Revitalized Bourbon Distillery Merges Tradition With Innovation

Gray AES Helps Castle & Key Implement Ignition System With Visualization, History & Alarming

When Castle & Key took ownership of the long-idled Old Taylor Distillery in Frankfort, Kentucky, and revitalized it as a modern facility, they opted to leave some of the 140-year-old buildings' wear as is. The property, which features an honest-to-goodness castle, a sunken garden, and the world's longest rickhouse, had languished in disrepair. Prior to the sale in 2014, there was even talk of deconstructing the castle itself and selling the limestone bricks. Leaving the patinaed brass and occasional cracked tile is an aesthetic choice, one that nods to the site's history as the birthplace of bourbon hospitality in the 1890s. But step inside, under the original Old Taylor sign, and it's clear that Castle & Key is equal parts tradition and innovation.

Castle & Key implemented Ignition — an industrial automation platform for SCADA, HMI, IIoT, and more — with the help of Gray AES to replace an outdated FactoryTalk system. Headquartered in nearby Lexington, Gray AES is a professional services company offering architecture, engineering, and automation solutions across a wide range of industries, including major greenfield or brownfield expansions. "Supporting distilled spirits producers and bourbon distillers, being headquartered in Lexington, Kentucky, is very important for us, not just as a systems integrator, but as a corporate citizen of our home state," said Taylor Sawyer, Director of Business Development at Gray AES.

The new Ignition system has allowed Castle & Key to collect data to further refine their processes as well as drive efficiency and consistency.

The two companies have a long history together; before the Ignition implementation, Gray AES had redone Castle & Key's control cabinet, running new terminals and updating the PLC programming. After that success, Gray AES was the clear choice to upgrade Castle & Key's SCADA system. As Elliott Schmitz, Distillery Manager at Castle & Key, put it, "Our goals were aligned from the get-go."

Improving Operational Efficiency

The biggest issue with the old system was the lack of historical data. While Castle & Key could see current production numbers,

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Digital Transformation Engineer, Gray AES

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there was little context. For a company with multiple products that require years to properly mature, this inability to look back made looking forward increasingly difficult. "Distilleries are in a unique position. They have to make decisions on a five-to-ten-year spectrum. They can't make a product today and sell it tomorrow," said Sawyer.

There is a limit to throughput as well; spirits like bourbon require physical space to age. To remain competitive in the market, Castle & Key needed to use the space they already had to its full potential.

Speaking about operational efficiency, Sawyer said, "It's not so much a buzzword or a euphemism within the industry. It's just the nature of where the industry is heading. How do you do what you're doing today, albeit more efficiently?" This is especially true for a registered historic site that doubles as a production floor.

"We are a historic distillery, but the things we like to modernize aren't necessarily traditional whiskey practices. It's more [about] improved automation techniques, better data and analytics, correlation and connectivity, and then just constantly being neurotic about scientific advancement of our craft," said Castle and Key's Brett Connors, whose formal job title is Whiskey Wizard, a position that encompasses the duties of head blender, product strategy, hospitality, and sales support.

High-Performance HMI

This implementation was Gray AES' first large-scale project using Ignition's mobile-responsive Perspective Module. "The main request was to make it a more modern look and feel. Perspective was a natural fit, taking advantage of the CSS and the style sheets," said Jeremy Plunkett, Digital Transformation Engineer at Gray AES.

Gray AES designed a new SCADA system featuring a high-performance HMI, leveraging modern frameworks closer to website design than traditional SCADA visualization. The goal was to modernize the system to run mostly on iPads while maintaining a close visual resemblance so that operators could easily transition to Ignition with minimal training.

When developing the system, Gray AES utilized DevOps principles. "We would pull down a stack into our local environment, spin it up with Docker, have code reviews using GitHub, and we'd create pull requests for any changes. Then we deploy it to our test server, test out changes before we'd actually deploy it to the production environment," said Plunkett.

The design process was collaborative between both companies, not just between Gray AES and Castle & Key upper

management, but with plant-floor staff as well. One request from operators was to keep the application's primary color the same. While the new HMI still adheres to the fundamentals of high-performance screens — heavy use of gray, bright colors like red reserved for alarms, minimal clutter — the background is a bright, inviting teal. When activated, all valves, pumps, and motors turn white, in line with the high-performance standard. "It felt very unfamiliar until we had the teal background. And it makes the white stand out a little bit more too," said Schmitz.

More than anything, this gave operators a sense of ownership of the Ignition system. "At the beginning, operators were a little resistant, just because change is difficult," said Schmitz. "However, there have been some really good features in Ignition. It's very easy to navigate and it's been well-received among the team."

Being able to access the Ignition system through mobile devices has greatly improved operator workflows, and the application's "crisp" response provides immediate feedback.

UI/UX

The Ignition system defaults to an overview of Castle & Key's still, giving operators an immediate view of the high-priority functions. The system is logically connected for the process flow, allowing operators to navigate between screens without having to return to the main overview like they did in the previous system.

The side menu provides quick access to other screens within the application. The operator can select the screen, monitor key metrics like temperature, and control distillation to hit target proofs and ensure consistency. With so much information on the screens, operators can move pop-ups out of the way, monitoring flow rate while adjusting the aperture of a valve. Additionally, Gray AES designed a variety of standard faceplates so that anytime Castle & Key needs to add another pump, agitator, or valve, they can reuse assets.

For processes like grain intake, the application shows the operator the entire path flow, including all conveyors and valves, as well as any information required to bring the grain from the truck to one of the silos. In addition to individual mobility, the Ignition system saves time by giving operators access to every part of the facility at any time. For example, when one operator is getting ready to unload a grain truck and does not have an iPad, they can radio for assistance, and another operator can help remotely.

Historian

Beyond the visuals, the Ignition system includes the Tag Historian Module. This allows Castle & Key to easily view historical data, identify trends, and make projections. Perhaps most importantly, this access to historical data allows them to identify anomalies, which can have far-reaching consequences for a process that is still as much art as science.

"On the product strategy and research side, we love the historian functionality of [Ignition] because it allows us to really integrate our product quality to historical

records and data to be able to improve our overall strategy and processes," said Connors. "We're excited about the data being able to come from the historian and to correlate that into our production methodology."

Alarming

The system also features Ignition's Alarm Notification Module, which provides two locations where operators can access alarms: current overview and alarm history. The former allows operators to see any active alarms in the system, while the latter gives Castle & Key long-term data, similar to the historian, to make continual improvements and better dial in preventative maintenance.

Prior to Ignition, acknowledging alarms was a highly manual endeavor, requiring an operator to physically walk to a machine (sometimes on a separate level of the production floor) and press a button to stop the process. Now, with Perspective's mobile-responsive capabilities, operators have a convenient, and immediate, method for responding to alarms.

Momentary Push Buttons

Distillation involves a great deal of sensory response during production; operators monitor the smell, taste, and visual clarity of product as it travels through the system. Fittingly, part of the process is dependent on another sense — touch — more specifically, the need to hold down buttons. "The FactoryTalk application had a lot of momentary push buttons, and that was a bit tricky with Perspective because there's not a one-to-one component that mimics a momentary push button," said Plunkett. "We didn't want to have to rewrite all the logic in the PLC, so we pretty much created our own custom momentary push button."

Gray AES' solution was to let operators tap a button in the Ignition application to "bump" open a valve or open it completely instead of holding down and releasing. Accurate grain weight is a critical component of spirit production, so the ability to slightly open, throttle, and completely close a gate with a tap or two instead of continually holding the button down has been just as, if not more, effective.

Parallel Deployment

As with most manufacturers, Castle & Key could not afford to halt production while Gray AES installed the new system. "We took a gateway backup and dropped it into their Ignition gateway on site. We had a simulation PLC as well, so we had already had all the tags mapped," said Plunkett.

That last point was originally considered an issue because all labels were stored in the FactoryTalk HMI and could not be directly collected from the PLC. While this task seemed daunting at first, Ignition's scripting capability allowed Gray AES to write a script that parsed through all of the tags from the HMI, then populated them in Ignition, avoiding what would have been an arduous conversion process.

Deploying the Ignition system was fast ("It took five minutes to deploy," said Plunkett) but to ensure there was absolutely no downtime, Castle & Key ran the old and new

systems in parallel. That way, if there were any unexpected changes after the fact, the plant floor could continue moving, not to mention bubbling, agitating, and distilling. “You can connect either to the control panel on the iPad on the same internal network or be connected to the PLC and Ignition at the same time,” said Schmitz.

“The ability to continuously run on our daily basis as we're developing this new programming system was really paramount because it caused us to not have to lose any production time as we were planning and eventually now transferred onto the new system,” said Connors.

Process Refinement

Shift after shift, Castle & Key is collecting data to further refine their processes. They have found that the Ignition system opens up a whole new path forward. As Schmitz put it, Ignition allows them “to get that access to identify trends and make improvements either to our programming or to mechanical aspects in order to drive consistency.”

Even as Castle & Key plans to expand the system by incorporating more processes, they intend to retain the human element that makes their operation unique. “Our industry relies a lot on organoleptic and sensory data. How do you correlate a human experience to your automated experience?” asked Connors. “To be able to actually take that data and scientific overlay and then apply that to your organoleptic program is incredibly uncommon. That's kind of the way our industry merges the balance of science and art, where we're still very human, but the more we move towards automation, we're not trying to remove that human element from the actual tasting and enjoying of whiskey, but we're trying to imbue that into our scientific ideology.”

Sawyer echoed the sentiment succinctly. “Technology is seen as it's going to replace human beings,” he said. “Here it augments, it enhances.”

Gray AES is the evolution of a collaborative legacy — bringing together the expertise of Gray AE, Gray Solutions, and InLine Engineers. Their roots extend beyond architecture, encompassing engineering and automation as core pillars of their business. Originally operating as separate entities, Gray AES has come together to offer a fully integrated approach to design, engineering, and automation solutions. Today, Gray AES serves customers across diverse markets, driving innovation and efficiency. Learn more at grayaes.com.

Taking up Colonel Taylor’s sensibilities for excellence, Castle & Key sources local ingredients to inspire their product. Castle & Key makes everything that they sell from carefully selected grains. Castle & Key chooses to do things the thoughtful way – even though it's not the easy way – because waiting to sell the spirits they make is worth it. In March 2022, Castle & Key Small Batch Kentucky Straight Bourbon Whiskey became the first bourbon distillate that has been distilled and released at the Historic Old Taylor Distillery in nearly 5 decades. Learn more at castleandkey.com.

Project Scope

- 27,505 Tags
- 27 Screens
- 16 Pop-ups
- 10 Clients
- 736 Alarms
- 1 Devices
- Basic Architecture
- 1 Database
- 62 Tags logging historical data