhawk Fine Chemicals

Location: Galena, Kansas, USA

Industry: Fine chemical custom manufacturing

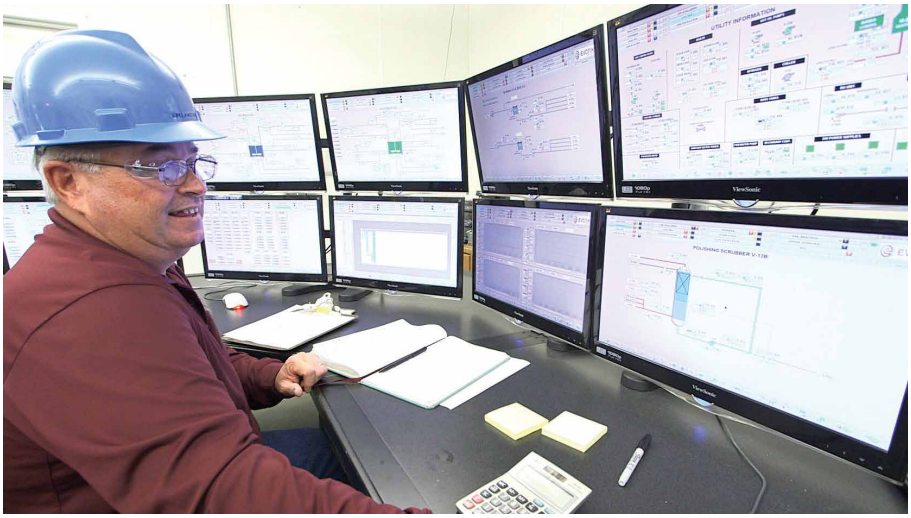
Challenge: Optimize batch production in four plants to ensure consistently high quality for customers across multiple industries, each with specialized requirements for active ingredients and advanced intermediates.

Siemens solutions used: SIMATIC PCS 7 with SIMATIC BATCH and Advanced Process Library • SIMATIC Virtualization as a Service

- SIMIT Simulation Platform • SIMATIC Logon • SIMATIC ET200iSP IO
- TIASTAR Motor Control Centers • SINAMICS Variable Frequency Drives
- Siemens DCS Engineering Solutions team

"We experienced very good process control with APACS+, but just by installing PCS 7 with BATCH and doing nothing else, we saw a 5% increase in Overall Equipment Effectiveness (OEE)."

–John Gaines, Business Engineering Manager



Jayhawk relies on the SIMATIC PCS 7 distributed control system with SIMATIC BATCH add-on software to configure, plan, control and log batch processes.

A DCS designed for batching

Jayhawk produces fine chemicals in limited quantities and to exacting specifications. This type of manufacturing is carried out with multistep batch processing, which demands constant pivoting between products, recipes and campaigns. To optimize production in such a complex and dynamic environment, Jayhawk relies on the SIMATIC PCS 7 distributed control system from Siemens with SIMATIC BATCH add-on software for batch automation. Using BATCH, Jayhawk can configure, plan, control and log batch processes directly in PCS 7.

PCS 7 with BATCH is currently installed in four distinct operating units across the site, one of which functions under full Good Manufacturing Practice (cGMP) validation requirements. Jayhawk opted to virtualize the systems in two of the units with SIMATIC Virtualization as a Service, a preconfigured, ready-to-run virtualization package. Two virtual servers host a number of thin clients to provide redundancy protection, reduce costs and simplify maintenance.

Jayhawk also uses the SIMIT Simulation Platform, which closely couples with PCS 7 for virtual commissioning and operator training. SIMIT allows the team to test new control strategies, including sequences, and make any necessary changes prior to deployment. Operators then have the opportunity to practice all new procedures in SIMIT, ensuring that they're carried out correctly once online.

Jayhawk is no stranger to the benefits of Siemens automation; they previously operated on the APACS+ control system before modernizing to PCS 7. "We experienced very good process control with APACS+, but just by installing PCS 7 with BATCH and doing nothing else, we saw a 5% increase in OEE," says John Gaines, Business Engineering Manager. OEE – Overall Equipment Effectiveness – is considered the gold standard for measuring manufacturing productivity.

Empowering operators with better visibility

Jayhawk strives to empower their customers by first empowering their employees. PCS 7 supports this philosophy, according to Damon Culp, Instrumentation and Controls Engineer. "We've used PCS 7 to automate formerly manual steps so that they no longer require operator input, which helps our operators focus on those steps where their attention is most critical," he says. "PCS 7 gives them all the process information they need, including prompts and alarms, to make the best possible decisions in the control room or the field."

"There are multiple processes where PCS 7 provides guidance to operators and prompts them when specific tasks are complete," agrees Larry Mosier, Site Operations Manager. "In some cases, it even asks for input regarding what analysis has been shared from our laboratory before giving the operator a green light to advance to the next step." In this way, PCS 7 not only makes operators' jobs easier – it also mitigates risks to ensure their continued safety.

Jayhawk's team leverages the extensive alarm management functionality built into PCS 7, meeting biweekly with production managers to review and optimize the alarm experience for operators. They utilize the system's color-coding option to more easily differentiate between alarms and have also adopted the PCS 7 Hit List tool, which organizes all alarms by how often they're triggered. This tool includes the option to hide those deemed irrelevant, eliminating unnecessary and potentially dangerous distractions.

(Left to right) Larry Mosier, Site Operations Manager; Damon Culp, Instrumentation and Controls Engineer; and John Gaines, Business Engineering Manager.

Jayhawk additionally benefits from the system's interlock function blocks. When an interlock is activated, an operator can navigate seamlessly from the interlocked device to a graphically based faceplate that spells out the root cause – making it easier to resolve the upset without excessive troubleshooting or frequent calls back to the engineering group. According to Culp, "We also like that we can link analog values to the blocks to provide additional information about the interlock. So, if a pressure interlock faceplate displays, the operator can see the current pressure in the process." As experienced operators retire, this type of visual learning is proving particularly effective in bringing the next generation up to speed quickly and safely.

To provide operators with even greater real-time visibility into process health, a remote PCS 7 client has been installed in one of the units, which connects back to the server via a KVM switch. This means operators aren't confined to the control room; instead, they can view and interact with all data in the field while directly observing the process – and take immediate action based on what they see.

Library increases efficiency, enhances simulation

Jayhawk has been able to minimize engineering efforts with the Advanced Process Library (APL), the standard PCS 7 library for process control and visualization. APL affords them the ability to configure their regulatory controls such as motors, valves and control loops with a pre-tested and proven library. The batch processes also use Sequential Function Charts (SFCs), which provide visual representations of every sequence and can be saved for future reuse. "Once a recipe is built, SFCs make it very user-friendly to transfer that recipe from one product line to another. Having a library means we don't need to reinvent the wheel when starting work on a new product – we can simply bring in the existing assets," says Mosier.

In the newest installations, they've also begun to make use of APL's Control Module Type (CMT) feature for added efficiency. CMTs eliminate the need to create a separate template for every variation of a function block. Instead, Jayhawk can develop one master template with an unlimited number of variants – and any changes made to this template are automatically synchronized to every variant.

The company produces fine chemicals using multistep batch processing, which demands constant pivoting between products, recipes and campaigns.

Jayhawk has found that standardizing on APL has mitigated the challenges associated with modernizing to new versions of PCS 7, as APL blocks are designed to preserve all existing functionality during upgrades. They've discovered another benefit of APL as well: tight integration between PCS 7 and SIMIT. Any updates to APL are reflected in the corresponding SIMIT templates, so the two platforms always remain in sync. "Thanks to APL, we've had to make very few changes to our SIMIT system even though we've continually upgraded our PCS 7 versions in every plant," says Culp.

Streamlining validation

Jayhawk produces an animal heath product requiring compliance with current Good Manufacturing Practice (cGMP) regulations. Since this product is regulated by the US Food and Drug Administration (FDA), the plant must continually meet stringent FDA requirements for validation.

PCS 7 with BATCH has supported Jayhawk in successfully navigating this process. BATCH conforms to all guidelines set out by the FDA, including administrator-controlled access rights and archiving of process data. Using SIMATIC Logon software, Jayhawk can authorize different levels of system access to operators. And, since BATCH performs end-to-end logging of events, Culp says Jayhawk has access to comprehensive reporting of all changes made during the course of production: "It's easy to pull any archived information out of PCS 7 that we need for validation purposes."

Flexible, intelligent IO

As Jayhawk produces a variety of fine chemicals, portions of their site are subject to increased risk of fire or explosion. At these locations they've adopted SIMATIC ET200iSP IO, which allows for direct connection to field instrumentation in hazardous areas. The ET200iSP has greatly streamlined their installation design, simplified their wiring strategies, and minimized costs and space requirements since external barriers are no longer needed. Servicing procedures have also improved: Jayhawk can work on the equipment and add or remove IO cards while the modules are still powered up.

As the ET200iSP is also HART-enabled, it can communicate digitally with instruments across the plants to provide valuable process intelligence. Culp cites one of their two-wire Coriolis flow meters as an example: "We're able to get multiple values out of the meter – not just the flow, but also the temperature and density – using only the two wires." Culp adds that this feature is a significant IO- and time-saver for Jayhawk.

Going beyond automation

With a portfolio of solutions for motors and drives, Siemens also plays a key role in Jayhawk's electrical infrastructure. They've installed TIASTAR Motor Control Centers (MCCs) – including some "smart" MCCs with SIMOCODE digital motor management technology – to monitor and manage motor operation, energy consumption and power quality in all production units as well as a boiler house.

Connected to the MCCs are SINAMICS Variable Frequency Drives (VFDs) for more precise control of motor speeds – a vital component in batch automation, where processes are constantly changing. Jayhawk uses the VFDs to drive their pumps, allowing them to switch quickly between media with differing densities. "Without the VFDs, we'd need to mechanically change the impellers to accommodate the varying raw materials," says Mosier. "Since a large part of our business is custom manufacturing, the VFDs give us the added flexibility we need to constantly push the envelope in process improvements and give our customers better service with each campaign."

A partnership for the future

While Jayhawk has employed third-party automation integrators to execute certain installations over the years, they've also collaborated directly with the Siemens DCS Engineering Solutions team on several projects – most recently the modernization of a production unit from APACS+ to PCS 7 with BATCH, the Advanced Process Library and Control Module Types. Their experiences have been positive, according to Gaines: "The quality of the team's work, the level of efficiency at which the solutions have been delivered, and their ability to help us stay on top of the latest and greatest technologies have resulted in an excellent partnership between Jayhawk and Siemens."

For 75 years, Jayhawk has taken pride in their best-in-class products, state-of-the-art facilities and longstanding customer relationships. With the recent infusion of support from CABB, Jayhawk's next chapter is brimming with potential for even greater success – and Siemens automation will help to propel them forward.

TIASTAR Motor Control Centers (MCCs) monitor and manage motor operation, energy consumption and power quality throughout the site. SINAMICS Variable Frequency Drives are connected to the MCCs for more precise control of motor speeds.

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