

## Case Study

### Top Milwaukee artisanal brewery deploys Siemens automation for greater precision, efficiency, and flexibility to drive innovation

If one word describes Lakefront Brewery, it's innovation. Founded in 1987, the family-owned operation has compiled a long list of firsts and awards as it has grown both its capacity and global reputation. Now the brewery has taken steps to automate production with Siemens technology.



- **Customer:** Lakefront Brewery, Milwaukee, Wisconsin
- **Challenges:** Manual operation limited production precision, visibility, and future expansion options
- **Solution:** TIA Portal Brewing/Distilling Template for full automation
- **Results:** Greater precision, efficiency, and flexibility to drive innovation, savings, and sustainability

Lakefront Brewery's roots go back to the 1980s when brothers Russ and Jim Klisch tried to outdo each other in homebrewing. The sibling rivalry led to better and better brews, then entries into tasting competitions – starting a legacy of awards that continues to this day. They began brewing with 55-gallon, stainless steel drums and used dairy equipment. Late in 1987, they sold their first barrel of beer to a tavern within “rolling distance” of the brewery, which operated out of a former bakery at the time.

“Our customers who consume Lakefront brewery beer would be surprised how much engineering is involved to create a perfect product,” says David Karrer, director of Brewing Operations. “Thanks to the new Siemens controls we’ve installed at Lakefront, we are able produce the highest-quality product possible.”

Now located in a 23,000-square-foot historic building on the Milwaukee River, the brewery is known for its innovative ales and lagers, plus its popular beer hall restaurant and brewery tours that attract more than 120,000 people a year. Its brew house produces approximately 50,000 barrels annually that span over 20 different beers, including seasonal and specialty brews. They're sold in 30 states and distributed to Canada and Ukraine.

Lakefront's pioneering spirit has created many U.S. brewing-industry firsts. Some examples: the first beer made entirely from Wisconsin-grown ingredients, including barley, wheat, hops and a first-of-its-kind, indigenous yeast strain; the country's oldest certified organic beer; and the first government-recognized, gluten-free beer. The brewery is also strongly committed to environmental sustainability and using ingredients and other supplies from the local community.



## Challenge: Manual operation limited production precision, visibility, and future expansion options

Despite Lakefront's wide variety of beers and a fermentation capacity of 32 tanks totaling 3,900 barrels of beer, the operation mostly had been run manually by a staff of eight across three shifts, four days a week, according to Karrer. "We weren't using any real automation at all," he says. "Each tank had its own little temperature controller, but if that went out and no one caught it in time, we could lose the batch, which could be worth many thousands of dollars."

Fortunately, this happened rarely, maybe once or twice a year, Karrer says, but because the brewing operation was closed on weekends, the risk remained. Another operating issue was visibility into the tank valves, about 39 of them, as to whether they were properly positioned or not. Checking on them was a safety issue, too. "That's because, if a tank seemed like it wasn't cooling enough or was cooling too much, we'd have to climb some 20 feet up in the air behind a tank, to physically check the valve's position," he adds.

As Tom Giese, Lakefront's Plant Engineer sees it, running the brewery's operations entirely by manual means, including recipes on spreadsheets, had two main challenges. One was precision: Sometimes the shift workers might get distracted and miss or delay an important step in the brewing process, which could slightly affect the consistency of beer quality. The second was flexibility in shifting production to different beers, especially trying out new recipes to continue Lakefront's tradition of innovation.

"We were flying blind a little bit technically, particularly with more complicated fermentation processes," Giese says. "We also wanted to be more efficient in all our brewing production with the goal of increasing our capacity at some point in the future."

## Solution: Deploy the Siemens TIA Portal Brewing/Distilling Template to start a journey to fully automate production

Coincidentally, about the same time Karrer and Giese were considering a do-it-yourself approach to start automating Lakefront's brewing production, they met their local Siemens representative, a Milwaukee resident and long-time fan of Lakefront brews. On hearing about the brewery's production challenges and continuing innovation ambitions, he introduced them to Siemens TIA Portal Brewing Template and brought in a top Siemens brewery expert to explain the Template model in detail and to thoroughly assess their operations for its optimal application.

The Siemens TIA Portal Brewing Template is a highly scalable turnkey solution that combines a SIMATIC S7-1500 CPU programmable logic controller (PLC), ET 200SP remote I/O, WinCC Professional HMI programming software, Comfort Panel HMI displays, and TIA Portal software engineering framework.

### The Siemens TIA Portal Brewing Template includes:

- PLC programming via TIA Portal
- HMI programming via WinCC Professional
- HMI visualization code autogeneration via SIMATIC Visualization Architect (SiVarc)
- PLC code autogeneration via TIA Portal

It features the S88 Recipe Unit Procedure (RUP) batch production concept to maximize equipment utilization in the brewery. It also includes the Siemens OpenLibrary of open-source brewing formulas, faceplates and control modules that Lakefront could use as starting points for customizing the programming of their own recipes. PROFINET, industrial Ethernet, provides the communications needed by the solution.

**Prefab, ready-to-use model.** Giese, who has a background in industrial automation programming, compares the Siemens TIA Portal Brewing Template to a prefabricated model that can be easily customized. “When we looked into the Siemens solution, it seemed a good fit for what we wanted,” he says.

“For example, while the Template’s fermentation sequence is pretty basic, it’s clearly well thought out, and we were able to customize it a lot for our wide range of different beer recipes. It gives us a lot of flexibility that we need to continue innovating and also a lot of options we can use down the road.”

**Big time-savings.** The TIA Portal took Giese a bit of time to learn, but “not excessively so,” he says, citing its point-and-click and click-and-drag user interface as being easy to use. Once he did learn it, he figures it saved him about 30 percent of the time that he otherwise would’ve needed to program other PLCs that he might have considered for a homegrown solution.

To this he adds: “Now that I’ve got this part of the programming done, I’ve built all of my own little function blocks and data blocks and user defined stuff, it will make doing other things much faster. I don’t have to start from a scratch point of redoing everything, I can reuse everything that I’ve written already.”

Today Lakefront is in Phase 1 of implementing the Siemens TIA Portal Brewing Template’s many capabilities. As such, just a quarter of the fermentation tanks are connected for monitoring valve positioning, although all the tanks are being monitored for temperatures and timings. Twice-daily reports of actual versus-set tank temperatures emailed to both Karrer and Giese as well as their staff and management. Text alerts are possible, too, but the feature has not yet been activated.

While the pandemic slowed completion of this initial phase of automating the fermentation process, Lakefront plans to complete it, then head to the next phase: automation of the carbonation process.

Eventually they envision expanding its implementation to cover even more of Lakefront’s brewing operations. “It’s clear from the Template’s features and capabilities we’ve worked with to date that we’ll be able to interconnect other systems and the workflow will be integrated yet each system will still be treated individually,” says Giese.

### **Results: Greater precision, efficiency, and flexibility to drive innovation, savings, and sustainability**

With the Siemens TIA Portal Brewing Template, Lakefront has improved the precision of its fermentation process – and therefore the consistency of its beer quality – by helping to remind the production staff of when a task needs to be done, limiting the potential to be distracted by other tasks. These reminders can boost efficiency, too.

“With 32 fermentation tanks to manage and just two or three team members present during each shift, there can be a lot of tasks competing for their attention,” Giese says. “Now, however,

with the Siemens automation we’ve put in place, including the color HMI displays, they can better assess and respond to tasks with greater precision, which can help improve the consistency in output quality. This can also help improve our yeast harvest, too.”

Giese notes that on weekends, when the brewery is closed, the fermentation tanks are still on the job, their yeast turning and the remote temperature and valve monitoring helps the staff watch out for any variations that might indicate a problem that needs addressing. “Also, via the HMI, we’re able to see the position of any one of some 39 valves across all of our tanks, so during the week, we’re not climbing ladders like we used to, which improves safety.”

**Savings and sustainability.** Thanks to the greater precision the Siemens TIA Portal Brewing Template provides Lakefront’s operations, Karrer anticipates the brewery will save on energy and CO2 costs. Both will boost Lakefront’s margins while also enhancing its sustainability posture. In fact, Lakefront Brewery was the first brewery in Wisconsin and just the 22nd brewery in the world to achieve Certified B Corporation status. Those are businesses that meet the highest standards of verified social and environmental performance, public transparency, and legal accountability to balance profit and purpose.

“We are currently carbonating our beer manually,” Karrer says. “We expect that automating this process will lead to more efficient CO2 use and an increase in the consistency and quality of our final product.”

**Enhancing innovation.** Karrer likes that Siemens is behind the Brewery Template solution. “I know that with Siemens now as our brewing partner, in effect, we’ll be covered no matter what issues arise in the future that need technical assistance,” he says. “That provides real peace of mind, even if we’ve moved on.”

Both Karrer and Giese emphasize that Lakefront’s reputation for brewing innovation is one of the main beneficiaries of the increased production flexibility that the Siemens TIA Portal Brewing Template provides.

**“The Siemens automation and controls brewing solution gives us a lot of latitude to more easily try new recipes and tweak our existing ones.”**

David Karrer

“Once we’re fully deployed,” he adds, “our production staff can focus more of their time and attention on innovation and less on just running the operations. Ultimately, that benefits our customers, who are artisanal beer lovers, who are highly discerning in their tastes. And it sets us apart from our competition.”

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