FOCUS
THE POWER OF SERVICE

INTERVIEW MATTHIAS KAIERSWERTH
Industry 4.0: Data is dynamite

VACUUM SYSTEMS IN DIE CASTING
Boosting Uptime

CUSTOMER STORY
How Gyermelyi became Hungarians No.1 for Pasta
FOCUS: THE POWER OF SERVICE
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Dear Readers,

our industry is changing fundamentally. Services based on industrial data are becoming increasingly important. As networking expands – just think of the “Internet of Things” – the wave of digitalization is now also engulfing our own industry with all its might. And this is opening up enormous opportunities for our customers as well as ourselves. Reason enough to choose the subject of Services & Solutions as the focus of the present diagram issue.

As the power of sensors and control systems rises continuously and they are more and more merged into highly effective networks, process control becomes increasingly accurate and efficient. This starts at the level of the individual components. In die casting, for instance, new vacuum systems today can extract the air from the molten aluminum in a fully controlled manner as it is injected into the die, ensuring high efficiency and quality (see page 32). However, in many cases significant performance increases are only possible if the entire system is considered. Bearing this in mind, we have launched the “Automation Retrofit” initiative and now offer our customers a general overhaul of their automation systems (see page 16). The new digital world also allows us to offer you new services that grant you access to your process data, thereby permitting support to be provided in a much more targeted way.

An organization evolving from the classical plant and equipment supplier to an industrial solution provider – that is what Bühler is today. With consulting, engineering, technologies, components, training and services. We at Bühler claim to be the engine powering the services and solutions world in our industry. We make every effort to ensure that you, our customers, can be successful. Today, we operate over 80 Service Stations across the globe so we are “on the doorstep” of our customers’ production and processing units – an excellent basis for growing together into this new age.

Calvin Grieder, CEO

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In the Regions for the Regions

It is about much more than just a machine: Bühler creates added value for its customers by providing comprehensive support and assistance through a network of service stations spanning the globe – and the resulting boost to productivity and quality is measurable.

TOTAL SERVICE STATIONS: 82

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The service station in Russia can meet all customer requirements locally.

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The service station in Cascavel is located at the heart of one of the centers of the Brazilian agricultural industry.

DONGGUAN, CHINA pg. 12
In China, Bühler runs a total of twelve service stations. The service station in Dongguan alone looks after 150 customers.

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Since 2013, customers in Romania have also been benefitting from their own service station.

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From engineering to process technology and beyond to service: Bühler covers every single link in its customers’ value-added chain.
EUROPE
35 Sales Offices
10 Manufacturing Sites
26 Service Stations

MIDDLE EAST / AFRICA
12 Sales Offices
2 Manufacturing Sites
11 Service Stations

ASIA
17 Sales Offices
6 Manufacturing Sites
13 Service Stations

EAST ASIA
4 Sales Offices
3 Service Stations

SOUTH ASIA
5 Sales Offices
2 Manufacturing Sites
11 Service Stations
10 Percent and More

With extensive training, consultation and engineering services, as well as application and development centers, Bühler is now a global industrial solution partner. Customers benefit from higher efficiency and productivity, better quality, and with Bühler being on site, the opportunity to tap into new markets.
Düsseldorf, Germany. 2:30 p.m. on Thursday, June 18, 2015. Wencan Group owner Mr. Tang has traveled all the way from China to attend the foundry trade fair GIFA, and is now making his way toward the Bühler die casting stand in Hall 11. The group he is representing is a Chinese manufacturer of aluminum die-cast parts that turns over around CHF 175 million every year and supplies global manufacturers including Volkswagen and Tesla. With a new factory in Tianjin, this group has an exciting future ahead of it. Wencan plans to use this facility to extend its production of sophisticated aluminum structural parts such as door frames. Today, after weeks of negotiations, Mr. Tang has come to the trade fair stand to sign a contract for the supply of eight machines to the tune of more than CHF 17 million. What’s more, he intends to make his mark at 15:18 precisely (or 3:18 p.m.) as this, he explains, is a lucky time of day for the Chinese.

“Bühler,” says Tang, “is our number-one choice of partner.” His praise is not only attributable to the Swiss company’s superior technology: “The services that Bühler is able to offer are equally important to us.” Being the best in today’s market requires much more than simply putting machinery in place. Other crucial elements include integrating components to form a die casting cell that boasts outstanding productivity, training that ensures machinery is operated as effectively as possible, die-making advice plus, above all else, rapid support in difficult situations. According to Tang, “Bühler is unique in its ability to provide all of this.”

Now let’s switch the scene to Asia. Indians take atta – a wholemeal wheat flour – very seriously. Atta has to taste slightly sweet and have a special roasted smell in order to correspond to regional preferences. Up to now, it has not been possible to create these proper-

“Almost all of our customers are looking for new products adapted to local preferences, which can be used to produce traditional and also new products on an industrial scale.”

Stefan Scheiber, CEO Business Grains & Food
ties during milling with conventional roller mills. Indians therefore use “chakki” mills, in which stone grinding elements generate the high process temperatures required. However, these mills are only suitable for small production quantities.

With its PESA mill, Bühler has now managed to create a solution for producing atta on an industrial scale. Special roller mills were developed so that the crushing mills, which are temperamental and require a great deal of maintenance, no longer have to be used. One PESA mill replaces 20 chakki mills, and is also more flexible, energy efficient, productive and profitable. “In terms of cost effectiveness and quality, this is a quantum leap forward for us,” says Prakash Parakh, owner of Parakh Agro Industries in Pune, which is already using the new atta mill.

• Complete service. From industrial solutions to processing basic foodstuffs and producing high-quality materials, Bühler has made a name for itself as a global provider of industrial process solutions. While the Bühler of old devised products in Switzerland and sold them throughout the world, a new era has dawned for the company in which it consistently operates according to its “In the region, for the region” principle and incorporates a holistic service concept into everything it does. “It is only by embedding our technologies and machines in solution and service packages that we will be able to fully realize their performance potential,” says Samuel Schär, who is responsible for Advanced Materials at Bühler. “A major part of our business these days is designing fully integrated die casting cells and offering our customers advice regarding the machine processes, dies and factory layout,” says Schär. When fully optimized, die casting productivity can rise by ten percent or more. “Almost all of our customers are looking for new products adapted to local preferences, which can be used to produce traditional and also new products on an industrial scale,” says Stefan Scheiber, CEO Business Grains & Food at Bühler. Scheiber is describing a global megatrend which is fundamentally changing the global food industry.

In addition to regionalization, increased demand for productivity, energy efficiency, quality and safety are also driving the need for holistic, solution-oriented concepts:

“The potential for optimizing individual machines has been exhausted in many cases,” says Bruno Mendler, who is responsible for Business Development at Bühler. In most cases, performance can only be improved significantly by looking at the system as a whole. Mendler puts it

At the end of April, Bühler opened its newest Service Station in Lahore, Pakistan. The large population offers a great deal of potential for growth as there are approximately 200 million people who harvest and consume around 25 million metric tons of wheat and 7 million metric tons of rice each year. The agriculture industry remains very traditional: farmers still cultivate and grow wheat and crops by hand. In addition, many Pakistanis prefer to grind their grain using traditional stone mills, which produces the desired roti flavor. Roti (or Indian chapati) is a north Indian or Pakistani wholegrain flatbread made of barley, millet and wheat. Bühler has refined the industrial process to such an extent that the roti flavor is still retained even if the flour has been produced cleanly and safely by machine.

As the only professional provider of inspections and repairs in the country, Bühler is also the first choice for competitors’ roles. In addition, spare parts are kept directly on site, allowing Bühler to respond to customers’ requirements rapidly. At the same time, the Service Station functions as a point of contact for consulting and training. Customers can inspect milling, rice and sorting machines locally and take part in training courses.

By opening the Service Station, Bühler is also creating jobs and, as a result, prospects for the population. That motivates the 14 young employees, such as 24-year-old Kamran Ali, who joined Bühler Pakistan right after finishing his mechanical engineering degree in England. Kamran notes, “Our economy and most jobs are directly dependent on agriculture. Working at Bühler gives us the chance to make it more productive and efficient, which ultimately helps everyone in the country.”
in a nutshell: “It’s the same if you look at traffic. You won’t improve mobility simply by making individual cars drive faster. You have to make the system intelligent and highly available,” he says.

To this end, Bühler has invested heavily in expanding its solutions expertise and service capacities in the last few years. Today it offers an extensive portfolio:

- **Analytics.** Bühler has top-quality laboratories in which fundamental process sequences can be analyzed. What exactly happens to a cereal grain when it goes through the roller mills? How does a substance behave morphologically when it passes through the Cenomic™? Is it comminuted or just deagglomerated? Bühler has the necessary equipment to obtain precise information, together with its customers, and to adapt applications and machines accordingly.

- **Product development.** Bühler has opened its application centers to customers in order to work together to develop and test new machine designs, recipes and end products. In China, for example, Bühler is supporting local chocolate producers with a special laboratory where more than 30 local experts are helping to develop typical Chinese sweets and the production plants required to create them. In the new food laboratory in Minnesota, customers can try out new foods and carry out tests on a complete processing line.

- **Advice.** In addition to its vacuum coating machines, for example, the Leybold Optics business area also provides the necessary process expertise to produce architectural glass or optical filters. These formulas are then tailored to suit the concrete application in collaboration with the users.

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**THE POWER OF SERVICE / Focus**

“Bühler has set a new benchmark and raised the standard of service. This is of great importance for the Milling Industry in Pakistan.”

Wajid Abdullah
Director, Sunny Flour Mills

Bühler Pakistan, partner during the entire plant life cycle.
• **Engineering.** Bühler has an extensive machine and component portfolio, enabling it to map entire value chains. Bühler engineers then develop a plant solution for mills, feed production, or chocolate production, which is perfectly adapted to the needs of the individual customer.

• **Construction/commissioning.** In 2014, Bühler handed over numerous plants to customers all over the world including the 6th flour milling line with a capacity of 750 t/24 h for Sayga Flour Mills in Khartoum, Sudan which Bühler installed and commissioned in a record time of four months only.

• **Maintenance and repair.** In the last few years, Bühler has developed a full range of services for maintaining and repairing its machines and plants in order to

Service Station Moscow, Russia:
Everything on the spot.

Bühler Moscow provides a wide service offering

The potato fields, wheat fields and meadows seem to go on forever. The breadth of the Russian landscape is matched only by the range of solutions offered by the Bühler team at the local Service Stations. The various Service Stations are characterized by professional reconditioning and repair of grain and feed mills, as well as beer, chocolate and oil production plants for Bühler’s local customers. What’s more, they also supply replacement parts and are able to service customers in the national language with specialist advice. The Moscow Service Station is proud of its enormous growth curve. Today, the Service Station looks after more than 1,000 customers including huge Russian companies, such as Ryazanzerno-product, as well as international customers like Nestlé, Kraft and Cargill.

This is also evidenced by a longstanding history: Bühler has done business in St. Petersburg, Russia since 1895, exactly 120 years ago.

**“The quality of reconditioned rolls from the Bühler Service Station is unprecedented.”**

Andrey B. Lebedin, Chief Engineer, Podgorenski Flour Mill
ensure optimal operation and high availability. The company currently has a global network of over 80 Service Stations, and ultimately aims to have over 100 Service Stations to ensure close customer proximity.

- **Retrofit.** With a comprehensive retrofit service concept, Bühler enables its customers to modernize the control and automation of existing plants. As a result, the productivity of a plant can be significantly increased and up to five percent of the costs saved (p. 16).

- **Training.** Bühler offers a wide range of training programs to assure customers and its own employees, have the right qualifications to use high-tech power units to their full potential. The latest example of this global education initiative is a milling school in Kenya, which has been open since spring 2015. The African Milling School will follow the tried-and-tested model of Swiss vocational education by combining theoretical knowledge with real-life practice.

“No other provider can cover the entire value chain from laboratories to targeted engineering to global service support and on-site training,” says Scheiber. This expertise is already proving crucial for the development of the business. “By combining leading machine technology with our comprehensive solution expertise, our die casting business has taken a massive step forward in the last few years,” says Schär, CEO business advanced materials. With a market share of around 25 percent, Bühler die casting is now the undisputed leader in its industry. Over 20 percent of all vehicles worldwide have engine blocks which were made on

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**Service Station Cascavel, Brazil: One Man, One Word.**

An ear-splitting rattle woke the settlers, who had set up their camp in a tranquil spot on a high plateau. The next morning they saw that they had been sleeping right next to a rattlesnake. Or so the myth of the founding of the Brazilian city of Cascavel, which means “rattlesnake” in Portuguese, goes. The fact that the area attracted settlers is true at least and the reasons why can still be seen today: The land is green and fertile, the climate subtropical. Cascavel grows a quarter of the grain in the state of Paraná. The farmers mainly grow soybeans, wheat and maize, as well as raising poultry, pigs and cattle. With so much agriculture, the food and feed industries were quick to come here. With 25 million metric tons each year, Cascavel produces a quarter of the feed in Brazil, making it an ideal location for a Bühler Service Station. Fernando Kuskowsi has been acting as the first contact for customers in Cascavel since 2012. The trained engineer advises customers and supplies them with replacement parts and smaller machines when the need arises. His biggest customers are the feed producers BRF (Brazilian Feed) and Cvale, as well as the agricultural cooperative Agraria, which produces feed, grain, oil and malt.

“Bühler has proven to be an outstanding service provider and partner for solving technical problems and developing new processes. Bühler offers me the quality that I would like to receive from other suppliers.”

Edson Luiz de Souza
Service Engineer, Cooperativa Agrária Agroindustrial

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“No other provider can cover the entire value chain from laboratories to targeted engineering to global service support and on-site training.”

Stefan Scheiber,
CEO Business Grains & Food
a Bühler machine; in China, this figure is over 45 percent.

As extensive as Bühler’s service and solutions portfolio is today, the company is confident that this is only the start of a longterm trend in which the focus will be on sensor technology, predictive analytics and maintenance. “The possibilities offered by sensor technology are going to revolutionize how we operate and maintain our machines and lead to massive increases in productivity,” says strategy head Bruno Mendler. For example, sensors in all relevant parts of the plant will flag minor irregularities during operation before any damage occurs. This allows the Bühler service engineer to take a

Service Station Dongguan, China: Striking the Right Chord.

China is the world’s biggest producer and consumer of wheat, rice, cooking oil, beer and animal feed. Over 3,000 customers use Bühler plants just to process the grain alone. As a result of this demand, Bühler has set up twelve Service Stations here in the last seven years. The Service Station in Dongguan is situated in southern China close to the Hong Kong border and the South China Sea. Today, the Service Station’s employees accommodate over 150 customers. The Service Station has relocated within the region several times due to its growth. In March 2015, Bühler inaugurated the new station with a regional customer seminar.

The team in Dongguan comprises seven employees. Bühler ensured that all the members had strong regional roots. “The service business is a completely local business,” says Bruce Lu, Head of Customer Services in China, “because speaking the customer’s language, literally, also plays a key role in success.” In the case of Dongguan, he refers to the fact that Cantonese is spoken in addition to the country’s official language, Mandarin. If customers need special solutions or have complicated questions, the service team brings in the corresponding experts from other sites.

The special services of the Service Station in southern China include professional pressing mold overhauls for local animal feed producers, thereby increasing the service life of the dies by an impressive 80–100 percent. In addition to the animal feed industry, the chemical and dyestuffs businesses represent important branches of industry in the catchment area of the Service Station. For example, Bühler also offers customers from this industry tailor made solutions, including experiments and training, which are conveniently available in the newly opened Grinding & Dispersion test laboratory.
proactive approach and get to the root of the problem. Most errors, however, will be identified by the system itself. These predictive analytics make it possible to carry out any necessary reconditioning work within the ideal time frame, making unforeseen stoppages an extremely rare occurrence. Sensor data can also be analyzed in order to find out why some components wear out too quickly or in an atypical manner, and to ensure that plants are always automati-

“Over the last two years, Bühler has significantly expanded its local service and sales organization in South China. Thanks to the Dongguan Service Station, I have easier and quicker access to replacement parts and service support.”

Keng LIU, Head of Technology and Technical Planning at the Shekou Lam Soon flour mills
Timisoara is the third-biggest city in Romania and is situated near the Hungarian and Serbian border. The history of this cultural “pearl” extends as far back as the 12th century. It has applied to be the European Capital of Culture for 2021. Historically, Timisoara has been characterized by the peaceful coexistence of different nationalities and has belonged to other states from time to time. It is an advantageous location for the Bühler Service Station because many people speak Hungarian, Serbian, or German, meaning that local employees can also look after customers in nearby Hungary, Serbia and Macedonia. After having supported customers remotely from Braunschweig for many years, Bühler began operating this Service Station in 2013. This made sense as 24 large mills from Bühler and a total of over 800 mills were situated in Romania alone.

The Service Station is housed in a 770-square-meter hall in an industrial park outside of the city. Two experienced engineers ensure that customers from the grain and feed milling, brewing and oilseed processing industries can always manufacture their products under optimum conditions. Grooving rolls is a key service. They also stock important replacement parts so that they can always quickly help their customers.

When asked about the customers, Andreea Radu, who heads up the Bühler business in Romania, explains, “It was two years ago when the Technical Manager of Goodmills, Hungary, a large international mill, registered with us in Timisoara. He was said to be extremely ambitious. I was already a little nervous but I greeted him in fluent Hungarian straightaway. We immediately got on very well and I ultimately acquired the customer. He recommended us to everyone he could, which was really helpful for us.”

The Soufflet Group is also one of the Timisoara Service Station’s loyal customers. The entire mechanical cleaning of the plant in Buzau, including the Sortex machines, is completely supplied by replacement and wear parts from the Service Station.
Bühler already has decades of experience with the sensor technology required for this type of system. For over 60 years, the SORTEX high-performance sorter has been at the absolute forefront of optical sensor technology. In the same way that the latest UltraVision generation from SORTEX can remove foreign particles and poor-quality grains with extreme precision using highly sensitive image sensors and modern flaw detection software, in the future, Bühler machines fitted with sensors will be able to register even the slightest of deviations from the normal state, analyze these in real time and, if necessary, make corrections.

“The subject of predictive analytics is very important to us,” stresses Scheiber. “The first machines are already in development. And regionalization will be a key success factor in this case too.” What sort of data is collected, the manner in which it is collected, and how exactly it can be used will vary considerably from industry to industry, country to country, and company to company. For some manufacturers, the process data for their plants contains the secret recipes for their products, whereas others do not regard the operation of production machines as one of their key skills and want to outsource it as much as possible. “With our regional presence, we are able to adapt the use of modern sensor and analysis technologies in our platforms to the precise needs of individual customers on site,” says Scheiber, looking to the future.

“Bühler ensures optimum manufacturing conditions for its clients.”

Aurel Iosif
Maintenance Manager, Soufflet-Group

“The local setup and the support from the Service Station have strengthened our relationship with Bühler. This close partnership will further increase the success of our business.”

Aurel Iosif
Maintenance Manager, Soufflet-Group
Fit with Retrofit

The productivity of an older industrial facility can be increased by modernizing its control and automation equipment. Bühler is addressing this with an integrated service concept.

Across the world, 2,500 million metric tons of corn (maize), rice, wheat, chocolate and coffee are processed into basic foods every year, in more than 30,000 industrial plants. About one in five plants is older than 20 years. It is precisely during this period that information technology, sensor systems and networking have made the greatest strides. The power of a standard PC has increased by a factor of 1,000 (as predicted by Moore’s Law), and the data transmission rate has surged in cable-based networks by a factor of 100, from ten Mbit/s to as much as 1 Gbit/s. “Properly serviced, the mechanical system of a roller mill, a cleaner, an extruder, or a scale may be maintained at a consistently high level for decades. On the other hand, the life cycle of the control or automation systems will reach an end much more quickly,” says Harry Blöchlinger, Head Customer Service SAS. The consequence is definite competitive disadvantages as a result of lower yield and quality, as well as decreased uptime. “Our experience shows that we can get as much as five percent more out of a processing system after we have updated its control and automation systems to the state-of-the-art level,” says Thomas Widmer, Head of Automation for the Grain Milling Business Unit.

In order to make updates as easy as possible for plant operators, Bühler has now developed an integral service concept called “Automation Retrofit.” Several solutions are available, with new ones being continuously added to the portfolio. These solutions cover all automation layers seamlessly, including machine controls and instrumentation, electrical and communications infrastructures, plant control hardware and software, as well as higher-level Enterprise Resource Planning applications.

In order to meet the various customer needs, the solution concept makes a distinction between three approaches:
Increased production reliability
More efficient operation; higher production output
and better production quality
Reduction in energy costs
Cost savings of up to five percent
As Good as New

The lifetime of a die casting machine is normally 20 to 25 years or even more. However, after 10 to 15 years, they often need “rejuvenation therapy”. For this, they can turn to Bühler Brescia.

Die casting machines are like the elephants of the machine engineering world. Gigantic in stature and often weighing in excess of 100 metric tons, with a closing force up to 4,400 ton, they can live to a ripe old age and “never forget”. A die casting machine is a huge investment, currently costing between 500,000 and three million US dollars. In many cases, they spend 20 years casting parts for the automotive, electronics and building industry without any issues or complaints, but one day, accuracy of fit starts to wane and an increasing number of parts need to be reworked by operators. So now a decision has to be made: buy new or overhaul? The latter, also known as reconditioning, normally costs half of the original purchase price, but in some cases it can increase to a maximum of 70 percent of the original investment. This is still a lot of money, but it is very easy to see why, taking into consideration how many highly specialized experts are involved in reconditioning...
“The benefit of reconditioning by Bühler is that the service lives of our die casting machines are extended by an average of 7 years. Bühler knows the previous history of our machines, so unnecessary work and expenses during reconditioning are avoided.”

Jürgen Mangold, Production Manager at Alupress in Brixen, Italy

One of these “mechanical elephants”. The process takes eight to sixteen weeks and is very demanding.

The experts at Bühler Brescia literally take hold of each individual screw, lever and cylinder. Sometimes, the platens of the machines weigh 20 to 30 metric tons, as much as most semi-trailers. “Some machines look like a pile of scrap when they arrive,” says Paolo Zanone, general manager of the Bühler site in Brescia. With finesse and expertise, his team dismantles, cleans, examines, and surveys every single part following the arrival of a machine in Brescia. Anything that can be saved is ground, smoothed and polished. Replacement parts are procured for anything that is beyond repair. Very often, replacement parts no longer exist for very old presses, so the experts at Bühler have to produce them manually. In some cases, when machines from competitors are reconditioned, construction drawings are not even available, thus parts have to be reconstructed entirely from scratch. Frequently, Bühler completely replaces software and electronic components. Finally, the team in Brescia puts the machine back together and tests it until it is functioning perfectly. “After the revision, keeping the original control unit, you can relax for another six to ten years. If you update to the latest generation of software and electric cabinet, the lifetime of the machine is prolonged for a minimum of another 10 to 15 years,” says Paul Stucki, head of production at Bühler Brescia.

An increasing number of companies are starting to see the benefits of reconditioning and are choosing to have their die casting presses overhauled. No wonder, since customers are essentially getting a machine with several brand new parts. Having become aware of this growing market in the 1980s, Bühler took over Brescia Presse, and has since been working on developing it into the European center for overhauling die casting machines. This year, Paolo Zanone and his 40-strong team will be working on 25 reconditioning projects. It is expected that within the next five years, more than 850 Bühler machines will be candidates for reconditioning. About half of these machines will be reconditioned. A promising future is foreseen for the overhaul of die press machines at Bühler Brescia.
Bühler Solutions & Services

Engineering & Consulting

Engineering
- Design engineering
- Manufacturing engineering
- Manufacturing processes
- Optimizations
- Hardware engineering
- Software engineering

Consulting
- Individual needs and root cause analysis
- Maximized efficiency with regard to output, energy consumption, etc.
- Reduced operating costs
- Flexible finance models

RAW MATERIALS (EXAMPLES)

Cleaning
Grading
Storing
Handling
Grinding
Sifting
Mixing

FUNCTIONAL, POWDERS E.G. PIGMENTS

Conveying
Storing
Dosing
Weighing
Homogenizing

Bühler Process Technologies (Selection)

Training and Continuing Education

- Highly qualified personnel
- Efficient plant operation
- Optimal sanitation and quality of end products
- High lifetime and availability of plant and machines
- Training Centers
- School Mills
- Bakery Innovation Center
- Technology Centers
Services

Maintenance
- Individual maintenance concepts – from basic to “total care”
- Minimized downtimes
- Increased safety and transparency in manufacturing operations

Spare parts
- Continued Bühler product warranty
- Maintained value of machines and equipment
- Extended lifecycle of machines and equipment

Retrofits
- Updates to the latest specifications with regard to sanitation, energy efficiency, etc.
- Improved quality and productivity
- Extended lifecycle of machines and equipment

Repairs
- Reliable expert support
- Minimized downtime of machinery
- Extended lifecycle of machines and equipment

Revisions
- Consistently high product quality
- Reduced energy costs
- Roll service for maximum yield

Facilities available at Uzwil / Switzerland, Beilngries / Germany, London / Great Britain, Minneapolis / USA, Stockton / USA, Raleigh / USA, Manhattan / USA, Wuxi / China, Holland / USA, Bangalore / India, Brescia / Italy
PODIUM DISCUSSION WITH REPRESENTATIVES FROM SYNGENTA, NESTLÉ AND BÜHLER

Swiss Expertise for Mexico’s Agriculture

In Mexico, around half of the population is dependent on agriculture for their livelihood. Although almost 50 percent of the land surface could be used for agriculture, this does not ensure self-supply with basic foodstuffs, such as wheat, maize, or beans. What can tried-and-tested Swiss practices and technologies do to contribute to the expansion? It was this question that representatives from Syngenta, Nestlé and Bühler tackled on April 15 of this year at a podium discussion at the Swiss embassy to celebrate 70 years of diplomatic relations between the two countries. Bühler used the opportunity to present itself as a solution partner for the grain-processing industry. “Our storage, drying and sorting solutions can prevent loss of raw materials, while simultaneously increasing food safety,” says Andreas Risch, Head of Grain Milling Sales for Bühler in Mexico. Bühler has had a presence in Mexico for 60 years. An example of a development especially for the local Mexican market is an energy-efficient solution for producing tortilla flour, which functions using just steam and does not produce wastewater.

13th INTERNATIONAL FOUNDRY TRADE FAIR (GIFA)

Leading the Growth Wave

The 13th International Foundry Trade Fair (GIFA) opened its doors once again in Düsseldorf, Germany. Bühler showcased its role as the global solution provider for aluminum high-pressure die casting and received strong growth signals, as well as substantial orders and commitments worth more than CHF 40 million. Asia proved to be the key driving force. The Chinese Wencan Group, a key supplier to the automotive industry in Asia, delivering to Volkswagen and Tesla amongst others, ordered equipment and services from Bühler worth more than CHF 17 million. Overall, the fair provided a strong confirmation for Bühler’s leading market and technology position in the aluminum die casting industry. This success can be attributed to leading technologies, broad service capabilities in Europe, the United States and China, and a comprehensive offering of solutions ensuring maximum productivity, consistently high parts quality and easy automation. This commitment was further demonstrated with innovations such as a new human machine interface and monitoring system, the Ecoline Pro line with integrated peripherals, as well as an integrated vacuum system.

With an increase in the number of cars being manufactured globally, lightweight construction has become the key to reducing fuel consumption and carbon emissions. By 2025 it is expected that the 150 kilograms of aluminum inside an average car, will rise to more than 250 kilograms. Car manufacturers are identifying new structural parts, such as door frames or shock towers to be produced with aluminum die casting. Aluminum is also making its way down from full-size cars to mid-size and compact cars, pushing further growth in the business. All signals for the aluminum die casting market are showing green.

Bühler is the global solution provider for aluminum high-pressure die casting.
**Lead Lab for China**

A New Grinding & Dispersion lab opened in Wuxi, China in May. The approx. 1,000 square meters facility combines testing equipment for inks, coatings, electronic pastes and other applications. It features a full range of Bühler solutions from lab to small production scale including bead mills and three-roll mills. Additionally, as the first location, the Wuxi Application Center hosts Bühler’s latest third-generation mixing technology for lithium-ion battery slurry production.

The lead test facility provides numerous services for its customers. Some of these services include application trials, which show the performance of machines and equipment, product evaluations, which allow for a thorough analysis during the trial period and process development, which details the production process for new products.

“The new location offers state-of-the-art, professional working conditions, enough space and a complete set of testing instruments. This allows our experts to demonstrate the full potential of Bühler GD machines to our customers and define the ideal set-up before the customer buys,” said Mr. Jesse Wang, head of the GD Application Center Wuxi.

China is the second lead lab, after Uzwil, connecting and expanding Bühler’s global knowledge and technology experience to customers. Besides the two lead labs in Europe and China we have two Regional Application Development and Educations Centers (RADEC). One is located in North America for The Americas and one is based in Japan, specializing in high-tech applications like electronics.

**Up-and-Coming Researchers Awarded**

The PhD workshop that Bühler hosted at its Uzwil headquarters in March had two objectives: to discuss new trends and to gain talented new staff. Cornelia Koller from ETH Zurich, whose work could catch the attention of chocolate lovers and the diet industry, received the Julius Maggi Award.

Food scientist Cornelia Koller worked on her doctorate for four and a half years. After several attempts, and a few pounds gained, all the hard work paid off. With her doctorate on the inclusion of air in fat systems, the 29-year-old won the 2,500-euro prize at the PhD workshop hosted by Bühler for the best European dissertation in the food engineering sector.

“Air inclusions make portions bigger, which means that people are fuller more quickly,” explains Koller. This process can be used to make low-calorie food without any sweeteners or foam stabilizers which is good because “the trend is leaning toward foods without additives.”

17 PhD students from twelve European cities were selected to present their research this year. Ten leading professors within the food sector from universities all over Europe and experts from Nestlé and Barilla judged the projects.

“The presentations ranged from very good to outstanding,” says Prof. Dr. Dietrich Knorr, discussing the work. Nicolas Meneses, food safety expert at Bühler, was in charge of the conference. “We are proud to have hosted these outstanding presentations. The workshop was an excellent platform for discussing the major challenges in the food industry with highly qualified, young scientists.” The workshop also served as a good opportunity to wet the up-and-coming young scientists’ appetites for a career in the food industry. It worked with Cornelia Koller, who will be starting her career at Bühler as a trainee in September.

**FOOD ENGINEERING**

The ETH scientist Cornelia Koller was awarded for her PhD.

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New Mill in Jazan

A new chapter is being written in the story of the longstanding, successful collaboration between the Saudi Grain Silos & Flour Mills Organization (GSFMO) and Bühler; the state flour manufacturer has commissioned Bühler to install a mill with a wheat processing capacity of 600 metric tons per 24 hours in Jazan, the southernmost port of the kingdom. This contract was signed by the Saudi Minister of Agriculture, HE Abdulrahman bin Abdulmohsen Al-Fadhli, on April 6, 2015. “Once again, the quality of our plants, our technology and process expertise, and the local services we can provide have proven to be a convincing factor,” says Stefan Scheiber, Bühler CEO Grains & Food. The complete system, which is fitted with Bühler’s state-of-the-art grinding technology, is expected to be built within three years and will supply the surrounding area with flour. Bühler has already built 15 mills at seven sites in Saudi Arabia. The largest plant to date has a capacity of 2 x 600 metric tons per 24 hours and was recently commissioned near Mecca. The annual flour consumption in Saudi Arabia is around two million metric tons.

The new mill will have a capacity of 600 metric tons of wheat per day.

Bühler Setting Standards

More and more food is manufactured by industrial means. A central measure for ensuring the safety of food products in the increasingly global processing chain is hygienically designing machines and processes (Hygienic Design). In line with this principle, cleanability is a key consideration from as early as the development stage of a machine or plant. The European Hygienic Engineering Design Group (EHEDG) is developing non-binding guidelines with the aim of increasing safety in the food industry. Bühler is bringing its extensive expertise into the group and is also playing a key role in the Swiss branch. 20 representatives from the Swiss food industry met at the EHEDG general assembly in Uzwil at the beginning of May. Dr.-Ing. Christoph Schill, Process Engineer at Bühler, will be taking the reins as president of the Swiss EHEDG group from 2015 to 2018. “In the EHEDG, Bühler is currently playing an active part in the facility design, dry materials handling and bakery equipment sectors. Our customers will also benefit from this commitment to increased safety,” explains Schill.
For people living in Southeast Asia, rice is the most important basic food in their diet. Bühler is working with rice processors to develop solutions that create added value for customers. These efforts are paying off. In the last 24 months, the company has managed to consolidate its market position in Southeast Asia and conclude contracts valued at more than USD 100 million with notable customers in countries such as Thailand, Cambodia, Indonesia, Vietnam, the Philippines, Myanmar and Malaysia.

Since its launch last year, the SORTEX S UltraVision™ optical sorter has played a key role in achieving this success. Its many intelligent sorting functions make a significant contribution towards increasing the quality and safety of the end product. This innovative solution is at the heart of the single biggest order ever placed in the region: Bühler will be installing equipment including 62 SORTEX S UltraVision™ sorters (with a sorting output of 10,000 metric tons per day) in the world’s largest rice mill, operated by the Thai company Merry Rice. This order alone has a value of USD 40 million.

MAJOR CONTRACTS AWARDED ACROSS SOUTHEAST ASIA VALUED IN EXCESS OF USD 100 MILLION

THAILAND
- Merry Rice
- Capital Rice
- Siam Indica
- Sirichokchai
- Riceland
- Siam Parboiled
- 4G Contracting
- Bright Lights

CAMBODIA
- First complete paddy processing plant

INDONESIA
- TPS Group
- PB. Mulyo

VIETNAM
- Phung Hoang
- Thanh Hung Enterprises
- Thung Thanh Company
- Tri Van Phu

PHILIPPINES
- Complete paddy processing plant

MALAYSIA
- Kilang Beras Pek Choo Keok Sdn. Bhd

MYANMAR
- Nine Seas
- Yoma Sun

For people living in Southeast Asia, rice is the most important basic food.
Does the Internet today simply permeate every aspect of our lives?
Essentially, it is a continuation of the decentralization which was triggered over 20 years ago with the advent of the Internet. The only differences are that the Internet of Things is much more closely integrated, and is automated to a greater extent. A second important aspect is that all these inter-connected objects and machines generate massive quantities of data. Sensors record the execution of a production process or constantly measure for example, temperature, humidity or composition. All this data is then available anywhere and at any time in a data cloud. That’s why we talk so much about “cloud computing”.

**What events have led up to this?**
In the early years of computer science, the computer was an isolated calculating machine which could easily fill an entire room. Much later, several PCs were connected to form networks. The TCP/IP protocol gave birth to what we know as the Internet. Today’s microchips are becoming ever smaller, yet more and more powerful, and we have an abundance of sensors and ubiquitous radio networks. As a result, cell phones, cars, fridges and industrial machines have integrated intelligence and are all connected in a network. This is why we hear of “the Internet of Things” (IoT) and so-called “cyber-physical systems”.

**diagram:** Mr. Kaiserswerth, why are people talking about a fourth industrial revolution?
**Matthias Kaiserswerth:** After mechanization by steam engines, specialized mass manufacturing using production lines, and the automation of manufacturing by IT, industry is undergoing yet another fundamental paradigm shift: The collection, analysis and ongoing evaluation of all the data which arises from industrial processes over the entire supply chain.
So what benefits does this data bring for us?

In the modern age, data is perhaps the most important currency. However, it becomes valuable only when new discoveries can be inferred from it. This is where yet another aspect of Industry 4.0 comes into play: Thanks to analysis processes such as those in big data and artificial intelligence, we are now able, for the first time, to link up even unstructured data or that of different formats intelligently. The actual explosive force of the current developments is therefore in how these data volumes can be applied.

Are other technologies involved in Industry 4.0?

Even the generative manufacturing processes, known as “additive manufacturing”, are included in the new industrial age. This in itself is a hugely promising area. Although, at the beginning, only plastic components could be printed, today metal parts and even a number of foods can be manufactured layer by layer. These developments have culminated in the manufacturing of a batch quantity of “one” – in other words, individualized, custom manufacturing, as opposed to industrial mass production.

Would you say that this is a particularly disruptive technology?

You only notice that a technological innovation is disruptive when something else ceases to exist. These phenomena are typically observed in niche areas. The transistor, for instance, was first established as the most efficient solution for hearing aids because of its compact size, but then later replaced the omnipresent pipes as the most important electronic component in all other applications. Additive manufacturing is also used in niche sectors today. Alas, it will be many years until we are able to 3D-print complex objects such as cell phones. A replacement part for a machine, on the other hand, will likely no longer have to be carted halfway across the world by courier, but simply printed on-site.

What does Industry 4.0 mean for companies like Bühler and its customers?

Machines and plants for the efficient and resource-saving production of a variety of goods will also be in demand in the future. Of course, Bühler offers not only machines, but comprehensive solutions for the end-to-end processing of various raw materials, for example. That entails extremely detailed expert understanding, as well as an encyclopedic knowledge of the requirements of a particular customer group or market. However, even the best technology will one day become the standard; and if you can no longer differentiate yourself with your technology, then you need a different unique selling proposition.

What does that mean more specifically?

Industry now has the unique opportunity to expand even further in the supply chain and develop innovative, data-driven business models. The winners in Industry 4.0 are those companies who generate real added value for their customers from the masses of data.

Which sectors will be the first to see the effects of this?

Initially, it is service which is most likely to improve. Bühler’s machines today acquire numerous parameters. Using these, you can perform a range of different tasks, such as remote control of production processes or pre-emptive, targeted maintenance. The Internet of Things will also spur on quality assurance to a new level, since sensors arranged in a network ensure that manufacturing processes are fully documented.
“In the modern age, data is perhaps the most important currency. However, it becomes valuable only when new discoveries can be inferred from it.”

What does all this mean for food safety?
Thanks to this information, every product in the food industry can be traced back to its base ingredients. Also, important data such as humidity can today be collected along the entire processing chain and controlled in real time. As a result, the Internet of Things is likely to soon bring huge improvements to areas such as food safety and the prevention of food waste.

Does a customer even have to own a machine?
Of course, that’s a perfectly reasonable question. The “sharing economy” works when more and more private individuals no longer choose to buy a car, yet still want to use one. Is owning the machine itself a priority for Bühler’s customers? Or is it, rather, the productivity it can generate? Say a grain processing firm decides they don’t want to buy mill plants any more, and simply want to pay a fixed price per ton of flour of a certain quality without having to worry about installation and maintenance themselves. In information technology, these kinds of business models have long been the standard under the term “service level agreements”.

POWER THROUGH INTELLIGENCE AND CONNECTIVITY

The explosive power of the Internet-of-Things (IoT) comes through ubiquitous connectivity, intelligence and data sharing, thereby boosting transparency and efficiency of components, machines, processes and even plants. Still new to many of Bühler’s markets, we have decided to enter this new world by a dedicated IoT initiative. To begin this innovation journey, Bühler’s IoT initiative is to sponsor at minimum three concrete and promising IoT development projects for our customers to reach new levels of productivity (e.g. by reducing unplanned downtime) and achieve better sustainability, (e.g. by improved food safety and security). For that matter, sharing data whilst respecting high data security standards is a key prerequisite to harvest the immense opportunities that IoT offers. To attain these goals we will look into leveraging our processing technologies across the whole value chain (from field to finished products) by making them smart and connected; and by integrating third-party information, (e.g. crop data or weather conditions), sustainability of the food value chain will be further increased.
Which new business models are now possible with data?
If we think about rice sorting as an example, the optical sorting machine’s job is to sort the rice. But even looking at this activity can teach us a lot more. For example, we could see how many rice grains from a particular supplier have been broken. If we were to consolidate and analyze information collected by hundreds of sorting machines, we could gain valuable new insights about the quality of the raw materials from a variety of cultivation regions, for instance. With the combined data from all the sorting machines, knowledge can be generated which could mean real added value for every plant owner; for example, in optimizing procurement. As a Swiss company with a long tradition, Bühler would also be able to guarantee critical factors for success such as data protection for new business models of this nature.

What are the risks for industrial businesses?
The biggest risk is that somebody else is offering the same service, and it doesn’t necessarily have to be an industrial firm. If we look at taxis, hospitality, or retail, companies like Uber, Airbnb and Amazon were startups which shook their respective industries to their very foundations using IT. Industry needs to be on its guard against this. With a few good ideas, market players outside of industry could become established in niche sectors and develop successful new services based on the analysis of industrial data.

What do these changes mean for the job market?
As machines become more intelligent and more networked, fewer staff will be required for operation and maintenance over the long term. However, this industrial revolution doesn’t mean that we’ll be unemployed. Rather, it will likely result in a shift toward new areas of activity. The field of data analysis, in particular, is highly promising. That’s why various universities are already offering courses on “data science”.

What do businesses have to do specifically in order to survive in the age of Industry 4.0?
Because Industry 4.0 has expanded to dominate entire supply chains, open innovation processes are in demand. Bühler, for example, should consider working more closely with its customers, suppliers and academic partners in order to experiment with new, data-driven business models. Only this kind of experimentation will yield the truly interesting business models. It’s therefore important to give rise to a startup culture. Innovation challenges for colleagues and partners, such as those that Bühler is already putting into practice to great success, are a core element of this.

What part do you play in this?
As a member of Bühler’s Innovation Advisory Board, I hope to bring along a whole host of enriching insights and perspectives from outside the industry. I would also like to ensure that Bühler is more even more connected with contacts outside of the company’s core business. Because industry and IT are set to grow together on an unprecedented scale, my expertise as an IT professional will certainly be of use.
Drying Pasta Economically

Drying pasta requires significant energy. Not only is the Eco-thermatik™ long-goods pasta dryer supremely energy-efficient, it also improves product quality and production reliability.
Making pasta involves a process of mixing flour or semolina with water, working it into a dough and then pressing it through a mold – creating the moist pasta which, once upon a time, might have been hung outside to dry in the wind. Today, however, we have a revolutionary machine to do this work. Launched in 2012, the Ecothermatik™ long-goods pasta dryer was the result of Bühler’s work to develop a pioneering new drying solution that would not only use significantly less energy, but increase product quality at the same time. Now, the company is providing this innovative system in a version that can accommodate capacities between 3,500 and 5,500 kilograms per hour.

Excellent energy efficiency – lower operating costs
The machine’s key feature is its reduced energy consumption, made possible due to functions such as in-process heat recovery. “The hot, humid exhaust air from inside the dryer is fed into a heat exchanger, which condenses the water and conveys the energy from the exhaust air back into the heater. This reduces thermal energy requirements by 40 percent,” explains Marco Loschi, Product Manager Pasta at Bühler. Not only that, but the system also needs 20 percent less cooling energy thanks to optimized air flow and intelligent heat management. To top it all off, fans featuring a special blade shape more efficiently generate the necessary air circulation, yielding an additional 10 percent in electrical energy savings. As a result, drying a metric ton of pasta consumes just 150 kWh instead of 250 kWh – a saving that translates directly into a higher margin for manufacturers, as well as improving environmental performance.

Improved quality with more humid drying air
The equipment’s special drying process also enhances product quality. Conventional systems blast a strong flow of drying air against the pasta – a method which does bring the moisture content down rapidly, but also creates stress or tiny cracks that can lead to breakages during cooking or even packaging, particularly in the case of long goods such as spaghetti. The result is that a longer stabilization phase is required in order to relieve this stress. “The Ecothermatik™ uses more humid air, which means that the pasta retains its rubbery state during the drying process. This creates less stress, cutting down the stabilization phase by 30 percent and preventing breakage. In addition, it’s an ideal method for cross-linking the proteins in pasta, which improves cooking stability and bite,” says Marco Loschi, describing the benefits of the approach.

New transport system for better production reliability
Bühler is now offering its system in a version that can accommodate capacities between 3,500 and 5,500 kilograms per hour, a range of output critical for market success. Despite this ability to process higher volumes, its design leverages the shorter stabilization time and requires less space in the factory. Production reliability has also been improved thanks to a new chain transport system which, in vertical passageways, simultaneously conveys two sticks containing pasta to a higher or lower level. As a result, the chain speed is reduced by 50 percent, increasing accuracy and thus enhancing production reliability.

Further information:
Marco Loschi
Product Manager Pasta
Bühler Uzwil
T +41 71 955 16 44
marco.loschi@buhlergroup.com

ADDED VALUE

- Efficient use of energy thanks to in-process heat recovery
- Better product quality thanks to drying in the rubbery state
- Maximum production reliability thanks to innovative stick transport system
The next step in Vacuum Die Casting

Vacuum systems in die casting increase the quality of cast parts, but they have their limits. Not anymore however: Bühler’s integrated solution Smart-Vac offers increased productivity, high flexibility and full traceability.

In order to meet the demand for high-quality structural parts in die casting, it is essential to work with vacuum systems. As molten aluminum fills the die, the residual die lubricant (waxes and/or oils) vaporizes. If the vapors are not removed by vacuum, they will become inclusions within the die cast part. However, until now the industry wasn’t fond of using vacuum systems since they were causing errors and downtime. Convinced that this could be done better, Bühler launched the SmartVac project.

“**The SmartVac system reduces scrap rate by 2.5 percent.”**

Steffen Pech, Foundry Manager
DGS Druckguss Systeme AG

**Limitations of existing equipment**

Bühler’s goal was to come up with a new solution that eliminates the weaknesses of the current vacuum process. For example the information exchange from the peripheral vacuum device to the die casting machine, which is done over an interface and therefore limited. Also, the interaction between vacuum unit and shot movement is rather difficult and disjointed. Frequent production disruptions also occur. Data handling, data storage and visualization, for example, happen on different controls, resulting in additional time and effort for synchronization and evaluation.

**SmartVac – the smart vacuum method**

Bühler worked meticulously on a new approach to overcome those restrictions. The R&D team came up with SmartVac, a vacuum system that is completely integrated into the die casting machine. To date, vacuum control and monitoring equipment were part of a separate peripheral device and then connected to the die casting machine with cables and hoses. Bühler now offers an integrated solution. With this integrated solution, the pipeline routing

A vacuum system integrated into the die casting machine prevents production downtimes and simplifies operation.
is now enclosed and much shorter. Mechanisms and check routines have been incorporated in the control system to detect potential trouble early and send alerts to prevent production shutdowns. Maintenance is done proactively and hold-ups can be avoided. Last but not least, the integration also saves space and offers the customer a machine on a small footprint.

**Easy operation and process monitoring**

SmartVac offers a centralized HMI (Human Machine Interface). Everything merges on one device, which makes the operation much easier for the operator. Adjustments of both the vacuum system and process can be done on one single screen. The vacuum performance and filter conditions are monitored and controlled continuously. All adjustments and production data are stored and visualized on the same operator screen and can easily be restored during a production change. The customer can save, analyze, link and use his data at his convenience. Also, the allocation of data to the respective shots happens automatically and is therefore up-to-date and accurate at all times. With this, SmartVac ensures full traceability and quality certification.

**Process flexibility at its best**

SmartVac offers maximum flexibility in operation and a modular configuration. The casting process is no longer controlled by the vacuum system, in fact the vacuum unit now supports the process. Bühler is one of a few vendors who can individually operate, monitor and control up to four die valves and one shot sleeve evacuation device. Process flexibility is guaranteed for both, evacuation at the shot sleeve as well as evacuation at the die. Also, the evacuation device can be positioned according to customers’ requirements. Thanks to the complete integration, the first phase of the die casting process can be automated. Algorithms were implemented which ensure that the amount of entrapped gas in the melt is minimized and the part quality can be improved accordingly. This feature is unique in the market and saves customers up to two seconds in cycle time.

**Overall productivity increase**

Several SmartVac machines are already in use, and customer feedbacks are consistently positive. With preventive maintenance measures, a considerable reduction of downtime, minimal rejects, easy operation, continuous independent monitoring and data that is available at any time, efficiency is increased all along the line. The integration of the vacuum system pays off – in terms of productivity, flexibility and quality.

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**Further information:**

Claude Stalder  
Project Manager R&D  
Die Casting  
Bühler Uzwil  
T +41 71 955 16 28  
claude.stalder@buhlergroup.com

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**ADDED VALUE**

- Increase in productivity
- Overall process flexibility
- Integrated data storage and quality control
- Complete traceability
- Easy operation
- Predictive maintenance
Success through Quality

How Gyermelyi, the Hungarian pasta producer, became the market leader with a uniquely integrated production process – and now wants to crank up its exports.

TEXT: BORIS SCHNEIDER – PHOTOS: KRISZTIAN BODIS
In many countries, pasta has a fixed place on people’s menus. However, when it comes to pasta preferences, there are vast regional differences. For example, in Italy almost all pasta served is made from durum wheat semolina, while the consumers in Hungary prefer egg pasta made from white flour. No one tantalizes taste buds in the Danube Republic quite like Gyermelyi. “Around 40 percent of all pasta produced in Hungary comes from us,” says Director Béla Tóth proudly. The differences don’t stop there, regions even have particular favorites when it comes to shapes. One specialty that is practically unheard of outside of Hungary is “tarhonya” or “egg barley.” The small pasta balls form the basis of many traditional one-pot dishes in Hungarian cuisine and are also added to soups.

“Making tasty pasta requires more than just efficient technology, it requires a lot of experience and, above all, excellent ingredients,” says Tóth describing the challenge. The Hungarian market leader combines all of these qualities. The company, which has its roots in an agricultural production cooperative founded by twelve small farmers in 1953 (see box), works using a vertically integrated production system. This system enables Gyermelyi to cover every stage in the value-added chain – from grain, to flour and eggs, right through to the finished pasta. Thanks to its seamless monitoring across every stage in the processing chain, Gyermelyi is able to ensure that the individual ingredients are of a sufficiently high quality, which means that the finished pasta is too.

An Integrated Production Network

Above all, making good pasta requires good-quality flour. However, a consistent flour quality can only be achieved if the grain has already fulfilled the highest requirements. “That’s why we start our activities from as early on as the raw-material stage,” explains Tóth. Because of this, Gyermelyi also grows wheat and other crops on an area of around 8,750 hectares. In addition, the company also runs a seeds business.
This supplies the approximately 250 farmers connected to the production network with seeds. “This allows us to create the right conditions for an ideal flour quality right from the cultivation stage,” says Tóth, explaining the advantage of this approach. Gyermelyi also works closely with the Agricultural Research Institute of the Hungarian Academy to ensure that it stays on the cutting-edge of development.

After the harvest in July, the silos on the factory premises store up to 100,000 metric tons of wheat. Around 20 percent of the resulting flour is used in pasta production, while the rest is traded or supplied to bakeries. With a market share of ten percent, Gyermelyi has also become a major flour producer in Hungary. The byproducts from the grain grinding and the maize grown by the company are processed in the feed factory and turned into animal feed. In addition to the flour, Gyermelyi also produces the eggs for its pasta: Hens in two chicken farms lay up to 400,000 eggs a day. A special machine cracks them open in the factory and transfers the fresh egg liquid directly into the production process. Up to 150 metric tons of pasta are produced and packaged on four production lines every day.

The pasta is then temporarily stored in two high-bay warehouses with a capacity of 11,000 pallets until it is finally delivered to around 1,000 customers of all sizes – from small consumers to supermarkets.

Longstanding Partnership with Bühler

The commercial success of Gyermelyi is also the result of a longstanding partnership with Bühler. The Hungarian market leader has been relying on technologies from Uzwil in key areas such as grain grinding and pasta production since 1994. The collaboration between the two companies can be traced back to the time before the political turn in Hungary. “After 1989, with the end of the economy of scarcity, the quality aspect became increasingly important, which is why previously we had bought the flour externally. However, we decided back then to build our own mill so that we could have better control over the quality of the flour,” remembers Tóth. The first plant was built using Hungarian grinding technology; however, by 1994, individual components, such as a power supply unit, a stone separator and the first rollers, had already been replaced by Bühler machines. In 2002, the mill was completely overhauled and

For director Béla Tóth, top quality is the key to success: Gyermelyi intends to increase its export volume and tap into new markets with wholesome pasta products made from durum wheat.
Bühler installed a plant with a capacity of 300 metric tons of soft wheat per day. For its egg pasta, Gyermelyi requires a white flour with a very low ash content and grains measuring just 100 to 140 micron. The tried-and-tested grinding technology from Bühler enables the company to manufacture this specific quality in an efficient, hygienic and energy-saving way, all the while producing a consistently high yield. Two of the four pasta production lines also came from Bühler: In 1997, a short-goods line with a capacity of 1,600 kg/h was installed in the Gyermelyi facility and in 2007 a second line with a pasta production capacity of 1,500 kg/h was added.

A New Soft Wheat-Durum Combination Mill

“Although egg-pasta products made from soft white flour are still the major product group, the demand for pasta made from durum wheat semolina has significantly increased in Hungary over recent years,” says Tóth describing the most recent market development. Gyermelyi previously bought Durum flour externally. However, the company decided to install a soft wheat-durum wheat combination mill so that they can produce it by themselves in the future. “We decided to use Bühler grinding technology for this project because we only use the best-quality flour,” explains Tóth. The groundbreaking ceremony took place in March 2012, assembly began in August and by December the plant was producing the first batch of flour.

Bühler supplied the complete mill technology for the plant that has a capacity of 200 metric tons of soft wheat or 150 metric tons of durum wheat a day. Equipment used in the cleaning process include a combi-cleaner, an optical sorter and a light-
The history of the Gyermelyi company is also part of European history: What started 60 years ago as a socialist cooperative is now a flagship enterprise with around 450 employees that successfully holds its ground in the highly competitive food market. The market leader of today has its roots in an agricultural production cooperative founded in 1953. Most farmers back then were forced to form cooperatives of this nature because they had no chance of meeting the production targets defined by the communist government on their own. In 1956, the Hungarian Revolution and its suppression by the Soviet army led to the break-up of the cooperative for a short period of time. However, in 1959, the cooperative was reformed this time with 120 members. The people who had settled around the village of Gyermely displayed a great deal of industriousness, as well as entrepreneurial thinking and spirit, which is why they always reinvested their profits for the future. Using agricultural machines and fertilizers increased their wheat-farming efficiency, which allowed them to generate surplus and make the workforce redundant. This gave rise to the idea of manufacturing animal feed and establishing a chicken farming operation. As eggs sold poorly in the summer months, the cooperative decided to make pasta itself. In 1970, the pasta factory began operation. When Alois Mock and Gyula Horn crossed the Iron Curtain of the Austria-Hungary border on June 27, 1989, and the political turn commenced in East Europe, this was a big opportunity for the cooperative. In Gyermely, the focus had always been on high quality for the domestic market, which meant that the transformation into a company that had to hold its own on the free market went off without a hitch. The cooperative was reorganized into a joint-stock company and the employees, who had always felt like they were running a family business and thus acted as such, were issued shares – and were now also officially owners of their lifework.

Hygienic, energy-saving and a continuously high yield: in addition to its existing soft wheat mill, Gyermelyi has now installed a combination mill for soft wheat and durum wheat.
peeling system. Grinding is carried out using 13 roller mills, as well as plansifters and purifiers. The two eight-roller mills efficiently grind the harder durum wheat. What’s more, Bühler also supplied the technology for the handling of the end products.

In 2014, the company’s two mills had already ground around 140,000 metric tons of grain. The plants are operated in four shifts around the clock. Thanks to the high level of automation, the entire milling sector is managed with just over 40 employees.

Developing Exports Even Further
Currently, 95 percent of the pasta is sold in Hungary. However, Gyermelyi already supplies supermarkets in Austria, Bulgaria and the Czech Republic through the Reve Group. Tóth estimates there to be high potential abroad. “We see our durum-wheat products in particular as a way to open up new markets and to develop our future export business even further,” he emphasizes.

The market leader is also always on the lookout for ways to improve its products; for example, by manufacturing pasta and baked goods that are enriched with aleurone. This storage protein contains the most valuable nutrients from the wheat grain and is associated with various health benefits. Gyermelyi worked with Budapest Technical University to develop a process which facilitates the particularly efficient extraction of aleurone from wheat bran. “In the future, we would like to use this process to produce products with even better nutritional properties,” specifies Tóth.

The dedicated director has more planned: The high-bay warehouse is set to be expanded within the next year. Due to the continued growth of the company, it is already reaching its capacity limits and Tóth is already thinking about the replacement for the pasta line installed in 1997. “When the time comes for this replacement, we will certainly also be looking at Bühler technology,” he says, looking ahead.

Around 40 percent of all pasta produced in Hungary comes from us.”
Béla Tóth, Director Gyermelyi

HISTORICAL CENTER OF THE HIGH MILLING INDUSTRY

In the 19th century, Budapest was an important center of the European high milling industry. Major advancements in milling technology were also invented in the country by Hungarian industrialists of Swiss descent. Abraham Ganz (1814–1867) of Embrach, Switzerland, manufactured the first corrugated cast-iron rollers in Budapest. And in 1888, Karl Jakob Haggenmacher (1835–1921), from Wintertur, Switzerland, invented the plansifter in the Hungarian capital. Hungarian flour was also very popular in England because of its high quality. Bühler has had a presence in Hungary for many years and in this time has installed several machines throughout the country, which is home to around 10 million inhabitants. These machines include nine mills, 55 sorting plants and various pelleting machines, paint mills, as well as cleaning and drying equipment.

Further information:
Gerhard Navisotschnig
Area Manager & Team Leader
Grain Milling & Grain Logistics
Bühler Central Eastern Europe
T +43 662 430 121 90
gerhard.navisotschnig@buhlergroup.com
A Soya Diet – for Salmon

Marine Harvest is the world's largest salmon farmer. Harnessing Bühler extrusion technology, it is now able to manufacture feed pellets from plant-based raw materials, reducing the inclusion of fish meal.
Rich in valuable protein, minerals, vitamins, antioxidants and omega-3 fatty acids, salmon is a healthy choice – not to mention a delicious one. Whether it is served up sushi-style, pan-fried, poached or smoked, this popular predatory fish is a common sight on our plates, with around two million metric tons of the Atlantic variety consumed every year. Nowadays, almost every single one comes from fish farms known as aquaculture. Norwegian company Marine Harvest, boasting a market share of 23 percent, is the world’s largest salmon producer. “Our farms can mainly be found in Norway, Scotland, Ireland, Canada, the Faroe Islands and Chile,” says Ben Hadfield, Chief Operating Officer of Fish Feed at Marine Harvest. It is Norway’s fjords that provide the very best conditions for the company’s business, with 60 percent of its total annual production level of more than 300,000 metric tons coming from this part of Scandinavia.

To ensure its product maintains an outstanding level of quality, Marine Harvest monitors the entire value chain – from breeding stocks right down to the packaged salmon that is ready to be turned into dinner. The fish go through a cycle of up to 2.5 years, with the yolk sac larvae and hatchlings being reared in fresh water. Once the young salmon have reached a little over a year old and weigh between 60 and 100 grams, they are transferred to large marine enclosures following a natural process known as smoltification. They remain there for a further 18 months or so until they reach approximately five kilograms in weight. Marine Harvest also runs its own dedicated facilities for processing salmon and supplies its products to over 150 countries in the form of fillets or pre-packed meals.

“Salmon feed used to contain as much as 50 percent fish meal but now that’s dropped to around ten percent.”

Ben Hadfield, COO Fish Feed Marine Harvest
“Like any aquaculture business, feed is our largest expenditure,” states Hadfield. In fact, feed costs account for roughly 50 percent of the total costs associated with a fish farm. The quantities required are huge: Marine Harvest needs 600,000 metric tons of feed per year, 350,000 of which is supplied entirely to its farms in Norway. “We wanted to become more flexible and gain more control over both the quality of the ingredients in the feed and our costs, so we decided to set up our own feed factory in Norway,” Hadfield explains.

The New Greenfield Salmon Feed Factory in Valsneset was completed in July 2014, one month ahead of schedule. With two production lines, it manufactures $2 \times 23$ metric tons of high-quality fish feed every hour – equating to an annual capacity of 300,000 metric tons. The factory has a newly built and dedicated port facility. All the farms it supplies can be reached by ship. The site is powered from the grid and uses Liquid Natural Gas as a source of thermal energy for drying pellets and propulsion of the two 3,000 metric tons delivery vessels. Given its location, it is also a primary user of wind generated electricity.

Just like any livestock, farmed fish need highly concentrated feed that will allow them to absorb enough nutritional elements over their growing period of just under 2.5 years. Salmon diets are high in protein and also high in healthy fats. Manufacturing the type of feed known as aquafeed
involves first grinding the ingredients, then mixing them, cooking them in an extruder, shaping them into pellets, drying them and then adding a blend of fish oil and rapeseed oil – a sequence that poses a variety of challenges. Not only must the size and composition of the pellets be exactly right for the variety of fish being fed, the cubes of feed also require a certain bulk density that will allow them to sink in the water. Salmon feed, for example, needs to sink slowly so that the fish can identify it and consume it before any pellets escape from the salmon pens the fish are reared in.

**Plant protein as a substitute for fish meal**

The most significant challenge facing feed production today, however, lies in the fundamental changes that ingredients are undergoing. Traditionally, the protein in salmon feed has come from animal sources such as fish meal and fish oil – both ideally suited to the needs of salmon and easy to convert into protein in the body. The fact that they are produced from wild-caught fish, however, makes them finite natural resources. Feeding wild fish to farmed fish is justifiably one of the biggest criticisms leveled at aquaculture and is a dubious practice from a sustainability perspective.

Marine Harvest points out that its fish meal and fish oil come from well managed and certified sustainable fisheries. Nevertheless, the company is trying to reduce the amount of marine resources it uses. With this in mind, the salmon industry is increasingly turning to plant proteins based on soya, wheat, corn, peas and bean concentrates in order to maintain sustainable production levels over the long term. “Salmon feed used to contain as much as 50 percent fish meal, but now that’s dropped to around 10 percent,” states Hadfield. Using plant-based proteins and plant oils has a profound impact on the manufacturing process. For example, pellets containing a high level of plant protein have to be extruded using a different process in order to obtain an end product with the desired properties. Another challenge lies in the high oil content of salmon feed and the fact that the pellets need a specific pore space as a result: The interstitial pore space in a pellet has to be just right or the pellet will not hold the oil.

**Unprecedented process monitoring**

To manufacture its feed, Marine Harvest employs Bühler extrusion technology in the form of an ECOTwin extrusion system that makes it possible to control and monitor the entire process on a previously unprecedented scale. This enables fish feed to be produced so that it not only has the highest standards of quality and the required properties, but also contains plant-based raw materials such as soya meal. One feature that allows this to happen is the precise control of the cooking and shaping process during extrusion – creating specific characteristics such as starch gelatinization, water stability, physical properties and texture. Even the digestibility of

The new feed farm supplies all of the salmon farms in Norway by ship.
By 2050, the world's population will have risen to nine billion. As the affluent middle classes grow within this trend, so too will the demand for higher-quality foods such as meat and fish. The latter is both rich in valuable protein and polyunsaturated fatty acids, but wild catching methods have long been unable to satisfy the growing demand for it. Aquaculture is therefore playing an increasingly important role in supplying protein, and already provides the source for around half of all the fish and seafood consumed around the world. According to estimates from the Food and Agriculture Organization of the United Nations (FAO), this figure is set to rise to two-thirds by 2030. While China and Southeast Asia tend to farm freshwater fish such as carp, Europe concentrates on the salmonids family, which includes salmon and trout. With an annual growth rate of seven percent, aquaculture is the fastest-rising branch of animal-based food production. As livestock, fish offer some crucial advantages over terrestrial animals: Fish are cold blooded and do not need to hold their own weight. As a result, their feed conversion is very efficient.

The ability to produce high-quality feed from plant-based proteins means that the salmon now consume less fish meal and fish oil.
Wind farms supply renewable energy to power the New Greenfield Salmon Feed Factory in Valsneset.

“We have to be sure that the plant-based raw materials we are using are being sustainably produced.”
Ben Hadfield, COO Fish Feed Marine Harvest

the pellets is determined by the cooking temperature. What’s more, the Bühler technology enables precise configuration of the bulk density at just the touch of a button – making it possible to manufacture pellets with perfectly defined sinking properties using any raw material.

This comprehensive process monitoring has brought with it some key advantages for Marine Harvest. “Optimizing properties of the pellets in specific areas allows us to increase their conversion ratio and save costs on the bottom line,” explains Hadfield. The company’s new-found ability to process plant-based raw materials efficiently has resulted in a significant boost in flexibility too. “We are able to respond much more flexibly than before to daily changes in availability and prices on the raw materials markets – and test out new recipes quickly,” says Hadfield, summing up the advantages.

In a short space of time, Marine Harvest has established a large feed company and integrated it within its existing operations. “I believe that we have started a good partnership with Bühler,” comments Hadfield. So it does not come as a surprise at all that the two partners are currently working on a capacity expansion of the existing production lines.

A drive toward more sustainability

Replacing fish meal and fish oil with plant-based proteins is undoubtedly an important step toward a more sustainable future, but, as Hadfield says when explaining the next challenge the company faces, “We have to be sure that the plant-based raw materials we are using are being sustainably produced.” As an example of what Marine Harvest is doing to achieve this, all the soya it processes is to come entirely from sustainable sources within a challenging time frame. The industry is also making efforts to improve the situation surrounding animal-based proteins, which are still required for some feed production: Where possible, fish meal and fish oil will now be derived from fish waste products from human consumption rather than wild-caught fish.

On top of this, the world’s largest salmon producer is working intensively with the Aquaculture Stewardship Council (ASC) on its current drive to have its salmon farms certified according to the strict criteria of the organization, which was founded in 2010 by bodies including WWF. It is, after all, important for consumers to be certain that the farmed salmon on their plate is not only healthy, but sustainable too.

Further information:
Urs Wüst
Product Manager Nutrition
Grains & Food
Bühler Uzwil
T +41 71 955 31 39
urs.wuest@buhlergroup.com
Healthy Grain

The media is questioning the value of grain. Consumers are getting more concerned. There is a growing demand for healthier products. This opens numerous opportunities for alternative products but also for the grain processing industry to step up to the challenge.

The rise of mankind and the skills to cultivate and consume wheat are intimately related. The earliest traces of wheat were found in Egypt, the Mediterranean area and Israel between the 15th and 10th millennium before Common Era. The first production of flour started in the stone age when wheat was ground with rocks. Leavened bread was produced around 3000 BC and the Romans started to sieve ground wheat to obtain finer flour around 200 BC. Historically, the ability to grow cereals was key in deciding the location of settlements. Following the green revolution, grain producers have placed greater emphasis on economic factors: such as yield, crop resilience, protein content and quality, giving the perception of a neglect of nutritional aspects.

Whilst consumers appreciate convenience foods that are ready to eat or ready to cook there is a growing push for natural products and visibility back to the farm. Artisanal food production is seen as a quality standard for good taste and wholesomeness while processed food items are coming under public scrutiny. Health concerns around diet, overconsumption and lifestyle rightly abound. The overweight and obesity rates continue to rise along with their associated healthcare costs. Refined wheat and flour has become a highly emotional topic of discussion and has been linked with various health concerns, ranging from overweight to Alzheimer’s disease.

As we reported in our previous diagram, gluten free products are ever more favored with a staggering 40 percent of US consumers professing to avoid gluten containing food. Mintel reported that 16 percent of products launched in the USA in 2014 were gluten free, compared to four percent in the previous year. In Germany, a company specializing in gluten free bakery products saw a 25 percent turnover increase in 2014.

Together with rice and maize, wheat stands as one of the basic staple foods today and has an important contribution to make in sustaining our ever growing global population. In many cultures, wheat is central to each dining experience, be it croissant, bread, cakes, pizza bases, cookies, muffins, pasta or noodles. While there are many alternative grains available, we are convinced that wheat will not only remain an intimate part of our diets in the future, but that it is critical if we are to ensure food security for our growing population.

Although, it is worthwhile to remember that processing wheat is also a food safety step (removing potential toxin forming moulds, such as fusarium). We acknowledge that as an industry we have neglected our role to inform about the value of wheat and the role wheat plays in our balanced diets.

We are working with top research groups in the field on the agricultural side, the processing and the human digestion and health aspects. At the same time, with several major players, we are setting up an industrial group integrating partners along the entire grain value chain to address the consumer perception on the health benefits of wheat. I believe that this challenge requires strong, transparent collaboration and I welcome your involvement.
IN ADDITION TO THEIR DAY JOB, BÜHLER RESEARCHERS HAVE FOUND TIME TO CONTRIBUTE SCIENTIFIC PUBLICATIONS. HERE’S A SELECTION.

1 Novel flour analysis methods for the prediction of baking quality

Starch and protein structure are important quality parameters in flour regarding functionality and quality of end products. In this article, reversed-phase HPLC was used to determine the glutenin and gliadin fraction, as well as distinguish between high and low molecular fractions of glutenin. It was proven to be a useful tool to establish structure-property functions when combined with classical methods like enzymatic determination of damaged starch. The comparison of results with empirical dough analysis methods showed a good correlation.

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2 Sterilization applying pulsed electric fields

Researchers from the Leibniz Institute for Agricultural Engineering, the Technical University Berlin and Bühler AG investigated the inactivation of endospores by a combined thermal and pulsed electric field (PEF) treatment, as well as by a pure thermal inactivation. It was shown that at identical F-value the pure thermal process led to an inactivation of Bacillus subtilis by 3.71 log while the combined thermal and PEF treatment led to a 4.67 log inactivation. The difference in effect was even more pronounced for Geobacillus stearothermophilus spores. Hence, the PEF technology was evaluated as an alternative ultra-high temperature process. However, for an industrial scale application of this process for sterilization, optimization of the treatment chamber design is needed to reduce the occurring inhomogeneous temperature fields.

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