Preparing for the Future: King's Hawaiian® Standardizes Technology Requirements for All Machine Builders at New Facility

Common Network and Integrated Architecture Ease Integration and Data Sharing Between All Machines

Challenge

- Create a common infrastructure for machine builders for first centralized data-collection system on a greenfield site

Solutions

Integrated Architecture System

- Scalable control across all machines in facility with Logix control platform
- EtherNet/IP network provides seamless, real-time communications structure and single design environment with consistent tools
- FactoryTalk software suite provides graphically rich, role-based production data; remote access to real-time and historical time-series data from all equipment and data sources in the plant; and intuitive production dashboards that provide a comprehensive picture of the factors contributing to operational performance

System Design and Delivery

- Bachelor Controls Inc., a Solution Partner within the Rockwell Automation PartnerNetwork™ program, designed and delivered the solution

Results

Met Implementation Timeline Goals

- Designed and delivered an integrated plant within a tight timeline one week ahead of schedule

Doubled Production and Increased Capacity

- Added capability to produce additional 180,000 pounds of bread per day, doubling production

The entire bread-baking process required a total of 11 specialized machines, manufactured by a different original equipment manufacturer (OEM).

Background

The distinctive sweetness of King's Hawaiian bread has made it an American favorite and fueled the growth of the company. Robert Taira created the recipe for the iconic round loaves 50 years ago in Hawaii. Taira's business – King's Bakery in Honolulu – became a destination for tourists who often shipped bread back to the mainland as gifts for friends and family.

As the appetite for the King's bread grew, Taira moved his family to Southern California and built a 30,000-square-foot facility. The bread's popularity continued to expand, and so did the family's operation. In the 1990s, King's Hawaiian added 40,000 square feet to its California bakery, and in 2004, the company built a 150,000-square-foot automated baking facility and corporate headquarters nearby.

By 2010, King's Hawaiian had reached capacity once again. Its California factory and bakery were operating 24/7, and consumer demand was spreading across the country. The company had also expanded its product line beyond the signature round loaves to baking dinner rolls, sub rolls and sandwich buns.

With rising gas prices and other transportation costs weighing on the bakery's budget, King's Hawaiian decided to build a new facility in the Eastern United States. This way, the company could get its growing family of products to store shelves more quickly and cost-effectively.

Challenge

King's Hawaiian chose to build a highly automated 125,000-square-foot facility in Oakwood, Ga., and set a goal to be up and running within 10 months. The timeline posed a challenge, especially considering the complexity of the project. The entire bread-baking process required a total of 11 specialized machines, manufactured by a different original equipment manufacturer (OEM), with a control and information platform requiring a unique design environment, user interface and vendor support model.

FactoryTalk ViewPoint allows the family-run business to monitor operations remotely from anywhere Internet access is available, helping make sure production meets customers' expectations.

While the initial project deadline was tight, King's Hawaiian wanted to address its long-term needs for the plant's information infrastructure.

"We've been a small, family-run company, so building a new plant 3,500 miles away in Georgia was a huge step," said Mike Williams, director of engineering for King's Hawaiian. "We wanted to be sure we could look in on the process remotely from California to make sure production meets our customers' expectations."

King's Hawaiian also wanted advanced data-collection capabilities to help it consistently bake the highest-quality products, as well as gain operational efficiencies across the enterprise.

"As a company, we haven't done a lot of formal reporting or evaluation, and whatever data we've captured has basically been penciled in," Williams said. "Since we were building a new facility, we wanted the infrastructure needed to capture information from all fronts."

The entire operation centers around the baking process. The first step in making Hawaiian bread is the precise measurement and blending of dry ingredients. The dry mix is then transferred into a continuous mixing machine where the liquid ingredients are added. Once mixed, the dough moves to a machine in another room where it is shaped into balls and then separated into aluminum pans to make the various products. From there, the dough is transferred to another machine – the proofer box where it rises. Then, it is on to the ovens. When the cooked bread comes out, it must be cooled on a long conveyor before it is sent to the packaging machine where it is then inspected and shipped.

"With more than 11 machines required for our production process, we couldn't just turn each OEM loose without clear specifications and an overall integrated design architecture," said Williams. "If we had, we would have had to learn several types of PLCs and HMIs, and stock several varieties of the same part for repairs."

In addition to standardized specifications, King's Hawaiian wanted a plant that its own staff could easily maintain and troubleshoot. "I'm a big supporter of ensuring a plant can support itself as much as possible," Williams said.

Solutions

In less than a year, the company had to specify and procure equipment from more than seven suppliers, integrate it, and test its reliability to meet production volumes of 8,000 pounds of bread per hour.

Williams worked with his team and Bachelor Controls Inc. (BCI), a Rockwell Automation Solution Partner, to create an architecture that would enable King's Hawaiian to meet its short-term goals of getting the equipment up and running to open the plant on time, while laying the groundwork for information gathering and sharing throughout the enterprise.

"BCI put a lot of emphasis on front-end design and forced me to be a better customer," Williams said. "They made us work hard to answer important questions up front so they could provide a return that was closer to what we actually wanted versus what we started with."

As the integrator on the project, BCI gathered the controller and human-machine interface (HMI) requirements from each OEM and wrote an overall

specification standardized on the Rockwell Automation Integrated Architecture™ system. BCI then worked with Rockwell Automation to validate the system's design.

"We wanted to establish a common configuration for the OEMs so that everything would connect easily and communicate well," said Rusty Bailey, Memphis office branch manager, BCI. "We also understood the bigger picture: King's Hawaiian needed to be able to monitor its process across the enterprise and make intelligent decisions to increase production efficiency."

BCI directed all the OEMs to use the Allen-Bradley® ControlLogix® programmable automation controller (PAC) featuring an integrated platform for scalable motion and machine control in a single programming environment. This integration provides King's Hawaiian with fewer spare parts to maintain, while the control platform's openness helps ensure easy integration with third-party components.

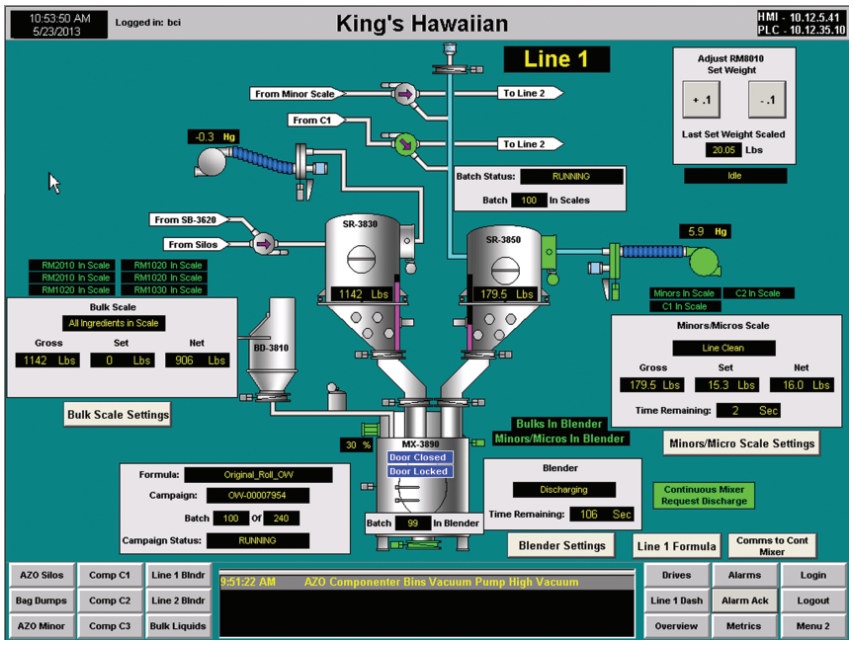
The specifications also required a standardized approach to the visualization and information software used on each machine. FactoryTalk® View Site Edition software is used on each machine to simplify application development and training – a crucial time-saving element on a fast-turnaround project. BCI specified the Site Edition version of the software to make it easier for the King's Hawaiian team to manage upgrades on its own long-term. Each version of the visualization software is then running on Allen-Bradley Industrial Environment Computers with a separate touch screen and solid-state hard drive to protect the system and reduce the number of failures in the future.

For the packaging machines, BCI specified Allen-Bradley CompactLogix™ PACs and Allen Bradley PanelView™ Plus HMIs. The scalability of the Integrated Architecture system allowed BCI to use the smaller controller, which provides all the benefits of the Logix control platform, but in a smaller form factor.

The entire plant communicates via EtherNet/IP.™ The single network architecture helped the company get the plant online faster and lowered the Total Cost to Design, Development and Deliver℠ the machines. EtherNet/IP also allows King's Hawaiian engineers to remotely access, diagnose and service their machines from two redundant VMware servers located in a central control room.

"By standardizing on the Integrated Architecture system, our people are now able to go from one process to another within the plant, and use the same software and same knowledge to address any number of issues," Williams said. "The architecture also allows us to collect vast amounts of data – about everything from oven temperatures and bake times to scale weights and maintenance operations – that previously we couldn't manage manually."

Production information is saved, stored and managed using FactoryTalk Historian software that collects and archives time-series data from all equipment and data sources in the plant. FactoryTalk VantagePoint software correlates and aggregates the information and produces real-time dashboards and web-based reports with unique situational and historical context for different users. Williams and others across the company can access the data using FactoryTalk ViewPoint software, which allows them to monitor operations remotely from any location where Internet access is available.



A common control and software specification, standardized on the Rockwell Automation Integrated Architecture system, helps the machines connect easily and communicate.

Results

The new facility opened in October 2011 – one week earlier than planned. Immediately, it doubled the company's bread production.

The facility is producing the company's two largest-selling products – the signature round bread and the 12-pack dinner rolls. Because the plant was built for future growth, it has the capacity to add another line. Long-term, the company plans to produce all types of its products at the Georgia location.

"The common network architecture enabled us to get this plant up and operational in a matter of weeks instead of months," Williams said. "And through the continuity of materials, we're able to stock spare parts we're familiar with, reducing lost production time during a failure. This plant gives King's Hawaiian the capacity we need for the foreseeable future."

Stage two of the project – developing the centralized data collection and control system – was completed in the months after the plant went live. Williams and his team are focusing first on leveraging this new information to establish exact product-quality standards and parameters. Then they will focus on operational efficiencies.

"We're still in the discovery phase because this is the first time we have been able to gather data from all the machines and make it visible across the enterprise," Williams said. "We will drill down into the production metrics, and see what the actual KPIs and business drivers are for King's Hawaiian."

A special team will help determine what data is most valuable for the plant's various departments, Williams said. "Each business owner – from maintenance to accounting to sanitation – will have a key interest, so it's going to take a while to find out what data they need," Williams said. "Then we'll determine the actual usefulness of that information. This is a learning process, though we all know the end goal – to put information to work for the greatest value."

The results mentioned above are specific to King's Hawaiian's use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.

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