FOCUS

STRONG LOCAL NUTRITION SOLUTIONS

SUSTAINABLE MOBILITY
Bühler is a key partner of the automotive industry

ABSORBENT HIGH-TECH GRANULES
Super absorbent polymers keep diapers dry

GRUPO ELAYO IN SPAIN
New products arise from healthy olive seeds
FOCUS: STRONG LOCAL SOLUTIONS
BÜHLER TRANSFORMS REGIONAL NUTRITION TRENDS INTO INNOVATIVE, INDUSTRIAL SOLUTIONS.

Understanding Local Needs
Indian atta flour, Asian noodles, or a coffee roaster for emerging markets: In Applications Centers throughout the world, Bühler specialists team up with customers to develop production processes and products matched to local raw materials and tastes.

Food Safety
14 Safety Builds Trust
Bühler bundles unique know-how in the field of food and feed safety.

Infographic
16 Local Innovation Laboratories
With Applications Centers in India, China, the United States, and Switzerland, Bühler’s presence extends across the world – and is close to where its customers’ pulses beat.

Interview
18 Saving Lives with Innovations
Dr. Martin Bloem of the United Nations WFP talks about the struggle to overcome malnutrition.

In Brief
20 Bühler Across the World

Mobility for Tomorrow
Clean, Efficient, and Safe
The automotive industry is growing vigorously – and it faces enormous challenges. Using Bühler technologies and solutions, manufacturers are getting fit for achieving sustainable mobility.

Super Absorbent Polymers (SAP)
30 Keeping Diapers Nice and Dry
High-tech granules are capable of absorbing several times more liquid than its own weight. Bühler grinding technology is used for making it.

Žamberk Site
32 The Value of Knowledge
In the Czech Republic, Bühler produces components of machines and plants based on the highest Swiss quality standards.
Dear Readers,

It goes without saying that we enjoy eating food from all over the world nowadays. It is not just the well-known restaurant chains that are driving the trend for globalization – people travel around much more now and they want to eat Asian food, Italian delicacies, Argentinian steaks, or Swiss cheese at home too.

Does this trend mean the end for regional differences? Far from it! In fact, we are seeing an opposing trend: Many manufacturers are producing typical regional products under the motto “In the region for the region”.

And that’s our motto too! We already work locally with our customers to provide the right solutions. In our application centers in China, for example, our customers are developing new types of chocolate which are adapted to suit the country’s tastes and eating habits. We can help by incorporating all of our process expertise – not just regarding the desired product features, but aspects such as food safety, hygienic design, and energy efficiency too.

We will continue on this path and continue to invest in regional application and service centers. And that applies not only to our Food division, but to Advanced Materials too. Globalization and (customer) proximity are not mutually exclusive – in fact, at Bühler we are convinced that both elements are crucial to sustained success.

Kind regards,

Calvin Grieder, CEO
Bühler transforms regional nutrition trends into innovative, industrial solutions. Its application centers in Switzerland, India, the USA, China, and other places play a key role here, as they see experienced specialists work together with customers to develop processes and products catering to local raw materials and tastes.
“It doesn’t get any more local than our food,” declares Stefan Scheiber, CEO Business Grains & Food at Bühler. This statement may seem surprising at first – aren’t pizza and pasta served everywhere nowadays? Isn’t there a McDonald’s or Starbucks on every corner? It’s true, the last few years have seen the arrival of a category of food products that are available the world over. Particularly in the emerging markets of Asia, a new, affluent middle class has established itself that is eager to try western products. As a result, global products can now be found in virtually every country across the globe.

“The better we understand local preferences and characteristics, the better our processing technologies will be”
Stefan Scheiber, CEO Business Grains & Food

Pulses such as lentils and beans are not only tasty, they are healthy too:

They are gluten-free and high in protein, vitamins and minerals, and represent an excellent substitute for meat. Flours made from the grinding of pulses, such as chickpeas, are increasingly finding their way into a variety of foods such as pasta and tortillas, while ready-to-eat snacks are also benefiting from novel pulse developments to boost their health appeal. The trend is set to expand even further during 2016, which the United Nations has proclaimed as “International Year of Pulses”.

In the past, pulse processing was often restricted to cleaning and then exporting. Now, pulse processors around the globe are looking to adopt complete hulling and grinding operations, in order to access the desirable nutrients from the pulses and extract greater value. What’s more, the rice and grain technologies that have been commonly employed for pulse hulling have not met the quality and quantity requirements of modern, large scale EU and US pulse processors. Bühler responded to this challenge with its all-new PULSROLL™. This dedicated pulse hulling solution was developed in the application center in Bangalore. It removes the hull from pulses efficiently, hygienically, and cost effectively. It allows processors to handle multiple pulses on one machine, achieving consistently uniform dehulling at the highest throughputs. In addition, the new development provides processors with the CE and ATEX certification they require to operate safely in today’s increasingly regulated and highly automated industry.
More than 2 billion metric tons of grain (maize, wheat, and rice) were processed worldwide in 2013/14.

LOCAL SOLUTIONS / Focus

In order to cater to local preferences in every country and every region, it is vital that we really know and understand our customers’ supply chains in the various markets,” explains Scheiber, summarizing the challenge. The development of industrial solutions for local requirements and tastes is also one of Bühler’s core competencies. Take this example: In India, flatbread made from wholewheat atta flour is an important staple. Bühler has developed an innovative milling technology to produce this flour hygienically in large quantities. In southern Africa, meanwhile, many people eat a maize porridge, which has to be cooked for at least half an hour. This requires a lot of energy and is impractical, particularly for urban populations. With a new process, Bühler has managed to reduce the cooking time to between two and five minutes. One final example relates to chocolate, which is becoming increasingly popular in Asia. Bühler has developed a compact system for producing compound chocolate which is precisely tailored to the needs of small businesses in Asia and other markets.

The Application Centers are Innovation Laboratories

Bühler’s 14 application centers around the world play a key role in the development of these types of local solutions: In the four major centers in Switzerland, India, the USA, and China, specialists from Bühler work together with customers to develop new processes and products. The centers are kitted out with industrial-scale processing equipment for all the key processes such as grinding, mixing,
Until recently, chocolate was practically unheard of in Asia. But now that’s all changing as more and more people are discovering the delicious delights of the bitter-sweet, melt-in-your-mouth delicacy. And the potential for growth is huge: While in Switzerland, for instance, each person consumes over 10 kilograms of chocolate products each year, in Asia, this figure amounts to only approximately 100 grams. To satisfy this growing demand, producers – primarily in the emerging markets – are switching to what is known as compound chocolate, which is made using plant fats instead of expensive cocoa butter.

Previously, Bühler offered just solutions for processing larger quantities of chocolate and compound but now more and more companies are wanting to penetrate this market and produce smaller batches of compound chocolate. In order to be able to offer these companies in both Asia and other markets a solution tailored to their requirements, Bühler’s Wuxi Application Center in China has developed the SmartChoc™ system. This compact production solution – which is made up of a ball mill, mixer, and an optional conche – facilitates the production of between 90 and 400 kilograms of filling, compound but also chocolate masses mixture an hour. This solution allows Bühler to apply a targeted approach when it comes to addressing the needs of smaller-scale producers of chocolate, bakery products, or ice cream. The SmartChoc™ market launch is already well underway, feedback from customers has been positive, and the first sales have also already been made.

“An application center basically works like an innovation laboratory, allowing us to make as many mistakes as possible, as quickly as possible, and then to learn from them – and away from critical production environments.”

Stefan Scheiber, CEO Business Grains & Food

Worldwide consumption of chocolate confectionery in 2014 (in metric tons)

<table>
<thead>
<tr>
<th>Region</th>
<th>Consumption (in metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>873,000</td>
</tr>
<tr>
<td>Australasia</td>
<td>150,900</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>1,420,800</td>
</tr>
<tr>
<td>Latin America</td>
<td>563,700</td>
</tr>
<tr>
<td>Middle East and Africa</td>
<td>331,300</td>
</tr>
<tr>
<td>North America</td>
<td>1,561,900</td>
</tr>
<tr>
<td>Western Europe</td>
<td>2,338,700</td>
</tr>
</tbody>
</table>

Source: Packaged Food: Euromonitor from trade sources/national statistics

SmartChoc™: Asia Gets a Taste for Chocolates.
extruding, drying, conching, and roasting. They can be used to process local raw materials, test new recipes, or develop innovative end products. “An application center basically works like an innovation laboratory, allowing us to make as many mistakes as possible, as quickly as possible, and then to learn from them – and away from critical production environments,” states Scheiber.

Bühler opened its first application center outside of Switzerland in Bangalore, India, in 2010. For Scheiber, that was no coincidence: “In contrast to Europe, for example, the food industry in India is heavily influenced by plant-based products such as pulses. To meet the demands of these special conditions, we have developed an extrusion technology for Indian snacks, innovative processing machines, a special processing technology for pulses, and our new coffee roasting process.” What’s more, from the desire to further improve how it addresses local circumstances, in 2012, Bühler launched its second application center in Minneapolis, USA. The emphasis is on American snacks and breakfast cereals. One focal point revolves around the topic of food safety. It is therefore hardly surprising that the new Ceres hygienic cereal dryer was developed there. The USA-based application center is also certified in accordance with the stringent requirements of the FDA (Food and Drug Administra-
Maize is a major staple in the southern African countries and is used in many meals. A firm favorite is a maize-grits porridge called ugali, mealie-meal, or pap depending on the region. This popular dish does, however, take a lot of time and energy to prepare: The maize meal has to be cooked for at least half an hour. In towns and cities in particular, however, demand for meals that are quick and easy to prepare is on the rise. That’s why Bühler has been making efforts for quite some time to develop a product that tastes the same but has a shorter cooking time.

With the “Instant Maize Meal” process innovation from Bühler, the cooking time of the maize meal has been cut from half an hour and can now be controlled to take between just two and five minutes. This reduction in the cooking time is achieved through the gelatinization of the starch in the maize. Steaming and flaking the maize grits naturally modifies their cooking properties without the use of additives. This tried-and-tested technology is also used in the production of cereals.

In 2010, two pilot plants were commissioned in South Africa and since then Bühler has continued to optimize the process on a constant basis. Following its launch in 2015, the technology is now available for other markets in southern Africa. Bühler is currently working intensively to identify additional target markets and customers.
“To run the centers, we rely on highly qualified specialists, such as engineers, in food technology who, as well as having expert knowledge in local raw materials and tastes, also possess an entrepreneurial mindset and approach.”

Stefan Scheiber, CEO Business Grains & Food


A cup of coffee invigorates the body and soul. While in Europe or America, almost everyone starts their day with a hot caffeinated beverage, the people of Asia have only recently discovered the advantages. The most important step in the production of coffee is the roasting process. Evenly and gently heating the green beans gives them their characteristic aroma – and gives the coffee its unmistakable taste.

In emerging markets such as India, China, Indonesia, or Korea, for example, it is mainly smaller companies that want to get into the coffee production industry. Bühler has used this demand to develop a high-quality roasting solution for small to medium capacities. This project was led by a team in the Bangalore application center that had expert knowledge of the specific requirements of the local small companies. The RoastMaster product range was the result of this work and Bühler was able to successfully establish two models for capacities of up to 240 kilograms an hour on the market. As the plants are completely manufactured in India, they boast an excellent price/performance ratio. Moreover, they are sold wherever there is a demand for a top-quality yet cost-effective roasting solution. Although the geographical focus is on Asia, Latin America, and Africa, the new roasters could prove their worth in more mature coffee markets too – in Germany or Switzerland, for example.

Worldwide consumption of coffee in 2014 (in metric tons)

<table>
<thead>
<tr>
<th>Region</th>
<th>Consumption (metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>1,105,066</td>
</tr>
<tr>
<td>Australasia</td>
<td>67,300</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>539,037</td>
</tr>
<tr>
<td>Latin America</td>
<td>1,497,256</td>
</tr>
<tr>
<td>Middle East and Africa</td>
<td>501,436</td>
</tr>
<tr>
<td>North America</td>
<td>1,101,924</td>
</tr>
<tr>
<td>Western Europe</td>
<td>1,651,804</td>
</tr>
</tbody>
</table>

Source: Hot Drinks: Euromonitor from trade sources/national statistics
In recent years, the demand for gluten-free food has seen a sharp increase, particularly in industrialized nations. By 2014, the market had already achieved a volume of 10.5 billion US dollars. Nowadays, around 30 percent of Americans consume little or no gluten due to health and lifestyle reasons. As a result, many pasta producers also want to make the most of this potential and offer their customers tasty pasta products made from gluten-free raw materials, such as maize or rice.

The challenge in producing this kind of pasta is the bite: Traditional pasta made from durum wheat, for example, gets its typical and firm “al dente” texture from a strong gluten network. Of course, gluten-free cereals naturally have a disadvantage regarding firmness, a product characteristic valued by consumers. For around 10 years, Bühler’s Application Center for pasta has been a pioneer in this field, developing a production solution for gluten-free pasta products. In doing so, the Polymatik™ pasta press has been adapted to be the key technology for delicious pasta products made from gluten-free raw materials that still retain the “al dente” bite. The solution has proven popular in various markets and is used by major pasta producers. But the potential goes far beyond this nutritional pasta trend of western nations: This process can also be used in Africa or Asia, for example, to process other gluten-free varieties of grains like sorghum or quinoa, which might be available locally.

“They aim to help our customers test new things so that they can stay ahead in their markets”

Stefan Scheiber, CEO Business Grains & Food

Polymatik™ Pasta Press: Gluten-Free Pasta with the al-dente Bite.

Source: Mintel 2014
Noodles have a fixed place on people’s menus in many Asian countries, but also increasingly in other parts of the world like Africa and Middle East, as well as the Americas. Unlike Italian-style pasta, Asian noodles have other flavor properties and are also stickier and more elastic in bite. Instant or stick noodles, for instance, are popular, as are noodles made from rice or starch flours. Practically portioned ready meals that just need hot water are also particularly common in Asia.

While noodle production processes share some similarities with dry pasta, they also have some differences. At the beginning of 2016, Bühler will be opening a noodles Application Center at its Wuxi site in China so that it can develop production solutions specifically for Asian noodle products. The aim of this Application Center is to combine Bühler’s already extensive experience in pasta and noodle production and develop further sustainable processing solutions that consider the local flavors and raw materials of Asia. And the potential for solutions of this nature goes far beyond the Asian market: Thanks to classics like the pad thai noodle dish from Thailand, or the ramen noodle soup from Japan, Asian noodles have also become popular meal choices in industrialized nations over many years.

Further Expansion in the Pipeline
The application centers therefore do much more than play a key role in the development of localized, industrial solutions. They aim to help our customers test new things so that they can stay ahead in their markets. Scheiber is firmly committed to this model and is planning to open further centers over the next few years – in South America and Africa, for example. “In South America, coffee production is one aspect we could focus on. Whereas in Africa, I can see great potential in areas such as processing local types of grain like sorghum, but also maize and cassava root, for example,” concludes Scheiber, looking ahead to the future with optimism.
Consumers want safe, tasty, and healthy food. They expect their breakfast cereals to be free from pesticides and pathogenic bacteria, and when they eat nutty chocolate, they don’t expect to break their teeth on a piece of shell. They also appreciate it when there are no storage pests crawling out of their packets of rice, and when they can trust the allergen information displayed on packaging. Unfortunately though, people do come to harm time and time again. When this happens, the consequences extend beyond shaking consumers’ trust: The product recalls for the affected items also result in significant costs. The food safety that we take for granted is therefore one of the greatest challenges for the food processing industry along the entire value chain. As well as the food that we eat ourselves, this also concerns the safety of the food that we give to animals – many of which, of course, ultimately end up on our plates as well.

Safety Builds Trust

In its application centers all over the world, Bühler is bringing together unique know-how in the area of food safety.

Ceres – a state-of-the-art dryer for clean and safe production of cereal products.

diagram #172
Risk Analyses and Preventive Measures Called for
Ensuring a high level of food safety begins before the processing stage with a meticulous risk analysis, which comprehensively evaluates all potential risks from the raw material to the preparation methods. The HACCP hazard analysis method has become well established and is now in widespread use. This analysis must incorporate the latest findings, such as the increasing risk of mycotoxins on grain, which is due in part to the effects of climate change. The relatively recent discovery that bacteria such as salmonella can survive on nuts for months and are quiet resistant to heat must also be taken into account. Safety also means taking preventive measures: The quality of the grain must be established when it is taken in by the mill and the cleaning procedure must be designed to ensure careful removal of any grains infected with mold in order to comply with the limit values for mycotoxins. When processing ready-to-eat products – for example, when extruding breakfast cereals, steam-treating cocoa, or roasting nuts – the thermal treatment step must be designed and monitored to ensure sufficient inactivation of pathogenic bacteria. Bühler makes sure that this know-how is incorporated when designing its processes.

Food Safety Measures also Reduce Losses
Ensuring food safety also means focusing on hygiene in the production environment. It is important that buildings, machines, air treatment systems, and electrical installations all have a hygienic design. Bühler is setting the standard with a number of new developments in this area. Whether it is mixers and micro-feeders with optimized access, or a breakfast cereal dryer that is much easier to clean, Bühler products are able to meet increasing hygiene requirements with regard to the processing of dry products. This not only reduces the risk of contamination – less waste also minimizes losses. Ultimately, good hygiene often pays off by improving shelf life. And the less likely we are to find mold on our toast bread, the more trust we will have in the food industry.

A hygienic design not only reduces the risk of contamination, it also reduces losses at the same time thanks to less wasted product.

Food must be both – tasty and safe.

Further information:
Dr. Béatrice Conde-Petit
Group Expert Food Science and Technology
Bühler Uzwil
T +41 71 955 21 52
beatrice.conde-petit@buhlergroup.com
Local Innovation Laboratories

Bühler is right on the pulse of the local markets with its 14 applications centers around the world – which ensures close customer proximity. In its four main centers in the regions of Europe, Asia, and North America, Bühler specialists team up with customers to develop new and innovative solutions in order to fulfill the needs and preferences of the local markets even more specifically. And the expansion of this local presence is already being planned, as two additional applications centers are to be opened in the next few years – in South America and Africa.

BANGALORE, INDIA
The Application Center in Bangalore is the state-of-the-art utility centre for conducting product and machine trials as well as on-site training to enhance the skills of mill operators and to establish new findings and operational parameters leading to new and innovative applications for its customers.

WUXI, CHINA
Bühler China has become an important innovation hub. In the research and development center in Wuxi, specialists from Bühler China constantly work on the development of new products and solutions for the local market. State-of-the-art labs and training facilities ensure that customers stay ahead in their markets.
PLYMOUTH, USA
The Bühler Food Innovation Center, located in Plymouth, Minnesota is a food-grade facility. This facility was designed according to sanitary standards and is maintained and operated under general FDA food industry guidelines. It encompasses mixing, extrusion, and drying process steps.

UZWIL, SWITZERLAND
The Application Center at the Bühler Headquarters in Uzwil offers a variety of pilot plants, analytical laboratories, and training centers for a broad range of applications. Here, Bühler works with its customers to test, develop, and optimize new products, processes, and machinery.
Humans require approximately 40 different nutrients for healthy growth and development.

The consequences of malnutrition are responsible for 45 percent of deaths of children. Dr. Martin Bloem from the World Food Program is convinced that the food industry can have a decisive impact in helping more people get access to the necessary nutrients.

**Nadina Müller:** One of the new UN Sustainable Development Goals is to end hunger. What have we learned from the previous millennium goals?

**Dr. Martin Bloem:** The main thing that we have learnt is that the UNO Sustainable Development Goals actually apply to the whole world, not just to developing countries. It is no longer “their world” or “our world”, but one world. Malnutrition affects almost every country on the planet – even in the developed world.

**What are the underlying problems of malnutrition?**

Malnutrition – including stunting, wasting, and micronutrient deficiencies – contributes to 45 percent of child deaths. Those who survive will live with irreversible effects, which means they will not perform up to their potential in school, will be less productive, and earn less. At the population level, the emotional and monetary cost is beyond what you would consider expensive.

**Where do we start to solve the problem?**

Stunting takes place within a limited time frame – the critical 1,000 days are from conception to two years of age – and the lack of nutrients in the diet of pregnant and lactating women, as well as in infants and young children is one of the key determinants. Humans require approximately 40 different nutrients, in different amounts, for healthy growth and development. Therefore, the focus on supplements for children and other special nutritious foods for women should also be an integral part of a food-based strategy.

**What are the biggest challenges?**

It is creating a sustainable food system that provides access to adequate nutrients, while also linking to the health system. We have yet to unlock the potential of the entire food value chain to come up with sustainable solutions, which include fruits and vegetables, animal source foods, but also fortified foods and
“Food systems must become more efficient in the way they provide access to nutrients. For this to happen, we need innovations along the entire value chain.”

Supplements specifically formulated to meet the needs of children 6 to 23 months old.

The players in the food industry can help to unlock this potential. How?
The food industry will need to view itself in the context of these transformations, which it needs to create a sustainable food system. This means there is an expanded list of challenges for the food industry to address: How to support improvement in nutrition; how to minimize environmental harm; and how, in turn, to be resilient to the impacts of climate change. The bright side for the food industry is that there is a lot of opportunity in the way of innovation.

What role can Bühler and its customers play to contribute to the goal of zero hunger?
Food systems must become more efficient in the way they provide access to nutrients. For this to happen, we need innovations along the entire value chain. To pick an example, fortification is a very important tool for meeting nutrient needs, especially considering the large numbers of people who are dependent on staple crops for meeting their caloric needs. But more specifically, knowing that there are so many nutrients required for healthy growth and development, when you can fortify a staple like rice with multiple micronutrients, as Bühler has done, the impact can be very significant.

Why is technology so important?
Nutrition per se is important but in addition, food safety and quality are critical, as well. We know that just like unsafe water, food that is contaminated or unsafe will contribute to diarrhea and illness, which limits nutrient intake and absorption.

Technology can also be critical in ensuring that fortified foods are acceptable to consumers, and aligned to their dietary and taste preferences. Developing countries are in need of these technologies just the same as we are in developed countries.

Dr. Martin Bloem has dedicated his career to improving the effectiveness of public health and nutrition programs. He holds a medical degree from the University of Utrecht and a doctorate from the University of Maastricht. Dr. Bloem has vast experience in nutrition research and policy and has participated in joint task forces with a number of organizations including the WHO and USAID. He is an Adjunct Associate Professor at the Johns Hopkins Bloomberg School of Public Health in Baltimore, USA as well as at the Friedman School of Nutrition Science and Policy, Tufts University, Boston, USA.

Dr. Nadina Müller has a background in food science and drives the Nutrition Program at Bühler which strives for a nutrition-optimized processing of food to contribute to the healthy growth, the healthy growth, development, and life-style for humans and animals.
In Africa, coffee growing provides a source of income for more than 10 million households across 25 countries. However, the continent’s coffee producers are facing a huge challenge: Their share of the global coffee market dropped from around 27 percent in the 1970s, to now less than half that figure. This in spite of growing demand for coffee worldwide.

By making investments and contributing its expertise, Bühler is confident that it can help African nations reverse this trend and profit more effectively from the global rise in coffee demand. Specific measures that coffee producers can take to achieve this involve conforming to the export criteria that apply in various countries and meeting expectations of quality, which are becoming higher all the time.

With this in mind, Bühler played host to the SORTEX Coffee Forum in its African Milling School in Nairobi. African coffee processors used the platform for discussing the challenges they face, attending demonstrations, and participating in training workshops. The insights gained from the SORTEX Coffee Forum are set to help coffee producers boost not only the quality of their coffee, but their productivity too.

“At the forum Bühler presented a SORTEX machine that Olam Uganda has recently purchased. I’ve told the other participants, with great satisfaction, about the excellent speed, usability, and output quality.”

Brian Nuwasasira, a sorting machine operator at Olam Uganda

“I was able to receive an update on the latest developments in the Optical Sorting and Processing industry. This helps me to prepare our future procurement strategy.”

Peter Kehr, Regional Milling Manager at NKG Coffee Mills Kenya Limited
The IBA in Munich is the world’s leading trade show for the bakery, confectionery, and snack foods industries. The Bühler Bakery & Ingredient Handling unit took it as an occasion to present the JetMix – its newly developed system for producing sponge dough for industrial bakeries. With its novel method of uniform hydration, JetMix ensures uniform wetting of each flour particle. Within a matter of seconds, this produces a fine, creamy sponge dough as is obtained with the traditional craftsman’s method. The responses received from industry representatives at the IBA were extremely positive throughout. Especially the high processing quality and the novel production and cleaning principle were met with keen interest. In the next few months, two pilot systems are to be started up at the sites of important Bühler customers.

JetMix plant for producing uniformly hydrated sponge dough.

Bühler plans to increase its local presence in Mexico with its capabilities in the field of wet grinding and dispersion technology and to strengthen its market position. For the first time, Bühler has therefore presented its solutions at the ANAFAPYT (Asociación Nacional de Fabricantes de Pinturas y Tintas), the Latin American coating trade show in Mexico. “More than 100 visitors and over 50 customer contacts confirm the need for a local solution provider,” says Luca Pellegrino, who, in his role as Business Development Manager, is in charge of developing Bühler’s Mexican market.

More than 95 percent of the visitors to the ANAFAPYT came from Mexican small and mid-size companies, in addition to customers from all of Central and South America. But also representatives from large local and international corporations came to Mexico City. Bühler presented its Performance Line models such as the Cenomic™ bead mill or the Trinomic™ three-roll mill. “These machines meet the regional market requirements and offer precisely the ruggedness and productivity that are demanded,” says Dr. Frank Tabellion, Head of Sales & Marketing at Bühler Grinding & Dispersion.

Bühler plans to increase its local presence in Mexico with its capabilities in the field of wet grinding and dispersion technology and to strengthen its market position. For the first time, Bühler has therefore presented its solutions at the ANAFAPYT (Asociación Nacional de Fabricantes de Pinturas y Tintas), the Latin American coating trade show in Mexico. “More than 100 visitors and over 50 customer contacts confirm the need for a local solution provider,” says Luca Pellegrino, who, in his role as Business Development Manager, is in charge of developing Bühler’s Mexican market.
The automotive industry is working with high pressure on improving the efficiency of its cars. Engine blocks or structural components are therefore increasingly being manufactured from lightweight aluminum instead of steel. This trend is driving demand for aluminum die casting solutions. The Business Area Die Casting of Bühler is a much sought-after provider of die casting technologies worldwide. For example, last July it presented its solutions at the China International Diecasting Congress Exhibition in Shanghai. Among other exhibits, an Ecoline casting cell with integrated peripherals was on display. The Bühler booth attracted numerous visitors – and many new projects were initiated. “The global market leadership of Bühler in the field of die casting, top quality and reliability were the reasons why we opted for an Ecoline system from Bühler”, said Fu Chunming, the president of Tuopu Automobile Parts Technology, a vendor to the car-making industry.

The fact that customers play in the top league with their Bühler die casting technology was also borne out in the United States. The industry association “North American Die Casting Association” (NADCA) presents various annual awards to companies or individuals. On the occasion of its “Die Casting Congress & Exhibition” in Indianapolis in October, several Bühler customers were distinguished – including Briggs & Stratton for significantly improving its small engine cylinder production. Leonard Cordaro of Premier Die Casting Company, a longstanding partner of Bühler, received the most prestigious award: The NADCA recognized him for his outstanding contributions to the advancement of the entire die casting industry.
Acquisition of Chocolate Specialist

Cocoa is the basis of numerous food products that make life sweet. One of them is chocolate. It is not just the quality of the ingredients that determines whether a chocolate product tastes good and melts on the tongue. Another crucial factor is the process applied for producing the chocolate mass. Over 60 percent of all chocolate today is produced on Bühler equipment. In recent years, Bühler Group has become the leader in processing technology for transforming cocoa beans into finished products such as chocolate, pralines, etc. Now, with its acquisition of the German chocolate specialist Hosokawa Bepex, it has also added equipment to its portfolio for making enrobed products such as bars, cookies, and caramels. The company possesses leading know-how in the areas of mass preparation, moulding, extrusion, as well as enrobing and tempering. The confectionery produced by these processes constitutes a substantial global market in both industrialized and emerging countries. This growth is mainly driven by rising demand in emerging markets – especially Asia – and the trend toward healthy snack foods in established markets such as Europe and North America. Together with Hosokawa Bepex, Bühler now offers its customers total plant solutions for making chocolate countlines, enrobed articles, and cereal bars. In the field of confectionary processes, Bühler customers can now benefit from all possible processing options.

Proximity for More Efficiency

Bühler has been present in Thailand since 1999. In October, the company opened its newest customer service and roll refurbishment center in the Saraburi province. Over 30 service technicians and customer service managers look after customers from both food and non-food markets. A broad range of services are offered, such as an application area for customer trials as well as complete stock of spare parts.

The opening ceremony took place in the presence of Swiss ambassador Ivo Sieber, and over 40 Bühler customers representing a cross section of industries – rice, flour, snacks, feed, die casting, inks and paint production. The customers welcomed the opening of the center as with local services and specialist knowledge in proximity, they can reduce costs of maintenance and downtime as well as boost their efficiency.
MOBILITY FOR TOMORROW

Clean, Efficient, and Safe

Lower CO₂ emissions, fiercer competition, and new technologies. Bühler supports the global automotive industry in tackling the challenges for the future – with leading die casting technology for lightweight solutions and innovative processing for the productions of batteries.
Aluminum engine blocks and structural components, headlight and tail light reflectors, electrode materials for lithium-ion batteries, paints and protective lacquers, shaded windows, chrome-plated interior parts, and cameras for driver-assistant systems: Bühler’s Advanced Materials Business represents a relevant equipment provider to the world’s automotive industry, offering innovative technologies for ensuring efficient and safe mobility.

As population levels have risen, along with prosperity in emerging nations, the demand for vehicles has experienced a sustained upturn. Data from market research company Autofacts states that, in 2014, some 90 million cars were manufactured across the globe – and it is believed that annual production output will hit as much as 113 million models by 2021. This translates into an annual increase of 4 percent, with most of the growth found in China, Southeast Asia, and India. What these up-and-coming markets in particular are demonstrating is that more and more people are now making the dream of owning their own car come true. As far back as 2009, China had replaced the United States as the world’s largest automotive market, and in 2013 it was the first country ever to sell more than 20 million vehicles within a year.
In 2014, some 90 million cars were manufactured worldwide. It is believed that annual production output will hit as much as 113 million models by 2021.

However, this significant growth in the automotive industry is accompanied by the challenging fact that the transport sector is responsible for 13 percent of all greenhouse gas emissions, 75 percent of which are attributable to vehicles on the roads. As global car production increases, so too does the need for efficient and clean mobility — and this is exactly where lightweight car design comes in, with aluminum components helping reduce the weight and, therefore, the fuel consumption of vehicles to a considerable extent. Hybrid and electric vehicles represent another long-term mobility trend: The International Energy Agency (IEA) estimates that as many as one in two new vehicles among the 120 million forecast to be sold in 2030 will also be powered by an electric motor.

The Business Areas within the Bühler Advanced Materials division are major suppliers to the automotive industry. They provide manufacturers and vendors with innovative technologies and solutions to help them produce vehicles that are efficient, durable, and safe.

Thanks to aluminum components, dozens of kilograms of weight can be saved in a vehicle.

<table>
<thead>
<tr>
<th>Component</th>
<th>Saving in Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocker panel</td>
<td>- 2.8 KG</td>
</tr>
<tr>
<td>Connector</td>
<td>- 1.1 KG</td>
</tr>
<tr>
<td>Plate</td>
<td>- 0.2 KG</td>
</tr>
<tr>
<td>Console</td>
<td>- 0.4 KG</td>
</tr>
<tr>
<td>Shock tower</td>
<td>- 1.5 KG</td>
</tr>
<tr>
<td>Longitudinal member</td>
<td>- 1.4 KG</td>
</tr>
</tbody>
</table>

Total saving in weight per vehicle, including other components: - 44 KG

\[ \text{I/100 Km} - 0.5 \]
Lightweight car designs contribute significantly to cutting fuel consumption and to reducing emissions as a result. Engine blocks, structural components such as shock towers and cross-members, as well as oil pans and transmission housing components are increasingly made of light alloys such as aluminum instead of steel or cast iron. On average, a present-day car contains 150 kilograms of aluminum, a figure that is expected to rise to 250 kilograms by the year 2025. As one of the world’s leading suppliers of die-casting technology to the automotive industry, Bühler’s Business Area Die Casting is reaping the benefits of this: 50 percent of all new passenger cars produced around the globe use die-cast cells made on Bühler equipment, and 20 percent of all engine blocks are manufactured on Bühler’s die-casting machines. One of the main reasons for this success is the complete solution portfolio that Bühler offers, from die casting cells to servicing and all the way through to technology support – allowing it to cater as efficiently as possible to the specific needs of customers, from small to large tier suppliers to original equipment manufacturers (OEMs). In addition, the geographical presence of Bühler extends across Europe, the United States, and China, making it the sole provider with production capacity in the three major markets of the global car-making industry.

Further information:
Marcello Fabbroni
Head of Product Management & Marketing
Die Casting
Bühler AG, Uzwil
+41 71 955 21 04
marcello.fabbroni@buhlergroup.com
COATINGS AND EFFICIENT BATTERIES

The Business Area Grinding & Dispersion focuses on solutions for wet grinding and dispersing of material systems, such as those used to produce high-grade vehicle coatings. This technology makes it possible to produce all kinds of automotive coatings, from primers to color coatings and top coats, right through to functional coatings for protecting cars against corrosion or impacts from stones. One of its fields of activity that promises strong growth in the age of electromobility is lithium-ion batteries. Within this complex value chain, Bühler technology can be found in areas such as raw material homogenization and producing electrode slurries. Additionally, Bühler’s wet-grinding technology is used to produce highly efficient lubricants that improve the performance and increase the life cycle of engines and their components. Other applications include glass ink (paint with integrated UV protection properties for the frame area of front windscreens), color pastes (pigments for producing colored plastic, designed to be used in various interior parts), and color filters (for pixel coloration of LCD displays such as those used in navigation systems). Bühler Grinding & Dispersion also offers solutions for manufacturing conductive metal pastes designed to be used in on-board electronics and functional ceramic pastes for catalytic converters and electronic components.

In the age of electromobility the demand for lithium-ion batteries is increasing.

Further information:
Norbert Kern
Head of Process Engineering & Market Segments
Bühler AG, Uzwil
Tel. +41 71 955 39 58
norbert.kern@buhlergroup.com
Headlamp reflectors are coated with machines from Bühler.

A PLUS IN SAFETY AND COMFORT

The Bühler Business Area Leybold Optics is specialized in high-vacuum thin-film coating technology. One of its key areas involves systems for metallizing plastic components: About 50 percent of all passenger cars around the world are equipped with headlamp and tail light reflectors that have been coated using equipment supplied by Bühler. These production lines and their process technology are also used to deposit decorative coatings onto automotive trim parts like decorative stripes, instrument rings, door handles, and grilles to enhance them with a chrome-colored finish. A trend-setting application are head-up displays, which allow route information to be projected directly onto the front windshield to produce an augmented-reality driving experience. For these systems, Bühler machines provide the optical coating of the reflecting components. Bühler also benefits from the trend toward enhanced safety, as more and more vehicles are being equipped with advanced driver assistance systems (ADAS). Leybold Optics can boast years of experience in the field of high-precision optics and can offer solutions for applications such as coating the infrared optics used in night-vision systems. Adopting technology that is being used on a large scale for architectural glass-coating and facade engineering, larger coating lines are used to provide windows with heat-reflective (low-E) layers, which will keep the interior temperature of vehicles within a comfortable range. This is particularly important for electric vehicles where heating and cooling eats away range. Last but not least, Leybold Optics also provides solutions for coating the film used in capacitors for electrically powered vehicles – an application that is being heavily propelled not only by the spread of hybrid vehicles, but also for renewable sources of energy like wind power in particular.

Further information:
Josephina Mayerle
Marketing Manager Leybold Optics
Bühler Alzenau GmbH, Alzenau
T +49 6023 500 105
josephina.mayerle@buhlergroup.com
Super absorbent polymers can soak up an extremely large amount of liquid. They can be found in diapers, sanitary napkins, and wound dressings, and are manufactured using Bühler drying and milling technology.

Even when the diaper is full, the baby’s bottom always stays dry – something parents will appreciate. This is made possible thanks to super absorbent polymers. These polymer granules, which are used in almost every disposable diaper on the market today, can absorb several times their own weight in liquid. “A single gram of the material can absorb up to 500 grams of pure water,” explains Franz Giger, Product Manager for Super Absorbent Polymers (SAP) at Bühler. And the advantages of this substance reach far beyond their enormous absorbency: Unlike diapers made from paper or pulp, which release the liquid again under pressure, super absorbent polymers bind the moisture to form a hydrogel. This means that nothing escapes if the child sits or lies on the diaper.

The Liquid is Trapped
Super absorbent polymers are three-dimensional polymer networks based on acrylic acid. Osmotic pressure ensures that the liquid is forced into the polyacrylate network. These substances were developed in the 1960s to increase the amount of water absorbed by the soil in agriculture. However, the breakthrough came with sanitary products: The first baby diapers with super absorbent polymers were launched on the market in 1982 and these are still the most common application to date. Even so, you can also find the absorbent granules in sanitary napkins, wound dressings, or packaging pads for raw meat.

In baby diapers, high-tech granules make sure that the bottom is always dry.

SUPER ABSORBENT POLYMERS (SAP)

Absorb and Hold

Super absorbent polymers can soak up an extremely large amount of liquid. They can be found in diapers, sanitary napkins, and wound dressings, and are manufactured using Bühler drying and milling technology.
The white powder is manufactured in a process with multiple stages. “To start with, the acrylic acid is polymerized to form a super absorbent polymer gel. This is then dried, crushed, and milled in order to achieve the particle size of 150 to 850 micrometers required for further processing,” explains Giger. To finish, the surface undergoes a special treatment process – the addition of a binding agent ensures that water diffuses into the material but does not escape again under pressure. When it comes to drying, milling, and inspecting, leading super absorbent polymer manufacturers have relied on Bühler technology for two decades. Conveyor dryers are used for drying gels in the same way they are used for drying cereals, and Bühler has also contributed to dry milling with its proven milling technology.

As Few Lines as Possible
According to Giger, “the most difficult factor in milling is keeping the fraction of very fine particles to a minimum as far as possible.” More fines means more waste, which has a negative impact on the profitability of the manufacturer. With the recirculation process, which is often used in chemical applications, several milling stages are carried out one after another. This results in a proportion of fines of around ten percent. The serial milling concept from Bühler, on the other hand, integrates a sieving machine after each milling process. This separates fines, good product, and coarse particles, with only the latter undergoing an additional milling process. “Thanks to this process, which is also used for processing grains, we can reduce the amount of fines resulting from the manufacture of super absorbent polymers by 50 percent,” maintains Giger. This is reflected in a higher yield and an increased margin for the producer.

Super Absorbent Polymers are a Growth Market
Bühler drying, milling, and inspection technologies are also used in other areas of the chemical industry where similar particle sizes need to be achieved. These applications include manufacturing flocculants based on polyacrylate, which are used to separate pollutants and water in sewage treatment plants. There is currently substantial evidence to suggest growth in the field of super absorbent polymers. People in China and India are only just starting to discover the advantages of modern diapers and there are also applications in developed countries. Most notably, incontinence underwear for elderly people has an enormous amount of growth potential. In Japan, for example, a country with a rapidly aging population, the sales figures from senior incontinence underwear have already overtaken those of baby diapers.

Further information:
Dr. Franz Giger
Product Manager
Grinding & Dispersion
Bühler AG, Uzwil
T +41 71 955 39 27
franz.giger@buhlergroup.com

ADDED VALUE

Proven drying and milling technology
Serial milling concept for highest yield
50 percent less fine particles
Worldwide service and support
For three years Bühler has been manufacturing components for machines and plants in Žamberk, Czech Republic – based on the highest Swiss quality standards.

TEXT AND PICTURES: THOMAS OEHRLI
Thanks to its long tradition, the company is able to call upon an extensive pool of knowledge: Mechanics, sheet-metal production, and assembly – plus packaging and shipping to the customer – are among its core areas of expertise. Specifically, this covers products such as gears, robots, sheet-metal racks, and electrical cabinets. Based on the additional know-how gained when Bühler came on board, the site now also manufactures components for food-processing plants, such as cyclones and filters.

The history of the factory in Žamberk, a town situated in the eastern Czech Republic, dates back over a hundred years. It started life in the early 20th century – 1908, to be exact – when a textiles factory was opened in the town. “It was a typical old weaving mill, specializing in cotton textiles,” says Jiri Appeltauer, current Managing Director of the plant.

In 1968, the company Kovostav bought the factory and transformed it into an industrial plant with textile machines. Automation was then introduced in 1986 in the form of mechanical robots for the rotor spinning machines. Following spells during which Žamberk had been under the ownership of Elitex and Rieter, Bühler acquired the Rieter production facilities in 2012.

**Extensive Expertise**

Thanks to its long tradition, the company is able to call upon an extensive pool of knowledge: Mechanics, sheet-metal production, and assembly – plus packaging and shipping to the customer – are among its core areas of expertise. Specifically, this covers products such as gears, robots, sheet-metal racks, and electrical cabinets. Based on the additional know-how gained when Bühler came on board, the site now also manufactures components for food-processing plants, such as cyclone separators and filters.

Exports play a key role in the business, representing an area in which it boasts more than 20 years of experience. In total, the factory produces goods for the Czech Republic over only three days out of the working week, meaning that the majority of products are exported: The main customer is Germany at 45 percent, followed by Switzerland at 35 percent.

Today, the Žamberk factory employs over 400 staff members. “My biggest motivation at work is to see that the people I work with take pride in what they do,” says Appeltauer. This motivation is what has compelled him to stay with the company for 35 years. Aside from the site’s long history, he believes that the people there are what make it truly special: “This has always been a place where people show the highest level of commitment.”

**Bringing Cultures Together**

For Appeltauer, Switzerland is of particular importance because he considers the country to have helped him gain a quick foothold on the European market. Production in line with European quality standards began as far back as the nineties during the company’s work under Rieter – and since the Žamberk team operates according to the ISO 9001 standard, upholding these levels of quality is no problem. “Working together with Bühler, we maintain the same quality standards as they do in Switzerland,” says Appeltauer proudly. The head of Bühler Žamberk is keen to explain that, after more than 20 years of collaboration, the cultures of both countries have become very close.

Quality is not simply an objective at Bühler Žamberk, but rather the driving force. We see quality as the benchmark for ensuring reliable products and services,” says Appeltauer. He takes the durability of gears for textile machines as an example: While gears for vehicles “only” have to withstand around 500,000 kilometers, those designed for use in textile machines must be able to stand up to a distance that is 100 times longer – that is, at least 50 million kilometers.

Moreover, thanks to the previous ownership of the production facilities by Rieter – a textiles company based in Winterthur, Switzerland – Bühler has benefited from high standards of quality, expertise, and familiarity with Swiss business culture. With this quality-conscious approach driving its work, nothing stands in the way of a brilliant future for the Žamberk facility and even closer collaboration with Switzerland.
Easier, Faster, Better ...  

Simple, yet effective – manganese steel instead of steel. New sieves made from hardened steel have reduced servicing time by half for the two hammer mills at the Heineken brewery in 's-Hertogenbosch in the Netherlands. This decision has paid off.

TEXT: HERBERT BOSSHART – PICTURES: HEINEKEN
Heineken, the third largest beer brewery in the world, has installed machines manufactured by Bühler in its breweries for raw material intake and for grinding malt and in its malting houses to transform barley into malt. This brings two companies together that at first glance would seem very different: On the one hand, a market-listed beer brewery, and on the other, the leading systems provider for the food and beverage sector, which has been family-owned for over 150 years. When it comes to the constant drive toward innovations and improvement, however, Bühler and Heineken stand side by side.

**The Central Machine**

A good example of this common goal is the brewery’s raw material handling in ’s-Hertogenbosch: Out of the 165 production plants Heineken operates in 70 countries, this facility is a specialty brewery. Employing 450 people, the brewery produces over six million hectoliters of beer per year and crafts more than 50 different beer varieties, exported to 150 countries.

Two Vertica™ hammer mills from Bühler are used to grind malt – the key ingredient in beer – at the plant, optimally preparing it for the actual brewing process. “The hammer mill is one of the most important machines in the brewery,” explains maintenance specialist Dennis van Tetering, who is responsible for maintaining the silo, mill, and brewery plants at ’s-Hertogenbosch. Ultimately, if the malt is not ground correctly, the end quality of the beer suffers. Only optimal grinding allows for a maximum yield in the brewing process.

**Excessive Downtimes**

Both Bühler mills are operational at Heineken’s ’s-Hertogenbosch brewery 24 hours a day, 7 days a week. To ensure optimum functionality of the hammer mill, sieves with a mesh opening of only 2.0 millimeters are of central importance. “If these sieves become blocked, or if some other fault occurs, there are negative consequences for the entire process downstream,” says the maintenance specialist.

To prevent faults, the sieves are regularly rotated by one position, and after three rotations they are replaced. These servicing procedures used to take around 90 minutes every week. For Dennis van Tetering, this was far too long, mainly because of the strict and time-consuming safety procedures that must be followed each time the hammer mills are switched off. “The hammer mills were simply idle for too long.”
Substantial Savings
Van Tetering took his concerns to Uncas Roukema, the Bühler representative responsible for customers in the Benelux countries. Uncas Roukema then got in touch with the Bühler engineers. Soon enough, he was able to offer Dennis van Tetering a solution: Hardened sieves and hammers manufactured from manganese steel instead of steel.

Van Tetering did not hesitate for long, and had the new sieves and hammers installed in “his” hammer mills. “Uncas has always kept his promises in the past. I knew that I could trust him and Bühler as a partner.”

After only a short amount of time in operation, it became clear that the hardened-steel sieves had dramatically improved the service interval. Since then, the service interval has been tripled to 22 days without any problems occurring. “Year on year, our total savings due to the new sieves are substantial”, the maintenance expert reveals. The additional costs for the sieves, he explains, were very quickly offset by these added savings.

The Search for Improvements
Trained mechanic Van Tetering is proud to work for the “Green Company”. Watching the manager of the maintenance team around “his brewery”, it’s easy to believe him. His duties at Heineken, as he sees it, are not just to provide maintenance services and to carry out repairs: “It’s more than that. I’m always on the lookout for improvements in processes and workflows.”

In everything he does, he always keeps in mind the impact on costs and the potential improvement of workflows. The question he asks himself daily is “what can I change to make it work better, faster, and easier?” This question also links the longstanding partnership between Bühler and Heineken.

Further information:
Uncas Roukema
Area Sales Manager Benelux,
Key Account Manager
Grains & Food
Bühler Benelux
T +32 1520 5102
uncas.roukema@buhlergroup.com
Twice the Resolution

Efficient detection and removal of foreign objects smaller than ever before: The newly developed InGaAs HD camera for Bühler's optical sorting machines makes it possible.

Deep-frozen fruits and vegetables, such as raspberries, peas, and baby carrots are becoming more and more popular among consumers. Not only are they quick to prepare and available all year round; because they are harvested at their full ripeness and frozen straight away, they are often superior to fresh produce as the nutrient content has been preserved at its peak. As the amount of deep-frozen fruits and vegetables processed around the world increases, so too do the requirements for food safety. “Foreign objects such as small stones, wooden splinters, or plastic pose a risk in packaged products,” says Stephen Jacobs, Global Product Manager at Bühler SORTEX. “They can cause cuts or, in the worst-case scenario, choking.” For the processors and suppliers, this results in costly product recall campaigns and a damaged reputation.

HD Camera Detects Smaller Foreign Objects

Optical sorting machines with enhanced InGaAs HD cameras have proven to be particularly efficient for the detection and removal of various foreign objects from foodstuffs. These special cameras are based on semiconductive materials and operate in the short-wavelength infrared range. They are capable of detecting the most subtle differences in color that are not visible to the human eye. Bühler was a pioneer in the application of this technology in optical sorting. Now the cameras have been considerably enhanced once again: “By combining new hardware, software, and lenses, we have succeeded in developing an InGaAs HD camera with a resolution twice as high as before. This means that the detection is more reliable, seeing smaller objects up to half the size”, explains Jacobs, describing the key advantage of the new technology.

Further information:
Stephen Jacobs
Global Product Manager
Bühler SORTEX Ltd
London
T +44 20 70 55 77 99
stephen.jacobs@buhlergroup.com

ADDED VALUE

Detection of foreign objects smaller than ever before
Considerably improved food safety
Upgrade option for existing systems
Can be used in both processing and packaging lines
Grupo Elayo is making use of the health-enhancing bioactive components found in olives for innovative new applications. To do this, they extract the seeds from the fruit’s hard stone – using SORTEX sorting technology from Bühler.
Intensely fruity, bitter, and slightly pungent: The oil from the fruit of the olive tree is an integral part of Mediterranean cuisine, and has long been popular all over the world. This is not only because of its distinctive flavor, but also for the health benefits associated with its high levels of polyphenols. These phytochemicals protect the body from oxidation processes and have a positive effect on blood pressure. In addition, olive oil contains many monounsaturated fatty acids, which are proven to reduce cholesterol levels.

Spain is the largest olive oil producer in the world, ahead of Italy and Greece. The Andalusian province of Jaén – one of the most important growing regions in the world – is also home to Grupo Elayo. This group of companies was founded in 2012 by José María Olmo Peinado, a mechanical engineer and business economist, who has worked in the olive sector for 33 years. He is completely committed to innovation: “We are developing new products and applications from various parts of the olive including certain by-products – not only in the field of food, but also for the pharmaceutical and cosmetic industries,” summarizes Olmo. This inventive entrepreneur currently has nine patents for pioneering procedures and technologies.
“We discovered that the seed within the olive stone contains up to 100 times more polyphenols and antioxidants than conventional olive oil.”

José María Olmo Peinado, Founder Grupo Elayo

Innovative New Applications and Products
One company within the group concentrates on utilizing the leaves of the olive tree and the waxy protective layer which encloses the fruit: “Using supercritical fluid extraction, we can obtain bioactive agents, such as oleanolic acid or maslinic acid, which can be used in medical applications,” states Olmo.

Another company in the group produces around 140 tonnes of olive oil products per year. Once again, the focus is on innovation: The product line “World Flavours” features olive oils with a range of added flavors including chili peppers, garlic, butter, coconut, and chocolate. The aim is to expand into markets which do not currently consume olive oil. In addition, Olmo has developed an industrial procedure which turns olive oil into small spheres that resemble caviar. This method, known as spherification, is also employed in molecular cuisine. This “Caviar de Oliva” is available in a range of flavors and is used to give dishes an added level of culinary and visual refinement. The premium product has already proven popular abroad in places like England and the Benelux countries.

A High Concentration of Polyphenols
Olmo was especially taken with one particular idea: “We discovered that the seed within the olive stone contains up to 100 times more polyphenols and antioxidants than conventional olive oil. It also has very high levels of high-quality dietary fibers. In the past, however, we have simply discarded the stones as a waste product,” he explains. He therefore came up with the idea of extracting the olive seeds and using them for new products and applications. In order to put his plan into action, Olmo invested in a processing line to clean, dry, crack open, and sort...
the olive stones from the seeds. However, problems started at the sorting stage. “As the seeds and the stones are practically the same color, none of the sorting technologies that we had installed were able to distinguish between them reliably,” he recalls. It was not possible to sort out the good seeds for further processing.

But Olmo was not about to give up. He got in touch with the specialists at Bühler Sortex, who have around 70 years of experience in developing optical sorting solutions for various applications and industries. After several months of intensive trials, the London optical sorting research and applications department made a breakthrough. Using special InGaAs technology, it was possible to distinguish the olive seeds from the stones as well as from the seeds with embedded stone fragments, thus laying the foundation for a successful extraction process. InGaAs cameras (indium gallium arsine) are based on semiconductor materials and operate in the short-wavelength infrared range (SWIR). They detect the most subtle differences in color, which are not visible to the human eye. Bühler is a pioneer in the application of these cameras in optical sorting machines and has continued to develop and improve the technology.

**Special Cameras Manage the Task Reliably**

The solution won over Olmo, who decided to install the SORTEX optical sorting technology in his factory in Jaén. The system went into operation the very next day. The sorting process comprises a total of three stages. After the stones have been broken, the mix of stone fragments and seeds is conveyed into the first chute of the sorting machine. Here, the InGaAs cameras aid the separation of the stones from the seeds, which constitute almost 90 percent of the conveyed material. The remainder – around 10 percent – then undergoes another sort on the second chute, to ensure that only flawless seeds, without any pieces of stone, are sent on for further processing. The third chute resorts the rejected material, to recover any seeds that are still attached to the stone, so that they can be sent back to the cracking machine and then re-sorted, to minimize wastage of the valuable seed.
"We can adapt the number of stages to the properties of the raw material at any time in order to keep the yield at a consistently high level."

José María Olmo Peinado, Founder Grupo Elayo

"The solution from Bühler impressed us in every regard. It makes us the only company in the world capable of extracting olive seeds successfully," says Olmo, not without a certain amount of pride. A key feature of the sorting solution is the high throughput rate of around 700 kg of raw material per hour. It also produces a remarkable yield, as only one percent of the good seeds are lost. This is a crucial success factor: It takes 25 tonnes of olive stones to extract just 1,250 kg of seeds. An additional benefit is the exceptional level of flexibility: "We can adapt the number of stages to the properties of the raw material at any time, in order to keep the yield at a consistently high level," explains Olmo.

The Seed of Something New
Grupo Elayo is currently working on developing new products based on the olive seeds. For example, the seeds can be used in energy bars or snacks, in a similar way to pumpkin seeds. Olmo has also
CUSTOMER CASES / Grupo Elayo

developed a procedure for extracting a highly concentrated oil from the seeds. This oil offers greater health benefits than conventional olive oil, as it contains a much higher concentration of polyphenols and antioxidants. “Small quantities of this kernel oil could be used for cosmetics, functional foods, or medical applications such as therapy for joint pains or the treatment of burns,” explains Olmo. Extensive testing is currently underway, to find out even more about the bioactive compounds contained in the oil. And that’s not all: The seeds, which boast high levels of fiber, can also be used to produce flour, which can then be added to baked goods, such as bread or pizza dough.

Perhaps the secret to José Maria Olmo Peinado’s success is that he has such a holistic way of thinking and acting. He has even thought up a way of using the residual products from the seed extraction process – he uses the stone fragments to produce, among other things, biomass for heating systems, fireplaces, and barbecues. He can also grind them into a powder which is ideal for use in cosmetic creams due to its exfoliating effect. But that’s not all: Broken-up olive stones can also be used as a raw material to make an exceptionally robust and durable chipboard. A separate company has recently been set up within the group to produce and market these boards. One thing’s for sure: This will not be the last innovation to come out of Jaén.

Further information:
Alfredo Avendano
Product Manager
Bühler Madrid
T +34 916 929 422
alfredo.avendano@buhlergroup.com

OLIVE OIL: A SUCCESS STORY THOUSANDS OF YEARS IN THE MAKING

Olive oil is said to have been traded and consumed in Galilee as early as the sixth millennium BC. It is thought that people began growing olive trees specifically to extract the oil around 3500 BC in Crete. In Greece, the olive tree was sacred and its oil was the most precious gift that could be given to the gods. It was also used as soap in the ancient world: Both Greeks and Romans would rub themselves with olive oil after bathing, before using a scraper to remove dirt and oil residues from their bodies. People have also been aware of the anti-inflammatory properties of the plant oil since antiquity. Today, almost all of the producer regions are in the Mediterranean countries. As olive trees require certain conditions with regard to the climate and the soil, just a few regions produce the lion’s share of the oil. The major producers are Spain, Italy, and Greece, but olive tree plantations can also be found in Tunisia, Turkey, Syria, Morocco, and Portugal. Spain is by far the largest producer and exporter of olive oil: It produces 1.1 million tonnes of olive oil each year from a total cultivation area of 2.2 million hectares. Four fifths of all olives are grown in Andalusia, of which 82 percent are in the province of Jaén, situated between Cordoba and Granada. The most common variety of olive is the Picual, which represents around half of the harvest, although the Arbequina, Blanqueta, Hojiblanca, and Picudo varieties are also popular. With global production of 2.8 million tonnes, olive oil only made it to tenth place in the list of the most widely produced plant oils in 2013, according to the Food and Agriculture Organization of the United Nations (FAO). The top spot was taken by palm oil with 54 million tonnes, followed by soybean oil and rapeseed oil.
Power Your Life!

Lithium-ion batteries from Chinese manufacturer Lishen can be found in all sorts of places, from iPhones to Fitbit wristbands and Dell notebooks. The next major field of application for Lishen is energy storage systems for electric vehicles. The company will be joined on this venture by the Bühler Group, which is redefining the manufacture of electrode paste with a new process.

TEXT AND PICTURES: BURKHARD BÖNDEL

Extruder: Revolutionary battery production thanks to continuous processes.
Lishen is a young company with a history which reads like a fairy tale of the Chinese economic boom: Founded in 1997, the company now employs over 9,000 people. In 2001, Motorola – then a major player on the mobile communications scene – was the first Western manufacturer to name Lishen as an official partner; today, the Chinese company supplies the top global brands in the electronics and entertainment industry. The company’s production capacity, which started at the equivalent of 5 million ampere-hours of battery capacity, has now grown by a factor of 200.

And that is just the beginning. What is the secret behind their success? “We focus on technology and quality,” says Gao Junkui, Executive Vice President with responsibility for research and development. This enables Lishen to supply its customers with first-class products in terms of battery capacity, durability, and weight, and helps it to avoid a disastrous price war. Lishen invests up to 5% of its turnover in research and development, with over 1,500 engineers working to develop the batteries of the future. And this future lies in the next stage of expansion – the automotive industry.

China is one of the global driving forces in this field too. Due to population growth and increasing prosperity in the emerging markets, the demand for vehicles is rising on a sustained basis: In 2014, 90 million cars were produced worldwide; by 2021, annual production capacity is expected to reach 113 million. This growth brings challenges with it: The transport sector is responsible for 13 percent of all greenhouse gas emissions, of which 75 percent is caused by road traffic. That’s to say nothing of the smog polluting the world’s megacities.

Electric vehicles play a key role in reducing CO₂ emissions and improving air quality. The International Energy Agency (IEA) estimates that, of the 120 million new cars sold in 2030, half will be powered by an electric motor. Based on a recent study, the automotive supplier Continental also predicts that hybrid and electric vehicles will increase their global market share from the current level of 4 percent to around 20 percent by 2025. The focus here is very much on the growing Chinese automotive market, for which an annual volume of 34 million units is predicted in 2025 – more than a quarter of the global vehicle sales.

**Electric Vehicles Need Efficient Batteries**

The crucial component of an electric vehicle is its battery. Range, speed, weight, and costs – everything is affected by the energy storage system. Lithium-ion batteries provide excellent reliability and quality and are therefore ideal for use in electric vehicles. They are also used for temporary storage of solar or wind energy, for example. The global production capacity for lithium-ion batteries is expected to expand on a huge scale over the next few years, and Lishen will be devoting all of its energy to the cause: “We want to virtually double our production capacity by 2017,” says head of development Gao. The company intends to invest just under CHF 2 billion in the establishment of a “Power Battery Industrial Park” with an annual production capacity of 10 GWh.

If Bühler’s recent development work in the lab – which is now being implemented in an initial pilot plant at Lishen – comes to fruition, the Uzwil-based group will be part of the action, as its new continuous production process for electrode paste offers enormous advantages.

**Fine Dispersion Improves Battery Capacity**

The process for manufacturing lithium-ion batteries comprises several stages and is extremely com-
A key step in the process is the wet preparation of the electrode slurries, which are then applied to the electrode films. The quality of these pastes has a direct impact on the capacity of the cells. A critical factor in ensuring success is careful, controlled dispersion. The active component – such as nanoscale lithium iron phosphate – must be dispersed finely in the carrier medium while retaining its porous structure.

In order to secure the electrical connections between the individual active particles, long carbon chains are also added. These chains must not be severed either; they must only be dispersed finely. The better this “conductive soot” is dispersed while retaining its form, the higher the loads the finished battery can be exposed to for brief periods of time. To maximize the electrochemical performance, it must be possible to control the load on the individual particles precisely during the dispersion phase.

This mixing has previously been carried out in large stirring tanks, similar to super-sized food kneading machines. The problem with this method is that the electrode mass can only be produced batchwise (batch process). If a batch does not meet the quality requirements, it is rejected as waste or used for lower-quality products. A great deal of time and space is also required for the plants used in this process.

Extruder Improves Process Monitoring

In contrast, the core machine in Bühler’s process is a co-rotating twin-screw extruder. Through flexible configuration of the screws, various steps such as mixing, homogenizing, dispersing, and degassing can be combined in one unit. With different addition points for solids and liquids, the concentration of solids – and, therefore, the viscosity – can be changed at any time. This makes it possible to adapt the mixing and dispersing processes precisely to the requirements of the raw materials, some of which are quite delicate.

Due to the compact dimensions of the extruder, only a fraction of the volume of a conventional slurry preparation system in the batch method is required. As some of the materials used are sensitive to air humidity and the production environments are designed as dry rooms, the reduced space requirements ultimately result in lower overall costs.

“We want to virtually double our production capacity by 2017.”

Gao Junkui, Executive Vice President Lishen

Gao Junkui, Executive Vice President Lishen: China drives electric vehicles ahead.
Bühler supplies key process technologies along the production chain of lithium-ion batteries. The proper preparation of the electrode active materials is the basis for high-performance LIBs. With our wet grinding equipment and extensive knowledge in processing of nanoparticles, Bühler enables enhanced converting of these materials.

Furthermore, Bühler offers complete solutions for the production of LIB anode, cathode, and separator slurries, including solid and liquid raw material handling.
Inline Quality Assurance Reduces Waste
Dispensing the individual components is just as challenging a process as the dispersion phase. To ensure that the paste always has the right composition when it is sent on directly for further processing, the precise formulation must be used accurately at all times. The newly developed QuaLIB™ unit from Bühler – for inline quality control of the paste after the dispersion process – constantly measures the solids concentration, flow behavior, particle size, and other important product parameters, and checks whether they are within the defined tolerances. If not, the paste is automatically diverted to a special tank. This minimizes the amount of electrodes and cells wasted, and thus improves the productivity and cost-effectiveness of the battery manufacturers.

Lithium-ion batteries provide excellent reliability and quality and are therefore ideal for use in electric vehicles.

Bühler battery lab in Wuxi: offering customers to test their formulations.
Furthermore, inline quality control also helps to optimize the manufacturing process over time. All of the data relating to slurry manufacturing is collected in a cloud and analyzed comprehensively together with the battery capacity data. As soon as the data set is large enough, the software will provide recommendations for how to optimize the process.

The tests carried out by Bühler in its own lab in Uzwil and its battery lab in Wuxi, China, are producing impressive results. The number of electrodes and cells wasted due to poor slurry manufacturing can be significantly reduced. Less waste in turn reduces the amount of investment needed. In order to verify these values in tough, every-day industrial conditions, Lishen is currently commissioning a Bühler pilot plant. “The first test runs we have done are very promising,” says top manager Gao. As soon as the process is running in a stable manner, the Bühler plant will become part of the normal production environment. This would extend Lishen's technological lead in the manufacture of the crucial car component and, for Bühler, it would be an important step into a promising new field of application.

Further information:
Cornel Mendler
Head of Business Area Grinding & Dispersion
Bühler AG, Uzwil
+41 71 955 13 43
cornel.mendler@buhlergroup.com

Home batteries could be used to store solar energy.
Reducing energy consumption is a goal we all share. It is a goal that makes sense from economical and environmental perspectives. At Bühler, we must optimize the energy reduction of our own operations and we run continuous improvement initiatives to achieve this. However, our biggest impact comes from the continuous use of our solutions, day after day and year after year, at our customer’s production sites. This is a responsibility that we take very seriously. In fact, we aim to support our customers to reduce the energy required to produce a unit of finished product by at least 20% by 2020.

There are many levers to achieve this, from
- eliminating inefficiencies in processing by reducing change over times, moving to higher energy efficiency drives, or by utilizing enhanced process control or services to carefully manage thermal or electrical energy requirements
- reducing waste or losses in the food value chain from logistics and manufacturing or creating valuable products from previously low value by-products
- bringing new technology approaches to make a step change in energy consumption, such as the Ecothermatik pasta dryer, lightweight automotive structural parts, or functional coatings for architectural glass.

Solving a challenge of this magnitude requires collaboration between multiple actors, with broad technical skills and business thinking. Accordingly, we have launched the Bühler Energy Challenge in October to engage with some of the finest young minds across more than ten universities. By interacting with these future technology and business leaders we challenge our own thinking, identify new technologies, facilitate collaboration between students around this topic of energy reduction, and maybe we will find some promising solutions to develop together in the future.
IN ADDITION TO THEIR DAY JOB, BÜHLER RESEARCHERS HAVE FOUND TIME TO CONTRIBUTE TO SCIENTIFIC PUBLICATIONS. HERE’S A SELECTION.

1 Advancing Cleaning Solutions for Cereal Grains
In the past few years, grain processors from around the world have intensified their efforts to ensure safe food and feed. Matthias Graeber, mycotoxin expert within Bühler’s Corporate Technology Group, discusses how advanced separation and optical sorting solutions can be used to manage the risk of mycotoxins and other hazardous contaminants.

Internet: http://issuu.com/globalmillingadvances/docs/gm_august_2015

2 Mapping Emerging Processing Technologies
Emerging technologies like HPP, microwave, UV, and PEF were developed in the early 20th century, but have not yet been adopted at any large scale, such as canning or heat pasteurisation. The presented study discusses these novel technologies and evaluates their current and predicted upcoming worldwide applications in different food sectors.

Internet: www.sciencedirect.com/science/article/pii/S1466856415001162

3 Ensuring Food Safety in Extrusion Processing
Food processors have to ensure food safety. The article focuses on ready-to-eat products that do not require cooking before consumption. The authors highlight how cooking extrusion can be designed into a validated kill step and explain hygiene measures necessary to avoid cross-contamination of RTE breakfast cereals.

Internet: http://safst.co.za