A playground for **millers**

Bühler's new Grain Innovation Center in Uzwil is where new creations are made from an extremely wide range of grains and much more. Siemens technology ensures that around 70 systems – from sorting screens and grinders to fans – work together both seamlessly and efficiently.

It's entirely possible that you already came into contact with Bühler from Uzwil when you took a bite of your breakfast roll this morning. Roughly 65% of the wheat processed worldwide is ground in mills equipped with Bühler technology. But Bühler's mills don't just grind wheat: spices, pulses, coffee, nuts and even insects are among the raw materials being processed into flakes, pellets, muesli mixtures, animal feed or pasta. There is also a growing focus on side streams from food production, like draff or alternative plant-based protein sources, including microalgae.

Bühler opened its Grain Innovation Center (GIC) in Uzwil in October 2024 to comprehensively test both new innovations in the industry as well as new processing processes. Innovative processes for the food and animal feed industry can be put to the test in this five-story test center, which features 2,000 m² of floor space and more than 70 machines. According to Lothar Driller, Dept. Manager Feed Application Center at Bühler: «With the GIC, Bühler has created a versatile test center for its own R&D activities, for practical customer testing, and for training on special processes, like grinding rare types of grain. Its focus is on topics like process optimization, energy efficiency, maximum availability (in part through the use of predictive maintenance), circular production, and digitalization along the entire value chain.»

The Simatic HMI provides all important information at a glance in the Bühler Grain Innovation Center.

High-end mill construction: Bühler relies on Siemens for automation in its state-of-the-art Grain Innovation Center.

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> **Lothar Driller**
> Department Manager Feed Application Center at Bühler

The big picture

Bühler handled all of the engineering-related aspects of the GIC itself but relied entirely on Siemens technology for the automation and drive technology. «We're delighted to be part of such an innovative and simultaneously important project – it's ultimately also about global food security,» says Alessandro Pepa, Siemens Global Account Manager for Bühler.

This project's big challenge lay in the end-to-end, future-proof automation such a large test center, including the seamless integration of the safety functions. Numerous components like motors, frequency converters and controls as well as components from the realms of industrial switching technology and low-voltage power distribution work together in perfect harmony on this «playground for millers». «Hammer mills used in animal feed production, for example, rotate at high speed and crush the material by spinning,» explains Driller. «The motor has to cope with a high initial load – something referred to as heavy starting. That's handled by Sinamics G220 high-performance frequency inverters with precise speed and torque control, flexible hardware and software options and integrated safety functions. We appreciate the way the PLC and the HMI seamlessly interact in the TIA Portal. Another plus: Even if a customer provides small samples for testing, precise control lets us adjust the grinding speed to optimize the process parameters.»

The right start for every motor

The shear forces created by rollers rotating in opposite directions make the grinding done by roll mills somewhat gentler than grinding in a hammer mill. To reduce the strain on machine parts, compact Sirius 3RW soft starters let the electric motors start up gently. After start-up, integrated bypass contacts ensure that current flows directly to the motor for energy-efficient operation.

The status monitoring function provided by the soft starters makes it easier to plan maintenance work, thereby maximizing system availability. Powering the many fans is easier, but no less important for the system. They prevent dust from accumulating – dust that could potentially cause an explosion. The fans are actuated via Simatic ET 200SP motor starters. Real-time measurement of the rated current and comprehensive diagnostic data make it possible to precisely assess the fans' operating status.

Hygiene is also critical factor in the facility: To kill microorganisms like salmonella using heat, the raw materials are exposed to steam or heat mats for an extended period of time. This is where Siemens frequency inverters play an important role: «To ensure that the heat-sensitive vitamins and proteins are preserved as well as possible during this process, we use the frequency converters to reduce the speed of the motor. That allows the material to remain in the machine for a longer period of time yet still be hygienized more gently at a lower temperature,» Driller reveals.

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> **Stefan Suhner**
> Head of Automation Milling Solutions at Bühler

Valuable data

Each of the GIC's five floors contains up to ten control cabinets equipped with Siemens components. «A reliable power supply is essential for us,» emphasizes Stefan Suhner, Head of Automation Milling Solutions at Bühler. The control cabinets' main switches are Sentron 3VA compact circuit breakers with an integrated measuring function for current, voltage and energy values. They can be easily integrated into higher-level energy management and automation systems via common bus systems. This concept prevents failures, optimizes processes and sustainably increases the efficiency of the entire system.

In the Grain Innovation Center, all machine and process data is recorded centrally via the TIA Portal, enabling Bühler to conduct targeted evaluations and functional tests on this basis – from the raw material feed to processing and the finished product. The TIA Portal combines hardware and software: It enables the real-time analysis of data such as energy consumption, temperature or engine load, which is collected via frequency converters and starter components. Bühler uses this data to optimize processes, test new formulations, and evaluate the efficiency of individual machines or entire lines. That makes the GIC a data-driven platform for innovation, quality assurance and future-proof developments.

Food from plants belonging to Bühler, the Uzwil-based global market leader, reaches around two billion people worldwide every day. New products and processing processes are developed at the Grain Innovation Center.

End-to-end data and transparent operation provide a better overview of production processes, machine statuses and energy consumption.

Sustainably into the future

The GIC also stands for sustainability: Thanks to its close connection to the Bühler Energy Recovery Center, which is also located in Uzwil, by-products such as wheat bran and rice husks are used to generate energy. This reduces both waste and energy consumption. Bühler aims to reduce energy consumption, water consumption and waste in its customers' on-site production processes by 50% by 2025.

It took around three years to develop the GIC from start to finish, with Siemens joining at about the midway point. Suhner has fond memories of this time: «For Bühler, Siemens is more than just a supplier. It's a reliable partner. We're more than satisfied with the technology. Everything is running smoothly and not only are our own tests working perfectly, but our customers are enthusiastic about the GIC as well. We've received lots of interesting inquiries and are very well booked.» The flexible system is the outward sign of a promising collaboration between Bühler and Siemens: «If we want to test new technologies that are useful for this application in the future – like a digital twin – Bühler is open to the possibility. We look forward to future innovations and joint developments at the GIC,» says Pepa.

Sinamics G220 frequency inverters master heavy starting and optimize process parameters – even for small test samples in the Grain Innovation Center.

To reduce the strain on machine parts in the Grain Innovation Center, compact Sirius 3RW soft starters allow the electric motors to start up gently.

Technology in brief

From drive and automation technology to industrial switching technology and low-voltage power distribution: The GIC is an impressive example of end-to-end Siemens technology. In the TIA Portal, hardware and software are seamlessly intertwined – the digital representation of the system lays the basis for programming, visualization and diagnostics. The modular interaction of all components and their integration in the TIA Portal ensure maximum transparency during operation and the highest-possible level of system availability.

Clients

Bühler AG

Bühler's story began around 165 years ago in Uzwil, a small town in Eastern Switzerland. Bühler is active in the areas of food processing and advanced materials (e.g. die casting for the automotive industry) and is the global market leader in grain mills. The company is still family-owned and employs more than 13,000 people in 140 countries.

Grain Innovation Center

Bühler works with customers to develop tailor-made solutions for grain processing at the Grain Innovation Center (GIC) in Uzwil. There, new processes are tested under real conditions and existing processes are optimized in a targeted manner. Another focus is on approaches to the circular economy – for example, the recycling of by-products such as shells, press cakes or dry slurries. Other priorities include optimizing material density to reduce storage and transport costs, fine grinding of plant proteins for fish feed, pet food or food items, and targeted hygienization in a way that preserves functional ingredients. The extensive range also includes developments relating to the production of homogeneous mixtures using organic and inorganic components.