DIGITALIZATION IS THE NEW NORMAL
Why companies should embrace IoT

TRACEABILITY FROM FIELD TO FORK
Gain competitive advantage with automation

A SECOND LIFE FOR PET BOTTLES
Reprocessing plastics to reduce waste
We help make e-mobility more efficient with a new continuous mixing process for battery slurry.

By 2020, about 5 million electric vehicles will fill the world’s roads. Our unique mixing solution for electrode slurries is a key contributor to enabling those cars to drive a third farther than those using conventional batteries.

Interested? Contact us.
grinding.dispersion@buhlergroup.com

The future of mobility.
Dear Readers,

Digitalization has now arrived in full force for our industries, and it has changed many aspects of our private and business lives. The Internet of Things isn’t just a buzzword anymore, it’s a reality. At Bühler, we are positioning ourselves at the forefront of this accelerated transformation. We are convinced that the new services we are developing will not only have added value for you, our customers, but also benefit your end customers. For us, digitalization is not just an end in itself, but a value driver – which is why we are dedicating this issue of “diagram” to the topic.

The value of IoT is clearly evident in the areas of quality and food safety. For example, we have developed a food safety intelligence tool for roasting nuts that provides real-time monitoring and an overview of conditions across the full roasting process, helping you to ensure that harmful bacteria are inactivated. A second service, which we are currently launching, is used for quality control in the production of rice. Today, many rice millers manually sort rice samples to determine the quality of the batch. This is time-consuming, prone to errors, and subjective. With our TotalSense service, the rice miller takes a photo of the sample with a smartphone, the quality of which is quickly and reliably determined in our cloud solution in only a few minutes.

These types of services mark just a beginning. Bühler is investing considerable resources in developing and harnessing digital opportunities. In the spirit of our partnership-based innovation philosophy, we cordially invite you to support us with these projects and to get involved wherever possible. The benefit of digitalization lies in networking – this principle applies not only to technology, but also in entrepreneurial terms and on a personal, human level. In simple terms, we aim at making our physical world better with digital means.

As always, we look forward to receiving your suggestions and comments on our customer magazine, and we thank you for your trust and collaboration.

Kind regards,

Stefan Scheiber
CEO Bühler Group
# FOCUS

**IoT: the new normal**
Digitalization is here to stay, but don’t fret. Early adopters will reap the rewards.

**Interview with Stuart Bashford**
Our Digital Officer explains how Bühler supports customers on their digital journey.

**Our IoT solutions**
Bühler enables customers to get the most out of the Internet of Things.

**AnywarePro**
Improve your production capacity from anywhere in the world.

**TotalSense**
The future of rice analysis has changed with a new, portable, IoT solution.

**MyAssist**
An IoT solution to help you make data-driven, cost-saving, milling decisions.

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CUSTOMER CASES

A logistical masterpiece
In three years, a huge plant for City Group took shape on what was a wasteland.

A new life for PET bottles
Bühler works with recyclers worldwide to boost PET recycling.

TECHNOLOGY & SOLUTIONS

Reusing rejected bread
Reduce food waste with rework technology for dry unused bread.

First-class service
You can count on support during the full lifecycle of your die-casting equipment.

Latest innovations

INNOVATION

A space for change
The ground has been broken for Bühler’s new innovation center.

Interview with Andreas Aepli
Our insect business is gaining interest worldwide. The story has just begun.

Did you know?
• Interesting facts about digitalization
• Imprint

Food for thought
Bühler’s Chief Technology Officer on reducing waste and energy.
The new normal

The Internet of Things makes everyday devices smarter — like your home thermostat that you can now adjust from afar, your car that receives real-time traffic alerts, or your tracker that sends your daily activity to your smartphone. Machines can instantaneously communicate with other machines thanks to networks of data-gathering sensors and cloud computing. While the implications of this are immense, so are the opportunities.

TEXT: MICHÈLE BODMER
“Bühler is thinking out of the box, beyond machine solutions, to create real value for its customers.”

Hal Gurley, founding member of the Urs Bühler Innovation Fund

Remember life before your smartphone? It’s entirely possible that within the space of a few short years we’ll look back at today as a similar kind of “digital desert.” In just three years it’s estimated that 28 billion “things” will be connected to the internet. While that’s a mind-boggling statistic, the concept is actually quite straightforward. Sensors embedded in machines monitor and track data, which is then sent to the cloud where apps convert it into intelligent information. This “smart” info is transferred back to the machines where it becomes a real-time action. That’s where the real value of the IoT lies – in gathering data and leveraging it intelligently.

Crucially, IoT is a technology that “enables companies to gain business value,” explains Hal Gurley, an automation intelligence expert and a founding member of the Urs Bühler Innovation Fund (UBIF). “That value can take many forms, such as being more productive and efficient, to delivering higher-quality products, or to grow faster.” Gurley has supported many companies in their journey to embrace digitalization and cloud technologies during his 17-year career at Cisco. As a member of UBIF, Gurley is helping Bühler deliver greater business value with digital solutions. His experience and insight should help drive significant change.

“Companies, including Bühler, need to appreciate the fact that operating in a digital world is the new normal,” Gurley stresses. “Those thinking it’s just a passing trend should be aware that the rate of digital developments is accelerating exponentially,” he says, citing Ray Kurzweil’s Law of Accelerating Returns. Kurzweil, a famous artificial intelligence researcher and a Director of Engineering at Google, theorized that mankind will advance its technological capabilities – cloud computing, internet, network connectivity, deep learning of machines – at an exponential pace.

In 2001, Kurzweil predicted that we won’t just experience 100 years of progress in the 21st century – it will actually be more like 20,000 years. This means that five years from now, in 2022, we will have had as much change as in the last 50 years. As humans tend to think in linear terms, this expo-
nential acceleration of technology is hard to comprehend and inevitably quite intimidating, Gurley says. “But let’s face it, Kurzweil’s predictions have proven true. Companies that don’t embrace digitalization could end up like Kodak or Nokia.”

Salutary lessons
The fate of these organisations is still fresh in many minds, and serves as a warning. Nokia may have underestimated the technology’s potential and lost its position in the industry. Kodak – once the undisputed leader in its field – didn’t see the value of digital photography and also paid a heavy price. “Established companies that have long histories and a lot of success are often reluctant to fully explore new business models,” Gurley explains. “This is why I always say that the technology itself is easy. What’s hard for organizations is changing their company culture, and getting their employees to think differently in order to be open to changing established business processes.”

Changing a company’s culture is a top-down endeavor that requires both consistency and persistence, he says – it’s not something that can be rushed. “At Bühler, the journey started several years ago. The top management decided to place an emphasis on IoT and digitalization and established the Urs Bühler Innovation Fund in 2014. Since then, IoT has been a priority.”

Small is beautiful
Many smaller companies believe they can’t afford to automate and adopt digital technologies, but Gurley believes they could actually be at an advantage as they’re often more agile than their larger competitors. For example, even leading IT companies have missed the boat when it comes to the cloud, failing to understand the value it could add for their customers, and no company, big or small, can afford to be left behind in the digital era, he adds. “The longer you wait, the bigger the gap between you and the early adopters. Remember Kurzweil – the gap, like the technology, will increase at an exponential rate,” he warns.

What’s more, digital solutions don’t have to have a big budget to deliver a real impact, he explains. “The perfect example of this is Bühler’s TotalSense rice analyzer. The concept is beautifully simple. It’s not a machine, it’s a portable IoT solution that solves the real problem of rice quality (more on page 18). I believe this innovation is a game changer that has the potential to be sold at internet scale for a few hundred dollars,” Gurley enthuses. “Bühler is thinking out of the box, beyond machine solutions, to create real value for its customers. That is what digitalization is all about. With its profound machine and process knowledge in the food and advanced materials industries, Bühler can help companies mitigate risk while gaining competitive advantage.”

Don’t go it alone
Bühler has always believed that – rather than a solution in itself – technology is an enabler, and that there’s no final destination when it comes to digitalization. It’s an ongoing journey with complexities and opportunities that have yet to be revealed. And, Gurley stresses, it’s one that companies definitely shouldn’t embark on solo.

“It’s important to build a network of strong partnerships to gain knowledge and external perspective from other industries, start-ups and academia. Collaborative thinking and building networks is how to stay in the game and accelerate, and companies on their own can drown in the complexity of digitalization. It takes a broad network to discover innovation opportunities.”

Hal Gurley

Hal Gurley holds Bachelor’s and Master’s degrees in Electrical Engineering from the Georgia Institute of Technology (USA), and an executive MBA from the Institute IMD (Switzerland). Before moving to Switzerland in 1995, Gurley was President and Founder of Automation Intelligence, an advanced systems integration and software development firm based in the USA specializing in real-time communications and control systems for industrial, robotic, and military applications. Prior to joining Cisco in 2000, Gurley was Director Internet/IP at Swisscom. During his 17-year career at Cisco, he held executive leadership positions within Cisco’s professional services, management consulting, and sales organizations. From 2013 until his retirement in late 2016, Hal Gurley had global responsibility for Cisco’s Cloud/Network Management and Automation software sales and go-to-market execution. He also served as sole Managing Director and legal representative of Cisco Systems (Switzerland) GmbH. Hal Gurley was born in 1955. He is Swiss/American.
“This is a time where we are not only considering the potential of the future – the future is here.”
“Technology is an enabler, not a solution in itself”

Thanks to the Internet of Things (IoT), machines today no longer “merely” produce goods, but also produce valuable data that can revolutionize your business. Stuart Bashford, Digital Officer at Bühler, welcomes this revolution. He – and Bühler – view technology as an enabler for positive progress. Implemented right, digital innovations can help reduce waste, energy and downtime, improve quality, and ultimately boost the bottom line.

INTERVIEW: MICHÈLE BODMER / PHOTOS: ANDRÈ GUTZWILLER

As Bühler’s Digital Officer, you are responsible for delivering the company’s digitalization strategy at a time where the IoT is truly beginning to shape the future of businesses.

Absolutely. I must say, this is the perfect time to be in this role. The technology is here and it’s commercially viable. This means that we can now really deliver the IoT solutions that we were dreaming about five years ago. Several aspects are coming together: Sensors are low-cost, the cost of transferring data is low, and the cost of storage is low.

At Bühler, we’re investing in the development of digital solutions to enable our customers to reach their goals. Our management and board are fully committed to driving a digitalization strategy that helps our customers reduce energy consumption and waste, and improve efficiency.

What does this mean for you personally?

For someone who loves technology and all things digital, this means the stars have aligned – the technology exists and the company fully stands behind it. It’s a time when we’re not only considering the potential of the future – the future is here and we can actually offer game-changing solutions to our customers. Manufacturing across the value chain has the opportunity to reach new levels of productivity, service, safety, and differentiation and thereby drop operating costs or increase revenue.

Can IoT solutions really make such a big difference? It’s not just media hype?

The value and benefit are real and they will have a positive influence on a company’s bottom line. Through real-time monitoring and control, even small benefits can accumulate into significant gains over a year. IoT helps our customers become more cost effective and brings value to their business.

Can you share an example?

One example is a recent test we ran where we compared our algorithms to the performance of the best operator at a rice mill. A great deal of expertise is needed to set up a machine so that it performs to expectations. We analyzed what the line operator did to achieve an optimal set-up, put that into an algorithm, and applied it to the machine. The algorithm outperformed the one-time adjustments made by operators by half a percent. This system’s analysis is in real time, so the machine is always operating at its best – adjusting itself to maintain consistent quality. This half a percent of higher performance translates into significant gains for our customers in terms of recurring revenue year on year. Reducing unplanned downtime, establishing consistent quality, lowering waste and energy, and achieving overall equipment effectiveness – all of these maximize productivity and generate revenue for our customers.
What types of solutions are customers asking you about?
Many of our customers talk to us about reducing unplanned downtime, which is money lost. Using our machine-learning algorithms, for example, we can predict where and when failures will occur. This enables customers to schedule maintenance activities around production schedules without interruption. This is just one example of the very real benefits we can offer with our IoT solutions.

Getting the most out of their processes is important to all of our customers and IoT solutions enable us to significantly improve the Overall Equipment Effectiveness (OEE) numbers for a given plant. We do this by not only collecting data, but also by analyzing it.

Our data analytics team combine with Bühler’s process experts to help customers extract real value from the collected data. Data analytics translate directly into financial gains according to a recent study by the University of Texas in Austin, USA.

How are we helping our customers to get on board with digitalization?
The digital journey we are all on is certainly complex, and one of the main reasons is the pace at which things are moving. Technology is advancing fast – this means changes are hitting us continually, which is feeding our imaginations and offering us the opportunities to maximize the benefits.

One important challenge we see for our customers is that there can be a temptation to throw technology at the problem and then after implementation try to uncover what benefit or value has been generated.

So digitalization is isn’t always the solution?
We keep in mind that technology itself is not a solution, it’s an enabler. So, while we certainly have many technology/IoT solutions that can be applied to any challenge, we prefer to take a value-centric approach. This means we first want to fully understand the problem and second, we apply the right building blocks from our technology portfolio to solve it.

We speak with our customers and find out what’s important to them – be it product quality, safety, increased efficiency – then we develop solutions with them, with our experts, and with partners.

How do you do this in practice?
We work with our customers, usually in an open exchange environment. Through these workshops, we may find that the solution can be far simpler than originally considered, and again, perhaps digitalization is not the solution. A benefit of the digital solutions that Bühler offers is that through their transparency, we can really analyze the process to gain a higher resolution – this enables our customers to gain greater insight into how we can extract maximum benefit.

Cloud storage is available to everybody. And, anyone can hire data scientists to build their own data analytics teams. With this in mind, what does Bühler offer its customers that other providers can’t?
Simply put, our digital offering is strengthened by our experience in measuring quality of the product; we have in-house data scientists who can analyze that data; we have a 150 years of process technology and we have the global physical infrastructure. That’s a combination that digital service providers alone can’t match. Bühler’s digitalization efforts span a huge array of possibilities and potential.

In 2016, Bühler communicated its intention of reducing waste, water, and energy use by 30 percent with digitalization and IoT as drivers. What are some of the key achievements since that announcement?
We’ve had a lot of success stories since then and we are working on many more with our collaborative innovation network that includes start-ups, students, academics, think tanks, universities, and business partners. A great example of collaborative innovation is the TotalSense rice analyzer, an IoT product that enables the high-quality analysis of rice (more on page 20). One of our engineers at Bühler Sortex in London, who began as a UNITECH student intern, used our internal research capabilities to develop the product in competition aimed at driving digitalization in Bühler. It was voted best digital business solution at Bühler’s Digitalization Fair in May this year. We are a corporate partner of UNITECH, a program that offers internships to high-potential engineering students.

At Networking Days 2017 @ Interpack, we launched several innovations, including ChocoGenius. It’s an “anytime, anywhere” web-based training service to train chocolate line operators. We also released the Smart Chocolate Factory, a self-optimizing digital service for dosing, mixing, rolling, and conching lines. It’s a “digital factory” that improves the quality and performance of a line. With it, customers achieve a 10 percent reduction in operating costs and a 10 percent increase in performance. AnywarePro is another great example (more on page 16) of IoT at work. Bühler’s IoT platform is designed to take all of the complex analysis data produced by an optical sorter and provide feedback to a customized dashboard to whomever needs it on whatever device. It was introduced for rice mills, but is now being adapted for any food and non-food production lines using an optical sorter.
What are the key concerns around IoT that might be holding some manufacturers back?
Concerns about information and data security, initial investment, complexity, what to do with the information that is gathered, and doubts that the return on investment might not meet expectations. We have the experts, the partners, and the know-how to address all of these concerns. Again, it all comes down to meeting our customers, determining what their needs are, and finding the solutions that best suit them.

You mentioned data security. How has Bühler addressed this issue?
We recognize the concerns our customers may have and take data security very seriously. It is a basic requirement for us, not only in IoT but in all our activities. We ensure that potential security issues at the device end, the cloud end, and the network traffic between the two is mitigated. It was a decisive criterion for choosing Microsoft as a preferred innovation partner.

We authenticate using digital certificates between the device end and the cloud end, in addition all data is encrypted at source and while it is stored on the cloud. We also use a secure gateway to transfer data either through a wired or wireless connection – this is a secure but “firewall friendly” process. Data transmission is one way – this means that all the data transmissions are instigated from the device end which enhances security by minimizing the risk of penetration attacks.

What other reassurances can you offer?
We also provide assistance to our customers through e-learning modules to raise awareness of best security practice on-site – the largest security risk is still the activities which happen on-site – for example connecting a USB device that has been used at home, or on other less secure networks and unwittingly transferring a virus. The Microsoft datacenters where we store our data complies with many of the worldwide industry security standards, for example ISO 27001 for physical security and availability, and it is continuously managed, monitored, and administered by the resources of Microsoft.

What final words of advice do you have for our customers?
Come and talk with us. We have a number of digital building blocks for customers big and small. We have a range of solutions and will work with you to find the best fit. I think it’s also important to recognize and accept change that is here – and more is on the way, but also to see that with change come opportunities. This is an exciting time where the first-mover advantage can be quite significant.

Stuart Bashford
As Digital Officer at Bühler, Stuart Bashford is responsible for setting and delivering the company’s digitalization strategy. He began his career at Bühler in 2013 in London, as Head of Software and Hardware Development. Prior to joining Bühler, he worked at a high-tech start-up company for ten years designing lasers for sales into the solar panel manufacture business and also in the semiconductor industry for applied materials. He is MBA qualified and has a background in hardware and software design.

“Data analytics translate directly into financial gains, according to a recent study.”
BÜHLER IOT SOLUTIONS
The ability to remotely access critical production data through the Internet of Things is heralding exciting new efficiencies for food access processing. Using AnywarePro and its dashboard will slash downtimes from system failures and provide your decision makers with the key data they need to optimize your production from wherever they are in the world.

TEXT: STUART SPEAR
In this data rich world, we are used to our tablets or smartphones being able to access the information we need, where we need it and at any time. So why shouldn’t a food plant operator also be able to instantly access all the data analytics being produced during a food processing run, no matter where their location?

Imagine the cost savings if an engineer could within minutes diagnose and solve a system malfunction remotely. Imagine the increased efficiencies if system production parameters could be set instantly from wherever your decision makers are. Through the IoT, Bühler has found a way to achieve these goals and the development is set to mark a new milestone in production capabilities. Initially launched for the rice sector, AnywarePro is designed to take the complex analysis data produced by your optical sorter and provide a real-time feed to whoever needs the information, whether on their PC or remotely on their laptop, tablet, or phone.

**One solution for many commodities**

Machine performance, tolerance levels, and sorting criteria are all critical to any production line’s performance. AnywarePro is designed to transmit the data needed to optimize production onto the cloud and so make it accessible to anyone with permission to see it. This could be an off-site plant operator wanting to increase output or a Bühler engineer helping reset operating standards for a new product run. “With the additional Remote Assist an engineer can look at the computer screen that is on the optical sorter and control it from anywhere in the world as long as the customer gives them the permission to do so,” says Peter Denhard, Global Market Development Manager for Bühler.

Launched last year, AnywarePro is currently being used by rice mills but is already being adapted for any food producer using an optical sorter for quality control and food safety. “Over the next few months we will be expanding beyond rice and use AnywarePro on optical sorters that handle other commodities, whether it’s wheat, corn, coffee, or pulses. In fact, it is for anyone who has an optical sorter, and it could be used for non-food items such as plastics,” explains Denhard.

**Fine tune your data**

Of course, different producers will need to see different data and in different forms. So over the next few months Bühler plans to introduce the Dashboard in the next phase of AnywarePro’s evolution. The Dashboard will enable the user to fine-tune their data criteria and to present it in the most effective way for their specific business needs. “We are in the last phases of development but it will be a means by which the user will be able to see all the data they need on one screen. It will be customized so it is presented in the way they best require it and give our clients better informed plant management,” says Denhard.

AnywarePro’s ability to transmit diagnostics to a Bühler engineer anywhere in the world could radically save costs. The engineer will be able to immediately access wear information from the component lifetime indicator, monitor fault logs, and refer to audit data relating to the machine’s operating history. It means the diagnosis, if not the solution to the breakdown, could be within minutes and dealt with remotely rather than the frustrating hours it might take for an engineer to be on-site.

In multisite operations, data feeds from different plants fed to operating managers could be used to show real-time output performance. This will enable set up criteria to be quickly compared and assessed or for settings to be adapted on one production run to emulate the higher performance being achieved by another.

Audit trails are also integral to AnywarePro, providing historical records so setting changes can be related to output levels or food quality audits can be supported by objective output data. In the dynamic world of food production ever greater flexibility is being required. With AnywarePro’s link to the IoT and the cloud, optimal management, operations and maintenance can be achievable not just from your plant but from wherever your staff need to be.
“It is a completely different way of doing things,” explains Sara Larsen, Product Design Engineer for Bühler. “We wanted to take the pain out of the rice business and come up with something that provides a quick and objective analysis that customers can also be able to keep a record of to ensure there is traceability.”

TotalSense is primarily aimed at quality laboratories in rice mills. With no global industry standard for grain color or blemishes each rice mill must set its own tolerance thresholds. Whether in the country where rice has been produced for export or a mill importing paddy rice into a nonproducing one of the most ubiquitous foods on earth we all know what to expect when we choose to eat rice. Whether grown in the paddy fields of Thailand or the risotto fields of Lombardy, billions of grains are consumed daily, each uniform, unblemished, and unbroken. So how is it that despite the vagaries of nature such uniformity is achieved? The answer is down to a painstaking quality control process involving samples taken throughout a rice mill’s production line. Grains are often manually measured and inspected to ensure they meet preset size and blemish parameters. It can be a slow, subjective, and skilled analytical process.

That is until now. Bühler has developed TotalSense, a mobile rice analyzer that not only speeds up the process but removes those subjective judgements about grain quality and color and replaces them with objective traceable data through the use of the Internet of Things and cloud technology.

With time from sample to analysis report having been reduced to just a matter of minutes it means quicker diagnostics leading to faster machinery adjustments resulting in optimized yields. Quicker diagnostics also means being able to quickly spot and then adjust machine settings that may be damaging grains. TotalSense is all about simplicity and getting the greatest return from your raw material.

From field to fork, the uniformity of each grain of rice on our plate is rarely considered but is in reality a wonder of quality control. Until now the process has been painstaking and time-consuming but the launch of Bühler’s TotalSense and its use of the Internet of Things is set to transform the rice industry by both maximizing yields and providing speedy and objective data on rice quality at every step of production.
country for domestic sale, each batch produced will be required to meet the specific standards of that mill and their clients.

The user is able to prepare the analysis by first “training” TotalSense to look for grains that fail to meet those standards set by a mill. Grains placed in the “training tray” are examples of what is to be detected. Next, a sample tray is analyzed against the set quality parameters, a photograph is taken using an Android smartphone and the data is sent to the cloud for analysis.

Data instantly and everywhere
This is where the process gets even cleverer. Once the cloud has the raw data within 30 seconds it is able to produce a report that dates and locates the sample for traceability and then analyses the grains. The report is securely encrypted and then sent back to the mobile phone providing the user with data about average grain length, width, total brokens, percent acceptable, and color defects along with other set criteria. Each sample grain is also individually photographed so that if needed the analytics provided in the report can be compared to a visual assessment of the grain itself.

Being in the cloud this data can then be received instantly anywhere. A mill owner could feed data back into TotalSense from their location and change parameters, adjust bias settings, and so amend the criteria set for production.

Where this is of particular use is when analyzing different parts of the rice mill production line where grain breakages might occur such as whitening, polishing, or dehusking. “Removing the husk off rice involves easing it between rubber rolls at great speed,” Larsen explains. “This process can break the rice, so by analyzing what is coming off the machine TotalSense provides the analytics that enables the operator to make the necessary adjustments to settings to ensure maximum productivity by producing fewer broken grains.”

“I could even take it to the boardroom of my customer and actually do a live demonstration there and then if I chose to,” Larsen says. TotalSense also saves valuable time. Traditionally a rice mill laboratory sampling by eye would have to use various techniques to assess different quality criteria whether it is shape, blemish, color, or breaks. It may take up to an hour to complete each batch analysis. Using Bühler’s cloud-based solution from sample to report could be completed when adjusting machinery on a production line.

TotalSense, currently launching in India, is the first in a new generation of products targeted at the rice industry that aims to bring age-old production processes into the future through the IoT and cloud-based analytics.

ADDED VALUE
+ Provides objective traceable data
+ Speedy analysis to enable increased productivity
+ A single process to measure all grain parameters
+ Portable, light, and easy to use

Would you like more information?
Peter Denhard
Global Market Development Manager
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+44 207 055 2470

Would you like more information?
Quality control made easy with TotalSense

The future of rice analysis is changing with the Internet of Things and the launch of TotalSense. Thanks to this intuitive, portable solution, rice mills can profit from quick and objective rice quality analysis sent straight to a smartphone.

TEXT: SARA LARSEN / INFOGRAPHIC: DANIEL RÖTTELE

TotalSense: Here’s how it works
The TotalSense self-contained unit is portable, and can be set up in just a few minutes. Processors have the freedom to measure rice quality anytime and anywhere.

1. The rice samples are prepared for analysis
Spread a 10–15 gram sample of your rice onto the large sample tray (A). Place examples of your defects into the compartments of the small training tray (B). Up to six different defect types can be analyzed at once.

2. Set up the mobile rice analyzer unit
Slide your rice samples into the light box. Start with the small training tray, followed by the large sample tray (C). Then, connect the lighting. Close the light box (D). Place a smartphone (E) on top of the light box (F).

3. Take photos of the samples with your own smartphone
Align your Android smartphone camera with the image capturing space. Take a photo of the sample trays. The small training tray holds examples of grains you consider unacceptable. The grains in the large tray are compared to quality parameters set in the small tray.

The world’s 10 biggest rice producers
Production of paddy rice in metric tons by country in 2016. (M = million)

China: 209 M (27.8% of global production)
India: 164 M (21.8%)
Indonesia: 73 M (9.7%)
Bangladesh: 52 M (6.9%)
Vietnam: 44 M (5.8%)

Sources: Bühler Sortex & Rice, US Food and Agriculture Organization. Contributors from Bühler: Michèle Bodmer, Peter Denhard, and Tracey Ibbotson.
4. Upload the photos to the Bühler TotalSense cloud

Upload the photos you have made with your Android smartphone to the Bühler cloud. Using the app, the user defines the parameters for the sample and sends the photo and information to the cloud for analysis.

5. The cloud analyzes the photos and returns a report

The analysis is completed quickly and a quality report is sent back to the user’s phone within a few minutes. The report is displayed in an easy-to-read format and provides quality traceability. It can be used as proof of quality compliance.

The many benefits of using the mobile rice analyzer

- Objective analysis
- Quality traceability
- Informed plant management
- Increased quality control
- Maximized yield
- Low cost
- Quality report

How rice is used

Global use of rice 2016/17

- 80% Food use
- 4% Feed use
- 16% Other use

<table>
<thead>
<tr>
<th>Country</th>
<th>Price (in M)</th>
<th>Share (%)</th>
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<tbody>
<tr>
<td>Thailand</td>
<td>33 M (4.4%)</td>
<td></td>
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<td>Myanmar</td>
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<tr>
<td>Brazil</td>
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Milling
21st century style

Bühler is set to thrust milling into the 21st century with the development of myAssist, a data analytics solution that uses the Internet of Things and cloud technology to provide valuable aid to production processes that rely on the experience, intuition, and skill of the head miller to maximize productivity.

Text: Stuart Spear

Ask several different millers how to maximize flour yield from a ton of grain and you will get several different answers. Each opinion will have been born out of individual experience shaped by an understanding of raw material quality, processing considerations, and final product requirements, to name a few. The head miller’s unique expertise is largely based on learned experiences. Decisions that work get repeated. Those that do not are abandoned.

Bühler has taken this age-old principle and applied it to 21st century technology by using the Internet of Things to monitor and analyze every job in a wheat mill. myAssist is capable of feeding back data every few seconds on hundreds of processing variables relating to any part of the automated milling production process. Live yield data, roller mill currents, power consumption, ambient conditions, but also product quality parameters such as water content, ash content or starch damage, can all be monitored. The use of the latest data analytical techniques and visualization tools gives the miller additional transparency to achieve maximum yield in all situations.

Data has little value unless it can be interpreted and then understood to lead to informed decision-making around processing. Current outcomes need to be compared to historical data. Anomalies need to be recognized, trends to be assessed, and variables changed for any mill to operate at optimum efficiency. myAssist carries out these analytics in the cloud so that relevant information can be clearly presented on a cloud-based dashboard that can be accessed on-site or remotely via mobile devices. Operation managers, millers, and plant owners are able to assess on-site productivity, compare production levels or analyze faults across multiple locations against set benchmarks.

The cloud is key to unlocking the highest flexibility and data-driven performance optimization. It enables complex analytics to be accessible for technical experts in remote locations, management teams, and even clients. Production parameters can then be adjusted in line with client expectations or commercial targets. The principle of flexibility runs through the whole myAssist process.

Data sources can be configured individually and typically include data from the plant’s PLC systems as well as the plant
control system, Bühler WinCos. The type of data collected is at the customer's discretion and the way the data is presented is also customized to the needs of the specific mill.

So, what is the value of myAssist to customers? The challenge in the milling industry is to take a natural raw material with all its imperfections and variations and turn it into a product of consistent quality and quantity. With 80 percent of a mill's running costs given by the raw material, producers have to get all they can from their grains.

Bühler has been working with a premium German wheat flour producer to see how the advanced analytics from myAssist is helping this process. “Our processes are designed to correct for the natural variability of the raw materials entering the mill,” explains Christian Heiniger, who is leading the development of the myAssist project. “We have been working with our pilot company to assess how these analytics are improving output and our customers are very pleased by the increase in efficiency they are seeing.”

Matthias Graeber, who is leading the analytics team behind myAssist, likes to use a football analogy to explain the concept and benefits of myAssist. “Twenty years ago the only way to assess a football player's skill was down to a subjective judgement about what defines exceptional talent,” he explains. “But today we have witnessed a data transformation in the sport. We can measure how many kilometers a player runs in a game, how many passes were made, how many were successful, and so you build up a complete record of statistics to help you identify good players and also to help you find the optimal position for them. Put simply, we are doing something similar with every job of flour production by collecting all the data and analyzing it for optimum productivity.”

The natural variability of the raw materials may produce variations in output quality and quantity. Historically it has been up to the intuition, skill and experience of the miller to adjust processes to achieve consistency out of so many variables.

Millers today, with the aid of myAssist, can quickly and conveniently access clear data analytics that will support them in making data-driven decisions that will save time and further improve product quality. “The real surprise is that this has not been thought of before,” Heiniger says. “The feedback we are getting from millers is that myAssist is a good support and it has a lot of potential for the whole industry.”

ADDED VALUE
+ Increased productivity and yield
+ Detection of production anomalies and long-term trends
+ Intuitive visualization for production monitoring analysis
+ Specific energy consumption monitoring
+ Enabler for inter-mill benchmarking

Would you like more information?
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Today’s margins in the feed industry are tight. This means the smallest percentage gain in your production process can increase both your yield and your profitability. And getting the moisture content in your product right is one way to quickly achieve these gains.

Not drying feed enough results in too much moisture and risk of mold contamination. And, over-drying wastes energy, adds to the climate change footprint, and increases waste. It also means using more raw materials for each bag produced. Somewhere between the two is the optimum moisture content, which gives you the shelf-stable product you and your customers desire while utilizing the least amount of raw material.

But how do you sustainably increase water content and reduce moisture deviation?

**Tackling the temperature profile challenge**

The answer is AeroPro Moisture Control. It reduces the struggle companies have had in trying to maintain the right drying parameters for a dizzying mix of product range. Over-drying has become a common problem in the feed sector, as tougher market conditions have forced many factories to become leaner and the remaining operations staff have less time to monitor and make the right drying adjustments. “Too little information and too much time between adjustments makes optimizing a dryer’s temperature profile a constant challenge-
for operators,” explains Doug Beloskur, Product Manager Automation at Bühler Aeroglide. “This results in unnecessarily high operating costs.”

Bühler is utilizing connected sensor technology, the Internet of Things and cloud-based storage architecture to produce an intelligent drying solution with real-time, continuous moisture management. The Bühler team developed the AeroPro Moisture Control in partnership with a full-scale pet food customer to improve dryer yield.

“AeroPro Moisture Control reduces moisture deviation with a control algorithm that improves dryer yield and reduces dryer energy consumption,” explains Beloskur.

**Intelligent dryer control**

With AeroPro Moisture Control sustaining a 1 percent increase in dryer discharge moisture content, a yearly yield savings of USD 300,000 is possible for a typical feed dryer operation. In parallel to yield savings, USD 20,000 savings is also possible due to reduced energy input. “Intelligent moisture control can quickly show returns on infrastructure investments. It can increase profitability while decreasing energy and material costs,” explains Beloskur.

Another feature of the AeroPro Moisture Control is that comprehensive production data is available at your fingertips, wherever you are via computer, phone, tablet, or other web-connected device thanks to cloud-based architecture.

So how does the AeroPro Moisture Control system actually work? A continuous stream of discharging product passes through an analysis chute for moisture and temperature analysis. The moisture sensor then relays this data to the AeroCos dryer control software. The necessary dryer heat adjustments are made continuously, which eliminates potential time gaps associated with typical manual sampling, testing, and manual dryer adjustment. The fully automated method significantly increases the frequency of sampling and moves more of the product closer to the target moisture content.

AeroPro Moisture Control also improves energy efficiency by making correct dryer control decisions quickly and reliably. “Moisture content targets can be input by the operator or by recipe control, and the dryer will automatically establish and maintain the optimal drying environment for the remaining production run,” Beloskur explains. “This eliminates the wasted energy, and product, that can result from manually attempting to reach a moisture target.”

Processors can customize dashboards to configure the data reports in a way that best suits their needs, making the viewing and reporting of key process indicators fast and easy. Beloskur explains: “Having this dynamic, web-based reporting at your fingertips gives processors the ability to make decisions with confidence and actually visualize their savings and production gains.”

---

**ADDED VALUE**

+ Improved yield
+ Improved energy efficiency
+ Improved product consistency
+ Reduced raw material costs

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**Would you like more information?**

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“Make decisions with confidence and actually visualize savings and production gains.”

Doug Beloskur
Food fraud, pathogen spread, foreign objects, undeclared allergens, the number of issues that a food producer must be alerted to when ensuring the safety of their product are legion. The speed of a company’s response to these risks is critical. This alert system is designed to help companies corral food safety information accurately and quickly from a complex web of sources, whether international alert systems, national food agencies, social media, food producers, or news channels, into one easily interpretable conduit. Quickly understanding a potential risk could mean the difference between commercial inconvenience and reputational disaster.

Knowing you have all the information available on a potential risk also affirms your due diligence. Understanding the history of incidents related to your ingredients means powerful prevention measures can be put in place. And yet Harnessing all the food safety data sources available for a product is complex in times of global supply chains – which is why Bühler is providing the tools to ensure companies are equipped to limit the risk to health and to business when facing a food safety incident.

Based on the experience of its global Food Safety Program, Bühler recognized the opportunity to provide the industry with an intelligence solution designed to meet a specific client’s food safety information needs. The food safety alert system applies data analytics to a mass of different information sources providing timely, accurate, and relevant data. These include the Food and Drink Administration in the USA, the European Union Rapid Alert System for Food and Feed, the Centers for Disease Control and Prevention as well as information from all the national food safety authorities such as the Food Standards Agency in the United Kingdom. These data searches are made through an intuitive and easily navigated dashboard. Searches and statistical analysis by country, product, time period, data source, and risk type that previously may have required hours of spreadsheet analysis can now be carried out in next to no time.

Bühler hopes that this move into food safety intelligence will forge new and strong links between those responsible for food safety and Bühler’s role in the food production process. “In the past, food safety officers have not had much interaction with Bühler apart from perhaps seeing our logo on the production line,” explains Beatrice Conde-Petit, Bühler’s Food Safety Officer. “Now we have the opportunity to connect with the food safety community and open a dialogue between them, the production line, and Bühler – not only flagging risks but also giving insights on potential solutions.”

Easily follow the buzz
The system monitors all product recalls across a region over a specific time period and then filters out all those not relevant to your production process. It can tap into social media sources such as Twitter and provide feedback on public reactions to any specific food safety concern. What is the level of traffic on social media? How many posts have...
mentioned a specific salmonella outbreak? Is your product being linked to a food safety issue? How is a food safety risk being amplified on social media beyond scientific evidence?

By accessing high-quality current and historical records from official databases, the alert system also helps producers carry out or update risk assessments under HACCP (hazard analysis and critical control points). A company can see food safety incidents related to ingredients across national and international data sources enabling a client to review critical control points for emerging hazards using reliable and traceable data sources. In a global food economy using international trade networks it is important to be able to analyze potential food safety threats by country by ingredient, time scale, and risk assessment.

The system can also be used in food safety education, alerting employees to the diverse potential risks a food production company must be aware of. The system is in its final development stage and will soon be available through the myBühler platform. It is another example of how Bühler innovates collaboratively with its clients to shape future products that meet their needs.

A one-stop-shop for food safety alerts.

“Food safety is clearly top of mind with consumers and has become a real game changer for the industry.”
Beatrice Conde-Petit

“Food safety is clearly top of mind with consumers and has become a real game changer for the industry.”
Beatrice Conde-Petit

ADDED VALUE
+ Early warning system for outbreaks and emerging hazards
+ Cloud-based analytics for focused data searches
+ Risk assessment tool for review of HACCP plans
+ Social media analytics on products and potential risks
+ Access to wide data sources on food safety risks

Would you like more information?
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Food safety: the best defense is a good offense

In this digital age where food incidents can quickly become full-blown food safety scandals, traceability, transparency, and data intelligence are the truest allies of food processors. The key to unlocking the profound degree of food safety insight, control, and assurance from the field to the end consumer is by embracing new, digital technologies.

TEXT: MICHÈLE BODMER

The digital revolution is transforming the entire food industry. From precision farming, to cloud-based sensor technologies for food quality inspection, to the full traceability of ingredient flows in food manufacturing, and smart distribution logistics to seamlessly reach consumers with food services – digitalization is here and is disrupting businesses. Unlike in the past, if something goes wrong along the value chain, it won’t pass unnoticed.

Consumers, authorities, advocate groups, and even bloggers from around the globe are quick to raise issues on social media – and what they’ve got to say will impact your brand. But, there is also a benefit to the internet buzz. Companies that monitor what’s being said with data analytics solutions can react swiftly and quell the buzz before it gets too loud because they know where potential issues lie and can catch them early.

“Digitalization will transform every link of the value chain from supply, to factory operations to food sales and services,” explains Beatrice Conde-Petit, Bühler’s Food Safety Officer. “Companies that harness the vital data coming from many sources in one hub, and apply intelligent analytics to understand them, can stay ahead of the curve, stopping safety incidents from becoming scandals.” Digital technologies are not only changing the way food is produced and sold; they are also profoundly changing the food industry’s relationship with the end consumer. With health and safety high on the agenda, the industry is reaching to new digital solutions to prevent food safety risks, protect consumers, and provide the transparency that they increasingly expect.

Food fraud cases go viral

“Today’s consumers are digitally connected and social media has become the main place to seek and share information about food with a broad audience,” says Conde-Petit. “They share everything: recipes, campaigns, advice, pictures, and views about the food they eat and where it comes from. Tips, recommendations, criticism, and boycotts are all part of today’s digital communication landscape. For the food industry this presents both opportunities and challenges that need to be met head on, because in a 24/7 connected world, food safety scares attract attention fast and spread rapidly across social media.”
“Digitalization will transform every link in the value chain.”

Beatrice Conde-Petit, Bühler Food Safety Officer
Nut processors have had to implement preventative measures to protect consumers from harmful bacteria, says Beatrice Conde-Pettit.
Take, for example, the recent food fraud scandal that began in the Netherlands, where eggs were found to be contaminated with fipronil, an insecticide which had been applied illegally in chicken farms. Millions of eggs and products containing eggs were removed from supermarket shelves across Europe and Asia. The news of the massive recall quickly went viral as social media posts heavily contributed to magnifying the scare.

**Transparency is the new value driver**

It’s easy to understand why. Health and safety, which have always been important, are now decisive factors for food and beverage purchases. A 2016 study by Deloitte, the Food Marketing Institute, and the Grocery Manufacturers Association in the United States showed that traditional value drivers such as price, taste, and convenience are no longer the sole deciding factors.

Transparency has become the new overarching value driver for food, along with health, wellness, safety, social impact, and experience. This is particularly important for food producers because it’s these consumers with preference for these evolving value drivers that make the highest use of social media and digital channels. This trend, surprisingly, isn’t driven by the interests of millennials, it spans generations and regions.

“Food safety is clearly top of mind with consumers and therefore has become a real game changer for the food industry,” says Conde-Petit. “Preventing contamination, minimizing costly and brand-damaging product recalls, and strengthening consumers’ trust and loyalty are key to strengthening brand value. Implementing stringent practices to manage food safety risk while also engaging in constructive dialogue with consumers is part and parcel in today’s digital economy.”

Keeping on top of food safety news is increasingly difficult given the vast flow of information across diverse channels – yet it is critically important. Today, food experts wade through databases, websites, blogs, social media platforms, newsstreams, and scientific literature to conduct time-consuming comprehensive hazard analyses and risk assessments.

“Without harnessing the potential of digitalization and smart analytics, it just isn’t possible to know everything that goes on in your markets,” explains Conde-Petit. “Food fraud occurrences and food safety incidents – if identified early – can be addressed and managed. This reduces potential human suffering, protects jobs, and saves brands.”

**Alerts can prevent food safety incidents**

To help food industry players stay ahead, Bühler has developed a food safety intelligence service that bundles the overwhelming amount of information in the digital space into a comprehensive dashboard displaying food safety hazards for different foods (see article page 26). This digital tool enables food safety professionals to get an early warning about hazards at an early stage of food safety incidences. The tool doesn’t rely on official alerts alone, it includes social media channels. The inclusion of this data in the analysis shows the impact that current food issues have on public opinion.

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**“Without harnessing the potential of digitalization and smart analytics, it just isn’t possible to know everything that goes on in your markets.”**

Beatrice Conde-Petit, Bühler Food Safety Officer

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With the right roasting process and and continuous monitoring, bacteria on nuts can be inactivated.
“We created this analytics tool to support food manufacturers in carrying out risk analysis and also assess the vulnerability of their business – a task that has become more demanding given the high pace at which new food safety issues are identified,” explains Matthias Graeber, Bühler’s data analytics manager. “The information is tailored to individual needs and is instantly updated.”

Get the same information as legislators
A search for the food category nuts and seeds in Bühler’s food safety intelligence tool, for example, shows that the most common hazard is undeclared allergens, followed by pathogenic microorganisms, mycotoxins, adulteration or fraud, and foreign bodies. The presence of pathogenic microorganisms such as salmonella, listeria or E. coli on plant-based foods is increasingly recognized as a risk not only for fresh fruit and vegetables, but also for dry foods including nuts, seeds, spices, and cereal grains. These bacteria pose a high risk for consumers. Contamination of nuts have led to well documented outbreaks of foodborne illness and high profile food recalls and has driven companies out of business.

Luckily, new digital technologies play a key role in detection and prevention, too. Public health authorities are today able to pinpoint sources of bacterial contamination through big data analysis of foodborne illnesses in combination with DNA profiling of bacteria found in food. This was key to revealing the source of one of the most significant outbreaks of foodborne illness in the United States in recent times.

In 2008/2009, peanuts tainted with salmonella killed nine people and made hundreds more sick. Over 3,000 products were recalled by 200 companies and the industry lost USD 1 billion. It was the tipping point for the biggest change in the legislative landscape. The US Food Modernization Act (FSMA) signed in 2011, changed the food safety system from one that not only reacts but prevents such crises.

“The US Food and Drug Administration, the US Centers for Disease Control and Prevention, and their European counterparts are all already analyzing big data,” says Conde-Petit. “The food safety intelligence tool also analyzes the big data food manufacturers need to stay ahead of the game.”

IoT solutions will improve food safety
Nut processing is just one of the industry segments that has had to implement preventive measures to protect consumers from harmful bacteria. Although thermal processing is the most common method for killing bacteria, it cannot be taken for granted that nut roasting will always deliver sufficient salmonella inactivation.

Scientific studies have shown that salmonella are relatively heat-resistant and that dry heat, such as roasting, leads to slow inactivation which needs to be compensated by high temperatures or long exposure times. With this in mind, nut processors need to carefully design the roasting process and ensure continuous monitoring of the critical processing conditions to prove that the process does indeed deliver sufficient bacterial inactivation. To assist them, Bühler has developed an IoT-based monitoring service that provides real-time insight and an overview of conditions including temperature map-

“We have to be able to register and document what’s going on in a plant every minute, every hour, every day.”

Andy Sharpe, CEO of Bühler Aeroglide
ping across the full roasting process. According to Andy Sharpe, CEO of Bühler Aeroglide, it’s not just nut processors, but all thermal processing lines too that will have to be monitored more closely.

“We have to be able to register and document what’s going on in a plant every minute, every hour, every day, to ensure the machine is performing exactly according to a validated process,” he says. Bühler Aeroglide’s solution is a service package that includes process monitoring, data management, analysis and the possibility to intervene when the system shows an alert. It is currently being implemented at the first customer’s plant.

Bühler is developing a similar IoT-based service for the feed industry, which is likewise under increasing pressure to prove that harmful bacteria such as salmonella have been inactivated to prevent livestock diseases. “Process monitoring in the steam conditioning step of feed pelleting is key for precision processing. It is critical to adjust the process to kill sufficient bacteria and, on the other side, avoid over-processing to protect sensitive nutrients,” says Edyta Margas, Food Safety Specialist.

Traceability has become even more essential in the effort to ensure food safety. Take, for example, the management of food allergens. In most countries it is a legal requirement to declare common allergens on food labels. In fact, the detection of undeclared allergens in a product is one of the main reasons for food recalls. “Assuring compliance in the declaration of allergens requires a number of preventive measures from accurate dosing to efficient cleaning,” says Conde-Petit. “The prerequisite is ensuring traceability of all ingredients, recipes, and production batches.” In the past, this meant piles of paperwork. Today, thanks to advances in digital technology, it can be managed by automated solutions that guarantee traceability and minimize mistakes throughout the whole production line (see article page 34). Unfortunately, today’s increasingly complex, fragmented, and global food supply chains have led to a steep increase in food fraud – the intentional adulteration or mislabeling of food for economic gain.

**Protect and monitor from harvest to market**

One of the most high-profile food fraud cases happened in China in 2008 when melamine tainted milk powder caused death and illness of babies. In 2013 the horse meat scandal, where horse meat had been used in convenience products declared as beef hit the European market. “Today, more than ever, the integrity of the food system is threatened, putting at risk consumers and food businesses,” says Conde-Petit. “Eggs contaminated with insecticide, mislabeled fish, adulterated spices, fake honey, and the deliberate introduction of mycotoxin contaminated grain to animal feed are just a few examples of rising food fraud incidences.”

The answer to illegal practices in the food sector is enhanced transparency across the entire value chain. It’s here where the emerging digital solutions will create the biggest impact. New real-time track-and-trace sensors and blockchain technologies for tamper-proof data sharing will enable food companies to monitor and protect the complete harvest-to-market process.

And, food analysis to assess food contamination is moving out of the lab. Now, handheld spectroscopy devices in the hands of consumers are already a reality. At industrial scale, advanced optical sorting of food crops with Sortex InGaAs cameras allows the detection and removal of a wide range of foreign materials. The inspection of every single grain in combination with big data analysis by AnywarePro for real-time display of sorting performance and documentation of statistics has become a powerful high-resolution tool for building transparency in the cereal grain value chain (see article page 16).

In future, this will enable all actors in the food system including end consumers to access every detail about food preprocessing, which is crucial to reestablish trust in the food safety hazards are a reality, but with the right methods, food manufacturers can concentrate on preventing food safety incidences and on reaching consumers, rather than just taking a reactive position,” says Conde-Petit. The digital technologies of today represent a major opportunity for food producers to improve efficiency, prevent such scandals, and meet the growing demands that consumers have for information and transparency.
From intake to outload – 24/7 traceability with WinCos

Every component that enters your production process – whether raw material, water, or additive – is automatically tracked in the WinCos plant control system. The user can visualize the flow of raw materials and end products both backwards and forwards.

Video: Bühler Traceability by WinCos

Every component that enters your production process – whether raw material, water, or additive – is automatically tracked in the WinCos plant control system. The user can visualize the flow of raw materials and end products both backwards and forwards.
With heightened feed and food safety regulations and the rise of the empowered consumer wanting full transparency about what they buy, feed and food processors must collect high quality track-and-trace data along the entire supply chain. That “quality” data is in reach thanks to automation and Bühler’s Traceability by WinCos plant control system.
In the last decades, after a few notable public health scares, tracing feed and food through the production and distribution chain has been a requirement of legislators around the globe. The European Union has had strict regulations in place for several years, and the guidelines in the United States have also tightened with the recently published Food Safety Modernization Act (FSMA) rules. Regulators are demanding traceability to protect public health and prevent contaminated materials from entering the food chain. In fact, the point of automated traceability is that enough fail-safes are in place to avoid recall situations. However, should a contaminated product actually make it to the animal or the consumer, automated traceability enables quick and effective corrective action in order to withdraw the affected products from the market.

Automated traceability systems enable food manufacturers to objectively measure the effectiveness of their operations by accurately tracing any raw material, product unit or batch that is incorporated into a food chain through every stage of its production, processing, and distribution. This is essential for businesses considering these ever-globalized, regulated markets where success depends not only on safety, but also quality and transparency along the whole supply chain.

Its benefits extend beyond food safety compliance. Implementing automated traceability is one means to meeting increasingly stringent safety regulations while acquiring measurable data that can also potentially increase long-term profitability. “Automated traceability is a differentiator for plant owners and a chance to improve performance,” explains Felipe Garcia Winterling, Bühler Automation Retrofit Program Manager. “Along with food safety management, automated traceability strengthens a business’ ability to monitor performance and make informed, cost-saving, and quality-enhancing decisions based on the collected data.”

**Automating creates a competitive advantage**

By implementing automation systems, customers also reduce administrative overhead needed to ensure traceability and monitoring from intake to outload by as much as 80 percent. “We find that some customers are reluctant to invest in an automated system, believing the initial investment is high,” explains Christian Kraemer, Bühler Automation Platform Product Manager. “However, in the longterm, the cost of relying on manual systems is much higher, especially as industry transforms and further embraces digitalization.”

Implementing an intelligent automation system will not only help manufacturers to stay flexible in the future, but also to react to rapid market developments, and ensure seamless production, he explains. And, businesses can use it strategically to address the growing concerns consumers have about product integrity.

Bühler’s track-and-trace solution is incorporated into its comprehensive WinCos plant control system. It ensures complete product traceability, registers all production weights, analyzes each integrated process line, and provides graphics so that the user can visualize the flow of raw materials and end products backwards and forwards – no matter how long or short the production chain. Traceability by WinCos has been applied successfully in grain milling and grain logistics, in chocolate pro-
FOCUS / Traceability

Regulations in most countries state that in the event of a recall every supply chain participant must be able to "rapidly provide" information to competent authorities about where their products have come from and where they have been delivered. Manual systems are vulnerable to another factor as well – the human factor. "Human error is a potential stumbling block at every stage of the supply chain, therefore, relying solely on workers to respond to an audit in minutes will help manufacturers minimize impacts when food safety incidents occur. Implementing the system also contributes to better food safety, reduction of costs compared with manual input."

Automated vs. manual data collection
Currently, though the obligation of tracing is regulated, the system a company uses to be compliant, is not. This means that all of the players across the feed and food supply chain have at least rudimentary, traceability systems in place. Some even rely on purchasing and sales systems, and many have a labor-intensive system that is recorded manually. While manual systems that are founded on good document management practices may well meet regulatory requirements, they also have important limitations. Manual documentation is vulnerable, data can be incorrectly noted, and most of the information retrieval is time consuming compared with automated systems.

"Imagine facing a food safety incident scenario and finding out that your employees have made a mistake in the manual data entry or system entry. As a result, contaminated batches may not be properly identified and disposed," explains Kraemer. "A manual system significantly limits the speed that manufacturers can respond to and mitigate the negative impact of a food safety incident. In today's information economy, slow response times can lead to substantial consequences for a business." Data collected by automated systems, such as Bühler's Traceability by WinCos, is available in real time, from anywhere, and at all times. This is vital as regulations in most countries state that in the event of a recall every supply chain participant must be able to "rapidly provide" information to competent authorities about where their products have come from and where they have been delivered. Manual systems are vulnerable to another factor as well – the human factor. "Human error is a potential stumbling block at every stage of the supply chain, therefore, relying solely on workers to compile data, no matter how qualified they might be, is risky and costly," explains Felipe Garcia Winterling. "Our automated traceability system will help manufacturers minimize impacts when food safety incidents occur. Implementing the system also contributes to better food safety, improved plant efficiency, and the significant reduction of costs compared with manual input."

Traceability and transparency inspire trust
It’s not only regulators who are interested in tracing a product from the fork back to the field or farm, it’s also discerning consumers. They want to know where the ingredients in the food they purchase are coming from, and how they were grown and produced. "Many food producers that have implemented digital traceability systems already use them as a competitive advantage, promoting their compliance and transparency to customers and consumers," says Kraemer. This trend will continue as technology advances, and the individual shopper will someday be able to track the entire supply chain behind the foods they purchase using their smart phones. Traceability is here, so why not make it part of your competitive advantage?

Would you like more information?

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ADDED VALUE
+ Differentiation from competitors
+ Reduce administrative overhead by over 80 percent
+ Benefit from full data transparency
+ React quickly and take specific action
Discover how digitalization can work for you.

Our new automation microsite is live!
You can find smart solutions for the grains and food industries on this state-of-the-art platform. From consulting, to engineering, manufacturing, commissioning, training, and support – we offer full service support. Discover how we use digitalization to create innovations for a better world.

Check it out!
automation.buhlergroup.com

Innovations for a better world.
Haas acquisition – birds of a feather flock together

The Haas Group will become part of the Bühler family in 2018. Like Bühler, Haas has been a family-owned business for over 100 years and is committed to sustainability. Together, both quality providers intend to create added value for their customers. Haas is the unchallenged world leader in manufacturing of production facilities for wafers, biscuits, and confectionery. As Bühler has not yet been operating in these areas, its customers in the food industry will be given the opportunity of diversification due to the acquisition. Haas benefits from access to the resources of the worldwide Bühler Group, about 100 service stations and its innovation network. In this way complete solutions for the production of wafers, biscuits, and confectionery can be developed for Haas customers.

Universal Motor – one solution for all

The growing need for greater energy efficiency and the associated legislation is bringing about an increasing variety of three-phase motors in the market. Consequently, complexity is also increasing along the supply chain – all parties involved are affected from design to delivery. With its Universal Motor Bühler is addressing this growing challenge. As the motor meets IEC standards and delivery is possible with all widespread certificates and energy efficiency labels, Bühler is able to reduce its current range from 100,000 to 6,000 three-phase motors, thereby covering more than 80 percent of Bühler’s worldwide requirements. The Universal Motor will be rolled out across the world at the start of 2018 and will go into mass production in April 2018.

The Bakery Innovation Center (BIC) – extended and modernized

In summer 2017, Bühler opened its Bakery Innovation Center (BIC) which is part of the CUBIC project. In the BIC, Bühler presents its accumulated knowledge along the entire value chain for the baking industry. In a space of over 1,000 square meters, the innovation center is now incorporating new Bühler solutions for the baking industry, from provision of raw materials to pre-dough production. The BIC enables customers, together with Bühler experts, to develop new products or to use the modern infrastructure for further practical training. To celebrate the opening of the BIC Bühler organized the first German-speaking specialist bakery conference on July 5 and 6 with approximately 80 well-known representatives from the sector.
On September 27, 2017, Bühler opened its new factory in Changzhou, China. It will serve as a production, research, and development center for Bühler’s global feed machinery and plants. The first phase of the newly completed production and R&D factory was built on a 35.8-hectare site.

The factory is expected to achieve a considerable annual production capacity, making it one of Bühler’s top three global production centers. It will specialize in processing equipment and complete plants for animal feed, aquatic feed, and pet food. With it, we provide our customers with complete, convenient, and efficient solutions. An official opening ceremony with customers will be held on April 26 and 27, 2018.


**Appearance at the HackZurich**

As the pioneer in digital transformation, participation in the biggest hackathon in Europe was a natural step for Bühler. The event, which took place in Zurich in September 2017, is regarded as one of the most prestigious events in the programming scene and already attracted the top talent in the sector in Switzerland for the fourth time. Of the participants numbering over 500, 10 teams each consisting of three or four took on the Bühler challenge in which the focus was on food safety. On the basis of sensor technology, the IT experts worked day and night – 40 hours in total – programming software solutions to identify and record foreign bodies in contaminated grain samples. In accordance with the motto “smart solutions for safer food”, some of the best hackers in the world impressed us with their ad hoc solutions and confirmed our conviction that we can only continue our success in all areas of business with digitalized, intelligent complete solutions.
Feeding a growing economy
It’s one of Bühler’s largest customer projects to date – a gigantic production facility for rice and lentils developed in just three years on a plot of wasteland near Dhaka, Bangladesh. For the food producer City Group, it’s an investment not only in their own business, but in the future of this fast-growing economy.

TEXT: CARMEN PÜNTERER / PHOTOS: EHRIN MACKSEY AND CARMEN PÜNTERER
Local workers heave sacks of rice and lentils onto the waiting trucks at record speed, since up to 50 metric tons of finished product an hour leave City Group’s production sites at peak times. “When I first came here three years ago, there was only wasteland,” says Saniat Islam, Senior Engineer of Bühler Dhaka, as he watches the loading process at the site 25 kilometers outside Bangladesh’s capital Dhaka.

He and two other Bühler engineers will remain at the production plant for a further year after the facility has been handed over to the customer. “We actually have two delivery dates: the first, when production starts and the plant is handed over to the customer, and the second one year later, when we are sure that daily business is running smoothly and all employees are trained.”

A project of huge proportions
It was a desire to further diversify the business that led City Group founder and Chairman Fazlur Rahman to contact Bühler in 2014. On his large plot on the bank of the Shitalakshya River, he not only wanted to build a new transshipment center for grain, but at the same time, to expand the existing Shampa Mill by four more combi-mills and begin processing dal (red lentils) and rice.

A huge silo plant for safe storage and corresponding conveyor systems, including pre-cleaning and drying plants for paddy, would complement the entire plant ensuring that every step of production could be carried out efficiently and with the greatest possible throughput. In other words, Rahman dreamed of implementing a project of gigantic proportions to support.

“Bangladesh is growing, and it’s growing fast,” says Shampa Rahman,
Market traders in Bangladesh are selling more local staple foods as production increases.

City Group, Bangladesh

City Group, one of the largest business conglomerates in Bangladesh, has been active in food production since the 1970s. Founder Fazlur Rahman’s first project was a mustard mill. With that achieved, he began to diversify.

Other lines of business such as packaging, energy, and steel were added. The collaboration with Bühler started in 1997 with the construction of the first flour mill. Soon, Rahman expanded his business with another mill, two pelletizing plants for poultry food and a production facility for fish feed.

Bühler also delivered machines for crushing soybeans which were used in a soy oil extraction plant from Andreotti. Today, City Group consists of 26 companies with a total of over 10,000 employees.

Director of City Group and daughter of the company’s founder. “We want to help set the country’s economy on a healthy footing. The government has set itself the ambitious goal of making Bangladesh a middle-income country by 2020. To achieve this, the private sector must invest in production – we need more rice, flour, and cooking oil.”

Bühler has taken up this challenge. On October 23, 2014, the two companies signed the contract and construction work began immediately on the first silo block. “The goal was to enable the customer to make money with the facility as quickly as possible. Receiving and bagging wheat was our main priority, as well as the four new lines for atta flour,” explains Rolf Gmünder, Project Director at Bühler.

City Group pushed forward and the buildings sprouted out of the ground within the first few months. “Fazlur Rahman works almost exclusively with his own team of project managers, even during construction, so it was partly a challenge for us to keep up with the pace,” says Gmünder.

Rice delicacy puts Bühler to the test

Fazlur Rahman not only pulled out all the stops to get things done quickly and move construction work along as fast as possible, but before completing the construction phase, he gave Bühler another assignment: installation of a soybean warm dehulling plant with a throughput of 5,000 metric tons per day near to the existing construction site.

In the rice mill, Bühler was also given the task of converting one of the production lines City Group had ordered for processing Chinigura rice – a particularly aromatic and snow-white variety that is very popular and considered a delicacy in Bangladesh.

In retail, it is almost twice as expensive as conventional rice. This presented Bühler with an unexpected challenge. “Processing Chinigura is very different from conventional rice processing,” explains Sunil Ranade, Bühler’s Head of Rice Processing for South Asia. “We had never built such a plant before, so we could not just implement a process from our repertoire.”

To achieve the right color and flavor, Chinigura is treated with very high heat,
Facts and figures for the City Group project

It all began for Bühler and City Group on October 23, 2014. Construction of the entire plant took place over a period of three years. From May 2016 to August 2017, the customer put the production lines into operation.

54 Bühler supervisors, specialists and technologists were involved on the construction site, who together worked a total of 45,000 hours for assembly and commissioning of the silo systems as well as the rice and dal production plant.

A logistical masterpiece
All the while, machine components for the systems that had been ordered were leaving the various Bühler factories in Europe, container by container. Altogether, 713 containers with a total of 8,200 tonnes of cost weight were shipped to Bangladesh.

Bühler supplied 193 chain conveyors and 164 elevators for the conveying elements alone. In the Port of Chittagong, in the south of Bangladesh, the customer unloaded the containers and loaded the boxes onto trucks for transport to Dhaka.

“After the arrival of the material, it was necessary to sort the huge amount of boxes with plant components inside. We had to have the right box at the right place at the right time,” says Project Manager Gmünder. A logistical challenge. “In order to prevent possible chaos on site, we gradually sent the containers to Bangladesh.”

In addition to on-time deliveries, customer support was a top priority for Bühler during the construction period. Marcel Züst, Senior Advisor at Bühler for South Asia, traveled to Dhaka on average once every two months during the last two years. “At the beginning of the summer, we opened a new Bühler service station in Dhaka, which is a great help,” says Züst. “In the future, a highly competent team will be on hand to help with technical problems or revisions.”

Long-term partnership
City Group's successful partnership with Bühler in previous projects is the reason why their family turned to Bühler for the order, says Shampa Rahman. “I have known the people at Bühler since my childhood, some of them are for me like family members.” She and her father especially appreciated the high quality of work that Bühler achieves: “And when problems arise, we can turn to Bühler to solve them – and they always traditionally, in a horizontal mill. However, this can result in a large number of the rice grains being broken. “In order to obtain a product as white as possible and with as little breakage as possible, numerous tests were necessary and the customer was not fully satisfied with the final product for a long time,” explains Ranade.
solve them! For us, Bühler is not just a supplier but a partner.”

What about the Chinigura, our biggest challenge? After hundreds of hours of testing and optimizing production, on September 19, 2017, Bühler engineers succeeded in producing the rice with the right quality, aroma, and color.

“The exact analysis of the process carried out by our experts and their innovative approaches have significantly contributed to meeting the requirements,” says Saniat Islam, Bühler Senior Engineer. The Chinigura line will be handed over to the customer in the coming weeks.

And when Islam climbs onto the roof of the rice mill to take in the whole production facility, he sometimes cannot believe his eyes: “When I look at this and see what we have achieved together with the customer, I feel great.”
Josef Söllner, Managing Director of STF, and Bernhard Gabauer, Bühler Segment Development Manager Plastic, examine the performance of the sorter.
Billions of plastic drinks bottles are bought by consumers globally each year, yet only a fraction of these is recycled. Too often they end in landfill or waterways, contributing to a rising environmental problem. Bühler’s revolutionary Sortex PolyVision sorting technology, is helping recycling firms address this challenge.
Plastic first came into our lives around a century ago. Now it is hard to go through a day without it. A highly versatile material, cheap and easy to make, it is used in everything from toys and clothing to automobile parts, medical equipment, food and drink packaging.

Its success is clear from the figures: Since 1964, global plastic production has increased 20-fold, to some 311 million tons in 2014 – and it shows no sign of slowing. For many, plastic has become synonymous with our throw-away society and its waste is now one of the world’s biggest environmental challenges.

The problem is that much of the plastic that touches our everyday lives is disposable. Plastic bags, food wrappers, and bottles are an integral part of convenience culture – a culture that has spread around the world as more people move to cities. The rise in sales of bottled water and other soft drinks is evidence of this. According to a recent Euromonitor International report, 480 billion plastic bottles were sold globally in 2016, up from about 300 billion 10 years ago. This will rise to 583 billion by 2021, according to the report. Most of these bottles are made from polyethylene terephthalate (PET), which is highly recyclable.

**Everyone’s pet**

The PET bottle is much loved by consumers and producers alike: transparent, light-weight, strong, and impermeable – it is also highly recyclable. Recycled PET, or rPET, can be used to manufacture a wide range of products, including food and drink packaging. But as our consumption of plastic rises, recycling efforts are struggling to keep up. On average just 14 percent of PET bottles are recycled worldwide, according to the Ellen MacArthur Foundation. Much of the rest ends up with our other plastic waste in landfill or the oceans, where it takes over 50 years to degrade into smaller particles (microplastics). Most types never fully mineralize. The oceans could contain more plastic waste than fish by 2050 if current trends continue, the Ellen MacArthur Foundation claims.

**A second life**

Yet most plastics are recoverable and can have a second life. Finding effective ways to reprocess more post-consumer plastic has become an urgent challenge. With legislation being introduced in many countries aimed at diverting waste from landfill, demand for improved recycling processes is on the rise.

Consumers are increasingly interested in more sustainable packaging and producers are keen to recoup this valuable material. Several major drinks brands have set targets to increase use of recycled plastics. Yet, in order to do this, there needs to be far more high-quality, food-grade plastic available in the recycling stream.

One major challenge is that food-grade recycled PET requires highest purity, whereas the post-consumer plastic waste that arrives at recycling plants is a mix of many types of material including metal, glass, wood, paper, and silicone. From bottle lids to labels, before processing can begin, the waste has to be sorted and all contaminants removed. A further challenge is sorting out all the different types of plastic packaging from each other – for example removing PVC (polyvinyl chloride), PE (polyethylene), PP (polypropylene), PA (polyamide) and PS (polystyrene), from PET [see graphic on opposite page].

Bühler flake sorting technology enables customers to recycle more plastic at higher grades. Its two-machine solution – the Sortex E PolyVision and Sortex A ColorVision – deliver bottle-grade recycled PET flakes at the highest yield in the market. By partnering with US-based National Recovery Technologies (NRT), the two companies...
Reducing plastic waste with PET recycling

Today, not enough plastic is recycled ... 86% of PET bottles end up as waste that fills the world’s oceans and litters the landscape. Just 14% are recycled worldwide.

... but, Bühler technology can help. Recyclers can generate food-grade PET out of old bottles. Our flake sorting technology enables customers to recycle more plastic at higher grades.

PET & Co.: types of plastic packaging

PET
Water and soft drinks bottles, salad domes**

PE
Detergent bottles, ice cream containers**

PVC
Cosmetic containers, cling film**

PS
Disposable cups, EPS for hot drinks and food**

PP
Potato chip bags, microwave dishes**

PA
Flexible film for barrier properties**

* Keep in mind that this is an oversimplification. ** Examples of plastics. *** The process of mineralization refers to the full conversion of all breakdown products into carbon dioxide, water, and small inorganic molecules (Andrady, 2003). Sources: Ellen MacArthur Foundation, Bühler Sortex, NOAA Marine Debris Program (www.marinedebris.noaa.gov/info/plastic.html).
are able to offer the best of both bottle and flake sorting technologies.

**Clever sorting**

Historically, removing same-color polymer material from rPET flakes, such as clear PVC from clear PET, has been difficult as they look so similar. In high-speed processing, too many of the valuable rPET flakes can be lost. Conventional sorting solutions typically rely on either transmissive or reflective sorting. Sortex E PolyVision uses both methods simultaneously. The technology enables recyclers to sort by color and by the chemical signature of the plastic, improving the accuracy and speed with which different plastic polymers can be identified and removed and reducing contamination to below industry standards of 50 parts per million.

STF Recycling GmbH, one of the largest recyclers in Europe, has tried and tested the Sortex system and given the machines its seal of approval. STF turns around 70,000 metric tons of returnable PET bottles a year into granules for bottle-to-bottle recycling. With 25 years experience in the recycling business, the company knows what is needed to meet the industry’s challenges. Bühler’s machines enabled STF to achieve higher value recyclate by accurately separating rPET from the rest of the material. “Bühler offers the best flake sorters on the market,” explains Josef Söllner, managing director at STF.

One of the biggest challenges STF faces is the constantly changing composition of the materials to be sorted and recycled. At the same time, it has to work to ever tighter specifications for the output. Not only do they find more metals from drinks cans in the mix, but also bottles with multi layers, sleeves and labels made of other plastics.

Sortex A ColorVision works on a transmissive and reflective basis to remove colored, wood, metal, translucent, and opaque objects – anything that can be detected by the human eye. Thanks to its use of three visible wavelengths, its color detection is excellent and means it can deliver superior color sorting. Sortex E PolyVision then removes anything that can’t be detected by the human eye such as clear PVC, PE and PP objects from the flow of clear PET. It also reduces multilayer materials. This polymer sorting process is unique and revol-
The experts at STF Recycling GmbH work with Bühler technology to ensure recycled PET is food grade.

Thanks to the flake sorters, different plastic polymers and other contaminants are removed.

Josef Söllner believes Bühler offers the best flake sorters on the market.
Conventional sorting solutions typically rely on either transmissive or reflective sorting. Bühler solutions use both methods simultaneously.

Meeting highest standards
The Sortex sorters are part of an integrated sorting station concept for plastics processors. Designed by Bühler’s engineers, and built on 70 years of experience in optical sorting, the sorting station purifies and color grades plastic flakes. The machines are linked to convey the product between stages. Flakes are fed into one end of the station and collected at the other end, ready for bagging or further processing. If required, they can be re-introduced into the system for resorting.

Viridor Polymer Recycling in the UK recycles 3,000 tonnes of plastic bottles each month, producing highest quality plastic pellets and flakes ready for use in remanufacture. By investing in Bühler’s flake sorting technology it has increased its yield of high-density polyethylene (or HDPE), which is used mainly for milk bottles in the UK.

Consistently meeting the exacting standards of global food industry customers like PepsiCo and Nestlé requires technology that can be relied on whatever the circumstances. Differences in local recycling practices from country to country mean that contamination from non-plastic materials can vary from as little as 5 percent to as much as 30 percent of the material brought to the recycling center. When California recycling firm CarbonLITE invested in a new plant to recycle post-consumer PET into rPET pellets, they knew they had to meet high-end specifications. Their rPET pellets are used to manufacture new wplastic drinks bottles for their food industry customers. That is why they turned to Bühler’s sorting technology.

“Sustainability is increasingly vital in the food industry,” says Bernhard Gabauer, Segment Development Manager for Plastics at Bühler. “Our new flake sorting technology enables our customers to recycle more plastic, more efficiently and to a higher grade.”

Helping the recycling industry meet increasing demand also fits well with Bühler’s environmental goal to reduce energy, water, and resources in all core processes by 30 percent by 2020. With resource scarcity, more countries will be looking to recycling to provide a solution and minimize waste. Turning post-consumer PET bottles into new PET bottles supports the plastic packaging industry’s commitment to preserve virgin resources, reduces the number of PET bottles that end up in landfill, and harnesses the energy already expended in making the original PET bottles.

As plastic recyclers look to adopt even more advanced, cost-effective and energy-efficient processes, Bühler is helping them achieve their goals.
A new life for PET bottles.

Recycle at higher grades.

The Bühler and NRT complete optical sorting solution removes unwanted colors, polymers, and foreign materials from bottle to flake. Look to the first choice supplier for your purest and cleanest PET and high-density polyethylene (HDPE) recyclate yet.

Interested? Let’s chat.
sortexenquiries@buhlergroup.com
A fulfilling role for rejected bread

A third of all food is lost between the field and the table – a sad truth, but that doesn’t have to be end of the story. Technology can contribute to the reduction of food waste. Bühler rework technology for the reuse of dry unused bread is one example.

TEXT: DR. MARKUS SCHIRMER AND SUSANNE STEGHOEFER

A nywhere from 3 to 10 percent of the bread produced in bakeries is rejected immediately after production and not sold. In the case of an average line production of 3-4 metric tons per hour, this can mean up to 8 metric tons of unused bread a day. This unused bread consists of discarded sliced bread, errors in production, and overproduction, for example.

But unused bread can have a second life and serve as a cost saving solution in industrial bread production. It can be put back into the process, becoming a valuable ingredient rather than adding to food waste. In Germany, for example, regulations state that unused bread may be reused as up to 6 percent of the ingredients in products primarily made of wheat, and up to 20 percent in products primarily made of rye, both percentages being calculated on the basis of the fresh bread. Tests in the Bühler Bakery Innovation Center have shown that adding reworked bread to a recipe not only has a positive effect on the end product, it also increases dough yields.

Efficient use of unused bread

Bühler offers a unique rework technology for the reuse of dry unused bread. The freshly produced rejected bread is shredded, dried, and ground into fine particles. The resulting dry rework can be stored separately, then added to the recipe with the other dry components. This process allows unused bread to be converted directly into a storable raw material with low hygienic risk. In the product, dry rework enhances water binding and permits an increase in the quantity of bulk water. The Bühler process can be used more flexibly, bears less risk of contamination, and permits more efficient use of unused bread.

Dry rework process explained

Before being returned to the process, the unused bread is often pulped with water. The resulting slurry, however, is at significant risk of contamination and cannot be stored for long. As a result, the direct use of dried unused bread, also called “dry rework,” is an alternative.

However, until now there have been no investigations of the effects of this alternative on product quality. As a result, baking experiments were carried out at Bühler’s Bakery Innovation Center to examine the difference between slurry and dry rework as well as the effect of different dry rework ratios on wheat breads. The quantity of rework added was deducted from the quantity of flour, so the total solid portion remained constant. Water added to the slurry was deducted from the bulk water quantity. The investigation examined baking loss, specific bread volume, maximum hardness, and sensory characteristics.

There was no difference between unused bread (10 percent relative to 100 percent flour) in slurry or dry form on the parameters investigated. Due to the
After the unused bread is macerated (left), it passes through the drying and grinding station. In the final stage it is stored.

very fine grinding of the dried rework, even without prior pulping, there was no detectable residue in the finished bread.

As the portion of dry rework rose (5 percent, 10 percent, and 15 percent, each relative to 100 percent flour), the specific bread volume dropped significantly and maximum hardness rose significantly. The reason for this is that the share of functional gluten was reduced and the rework particles – which are similar to pentosanes – could move into the spaces between gluten filaments. These effects reduced the formation of gluten structure and led to a more compact product.

Dough yields increase with rework
The compact effect is reinforced as the portion of rework increases. On the positive end, it turned out that at 5 percent dry rework (relative to 100 percent flour) after two hours storage, the baking loss was reduced by over 4 percent in comparison with the standard. This experiment shows that 5 percent rework (relative to 100 percent flour) is the upper limit for use in wheat breads, since at higher proportions the negative effects on product quality become perceptible. It was also determined that doughs with rework were significantly drier and firmer. As a result, the bulk water volume for 5 percent dry rework (relative to 100 percent flour) was increased in the final step.

It was demonstrated that the reduction in specific bread volume could be partly compensated and the increase in maximum hardness entirely compensated by increasing the water volume by 2 percent. The reduction in baking loss remained constant at about 5 percent. There is potential for a further increase in dough yield, so that at constant product quality the water content could be increased by up to 10 percent by the use of dry rework.

The Bühler Bakery Innovation Center experiment confirmed that adding dry rework and adapting possible without loss of quality. In fact, it simultaneously increases dough yield by at least 2 percent with potential of up to 10 percent. Additionally, overall baking loss was also reduced by about 5 percent.

ADDED VALUE

+ Increased dough yield
+ Resource efficient production
+ Storable rework without contamination risk
+ Less food waste

Would you like more information?

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Die-casting services from installation to IoT

You can benefit from Bühler services over the entire lifecycle of your equipment. From installation, to technical support and maintenance, to IoT solutions, to revisions and retrofits – we offer tailored services and support you can count on.

**TEXT:** DOMINIQUE SOMMER / **INFOGRAPHIC:** DANIEL RÖTTELE
Spare & ware parts
Enjoy short delivery times of spare and ware parts, along with increased availability thanks to our local distribution centers.

Maintenance
Regular maintenance by our professionals reduces unscheduled downtimes.

Revision & retrofits
Extend the lifespan of your system and update it to the latest technological standard with the support of our experts.

Internet of Things
You can benefit from virtual support and online monitoring for a quick response and predictive analysis of components.

Technical support
Our knowledge and expert support is available to you 24/7. This service will help you maximize the uptime of your system.
ChocoGenius

ChocoGenius is the online training system for chocolate production. Anytime and anywhere, it provides standardized, high-quality training for machine operators with DoMifeCo processes (dosing, mixing, refining, conching). It achieves this with systematic, video-based training units, sophisticated tasks, and support with troubleshooting. Another advantage: its integrated reporting function. In this way ChocoGenius covers any gaps in knowledge and weaknesses among its students so that they can address them immediately.

- Learning anytime, anywhere

Novablue sieve cleaner

Novablue, the sieve cleaner with the most innovative, bristle-free design, replaces the conventional brush cleaner for plan sifters. It cleans sieve fabrics for hard and soft wheat flour and durum products with the same performance as existing brush cleaners but with the advantage that loose elements in the end product are not possible. With its striking color and the material used, Novablue can be detected visually or with the aid of metal detectors in the end product. Its bristle-free comb form consisting of high-quality elastomeric plastic is temperature, fat, and enzyme resistant. Novablue is available for sieve fabrics with mesh sizes from 85 μm to 250 μm.

- Maximum food safety

Oil Cleaner

The oil cleaner decreases downtimes and unscheduled stoppages of pressure casting systems by 55 percent. Its key principle: clean hydraulic fluid. The oil cleaner filters corrosion residues and wear particles from the oil system and removes deposited impurities such as resin and sediment from the tank. With a filter fineness of 3μm the oil cleaner eliminates solid particles and soft contaminants continuously (24/7) in one process. Maintenance costs are reduced and productivity of the system increases.

- 55% less downtimes and unscheduled stoppages
- Reduced maintenance costs
Impact detacher
MJZI

MJZI, the new impact detacher, is an all-rounder. Dissolving flour plates without causing damage, micronizing flour or pulverizing sugar is no problem at all for its modular rotor-stator design. The differently shaped pins on the rotor and stator make it possible. MJZI has a larger diameter in the inlet and outlet than the predecessor MJZE/F. The pressure resistance in the machine is reduced and installation of a bypass pipe is unnecessary. This eliminates the risk of product sediment and guarantees maximum food safety. The new impact detacher also provides flexible mounting options. It can be installed in a standing or hanging position, on the downpipe or directly on the pneumatic cord.

- Flexible use
- Maximum food safety

Bran centrifuge
MKLD

The bran centrifuge MKLD combines high performance with improved efficiency. When compared to its predecessor it separates flour particles from bran with up to 30 percent less energy required. It also guarantees high product safety and optimum hygiene: With its stainless steel sieve frame it has no nail or screw connections in the product area. The side door opening simplifies the exchange of the sieve cover as well as maintenance. With its two sizes the new bran centrifuge MKLD covers a substantially larger range and thereby reduces the number of required bran centrifuges in a mill.

- Up to 30% reduced energy requirement
- Optimum hygiene

Sortex F
BioVision

Sortex F BioVision is a multitasker: The Bühler innovation identifies and eliminates color defects, shells, and foreign materials when sorting nuts and dried fruits in one go. Sortex F BioVision is the most hygienic optical sorter in the industry: its open design makes it easy to clean and reduces the risk of bacterial contamination.

- 256 new powerful ejectors with 25% more force for heavier product rejection

25% more force for heavier product rejection
Space to make innovations for a better world

Today’s challenges are too complex to solve alone. Bühler’s new innovation campus, the CUBIC, is a space where the smartest minds from across the industry and beyond will come together to create solutions for a better world.

TEXT: BURKHARD BÖNDEL / RENDERINGS AND PHOTOS: BÜHLER & ANDRÉ GUTZWILLER
How can we provide nutritious food to a growing global population? How do we minimize our use of nonrenewable resources? How can we reduce waste, improve efficiency, and ensure safety in an increasingly complex world?

These are challenges that face not just Bühler, but businesses across our industry and beyond. They are complex challenges that one company working alone cannot hope to solve. But by combining efforts, leveraging the power of digital technologies, and using the latest approaches to innovation, we can make progress toward solutions.

The new “Cool Urs Bühler Innovation Campus” – CUBIC – in Uzwil, Switzerland, is designed to provide the ideal setting for this kind of collaboration. Combining upgraded technology labs and a new innovation building, the CHF 50 million campus will be a place that fosters creative thinking and open innovation.

At Bühler our scientists, engineers, and techni-
cians have been developing world-leading ma-
chines and processes for over 150 years. Building on that experience, we are opening up our innovation processes to work more closely with our partners – from customers and suppliers to academics, apprentices, and start-ups – to create solutions for a better world.

The CUBIC will be a place that brings together the worlds of engineering and business, where multidisciplinary teams can work together on ideas. The diversity of approaches and backgrounds and is key to success, each bringing its own unique perspective to challenges and contrib-
uting to finding the best solution. Visionaries and long-term thinkers from the start-up scene and from universities will be able to work side by side with engineering teams that hold Bühler’s long-standing applied and tested know-how in processing technology.

“The CUBIC is a state-of-the-art workplace focused on collaborative innovation,” explains Ian Roberts, Chief Technology Officer at Bühler. “Collaboration across all functions, ages, and knowledge holders allows us to live and foster our innovation culture and test future work practices.”

Whether in large groups or small, the new campus will encourage gatherings where people can discuss and collaborate in an open atmosphere. From the new auditorium for up to 300 people to the smaller thinking spaces, each area is designed to foster creative exchange. The central coffee bar and tea lounge are not just spaces to relax and seek refreshment – with Bühler’s strong focus on the food processing industry, we hope they will also serve as a source of inspiration.
Breaking ground for the new CUBIC. From left to right: Elvis Pidic (Bühler Architect), Johannes Wick (CEO Grains & Food), Carlos Martinez (Architect), Stefan Scheiber (Group CEO), Ian Roberts (CTO), Samuel Schär (CEO Advanced Materials), Andreas Herzog (CFO), Burkhard Böndel (Head of Corporate Communications).
An entire floor of the new tower will be dedicated to co-working, with open and secured spaces for over 100 people. The newest recruits, Bühler’s apprentices, will have their own apprentice center with new training rooms. By providing a “maker space” where people can feel free to experiment in a hands-on way with new ideas, we are applying cutting-edge innovation techniques.

“Impression has always been at the heart of our strategy,” says Bühler’s CEO, Stefan Scheiber. “From smart roller mills that use the power of the Internet of Things, and new solutions for insect processing that will help close the world’s looming protein gap, to the innovative battery slurry that will contribute to the future of mobility – these and other innovations are not only key to our business success; they are also our contribution to meeting the world's challenges.”

As a leading technology group, Bühler invests up to 5 percent of turnover every year in Research & Development. The additional investment in the new campus will include upgrading existing technology and application labs, such as the Bakery Innovation Center. These will play a central role in the CUBIC.

In many ways, the journey toward the CUBIC began in 2016 with the introduction of Bühler Networking Days. “Bringing together the entire industry to discuss ideas and challenges at first seemed risky, as no one could predict what the outcome would be or if the approach would be welcomed by our partners,” says Scheiber. “But the result was amazing. By embracing open innovation and partnership we have created a collaborative platform to address today’s big challenges, together. The CUBIC is a natural continuation of this journey.”
Construction is underway! The innovation campus will consist of two key elements: the upgraded technology labs and the new innovation building. The new building will be a bridge between the engineering and business world in the existing towers and the upgraded application labs.
Elvis Pidic is responsible for the design and completion of the CUBIC. This expansion onto an existing building merges the Innovation Center and Application Center to form the CUBIC. Its purpose is to provide fertile ground for cooperation and innovation.

INTERVIEW: ANJA METZGER / PHOTOS: ANDRÉ GUTZWILLER

Elvis, what is the biggest challenge in building the CUBIC?

We wanted to reduce the impact on the everyday working routine of the employees as much as possible. As the construction site is right in the middle of Bühler, it makes the completion very difficult. We are talking about the level of noise pollution for employees, the logistics around the construction site, and the downtime around certain areas in the Application Center. This is a huge amount of pressure, so we had to streamline the construction time to fit in with this. In many areas, we also want to make a decision on what is “state-of-the-art” as late as possible. Which is why we designed the construction of the project to be as flexible as can be.

What was especially important in designing the new construction?

Giving the structure an identity despite its extreme flexibility. Innovation is an area that changes very quickly, so we had to make sure the interior could be adapted at short notice. We came up with a straightforward model where both main floors can be redesigned very easily.

Why put the new construction on the Application Center?

During the preparation stage, we examined two other variations. But through the many discussions, it became apparent that there was a need to connect the Innovation Center with the Application Center as well as customers and engineering and this location was the best choice. Any university can build a place for collaboration. But to have an Innovation Center connected with an Application Center where testing can be conducted directly in the machine pool – hardly anyone can do that. We decided to emphasize this symbiosis by putting the new construction in the Application Center.

What is so special about this project?

There is a high level of complexity. What makes it especially interesting is meeting the many campus challenges the process throws up. This ranges from the project teams and start-ups, which require ideal environments for their creative process, to trainees who print the small-part prototypes in the “maker space,” to the customer tests that take place in the Application Center every day.

The new Bühler Changzhou plant was an equally complex and exciting project. With the CUBIC though, I am always physically on site, so I can exercise far more influence on its design and implementation.

Which tasks do you see as part of this project?

Every job starts with a very creative phase, where I search for ideas, approaches to solutions, and references that have already been built. At the start of a project like this, I first come up with some design
ideas and bring discussion basics to the table so that we can discuss the client’s wishes and requirements. I get people together and see what they need. For the CUBIC, I work closely with CFO Andreas Herzog and CTO Ian Roberts. Once the design intent and project requirements have been fleshed out, I add internal or external architects and specialists to the project team, depending on size, complexity, and the available resources.

**What does the cooperation in such a project look like?**

The project embodies the exact collaborative thoughts that are associated with the CUBIC. For this project, we worked with office planner Carlos Martinez Architects on developing the design further at an early stage. Around a dozen other external planning teams are involved as specialists for this CUBIC project. These teams are also responsible for individual elements such as ventilation, lighting, the facade, or landscaping.

**How much flexibility has the client given you?**

We were given ideal conditions to work out an amazing concept. The willingness for something unique was there. Top management has a great understanding of the affect a construction project like this has on the external image. At the same time, however, there is also an awareness that it is not the building as such that leads to innovation, but rather the culture that predominates within and the cooperation that takes place there.

As architects, we can “only” create favorable conditions. Which is why we felt it was important not to give the interior spaces too strong a style –

“It is not the building that leads to innovation, but the culture.”
after all, it should be a place of work and not an exhibition, so we gave it the industrial touch. At the end of the day, the new construction is nothing more than a cube, a dice.

**Are there any stumbling blocks?**
Of course, we have an extremely tight timeline. The connections between the existing structure and the new construction are difficult to plan. We are working for a target group that doesn’t even exist yet. I have no idea what requirements the building will need to meet in five years’ time. This doesn’t make it any easier, but it does make it more interesting.

**Which elements in the building make your architect’s heart jump with joy?**
The wide staircase between the first and second main levels is a design element with an interesting story of how it came into existence. I had discussed this a few times with CTO Ian Roberts. But, we never really found the right spot for it. So, I thought okay, it doesn’t belong in this project then.

A few months later, we were looking for a solution to enlarging the auditorium and suddenly realized that the tiered seating makes a perfect way to increase the space in the auditorium; at the same time, it connects the main floor and gallery floor in a more intuitive way. We didn’t just design the stairs because they are cool, we did it to fulfill a purpose.

**So, the building is only a means to an end?**
Of course, that is always the case. The question is simply what the purpose is. Speaking in terms of construction, the CUBIC is not the easiest thing that you can do by far. Putting one building on top of another and with floating and prominent elements. But if the purpose is to make the building look representative and iconic, then our concept is the right answer from my point of view.
Thank you, Andreas, for agreeing to talk to us. Tell us, what drew Bühler to investing in insect processing?

Bühler has, for a long time, been thinking about how we feed an ever-growing population, in a way that brings health, is safe and sustainable. We rely mainly on conventional raw materials such as wheat or rice, where Bühler is today the market leader. But we believe that, in the future, insect products will take an increasingly large share of the market.

Bühler has been researching insects for several years, and set up a pilot plant, in China, to process an industrial scale was then set in motion, in concrete terms, in 2015, by a meeting between our CTO Ian Roberts and Kees Aarts, the entrepreneur and founder of leading insect processor Protix. A little over a year later, in early 2017, we established the joint venture Bühler Insect Technology Solutions.

That was fast! And just a few months later, in June 2017, you were able to present the first customer project. How is that going?

That’s right. We are currently building the world’s largest industrial insect-processing plant, for our partner Protix. The engineering teams in China, Switzerland, and the Netherlands are working on the facility at full pace. Our automation teams are creating a completely new control system based on Bühler’s state-of-the-art WinCos standard, which will serve as a basis for all other systems of this kind. Hence, future customers will benefit from these accomplishments realized for this first customer installation. We have signed supply contracts, and the first tranches have already been ordered. If we receive the approval of the local authorities in time, we expect a scheduled start of the plant in the first half of 2018.

Naturally, this first project is having a signal effect on the industry. Both the expert and the daily media are watching closely. We see it as a blueprint for further plants. We are currently in contact with more than 80 potential customers, and are focusing on four projects, which should be signed in the coming months.

Can you tell us some more about these other projects? What companies are already investing in insects?

These four promising projects are spread all over the world. The customers are either interested in protein flour and the fats and oils that we can produce from insects, or they are looking for ongoing use of a by-product. This may come from breweries or distilleries, as well as from fruit and vegetable producers. The by-products of these are ideal foods for insects. This makes sense both financially and ecologically. Insects are, after all, excellent recyclers. They can recover up to 70 percent of proteins from organic by-products.

Naturally, it is the traditional feedstuffs manufacturers that will be responsible for starting the insect business. This is because insect meal will be able to replace the less sustainable fish meal. In addition, trials have shown additional benefits such as faster growth and fewer diseases in some livestock species. This is where we see the greatest potential, at the moment. After all, 60 percent of
primary proteins now go to produce feedstuffs, and only 25 percent of them end up on our plates. It is therefore a question of volume, which is why we are currently concentrating mainly on the feed sector.

**Bühler is virtually starting an industry...**

This is how I see it. Of course, insects have always been on the agenda in certain parts of the world, and dozens of start-ups have been active in this area in recent years. However, the fact that we are now producing protein flour, lipids, and fertilizers, based on insects, and on an industrial scale, is something new. You can imagine, perhaps, the beginnings of modern mills 150 years ago occurring in a similar way.

Bühler has also played a pioneering role here and has defined the industry standards in terms of technology and production methods. At the same time, the company has continued to drive forward advances in productivity and food safety, by promoting innovation across the industry. We would also like to play this role in the insect sector.

Can a food processor still afford not to think about insect products? I believe that forward-looking companies with a vision for the long-term cannot escape getting involved with the opportunities on offer from insect processing. And the prospects are good: today’s pioneers will be rewarded with an optimal starting position in a newly emerging industry – where else is this still possible?

**So where do we go from here, where do you see the greatest potential?**

This industry is only just beginning, – it will boom, this much is clear. By the year 2050, the earth’s population will be 10 billion. We need an extra 250 million tons of protein, per year, in order to feed them all on a lasting basis – that’s 50 percent more than today. We cannot cover such a demand using conventional methods; existing farmland is almost inevitably gained at the expense of rainforest, while we have been overfishing the oceans for 30 years. There is therefore a clear and, above all, strong need for alternatives when producing proteins and fats. The demand for biologically produced fertilizer, also an important product of an industrial insect facility, will continue to rise.

Today we are working on Europe’s first insect facility. But we believe that in just a few years, we will build 30 plants per year for our customers. For this reason, in addition to the unit in China, we have also decided to build a second offshoot of Bühler Insect Technology Solutions in Europe. Based on this site, we will be in a better position to serve our customers in the Western world.

**Is the venture with insect processor Protix progressing well?**

Our two companies are the ideal pair. In Protix, we have an entrepreneurial partner, a start-up in fact that, over recent years, has developed the technology and – most importantly – the biological and genetic know-how on insect breeding and processing. Together with the process knowledge, global customer access and the experience of Bühler’s project management, our customers receive an attractive package for successful entry into this new industry.

**What is it that inspires you personally about insects and this new industry?**

It is a privilege to be able to help shape this new industry right from the word go. Mankind is now facing two massive challenges. Firstly, the problem of nutrition. How do we feed an ever-growing population healthily, sustainably, and safely? And secondly, there is the problem of waste and recycling; we waste vast amounts of food. Insects offer a new way to make use of this waste, both meaningfully and to generate value. This motivates me in my work, every day.

“Can a food processor still afford not to think about insects?”

Andreas Aepli, CEO Bühler Insect Technology Solutions
**Did you know…**

...that the term Internet of Things was coined by Kevin Ashton while working for Procter & Gamble in 1999? But, according to Forbes, 17 years later, 87 percent of people actually have no idea of what the IoT means or what it stands for.

...that according to estimations by the McKinsey Global Institute, the IoT will have a total economic impact of up to USD 11 trillion by 2025?

...that back in 2008, there were already more objects connected to the Internet than people?

...that scientists have used data analytics to identify early signs of depression from Instagram posts? They surveyed the mental health of 166 people, then set an algorithm to comb through 43,950 photos posted by them, looking for features correlating with depression. The algorithm predicted depression 70 percent of the time — better than the 42 percent average accuracy of human doctors.

...that Bühler is building up its own team of data scientists? The team has already produced a food safety notification system which analyses social media for early indications of food safety issues.

...that for a typical Fortune 1000 company, just a 10 percent increase in data accessibility will result in more than USD 65 million additional net income? And yet, at the moment, less than 0.5 percent of all data is ever analysed and used.

...that April 9th is IoT Day? It is founded by the IoT council, a think tank for the Internet of Things. You find all events planned worldwide on their website iotday.org.

...that data volumes are exploding? More data has been created in the past two years than in previous history. By 2020, 1 megabyte of new information will be created every 4 seconds for every human on the planet.

...that according to estimates by the McKinsey Global Institute, the IoT will have a total economic impact of up to USD 11 trillion by 2025?

**Data volume generated worldwide in exabytes**

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* 1 exabyte = 1 billion gigabytes

Sources: IDC 2017, Illustration of K. Ashton based on an image by Larry D. Moore

* 1 exabyte = 1 billion gigabytes
Together, we can actively reduce waste and energy

To achieve our ambitious sustainability goals – 30 percent reduction of waste and 30 percent reduction of energy consumption for our customers – we cannot work in isolation. We are convinced that only through broad-scale collaboration will we be able to create a sustainable business that delivers a significant impact on climate goals. During the last 10 years, we have consciously opened up our innovation model and have developed close partnerships with customers, suppliers, academic institutes, and start-ups.

We have previously shared the partnerships with the World Food System Center at the ETH Zurich, the Integrative Food and Nutrition Centre at the EPF Lausanne, and the Business Model Innovation Thinktank at the HSG St. Gallen, but today I would like to share some of the experiences we have made with collaborative innovation models, including start-ups, students, academics, and business partners.

In 2014, we started our partnership with MassChallenge in Boston. It is a non-for-profit start-up accelerator that, in Boston alone, accelerates 128 start-ups during an intensive four-month program every year. After the first year, we decided, along with several key players in the food and life science industry (Nestlé, Inarit Foundation, SEF, Givaudan, Barry Callebaut, GEA, Swiss Re among others) to support the foundation of MassChallenge in Switzerland. In the first year, 70 start-ups were accelerated in the program in Lausanne. This year, 75 start-ups are in the program. They have a structured curriculum, strong mentors from across industry, academia, venture capitals, and successful entrepreneurs. The final will take place at the Swiss Innovation Forum on November 16, 2017. It would be good to see you there.

Last year, we decided to work more closely with the UNITECH network to source innovation ideas. UNITECH runs an engineering master’s program across eight universities, supported by 20 active corporate partners, and focuses on preparing talent for international careers in technology leadership positions. Along with Infineon, Nosco, and Evonik, we issued a challenge to reduce the carbon footprint of manufacturing. More than a hundred proposals were received and the five best proposals were invited to Bühler in Uzwil to develop their ideas and pitch them to senior leaders of the partner companies. The winning idea was a UNITECH team Counting Carbon from Trinity College Dublin. They aim to change consumer purchase decision criteria to include carbon footprint by introducing a transparent labelling. They are now in the MassChallenge accelerator and have major companies supporting their start-up development.

Finally, and hot off the press, we have received the welcome news that the MassChallenge accelerator will be the official partner for the European Union Food accelerator program governed by the European Institute of Innovation and Technology (EIT). We will bring more news on this in the next edition of “diagram”.

More than ever, we are committed to opening our innovation approach and driving collaboration. In the digital world this is a critical foundation for success. We remain at your disposal for further information and welcome more innovation partners who share our goals in actively reducing energy and waste reduction.