2014.
Solutions for our customers.

Annual Report Magazine
Our Business Areas.
With its eight business areas, Bühler occupies an outstanding position with regard to its technology and regional presence, serving as a local solution partner for customers in the food processing industry, as well as for processes in the automotive, glass, electrical, and packaging industries.

Services & Solutions.

Customer Stories

Whitworth, UK.
A technology partnership founded on a shared passion for getting things right.

Isigayo, Mozambique.
Sustainable agribusiness is changing people’s lives.

Jinjing, China.
More energy-efficient buildings with silver-coated low-e glass.

Customer Service.
The changes that other industries have successfully managed over the past decades have now also reached the suppliers of industrial plants and equipment. We are also transitioning to a business model strongly driven by new service and integrated solutions. Hardware remains a key competitive factor. But based on it, services – ranging from plant engineering, extended maintenance, and optimization of overall plant efficiency to training and continuing education – are increasingly coming to the fore. Why? Because in many cases customized solutions and integral system approaches are the only way to significantly increase performance. And the satisfaction of regional needs, too, is calling for new, application-focused concepts – for example in order to jointly develop regional food products that are based on completely new production processes.

We at Bühler claim to be the engine powering the new service and solutions world in our specific industry. We are making every effort to help our customers achieve success. This is the core message of this magazine. Today, we operate almost 100 sites around the world to be close to our customers. Our efforts in this connection are governed by the philosophy of being “in the region, for the region”. We invite you to read about how we are joining forces with our customers in our new applications laboratory in China (page 11), how we have developed a new concept for a compact maize mill to meet the needs in Africa (page 22), or how our customers in Spain can benefit from our new service & solutions station (page 39).

Thank you for your attention and kind regards,

Calvin Grieder
CEO
Grain Logistics.

Bühler Grain Logistics offers storage solutions, machinery and components throughout the entire food value-added chain – from an agricultural product’s reception through to the final stages of processing. Whether it’s a silo installation for harvesting purposes, a plant for grain trade, or a storage solution for the processing industry: Grain Logistics is a competent global partner providing individualized on-site customer service from conception to startup. With its knowledge and services, Grain Logistics sees to it that post-harvest losses, which are still occurring at an immense rate globally, are further reduced and that fewer commodities go to waste. Furthermore, with 75% of all malt produced in plants provided by Bühler, Grain Logistics is the worldwide leading supplier of individually tailored malting systems.
Our Business Areas.

Grain Milling.

The Grain Milling business area makes a significant contribution to global food supplies. Around 85% of the wheat harvested worldwide is ground on Bühler mills. Grain Milling offers its customers state-of-the-art process technology and innovative engineering for processing wheat, maize (corn), rye, oat, barley, millet/sorghum, buckwheat, and soybean. As a solution partner for its customers, the business area covers the entire value chain from consultation to engineering, assembly, and commissioning, right through to maintenance, training, and continuing education. The business area also provides innovative plant concepts for the brewery and bakery markets. Bühler plants guarantee sensitive handling of valuable raw materials and achieve the highest product quality and yield while making it possible to optimize production and staffing costs. The business area has a presence in 140 countries and 40 of its own branches, and is active on all continents.
Bühler Sortex & Rice significantly contributes to global rice and pulses nutrition and additionally ensures and safeguards food safety by unique proprietary sorting technology. As the global benchmark in optical sorting, SORTEX advanced technology ensures that many crops are sorted with exceptional accuracy and speed. Defective grains and foreign materials are rejected, while maximizing speed and yield and minimizing the loss of good grains. Our reputation for research and technology in the processing of rice by-products helps our customers to maximize value from every grain. In pulses, sesame, and spices processing, our collaborative innovation approach aims to develop comprehensive processing solutions along the pulses value chain from farm to plate. With landmark rice mill installations in every major rice geography, a global installed sorter base of over 25,000 machines and extensive capabilities including consultation, project management, installation, and startups, Sortex & Rice is the technology partner of choice for processors who value excellence.
Our Business Areas.

Value Nutrition.

The Value Nutrition business area combines innovative process solutions for the food and animal feed industries and pays particular attention to the ever-increasing requirements placed on valuable human and animal nutrition. As a result, Value Nutrition is the global solution partner for producers of food and animal feed; from pasta and noodles, cereals, and snacks to pet food and feed for fish, cattle, and poultry. The company’s contribution in this area is substantial: Around 40% of global pasta production takes place on machines made by Bühler. It is also responsible for 35% of the world’s cereals and 20% of its feedstuff. The core technologies of Value Nutrition relate to the areas of extrusion and drying, both of which are ingrained in comprehensive expertise throughout the entire process. This allows Bühler to time and again set international standards in various areas, including energy efficiency in the production process, for example.
Consumer Foods.

Consumer Foods contributes significantly to the worldwide production of cocoa, chocolate, coffee, and nuts. With a market share of 60%, the business area has set standards in chocolate manufacturing and is committed to the continuous development of innovative technologies. The company is a complete product and service provider to the industry and covers every process stage with state-of-the-art production systems. Bühler provides energy-efficient processes with maximum raw material yield and top product quality.
Die Casting.

Bühler Die Casting is the global leading provider of aluminum lightweight solutions to the automotive industry, supporting their efforts to reduce CO₂ emissions. Around 20% of all cars drive with engine blocks made with Bühler equipment. The business area provides optimized die casting machines and cell solutions, fully integrated process controls, plant layout know-how as well as global service support and process knowledge. With a strong global service network, several application centers as well as its own production, machine revision and technology sites in Europe, Asia, and North America, Die Casting supports its customers in all phases of their investment, ensuring highest productivity and quality – from planning to startup and throughout the entire life cycle of the equipment.
Grinding & Dispersion.

The production of inks, printed products, solar panels, or batteries for electric cars rely on equipment and solutions available from Bühler Grinding & Dispersion. Around 75% of the silver paste used in solar panels are produced on Bühler equipment. Bühler Grinding & Dispersion offers comprehensive know-how and has the ability to deliver its customers tailor-made systems for complex processes. As a technology partner for process engineering, Grinding & Dispersion has not only state-of-the-art machines, but also complete solutions for the manufacture of highly advanced materials. Our continuous development enables our customers to manufacture better products and be at the forefront with market innovations.
Leybold Optics.

With its vacuum deposition equipment, Bühler Leybold Optics contributes among other things to energy efficiency, comfort, and food preservation. Thin-film applied on our machines ranges from functional coatings for window glass to coatings for headlight reflectors as well as flexible packaging. Coatings for ophthalmic and precision optics products such as lenses, lasers, or high-end telescopes complete the Leybold Optics product portfolio. Buildings with coated facade glass require up to 50% less energy for heating and cooling. The business area combines state-of-the-art equipment technology with comprehensive process and application know-how to offer customers complete production solutions.
From Swiss Machine Builder to Global Solution Partner.
Bühler has long offered more than just machines and plants. With extensive training, consultation, and engineering services, application and development centers in all major customer regions, and a global network of around 100 service stations, the company is now a global industrial solution partner. Customers benefit from higher efficiency and productivity, better quality, and the opportunity to tap into new markets.

Indians are as particular about atta – a wholemeal wheat flour – as the Swiss are about Olma veal bratwurst, Italians are about Parma ham, Americans are about hot dogs, or the Chinese are about Peking duck. Atta has to taste slightly sweet and have a special roasted smell in order to correspond to the regional preferences. Up to now, it has not been possible to create these properties 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-saving, 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.

For Bühler, PESA represents a paradigm shift toward becoming a global solution provider. In the old Bühler world, the products were developed in Switzerland and distributed around the world. The new Bühler world works consistently according to the motto “in the region, for the region” – with a holistic, solution-oriented approach. “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, head of Grains & Food at Bühler. Scheiber is describing a global mega-trend which is fundamentally changing the global food industry.

And that’s not all: “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. For example, Bühler’s die casting machines are incorporated into the complex production processes of automotive manufacturers. “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.

In addition to regionalization, therefore, 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 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, and 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 Centex bead mill from the Grinding & Dispersion business area? Is it ground down or stretched? 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
Bruno Mendler, Chief Strategy Officer.

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

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, the Leybold Optics business area also provides the necessary process expertise to produce architectural glass or optical filters, for example. These formulas are then tailored to suit the concrete application in collaboration with the users.

•  Engineering. Bühler has an extensive machine and component portfolio, enabling it to map entire value chains – for example, in grain or chocolate processing. The 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. Also during the year 2014, Bühler has handed over numerous plants to customers all over the world such as e.g. 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. In the last few years, Bühler has developed a full range of services for maintaining and repairing its machines and plants in order to ensure optimal operation and high availability: the company currently has a global network of over 80 service and solutions stations, and ultimately aims to have over 100 service locations to ensure close customer proximity.

•  Training. Bühler offers a unique range of training programs to provide customers and its own employees with the right qualifications to use hi-tech power units to their full potential. The latest example of this global education initiative is a milling school in Kenya, which is due to open in 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, head of Advanced Materials. With a market share of around 25%, Bühler Die Casting is now the undisputed leader in its industry. Over 20% of all vehicles worldwide have engine blocks which were made on a Bühler machine; in China, this figure is over 45%.
NIR Multi Online Analyzer continuously monitors the quality of raw material and finished products in real time.

Predicting the future.
As extensive as Bühler’s service and solutions portfolio is today, the company is confident that this is only the start of a long-term trend – where the focus will be on sensor technology, predictive analytics, and preventive 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 up minor irregularities during operation before any damage occurs. This allows the Bühler service engineer to take a 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 automatically operated in the best possible way.

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 Services & Solutions.

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

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
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

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
Going with
the Grain.

Whitworth Brothers Victoria Mills is a world-class flour mill, successful in the competitive UK market. For 15 years, Bühler has been with them every step of the way: a relationship founded on a shared passion for getting things right.

By Daniel Whitaker (text) and Raffael Waldner (photos).
Archaeologists, anthropologists, and historians believe that learning to grow grains and to grind them for eating was the most important step in our path to civilization. Bread became known as “the staff of life”. Certainly, grinding flour has been the source of great success for family-owned Whitworth Brothers, who operate probably the world’s most advanced mill at Wellingborough in Britain’s East Midlands.

The company’s growth in recent years has been prodigious. When its current owner, Martin George, bought out his brothers to take control in 1998, Whitworth Brothers Limited had barely 2 percent of the British flour milling market. Yet today it is the largest player with over a quarter of the free trade flour market.

The battle for British bread.
This is all the more remarkable because the UK flour market is not only large – well over €1 billion – but also acknowledged to be perhaps the world’s most demanding in which to trade. On the supply side, a maritime climate that delivers unexpected weather fronts from the Atlantic and North Sea means that cereal harvests are unpredictable, in quality as much as volume.

Roger Butler, Whitworth’s managing director since 2000, holds two wheat kernels up to the fading Northamptonshire afternoon light at Whitworth’s state-of-the-art Victoria mills complex. Both grains are from the heart of the British “wheat belt”, the flat fertile counties east of the M1 motorway, that are more sheltered from the rains that drench the west of the country. Roger affectionately describes one as “like a lovely plump ball bearing, with just enough length to indicate minimal air trapped within it.” This was grown in 2013’s reasonable harvest. But his face saddens as he indicates the second smaller, more shriveled kernel, gathered in the wet summer of 2012, which Roger describes as “a shocker.” The second sample is “almost unmillable,” he says.

The domestic harvest matters because less than 15 percent of UK milled wheat is imported – mainly from Canada, Germany and France. So millers need expertise in knowing how to analyze what they are given and how to adapt their milling process to its condition. And the UK’s demand side is no easier to deal with. There is a longstanding native predilection for a wide range of baked goods – from sliced white industrial loaves to artisanal wholegrain, and encompassing sponge cakes, crumpets, fruit breads, and pastries. But the UK’s mosaic population and cosmopolitan tastes mean that Whitworth must also know how to mill for Indian chapattis, for Polish rye breads and for Middle Eastern pita breads. The challenges in both processing inputs and delivering outputs mean that technology is often developed in the UK before any other milling market.

A technology partnership.
For a UK miller to survive, let alone to thrive as Whitworth has done, a good eye for investments is essential. These will be in staff; in relationships with suppliers and customers; but primarily they must be in...
the machinery with which they mill. Whitworth chose Bühler fifteen years ago as its main technology partner, and the two companies together have developed Victoria Mills into what is now perhaps the world’s most advanced flour mill.

Roger sums up the reasons for Whitworth’s choice: “Bühler like to challenge the status quo. And just as importantly they do what they say they will. When they face a challenge, they sort it out.” The same might be said of Whitworth Brothers Ltd and the result is a milling company producing more than 700,000 tons of flour a year compared to just 85,000 tons back in 1999. Apart from conventional flour, there are now four heat treatment plants, offering an additional capability compared to most competitors. But the expanded volumes and product lines are the results, rather than the causes of Whitworth’s success. That success has come through achieving quality control and food hygiene, which customers can rely upon absolutely, and through efficiency that allows consistently competitive pricing.

Focus on hygiene.

Operations director Mike Peters enthusiastically demonstrates the process stages provided by the Victoria Mills plant. Wheat is brought in, cleaned, milled, separated into wheat feed – which is pelleted – and flour; then finally both are bulk loaded into the yellow Whitworth transporter lorries familiar to anyone who drives the main English arterial roads. In particular, Mike emphasizes quality control – through automated control loops and retractable best practice quality check – and hygienic design. He also explains why this matters: “The UK has some of the most stringent food safety regulations in the world. But beyond this, protecting both our own and the customer’s reputation and brand is our first priority. This is why we have a constant focus on filters. Rubber seals have been switched to more durable metal, and parts that were once made in white are now made in blue, so that they can be seen against the flour.” Surveying the milling machinery, what first strikes the eye is the gleam of stainless steel. Bühler’s Ernst Hobi, who worked closely with Whitworth in establishing the current plant estate, describes why this is necessary. “Although a more expensive material, stainless steel guarantees no contamination of the flour by flaked off paint or metal coatings, or rust.” Over the years, Roger has come to appreciate that Bühler’s technical knowledge of metallurgy, and of the stresses that will be placed on machinery, is a vital competitive advantage. Without this, initially
useful machine parts can suffer cracks, vibrations, and damage over time, which will cost money or worse: compromise the safety and hygiene of the flour. Ernst adds one other advantage of the ranks of stainless steel components: “They’re not only functional but also beautiful. We are engineers, but we have emotions.”

In good times as in bad. Whitworth enjoys other strong relationships with stakeholders. Camgrain is a farmer-owned cooperative with over half a million tons of storage capacity that can collect grain from farmers and then provide it to Whitworth. Through Camgrain, Whitworth has acted to support its farmer suppliers through difficult times, and both organizations act in ever closer cooperation with the mutual aim of maintaining product quality. There is also an air of satisfaction among mill employees, including those trained

Martin George’s family business.
Martin George sits under a portrait of his grandfather, who had started as an apprentice to the Whitworth brothers, before persuading them to sell him the firm in the 1930s. Both men look quietly satisfied with what they have achieved. Since Martin himself took up the reins, buying out his own brothers and family trusts in 1997, the changes have been on a grand scale.

First has come a new concentration on milling, with other businesses in bakeries and cooking ingredients being sold. Then there has been the sustained increase in scale – lifting Whitworth Bros. from twelfth to first place in the national league table of flour millers, going from 100,000 tons a year to a million in just a decade. But linking these two together has been the relentless focus on quality of technique and control of costs.

“We had luck with our location,” admits Martin, recognizing Victoria Mills’ proximity to ample wheat farming territory and to the best of Britain’s road network, “but we also certainly made the best of what we had.” Across the River Nene – which had once delivered both power for watermills and also an earlier transport network – abandoned shoe and clothing factories can be seen, which show only too clearly what happens when owners don’t adapt and invest adequately.

“As the key has been that this firm is a family business, here for the long term,” Martin says. “Public corporations might cut corners so as to favor quarterly results, or sell the business for a quick profit. “But our staff, our suppliers and our customers all know that we will invest as needed and won’t be going anywhere.”

It’s also telling that Martin’s is far from the only family intimately connected to Whitworth. Roger Butler’s father Bill had been sales director for Martin’s father, for example. Meanwhile the

brother of the current finance director works for Martin’s son Michael in a private equity firm that may be just the preparation for a later career for both in Whitworth Bros.

As he talks about the relationship with Bühler, it almost feels like Martin is describing another family member. Certainly the successful procession through one challenge after another has bound the two companies closely together. Martin reels off the innovations: “Individual storage bins; the first roller mill on the roof of the building; automation so that a single miller can cover four mills. We have learnt as we went along.”
as apprentices – another practice in which Whitworth leads many competitor mills.

But the link with Bühler is a special one, stronger still since the “shockingly” bad 2012 harvest that Roger Butler described earlier. That year became a great test for UK millers, as their customers demanded a consistent product that the available grains seemed unlikely to permit. Yet, Bühler’s analytic, recipe-based adjustment and control functions allowed Whitworth’s expert millers to vary the blending and processing of the grains until an acceptable flour was produced. Whitworth Brothers passed with flying colors – they were, for instance, the only miller that could provide all of supermarket chain Sainsbury’s with UK-only wheat. Roger recounts that “Bühler have given us a flexibility in milling which allowed us to deal with a very tricky harvest. That’s something that we really appreciate.”
The milling process.

Victoria Mills is capable of processing a range of different qualities of wheat, including those “hard” grains with a high protein content – which produces flour, which best holds the shape when baked. Around 80 percent of the grain is endosperm, the raw ingredient for flour. The remainder, germ and bran, will usually become animal feeds, turned into pellets. But there is great variety in this – with whole meal using all of the grain and, for example, pastry flour using not much more than half of it. The milling technicians will carefully blend grains to order, what is known as a “controlled grist”.

Since 2003 a “peeling” process has been employed to strip off the outside of the grain, which has the benefit of removing pesticide residue. Victoria Mills was the first place that this was done, though it is now applied worldwide. The main milling process is through giant roller mills, occupying most of the “roller” floor of the plant, which will break the kernel. A pneumatic suction system with cyclone separation conveys the intermediate milling stock to the top floor. Finally the flour passes to the “sifter” floor, where a powerful shaking mechanism calibrates the flour particles. From here, the flour will descend to the “spout” floor, passing through bran finishers, before the flour is collected on a gentle gathering chain conveyor. This is preferable to the more traditional screw mechanism for taking out the flour for sanitation reasons. A pneumatic conveyance system transports the finished flour to the flour storage and bulk loading bins.

Double control sifting works as a precautionary last defense against anything untoward entering the flour. Infrared NIR technology is used to analyze the final product, checking for mineral, protein, moisture, and starch content.
A Compact Mill Drives a Community’s Growth.

In rural Mozambique, a tough, innovative compact mill is kick-starting sustainable agribusiness – and changing people’s lives.

By Janine Stephen (text) and Raffael Waldner (photos).
It can take up to six hours to drive from the port of Beira, Mozambique, to the inland town of Catandica. The town is surrounded by rural villages, where people till the land and wait for rain to nourish small fields of maize and beans. Here, women still use a heavy wooden pole and mortar to pound their own maize, an arduous, time-consuming task. Other villagers may use basic, generator-run hammer mills to grind flour. Yet tucked away in a warehouse on the outskirts of Catandica, a humming, compact Bühler maize mill now produces the finest quality grits and flour seen in Manica Province. Suddenly, smallholder farmers have a stable market for their crop – an unknown luxury.

The owners of this 2-ton per hour Isigayo mill are Grant and Alison Taylor of Empresa de Comercialização Agrícola (ECA). The young company not only plans to grow agribusiness in this prime maize-growing region in Mozambique, but to uplift farmers. ECA provides local farmers with the quality seed and fertilizer they need to increase yields, and promise to purchase the harvested corn. “We help farmers become commercially viable, just as we’re commercially viable,” explains Grant Taylor. It works: farmers, with plots of just 0.25 to 5 hectares, are producing up to four times more maize than before. Crucially, they no longer have to sell their surplus on the side of the road, or to “unsavory buyers at a low, reduced price.” Simply because ECA pays its contracted farmers a premium price.

Adding value and building trust. ECA always had a “vision” of processing maize. “Marketing raw maize in Mozambique is extremely difficult for smaller producers,” Grant explains. The secret is adding value. ECA’s breakthrough was securing a three-year contract to supply grits to Mozambican-based brewers Cervejas de Moçambique (owned by South Africa’s SAB Miller) to make a traditional beer. With this client, ECA and social impact investor AgDevCo could begin the search for the right mill. They needed a robust, entry-level model that was highly reliable. It also needed to produce top quality grits. “The specs CDM required were very high,” Grant says. “In the end, the only option that answered all our needs was Bühler’s Isigayo mill.”

The Isigayo is a preassembled mill built into two shipping containers, designed for easy transportation to rural areas. It can be installed in a week. Developed during a Bühler Innovation Challenge, it condenses top-quality milling technology into a turnkey solution that only needs a suitable power source to run. The Isigayo has no touch screens or high-tech electronic components, a liability in a rural setting. And it’s made to last for 40-odd years. As Bühler business development head Anton Holenstein says, it brings Bühler’s ethos – engineering customer success – to startup enterprises entering the milling market.

The Isigayo was a significant investment for the Taylors, and more expen-
Bühler’s Isigayo mill has already created seven permanent milling jobs, with more to come. Above, packers Jó Zacharia, 23 (left), and Paulo Santos, 30, bag milled maize grits.

Employment creation is exceptionally important in rural Mozambique. Evance Musarurwa, ECA’s miller, says:
“This is almost the only company in the area. It provides employment and procures (maize) locally, so it is part of the economic life of our community.”

Claude Inauen, Bühler South Africa team leader sales, ensured that the Isigayo mill could provide ECA with the top quality maize grits a key client demanded.
sive than other entry-level mills, which however were based on less reliable technology, especially for de-germination. “The quality was a factor, and as a plug-in and go option, it was very attractive,” says Grant. “It didn’t require huge project management.” The Isigayo is also a movable asset, important for areas where political instability or changing weather patterns can influence farming. Beside the Bühler name, in the end it was “the service, back-up and all the support that came with the mill that helped us decide on the Isigayo,” Alison says.

Remarkable growth.
The Taylors had a taste of the service levels when Bühler South Africa team leader sales Claude Inauen flew to Mozambique to check that the Isigayo could profitably produce the grits CDM needed for their beer. He analyzed CDM’s brewing mix, and was able to suggest a few simple modifications to the Isigayo to ensure it turned out the right quality, low-fat grits – and doubled the yield. This meant that ECA could both meet CDM’s needs, and continue paying its farmers a fair price. “Grant is an agricultural entrepreneur turned first-time miller,” Claude explains. “As we understand the entire value chain and know the market in Mozambique very well, we were able to consult ECA with our milling and brewing know-how.”

“Bühler equipment is the Rolls Royce of the industry,” ECA’s miller, Evance Musarurwa, says proudly. “The Isigayo may just look like containers, but the equipment fitted in there is state-of-the-art. You look at the de-germinator, the roller stands, the sieves: it’s all new technology. The system is very efficient in terms of extraction, quality, and capacity. It’s a simple solution to a sophisticated problem.”

ECA has achieved remarkable growth in just three growing seasons. In June, the Mozambican president officially opened the mill and praised its contribution to food security and sustainable development in the Barue district. ECA plans to ramp up production on its mill – designed to run 24/7 – to three shifts in 2015, which will require a workforce of 21 people.

Fields of change.
A job as a packer has already changed John Shingirai’s life. Born in Barue district, his own family grew maize for subsistence; now he hires someone to help him farm. “When the mill arrived, we could see there was growth in the company,” John says. “This meant the work was secure and there was a chance to improve my livelihood.”
ECA buys all the maize local farmers can produce. The operation has grown dramatically in just three years, making additional storage facilities necessary.

“\textit{We do think this is a replicable model, both in terms of how ECA is working with its network of farmers and also the milling solution (in terms of Bühler’s equipment and technical support package). It has the potential to bring capable entrepreneurs that full turnkey solution.}”

\textit{AgDevCo.}

\textit{AgDevCo} is a social impact investor committed to poverty reduction and food security who financed the mill. AgDevCo decided the ECA business model had the holistic approach projects in this area need to succeed. “\textit{Rural Africa needs complete solutions},” says AgDevCo’s executive director business development, Chris Isaac. “\textit{A lot of smallholder farmer projects have not proven sustainable because they only address one piece of the problem.}”

Chris Isaac, AgDevCo executive director business development.
A woman in Catandica, Mozambique, carries a hand-carved wooden mortar and two heavy wooden pestles. This traditional method is still used to grind maize – but it’s tough, tiring work.
“I’ve been a farmer all my life. I use the maize I grow to feed my own children, and I sell the rest. For many years, we would just produce enough maize for the family to eat. But for the last three years, we’ve produced extra and sold it to ECA.

My land is about 3 ha. In the first year we worked with ECA, I grew 50 bags of maize. In the second year, it was 60 bags. And in the third year, I produced 120 bags. That first year, I did not have oxen to help me cultivate the fields. The next year, I used oxen on a part of the field, and some fertilizer. In the third year, we used oxen to prepare the entire field and fertilized all the land. Using fertilizer gives us a big advantage. We get a fair price considering that ECA gives us seed have not been able to buy a beast, but this year I was able to buy two cattle to plough my fields. And now that we have this extra income, I will be able to send the children to school.”

Most local residents rely on farming to feed their families. “Maize is the staple food here,” one farmer said. “If there is no ground maize at a homestead, we say there is hunger in that home.”

The Isigayo, which can run 24/7, will contribute to food security in the region. ECA’s top client, Cervejas de Moçambique, is delighted to have a local supplier to purchase maize grits from. “It fits in with our company values of expanding local supply chains,” says CDM’s Adrian Mitchell.
Farmers in the nearby village of Chozvo are as enthusiastic. “ECA has brought a lot of security to the village, because we know where we will be able to sell our crop,” says Pedro Chico Dzimba. “The price they pay is also different to the price that others would give us for our produce. The community is very happy about this.”

“ECA has not got any special magic formula, but does the basics well and deals fairly with farmers,” says Chris Isaac. “The investment in the mill made sense; ECA needed to value-add to secure its place in the market.” As Claude Inauen says, by taking the mill right to the areas where smallholder farmers are based, startups can cut out high transportation, staff, and logistics costs. “You can become operational with a small investment and a lean setup. The Isigayo can work anywhere that needs entry-level and small-scale solutions,” Inauen says.

Near Chozvo, Charles Langton lives on a four-hectare patch of land with his wife and six children. His farm appears relatively prosperous: Goats and chickens wander about and the maize fields have been prepared for planting. “Before ECA it was hard to get to market,” Charles explains. “We’d have to hire a truck and travel long distances.” He has ploughed his earnings back into his farm, investing in irrigation pipes that use gravity to bring mountain spring water to his fields. He has plans to send all his children to school. And he has built a shop in the village that now sells staple groceries. He is yet another ECA success story. As Charles says: “ECA has brought very good change to the whole community, not just a few families.”

“With us, the farmer knows he has a ready market for his crop, and that provides enough security for him to work hard in the field. ECA’s mill has helped build trust in the market too. That mill needs a constant supply of maize. In our first year, when the farmers came to sell their maize, they thought: ‘Okay, this is one of those companies that will be here for a year.’ The second year, they came and saw we’d built another warehouse and a lot of change had taken place. And the third year, they came and saw the mill running. Now they’re confident that ECA will be staying for some time and that they have a guaranteed market for their produce.”

Moses Muchayaya, 46.
Beijing’s Blue Skies.

The continuing urbanization of China places a huge responsibility on the construction industry to contribute towards more energy-efficient buildings. Jinjing’s low-e glass improves insulation on a significant scale.

By Justus Krüger (text) and Raffael Waldner (photos).
This looks odd: Yizhuang, a suburb of Beijing, is normally swarming with workers, office staff and trucks. Located about 45 minutes’ drive southeast away from the city center, Yizhuang is an industrial zone. Today, however, early in November 2014, the area is quiet, nearly empty. Production is standing still. There is hardly a car on the road. The reason: Factories in Beijing and neighboring areas were temporarily closed to reduce the notorious smog over the Chinese capital for a few days.

It worked. But while the citizens of Beijing enjoyed the blue sky, more long-term measures are needed to make China’s economic success more ecologically sustainable. Naturally, the government as well as private companies are aware of this. One of the companies that make a difference is the glass producer Jinjing.

Saving the energy of entire power plants.
Xu Jun, technology manager for engineering glass at the company, is one of the few people in the Jinjing factory in Beijing’s suburb during the anti-smog holiday. “Normally, there are about sixty people in this facility,” he says. “Now, we are using the days off to do maintenance work.” The factory in Yizhuang, so quiet in early November, is otherwise one of the company’s main production sites. The centerpiece of the facility is a large, state-of-the-art glass coater – which goes by the promising name of Apollon – by Leybold Optics, which belongs to the Bühler Group. In its entirety, the installation with the Leybold machine at its core is well over 100 meters long and has a whole factory hall dedicated solely to housing it. “We are putting out millions of square meters of low-e glass every year in this one factory in Beijing alone,” says Xu. “Low-e” stands for “low thermal emissivity” – referring to the insulating capacity of glass. The lower the “emissivity” the better the windows made of such glass insulate against heat loss. The annual energy savings achieved with the low-e glass produced by Jinjing’s one Leybold machine alone make a real difference: They amount to a significant share of the yearly energy production of an entire nuclear power plant. “It is difficult to quantify this with more precision,” says Xu. The reason is that there are many factors determining the “emissivity” of a building, not just the quality of the glass. How large is the ratio of windows in the overall structure? What construction material are the walls made of? “All this plays a role too,” says Xu. “It is clear, though, that low-e glass really changes the energy efficiency for the better on a very significant scale.”

New cities for hundreds of millions.
This holds true especially in China. Real estate, and therefore construction, is a very significant factor for the Chinese economy at large, and is virtually certain to remain so. This is because urbanization is one of the megatrends that will continue to define China in the coming decades. In addition to the growth of existing cities, the Chinese government projected last year to build new cities from scratch to provide housing for approximately 120 million rural migrants – all within the next 12 years.
The urbanization of China has meant good business for Jinjing. “We saw growth rates of up to 80 percent a year,” says Dr. Ji Yalin, deputy general manager at Jinjing Group in Beijing. “Now it has slowed down.” In this context, the word “slow” can have a surprising meaning, though. “Our more recent growth was at 20 percent annually,” he adds. Due to the sheer scale of urban construction in China, the growth of cities is not only economically important. It is also one of the most significant factors for ecological sustainability in the country. Coated glass plays a key role in making buildings, and by consequence cities, more energy-efficient. And this is an area in which Jinjing is a step ahead of its competition.

**“In order to insulate the glass, invisibly thin layers of silver are applied onto the panels. This is done atom layer by atom layer.”**

Xu Jun, technology manager at Jinjing in Beijing.

The glass coater Apollon by Leybold Optics is at the core of Jinjing’s facilities in Beijing. With this one glass coater alone, the company is producing several million square meters of low-e glass each year.

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**Single, double, triple.**

In order to manufacture low-e glass out of regular float glass, invisibly thin layers of silver are applied onto the glass panels until the coating reaches a thickness of about eight to ten nanometers. “This is done atom layer by atom layer,” explains Xu. The decisive quality of silver in this context consists in functioning as a mirror for infrared wavelengths. “The thin silver layer allows most of the visible light to go through,” says Xu, “while blocking invisible thermal radiation.” That way, warmth stays inside the buildings, where it belongs, while the coating makes no significant difference with regards to light transmission – as long as it is thin enough. The most common form of this type of glass to date is so-called “single low-e”, which means that it is coated with one layer of silver coating. It is possible, however, to sharply increase the insulating capacity of the glass by adding two or three layers – double and triple low-e.

**Without competition.**

The coating, whether single, double, or triple, can pose a challenge, how-
Requirements for energy efficiency in China are rising. Jinjing is well placed to meet this demand.

“We observe a move into the high-end sector.”

Building activity in China is growing at a slower pace than it used to. How does this affect Jinjing?

Ji Yalin: True, growth has slowed. Even so, it is still at a high rate. At the same time, we observe a marked move into the high-end sector with regards to glass. While single low-e glass is still common, there are now overcapacities in the production of this kind of glass in the industry. Meanwhile, the demand for double and triple low-e glass is increasing.

Is this good news for Jinjing?

JY: It is good news for everybody in China, because the high-end glass has a much better capacity at making buildings more energy-efficient. It is also good news for Jinjing, because we are very well positioned to cater to this section of the market.

Jinjing has rather a large portfolio. How important is engineering glass, including low-e glass, for the Jinjing Group?

JY: Our new production site for engineering glass in Beijing went into operation in 2013. It is equipped with some of the best hardware available, and it has an annual capacity of about 10 million square meters of coated glass. This is at the core of our future development.

China’s current rate of urbanization is unprecedented in all of human history. More than 300 million people are expected to migrate from the countryside to conurbations within the next 30 years.
ever, for the manufacturers who process the glass, whether to increase its durability or simply to cut it to size before it is installed in the buildings in questions. Conventionally, the coating can only be applied after processing the glass in this manner. This can turn into a real problem. “You can have terrible delays at construction sites simply because a few windows broke,” says Xu, the engineer in the empty factory. “The building firm needs to contact their suppliers, and they in turn need to go back to the company that made the glass in order to get exactly the right-sized windows from them. So everything has to be made from scratch, just to replace a broken window. This can take weeks, in extreme cases even months.” For Jinjing’s customers, this problem does not exist. The Leybold glass coater that it operates is capable of producing

Vacuum chambers are needed to apply the silver coating. Its thickness reaches 8 to 10 nanometers, or about 80 layers of atoms.

Jinjing is a leader in the industry in China. Its business is growing at approximately 20 percent annually.
so-called “temperable” low-e glass, whether single, double, or triple. This means that the glass panels can be processed after the coating is applied.

“This sounds highly technical, but it is a huge advantage,” says Xu. “This way, our clients can process the coated glass panels any way they need. One implication is that they can replace breakage quickly and without any fuss.” This gives Jinjing an edge over the competition. “There are many firms in China who can do this with regards to single low-e glass,” says Xu. “And there are just a few that can do it with double low-e. But there is nobody who can do this with triple low-e. We are the only one.” This was decisive for Jinjing’s decision to invest in a Leybold glass coater. “This was an important factor for us,” says Dr. Ji. “So far, we have no competition in this field.”

Rising standards.
This is all the more important because it is a virtual certainty that efficiency standards for buildings in China will continue to rise. “So far, single low-e is the most common form of low-e glass in China,” says Dr. Ji. “This will certainly change.” As a consequence, Jinjing’s advantage will increase until, that is, other companies acquire the same capabilities. This would certainly be good news. It would contribute to reducing the overall energy consumption – and it would help to make the sky a little bluer.

“You can have terrible delays at construction sites simply because a few windows broke.”
Global presence, close to our customers.

137 Sites worldwide*

<table>
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<th>Sites worldwide</th>
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<tr>
<td>28 Production sites</td>
</tr>
<tr>
<td>21 Engineering sites</td>
</tr>
<tr>
<td>94 Sales &amp; Service sites</td>
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<tr>
<td>14 Application centers</td>
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<tr>
<td>3 Analytical laboratories</td>
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North America

- **10** Sites (+0)
- 723 Employees (−4.7 %)

Main production sites

- Uzwil Switzerland (head office)
- Braunschweig Germany
- Beilngries Germany
- Zamberk Czech Republic
- Wuxi China
- Changzhou China
- Bangalore India
- Johannesburg South Africa
- Minneapolis USA
- Raleigh USA
- Joinville Brazil

South America

- **14** Sites (+3)
- 407 Employees (−0.3 %)

* As some sites are multi-functional, the total number of sites is smaller than the total number of individual positions.
Europe

44 (+1) Sites
4933 Employees (−4 %)

Asia

51 (+13) Sites
4025 Employees (+4.9 %)

Middle East and Africa

18 (+1) Sites
487 Employees (+1.9 %)
In the Region, for the Region.
The new service station in Lleida in north-east Spain shows how individual Bühler customers can benefit from the creation of a global network comprising around 100 service stations. In addition to faster response times and easy access to specialist expertise, above all this personal contact makes customer care much more individual and much more active.

By Manuel Meyer (text) und Bob Masters (photos).

“For us, prolonged loss of production would be the worst-case scenario,” says Alberto Jofre about the biggest risk in his business. To prevent this from happening, the maintenance manager at the Spanish feed producer Esporc SA is not just relying on spare parts being supplied quickly: “For us, it is crucial that we are in close contact with a local service engineer who really understands our plant and our problems.” This is precisely what Esporc SA and around 700 other Bühler customers in the regions of Catalonia, Aragon, Navarre, and Valencia can count on today. In August 2013, Bühler opened a new service station in Lleida specifically for grain and feed producers in the granaries of north-east Spain.

To put this into a wider context: “The new service station in Lleida is one of over 80 that we have set up around the world in the last few years,” says Roman Sonderegger, head of Sales & Services Operations at Bühler. The ultimate aim is to have around 100 service stations covering all regions of the globe, so that every customer is within a reasonable driving distance of a service manager. In Brazil, for example, there are now six Bühler sites across the country as opposed to just one, as was the case before. There are also stations in other countries such as Indonesia, Nigeria, and Norway.

Comprehensive portfolio with targeted localization.
The comprehensive Bühler service portfolio supports the entire life cycle of the machines and plants with laboratory services, advice, training, maintenance, spare parts, wear parts, repairs, reconditioning, and retrofits. From all of these different elements, the individual service stations put together a service package which is tailored to specific local needs: “Every region, country, and customer has particular needs. The better we can respond to these needs, the greater the added value that we can provide,” stresses Sonderegger.

Routine work is carried out directly on the customer’s premises or in the service station. If necessary, the customer adviser can organize specialist expertise quickly via the regional and global Bühler network. In the future, this may also involve the use of modern video collaboration technology, where the on-site service engineer has a camera on his/her head and the specialist at the main office can analyze the situation on a computer screen.

Customers want greater proximity.
Bühler is quite deliberately not running the local stations as mere outposts of the central organization, but as companies in their own right. Those in charge of the stations decide on the services that are offered and the details of the individual products. “By promoting entrepreneurship in the service stations, we are ensuring that the product range corresponds precisely to local needs,” explains Sonderegger. And this approach is definitely paying off, as demonstrated by the service station in Lleida which has...
seen a sharp increase in new customers wanting to replace their pelleting dies.

The impetus to improve customer proximity actually came primarily from the customers themselves, as Jaume Serra from Grup Alimentari Guissona confirms: “We have been working with three Bühler plants for many years and we value their high technological quality standards, so we decided to expand our collaboration to include the service station, since Bühler offers top quality at good prices in this area too.” Serra previously worked with local companies when repairing mills and replacing or grinding pelleting dies and press rolls. However, there is no doubt that Bühler engineers can offer more extensive expertise when repairing and maintaining their own plants, according to Jaume Serra. He is pleased that Bühler has now filled this gap in the Lleida region.

For us, prolonged loss of production is the worst-case scenario. That is why it is so important for us to have a service station nearby.”

Alberto Jofre, Esporc SA.

Training local employees.

For Roman Sonderegger, it is clear that training local employees is crucial so that Bühler’s quality of service stands out from the competition while also being able to offer local market prices. “We invest a great deal in training specialist staff in the different regions. As many parts of the world do not have a ‘dual system’ of studying and working as we do in Germany or Switzerland, we have started to train apprentices in the key regions according to the Swiss model.”

Customers appreciate the fact that Bühler is helping to build up expertise, but there is another benefit too: The shortage of skilled labor is a pressing issue all around the world at the moment. With well-trained service engineers from Bühler, there is less need for customers to build up internal resources themselves.
Fixed costs, flexibility, core competencies, and trust.

For Sonderegger, however, the fact that Bühler can fill in any gaps in expertise is only one of the benefits that the global service network offers to customers: "Thanks to our services, customers can also reduce their fixed costs, adapt their business more flexibly to changes in the market, and concentrate more on their core competencies."

Geographical proximity to the customers also creates a sense of trust. "I always found it difficult having to phone a service engineer I didn’t know in Madrid or Switzerland so I could explain our problem to them. For our company, the service station in Lleida was an important prerequisite for working more closely with Bühler in this area," stresses Alberto Jofre from Esporc SA, for example.

Constantly expanding and adapting.

For Sonderegger, the service network will not be complete even when it reaches the target figure of around 100 service stations: "We are constantly expanding the range and adapting it to suit local needs." In this context, Bühler itself also profits from its tight-knit network: Through its close cooperation with customers, Bühler is much better placed to know exactly where the shoe is pinching.

The Bühler service engineer changes the sieve periodically, and also checks the other wear parts and the relevant machine settings at the same time.
Bühler makes a significant contribution to global food supplies with its industrial process technologies and solutions. Around 65% of the wheat harvested worldwide is turned into flour on Bühler mills. The company’s contribution to the global production and processing of rice, pasta, chocolate, and breakfast cereals is equally substantial. Furthermore, Bühler is the leading supplier of solutions for die casting, wet grinding, and coating technology with a focus on applications in the automotive industry, optics, electronics, paints, packaging, and glass technology. As a technology group, Bühler invests up to 5% of its turnover in research and development each year. Bühler covers the entire value creation chain, from consulting and engineering to construction and commissioning of machines and plants, right through to extensive maintenance and optimization services and training programs.

Bühler is proud of the Swiss heritage that has underpinned its work from its beginnings over 150 years ago to today, when the company has become a global player operating in nearly 140 countries. With around 10,600 employees, the company generates turnover of CHF 2.3 billion and is aiming to sustain its profitable growth. As a family company, Bühler is particularly committed to sustainability. With its industrial process technologies and solutions, Bühler is helping to ensure that everyone around the world will always have access to a safe, healthy, and affordable food supply, while also setting standards with regard to energy efficiency and sustainable mobility. Bühler regards itself as a partner for industry and science, but also governments, helping to tackle global challenges resulting from population growth and climate change. Bühler places great emphasis on providing high-quality training and continuing education for its employees and currently has around 600 trainees in Switzerland, the USA, and Asia.