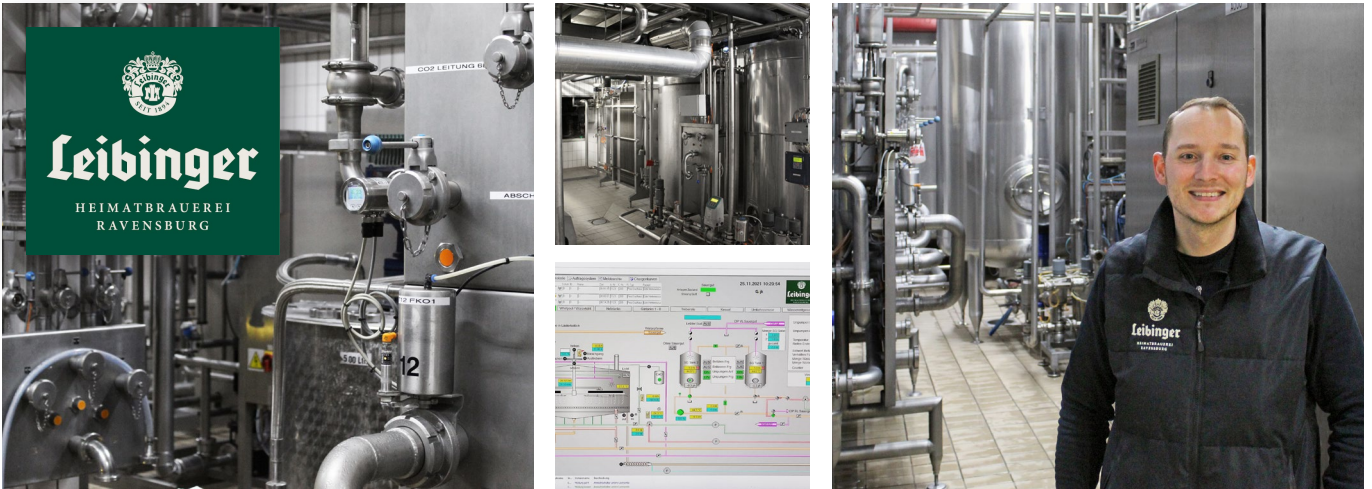


Case study: Specialized instrumentation for brewery automation

FOOD



Reliable efficiency and quality in yeast harvesting, lauter tun monitoring, CIP, and much more

The Brewery Leibinger in Ravensburg in southern Germany can already look back on over 125 years of tradition. Just as traditionally, the company sees itself in a pioneering role in using new technologies and processes to consistently and reliably ensure the best possible quality of its products. Leibinger was one of the very first breweries to use Siemens Braumatik process control and crossflow membrane filtration to replace diatomite. Today, the entire team continues to live this spirit, always looking for and finding new ideas to make the brewing process even more reliable, consistent and efficient. This use of high level automation and high-precision sensor technologies ensures that the growing customer base can always and consistently enjoy the best beer.

The application

Johannes Kehrer, Head of Maintenance, is responsible for the smooth running of the entire brewing and manufacturing process, which produces 16 different beer specialties. Brauerei Leibinger thus offers its customers a broad range of drinking pleasures at the highest level of quality. The consumers should be able to rely on what they get, making fluctuations in the quality of their products out of the question for Kehrer. He sees automation as the appropriate approach for many process steps to achieving this goal and constantly tests new techniques or products. Additional benefits are increased efficiency and yield in production. The noticeably improved sustainability through less consumption of resources, water, and energy are welcome side effects.

Advantages in the application



- » In all process steps, sensor technology ensures reliable monitoring and active process control, and thus a predictably consistently high product quality.
- » The high degree of automation increases staff efficiency as they can focus on more demanding tasks.
- » Switching in real time when a target value is reached and greater precision in process control help to shorten process runtimes, save resources such as water, cleaning agent, or product, and reduce energy consumption

Turbidity measurement: The all-purpose tool for the brewing process

Leibinger brewers rely on their brewing skills, expertise, and experience to optimize recipes and process sequences and program process control accordingly. The formerly well-known look into the sight glass for the next process step has long since been replaced by a series of turbidity sensors.

Lauter tun:

In the control center directly next to the lauter tun, the high technical level of the company becomes apparent. Leibinger was one of the first breweries to introduce the Siemens Braumat process control system, even before its official market launch. Today, a virtual machine works here on a supercomputer to control all processes and run simulations including the controlling of the lauter tun. An ITM-4 turbidimeter ensures seamless monitoring of the turbid wort. The process is switched over to the wort kettle as soon as the desired turbidity value is reached. Since the ITM-4 is equipped with an active switching output, the changeover itself can be triggered directly by the sensor. The manual process with a fixed timer value that is otherwise standard in this process step can thus be replaced by the turbidity sensor, with an effect that Kehrler welcomes:

“Saving 3-4 minutes for each batch, that's again something gained.”



Turbidity measurement and active process control in the lauter tun with ITM-4

Yeast harvest:

Despite running at full capacity, it's surprisingly quiet in the brewhouse and lager cellar. Kehrler explains this, too, with the high level of technology:

“In a brewery of this size, 2 to 3 people are usually in the lager cellar alone. With us, one person can manage that alone.”

Here again, turbidity measurement helps essentially with both yeast harvesting in the fermentation tanks and disposal of the spent yeast. The yeast is separated with an ITM-51 at the fermentation tanks when a preset turbidity value is attained. Then, it can be reused for the next brew, thanks to high measuring accuracy in a superior degree of purity.

Following the positive experience in the brewhouse, Kehrler also installed a turbidity sensor for the spent yeast disposal. Here, too, an ITM-51 with its measuring range is perfectly adequate.

Previously, an employee had to monitor the right moment to drain the spent yeast for about 15 minutes at the sight glass. And that was three times per storage tank and batch. Kehrler sees the massive savings potential here in the sum of such activities:

“With the intelligent use of sensor technology, we can automate the simple process sequences, and the employees can concentrate on the really relevant and demanding tasks.”

The optimal switching values for each process step and each recipe are determined by the team through tests; here, too, the aim is continuous process optimization.



ITM-51 for the control of the blowdown of the spent yeast

Conductivity measurement: All-round control technology for the brewing process

Conductivity measurement is a classic measuring method used by Leibinger's Brewers to control and monitor a large number of process steps as well as the various CIP systems.

Process monitoring:

With a response time of just under one second, the ILM-4 can detect a phase switch with high accuracy and precisely control the corresponding valve via an active switching output. In the filling systems for bottles, cans, and kegs, one conductivity meter each ensures that the beer ends up in the bottle and rinse water in the sewer. Highly sensitive conductivity detection and real-time switching ensure reliable product quality and maximum resource efficiency. However, every liter of beer lost is a measurable loss of value and increases the cost of wastewater treatment. And even though water is not a scarce commodity in the region, excessive water consumption represents a cost factor that can be easily avoided with conductivity technology.



Continuous quality monitoring during keg filling (top) and canning (bottom) with the ILM-4. On the left image the ILM-4 for CIP acid/lye concentration control.

CIP control:

Brauerei Leibinger works with decentralized CIP technology: each process area has its own CIP system that perfectly matches the individual requirements. For example, CIP cleaning in the crossflow membrane filter system and the pressure tanks works according to the lost principle, while the CIP return is recovered for recycling in the bottling lines. In all cases, an ILM-4 is used to monitor and record the acid/lye concentration for verifiable cleaning efficiency. In the case of multiple-use of cleaners, an ILM-4 is also used to control the concentration of the return flow in the batch tank.



Diverse sensor technology for ever new applications

Thanks to the wide range of products at Anderson-Negele, specifically for breweries, Brauerei Leibinger can focus on one partner for many of its sensor requirements.

“ We always find an open ear and partnership-based advice at Anderson-Negele when we want to implement a new project for process optimization. Also, new sensor types or improved product characteristics of the measuring systems always offer new opportunities for improvement. ”

For example, plans are already underway to automate the bunging process, which will use P41 pressure sensors to monitor the CO₂ content in the pressure tanks. Initial test runs have also been carried out for the production of alcohol-free beer. A particular type of yeast is used here, which, according to Kehler, offers a significantly better beer taste but is much more demanding in the brewing process. The high measuring accuracy of the sensors is paramount here so that temperature, pressure, and all other parameters can be precisely adjusted to the sensitivity of this yeast. For such requirements, too, Johannes Kehler is sure that he has the right partner.



Glycol plate heat exchanger with TS temperature sensor and P41 pressure transmitter in the supply and return lines



Maturing tank for biological acidification with level meter NSL-F in the riser tube



“ At Leibinger, innovations, further developments, and continuous improvements are in the genes. With Anderson-Negele, its sensors, and its support, we have an excellent partner to implement this principle in the best possible way. ”

— Johannes Kehler,
Head of maintenance



Crossflow membrane filtration with FTS flow monitor and TS temperature sensor



Monitoring of the CIP tank for membrane filtration with TFP temperature sensor and L3 pressure and level sensor