# diagram

#188 / June 2024

the Bühler magazine

# BOOST YOUR BASE

## REMANUFACTURE TO REVITALIZE

EXTEND THE LIFE OF YOUR TRUSTED TECHNOLOGY

## ACCELERATION THROUGH AUTOMATION

RETROFIT AND DIGITALIZE TO MAKE YOUR PLANT FIT FOR THE FUTURE

## BUILDING THE BIOECONOMY

HOW PANNONIA BIO LETS NOTHING GO TO WASTE

**Achieve the next level in pelleting performance and sustainability with Bühler's complete pelleting systems, from conditioning, pellet mills, and smart controls to digital services for optimal pellet production and quality.**

Our solutions:

- improve efficiency, reduce waste, and create the highest quality output;
- are robust and engineered for 24/7 continuous production;
- can be optimized with digital services that provide actionable insights from real-time analytics – PelletingPro automatically improves system performance and quality, while Pelleting Essential allows for data-driven decisions.

**Scan the QR Code to discover more about the Kubex® 5 Series, the newest member of our pellet mill family.**

# Bühler's pelleting systems.

## Boosting efficiency and sustainability.

Innovations for a **better world.**

BÜHLER

# EDITORIAL

**STEFAN SCHEIBER**
CEO BÜHLER GROUP

**DEAR READERS,**

Manufacturers today face many difficult questions: How to deal with rising costs and talent shortages, how to manage increasing regulation and customer expectations around sustainability, and, last but not least, how to stay competitive in a volatile, complex, and unpredictable world.

Among all of these, one issue that many of our customers need to address is what to do about ageing equipment and older technology – whether and when to repair it, update it, remanufacture it, or replace it. Finding the right answer is vital because it's not just about bringing equipment up to the latest version. It is also an opportunity to make fundamental changes in processes through increased automation and digital connection.

Automation breathes life into machinery, and when machines are networked through a plant control system, it brings about a step change. Systems become more efficient and, at the same time, more user-friendly. It can even enable "lights out" operation, needing only one or two people to run a factory, a critical factor when facing talent shortages. Add to this digitalization, connectivity, and artificial intelligence (AI) – Industry 4.0 technologies that have become an essential part of business in every industry, including the most traditional – and you not only reduce unplanned interruptions but also enable remote support.

By automating and digitalizing your operations, you can have your plant running autonomously 24/7, leaving you free to focus on other essential challenges such as process optimization and product quality using the insights and transparency that these updates afford. Many of these improvements also have a beneficial impact on your environmental footprint, helping you to reduce waste and minimize use of resources like water and energy – benefits that you, in turn, pass on to your customers.

We know that each of you has very specific individual requirements. That's why when you come to us for anything, from a simple repair to complete plant automation and digitalization, we accompany you every step of the way.

In this issue, learn how we helped Molino Quaglia in Italy become a fully automated, digitalized mill, and how, thanks to a large-scale retrofit, Japanese chocolate manufacturer Lotte was able to improve efficiency and sustainability. You can also find out how remanufacturing can extend the life of die-casting machinery by 15 to 20 years.

We hope you enjoy this edition and that we can inspire you with the many ways in which we can help your business stay fit for the future.

Sincerely yours,
Stefan

# IN THIS ISSUE

DIAGRAM #188 | JUNE 2024


24

## THE FOCUS



## THE BOOST IN ACTION



### ON THE COVER

Boost your base – automating and digitalizing machines brings installed assets right up to date with the latest technology and connectivity. The options are many, but the heart of the system is always Bühler’s plant control system. In this issue we hear from customers who are reaping the benefits in terms of efficiency and sustainability.



# FROM "RETRO" TO FIT FOR THE FUTURE

TEXT: JANET ANDERSON

*What to do when an asset comes of age? It's a question that every manufacturer faces at some point. From retro-fitting and refurbishing to remanufacturing, many options exist alongside replacement. These options offer more than just a facelift – they help future proof your business.*

**THE OLDEST MACHINE** in the plant is a piece of trusted technology that has served you well over the years but now it's showing its age and has started letting you down. You can't afford to stop everything to fix it so frequently. Worse still, you begin to wonder if you can still get the spare parts you need.

Is it time to replace it with a new machine with more modern technology? Or is there a way you can bring life back into the old machine and bring it up to date?

"For our customers, what matters is often not whether a machine is new or old, but how high its operating costs are," says Martin Staeger, Head of Service Transformation at Bühler. The annual cost of maintaining, overhauling, and repairing equipment increases over time. Investing in scheduled maintenance extends life, and Bühler can help there with the right parts, techniques, tools, and procedures, as well as service agreements. But end of life considerations will at some point become a big pain point.

It could be parts, productivity, or new technology that drives the decision. "Many machines have local control. The life cycle of these systems is often much shorter than that of the hardware. It may be that the electronic components are no longer supplied, so you have to replace the control system," Staeger says. "Or it may be that new technology has become available and you want to know if you can retrofit it into your existing installed base of assets to make them more productive."

## The Rs in circular economy

This is where the Rs come in – not just Replace, but also Refurbish, Remanufacture, and Retrofit. In a way, there is nothing new about these – people have always fixed and repaired machines. But today these ideas are gaining new significance as they not only save money but also resources, contributing to the circular economy.

The benefits that can be achieved include lower energy usage, better yield, and increased productivity. All of these also have an impact on the operation's environmental footprint. "Take die casting. Together with one of our customers we calculated that overhauling a die-casting machine can lead to 70 percent energy savings, and reusing the materials saves around 75 percent of $CO_2e$ compared to the production of a new machine of comparable size," explains Staeger.

And the knock-on effects flow through the value chain. You are not only increasing the sustainability of your own operations but, in turn, helping to make your customers' products more sustainable. Whether refurbishing roller mills to extend their life, retrofitting new equipment to accommodate new ingredients, upgrading a machine to introduce a new process, or automating a complete plant, the beneficial impact can be both on the environment and the business's bottom line.

## Fast forward

Remanufacturing can extend the product life cycle, reduce material and energy consumption, and lower waste generation and costs. In contrast to refurbishing, which involves restoring an old machine to an almost-like-new state and fixes minor issues, with remanufacturing worn parts are restored to a condition that is equivalent or superior to the original in terms of quality, performance, and functionality.

"This is what we do in die casting at our workshops in Brescia in Italy, Michigan in the US, and Wuxi in China," says Staeger. "We take the machine completely apart, inspect all the components, clean them, possibly replace some, reassemble it, and sometimes also improve the control system."

What threatened to become a hunk of scrap metal is working again, playing its part in the overall system. But more than that, process steps are automated and the machine from yesteryear is brought into the digital era. It can communicate with the machines around it and with you, providing data insights and transparency to support your decision-making and action-taking. It enables you to do things quicker, smarter, and with a more consistent quality.

## A step on the digitalization journey

"Digital transformation can seem a tall order for hardware that is sometimes decades old," Staeger explains. "But it is a step worth considering even if your legacy machines generate a lot of money because they are fully paid off and serve a particular niche. The potential is huge."

Uli Homann, Corporate Vice President and Distinguished Architect (cloud & AI) at Microsoft, views digitalization and cloud/edge computing as key to tackling two big challenges that many industries face: one is the talent shortage and the other is managing multi-location operations.

"To address the talent shortage, we need higher levels of automation," explains Homann. "That requires thinking through how we take existing and new capabilities and bring them into an end-to-end cloud-based management model with the necessary controls, so that the industrial environment remains safe and secure, but at the same time does more work with fewer resources."

To address the second challenge – operations running in different locations – used to mean relying on the local experts on site. But as business pressure becomes more real-time, Homann says that the senior management at headquarters need to be able to see for themselves in real-time how their factories are running. "The good news is that we are seeing advances on the enabling side. Satellite capabilities and 5G are becoming ubiquitous and affordable, making communications with even remote factories much easier. Businesses can now mix a distributed edge computing environment with centralized management, enabling local monitoring of the business process and machine health as well as global insights."

> ***"DIGITAL TRANSFORMATION IS A STEP WORTH CONSIDERING EVEN IF YOUR LEGACY MACHINES GENERATE A LOT OF MONEY. THE POTENTIAL IS HUGE."***
>
> **MARTIN STAEGER**
> Head of Service Transformation at Bühler

Bühler Insights is the groundbreaking cloud platform initiated by Bühler in 2018, utilizing Microsoft's robust Azure platform. This platform is the cornerstone for supporting customers in fully leveraging the potential of digitalization to enhance their operations. "We provide the technology and work with companies like Bühler who help their customers ensure that the data is collected and transported into the cloud securely for advanced analytics and AI," Homann explains. "If we can work with Bühler and our joint customers to think through, end to end, how a digitalized process works, that will enable them to bring new capabilities into their industrial environment very quickly."

The biggest worry any factory owner or manager has when considering such a change is that it will prevent them from meeting their targeted output. Homann understands this. "Any interruption or interference to their processes is a problem. They need assurance that whatever changes are being made to optimize their processes are applied in a way that the factory keeps on delivering and does not impact the output," he says.

The second biggest worry is whether the retrofitted or remanufactured machine will perform as expected. Bühler is well aware that this is top of mind for its customers. "We know this is a worry, so we don't just carry out an upgrade, we provide the support to make sure the customer achieves the outcome they are looking for through the years of operation," says Staeger. "Through our services agreements we collaborate with our customers throughout the life cycle of the assets, whether it is to provide remote support services, regular inspections, or frequent process data review by our process experts. Such agreements can even be carried out as an Outcome as a Service package, where we provide professional project management and engineering with very high standards. It is one of our key differentiators. Our aim is to put the customer's mind at rest."

Bühler's professional footprint of project execution teams, engineering, and automation teams enables it to support its customers around the world and to consult them holistically on process improvements. "We look at the full process and we have the expertise – we know how a production process should run and what product quality looks like. We base our recommendations on thorough assessments of the customers' assets and processes and come up with a feasible concept, which could be an upgrade or a different service."

### Where the journey leads next

Just selling data is easy – but it leaves customers alone to take decisions. "We look at analytics together and advise you, or we go further and help you to reduce energy consumption. We can install sensors and connect your system to Bühler Insights, and based on what we see, we can advise you and train your people," says Staeger.

*"TO ADDRESS THE TALENT SHORTAGE, WE NEED HIGHER LEVELS OF AUTOMATION. THAT REQUIRES THINKING THROUGH HOW WE TAKE EXISTING AND NEW CAPABILITIES AND BRING THEM INTO AN END-TO-END MANAGEMENT MODEL WITH THE NECESSARY CONTROLS."*

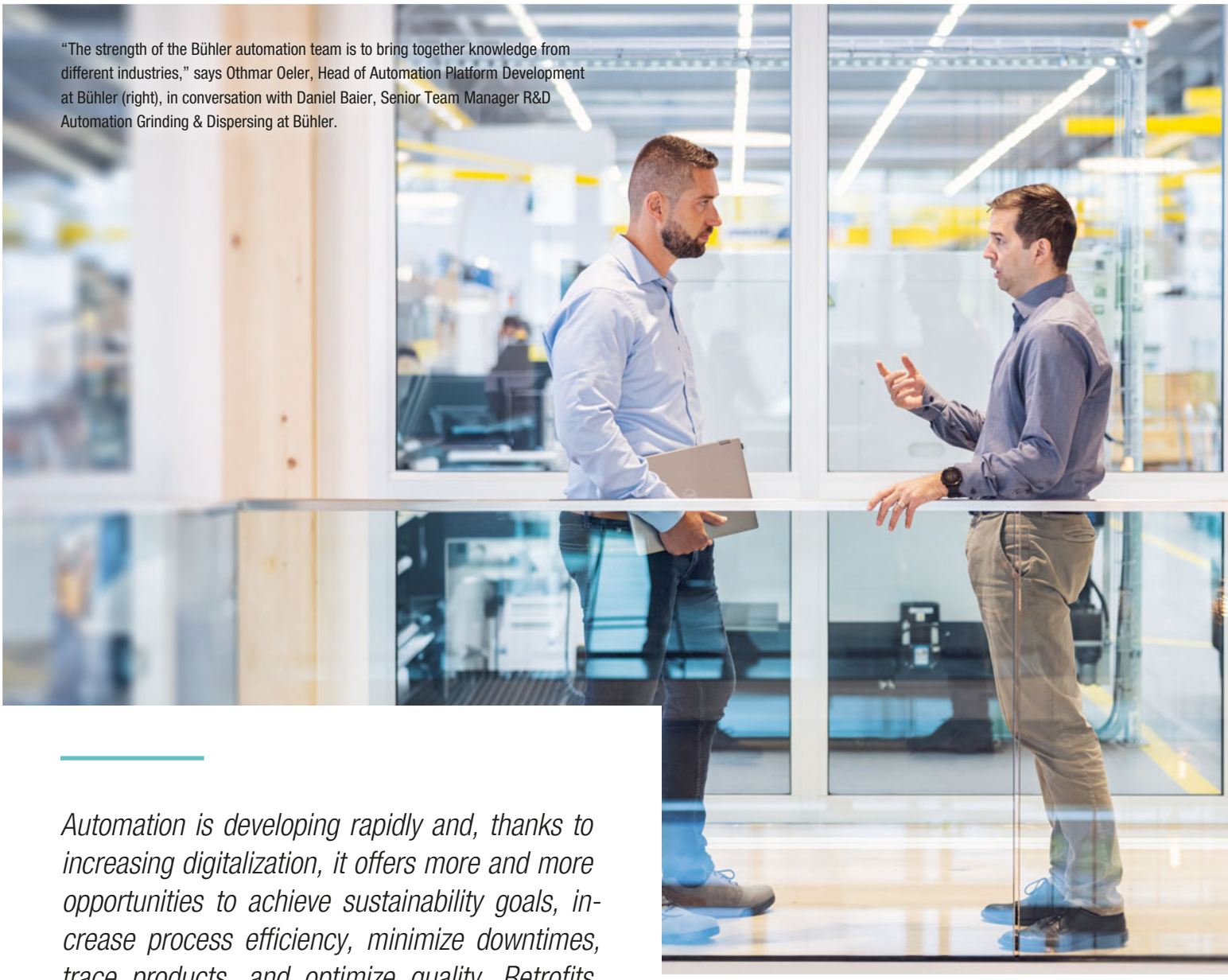
**ULI HOMANN**
Corporate Vice President and Distinguished Architect (Cloud & AI) at Microsoft

**WEB** Find out more about Bühler's upgrade, retrofit, and remanufacturing services on our website.

Key to this is bringing together Bühler's process expertise, globally available service business, and knowledgeable people with digitalization, upgrade capabilities, and a full portfolio of services. "We collaborate with our customers to provide a customized solution to meet their needs and get the best out of their assets throughout the life cycle. We are investing a lot in digitalization because we know that if we put that into the mix, we can help our customers better," Staeger says.

The journey doesn't stop here. Homann believes that the next opportunities will emerge from greater use of AI, and that this will change the way we think about applications and processes. "AI will enable human operators to work intelligently with the system. The system becomes an intelligent node, and the human operator just has to say what they need," he says. "We will see more intelligent and more human-friendly systems. And this is important when you remember the talent shortage. We need to help the people who are there to do the job faster, more easily, and more securely."

Managing globally dispersed assets will also get easier. "With increased connectivity, businesses will be able to think of their remote factories and corporate headquarters as a single environment, continuously connected and talking to each other, sharing data, understanding what's going on," explains Homann. "Bring in AI and you can react to market, technology, or process changes much faster." Good grounds to consider giving your ageing plant or machinery more than just a facelift.



"The strength of the Bühler automation team is to bring together knowledge from different industries," says Othmar Oeler, Head of Automation Platform Development at Bühler (right), in conversation with Daniel Baier, Senior Team Manager R&D Automation Grinding & Dispersing at Bühler.

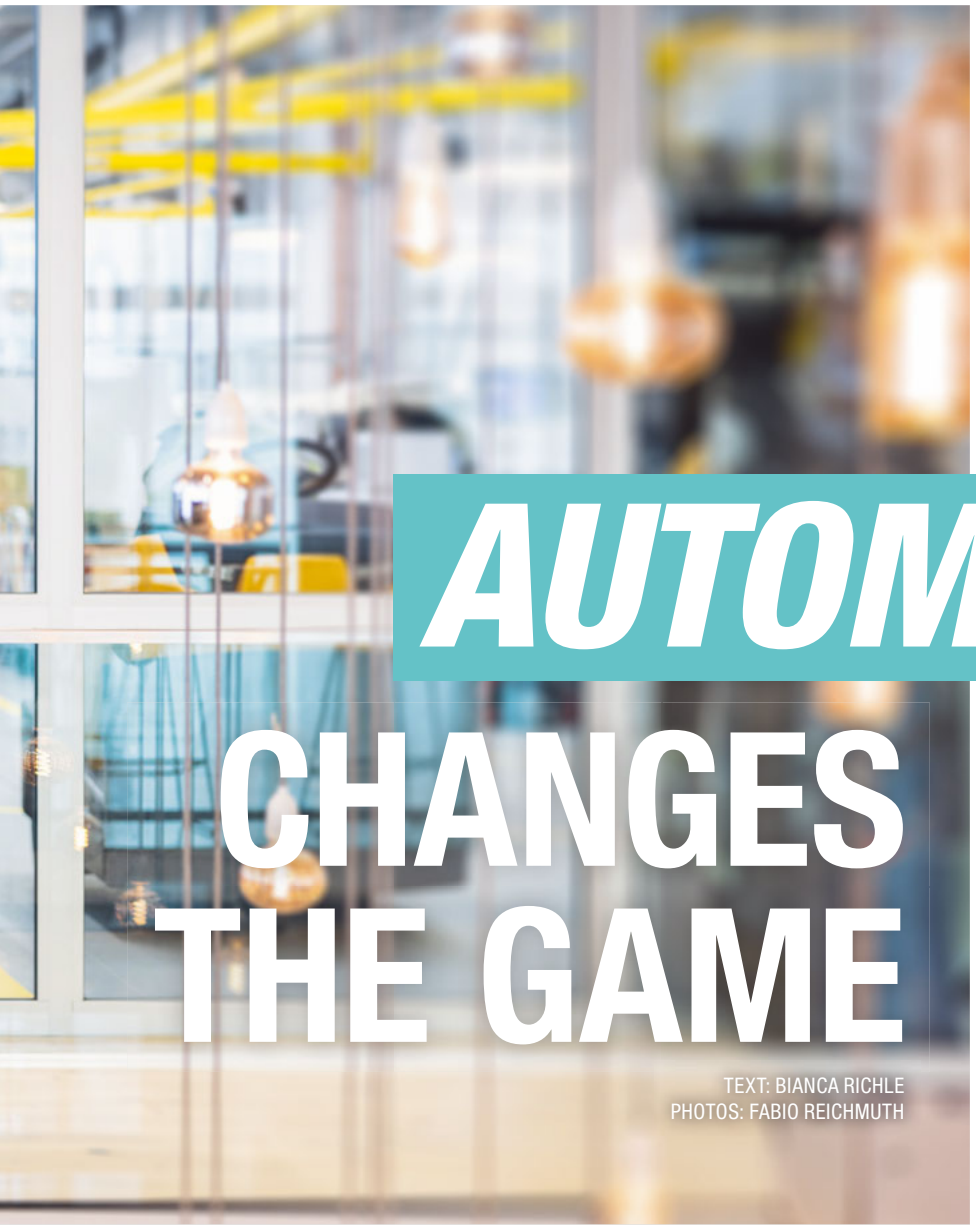
*Automation is developing rapidly and, thanks to increasing digitalization, it offers more and more opportunities to achieve sustainability goals, increase process efficiency, minimize downtimes, trace products, and optimize quality. Retrofits and software updates make existing systems fit for the future and ensure security.*

**AUTOMATION** is the invisible force that propels our daily lives – without it, our vehicles would stall, our washing machines would cease to work, and even a simple scroll on a cell phone would be impossible. From household chores to complex high-tech processes, automation is seamlessly integrated into our world, often unnoticed.

Automation breathes life into machinery. Behind every automated action is a sophisticated interplay of mechanics, electrical engineering, and software. Consider the seemingly simple act of using a car key fob to open the trunk; it opens as if by magic, yet this convenience is choreographed by software issuing commands, a motor powering the process, and a cable to pass on the electricity that sets the door in motion. This interaction is repeated for every other automated function, adding up to several kilometers of cable in an average car alone.

In a Bühler plant, automation operates based on the same principle. It's an integral component of every solution. Each machine requires an automation system including control cabinet and software. To network and control all the machines together, an overarching plant control system is also required.

Bühler has already installed line or plant control systems over 5,000 times worldwide. As the possibilities for increasing efficiency, quality assurance, energy savings, water savings, waste avoidance, and product traceability are constantly increasing thanks to new automation solutions, it's good to know that these can also be installed on existing systems as retrofits. "Many of our customers are enthusiastic about this option, as it ensures that their investments are future-proof and it also pays off economically," says Othmar Oeler, Head of Automation Platform Development at Bühler.



# AUTOMATION CHANGES THE GAME

TEXT: BIANCA RICHLE
PHOTOS: FABIO REICHMUTH

By installing better drives, customers can achieve energy savings of 20 to 30 percent. Another important aspect is the user-friendliness of the new automation solutions. “Today’s systems are designed to be more intuitive and greatly reduce the amount of training required for new employees,” says Oeler. “In times where finding qualified specialists is hard, this is becoming an important criterion.”

Customers’ requirements are very diverse. This is why Bühler covers the entire spectrum of automation solutions, from simple automation systems to innovative, integrated automation solutions for the entire plant. This customizable approach enables customers to select a solution customized to their specific requirements.

## Digitalization as a driver

While just a few years ago there was speculation about how quickly the Internet of Things would catch on, Industry 4.0 is now an integral part of everyday production. In every solution that Bühler has sold recently, machines can be networked via a cloud system, enabling services that offer many advantages. For example, by making use of connectivity, artificial intelligence (AI), and analytics, it is possible to increase productivity and sustainability, and to reduce operating costs.

Bühler uses machine learning to further develop its automation solutions. Algorithms, for example, can be used to predict where and when breakdowns will occur. This allows customers to plan preventive maintenance work without unplanned interruptions to production.

Another major advantage is the possibility of remote support. Bühler has 500 highly qualified engineers worldwide who provide remote support to customers around the clock. Each of them receives 15 days of training every year to ensure they are always up to date on the latest developments. Customers can benefit from remote maintenance solutions using the latest smart glass technology and augmented reality software.

> *"WE STRIVE TO ENRICH THE FIELD OF AUTOMATION WITH STATE-OF-THE-ART SOLUTIONS USING TECHNOLOGIES THAT WILL SOON SET THE STANDARD IN THE INDUSTRY."*
>
> **OTHMAR OELER**
> Head of Automation Platform Development at Bühler

Bühler systems have a service life of 30-50 years. In the past, the automation system was retrofitted after 15 years at the latest. Today, with new technological advances, it makes sense to constantly update the automation system to benefit from new functionalities and safety updates. Bühler has therefore put together various service packages in which different modules can be selected according to the customer's requirements.

With Remote Care, customers choose how much support they require via remote maintenance, while with System Care, automation experts analyze and diagnose the system annually to achieve the best possible performance and to ensure system security. With System Upgrade, the system is always upgraded to the latest version. Services such as Replay are seamlessly integrated into the automation systems and are also an important part of the overall package. The Bühler Insights platform enables access via a tablet or smartphone, so that the system can also be monitored while on the move.

All these services can be provided under a Service Agreement, which gives customers the option of having all automation maintenance and safety updates handled by Bühler. Service Agreements also enable them to benefit from the full range of digital services offered by the Bühler Insights platform.

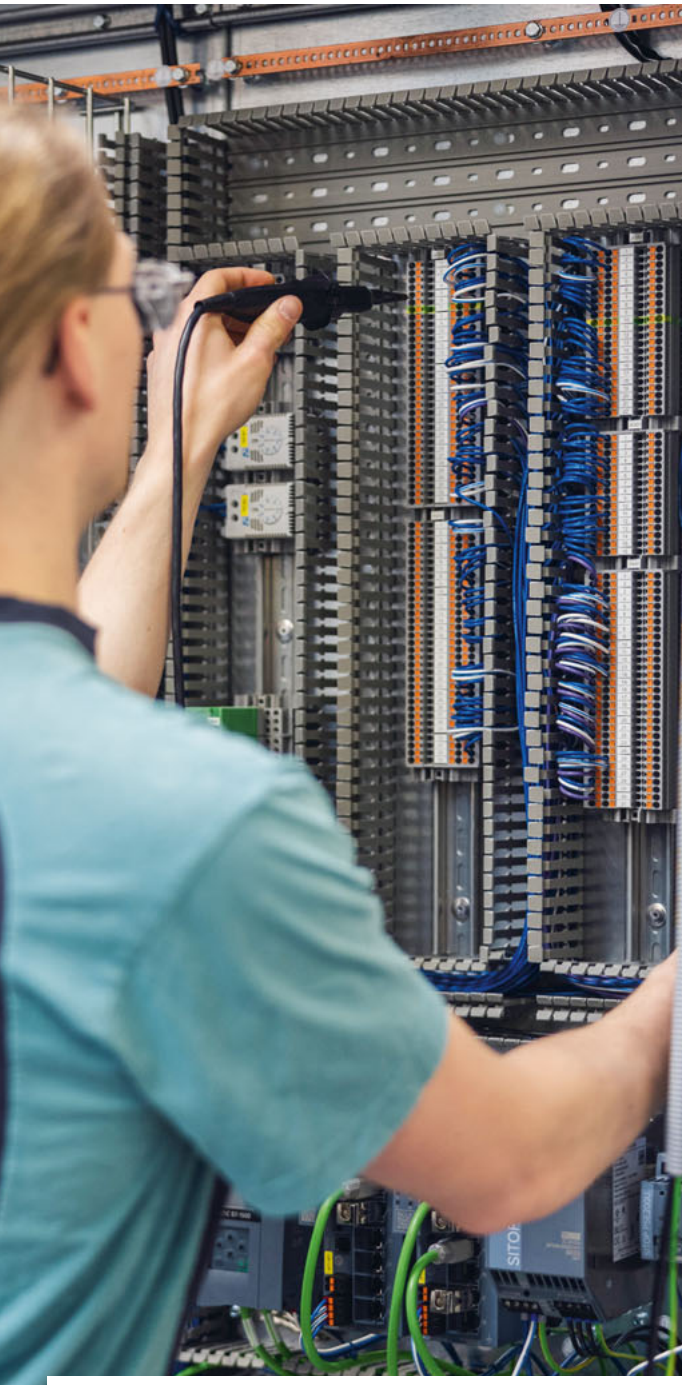
More and more customers are taking advantage of these opportunities, for example Harivenasa, a Bühler customer based in Spain that produces and markets oat products. "With a Service Agreement in place under which Bühler provides maintenance, we can concentrate fully on oat production and value creation, knowing that we have Bühler's constant support for any needs that arise," says Mikel Pomes, Plant Manager at Harivenasa. "Thanks to our collaboration, we have been able to achieve important milestones. One example is downtime, which we reduced by 2 percent thanks to digitalization and continuous improvements. And thanks to fully automated production reports tailored to our needs, we have also saved nine hours a week in administration work."

### A focus on cybersecurity

The cybersecurity landscape is constantly evolving, driven by new threats and regulatory developments. Regulations for the secure operation of critical security infrastructures are increasing worldwide. Upcoming legislation such as the European Union's Network and Information Security Directive 2 (NIS2) and the Cyber Resilience Act are just two examples. The responsibilities of providers and suppliers are increasing and require robust cybersecurity measures, incident response capabilities, and transparency in risk management practices.

Compared to many other providers in the field of security, Bühler has the advantage that the company itself is active in production.

"As a technology company, we know how important it is to protect our systems, data, and, above all, the trust of our customers. Every day, we face cybersecurity risks ranging from cyberattacks to simple human error. However, our commitment to security gives us the ability to overcome these challenges with resilience and confidence," explains Patrick Zimmermann, Expert Information Security Specialist at Bühler. "Cybersecurity is not just a technology issue, but a holistic endeavor that requires a strategic multi-layered approach. That's why we are committed to investing in implementing robust and advanced security measures throughout our entire organization, which include everything from cutting-edge, state-of-the-art technical controls to very comprehensive user awareness training programs."



A Bühler inspector carries out a functional check on a control cabinet, in this case a five-roll refiner retrofit for chocolate.

Bühler also draws on its wealth of experience when developing products. The development and operating processes of solutions such as the Mercury MES plant automation system and the Bühler Insights central platform for connected solutions meets high security standards and are certified to the ISO 27001:2013 standard for cybersecurity.

Bühler has the expertise to support customers in analyzing and implementing cybersecurity improvements. “We can also act as a sparring partner and hold informal discussions on cybersecurity issues or compliance with NIS2 requirements,” Zimmermann says. “We are in active contact with our customers and are happy to advise them.”

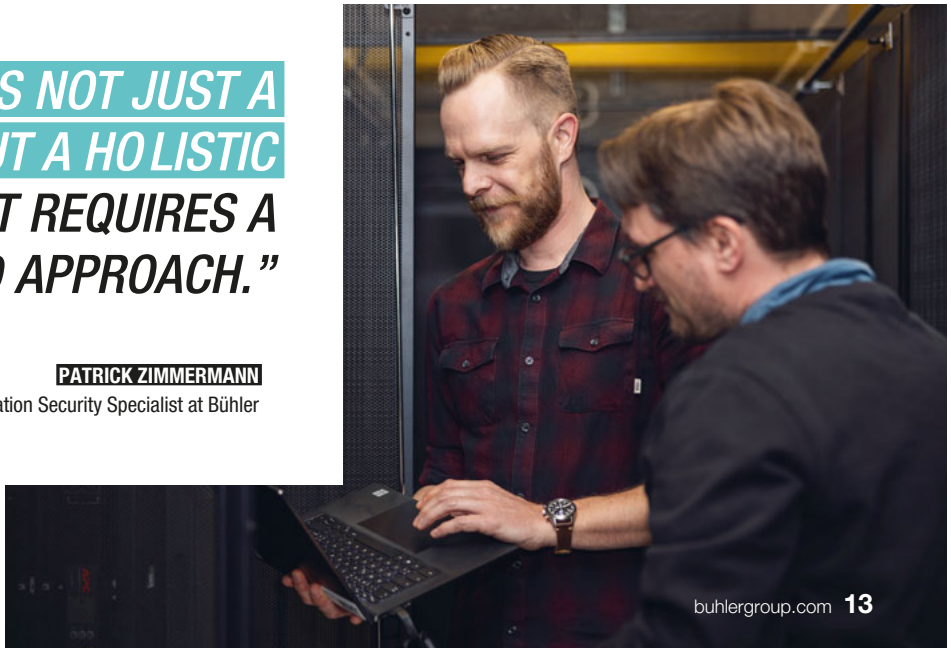
The benefits of automation and retrofits become tangible with specific customer examples. Molino Quaglia in Italy is one of many companies that has upgraded its automation system from WinCos to Mercury MES plant automation system. Now Molino Quaglia benefits from a fully automated, digitalized mill that produces up to 400 tonnes of flour per day and runs autonomously at weekends. At the same time, energy consumption and food waste have been reduced.

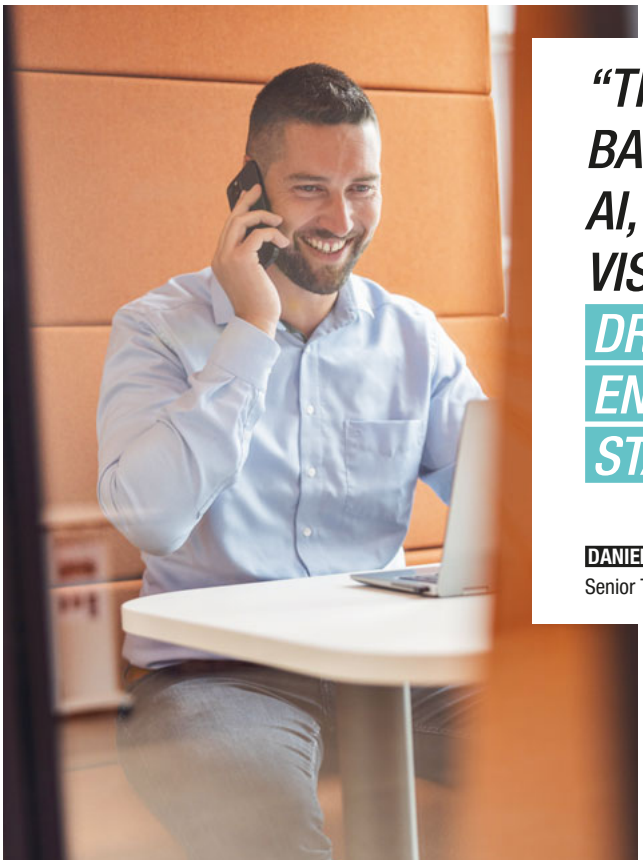
Bühler carried out one of its largest retrofits at chocolate manufacturer Lotte in Japan. Many machines were retrofitted, including roller mills, conching machines, and mixers. More efficient drives, modern touch-panel controls and state-of-the-art, fully-fledged safety devices were installed, including safety barriers and sensors that eliminate any hazardous situations and effectively protect machine operators.

Bühler works closely with its customers to develop solutions that move the industry forward. The Swiss animal feed manufacturer UFA co-developed Bühler’s

***“SECURITY IS NOT JUST A TECHNOLOGY ISSUE, BUT A HOLISTIC ENDEAVOR THAT REQUIRES A MULTI-LAYERED APPROACH.”***

**PATRICK ZIMMERMANN**
Expert Information Security Specialist at Bühler





*"THROUGH HIGH-LEVEL LANGUAGE-BASED PROGRAMMING, THE USE OF AI, AND EASILY SCALABLE PROCESS VISUALIZATIONS, BÜHLER IS ACTIVELY DRIVING TRENDS IN AUTOMATION TO ENRICH CUSTOMERS' PROCESSES WITH STATE-OF-THE-ART SOLUTIONS."*

**DANIEL BAIER**
Senior Team Manager R&D Automation Grinding & Dispersing at Bühler

PelletingPro service and uses it to achieve consistently uniform quality in the final product, saving 20 percent of energy in the pelleting process at its plant in Herzogenbuchsee in Switzerland. UFA is now installing the PelletingPro Service as a retrofit on all its systems.

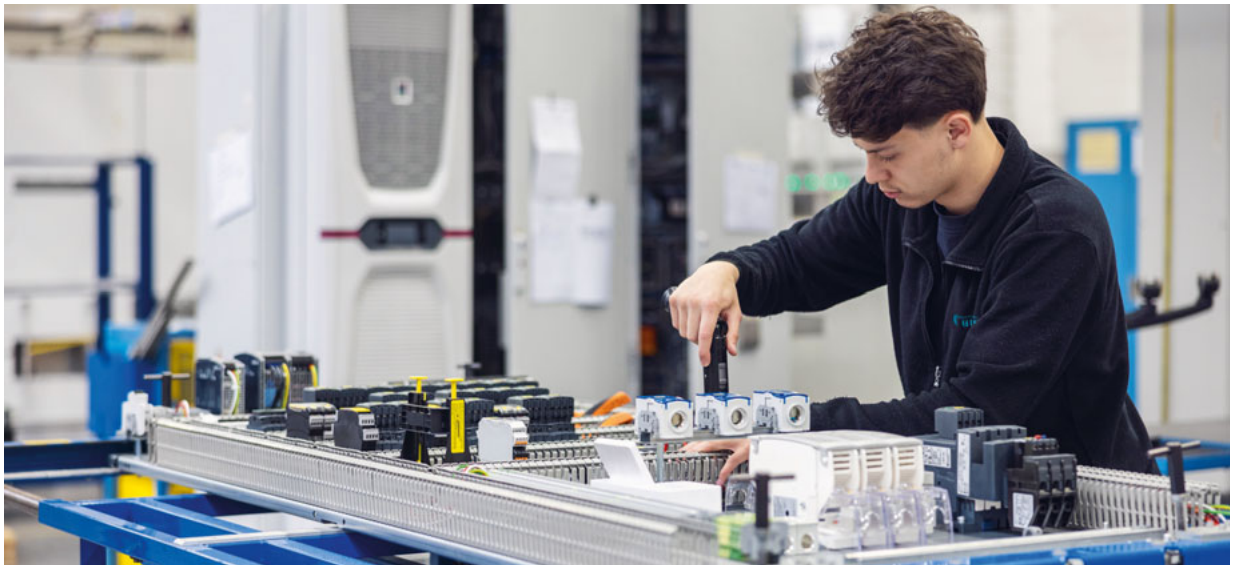
Bühler is working on the latest developments to make the automation of machines and systems even simpler, smarter, and more networked. "Through high-level language-based programming at PLC level, the use of AI, and easily scalable browser-based process visualizations, Bühler is actively driving current trends in automation to enrich customers' processes with state-of-the-art solutions," explains Daniel Baier, Senior Team Manager R&D Automation Grinding & Dispersing at Bühler.

Artificial intelligence will play an ever-greater role by enabling machines to learn and make decisions independently. This means that, over time, machines will become better at optimizing and adapting tasks, ultimately leading to more efficient production.

Bühler also wants to ensure that all machines and devices can communicate with each other without any issues. "To achieve this, we rely on a communication standard called OPC-UA, which enables the smooth exchange of information between different devices," says Baier.

Ensuring that every process can be monitored and controlled through user-friendly, web-based applications is also vital. These applications can be easily accessed via the internet browser on computers or mobile devices and can be flexibly adapted to the size and specific requirements of a company as necessary.

"We strive to enrich the field of automation with state-of-the-art solutions using technologies that will soon set the standard in the industry," explains Oeler. But close exchange with customers is essential. "Please get in touch with us. We are very interested in shaping the future of industry together with you."



Gent Jakupi, Automation Technician at Bühler attaches electrical equipment to a mounting plate.

# Bühler automation and digital solutions.

Optimize operations, maximize profit.

**Do you rely on manual reporting, experience inefficient energy usage or even unexpected process interruptions?**

With over 160 years of experience in plant engineering, Bühler designs its automation and digital solutions to minimize your efforts and improve the efficiency of your operations.

**Would you like to know more?**
Scan the QR code and get in touch with us.

Innovations for a **better world.**

BÜHLER

# AUTOMATE TO ACCELERATE

*Unlock new productivity heights with Bühler's modular automation solutions – boost efficiency, safety, and savings all while closing production and skills gaps for peak performance. From operator-guided to fully automatic, many solutions are available to drastically improve the operational excellence of your business.*

TEXT: BIANCA RICHLE

## WAREHOUSE MANAGEMENT

Enhance storage intelligence with our Warehouse Management add-on, ensuring accurate stock monitoring and rapid, error-free dispatching.


## PRODUCTION MANAGEMENT

Maximize efficiency with our Production Management add-on, which brings real-time control and visibility to your production processes, driving optimal performance.

## FOOD SAFETY AND QUALITY

Uphold the highest standards with our Food Safety, Traceability, and Quality add-on, safe-guarding your products through stringent tracking and compliance monitoring.

## BENEFITS OF AUTOMATION

- **INCREASED PRODUCTIVITY**
  thanks to orchestration of machines.
- **INCREASED AVAILABILITY**
  thanks to monitoring on a higher level.
- **INCREASED TRANSPARENCY**
  thanks to traceability.
- **REDUCED COSTS**
  thanks to more intelligent machinery and systems.
- **INCREASED SUSTAINABILITY**
  thanks to quantification and optimization.


## LEVELS OF AUTOMATION

**01** **MANUAL AUTOMATION:**
This category of machine automation is operator-dependent, with the necessity for continuous human oversight and control throughout the production process.

**02** **OPERATOR-DRIVEN AUTOMATION:**
While still predominantly managed by an operator, the system offers a real-time display of operational status. The operator analyzes and acts on the information.

**03** **OPERATOR-GUIDED AUTOMATION:**
At this level, systems not only present real-time data but also proactively recommend adjustments to the human operator, which they can choose to implement.

**04** **FULLY AUTOMATED:**
A fully automated facility can operate without human intervention, also known as “lights-out” production. The plant runs 24/7 and streamlines workflows.

## ENERGY MANAGEMENT AND $CO_2e$ QUANTIFICATION

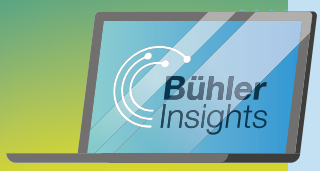
Cut costs and carbon with our Energy Management add-on, leveraging detailed tracking and analysis to promote energy efficiency across your plant. With our Environmental Impact Services you will be able to quantify and reduce your footprint.

The Bühler plant control system is the centerpiece for automating your processes and increasing productivity, enabling you to boost your base.


## INTEGRATION

Simplify decision-making with our Integration add-on, offering cohesive data collection and seamless system synchronization.

## DATA ANALYTICS




Our Data Analytics platform excels at leveraging advanced AI algorithms to analyze large-scale production data in real time, providing actionable feedback and optimization recommendations to enhance plant automation efficiency and productivity.

## REPORTING AND ANALYTICS

Unlock actionable insights with our Reporting and Analytics add-on, turning data into strategic advantage for continuous process improvement.

For more information, scan the QR code and get in touch with us.

Lucio Quaglia stands in the old milling complex of Molino Quaglia, which today serves as a holistic flour school called “Il Laboratorio”. Together with his brother and sister, they are the third generation to run the family-owned company.

*Molino Quaglia*

# WHERE FLOUR BECOMES ART

TEXT: LUKAS HOFSTETTER
PHOTOS: ANDREAS ZUBER

*Molino Quaglia has been producing wheat flour in the heart of the Veneto region in Este, northeastern Italy for more than 100 years. The family-owned and -run company exemplifies the journey of countless mills around the world; from water-powered grinding stones to high-tech production facilities. Today they embrace automation and digitalization on all levels and are harvesting the full potential of digital solutions within their mill.*

**THE APPRECIATION** of great quality food is deeply ingrained in the lifestyle of over 60 million Italians. From business meetings to family gatherings, food plays a key role, uniting people from the deep south all the way to the Italian Alps in the north. At Molino Quaglia, the three siblings Andrea, Lucio, and Chiara Quaglia dedicate their time and energy to ensuring that millions of consumers get the main ingredient that put Italy on food menus across the globe: high-quality wheat flour. They are the third generation of their family to run Molino Quaglia and live up to the company's motto: "Dove la farina diventa arte" – where flour becomes art.

As Lucio Quaglia walks past the old grinding stone from 1913 in Molino Quaglia's flour training and application center and makes his way up to the modern pizza training rooms, it feels as though he is traveling through 100 years of company history.

The grain's journey is digitalized from intake to final product.

Roberto Libertini (left) and Lucio Quaglia (right) share a mutual understanding of the impact automation and digitalization can have on the final product.


The mill is equipped with some of the latest milling technology from Bühler, such as the Sirius plansifter.


Molino Quaglia carefully combines the traditional art of flour milling with state-of-the-art digital technologies to get the most out of each grain.

***"MOLINO QUAGLIA PLACES SUCH A BIG EMPHASIS ON QUALITY AND PROCESS IMPROVEMENT AND WERE VERY OPEN TO ADDING DIGITAL SOLUTIONS INTO THEIR OPERATIONS."***

**ROBERTO LIBERTINI**
Automation and Digitalization Sales Support at Bühler

"Our grandfather founded Molino Quaglia in 1914. There was no electricity, so the grinding stones were placed on rafts and powered by the Adige river," says Quaglia. His grandfather, Angelo Quaglia, moved the operation to Vighizzolo d'Este in 1937, 40 kilometers south of Padova. "My father Annito then modernized the mill and turned it into an industrial-scale operation from 1947 onward. My brother, my sister, and I had the privilege of growing up with the mill," he recalls.

Fast forward to 2024, and the mill still stands in Vighizzolo d'Este, catering to the same bakeries, restaurants, and private households as the Quaglias have for generations. Their most famous brand is called "Petra", and just like countless Italian food traditions that conquered the world from small villages, Petra is sold globally.

### A holistic approach to flour milling

"We put a strong focus on our supply chains. Whenever possible, we get our wheat from local farmers who follow strict agriculture practices, and the same applies to our international suppliers. Quality starts in the farmer's field, and we're very happy that they share the same values as we have," explains Lucio Quaglia.

It's safe to say that the family lives and breathes flour. In 2002, they renovated the old mill building across the street of the current operations and built a comprehensive flour school called "Il Laboratorio", consisting of the Università della Pizza, Accademia del Pane, PizzaUp, and Pasticceria Dinamica. It's a unique facility where attendees deepen their knowledge of flour handling and processing into seemingly endless varieties of bread, pasta, or pizza.

Across the street, the mill runs like clockwork. Molino Quaglia has invested in the latest flour milling equipment over the years and is now reaping the benefits of reliable operations from intake to cleaning, sorting, milling, and packaging. Bühler's SORTEX H SpectraVision optical sorter is a prime example of the company's commitment to food safety and quality. Its newly designed cameras detect the subtlest of color defects, and new InGaAs cameras take foreign matter detection to new levels.

In 2021, the three siblings decided to fully leverage the opportunities of digitalization and automation in their operations. "We set out to change the historical course of the mill. Everybody in the milling industry knows that each grain matters, so we wanted to get the latest technologies to improve our operations to an unprecedented level. That's why we reached out to Bühler," says Lucio Quaglia.

When Roberto Libertini, Automation and Digitalization Sales Support at Bühler, received the call from Molino Quaglia, he jumped in his car and made the 2-hour journey to visit Lucio Quaglia and his team in person. "The upgrade to Bühler's Mercury MES plant automation system was a very exciting project. Molino Quaglia places such a big emphasis on quality and process improvement and were very open to adding digital solutions into their operations, so we were on the same page from the beginning," Libertini explains.

He and his colleagues got straight to work with the milling team of Molino Quaglia, led by Head Miller Gianluca Sinigaglia. Keeping plant downtime to a minimum was a key requirement – not an easy task given the strict working conditions during Covid-19 in the fall of 2021. "We all stuck together with the same goal. This approach created a great team spirit and enabled us to switch from the previous automation system, WinCos, to Mercury MES as efficiently as possible," says Sinigaglia. The mill was up and running again in less than 3 days – and the famous "Petra" flour bags were again sent around the world.

> ***"WE SET OUT TO CHANGE THE HISTORICAL COURSE OF THE MILL, AND WE WANTED TO GET THE LATEST TECHNOLOGIES TO IMPROVE OUR OPERATIONS TO AN UNPRECEDENTED LEVEL."***
>
> **LUCIO QUAGLIA**
> Co-owner of Molino Quaglia

### A silent guardian

With a few years of experience in running the mill with the Mercury MES plant automation system, Sinigaglia can't imagine going back to the old ways. "It's like working with an invisible helper who is always monitoring and reporting every step of our operations. All the data is fed into one easy-to-use dashboard and, if something goes wrong, we are notified immediately and can act where needed. This reduces food and financial loss – and it gives our team more time to focus on the quality of our flour rather than carrying out manual tasks," he says.

With the upgrade to Bühler's Mercury MES plant automation system, Molino Quaglia's mill runs autonomously 24/7, enabling millers to focus more on quality and process optimization.

The mill produces up to 400 tonnes of flour per day and runs autonomously on the weekend. Such a level of automation is only possible by leveraging the full scope of digital solutions. "We connected all the processes to Mercury MES via our digital platform Bühler Insights. Every single parameter of the mill is sent to Bühler Insights, where data is analyzed in real time and any deviations are reported immediately to the miller in charge via push notifications," says Javier Lozano, Product Manager Automation & Digital Services at Bühler. "Traditionally, we used to react to issues that happened in the mill. Now, we prevent those thanks to countless data points."

Bühler's temperature and vibration management (TVM) service is a key element of this. Sensors inside the roller mill continuously analyze grinding temperature distribution and how the vibrations are developing. Gianluca Sinigaglia receives real-time information about the grinding performance of the 16 Antares roller mills on his tablet, allowing him to reduce his teams' on-site process checks and spend more time focusing on product quality and improving overall operations.

"A couple of years ago, we couldn't imagine benefiting from this level of automation and digitalization," he explains. "Today, it's become second nature to us, enabling us to increase efficiency in every aspect of our milling operations. We reduced downtime, lowered our energy costs, and developed an even better understanding of all processes from intake all the way to packaging."

INFO

MOLINO QUAGLIA

## Petra Molino Quaglia, S.p.A.

*Vighizzolo D'este, Padua, Italy*

- Founded in 1914.
- Molino Quaglia produces high quality wheat flour, gluten-free flour, and specialty flours for baking, pasta, and pizza production.
- Molino Quaglia sells its flour varieties both to end-consumers and industrial food producers globally.
- Molino Quaglia has relied on Bühler's milling solutions for decades, and today is reaping the benefits of digital solutions and the Mercury MES plant automation system.

*"WE REDUCED DOWNTIME, LOWERED OUR ENERGY COSTS, AND DEVELOPED AN EVEN BETTER UNDERSTANDING OF ALL PROCESSES FROM INTAKE ALL THE WAY TO PACKAGING."*

**GIANLUCA SINIGAGLIA**
Head Miller at Molino Quaglia

**VIDEO**

Watch this video about Molino Quaglia to learn more about how they combine art and technology.

Lucio Quaglia and his siblings, like their mill, never stand still. They're driven by their mission to carry on their family's legacy and thrive in a highly competitive market. "A mill and the people running it should never be satisfied with the status quo. Supply chain issues, the effects of climate change, and rising energy costs are just a few challenges we have to meet. With our current set up with Mercury MES at the heart of our operations, we're perfectly equipped to tackle these challenges head on and turn them into opportunities for Molino Quaglia. At the end of the day, we feel that we have an obligation to provide high quality flour to millions of consumers 365 days a year," he says.

As the staff at Molino Quaglia make their way home, the mill continues to grind wheat as reliably as ever. It's a landmark standing out against a picturesque landscape of neatly aligned wheat fields, creeks, and gently rising hills – perfectly embodying the company's carefully balanced combination of the ancient and the modern.


Gianluca Sinigaglia, Head Miller at Molino Quaglia and his team were able to reduce downtime, lower energy costs, and develop an even better understanding of all processes.

Lotte Co., Ltd.

# A NEW LEASE ON LIFE


TEXT: TIM HORNYAK
PHOTOS: BENJAMIN PARKS

*When Japanese chocolate manufacturer Lotte decided to bring their production line up to date, rather than investing in new equipment, they opted for a major retrofit. This decision not only brought significant financial savings, it also led to reductions in their energy usage and in the environmental impact of their operations. These are major benefits in today's business climate.*


Masanobu Kamakura, Deputy Manager Customer Service at Bühler Japan and Kazushi Terada, Assistant Manager, Machinery Engineering Department, Urawa Plant, for Lotte Co., Ltd. proudly hold Lotte's signature chocolate brand, Ghana.

**AT THE NO. 7 FACTORY** in Lotte's Urawa plant in Urawa, north of Tokyo, machines extend for tens of meters down the floor, and the air inside the factory is thick with the sweet aroma of chocolate mass. There are rows of roll refiners, which grind the ingredients down to the micron level to make the fine chocolate mass used in Lotte's mainstay Ghana brand chocolate bars. Alongside them are a large number of conching machines, which add the final adjustments to the taste and flavor of the chocolate, and mixers that ensure the chocolate is a homogeneous mass.

Lotte is one of Japan's best-known chocolate manufacturers. Step into any convenience store or supermarket in Japan, and you are sure to see chocolates, candy, biscuits, gum, and ice cream from Lotte. Its products, such as Choco Pie cakes, Toppo biscuits, and Koala's March cookies, are on just about every kid's snack menu. The company is also active globally. It owns Wedel in Poland as well as several production sites in Southeast Asia, Indonesia, Vietnam, and Thailand.

The core of what makes its chocolate goodies possible is reliable equipment from Bühler. The relationship between the two companies goes back nearly half a century. The machines in the No. 7 Factory were built over 20 years ago, and yet they look and perform like new models, with modern touch-panel controls and the latest equipment. This is the result of a major retrofit carried out by Bühler.

### Targeting higher efficiency

Lotte's history stretches back to 1948, when it began producing and selling chewing gum in Tokyo. Since then, Lotte has expanded its business by introducing chocolates, candy, ice cream, and biscuits, in a range of highly original, high-quality products, growing to establish a solid position as a general confectionary maker.

To maintain its position as one of the biggest confectionary makers in Japan, Lotte is always seeking to improve its efficiency by incorporating new manufacturing technology and equipment. In 2018, the company realized that it needed to improve its mix of old and new machines for chocolate production to ensure sound maintenance and management of equipment for this essential part of its mainstay business. The company decided to concentrate all the machines in one place and retrofit the older units. This was a huge challenge due to the massive size and complexity of the equipment.

The conche, which adds the final adjustments to the taste and flavor of the chocolate, was newer than the other machines. With the retrofit, all the machines were brought up to date.

"In confectionary manufacturing, we have worked with Bühler for a long time because of our high standards for our products. No matter how much we use the machines, if they are maintained regularly the quality of the products does not change," explains Takao Okada, Manager, Machinery Engineering Department at Lotte's Urawa Plant. "In this project, Bühler managed the relocation, planning and installation of old and new machines, and in 2022 we finished relocating, concentrating, and retrofitting the machines, and finally completed the new factory project."

### Retrofitting on a grand scale

The retrofit was a large-scale project, one of the biggest that Bühler has undertaken for a single customer anywhere in the world. A large number of machines were retrofitted, including roll refiners, conching machines, and mixers. More efficient drive units were installed, as well as modern touch-panel controls and state-of-the-art, full-featured safety devices, including safety barriers and sensors that eliminate any dangerous situation to provide powerful safety protection for machinery operators.

"Bühler has focused on enhancing the safety features of its machines over the years. Moreover, in this project, in addition to our paramount requirement of safety, we also covered energy savings and cost," says Kazushi Terada, Assistant Manager, Machinery Engineering Department at Lotte's Urawa Plant. He estimates that the retrofit has saved Lotte about JPY 3 billion (around CHF 20 million) compared to buying all new machines.

The benefits of retrofitting are readily apparent, especially in an era of rising inflation. The equipment installation cost to the customer is significantly lower than the case of new equipment. Bühler's machines have an extremely long service life and can last up to 30 to 50 years. Control systems and electrical equipment for the machines, however, must be renewed every 10 to 15 years.

By installing better drive units, customers can also realize energy savings of 20 to 30 percent. That's a major advantage in countries like Japan, where utility companies have increased the average price of electricity by 50 percent over the past few years and are planning further increases of about 30 percent. For a large-scale production site such as Lotte's Urawa Plant, that can mean monthly electricity bills, already around EUR 700,000, will rise by some EUR 235,000.

Initiatives have been taken to reduce electricity in various parts of the plant. Positioned at one end of the machine floor is a large display of numbers indicating current power usage. If the factory exceeds the maximum monthly amount contracted with its electricity utility, subsequent electricity charges

The SFLF 1800 five-roll refiner Finer™ (left) and the SZAP 1300 two-roll refiner PreFiner™ (right). The five-roll refiner was the most challenging to retrofit.

*"NO MATTER HOW MUCH WE USE THE MACHINES, IF THEY ARE MAINTAINED REGULARLY THE QUALITY OF THE PRODUCTS DOES NOT CHANGE."*

**TAKAO OKADA**
Manager, Machinery Engineering Department,
Urawa Plant, Lotte Co., Ltd.

The first chocolate mass that comes out of the mixer is still very coarse. In the next stage it moves into the two-roll refiner and will be further refined with each subsequent step.

increase sharply. The factory is therefore taking measures to prevent this. Through the energy savings, the project has also enhanced Lotte's efforts to become a more sustainable business. For the newly built No. 7 Factory, the company incorporated energy-saving initiatives into the building itself. On the high-ceilinged floors of the new factory, the company installed a displacement air conditioning system that concentrates on the areas where people work and creates temperature stratification, thereby reducing electricity usage.

The company procures cocoa beans, one of the company's most important raw materials, only from sustainable sources. All of these measures are part of a heightened awareness of the environmental impact of the business and a commitment to making reductions and transitioning to more sustainable alternatives where possible.

"Confectionary production requires the operation of a lot of cooling equipment," says Okada. "We have installed the latest freezers using environmentally friendly refrigerants that don't contribute to greenhouse gas emissions for the cooling tunnel in our chocolate manufacturing line and our ice cream manufacturing equipment. It's the first in the world to use $CO_2$, a natural refrigerant, to cool the ice cream and was installed here at the Urawa Plant."

### Getting the most out of the equipment

There are many other benefits to retrofits, too. "Retrofits are very useful to extend the lifetime of our machines. They help not only with energy savings but also with reducing food loss because stable operation mitigates the amount of substandard product that has to be disposed of," says Koichi Yashiro, Head of Customer Service at Bühler. He was involved with the Lotte retrofit project from the beginning.

Within the retrofit project, older machines are upgraded so that they essentially become new machines. Along with increased quality and energy savings, there are other benefits which include reduced production troubles, increased safety, greater spare parts availability, and a sense of confidence for the equipment maintenance management team, according to Yashiro.

The retrofit also brings older equipment to a level that is ready to integrate digitalization, a factor that brings with it current and future benefits, he adds. For Lotte, it meant bringing several generations of

The control cabinet at Lotte's Urawa plant. Supply chain issues made getting semiconductors difficult, but the retrofit was still finished on schedule.

At the Bühler moulding line, the chocolate is formed into bars of Ghana chocolate.


*"IN THIS PROJECT, IN ADDITION TO OUR PARAMOUNT REQUIREMENT OF SAFETY, WE ALSO COVERED ENERGY SAVINGS AND COST."*

**KAZUSHI TERADA**
Assistant Manager, Machinery Engineering Department,
Urawa Plant, Lotte Co., Ltd.

machines up to the same level, which also helps the management of equipment maintenance and the operators who run the machines.

"At Bühler, we don't just sell new machines, we support customers to use their existing machines with the best performance over a long period," Yashiro explains.

### Local solutions for global challenges

This was not only one of the biggest retrofits Bühler has ever carried out, it was also completed against the background of severe supply chain tensions around the world.

Yashiro opens a door at one end of the factory floor and points to a large number of control panels neatly housing logic controllers (PLCs) running the machines. Procuring this vitally important core piece of the retrofit was the most challenging job because of the difficulty sourcing semiconductors and other parts. The Covid-19 pandemic and conflict in Ukraine caused a worldwide chip shortage and severely impacted other supply lines as well as international travel. Bühler engineers from Europe were unable to travel to Japan for the Lotte project due to entry restrictions. Despite these challenges, Bühler was able to source the parts, ship them by air, carry out the modifications and installation work with its Japanese staff, and finish the job on schedule by September 2022.

Close coordination and cooperation between Bühler Japan, Bühler head office in Switzerland and Lotte was the most important element in overcoming these difficulties. This was a great source of pride for Yashiro but, more importantly, it was a successful result for Lotte. The peak period for chocolate production starts at the beginning of autumn. If the retrofit had not been completed on time, it would have had to be delayed to the following spring, causing a major obstruction to production plans.

"Bühler was able to integrate the new and old machines in the retrofit, adding features such as the remote control of conching," Terada explains. "This was a great benefit that allowed us to increase operational efficiency."

INFO

お口の恋人

LOTTE

**Lotte Co., Ltd.**

*Tokyo, Japan*

Founded in 1948.

Lotte is one of Japan's best-known chocolate manufacturers. It also makes chewing gum, cookies, candy, and ice cream.

Lotte sells its delicious products to customers across Japan as well as Indonesia, Vietnam, Taiwan, Thailand, and Poland.

Lotte has relied on Bühler solutions for nearly half a century, including cacao processing, mixers, roll refiners, conching machines, and moulding lines.

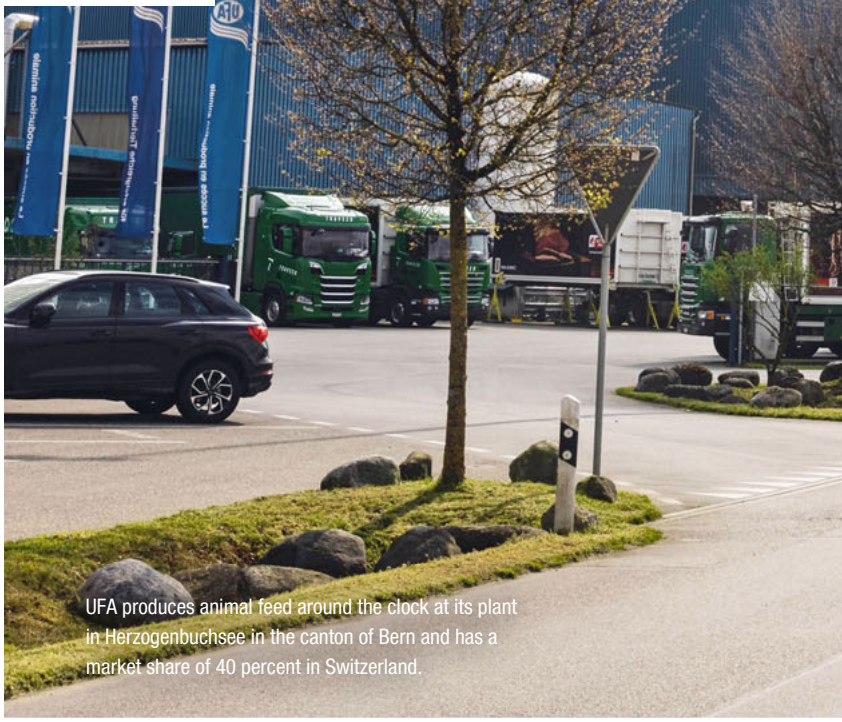
# WHEN DIGITALIZATION UFA MEETS AG

TEXT: BIANCA RICHLE
PHOTOS: FABIO REICHMUTH

*Swiss animal feed manufacturer UFA is the first customer to commission Bühler's PelletingPro, having co-developed the digital service together with Bühler. The result speaks for itself. UFA achieves consistent quality in its end products and saves 20 percent energy in its pelleting process. It is now installing the PelletingPro service on all its systems.*

**THE IDYLLIC COUNTRYSIDE** of Herzogenbuchsee in Switzerland is home to one of the five sites owned by animal feed manufacturer UFA. The feed mill rises a full 14 stories into the air. Feed mixtures for livestock are produced here around the clock. The key difficulty is to produce a consistently uniform end product. The company set out to remedy the situation with a digital solution. "We work with natural raw materials, which makes it challenging to consistently achieve the same quality," explains Reto Mösch, Head of Production & Technology at UFA. "Talking to Bühler, we discovered that they were already one step ahead and had a pilot project underway," he says.

The two partners quickly decided to work together on a solution. The partnership was very successful and resulted in the new PelletingPro service.



UFA produces animal feed around the clock at its plant in Herzogenbuchsee in the canton of Bern and has a market share of 40 percent in Switzerland.

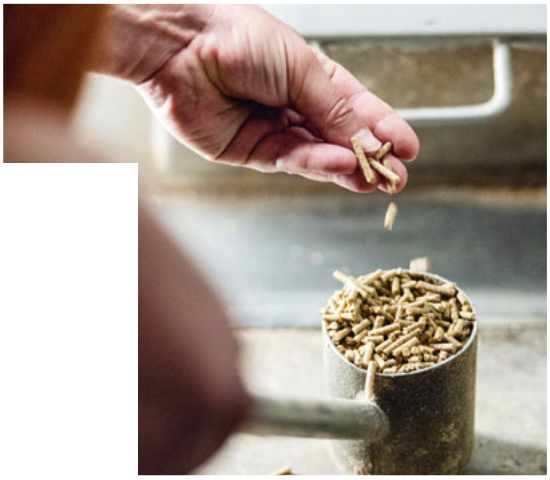
# RICULTURE

VIDEO

Find out more about UFA's digital journey and the development of PelletingPro.

Martin Bolkenius, Technical Manager at UFA, monitors production on site using the dashboard.

PelletingPro service enables consistent quality regardless of the raw material.



A sample shows that UFA achieves perfect feed pellets at all times.

***"WE CAN REDUCE THE ENERGY CONSUMPTION OF THE PRESS BY AROUND 20 PERCENT OR INCREASE ITS CAPACITY BY THE SAME AMOUNT."***

**RETO MÖSCH**
Head of Production & Technology at UFA

"During our collaboration, we realized how much experience Bühler has in process engineering and automation," Mösch explains. "There were some tricky times during the course of the project when things didn't really progress, but one side always motivated the other to keep going."

### Maintaining moisture content

"The advantage of PelletingPro is the consistent quality regardless of the raw material and independent of the prevailing weather conditions. And we can monitor and control the moisture content in the entire thermal line," Mösch explains. "By using PelletingPro, we can reduce the energy consumption of the press by around 20 percent or increase its capacity by the same amount."

These advantages prompted UFA to further invest in digitalization. "We decided to use PelletingPro on all our thermal lines," he says.

The digital service has been put through its paces by the operators at UFA. "The challenge for our operators is that they manage five lines," says Martin Bolkenius, Technical Manager at UFA. "You have to constantly monitor them and adjust them accordingly so that the right quality is achieved."

To assist operators in this task, UFA has equipped the mixer with a moisture measurement system, specifically the DCMA (Multi NIR Inline System). This advanced installation enables the continual assessment of a large volume of product as it moves through the mixer, where near-infrared sensors are strategically placed to analyze the product.

"Thanks to the PelletingPro system, we're able to anticipate the behavior of the product in the subsequent pressing stages. We have the capability to adjust for variables such as air conditions, ambient temperatures, and raw material moisture within the system. This allows us to maintain a consistent quality of product delivered to the press," explains Bolkenius. "The PelletingPro system can predict the final product moisture to a maximum deviation of +/- 0.5 percent. Most of the time, we actually achieve 0.3 percent."

### Innovation in a dynamic environment

Achieving consistent quality in their final product is not the only challenge that UFA has faced. "We work in a very dynamic environment," explains Mösch. "The agricultural industry is undergoing structural change; there is a consolidation into fewer, larger operations that are more receptive to technology. We need to keep pace with that."

There are also new trends in nutrition. One example is the increased use of oat milk instead of cow's milk. As a result, more oats are being grown in Switzerland. "One liter of oat milk yields around 4 kilograms of by-products. The aim is to ensure that we utilize these side streams and drive the circular economy," says Mösch.

Due to rising energy prices and its goal of being $CO_2$ neutral by 2040, UFA must not only become more efficient in its manufacturing processes, but also in all related areas, including logistics. UFA tries to avoid empty runs wherever possible and generates up to 20 percent of its electricity using photovoltaics. It is currently working with universities and Bühler on a project that aims to use waste heat to produce steam and feed it back into the production cycle as energy. UFA is also working on innovative solutions for greater sustainability in its products.

The company has released a new mineral feed that helps reduce cow methane production while increasing milk production efficiency by 10–15 percent. The feed is priced the same as conventional feeds. However, any extra costs incurred in producing this specialized feed are offset by the revenue generated from selling carbon credits.

As a major player with a market share of 40 percent in Switzerland, UFA sees its duty be a leader in sustainability and to pave the way for smaller companies. "Bühler is an important partner for us as it operates globally in various sectors. This allows us to learn from the best around the world," says Mösch.

INFO

**UFA AG**

*Herzogenbuchsee, Switzerland*

- Founded in 1958.
- UFA is a supplier of livestock feed for customers in Switzerland.
- UFA's customers are Swiss livestock farmers.
- UFA operates five Bühler feed production plants and played a key role in the co-development of the digital Bühler service PelletingPro.

# SPOTLIGHT ON **RETROFIT AND AUTOMATION**

From transforming an abandoned silo into a state-of-the-art facility to staying at the forefront of cutting-edge technology – retrofitting, automation, digitalization, together with Bühler services enable customers to focus on what they do best and care about most.

Octaviano Palomo, Spain

## FROM ABANDONED SILO TO INTELLIGENT FACILITY

The family-owned business Octaviano Palomo in Spain has been operating in the cereal sector for over 70 years. In 2020 they set out a growth plan based on four pillars: digitalization, sustainability, new consumer trends, and people. As part of this, they acquired an abandoned 1970s silo in Pancorbo and, together with Bühler, began to modernize, automate, and digitalize the facilities, transforming them into a state-of-the-art strategic grain storage and distribution center. As well as automating and digitalizing the facility, new functionalities were added. Data from the factory can now be analyzed in the cloud with Bühler Insights, and with the Mercury MES plant automation system, there is full transparency of processes, from reception of the raw materials to seed classification, mixing, and truck loading. Today the silo is a benchmark for cereal storage and distribution centers and is helping Octaviano Palomo to achieve its goal of becoming carbon neutral.

The 1970s silo in Pancorbo, Spain has been transformed into a state-of-the-art grain storage and distribution center.

**VIDEO** Watch the video to learn more about Octaviano Palomo's journey.

From left to right: Umang Maheshwari, Director, and Anil Maheshwari, Chairman, Jai Giriraj Rice & Agro Mills Pvt. Ltd.; Onkare Gowda, Head of Service Operations, Middle East Africa & India, Bühler Group; Udit Maheshwari, Director, Jai Giriraj; Shivaganga V, Team Leader, Services Agreement, Prasoon Mishra, Senior Manager, Process Expert, and Bhavesh Jain, Team Leader, Customer Service, Bühler India.

VIDEO

Find out more about how Jai Giriraj is supported by Bühler services.

Jai Giriraj Rice & Agro Mills, India

## A STRATEGIC SHIFT TO EFFICIENCY AND EXPERTISE

Jai Giriraj Rice & Agro Mills Pvt. Ltd. has been in the food and agricultural industry for decades. The most recent addition to their diverse portfolio is a rice mill, which has operated successfully since 2014. In 2022, they decided to have their rice mill equipment taken care of by Bühler so that they could focus on their core business. Thanks to a Service Agreement with Bühler, they now have consistent output across all lines, lower operational costs, and asset lifetime has been extended. Not only that, Bühler service engineers have enhanced the knowledge of Jai Giriraj's own operators.

Molinos El Yopal, Columbia

## EMPOWERING THE LOCAL ECONOMY

In Casanare in Columbia, Molinos El Yopal stands as a testament to agro-industrial innovation and community development. As one of the first automated rice plants in Latin America, it has not just revolutionized rice production in the region but also empowered the local economy. The facility is the result of a close collaboration with Bühler, whose experts worked with the team at Molinos El Yopal from design through to start-up. With Bühler solutions such as the TAS universal cleaning machine and the Sortex S Ultravision optical sorter, Molinos El Yopal can achieve high levels of operational efficiency and exceptional product quality, while the Mercury MES plant automation system enables operators to monitor what is happening in any part of the plant from wherever they are, including remotely. Combining tradition, technology, and vision, Molinos El Yopal has helped to invigorate the regional economy, encouraging farmers to diversify and innovate.

VIDEO

Watch the video about Molinos El Yopal to see how they improve efficiency.

Harivenasa, Spain

## HARVESTING QUALITY WITH PEACE OF MIND

VIDEO

Watch the video to see how Harivenasa improved quality with Bühler services.

Harivenasa, Spain's first and leading oat plant, specializes in producing and supplying high-quality oats and other cereal-based products. With a Bühler Service Agreement it is able to keep its systems constantly up to date with the latest cybersecurity, technologies, and functionalities. This includes enhancements to the Mercury MES plant automation system, as well as scanning services. The service package provides not only continuous upgrades, but also 24/7 comprehensive technical support every day of the year, ensuring that any interruptions are resolved with the minimum possible delay. Thanks to digitalization and continuous improvements, the company has reduced downtime by 2 percent. With this support, Harivenasa is able to fully focus on its commitment to producing high-quality oats and adding value to its customers.

The latest milling equipment and close proximity to one of Quebec's largest organic grain farms provides the Calico Mill with the ability to process a steady stream of high-quality raw material.

*Nestled in Quebec's picturesque Lanaudière region, the small but mighty Calico Mill emerges as a beacon of success, driven by a profound commitment to sustainability and customer satisfaction. With a team of just three, the company has mastered the art of organic corn processing, setting a new standard in North America – and it's their strategic embrace of automation that has put them at the forefront.*

*Calico Mill*

# GIANT STRIDES IN ORGANIC CORN PRODUCTION


TEXT: VERONICA OCCELLI
PHOTOS: PHILIP TOUITOU

**THE RAYNAULT BROTHERS,** Sylvain and Richard, have been in the farming business in Canada since 1985. They are experts in dairy farming, raising steers, and cultivating all manner of crops, including corn (maize), soybeans, green peas, extra-fine peas, and cereals. In 2020, they decided to use their rich heritage to redefine the organic corn market, identifying an untapped opportunity for human consumption.

In the region, corn was only milled on a large scale for animal feed. The brothers knew that they could not sell their product for feed at a price that matched the quality of their corn, so they refocused the resources of their farm, Ferme Bonneterre, and began growing high-value organic corn suited for food producers. They didn't stop there. They also decided to start Canada's first industrial corn mill for human consumption.

"I was born and raised in the area and started operating a farm here with my brother. We produce mainly corn, soy, wheat, and spelt. Everything but the corn was grown for human consumption, but with the high-quality corn we were producing, we had difficulty gaining value in the animal market," explains Sylvain Raynault, Co-Owner, Calico Mill Inc. "Our vision was to increase the value of our high-quality, organic corn by processing it into a variety of products suited for human consumption."

They started by setting up complimentary facilities right next to the farm, including a grain center that would directly supply the mill, and established systems to take organic cornmeal and organic corn flour to a larger market with their combined knowledge of farming and agriculture. However, when it came to milling equipment, they were completely in the dark.

General Manager Alexandre McGrath realized Calico Mill needed an industry expert. "We knew we were starting from scratch, and we knew we would need help figuring out what equipment to get," McGrath explains. "We quickly realized there was so much to know, and we couldn't just go and buy equipment. We really needed to partner with experienced people as well."

## Turning to Bühler

In their search for a reputable milling equipment company to guide them, it was important to find an organization that prioritized sustainability, efficiency, and quality. Their quest led to Bühler. It was not only Bühler's focus on high-grade, sustainable solutions that appealed to the brothers, but it was the people and the level of support they received that sealed their decision.

"For us it was important to partner with a company that believes in organic production and sustainable development," Raynault explains. "We knew that Bühler machines are high quality but had underestimated the quality and professionalism of the staff. They exceeded our expectations in terms of installation, follow-up, and all the advice they provided."

Since Calico Mill launched its project during the pandemic, they faced a unique set of hurdles. Due to the travel restrictions in place between the United States and Canada, Raynault and the team couldn't visit Bühler's Food Application Center in Minneapolis, or even meet their Bühler counterparts in person. Designing a mill under these circumstances was challenging, but through the use of video conferencing they were able to not only discuss, but also refine the details of the project.

*"WE'RE COMMITTED TO ALWAYS GIVING OUR BEST. THAT'S WHY WE STARTED WITH THE BEST ORGANIC CORN AND THE BEST EQUIPMENT. DAY AFTER DAY, OUR CUSTOMERS CAN RELY ON THE SAME QUALITY."*

**SYLVAIN RAYNAULT**
Co-Owner, Calico Mill Inc.

**VIDEO**

Find out more about how this small mill benefits from automation.

Combining ease of operation with the required throughput keeps the Calico Mill ahead of the curve.

**INFO**

Calico

## Calico Mill Inc.

***St. Paul, Quebec, Canada***

- Founded in 2022.
- Calico Mill is Canada's largest processor of organic corn for human consumption.
- Calico Mill's customers include food processors, wholesale, and food service suppliers.
- Calico Mill uses a complete Bühler milling and automation solution for corn.

The rollstand floor of the mill is capable of processing 72 tonnes a day, making it Canada's largest processor of organic corn for human consumption.

Communication was key during this difficult time. "I have 27 years of experience in corn milling and was able to put all of that to use in order to connect with the Calico team and support them throughout their project," explains Herman Roux, Regional Sales Manager at Bühler.

Roux designed a milling layout tailored to Calico's organic corn quality and their desired products: cornmeal and corn flour. "We began by analyzing a sample of their corn at our Minneapolis Food Application Center to assess its hardness," Roux says. Anticipating future growth plans, he recommended doubling the cleaning and degermination capacities from the outset. In the online meetings, a precise design emerged: a 72-tonne mill with cleaning and degermination capacity for up to 154 tonnes per day.

One of the most important aspects of the project for Sylvain Raynault was that the mill would "run itself", according to Roux. "To meet Calico's requirements, we equipped them with the Mercury MES plant automation system. We also provided comprehensive training on its operation. As a result, their miller can now manage the entire process from a centralized workstation."

The project came together as planned, despite complicated logistics during the pandemic. Together, Bühler and Calico installed the mill.

"We provided a team to assemble everything. They worked alongside a Bühler technologist who we managed to get on site even during the travel restrictions," explains Raynault. "In the background, the entire operation was overseen by a remote Bühler team of specialists. It was a great collaboration and we were very satisfied with how smoothly the process ran."

Since 2022, the Raynault brothers have been running a corn mill that conserves energy, optimizes water usage, and even finds a use for food-grade corn dust. Automation is their silent helper, enabling their lean team of three to oversee production. "The entire plant is fully automated from raw material to packaging. It is very efficient. We produce virtually no dust, either inside the plant or outside in the atmosphere, so it's very environmentally friendly," McGrath explains.

### Small but mighty

By integrating automation and industry-leading expertise, Calico ensures not just quality but consistency and reliability across their product range. From the flour used in baked goods to the cornmeal enriching a myriad of recipes, the thread that connects them is Calico's dedication to quality. "We're committed to always giving our best. That's why we started with the best organic corn and the best equipment. Day after day, our customers can rely on the same quality, and that is very important to us," says Raynault.

Calico has always had an eye on the horizon and the present mill is designed to accommodate future expansion. Plans for diversifying product lines are already laid out, ensuring that as consumer needs evolve, Calico will evolve with them.

"I believe that our company is unique. We produce organic flour from raw materials from our own farm. This reassures our buyers because they know where the product they are buying comes from," Raynault explains. "With our high production capacity, we are in a strong position to meet the ever-growing needs of leading organic food companies."

***"WE EQUIPPED CALICO WITH MERCURY MES AND PROVIDED TRAINING ON ITS OPERATION. AS A RESULT, THEIR MILLER CAN MANAGE THE ENTIRE PROCESS FROM A CENTRALIZED WORKSTATION."***

**HERMAN ROUX**
Regional Sales Manager at Bühler

*Remanufacturing machinery offers financial benefits and sustainability advantages. Leveraging years of experience and a network of remanufacturing facilities globally, Bühler provides custom remanufacturing solutions for its customers in the die-casting business to revitalize well-used machines, potentially extending their service life by up to 20 years.*

**AT FIRST GLANCE,** it looks like a gigantic puzzle. Hundreds of parts are neatly aligned, waiting to be cleaned, remanufactured, replaced, or upgraded and eventually reassembled into a die-casting machine. A few meters away, workers are busy with other machines further along in the value chain, using ratchet tools the size of a grown man's arm, industrial high-pressure washing systems, or nanometer measuring tools to ensure every detail functions perfectly.

Welcome to Bühler's die-casting remanufacturing site in Bedizzole near Brescia in northern Italy. It's one of three such facilities the company operates – the others are in Wuxi, China and in Holland, Michigan in the United States, ensuring customer proximity in the biggest die-casting markets.

In this 7,000-square-meter facility in Italy, a dedicated team of around 40 employees remanufactures between 15 and 20 machines per year, depending on the size of the machines. The specialized plant offers a choice of full or partial overhauls, including control upgrades to the latest Bühler DataView control system.

### Repurposing the weight of 45 elephants

The locking forces of the machines that are being given a fresh start close to the shores of the picturesque Lake Garda range from 2,600 kilonewton (kN) up to 42,000 kN. Regardless of their size, the impact on sustainability is eye-opening. Compared to building a new die-casting machine, remanufacturing requires around 70 percent less energy and over 71 percent less water.

At the same time, hundreds of tonnes of material are reused instead of being produced. The example of the Evolution 420 die-casting machine impressively demonstrates this. During the overhaul of a machine of this size, 233 tonnes of material are reused – the equivalent of the weight of about 45 elephants. Overall, a general overhaul saves 67 percent of $CO_2e$ compared to the production of a new machine of comparable size.

"We offer an entire set of services for our customers' die-casting machines. When a machine arrives, we disassemble it and document every part. After inspecting each part, we decide together with the customer which parts need to be replaced as part of our transparent remanufacturing process," says Jan Meier, Head of Operations at Bühler Brescia.

This process can take 3 to 4 weeks and requires a great deal of factory space – a challenge in times when the order books are full. "We're working on plans to increase our capacity. One idea is to externalize dismantling to nearby factories. This would free up precious space to clean, repair, and reassemble the machines."

# AS GOOD AS NEW

TEXT: LUKAS HOFSTETTER

As good as new: remanufacturing is a means to extend the return on an original investment. This die-casting machine has been remanufactured, repainted, reassembled, and fully tested in Brescia, before being shipped to the customer's foundry, where it will be reinstalled and recommissioned for production.

The equipment can run for another 15 to 20 years after remanufacturing, depending on usage and maintenance – up to 25 years if the customer takes excellent care of the machines. "Thirty percent of the machines we remanufacture are secondhand Bühler machines that are on the market. We scout for them to renew and sell them. The other 70 percent are from customers who approach us directly," says Francesca Sauda, CFO & Head of Commercial and Human Resources at Bühler Brescia.

The remanufacturing business is as cyclical as the die-casting business, and currently it's in a very busy cycle. "Our order book is filled well and we're happy to contribute to our customers' success. Our customers from the automotive sector, for example, are under pressure to deliver car parts 24/7. We see it as our duty to do everything we can to plan and execute the entire process as smoothly and as efficiently as possible."

## Ready for anything

With Bühler's constant push for new innovations in die casting, the team in Bedizzole must adapt to new technologies as an entire industry is changing. Take the example of the Carat series. These two-platen machines with locking forces of 10,500 to 92,000 kN are designed for die casting standard structural and other parts as well as large and com-

plex parts, while increasing productivity by up to 30 percent. A Carat machine can be the size of a house, which comes with a host of challenges for the team in Bedizzole.

### Like Hannibal crossing the Alps

Jan Meier's eyes light up as he talks about the first Carat his team is currently remanufacturing. "The Carat 250 came from Germany and, yes, it's huge. Organizing the transport over the Alps was an incredible undertaking as it weighs 63 tonnes. Once we had it at our workshops, it seemed to dwarf everything we've ever done before. But the team pulled it off like they always do by learning on the go, thinking outside the box, and always prioritizing quality over quantity," he says.

The Carat series has been highly successful since its launch in 2007 and can now be used to manufacture parts for electric vehicles (EVs) – a change many producers are undergoing. Remanufacturing adds up to 20 years to a Carat's lifecycle and enables producers to cover the increasing demand for EV parts. The team in Bedizzole is ready to give a new lease on life to the Carat machines.

"What makes our customers ship their precious machines to us is their trust in our ability to extend the lifetime of their machines by up to two decades. For one, that's financially attractive as their initial investment is quite high. Secondly, they are under scrutiny to reduce their $CO_2e$ footprint, and we can make a tangible difference there," says Francesca Sauda. "It's a win-win situation that shows the power of buying high quality in the first place and then remanufacturing it rather than replacing it."

Over 7,000 kilometers west of Bedizzole, Ben DeJong, Customer Service Manager Die Casting at Bühler North America, looks for a spare part on the shop floor of Bühler's die-casting remanufacturing site in Holland, Michigan in the US. This is where a substantial portion of large American car manufacturers send their weary machines for the magic touch DeJong and his team provide. "We remanufacture between seven and 10 machines per year. Like our colleagues in Italy and in China, we feel the cyclical increase in the number of machines coming in for overhauling. Our advantage is that we have capacity to manufacture up to 60 die-casting machines here per year," he says. "This gives us access to know-how about the design of the machines and to more than 7,000 machine parts from the mid-1960s to today. This is vital in times of supply chain disruptions and increasing demand for quicker turnarounds."

With the transformation towards the production of electric and hybrid vehicles well underway in North America, DeJong and his team are feeling the increasing demand for Bühler's Carat series. They know exactly what this means down the line.

"About 60 percent of new machines in our market are megacasting machines with locking forces exceeding 56,000 kN. The race between Europe, Asia, and North America for market share in the electromobility industry is gaining speed by the day, so these machines will be running at full capacity 24/7," DeJong explains. "That's why we're already preparing our workshops to handle the remanufacturing of these gigantic machines as efficiently as possible through investments in our infrastructure, expansion of our shop floor, training of employees, and proximity to our customers to plan as efficiently as possible."

### The cogwheels keep turning

There is a similar set up in China, where electric vehicles are the rule rather than the exception and a fundamental driver for the entire economy. The remanufacturing center in Wuxi completes Bühler's global ecosystem. "We remanufacture three to five machines per year and provide additional services at our customers' sites such as machine relocation or control system upgrades," says Ping Gu, Customer Service Supervisor Die Casting at Bühler Wuxi. "We're happy to offer our customers a more cost-effective alternative to buying new machinery that also contributes to sustainability."

And as hundreds of Bühler die-casting machines around the world reliably produce vital parts for our daily lives around the clock, the finely tuned cogwheels at Bühler's remanufacturing centers continue to set the clocks of weary machines to zero and transform them into high-performing assets again with decades of service left in them.

INFO

**Bühler's service stations**

Bühler operates a network of 105 service stations to cover customers' needs in the Advanced Materials and the Grains & Food businesses. While most services in these locations center around refurbishing parts such as rolls, dies, or sieves in food and feed processing machines, remanufacturing of entire machines is also possible depending on the location. Learn more about our refurbishment services on pages 44-47 and contact your Bühler representative to find out more about the possibilities of remanufacturing or refurbishing.

*"WHAT MAKES OUR CUSTOMERS SHIP THEIR PRECIOUS MACHINES TO US IS THEIR TRUST IN OUR ABILITY TO EXTEND THE LIFETIME OF THEIR MACHINES BY UP TO TWO DECADES."*

**FRANCESCA SAUDA**
CFO and Head of Commercial and Human Resources at Bühler Brescia

This is the machine on page 41 before remanufacturing. Every component was cleaned, machined, or replaced. Where possible, newer technology may be introduced to give customers an advantage in cycle times, cell uptime, control, and management.

Once each part has been cleaned and inspected, Bühler's expert engineers conduct a detailed analysis.

Disassembled to detail: Each component is meticulously laid out and documented.

# KEEP ON ROLLING

TEXT: LUKAS HOFSTETTER

*Efficient production not only hinges on people's expertise, but also on well-maintained technology. In food and materials processing environments, roller mills are subject to continuous wear and tear. Properly timed roll refurbishing is crucial for ensuring consistently high product quality and cost optimization. Bühler offers this vital service in dozens of locations around the world.*

**IN INDUSTRIES** ranging from grain milling to brewing, malting, oilseed processing, animal feed production, chocolate manufacturing, and the grinding of materials for inks or battery slurry, roller mills are a crucial component. The condition of these rolls – fluted or smooth, recently installed or in use for over a decade – directly impacts their performance.

However, without regular maintenance, even the most advanced rolls cannot operate at their peak efficiency. In fact, production capacity drops significantly, while energy demand can increase by up to 50 percent. In times where every grain counts, the milling industry is particularly vulnerable to inefficient processing of grains – and, as a result, they are at the forefront of combining learned nuances with state-of-the-art technology.

"When they are properly serviced, the rolls' cutting angles act like a fillet knife. In a flour mill, that is how they open the wheat kernel. Through each break the angles change, allowing a scraping action to accurately peel off the endosperm from the bran," explains Bill Ritchie, Technical Sales and Service at Bühler North America. He spent the better part of 2023 visiting 212 milling plants in North America to better understand customers' needs in terms of their rolls. "If the cutting angle begins to wear, it will not cut correctly and will inhibit the miller's ability to set the rolls properly. The process will change from a cutting action to a crushing action. This not only requires more energy; it also fails to deliver the right kind of granular product."

That's why regular check-ups are the prerequisite for determining when rolls must be sent for refurbishing. In a wheat mill, for example, manual checks of the flutes are a standard task of any miller. With their experience, millers around the world have developed a keen sense for literally checking the quality of flutes with their fingertips. While such


Dan McClellan, Roll Grinder at Bühler, prepares a roll for refurbishment at Bühler's service station in Minneapolis.

**VIDEO**

Want to learn more about roll refurbishment? Watch this 60-second video.

Hima Hastriando, Polymechanic at Bühler, inspects a roller mill. Consistent grinding performance can save up to 50 percent energy per grinding passage.

checks are a good first indicator for wear and tear and there are other manual measuring tools and many tips and tricks millers apply, high-end machinery should be examined with high-end tools.

### Taking out the guesswork

Bühler has been introducing digital solutions to its technologies for years to harness the full potential of digitalization. The temperature and vibration management (TVM) service is a prime example. It provides basic information about the parallelism of the grinding gap and early indications of wear-related issues. Nowadays, TVM is able to draw sophisticated conclusions. This includes, for example, feed gap analysis or cambering insights as a basis for predictive maintenance.

Such analysis provides a huge advantage to a flour miller. In the case of fluted rolls, the yield of pure flour extracted during sifting can drop by two or even up to four percent if the rolls are blunt. Both throughput and yield decline. A flour mill with a production capacity of 400 tonnes per day experiencing a drop in yield of only 0.1 percent will incur a loss of revenue of approximately USD 12,000 a month (based on US market prices).

Energy consumption may rise by as much as 50 percent, while moisture content declines and the quality of the final product suffers.

"This is significant in terms of the economics involved, but it is also a question of sustainability. If you can maintain a consistent grinding performance, you are able to save up to 50 percent energy per grinding passage. The same principle applies for brewing and for animal feed plants. Keeping rolls in top condition means less waste and more profitability," explains Gernot Stoerr, Head of Product Management Milling Solutions at Bühler Group.

Once the customer and the local Bühler expert determine that it's time for roll refurbishment, the rolls make the trip to one of the company's dozens of service stations in Europe, Asia, and North and South America. Bühler offers a range of services for both fluted and smooth rolls, grinded rolls for cocoa production and the grinding and dispersing industry, but also dies for processing animal feed, and tensioning and framing of sieves.

One of the largest service stations is located in Braunschweig, Germany, where Axel Kasper, Head of Processing, and his team provide their magic touch to around 3,000 rolls each year for customers

The WAFA high-speed corrugation machine was developed by engineers at Bühler Braunschweig exclusively for the service station. It corrugates fluted rolls at a speed of 120 meters per minute in both directions.

**VIDEO** Take a tour through the Braunschweig service station and watch roll refurbishment in action in this video.

***"WE RECONDITION ROLLS FROM A VARIETY OF APPLICATIONS IN THE FLOUR MILLING, ANIMAL FEED, COCOA, AND MALTING INDUSTRIES. IN 2023, WE PROVIDED ROLL RECONDITIONING SERVICES TO CUSTOMERS IN 24 COUNTRIES."***

**AXEL KASPER**
Head of Processing, Bühler Braunschweig

from all over Central and Northern Europe. "We recondition rolls from a variety of applications in the flour milling, animal feed, cocoa, and malting industries. Depending on the requirements of our customers and the type of roll, this takes between one week and several months. In 2023, we provided roll reconditioning services to customers in 24 countries," says Kaspar.

The corrugation of roller mills is a specialty of the experts in Braunschweig. Bühler's WAFA high-speed corrugation machine corrugates fluted rolls at a speed of 120 meters (about 400 feet) per minute in both directions. "The accuracy and the efficiency are impressive. Because it removes less material in the corrugation process, treating roller mills with WAFA extends their lifespan by up to 30 percent," explains Kasper.

And while the fluted, smooth, or grinded rolls keep on turning around the world and around the clock to produce food, feed, or advanced materials, the dedicated people in Bühler's dozens of service stations globally continue to ensure that customers can count on the performance of their machinery.

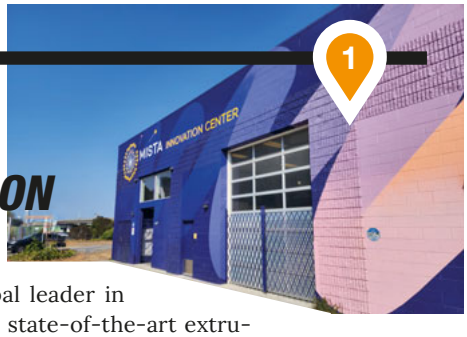
**INFO**

**Bühler's service stations**

Bühler operates a network of 105 service stations on five continents to cover customers' needs in the Advanced Materials and the Grains & Food businesses. Talk to your local Bühler representative to discover how our service portfolio can help you extend the lifetime of your Bühler equipment and get the most out of your process.


# AROUND THE WORLD

Our customers around the world have ambitious goals. Find out how they achieve these with the help of our deep expertise and our state-of-the-art technologies and solutions.




## TEAMING UP TO IGNITE INNOVATION

San Francisco, California, USA Bühler and Givaudan, the global leader in taste and well-being, opened a state-of-the-art extrusion hub at the MISTA Innovation Center in April 2024. This collaboration between Givaudan, Bühler, and MISTA offers companies the opportunity to conduct innovative and effective product development trials for their extruded products. Equipped with a 30-millimeter twin-screw Bühler extruder, the hub enables both high-moisture extrusion, such as plant-based meat production, and low-moisture extrusion, including snacks and cereals. Unlike smaller bench-top extruders, the results obtained at the facility can be translated to full-scale production equipment. With an output of up to 50 kilograms an hour, companies can now explore new possibilities in product development with ease. Givaudan and Bühler are teaming up on multiple initiatives to create sustainable food for a growing population, projected to reach 10 billion by 2050. They launched the Protein Innovation Centre in Singapore in 2021 for plant-based food development, started The Cultured Hub in Switzerland with Migros in 2022 for cultivated food products, and also opened the Tropical Food Innovation Lab in Brazil in 2023 with Cargill, Institute of Food Technology (Ital), and the FoodTech HUB Latam, furthering food and beverage sustainability.

2

## TRADITION MEETS TECHNOLOGY

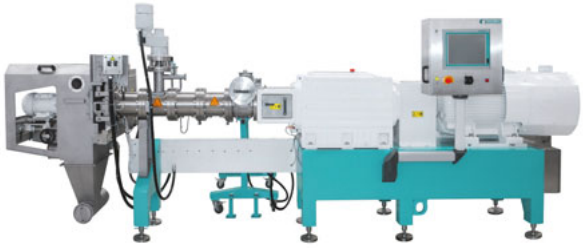
Puebla, Mexico For over 60 years, family-owned Gapsa (Galletera de Puebla, S.A. de C.V.) has been synonymous with artisanal excellence. Crafting irresistible cookies, pastries, and pasta, they've catered to the tastes of Mexico with top-notch quality and competitive prices. To continue meeting the soaring demand for their much-loved products, they invested in a state-of-the-art Bühler cracker line, elevating production to new heights of efficiency and excellence. Thanks to this advanced technology, Gapsa's signature products not only boast the perfect golden-brown hue but also a crave-worthy crunch. The use of direct fire baking captures the essence of traditional, oven-baked aromas and flavors that Gapsa's customers have enjoyed for decades.


VIDEO

Watch the video about Gapsa and its cookie craftsmanship.

3

## EXPLORING FUTURE FOOD CREATIONS



VIDEO

Watch the video about the NC Food Innovation Lab (NCFIL).

**Kannapolis, North Carolina, USA** NC Food Innovation Lab (NCFIL) is a 1,500 square-meter cutting-edge R&D space and the nation's only facility dedicated to supporting plant-based food innovators that operates under Current Good Manufacturing Practices (cGMP). Opened by North Carolina State University in 2019, the lab's mission is to help food companies and entrepreneurs get their products to market quickly and effectively. To do this it offers the latest in food processing equipment, expert food scientists, and partners from across the state. Services provided by the facility include everything from ideation through development and scale up for commercialization. At the heart of the lab is a Bühler twin screw extruder that the staff uses to help develop snack foods, cereal products, textured vegetable proteins, and high-moisture meat alternatives to the stage where they can be produced in a full commercial facility. Recognizing the importance of North Carolina within the food ecosystem, Bühler initiated the partnership with NCFIL in 2019 based on the aspiration of creating the food solutions of tomorrow. Bühler brings industry-leading technology and process expertise to NCFIL's clients, and benefits from NCFIL's position and reputation in the plant-based food innovation space.

4

## WHERE WASTE BECOMES WORTH

Photo: VGP

WEB

Read more about innovations in insect rearing and processing.

**Üllő, Hungary** Bühler is proud to support Agroloop with insect rearing technology for their state-of-the-art industrial black soldier fly plant. Black soldier fly larvae turn food processing by-products into nutritious and sustainable proteins for animal feed with high levels of efficiency and are key to a circular economy approach. In the new plant, Agroloop – supported by Bühler insect technology expertise – will produce more than 10,000 tonnes of black soldier fly larvae that will be turned into sustainable feed ingredients for the pet food, aquaculture, and livestock sector. The plant is only the first step in Agroloop's strategy to make insect feed ingredients available for Central and Eastern European (CEE) agribusiness. The CEE region is increasingly turning to alternative sources for feed ingredients. By incorporating insects into the feed supply chain, the region can address environmental concerns, reduce dependence on imported protein sources, and contribute to a circular economy approach. Feed formulations containing insects can optimize animal health and growth, thereby leading to more efficient livestock production systems. By the end of 2024, Agroloop plans to launch its first products.

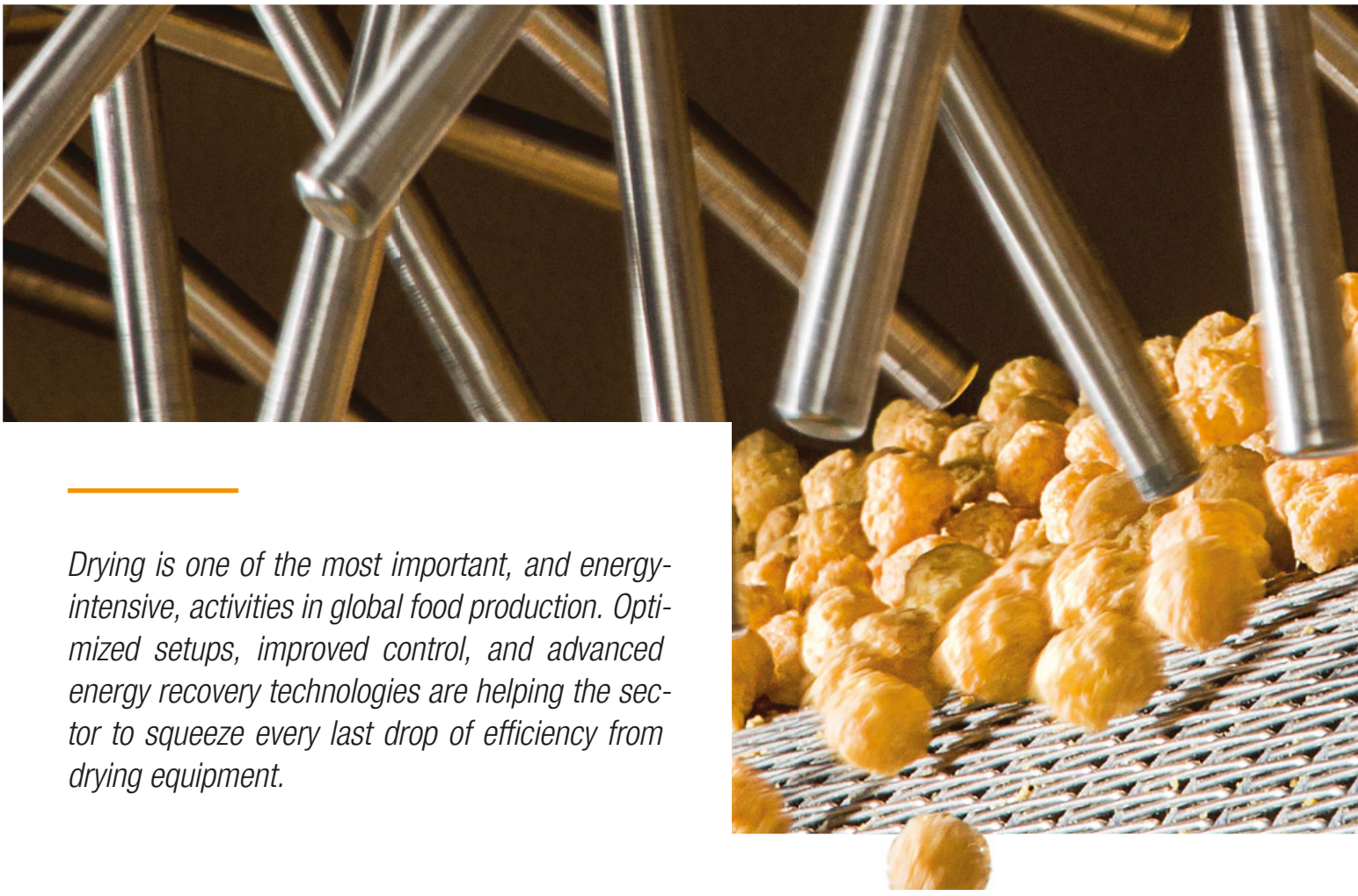
5

## EXCELLENCE IN EVERY CUP

**Jawa Barat, Indonesia** Bumi Boga Laksmi has been mastering the art of coffee since 2011. Starting out in a 90-square-meter shed with a Bühler RoastMaster 20, the company took its first steps toward supplying high-quality, safe coffee to the nation's burgeoning population of coffee enthusiasts. The coffee supplier and roaster focused on domestic markets for eight years, covering the entire process from green coffee beans to ready-to-brew coffee for roasteries and coffee shops. Indonesia is the fourth largest coffee producer with a sizeable population of coffee connoisseurs. With a vision of catering to both the growing domestic and international markets, Bumi Boga Laksmi has undergone a remarkable transformation. In 2019, it established a new facility and invested in the Bühler RoastMaster 60 to produce even roasts with consistent quality and taste. Indonesia's coffee is brewed and enjoyed in hundreds of ways, making the roasting of the beans a highly complex process. Today, the company's operations span a 5-hectare site with a production capacity of 17 tonnes daily. Bumi Boga Laksmi creates distinct roasts highlighting the beauty and taste of Indonesian coffee for the world to enjoy.

VIDEO

Watch the video about Bumi Boga Laksmi's growth journey.



*Drying is one of the most important, and energy-intensive, activities in global food production. Optimized setups, improved control, and advanced energy recovery technologies are helping the sector to squeeze every last drop of efficiency from drying equipment.*

**WHERE DO YOU GET YOUR ENERGY FROM?** If you are a human being or an animal the answer should be simple: from the sun, via your food. The meal on your plate is the last stop in a long chain of chemical reactions that transform solar energy into the fuel that enables us to grow, heal, and live our lives.

In the modern world, however, things are a bit more complicated. The production, distribution, and preparation of food relies on all sorts of additional energy inputs used to make fertilizers, run machinery, transport, process, and cook. Together, these inputs make food production a very energy-intensive business, accounting for about 30 percent of global final energy demand, according to the United Nations Food and Agriculture Organization.

Today, that energy demand is under scrutiny. Population growth and rising wealth are expected to increase food industry energy consumption significantly in the coming years, just as the world seeks to reduce the greenhouse gas emissions associated with energy production from fossil fuels.

Reducing food and food production emissions will require changes across the value chain, from the introduction of agricultural techniques that need fewer fossil-fuel inputs to the use of more energy-efficient appliances at home. In between, food and feed companies are taking a hard look at their own energy consumption, seeking ways to improve efficiency, reduce demand, and cut overall emissions.

For many food and feed companies, drying is the most energy-intensive activity. It's also one of the most important. Drying is a key process in the production of many types of food, from staples such as grains, pulses, fruits, and vegetables to indulgences such as French fries and breakfast cereals, as well as feed products such as pet food and aqua feed.

"Food companies rely on drying for several reasons," says Andy Britt, CEO and President of Bühler Aeroglide. "It extends the shelf life of products, which reduces packaging requirements, simplifies supply chains, and reduces waste. It makes products lighter, which saves energy in transportation, and it plays an important role in determining the texture and palatability of the finished product."

Those benefits come at a significant energy cost. It is estimated that drying accounts for about 25 percent of the total energy used in food production and 70 percent of $CO_2e$ emissions.

Much of this energy bill is due to basic physics. At 100°C, it takes 2,260 kilojoules of energy to turn a kilogram of liquid water into vapor. In industrial food processing, this is typically accomplished in a convection dryer. Food or ingredients are transported through the dryer on a conveyor while hot dry air is blown over them. The heat evaporates the water, and the air carries it away, leaving the dried product ready for freezing, packaging, or further processing.

# THE HOT TOPIC

TEXT: JONATHAN WARD

As a major supplier of drying equipment, Bühler has a clear picture of the energy requirements of modern drying operations and the challenges involved in improving efficiency. "The average dryer we supply can consume 2,300 to 2,600 kilowatts per hour," says Britt. "For our customers, it's not uncommon for drying to account for 50 percent of a plant's total energy consumption."

Industry-wide, this consumption leads to staggering totals. "If you take just the installed base of dryers that Bühler has supplied around the world, you are looking at an annual energy consumption of about 45 terawatt hours," says Britt. "That is equivalent to the entire electricity consumption of Hungary per year. If we take the entire food drying market into account, total $CO_2e$ emissions amount to around 40 million tons a year.

## Optimization through maintenance

Drying is such a large part of the food industry's energy footprint that even small percentage reductions in energy use can have a big impact. Britt and his team aim to help customers maximize the energy efficiency of their drying operations. That work starts on the plant floor. Al Worthington, Director of Process Engineering at Bühler Drying Solutions, and his team spend much of their time conducting performance assessment workshops at customer sites as part of this process.

"We audit existing Bühler and non-Bühler equipment, and help customers find ways to improve their product consistency, reliability, and energy efficiency," says Worthington. Efficiency is a key issue due to energy price increases and customers' desire to reduce the carbon footprint of their operations.

These audits often reveal simple changes that can make a significant difference in energy consumption. Ensuring that access doors are closed and sealed, for example, prevents hot air from escaping prematurely from the dryer. Control settings are also important. "Where plants process a lot of different products, we sometimes see dryers permanently set for the most demanding conditions," he says. "Overdrying is a big waste of energy, so the best practice is to optimize the machine for each type of product."

Better product handling also helps. "If you put a deeper, more uniform layer of product on the belt, you may be able to run the belt slower without sacrificing throughput," he explains. "With longer dwell times, you can get the same drying performance with less airflow and lower energy consumption."

Advances in machine control are the second major area of improvement. Modern dryers are equipped with sensors to monitor temperature and humidity, and actuators and variable speed drives to automatically adjust air flow rates. These components can also be retrofitted to older Bühler machines and non-Bühler machines.

"Controlling the exhaust system to keep air in the machine until it has absorbed as much water as possible is a very effective measure that can be achieved with simple hardware," he says.

Digital technologies are delivering real improvements to dryer efficiency through precise, closed-loop computer control. Bühler's DryingPro solution, for example, uses Internet of Things (IoT) technology to measure and adjust drying processes in real time, boosting yields, and reducing waste. A sensor in the dryer's exit chute continually measures moisture levels in the product, then feeds this information back to the Bühler Insights platform, which analyzes it and adjusts dryer settings automatically.

### Recovering energy

The energy that goes into a dryer must go somewhere, and most of it is vented into the environment with the moisture-laden exhaust air. To get to the next level of efficiency improvement, food companies are looking for smart ways to recover some of that energy before it escapes. If a plant's ductwork allows, this can be accomplished with a simple air-to-air heat exchanger. These devices bring the hot, humid exhaust air close to the cool, dry air flowing into the dryer heater. By preheating the supply air, less energy is required to bring it up to operating temperature.

"If the ductwork in the plant wasn't designed with energy recovery in mind, you can accomplish the same thing with a fluid-filled heat exchanger," says Worthington. In this approach, a coil containing a heat transfer fluid is installed in the exhaust duct, and the hot fluid is then pumped to a second coil where it heats the supply air. In some food processing plants, dryers can use a similar approach to recover waste heat from other operations or equipment, such as chillers or freezers.

Reusing waste heat is a compelling idea, but heat exchangers have limitations. "At a given temperature, saturated exhaust air contains more energy than dry air," says Worthington. Since heat transfers from hot to colder fluid, the supply air can only absorb a fraction of the energy from the exhaust. To overcome this, Bühler engineers are developing a better method. By installing a heat pump in the circuit between exhaust and supply air, they can raise the temperature of the heat exchange fluid at the dryer inlet, making more energy available for recovery.

Heat pump technology is well established: it's used to heat and cool millions of homes around the world. But the dryer application is at the cutting edge of current heat pump design. "We're looking at systems that operate at 120°C or higher, which has been the limit of commercially available heat pumps in recent years," Worthington says. "We are also taking a close look at emerging heat pump technologies that can provide significantly higher temperatures."

Getting heat pumps to work well in dryer applications is a tricky engineering challenge too. Unlike a simple air-to-air heat exchanger, these units require energy to operate, so users need to be sure that the pump will recover enough heat to cover its operating costs. They need to know that their heat recovery equipment will continue to operate reliably in a busy production environment, where the buildup of dust and food residue can interfere with efficient heat exchange. Because the most effective heat recovery systems extract enough energy to condense the water vapor in the exhaust air, they may need systems to handle a new wastewater stream.

These technologies are likely to play a significant role in industrial dryer installations as companies move toward net-zero carbon production. "In future energy systems, more heat will come from electricity," says Britt. "Switching to renewable and zero-carbon energy sources gives companies a route to carbon-neutral drying, but users will still want to use that electricity as efficiently as possible."

For now, Britt and his team are focused on making drying cleaner, cheaper, and more effective. "Optimizing the control of a dryer that has been running poorly can reduce energy consumption by 10 to 15 percent," Britt says. "With heat recovery, you could save the same amount again. Add a heat pump, and we can cut overall consumption by 30 percent or more and reduce $CO_2e$ emissions towards net zero."

*Pannonia Bio*

# WIN-WI

## *BY BUILDING THE BIOECONOMY*

TEXT: JANET ANDERSON
PHOTOS: GABOR SZABO

*Producing sustainable products efficiently while supporting local suppliers is a win-win-win – for customers, the environment, and the local economy. Pannonia Bio, Europe's leading biorefinery, has always delivered on all three fronts. Now it is expanding from corn into barley, a grain that offers great untapped opportunities in food and feed. Pannonia Bio is transforming how we see grain.*

# N-WIN

Michael Healy, Technical Director, ClonBio Engineering and Dirk Fleck, Head of Sales Market Segment Biorefinery at Bühler take a stroll through the facility in Hungary at ground level.

**IN THE HEART OF HUNGARY,** Pannonia Bio is a company leading the transition to a more sustainable economy. Founded just over a decade ago, it is now a major player in the growing bioeconomy – an economy that uses renewable raw materials in place of fossil-based raw materials.

The journey began when Mark Turley, an Irish entrepreneur, spotted an opportunity in biofuels. Turley brought together a team of experts and engineers from the brewing industry and beyond, all of whom shared an appetite for working fast and innovating. Through his company ClonBio Group, he founded Pannonia Bio and built a corn (maize) ethanol plant on the banks of the Danube. The plant evolved rapidly. "We are the largest ethanol production facility in Europe, and the world's most advanced grain biorefinery," says Turley. Pannonia Bio produces a range of products from fuel to animal feed and fertilizer – all processed from the starch, fiber, oil, and proteins in locally grown corn.

Pannonia Bio is still evolving. Today it is exploring the opportunities offered by another grain – barley. "Three years ago, we decided we wanted to be a food company, to make high protein products for humans at a low-cost price that people want to eat, with no chemicals in them. We believe there is a big market for that," says Turley.


***"THIS IS A GREAT EXAMPLE OF THE CIRCULAR ECONOMY. BY PROVIDING ORGANIC FERTILIZER, WE HELP FARMERS TO REDUCE THE ENVIRONMENTAL FOOTPRINT OF THEIR OPERATIONS."***

**MICHAEL HEALY**
Technical Director, ClonBio Engineering

### Sustainable in every way

In everything it does, Pannonia Bio relies on cutting-edge bio-based production processes, offering sustainable alternatives to fossil-based products. "We want to get the most out of every grain," Turley explains. "We also want to be the lowest cost producer in whatever we do."

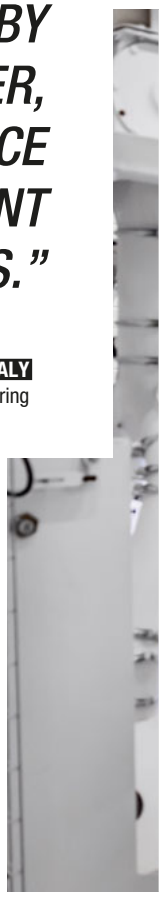
Located in the center of Hungary's corn-growing area, Pannonia Bio's principal feedstock is corn – an ideal grain for biofuels as it has a starch content of around 70 percent. Over 200 trucks deliver corn to the plant every day.

"We buy our corn predominantly from Hungarian farmers," says Pavel Kudriavtcev, Chief Executive Officer of Pannonia Bio. "More than 400 farmers, big and small, supply Pannonia Bio and are paid straight away. We are one of the biggest investors in the region, a major employer, and have built a close relationship with the local community."

In the bioethanol plant, the corn kernels are milled into flour and then, in a process similar to brewing, turned into a slurry. Enzymes are added to break the starch down into sugars. These are fermented to make a "beer" and then distilled to make highly concentrated alcohol. This is either sold as fuel-grade bioethanol – a climate-friendly substitute for petrol for the transportation sector – or it goes to the chemical, cosmetics, and beverage industries. After the ethanol production process is finished, the stillage – the residue from the manufacture of alcohol from grain – still contains nutritious elements. Separating out the water produces dried distillers' grain with solubles – DDGS. This is used as an animal feed for cattle, sheep, pigs, and chickens. Oil is also extracted from the stillage, as it is both nutritious and valuable, and sold primarily to the poultry industry.

"This is essentially what a biorefinery does," says Michael Healy, Technical Director, ClonBio Engineering. "It enables us to extract material that has a higher value than the original material it came from."

Pannonia Bio's first contact with Bühler came in 2017, when the company started looking at a further separation process prior to fermentation.



***"WE BUY OUR CORN PREDOMINANTLY FROM HUNGARIAN FARMERS. WE ARE ONE OF THE BIGGEST INVESTORS IN THE REGION, A MAJOR EMPLOYER, AND HAVE BUILT A CLOSE RELATIONSHIP WITH THE LOCAL COMMUNITY."***

**PAVEL KUDRIAVTCEV**
CEO at Pannonia Bio

"Corn has about 9 percent fiber. This fiber has value, as it can be sold as animal feed. However, separating fiber from flour is difficult," says Healy. "In a very short period, Bühler helped us to develop and build a corn-fiber separation plant on site to carry out this process."

The corn fiber is used to produce animal feed and is also converted into biogas through anaerobic digestion. The methane purified out of this process is a valuable renewable natural gas. Pannonia Bio utilizes it to enhance energy efficiency in its own production processes, or sells it as biomethane to its customers. But it doesn't end there. The residues of the anaerobic digestion process contain nitrogen, phosphorous, and potassium – the primary chemicals in fertilizer. The company sells the plant-based organic fertilizer mostly to the same farmers they buy the corn from. "This is a great example of the circular economy," says Healy. "By providing plant-based organic fertilizer, we help the farmers to reduce the environmental footprint of their operations." The rest of the biogas is made into liquid natural gas and injected into the grid.

Meanwhile, Pannonia Bio has further plans for the fiber. "We want to make soluble fiber, a probiotic for human food," explains Turley.

Healy and Fleck inspect the cleaning section of the facility, one of many key steps in separating fiber from the ground material.

In the milling section, MDDZ Diorit roller mills grind the barley into the desired particle size.


Raw barley: cleaned and ready to be ground.


After grinding, the desired particle size is achieved. The intermediate material is now ready to be separated into the fractions.

**VIDEO**

Watch the video for more about the collaboration and technology behind Pannonia Bio.

***"I'M CONVINCED THAT IN FIVE YEARS' TIME WE'LL BE KNOWN NOT ONLY AS A BIOREFINERY BUT ALSO AS A FOOD COMPANY."***

**MARK TURLEY**
Founder and Owner of Pannonia Bio

Mark Turley, Founder and Owner of Pannonia Bio standing proudly in the heart of the facility: the plant automation control room.

At dizzying heights, the scale and complexity of the facility become apparent.

*"THIS IS THE FIRST LARGE-SCALE INDUSTRIAL PLANT IN THE WORLD FOR GAINING HIGH-VALUE, PLANT-BASED PROTEINS FROM BARLEY."*

**DIRK FLECK**
Head of Sales Market Segment Biorefinery at Bühler

The human food market is the next big step for Pannonia Bio, and this means moving into protein separation, and also a different grain – barley. Barley is normally used in the feed and brewing industries. "Barley was fascinating for us because it has some interesting characteristics," says Turley. "In Hungary, as in many countries, it is only used as a rotation crop. But it has more potential than that as its protein is highly digestible."

To take advantage of this opportunity, Pannonia Bio embarked on building the first commercial-scale barley concentrate protein plant. The plant will use as a raw material the barley grown in Hungary. "We decided to go for 300,000 tonnes a year, which is about 20 percent of all the barley grown in this country," Healy explains. "We're not short on ambition!"

To carry out the plan, Pannonia Bio turned again to Bühler. "We were impressed by our first interaction. When Bühler built our corn fiber extraction plant, nothing like it existed anywhere else in the world, so it was a learning curve. The Bühler team didn't walk away, they stayed with us until we got what we wanted," says Turley.

The barley process has two parts, dry and wet. Bühler solutions take care of the entire dry process, which comes first, from intake, cleaning, handling, and removal of foreign particles through to milling. "We brought over 160 years of experience in milling to this project as well as our deep knowledge of processing grains into high-value food and feed products," says Dirk-Michael Fleck, Head of Sales Market Segment Biorefinery at Bühler.

## A world first

For Fleck, Pannonia Bio's move into barley protein is an impressive achievement. "This is the first large-scale industrial plant in the world for gaining high-value, plant-based proteins from barley," he says. "You will not find a similar solution on that scale anywhere else in the world."

It is also a good example of how Bühler works with its customers to develop a unique solution. "At our Application & Training Center in Uzwil we developed the optimal milling process to produce the right flour to get the protein extraction that Pannonia Bio required," says Fleck. "We gained an understanding of the process beyond our scope to make an exact piece of a puzzle to fit their unique plant."

There were challenges along the way. One of these was that the Pannonia Bio plant is a 24/7 operation. The plant runs more than 8,200 hours a year and is controlled remotely. The Bühler team therefore installed the latest milling technology, with a quality management system in the silo and the mill, and

temperature and vibration sensors in the roller mill. With the addition of Bühler Insights, the whole system can be tracked and controlled remotely.

"The Pannonia Bio team brought their visionary entrepreneurship and their outstanding speed in turning ideas into large-scale industrial solutions," says Fleck. "They are fast and innovative, and that is the way to compete successfully in these markets."

### Market potential

Initially, the principal market Pannonia Bio sees for barley protein is aquaculture and pet food. Currently, one of the main ingredients for intensively farmed fish is soy protein. However, soy protein can affect the digestive system of the fish, especially in salmon and trout. "The barley has to be carefully dehulled because fish do not like fiber in their diet," says Healy. "It is quite hard to do this. But we were able to do trials with the Bühler team, and through these we found the solutions."

After the flour is made, hot water is added to make a slurry and then enzymes to break down the starch to glucose and sugars. The glucose is separated from the protein, which is then dried and pelletized. The finished product has a minimum of 60 percent protein and is already sold for aquaculture in Norway, Scotland, and Portugal.

Typical of Pannonia Bio, nothing goes to waste. The fiber that is separated from the barley is also used for biogas production or pelletized and shipped out as animal feed, and the glucose fraction is blended in the corn plant with the corn mash to make more ethanol.

### Bioeconomy set to expand

With the new barley protein concentrate plant up and running, Pannonia Bio is now working to bring barley protein to the food industry. "Everything we do increases the portfolio of products we make. We are now starting this journey with the major food companies. They are looking for ingredients that are produced in a sustainable fashion and are pushing us to upgrade this to a food plant," says Healy.

To achieve their goals, Pannonia Bio is constantly looking at how the biorefinery can be used to upcycle more side streams and develop new, more efficient processes. In doing so, they can benefit not only from Bühler's competence in grain milling and processing, but also its access into the food and feed industry to develop new food and feed products. "Our expertise in aqua feed, pet food, animal nutrition, human nutrition, plant-based protein extrusion, and insect technology all come together in the field of biorefinery," says Fleck. "Working in this industry is very exciting but also complex and challenging. With our ecosystem at Bühler, we can be a significant pillar in this industry."

For Healy, the breadth and depth of expertise are the decisive factors. "Bühler experts have immense experience in the grain industry. Without this, we would not have been able to do this project. Other people can supply pieces of equipment, but Bühler can do the whole scope and make the whole thing work the way we want," he says.

As for Turley, he hasn't finished expanding and exploring new markets yet. He sees huge potential in the bioeconomy, in Europe and beyond, and has plans to build more plants like the one in Hungary.

"People want renewable fuels, and renewable and healthy products, and they want good value with no harm to the environment. We are a zero waste plant and the lowest cost producer in Europe of a wide range of innovative and sustainable products," Turley explains. "Every day it's a new initiative into a different area. I'm convinced that in five years' time we will be known not only as a biorefinery but also as a food company."

INFO

PannoniaBio

**Pannonia Bio**

*Tolna County, Hungary*

Founded in 2012.

Pannonia Bio operates a state-of-the-art biorefinery that processes over 1.5 million tonnes of grain a year into nutrition, health, biochemical, and fuel bioproducts.

Pannonia Bio supplies customers across Europe and the Middle East.

Pannonia Bio's corn fiber separation plant was built by Bühler and its barley concentrate protein plant has Bühler technology at the front end, including LAAB TAS universal cleaning machine, MTRC separator, MTSD destoner, BSPB polisher, MDDZ Diorit roller mills, MPAK Sirius sifters, DFZC hammer mill, AHHD pellet mill, MSDH and MSDM scales, and Bühler Insights.


Biorefinery.
Get the most out
of every grain.
Improve profitability by leveraging the circular economy.
Our customized solutions and process know-how for grain-based biorefineries offer:
• over 160 years of milling expertise within a unique partner ecosystem that covers the whole value chain from grain to finished products;
• solutions to separate and convert every component of the grain – starch, protein, fiber, and oils – into value-added end products;
• increased profitability and improved sustainability of operations through valorization of side streams.
Scan the QR code to find out more about Bühler's biorefinery solutions.
Contact us at:
biorefinery@buhlergroup.com
Innovations for a better world.
BÜHLER

PURIS's innovations run the full plant-based protein range, from seed to retail products.

*If you could jump into a time machine and head back to rural Iowa in 1985, you might come across a seed salesman on a mission to build a more sustainable food system by putting more plants on peoples' plates. Fast forward to today, the company he founded to foster that vision is now in its second generation and owns the entire value chain – from the seed to the grocery shelves.*

**IN THE MID-1980s,** the challenge of feeding 10 billion people by the year 2050 was not yet a factor in our collective consciousness. But even back then, Jerry Lorenzen, along with his wife, Renee, recognized the importance of plants as a sustainable protein source. Focused on cultivating non-GMO crops and Earth-friendly farming, the pair started what is now the revolutionary company, PURIS.

PURIS is a company deeply rooted in building a sustainable food future. Founded with the progressive idea of growing more crops directly for human consumption rather than for feeding animals, PURIS has transformed plant-based food production. Their mission is to build a system that hinges on plant-based ingredients, uniting farmers, producers, and consumers in the pursuit of a more sustainable food landscape. This vertical integration spans the entire journey from farm to plate: cultivating partnerships with growers, transforming agricultural produce into high-quality ingredients, and further using those very ingredients to create food products found in grocery aisles and restaurants.

*PURIS*

# INNOVATION FROM ITS ROOTS

TEXT: NICK MANLEY
PHOTOS: ANDREAS ZUBER

"What makes us unique is our focus on food," explains Nicole Atchison, CEO of PURIS Holdings and daughter of the company's founders. "We're an agriculture company, and a lot of agriculture is focused on feed. Our focus is purely on food, starting at the crop level. We started nearly 40 years ago breeding soybeans, peas, and corn, all with the intention of creating food from them."

Adding to their uniqueness is PURIS's ability to take this breeding capability and have the system and the infrastructure in place to transform these crops into ingredients through grain processing, flour milling, protein processing, extrusion, and food formulations. In essence, they were taking these specialty crops from the fields and bringing them all the way to a customer's plate, working with everyone from the small challenger brands seen at natural grocers to the biggest multinational consumer packaged goods (CPG) companies.

"That vision is what my dad called 'protein independence,'" Atchison explains. "But owning the entire supply chain from the field to the grocery store is not something that I would necessarily recommend. It is difficult. Every demand-supply-demand cycle that affects retailers and distribution centers, every drought and flood suffered by farmers, and everything in between – we are impacted by all of these."

PURIS's founders didn't have much choice at the time as the industry and systems required simply didn't exist in the 1980s and 90s. So, they decided to reimagine the system, which is characteristic of this company. From its mission to its business model to the brands and products it produces, everything about PURIS simply oozes innovation.

### An end-to-end food system

From the start, PURIS recognized that food products made from plants needed to taste good if they were going to become mainstream. To do that they needed to create a protein platform that was neutral in nature, allowing them and others to develop the products they wanted without having to deal with "off flavors" or other negative sensory impacts associated with some alternative proteins. They decided to focus on peas. It was clear that the only way to develop a pea protein platform was through conventional, or non-GMO breeding. This stands in stark contrast to most of the seed crops grown in the American Midwest, which are the result of GMO breeding and destined for animal feed. These natural non-GMO breeding techniques provide some transparency around the origins of the resulting food – which is of growing interest to consumers.

Similar to how bees do their work, pollen from one plant is combined with pollen from another, creating a child seed. By selecting varieties with specific traits, such as higher protein content or improved disease resistance, a seed that exhibits the desired characteristics is developed. This process is time intensive, and that's where PURIS's strengths lie. With their extensive expertise, they have become a reliable partner for those dedicated to incorporating natural processes into their food systems.

In the field of farming destined for animal feed, PURIS stands out as a creator of a sustainable food system for humans.

Spending time with the team at the downtown Minneapolis PURIS headquarters, you get that start-up feeling – high energy and high creativity, brimming with ideas. But then you also realize they have nearly four decades of experience, education, and drive that propels them forward. It's a formidable combination, and one that bodes well for our nutritional future.

Diving into the business a bit, you find PURIS produces wholesale, food service, and retail products. The ingredients business unit produces ingredients for business-to-business (B2B) distribution and is their largest channel. It's this channel that is mostly responsible for PURIS's ability to scale over the past 10 years. The primary product is their plant-based protein, but they also produce starch, fiber, and a liquid stream. The protein and starch products are sold to a wide variety of customers and range from industrial grade to food grade. The fiber and liquid products are sold to the animal feed market.

Then there's AcreMade, the CPG-focused business unit that's producing plant-based foods, primarily egg replacement, using PURIS ingredients and other ingredients for distribution in retail and food service work. This venture within the PURIS


***"WE GAUGE OUR SUCCESS ON TWO FACTORS – SAFE PEOPLE AND SAFE FOOD. A SMOOTH-RUNNING OPERATION IS VITAL TO ACHIEVE THAT SUCCESS."***

**MATT KARELS**
Plant Manager at PURIS

***"WE ARE ON THIS VERY LONG-TERM MARCH TOWARDS A MORE SUSTAINABLE FOOD FUTURE. FOR US THAT MEANS MORE PLANTS IN THE CENTER OF THE PLATE, MORE PLANTS IN PEOPLE'S DIETS AND MORE PRODUCTS MADE FROM PLANTS."***

**NICOLE ATCHISON**
CEO of PURIS Holdings



**VIDEO** Watch this video about PURIS to learn more about their pioneering approach to food systems.

organization is near and dear to Atchison, who herself is allergic to eggs. "We started AcreMade to spur growth in the plant-based egg space, as well as introduce the use of pea protein to that market," says Atchison. Before AcreMade, that market really consisted of only one entrant. The product is a good one, but the PURIS innovation team saw it as an opportunity to make a go of it themselves.

AcreMade brings a portfolio of products, which currently includes frozen patties, dry shelf stable goods, and plant-based meat products directly to consumers. While this part of the business is small in comparison to the ingredient side, the ambitions are similar. And the business model keeps the team close to the consumer, enabling them to get quick, valuable feedback from grocers, chefs, and even consumers on how they can improve the products they're delivering.

"We are focusing on college, university, and corporate dining settings, as well as some limited retailers to really understand our customer and how the product can roll out," Atchison explains. "But we're really excited because we're able to make great-tasting products featuring our strong North American supply chain and our pea protein and show the different ways that peas can be amazing in food."

Working your way down the PURIS innovation chain, you find yourself at the company's Dawson, Minneapolis facility, where all these pioneering products take their nascent steps.

"This plant is the largest pea protein plant in North America," says Matt Karels, Plant Manager at PURIS. "We gauge our success on two factors – safe people and safe food. A smooth-running operation is vital to achieve that success."

### Quality sets the tone

Sitting just outside of town and surrounded by thousands of acres of farmland, the former dairy plant has been retrofitted to accommodate the processes necessary to produce those four main product streams: protein, starch, fiber, and liquid. Regardless of the final product, all those perfect PURIS peas are first processed through Bühler milling equipment, a pivotal part of that smooth-running operation.

"Quality and efficiency in the milling step are critical," says Karels. "It sets the tone for the rest of the process. Bühler equipment helps us meet our production targets by remaining reliable. We turn it on, it runs. It does a phenomenal job of maintaining a particle size specification with little maintenance involved."

Karels credits the consistency of the milling process with the reliability of the downstream processes. “It impacts everything from the yield to the functionality of the final product.”

The building of the Dawson plant coincided with the building of the Bühler Food Application Center (FAC) in Plymouth, Minneapolis. This presented the perfect opportunity for the two companies to work together to optimize the milling process.

“PURIS has always been an innovative company,” says Aidin Milani, Sales and Development Manager, Pulses and Spices at Bühler. “We wanted to make sure that we built enough flexibility into the system to accommodate new products in future.”

The FAC is a platform for developing new ways to transform peas, chickpeas, beans, corn, oats, special grains, and many other crops into flours, flakes, snacks, pasta, cereals, meat analogs, food ingredients, and a myriad of extruded products. And, as it turns out, this has proven to be a very useful resource for PURIS, and one they return to sometimes when they exercise their innovation muscles.

### Back to the future

In a full-circle moment, we find ourselves back at the PURIS headquarters, but now in their pilot plant, managed by Randall Martin, Research & Development Manager at PURIS. “The purpose of the lab is really to scale up new ingredients, to develop new foods, and to create plant-based replacements for existing foods that are wildly delicious and fun.”

In the pilot plant, the PURIS team works with start-ups and big companies alike, as well as developing their own products. The heart of the lab is a Bühler 30-millimeter twin-screw extruder, the flexibility of which Randall says is key to taking those innovative product ideas from pilot scale to full production levels. “We’ve been able to develop recipes for plant-based chicken, pork, beef, and textured proteins and scale those up without having to use large amounts of ingredients.”

There is a certain paradox in the pride PURIS has in the neutral flavor of their pea protein. “We’re really focused on taste,” Martin says. “We like to say that our neutral pea protein flavor is a blank, wide-open canvas. Anything from a savory steak piece that you’re trying to make all the way to a chocolate shake, you can have those flavor combinations without having to alter or change your initial flavor.” It’s staggering to think about the time, innovation, and sheer determination it has taken to make that simple statement a reality.

In the ongoing efforts to ensure a sustainable food supply, PURIS is ahead of its time. And much of their success can be attributed to the people, companies, and organizations they have worked with along the way – those like-minded groups that want to be part of the solution. “Working with suppliers that share our corporate values and our vision for the future is important and is definitely a foundation from which we continue to build,” Atchison explains. “Bühler has the same mission and then also doubles down by having the expertise and the capabilities to help us fulfill our mission. Having the same mission is important, but it’s only when we work together and accelerate faster that it really provides a meaningful benefit.”

### Long-term vision

PURIS’s future is no different than what it was when the company started out, back in rural Iowa in 1985. “We are on this very long-term march towards a more sustainable food future,” Atchison explains. “For us that means more plants in the center of the plate, more plants in people’s diets and more products made from plants. We want people to enjoy it. We don’t want it to feel like a compromise to eat more plants. And so, we are going to keep doing what we’re doing.”

INFO

PURIS™

**PURIS Holdings**

***Minneapolis, MN, United States***

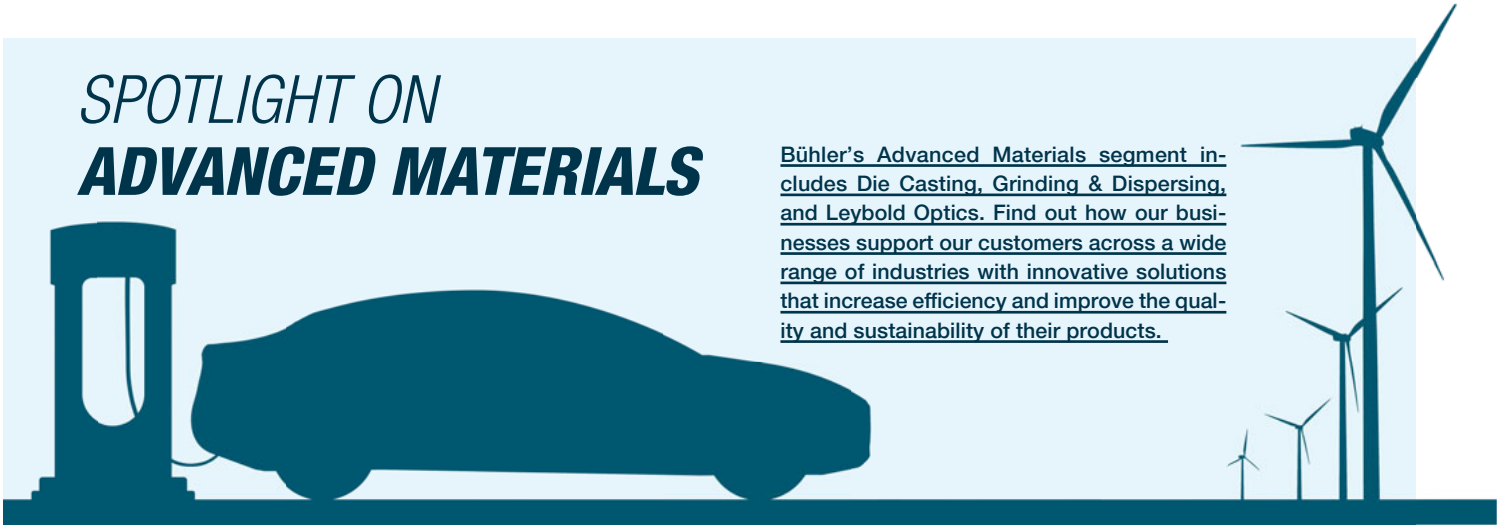
Founded in 1985.

PURIS is a family-owned company whose plant-based food system benefits every link in the chain of production: flavorful and nutritious choices for people, profitable opportunities for growers, flexible ingredients for food makers, and practices that nourish soil, the environment, and life on earth.

PURIS’s customers include start-ups, major food producers, and farmers in North America.

PURIS uses a complete Bühler milling solution for specialty crops, as well as extrusion technology in their lab.

# SPOTLIGHT ON
# ADVANCED MATERIALS



Bühler's Advanced Materials segment includes Die Casting, Grinding & Dispersing, and Leybold Optics. Find out how our businesses support our customers across a wide range of industries with innovative solutions that increase efficiency and improve the quality and sustainability of their products.

Duoli Technology

## A MEGACASTING INVESTMENT

The rapid rise of electric vehicles in China is increasing demand for large structural parts. Chinese car parts supplier Duoli Technology has therefore turned to Bühler to provide it with the die-casting solutions it needs, expanding its portfolio with an additional four Carat 920 megacasting cells. The Carat two-platen technology, with die locking forces of 10,500 to 92,000 kilonewton, is specifically designed to produce large and complex parts such as rear and front underbodies cast in a single piece. Megacastings replace between 70 to 100 parts with a single die-cast part and are generally produced close to the automotive assembly line, allowing for better integration and reduced transport. The latest additions will make Duoli one of the biggest suppliers of megacasting parts in the world and help it to succeed in this fast-moving and competitive market.


Jianqiang Jiang, General Manager and Director of Duoli and Cornel Mendler, Managing Director Die Casting at Bühler, shake hands at the contract signing ceremony held at Euroguss in Germany in January 2024.

**WEB** Read more about Duoli's investment in Bühler's megacasting solutions.

Helios

## A PLAYGROUND FOR INNOVATION

Bühler's Leybold Optics Application Center in Cary, North Carolina, in the US, provides a unique playground for customers from the semiconductor and optics industries to test and develop new ideas. The centerpiece is the Helios, a sputter batch coater capable of achieving state-of-the-art coatings on wafers of up to 12 inches. PARMS (Plasma-Assisted Reactive Magnetron-Sputtering) technology provides for highly precise films at atomic scale. Rapid prototyping means the step from design to production is easy. Combined with a proprietary optical monitoring system and in-house metrology, Helios can be used to develop complex coatings with benchmark reproducibility, supporting customers in the photonics, consumer electronics, biomedics, semiconductors, and other industries to become market leaders.

**VIDEO** Watch this video to see the Helios' role in testing and developing new ideas.

Ecoline DS Series

## COST-EFFECTIVE AND CUTTING-EDGE


WEB

Visit our website to learn more about the Ecoline DS Series.

The upgraded Ecoline DS Series is designed to help the die-casting industry meet increasing challenges, particularly within the automotive industry. E-mobility is changing the quantity and composition of parts in the powertrain and body-in-white of car platforms. This in turn increases price pressure and quality requirements. Businesses therefore need to focus on uptime, cycle time, and scrap rate to remain competitive. The Ecoline DS Series provides cost-efficient, high-pressure die-casting solutions for aluminum and magnesium parts production. With locking forces from 3,400 to 9,000 kilonewton, the machines offer high and repeatable part quality and full traceability of production data with state-of-the-art digital services. Reliability, stability, and quality are key characteristics that help customers meet increasingly stringent demands.

Magna

## DRIVING DOWN ENERGY COSTS

Energy costs are a significant concern in many businesses. One of the world's largest car part manufacturers, Magna International, headquartered in Ontario, Canada, decided to invest in ServoDrive systems for their six Carat 440 die-casting machines in the UK. By converting from the standard drive to this innovative technology, they made an important step toward more sustainable and energy-efficient production of structural car parts. The ServoDrive system helps reduce energy costs by only bringing into the system as much energy as is required. In this way, energy consumption can be reduced significantly. ServoDrive also helps to extend the lifetime of components and reduces maintenance costs – key features for a company like Magna, which is at the forefront of producing structural car parts.

The innovative ServoDrive helps reduce energy costs and extend the lifetime of components.

Inkmaker Inc.

## FUTURE-PROOFING A NEW FACTORY

VIDEO

Watch the video to learn how Inkmaker Inc. increased efficiency.

Bryant Herrick King, President of Inkmaker Inc., and the Cenomic in the background.

When Inkmaker Inc. decided to build a new factory in Cabuyao Laguna in the Philippines, the management had a clear target – to be more innovative and better prepared for the future of printing inks. To achieve this, they reached out to Bühler for the right solutions. The company produces printing inks for the packaging and printing industry, including solve-based and water-based inks for plastics and flexible packaging, and for labels and other paper products. The shift from a manual to a semi-automated plant brought significant improvements. With Bühler's Cenomic bead mill combined with the Premium Plus control system, Inkmaker was able to increase efficiency, speed, quality, and repeatability, while reducing energy consumption and costs – all changes that set them in good stead for the future.


# AN EYE FOR DETAIL

TEXT: JONATHAN WARD

*Smart glasses could be the consumer electronics industry's next big hit, but companies first need to come up with designs that people want to wear. Squeezing so much new technology into a tiny product requires ingenuity, innovation, and cutting-edge manufacturing capabilities.*

**DIGITAL PRODUCTS** tend to get smaller and more personal over time. The computer on your desk led to the laptop in your bag, then the smartphone in your pocket. Today, the watch on your wrist may be a powerful computing device too, capable of making calls, displaying messages, or monitoring your vital signs. After a slow start, smartwatches became the first mass-market "wearable" devices.

Now the technology industry has a new wearable product in its sights: the spectacles on your face. "Smart glasses" are a diverse category of digital devices. Broadly encompassing any form of spectacles or goggles that include electronic components, they range from relatively simple products that incorporate headphones or a camera, all the way to advanced headsets equipped with high-resolution displays and audio systems for immersive virtual reality experiences.

Each of these products has found its niche, but none has reached the level of adoption achieved by smartphones, with sales of more than 1.3 billion units per year according to research company Gartner, or even of smartwatches, with sales of around 180 million units, according to research company CCS Insight. Apple, the company that did so much to popularize smartphones and smartwatches, entered the smart glasses market this year. The company's Vision Pro won't replace your current favorite spectacles or sunglasses, however. It is a high-end headset intended to be used for virtual reality applications or as a replacement for a large computer monitor or TV screen.

### Will small glasses go big?

Technology companies haven't yet achieved their goal of smart glasses with true mass market appeal, but they know where to look. The most promising area of development today is products with "augmented reality" (AR) capabilities. These are glasses

that allow the user to see the real world in front of them overlaid with relevant digital data. The main applications for these products are in industry.

Bühler, for example, offers a remote service and maintenance solution for its customers called BühlerVision. Using an AR headset equipped with a camera, customers use BühlerVision to communicate with a technical support specialist who can explain the steps necessary to complete a task.

Smart glasses are proving their use in professional settings. But for smart glasses to succeed in the mainstream, companies need to package these capabilities in a format that looks much more like conventional spectacles. That is a formidable technical challenge, requiring the components within the glasses to be made significantly smaller, more robust, and at a lower cost than current-generation products.

"There are several different technologies in development for these next-generation smart glasses," says Dr. Steffen Runkel, Director of Business Unit Optics at Bühler Leybold Optics. "But they all contain a few basic components. First, you have the microdisplay, or light engine, which creates the image. That is a tiny component concealed within the frame of the glasses. Then you have the optical engine, which uses a combination of lenses and waveguides to project the image onto the glasses, correcting it to suit the needs of wearer's eyesight. Finally, you have the ophthalmic components: the main lenses on the glasses, which must perform a dual role, as optical lens and display screen."

Bühler is working with manufacturers and institutes on the development of the required optical coating solutions for all these systems for smart glasses. "Our work in this sector spans our business in semiconductors, precision optics, and ophthalmics," explains Runkel.

The Bühler contribution to the smart glasses revolution is focused on the specialized coatings and surface treatments needed to deliver crisp images in a tiny format. Those coatings are used to filter light at specific wavelengths, for example, or to increase the transmission of light within the optical engine. Microscopic etching into lenses or lens surface coatings is used to create grids of "pixels" that will reflect light to the wearer's eye.

Individual components within the system may require a stack of multiple coatings to achieve the desired combination of properties. "Even the lenses of conventional glasses may have six or eight coating layers, designed to prevent unwanted reflections, absorb certain light wavelengths, shed dirt, resist fingerprints, and protect the lens from scratches," explains Klaus Herbig, Head of Market Segment Precision Optics at Bühler Leybold Optics. "In smart glasses, there may be 12 layers or more."

**BENEFITS**

+ Bühler Leybold Optics is the right partner for development and mass production solutions for enabling next-generation AR, VR, and smart technology applications.
+ Our broad product portfolio is designed to meet your most challenging specifications for VIS, IR, DUV and even extreme wavelength regimes.
+ Specialized expertise in optical filters ensures high quality solutions.

Find out more about precision optics at Bühler:

Smart glass applications also place significant demands on coating quality. Within the optical engine, layers must be precise and consistent to keep the image focused. And a projected image changes the way users see their lenses, too. "With conventional glasses, you are always looking beyond the lens, so you might not notice tiny imperfections in the surface," explains Runkel. "With smart glasses, the projection comes from the lens itself, and you notice any problems."

The pursuit of optical perfection is encouraging lens makers to adopt new technologies, for example by replacing liquid-based, anti-scratch coatings with "dry" vacuum coatings that can be applied in thinner and more consistent layers. Manufacturing systems matter too, with production machines working in a cleanroom environment to reduce the risk of contamination.

### Turning the volume up

Advanced coating technologies and sophisticated coating machines are helping companies to overcome the technical challenges of smart glasses. But they still need to address the cost.

"Producing such advanced products at reasonable cost requires highly automated, high-volume manufacturing," explains Runkel. "We have worked with our customers to develop coating systems that work for prototypes and small batches. Now we are developing a new generation of equipment that will achieve the same quality and consistency in mass production."


GF Casting Solutions generates around 80 percent of its revenue in the automotive sector. At the Suzhou site, the focus is on the manufacturing and development of lightweight components for the mobility sector.

*To meet the growing requirements of the e-mobility sector, GF Casting Solutions relies on Bühler not only as a solution provider, but also to tackle challenges together through innovation. And for Bühler, it was an ideal partnership for co-developing a new technology that today helps GF Casting Solutions benefit from energy savings of up to 40 percent.*

**CHINA'S DOMINANCE IN ELECTRIC CAR SALES** shows no signs of abating, according to figures from the International Energy Agency. Approximately 60 percent of electric vehicles sold globally are deployed on China's roads. In 2022, electric vehicles accounted for 29 percent of total vehicle sales in the country, surpassing their target of achieving a 20 percent sales share by 2025.

Suppliers to this industry are confronted with many challenges, ranging from changing market dynamics to tense supply chains. One of these is GF Casting Solutions, a business division of Swiss-based Georg Fischer AG. With more than 4,000 employees in 12 production sites worldwide, the division makes around 80 percent of its sales in the automotive segment.

Having a regional presence in China contributes to the success of GF Casting solutions. This includes a site in Suzhou, close to Shanghai, that specializes in manufacturing and researching lightweight parts for the mobility sector. When the company began its search for a technology supplier, it was clear from the start that this supplier would have to be able to cover GF Casting Solutions' global footprint to ensure optimal support and service at the same level for all locations. The company found such a partner in Bühler.

The relationship spans more than 40 years and runs deep, especially today as both companies are focusing on improving the sustainability of the processes and value chains in which they are active. "We empower sustainable mobility," explains Oliver Teich, Chief Procurement Officer at GF Casting Solutions, quoting the division's motto. "We strongly believe that we can make a positive impact towards a more sustainable process by looking at the whole life cycle of a product, starting at research and development and ending when a part arrives with the customer."

This matches Bühler's approach to making the value chains of its customers more sustainable by looking at them holistically, meaning that the partnership goes beyond a traditional customer-supplier relationship.

In 2014 Bühler started developing the first simulations for the ServoDrive, a new, more efficient design for die-casting drive units. By 2015, the development team was looking for industry partners to test this new solution with the aim of decreasing energy consumption and improving the sustainability of the


# PARTNERING FOR SUSTAINABLE MOBILITY

TEXT: LUKAS NAEF

**VIDEO** Watch the video about the collaboration between GF Casting Solutions and Bühler.

die-casting process. “We were very glad to have GF Casting Solutions on board,” explains Dominik Widler, Team Manager R&D Mechanical at Bühler, who was part of the development team for ServoDrive. “With their sophisticated set-up, GF Casting Solutions was the perfect sparring partner to test our ideas and find out if they are feasible.”

A fruitful exchange started at this point, with meetings, on-site tests, and a bilateral knowledge exchange. Since 2018, the ServoDrive modules have been rolled out and tested for different machine sizes, and are delivering on their promise. The new drive unit design enables customers to save up to 40 percent of energy compared to the reference cycle, decreases the wear on the pumps thereby increasing their lifetime, increases pressure stability, and opens the possibility of predictive maintenance, which in turn can increase the uptime of the cell.

The ServoDrive was deployed at GF Casting Solution’s Suzhou site and contributes significantly to making the process there more sustainable.

Following the ServoDrive’s development and launch, both companies maintain contact. “We still have regular review meetings where we look at opportunities to collaborate further, on innovations, technologies, and technical performance,” explains Teich. “We look at the whole portfolio, at the complete cell. Having an honest and trustful exchange makes this partnership special and productive, enabling us to solve challenges together.”

**INFO**

+GF+

## GF Casting Solutions AG

***Schaffhausen, Switzerland***

- Georg Fischer AG was founded in 1802.
- The casting division of Georg Fischer focuses on die casting of light-weight aluminum as well as precision casting and iron casting.
- GF Casting Solutions AG supplies their lightweight castings to global customers from 13 production sites spread across the world.
- GF Casting Solutions has relied on Bühler for more than 40 years to supply their die-casting technology for their global footprint.

FOOD FOR THOUGHT

# A HOLISTIC APPROACH TO SKILLS SHORTAGES

Andy Sharpe, President & CEO Bühler North America

**RIGHT NOW,** the job market in North America is a bit of a double-edged sword for businesses. While the low unemployment rate is a positive sign that the economy is growing, it presents its own set of challenges for manufacturers. In the US, there are 0.7 people available per job opening. In Canada, the picture is only slightly different, with 1.3 people available for every job opening.

This situation makes it difficult for manufacturers to fill positions on production lines. When a manufacturer expands capacity on an existing line, or adds a new line, staffing issues become very real. Add to this that the average worker in North America stays with their employer for only 5.2 years, you can start to see why businesses don't see the same positive economic picture that their respective governments do. Staffing can be a determining factor in an organization's decision to expand or add new lines.

Adding yet another wrinkle to this is the skills gap in this region. Particularly in production positions, this gap in experience and knowledge between older workers eyeing retirement, and incoming untrained workers – or lack of them – results in a looming labor shortage. Canada is looking to address this shortage in part by planning to accept nearly 1.5 million immigrants by 2025. Meanwhile, in the US, immigration policy remains stalled, exacerbating the situation. Additionally, North American manufacturing companies have been slow to implement European-style apprenticeships, keeping the number of well-trained entry-level workers very low. This is changing to a degree, but not at a pace fast enough to have any real effect on the current staffing situation.

The pressure this employment landscape puts on manufacturers is not insurmountable, though. There are several ways North American processors are addressing these challenges while improving operations, making the most of their installed base, cutting operational costs, and perhaps even making progress in corporate sustainability goals.

Automation plays a key role in improving operations where staffing is an issue and can take an organization a long way towards highly efficient production, even with a reduced workforce. In the milling industry, for example, automation has reached a level that allows "lights out" operation – meaning that the mill can run entirely on its own with a crew of only one or two people to oversee and address any issues. While not every industry can take advantage of such a level of automation, many solutions are available that can drastically improve production efficiency and reduce energy consumption.

Today, automation solutions are incredibly diverse and feature software and hardware components that can be easily integrated into new and existing lines. They can be end-to-end solutions or can focus on a particular operation. Digital products can also have a significant impact here, leveraging data collected from smart and connected devices to improve efficiency. Using algorithms based on years of process expertise, real-time analytics of this data can find areas for improvements and then, using automation tools, adjust the process to optimize towards those improvement targets. This can be done with little to no human intervention and at a far superior speed. Even small improvements from digital tools can deliver significant positive impacts to the bottom line. Bühler has developed a sizeable portfolio of services to help processors grow their operation even in this climate.

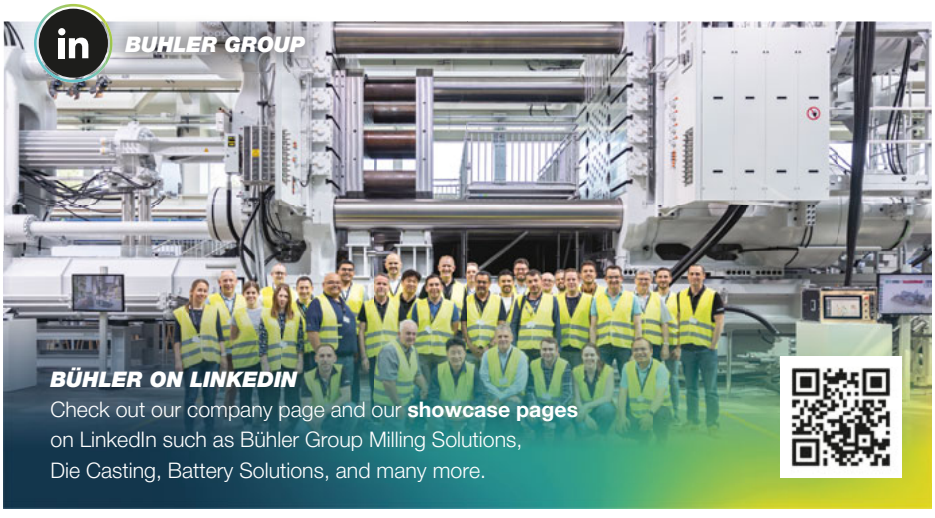
An expanding economy and insufficient human resources are conflicting forces. Taking a holistic approach to supporting challenged production operations with considered equipment and services designed to address this dichotomy can help to meet these challenges in a way that benefits all involved.

## LET'S GET SOCIAL!

Stay up-to-date with the latest trends, innovations, and customer success stories from the Bühler world by following us on our social media channels. You are also welcome to tag us in your posts about how you work with our solutions.








## THE BÜHLER INSPIRATION HUB

Would you like to know more about the key trends impacting your industry? Visit our Inspiration Hub, where you will also find features and videos highlighting the inspiring work of our customers and partners around the world.

## WHAT'S HOT?

Check out two of the most watched videos on our YouTube channel so far in 2024.



## YOUR OPINION MATTERS TO US

We would love to hear what you think of Diagram so that we can make it even more relevant for you. Please send your feedback to:

**media.relations@buhlergroup.com**

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