



SIEMENS



The digitalized brewery

Modern technologies for improved market opportunities.

[siemens.com/braubeviale](https://www.siemens.com/braubeviale)

Taking diversity into account

As the beer market grows more diverse and nuanced, breweries and equipment manufacturers are working together to seek solutions to new challenges.

Several weeks ago the news media picked up the story of two managers from the German Internet platform Rocket Internet who had founded their own craft brewery in a back courtyard in Berlin. There, in the city's Neukölln district, they aim to brew 1,000 hectoliters of pale ale, stout and Berliner Weisse beer in 2016 under their brand name Berliner Berg ("Berlin Mountain"). Feeling they'd had enough of virtual success, these young Internet pioneers longed for genuine craftsmanship with a real end product. Under the advertising slogan "Für mehr Vielfalt beim Bier" ("Promoting the diversity of beer"), they raised more than EUR 50,000 through crowdfunding for their initial investments. Is this the future of beer-brewing in Germany?

China in the lead, while Germany stagnates

At first glance it could appear that breweries have nothing to complain about: Production worldwide has risen from the roughly 1.5 billion hectoliters brewed in 2003 to almost two billion hectoliters today. Any yet this growth is very unevenly distributed. While production in Europe and the United States has stagnated, figures in South America and Africa are on the rise. The true engine of growth in recent years, however, has clearly been Asia. In recent years China has witnessed double-digit annual growth, and over half a billion hectoliters of beer were produced there already in 2013 – twice as much as in the United States.

between 106 and 110 liters for some years now, production hovers at 95 million hectoliters, and over 1,300 breweries fight hard for a share of the market. And now the new trend towards craft breweries is making itself felt, with micro-breweries like "Berliner Berg" challenging the major brewers for market share. This movement originated in the United States, yet it could indeed alter the German market. The shelves of Germany's supermarkets today offer beer brands for EUR 2.50 per half liter, yet a bottle of many premium upscale brews such as "Sylter Hopfen" ("Sylt Hops") can cost over EUR 20. While the Managing Director of the Research and Teaching Institute for Brewing in Berlin (VLB), Dr. Josef Fontaine, recognizes and welcomes the enhancing of beer's image in Germany – some beer enthusiasts have even begun training to become "beer sommeliers" – he sounds a note of caution about projecting the future: "Consumers are interested in new brands and types of beer, particularly in regional varieties. It remains to be seen, however, whether they're prepared to pay significantly higher prices."

How to successfully compete?

One word stands at the top of the list: profitability. Gunther Walden is someone who knows this well from talking with master brewers and brewery owners. Walden is Senior Vice President of the Food and Beverage Industry at Siemens. He and his team have the job of providing technical solutions that meet the needs these new challenges pose. More than three decades ago, Siemens' "Braumat" set the industry standard for process control systems, and most breweries still use this same system today to ensure reliable, qualitatively stable beer production. But this system alone is no longer enough to win in mature markets like Germany's. As Fontaine knows from the VLB, "Even if the prices for raw materials, auxiliaries and operating materials are currently rather low, the price pressure in the retail sector is making things increasingly difficult for beer brewers." At the same time breweries are incurring additional costs because they have to respond to changing consumer behavior by expanding their range of products. In particular, the market segment of alcohol-free beer and alcohol-free beer-mix drinks – shandy of various sorts – is momentarily at 5.5 percent and steadily growing. Walden is convinced: "To optimize their costs, breweries need to improve their processes, and make those processes more transparent and flexible. Our response to these needs is digitalization." Breweries are expanding production to offer seasonal varieties of beer and beer-mix drinks, but doing so requires producing in smaller brew batches. Yet how do you ensure that the right brew batch lands in the appropriate fermentation tank? How does the mature content of a storage tank find the most efficient

"To optimize their costs, breweries need to improve their processes, and make those processes more transparent and flexible. Our answer to that is digitalization."

Gunther Walden
Senior Vice President
Food and Beverage Industry, Siemens AG



The German market in particular has been saturated for years. According to Germany's Federal Statistical Office, per-capita beer consumption has been stagnating

Moritz Gathmann, 35, reports as a freelance journalist for Der Spiegel magazine, the newspaper Frankfurter Allgemeine Zeitung and a number of other German magazines and newspapers.

route for filling the right bottles and kegs? Siemens' Braumat process control system, for example, ensures this with Simatic IT, standard products for reporting, transparent

production and consistent company data that Siemens has developed in collaboration with long-standing business partners – and continues developing to this day.

Sitrans LR250 HEA – Not a drop of beer lost

The brewing industry faces a host of challenges today. On the one hand, the number of different beer styles, and thus also bottle types, is increasing more and more. On the other hand, fierce competition is ratcheting up cost pressures. Added to this are the strict conditions of the EHEDG Aseptic, which controls hygiene measures in the manufacture and packaging of foodstuffs. This includes precise determination of the contents of pressure tanks before bottling, as well as the contents of fermentation and storage tanks. Previously, this would have been done primarily using ultrasound sensors with direct product contact, or by means of differential pressure measurement. For around a year now, Siemens has offered the Sitrans LR250 HEA, a system for pressure measurement without product contact, based on the technology of the cross-sector Sitrans LR250 radar level transmitter.

"In further developing our field-proven radar level transmitter, we were aware of the specific requirements of the brewing industry, so we placed particular value on the hygienic enclosure of the antenna, and on the variety of process connections. It was also important to us that the new sensor should be especially easy to maintain and to repair, if it should come to that," explains Robert Gray, Project Head at Siemens Process Automation in Peterborough/Canada. The Sitrans LR250 HEA is thus much more cost-effective than comparable ultrasound-based systems, and it also has an electrical system that can be replaced without opening the tank.

Test run under actual conditions

Putting the new system through its paces, Siemens subjected the Sitrans LR250 HEA to a host of tests at the Technical University of Munich in Weihenstephan. Three fermentation and storage tanks at the research brewery were each equipped with a Sitrans LR250 HEA with different process connections. "In the past months, we have used the tanks to brew all possible styles of beer, from bottom-fermented beers (...) all the way to special beers with dry hopping or wood aromatization," relates Dr. Florian Schüll, Head of the Weihenstephan Research Brewery. Thanks to the dynamic envelope-curve algorithm with which all Siemens radar and ultrasound level transmitters are

equipped, the sensors were able to supply precise measurements even in the presence of layers of foam.

During the entire test period, there were no microbiological abnormalities or accretions. The reason for this is that the sensors in the upper area of the tanks were attached without contacting the product. In addition, the polytetrafluoroethylene (PTFE) used for the fully encapsulated antenna has a surface roughness of less than 0.8 μ , making the surface of the antenna especially smooth. On the basis of these results, the Sitrans LR250 HEA became the first radar level transmitter to acquire Aseptic certification in accordance with the strict rules of EHEDG.



Siemens offers the Sitrans LR250 HEA, a radar level transmitter that determines the contents of the tank without coming into contact with the product.
More: www.siemens.com/sensor-systems



The world's largest brewery

One of these long-standing partners with a rich tradition is Ziemann Holvrieka, a globally active manufacturer of brewing equipment and tanks. Ziemann Holvrieka has relied on Braumat systems since the 1970s and partnered with Siemens around the globe, currently for example to build Piedras Negras in Mexico, the largest brewery in the world. "We integrate Siemens' systems into our solutions and of course collaborate very closely with Siemens, for example by holding joint workshops on a regular basis. We also work just as closely with the breweries and are able to pass on their feedback to Siemens as industry-specific input," explains Klaus Gehrig, Managing Director and COO of Ziemann Holvrieka GmbH. In this way Siemens always knows what's on the brewers' minds, and where their concerns lie. One novel innovation from Siemens is currently solving a common problem master brewers have long struggled with: a measuring instrument which can precisely measure how many liters of beer are in a storage tank despite extensive foam formation (See infobox page 3.)

Efficiency thanks to software simulation

Siemens is also able to use simulation techniques to help breweries cut costs by first accurately assessing their existing capacities before making changes or purchasing new equipment. One brewery in South America, for example, ultimately opted not to buy new brewing tanks based on a simulation analysis using Siemens' Product Lifecycle Management (PLM) software. It turned out that optimized utilization of their existing systems eliminated any need to acquire new equipment. German brewer Paulaner set their trust in the same software in planning Paulaner's brewery near Munich, which is now completed. In the United States, craft breweries have been springing up everywhere like mushrooms in recent years in response to the dominance by major breweries. As a result, the United States has more breweries today – almost 3,500 in total – than any other single country worldwide. Total production by craft brewers has quadrupled since 2004; in 2014 it rose by 18 percent, and currently is at around 22 million barrels (circa 26 million hectoliters), holding a market share of

eleven percent. America's Brewers Association is forecasting that by 2020 this market share will grow to 20 percent.

Automation for up-and-coming newcomers, too

For ambitious brewmasters, achieving success on a major scale becomes problematic when rising demand calls for steadily growing production quantities. One typical example is Schlafly Bottleworks, a craft brewery founded in 1991 in the city of St. Louis by two beer enthusiasts who wanted to brew new and innovative types of beer. And that's just what the consumers wanted, too. Demand grew year by year, and the brewmasters had to work more and more night shifts to ensure supply met demand. In 2009, Schlafly installed Siemens' Braumat system and increased production efficiency by 30 percent. That ended the era of having to do night shifts, despite the fact that their 2009 production volume of nearly 35,000 hectoliters doubled to almost 70,000 hectoliters by 2014. "Up-and-coming international craft breweries as well as national specialty beer brewers are very interested in automation processes, which represents major opportunities for Siemens," says VLB Managing Director Fontaine. At the same time, automation also enables innovative, experimentalist newcomers to focus more on their core mission. "With automated control systems, master brewers notice that they suddenly have time again to devote energy to their real passion: creating new recipes," reports Siemens manager Walden. In the United States, it is precisely this eagerness to try something new that distinguishes craft brewers from the major brewing companies. Their brewers' art includes experimenting with ginger, lemon rind, coriander, chili peppers and every possible type of fruit. In Germany, this tendency is weaker owing to the country's Reinheitsgebot, the "Beer Purity Law." Experts like Fontaine also don't believe that this will change in the near future, as the Germans will be celebrating the 500-year anniversary of the Reinheitsgebot edict with great pride in 2016. ■

On the road to Industrie 4.0

Integrated engineering and operations is the answer to the digitalization occurring in the process industry on the road to Industrie 4.0. We thereby help our customers to significantly increase their speed, flexibility and efficiency gains.

Global Siemens Headquarters
braubeviale.industry@siemens.com

Siemens AG
Wittelsbacherplatz 2
80333 München
Germany

Printed in Germany | 75897 11150.5 |
© Siemens AG 2015