FOCUS

HOW BÜHLER REDUCES CO₂ EMISSIONS

VACUUM-COATED ARCHITECTURAL GLASS
A silver layer reflects thermal radiation

MODIFIED FLOURS AND MEAT ANALOGS
Tap into new markets with extrusion technology

PIERBURG FROM GERMANY
A high-tech factory for aluminum die casting
Information from the editorial team:

Dear Readers. We would like to inform you that from this edition on our diagram magazine will be printed in English and German only. We wish you an entertaining and inspiring read.

Content

3 Editorial

Focus: Far from being exploited
A reduced energy consumption is sustainable and cost effective.

Energy efficiency

Reducing emissions
Energy efficient processing solutions for customers, technologies for the production of batteries, lightweight vehicles or architectural glass coating: Bühler is committed to reducing the global emission of CO₂.

Infographic

14 Minimize the footprint
Ecological sustainability is a top priority for Bühler.

Die Casting

16 Energy consultancy
Specialists from Bühler examine customers’ die casting processes.

Architectural glass coating

18 Efficient heating or cooling
A thin layer of silver reflects heat radiation.

Interview

20 Keeping climate change at bay
Clean technologies can only gain acceptance if they are economically viable, says Lino Guzzella, President of the Swiss Federal Institute of Technology Zurich.

Shorts

24 Bühler worldwide

Technology & Solutions

Extrusion Technology

Extruding added value
Extruders can turn by-products from grain processing into higher value products.

Reconditioning

32 Better corrugation
A new corrugating machine improves quality.

AnywarePro™

33 Monitoring performance
Thanks to a central data analysis rice processors can improve their productivity.
Dear Readers,

Turning off the light when you leave the room, closing the refrigerator immediately after taking something out or traveling short distances on foot rather than by car – there are many things we can do in our daily lives to save energy. However, we in the industry have a much greater leverage in reducing energy consumption. Above all, energy is an important cost factor for all industrial processes. Energy efficiency has therefore been a key topic for years at Bühler: We are able to save energy in our own facilities (p. 14), but above all we can reduce considerably the energy consumption of our equipment and offer better economic value to our customers.

As a result, we develop every process and every product with a focus on reduced energy consumption from the very beginning. Be it in our Grains & Food or Advanced Materials business: In our focus section (starting on p. 4) you can read about how Bühler is driving the topic of energy efficiency in all of its business areas – from the milling and animal feed industry, to pasta and rice processing or wet grinding & dispersing. In order to improve the energy efficiency of its equipment & systems, Bühler offers special consulting services to provide an external perspective on customers’ processes (p. 16).

The industry should use the energy topic as a catalyst to further improve production processes and product design, says in an interview ETH President Prof. Dr. Lino Guzzella (p. 20). Energy efficiency is anything but an end in itself: Better energy efficiency leads to optimized production processes for our customers and at the end of the day, this increases their profitability. And above all, the environment will be grateful.

Kind regards,

Calvin Grieder, CEO
Far from being fully exploited

40% less heat for the drying of pasta, 50% less electrical power for a feed mill, thermal protection layers on architectural glass or lightweight construction for vehicles: For Bühler, the efficient use of energy is a top priority. Reducing energy consumption is not only sustainable – it increases the profit margins for customers.
Pasta products are processed with a certain moisture content. At the end of the process, however, they must be completely dry and ready for storage. For that purpose, large amounts of energy in their manufacturing are required for drying. Thanks to an innovative heat exchanger system, Bühler’s long-cut pasta dryer Ecothermatik needs approximately 40% less thermal energy and 20% less cooling energy.

This is just one example of many: For Bühler, the efficient use of energy is relevant in several aspects. “We develop every single process and every product with a reduced energy requirement in mind”, is as Ian Roberts, CTO of Bühler, sums it up. But that’s just one side of the story: With production solutions for lithium-ion batteries for electric vehicles, die casting machines for producing lightweight vehicle parts or large area coating systems for adding thermal protection layers to architectural glass, Bühler develops and markets solutions that have an even higher leverage effect in reducing global CO₂ emissions.

“Every process and every product is developed from the very onset with reduced energy consumption in mind.”

Ian Roberts, CTO Bühler
As the global thirst for energy grows rapidly, the reduction of emissions becomes more necessary today than ever before. About 13,000 million tonnes of oil equivalents primary energy are consumed globally each year. The UN Climate Change Conference in Paris again has shown that the fight against global warming is the most important task of our time. Essential factors to succeed in this fight are the use of renewable energies, an improved energy efficiency as well as exploiting energy-saving potentials.

20 % less energy for core processes
Bühler and its customers are making significant contributions to this goal: “By 2020, we want to reduce the energy consumption in all our core processes by at least 20 %, thereby reducing the amount of energy our customers are consuming”, states Roberts. And the potential is far from being fully exploited, as Lino Guzzella, the President of ETH Zurich, believes: “Industry should use the energy topic as an incentive to continuously improve production processes and product design”, he claims (p. 20).

An efficient use of energy is not only crucial with regard to sustainability, but also with regard to profitability. On one hand, purchasing decisions of end consumers are increasingly influenced by sustainability. A manufacturer who can certify that he is producing agitated bead mills from Bühler produce, for example, quality inks for packaging. Here, color pigments are dispersed as finely as possible into a carrier medium by means of the constant stress between countless small grinding media. The smaller the grinding media, the smaller the specific energy required for the dispersing process. In order for owners of older mills to also benefit from the efficiency gains of smaller grinding media, Bühler offers a special retrofit package. Older machines like Super-Flow™ and Advantis™ can thereby be converted to MicroMedia™, which was specifically developed for small grinding media from 20 to 800 micrometers. Thanks to these micro-grinding beads, the same amount of product can be produced in a shorter period of time and with less energy. Depending on the specific application, this results in an increase in efficiency and energy savings between 30 % and 50 %.
“By 2020, we want to reduce the energy consumption of all our core processes by at least 20 percent.”
Ian Roberts, CTO Bühler

In the production of animal feeds, the hot pellets discharged from the pellet mill must be cooled. With its Coolex™, Bühler has developed a highly efficient cooling solution enabling feed manufacturers to increase their product quality and hygiene while at the same time cutting costs. Coolex™ is characterized by its innovative design based on the countercurrent operating principle and its continuous discharge of material. This allows moisture variations in the product to be reduced by up to 50% compared to conventional coolers. And because a lower specific air volume per tonne of end product is needed for cooling, the system is perceptibly more energy-efficient than conventional coolers. Thanks to its smart design, Coolex™ can use smaller fans. In comparison to other countercurrent coolers, this reduces energy consumption by as much as 10%. Its easy cleaning, low number of wear parts, and durable air cushions also help minimize downtimes and contribute to low-maintenance operation and high productivity.

Up to 10% less energy consumption
Efficiency is the result of many small steps

For the efficient use of energy, however, there is not a single solution. High efficiency is rather the result of serveral measures and optimizations across different levels. One main aspect is also productivity: If a mill can produce 10% more flour in 24 hours, then the amount of energy needed for producing one tonne decreases accordingly. High quality and productivity are also the focal point in die casting: “The smaller the number of rejects, the lower the amount of energy needed for one unit”, Roberts explains. Another topic is shortening cycle times: If an engine block, for example, can be manufactured in 90 instead of 120 seconds, the energy required for manufacturing one unit decreases.

But other measures like, for example, shorter downtimes thanks to a quick product changeover, easy cleaning or proactive maintenance, also can have a positive effect on productivity. In addition, retrofitting solutions allow owners of older machines to benefit from the efficiency gains of newer systems. Another issue is the prevention of losses: “If grain, for example, perishes due to improper storage or cleaning, the total amount of energy invested in its cultivation is irrevocably lost”, is how the Bühler’s CTO outlines the problem.

The biggest energy savings can be achieved through the proper design of manufacturing processes. In order to achieve this, process parameters...
must be precisely aligned to the raw material and the final product. “Bühler’s experienced specialists have a great degree of experience in setting up processes in the areas of milling, extrusion, die casting or coating, for example”, explains Roberts. This unique process and application know-how is one of the main distinguishing features of the Uzwil based company.

**Process heat is a major energy consumer**

But improvements to single machines and pieces of equipment can, of course, also make a difference. Over 60% of the energy in the processing industry, for example, goes into generating process heat. “Products such as feed pellets, breakfast cereals or pasta are usually processed with a certain moisture content. In the end, however, they must be storable and maintain the desired characteristics through to the end consumption”, is as Roberts describes the task. Accordingly, a large amount of energy is put into the drying process.

The Ceres™ cereal dryer, for example, is specially designed so that the heat penetrates the cereals faster. This reduces energy requirements by shortening the drying time. But also the use of waste heat offers potential for savings: The long-cut pasta dryer Ecothermatik as well as Bühler’s cocoa bean roasters, for example, feature a heat exchanger system, reducing the total amount of energy needed to generate the necessary heat.
In addition to process heat, the second largest consumer in the industry is mechanical energy. According to a study by the International Energy Agency (IEA), electric motors and systems they power account for 40% of global electricity consumption. No wonder that the potential energy savings are huge: Motors with the highest efficiency rating could save 2,800 terawatt-hours of electricity and prevent 1.8 billion tonnes of CO\textsubscript{2} emissions globally each year. No wonder that the potential energy savings are huge: Motors with the highest efficiency rating could save 2,800 terawatt-hours of electricity and prevent 1.8 billion tonnes of CO\textsubscript{2} emissions globally each year. In cooperation with drive suppliers, Bühler works closely to improve the efficiency of electric drives. One example is the UFA feed production facility: Thanks to the use of synchronous reluctance motors, electrical energy requirements of the plant could be reduced by more than 50%.

“Another means of achieving more efficiency is the use of alternative drive concepts. Direct drives, for instance, can be considerably more efficient than conventional belt drives”, says Roberts. An example of this is the Pellet Mill Kubex T, whose motor is directly connected to the main shaft, thereby significantly reducing transmission losses. This feature enables customers like the largest Italian feed producer Veronesi to achieve energy savings of up to 20% compared to conventional pellet mills.

Rice is the most important staple food for billions of people. It is therefore all the more important to ensure its efficient and sustainable processing. With its new UltraLine™ rice processing solution, Bühler is once again setting standards in the rice industry: an unprecedented processing capacity as high as 16 tonnes of rice per hour on a single line and a high product quality together with reduced operating costs. The system integrates a number of components such as the UltraPoly™ polisher, the UltraWhite™ rice whitener, and the SORTEX S UltraVision™ optical sorter. All these machines offer not only the highest processing capacities ever achieved, but are also distinguished by their hygienic and energy efficient design. The result is a 20% reduction in energy consumption per tonne of rice. Sri Krishna Metcom Ltd in India was the first to adopt this technology in 2013, to provide high quality, super silky rice.

ULTRALINE™ RICE PROCESSING SYSTEM

Efficient processing of 16 tonnes of rice per hour

Up to 20% less energy required per tonne of rice
“Motors with the best efficiency rating could save 2,800 terawatt-hours of electricity and percent 1.8 billion tonnes of CO₂ emissions.”

Ian Roberts, CTO Bühler

Solutions with a high leverage effect

With its energy efficient processes and solutions, with its worldwide service network or with retrofitting packages, Bühler makes significant contributions to reducing the energy consumption of its customers. A much higher leverage effect for reducing global CO₂ emissions, however, is achieved through processes and technologies that affect the behaviour of literally hundreds of thousands of end users: Among these are, for example, technologies for the manufacturing of batteries for electric vehicles, die casting machines for the manufacturing of lightweight components for vehicles as well as large area coating systems for adding a thermal protection layer to architectural glass.

Performance Drum for Tornado Roaster

Shorter cycle time and lower energy consumption

Next to conching, roasting is the most important process that determines taste in the production of chocolate. It withdraws the bitter substances from the cacao nibs’ cores, while reducing the water content for further processing. In conventional processing, a double-walled roasting drum is heated from the inside, which requires a large amount of energy. The heat is then transferred from the drum jacket to the nibs and the roasting cycle lasts 45 to 60 minutes. Bühler has developed an energy-efficient alternative with the Performance Roasting Drum: The nibs are not only heated by the jacket around the drum, but they are simultaneously heated by hot air inside it. Depending on the initial moisture content of the raw material, the cycle time is reduced by up to 20 percent, saving simultaneously thermal energy up to 25 percent. The RSX technology is realized as a standard in new machines. However, the Performance Drum can easily be retrofitted on older Tornado roasters.

Motors with the best efficiency rating could save 2,800 terawatt-hours of electricity and percent 1.8 billion tonnes of CO₂ emissions.

Ian Roberts, CTO Bühler
In the previous years, Bühler has developed a new process for the production of electrode slurry for lithium-ion batteries. This process enables battery manufacturers to save more than 50% energy compared to the traditional mixing process. “Efficient and cost-effective production of batteries is not only a key factor for the more widespread use of electric vehicles. Because of their ability to temporarily store wind or solar power, batteries are also enabling and promoting the use of renewable energies”, is how Roberts sums it up.

But Bühler also contributes to reducing CO₂ emissions in transportation. This is where the company’s die casting technology comes into effect.

Today, an increasing number of vehicle components such as engine blocks or structural parts are manufactured from the lighter aluminum instead of steel. The lighter a vehicle is, the less fuel it consumes. And the potential of lightweight vehicle construction is far from being exploited: “Today, a car typically contains about 150 kg of aluminum parts on average. By 2025, this figure is expected to rise to 250 kg”, Roberts predicts.

**More efficient heating or cooling**

Another means for reducing CO₂ emissions is applying thermal protection layers to architectural glass. Glass containing such a functional coating signifies.

“Last October, we launched an Energy Challenge, which calls on students from the best universities to develop new solutions for greater energy efficiency.”

Ian Roberts, CTO Bühler

---

**ENERGY-SAVING FUNCTIONS FOR DIE CASTING MACHINES**

**Reduce energy consumption in die casting**

Die casting machines from Bühler have extensive functions for improving energy efficiency. For example, plants are equipped with monitoring systems that detect the energy consumption of all components and visualize this on a display screen. These measurements provide the basis for energy-related process optimization. Another function allows for the precise adjustment of the energy consumption of the machine to the requirements of the part being produced. An easy-to-configure start-stop automatic function ensures that individual components or peripherals automatically turn off in case of production interruptions or disturbances. This helps prevent energy-intensive idling of the entire casting cell. Finally, Bühler machines are also equipped with efficient hydraulic and drive systems, which significantly reduce energy consumption.

**Automatic**

elimination of energy-intensive idle times
FOCUS / Energy efficiency

The ecological footprint of large production plants is increasingly being given more attention. This development has been stimulated by regulators in many countries: In 2012, for example, the European Union tightened its legislation on energy efficiency. Therefore, Bühler Leybold Optics has extended its range of highly energy efficient coating plants. Now, some optical coating machines are equipped with a so-called Ecomode. This mode of operation ensures that individual components are only started when they are effectively required for the process. As a result, this optimizes the consumption of the entire machine and energy savings of around 30% can be achieved, such as with the ophthalmic optics machines. Another example of energy efficiency is the DynaJet coating machine: By replacing diffusion pumps with turbo-pumps, customers save around 8,000 euros in energy costs per machine per year.

Whether it be energy efficient processing solutions or machines for customers, or technologies for manufacturing batteries, lightweight vehicle parts or coated architectural glass: Bühler actively engages in reducing global CO₂ emissions. In order to continuously innovate and develop even more efficient solutions, CTO Ian Roberts now has once again recruited the brightest minds: “Last October, we launched an Energy Challenge which calls on students from the best universities to develop solutions for greater energy efficiency”, he states. We are already curious about the results.
Light off – heart and mind on.

Marco Lewe, energy officer in Bühler Braunschweig.

Reduction of consumption and emissions per productive hour
(relative to previous year)

Target: –5% per year

**GRI REPORT G4**
In 2015, our sustainability reporting has been completely revised and upgraded following the latest standards of the Global Reporting Initiative (GRI G4), thus setting a major milestone in our reporting approach.
An ecological footprint leaves an impression.
The big issues of our time are omnipresent in the media. Not a day passes when we don’t see, hear or read something about global warming, overpopulation or barrels of oil equivalents. The talk is of climate conferences and millions of tonnes of CO₂. And there we all were, under the illusion that gas was something extremely light.

But does it affect us? Really? In our everyday lives? We can certainly think about it and understand it. But we don’t feel it. That’s why the term “ecological footprint” is so wonderfully concrete, almost as unique as a fingerprint. Business enterprises have one, as do nations and regions within them. But so, too, does every human being, you and I included. And some of us have bigger feet than others.

If we weigh up all the criteria in an “ecological footprint”, Marco Lewe’s feet are definitely on the small side. He’s 47 and married, has three children and lives near Braunschweig in northern Germany. He joined Bühler in August 2011, initially as an electrical engineer. Since the beginning of the year, he has also been energy efficiency officer at the Braunschweig plant.

It is a post he has thoroughly deserved. He has always been one to take an extra spin through the factory workshops, turning off lights that are no longer needed once a shift is over. “I do the same at home. Leaving lights on is a total waste of money and energy. I don’t hand in my brain at the factory gate.” He states his views tersely and clearly.

For Marco Lewe, the factory premises in Braunschweig are like a second home. The small workshop in which he is standing has 350 lamps, the large one adjacent to it 1,276. These are orders of magnitude at which you could start thinking of replacing them with LEDs. But it would have to be worth it financially; after all, 350 LEDs would cost around 60,000 euros. And that’s without installation and programming. He thinks it through from the company’s point of view and gives his recommendations. The lighting may be just an example, but it’s fittingly illuminating.

In his role, Marco Lewe is authentic to the core. That’s what makes him so credible. He talks about the world he works in with emotion and genuine commitment, regularly comparing it with his private life. He can get annoyed if he spots a radiator in a corridor between the workshop and yard that is set too high. “You wouldn’t do that at home, would you?” he asks animatedly. In his blue overall, he’s one of them: a man who lives out what he says and thinks.

But for Marco Lewe, energy efficiency officer at the Bühler factory in Braunschweig, there is bound to be plenty more room for potential improvement in the facility’s stainless-steel center of excellence. And every success makes his own personal ecological footprint slightly smaller, as well as Bühler’s.

In 2015, 17 out of 27 production sites monitored their ecological footprint.

<table>
<thead>
<tr>
<th>Production Sites</th>
<th>Total of Productive Hours (in Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOLLAND</td>
<td></td>
</tr>
<tr>
<td>RALEIGH</td>
<td></td>
</tr>
<tr>
<td>LONDON</td>
<td></td>
</tr>
<tr>
<td>BERGNEUSTADT</td>
<td></td>
</tr>
<tr>
<td>BRAUNSCHWEIG</td>
<td></td>
</tr>
<tr>
<td>BEILNGRIES</td>
<td></td>
</tr>
<tr>
<td>ZAMBERK</td>
<td></td>
</tr>
<tr>
<td>HEFEI</td>
<td></td>
</tr>
<tr>
<td>CHANGZhou</td>
<td></td>
</tr>
<tr>
<td>WUXI (I)</td>
<td></td>
</tr>
<tr>
<td>WUXI (II)</td>
<td></td>
</tr>
<tr>
<td>BANGALORE</td>
<td></td>
</tr>
<tr>
<td>JOINVILLE</td>
<td></td>
</tr>
<tr>
<td>UZWIL</td>
<td></td>
</tr>
<tr>
<td>JOHANNESBURG</td>
<td></td>
</tr>
<tr>
<td>ALZENAU</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL OF PRODUCTIVE HOURS (IN MILLION)**
- 2015: 5.1
- 2014: 5.0
- 2013: 4.5
Consulting for more efficiency

Specialists from Bühler carefully examine customers’ die casting cells and show them ways to improve energy efficiency.

Vehicle parts are increasingly being produced by die casting lightweight aluminum instead of being made of steel. So-called lightweight construction helps reduce fuel consumption of cars and thus CO₂ emissions. Per 100 kg weight reduction, 0.4 litre fuel per 100 km will be saved. Energy efficiency is increasingly becoming a central focus, also for die casting foundries. On the one hand, the pressure is growing for industrial companies to conduct their production in an ecologically sustainable manner. On the other hand, reduced energy consumption is also economically viable: “In large foundries, energy costs quickly add up to several million euros per year,” says Martin Lagler, Process Engineer Applications at Bühler. In order to improve the energy efficiency of die casting cells, Bühler offers a specialized consulting service: “We conduct detailed measurements, take a holistic view of the die casting processes and show our customers different optimization potentials,” explains Lagler. In a typical die casting foundry, the melting furnaces account for more than half (54%) of energy consumption. The second biggest consumer is the building infrastructure with 34%. The actual die casting cell makes up 12% of the total energy.

Increase quality and avoid losses

“The key to sustainable reduction in consumption lies in the optimization of the overall process: Even a slight improvement in the so-called Overall Equipment Effectiveness (OEE) translates into lower operating costs and a reduced energy consumption per good part,” points out Lagler. Key success factors include increasing quality and reducing rejects. A faulty engine block is not only unsellable, it must also be remelted. Therefore, any faulty parts impair the energy balance. An enormous potential for savings, however, is also in shortening the cycle time: “Manufacturing an engine block in just 90 seconds instead of 120 ultimately requires significantly less energy per piece,” calculates Lagler.

Minimizing downtimes is also crucial. Even if nothing is being produced, the base energy load of a die casting cell still remains. “With the Event Analyzer, we offer a software tool for analyzing cell stoppages. This allows faults to be specifically addressed and remedied and increases the availability of a plant,” explains Lagler.
FOCUS / Energy efficiency

Improve efficiency of the machines
There is even room for improvement with the machines: The machine is driven by a powerful electric motor, which controls all movements of the machine via a hydraulic system. “Up to 20% energy can be saved with efficient hydraulic and drive systems,” states Lagler. Large energy consumers also include the temperature control units, which maintain the temperature of the die, as well as the sprayer for applying the release agent and the cooling of the die by means of compressed air. “Cooling integrated into the die significantly reduces the consumption of compressed air, thereby reducing the power consumption for spraying by up to 90% and at the same time also shortening the cycle time,” explains Lagler.

Bühler specialists often encounter optimization potentials even in unexpected areas: For example, they noticed that when being transported from the melting furnace to the die casting cell, the molten aluminum would often fall below the set point temperature, which would then have to be reheated in the holding furnace with large energy consumption and a lower degree of efficiency. “We were able to find a remedy and, in this case, create an optimized driving route for the forklifts transporting the liquid metal to the cells,” recalls Lagler. Process engineers often find improvements in areas where customers would not even suspect. “Therefore, it is also important that we obtain an external view of the processes,” concludes Lagler.

“The key to a sustainable reduction in energy consumption is optimizing the overall process.”

Martin Lagler, Process Engineer Applications

Further informations:
Martin Lagler
Process Engineer Applications
Bühler Uzwil
T +41 71 955 13 75
martin.lagler@buhler-group.com

The aluminum preparation accounts for more than half of the energy consumption in a typical die casting foundry.
Glass with special effects

An extremely thin film of silver on window glass reflects heat radiation but allows visible light to pass through, thereby improving the energy efficiency of buildings.

Large amounts of energy are expended around the world for heating or cooling buildings. In order to protect our global climate, more and more countries require that new buildings be highly energy efficient. Developers as well as real estate investors are focusing on environmental sustainability: Office buildings with low energy costs can be easily rented and promise higher returns.

One possibility for reducing the need for heating or cooling energy is by utilizing coated heat-resistant glass. “Coated double-layer insulating glass can reduce energy loss by around 50 percent compared to uncoated glass,” explains André Herzog, Product Manager of Large Area Coating at Bühler.

A layer of silver reflects the heat
The insulating effect is generally provided by one or several thin layers of silver. The precious metal acts as a mirror with invisible heat radiation and reflects it. At the same time, it allows the visible spectrum of sunlight to pass through with virtually no loss. “In this manner, heat remains inside the building in the winter, which can save on heating costs,” Herzog concludes. In hot regions of the earth, the same glass coating reduces a building’s interior from heating. Especially in sub-tropical countries, energy consumption for air conditioning can be significantly decreased as a result.

Bühler is active as a leading equipment manufacturer in this growth area. The Group supplies glass manufacturers around the world with its large area vacuum coating plants. Coating application is conducted by means of the
so-called magnetron sputter process – also known as sputtering. In a vacuum chamber, the coating material is sputtered by generating a plasma and bombarding it with ions. Finally, it is deposited on the glass as a thin, uniform coating of approximately ten nanometers and this on jumbo glass substrates as large as 6×3.3 meters.

Compared to pyrolytic coatings, in which the coating is applied directly under atmosphere like spray paint after exiting the furnace of the float line, the vacuum-based method offers a number of advantages: “Because environmental influences or contamination by foreign particles are excluded, a consistently high quality can be achieved. Secondly, the design freedom is almost unlimited with regards to the choice and combination of coating materials. Optical and physical properties can therefore be adjusted flexibly,” states Herzog.

Several coatings create a system
Low E coating (Low E stands for Low Emissivity) typically consists of several individual coatings that form a system with a total thickness of about 100 nanometers. While the silver coating reflects the thermal radiation, additional coatings, such as of aluminum or titanium, provide high transparency and light transmission. Special barrier coatings also effectively protect the silver against unwanted oxidation.

Similarly, double or triple Low E coatings are often used to improve efficiency, such as the trend of multiple glazings in window glass. In addition, the coloring of the glass can also be influenced through the coating structure of the glass. The color shades produced in this way are often used by architects as design elements.

Now that coated heat insulating glass has become the standard for new buildings, it has begun to take over the automotive sector: “Especially in summer, a high amount of heat radiation penetrates the windows of a car. The interior must therefore be cooled with a high degree of energy input,” says Herzog. Especially for electric vehicles, valuable and limited energy is lost as a result. Coated glass will therefore continue to ensure a better – and more ecological – interior climate of buildings as well as cars.

Further information:
André Herzog
Product Manager
Large Area Coating
Bühler Uzwil
T +41 71 955 13 75
martin.lagler@buhler-group.com
Cleantech has to pay off

“Keeping climate change at bay and adapting to it are strategies that require technical innovation,” says Lino Guzzella, President of ETH Zurich. New technologies can really only be implemented when they also pay off financially.
**FOCUS / Energy efficiency**

*diagram:* The World Climate Summit took place in Paris in December. What is your opinion of the results of this mega event?

**President Guzzella:** I find the results of this political gathering very positive. First, the whole world community has committed to limiting climate change and to reducing its consequences with a contract recognized under international law. The older Kyoto Protocol only included industrialized nations, so the Paris agreement has achieved a new level. While I find the specific goal to limit global warming to significantly less than 2 degrees extremely ambitious, it has sparked discussion over how this goal could be achieved. In this sense, I am also hopeful that it will raise awareness in society and among economic decision makers.

**In your opinion, where should the focus be, in order to stem the emission of greenhouse gases?**

There are generally three possibilities for reducing human CO₂ emissions: First, by employing the use of non-fossil fuels; second, by being more energy efficient; and third, by decreasing energy use in general. For example, our three possibilities for travel could be to: fly on a plane that uses organic fuel, fly on a plane that uses less fuel; or choose not to fly at all. We are at a point where we have to consider all options. The clock is ticking.

**What exactly does it mean to implement these goals?**

In research, we must gain a better understanding of the specific impact and focus on the effects of global warming. To do this, we ask questions like: Where will it rain more heavily and where will there be drought? Where will flooding occur? How will agricultural land be displaced? Where will specific trees and grain varieties be able to grow again and which species will be displaced? These and many other questions present a challenge for researchers at a technical university. ETH Zurich is involved in the Swiss government’s new National Centre for Climate Services that aims to provide this kind of information to the authorities and political decision makers that influence the economy. The more precisely we understand the processes and can forecast the changes, the better we can develop technical solutions that deal with this change constructively.

*“The industry could benefit by using the topic of energy as a catalyst to improve finishing processes and product designs that optimize a more energy efficient production.”*  
Professor Dr. Lino Guzzella, President of ETH Zurich

**Do you have an example of how the ETH Zurich is dealing with the change constructively?**

We are building a dynamic ground storage system made up of hundreds of geothermal probes 200 meters deep on our Science City Campus in Hönggerberg. During the summer months, we collect heat and store it in the earth. In the winter season, we bring the energy to the surface with heat pumps. The dynamic underground energy store is used for both heating and cooling. By 2025, we would like to connect more than 30 buildings in an area of 320,000 m² to the system essentially eliminating further CO₂ emissions (p. 23). Entire residential areas, office buildings and factories could also apply this principle. This is an example of how new technological solutions can be developed from scientific discoveries – increasing sustainability and delivering financial benefits. We save up to CHF 1 million in energy costs because of it.
Protecting the climate and economic growth don’t have to be polar opposites?
I firmly believe that in terms of climate protection, we are at the dawn of a new economic age.

What do you mean by that?
If we want to meet the goals established at the World Climate Summit in Paris, then we need to invest every Swiss franc in the most effective way possible. Governments cannot subsidize renewable energy resources in the long-term. Instead, they have to be widely accepted in the market. We need cost transparency for all energy resources. New technologies have to be “worth it” both for the producer and for the end user.

Which role does the industry play here? What opportunities do you see?
I think that industry could benefit by using the topic of energy as a catalyst to improve finishing processes and product designs that optimize a more energy efficient production. Of course, optimization in some areas, such as power plant construction, has already been exhausted. If combined, power stations today have an efficiency of nearly 60% – close to the thermodynamic maximum. However, in many other areas, the potential is far from exhausted. A provider who is able to deliver energy efficient machines and facilities to clients will have a competitive advantage in the future. Bühler is also very active in this field. Particularly in Switzerland, it is important that companies based in the country stand out with energy efficient models.

How can we find better solutions that use less energy?
We have to approach the entire system, not just the individual aggregates. While much has been accomplished in terms of better energy solutions for consumer and industry products, the systems model of thinking is only beginning to take hold. At ETH Zurich, for example, civil engineers, mechanical engineers, IT technicians, architects and specialists from other areas are working together. It’s similar to vehicular traffic. Even if every individual vehicle is operating as efficiently as possible, traffic flow still needs to be coordinated to minimize CO₂ output and to flow optimally. Ultimately, it is about working together systematically.

What does that mean for the qualification in research, the R&D departments of companies and the users?
We have to broaden our horizons. At ETH Zurich, we provide thorough training in individual disciplines, but we have also created multi-disciplinary professorships that have transformed traditional fields. The field of architecture is just one example. Technology has advanced this field from the design and construction of buildings to a field that integrates digital and robotic technologies that inspires both architectural and construction methods. At ETH Zurich we see close cooperation with industry and practical education as highly significant. Albert Einstein, one of our most famous alumni and a former professor once said, “There is nothing more practical than a good theory.” We feel that there is no better way of transferring knowledge to society than through our graduates, who eventually take their knowledge and systems consciousness into the workplace and ultimately influence the economy.

“We have to approach the entire system, not just the individual aggregates.”

Professor Dr. Lino Guzzella, President of ETH Zurich
The idea behind ETH’s dynamic underground energy store at the Campus Hönggerberg is as simple as it is sophisticated. While some buildings are heated in winter, others – mostly those where servers or lab equipment for research are located – give out heat throughout the year, and have to be cooled. Until now, the waste heat has been emitted, unused. With an underground storage system, the excess heat is now being stored with the help of geothermal probes filled with water 150–200 meters deep in the ground, so it can be used for heating in winter. In the cooler months, heat is taken from the store for heating and the temperature of the water circulating in it sinks. In summer the process happens in reverse, where cooler water is used to cool the buildings. The earth store works like a battery, which is charging or discharging depending on the season. The system is dynamic because it provides for both heating and cooling.

The heart of the system is the vast energy channel, a circuit ring. There are substations which come off this, which refine and transform the energy. The energy travels from the substations into the connected buildings or back into the circuit ring. The substations and geothermal probes are interconnected with each other through the circuit ring.

The circuit ring, substations and probes will mostly be finished before 2025. But the campus is growing and every substation provides for several buildings (so-called clusters), some of which still need to be built or renovated. The biggest challenge is to manage the expansion of the storage system underground at the same time as the gradual expansion of the campus above ground. Our next task is to connect the student residences and the chemistry buildings to the ‘anergy’ network.

The underground storage project will cost CHF 37 million, spread over 15 years. CHF 17 million of that are extra costs, because the ETH would have had to renovate the existing heating system anyway. The University is expecting savings in energy costs of one million CHF per year thanks to the innovative underground energy storage system. The CO₂ emissions will be halved by 2020. By 2025 there should be practically no CO₂ emissions for heating and cooling.
Boosting Swiss startups

According to the ‘Swiss Venture Capital Report 2016’, the startup scene in Switzerland is experiencing a highly positive development. Since 2012, the total amount invested in Swiss startups has more than doubled and reached a peak of CHF 676 million in 2015. The recently announced expansion of MassChallenge – the no equity and not-for-profit startup accelerator originating from Boston – to Switzerland, further boosts this upswing within the Swiss innovation ecosystem.

At its launch event in Geneva on February 10, 2016, MassChallenge Switzerland officially opened applications for its four month acceleration program, allowing startups in Switzerland, Europe and beyond to access Switzerland’s thriving innovation economy, mentorship, office space, education and a vast global network. The first program will start in June 2016 and run through October. At the conclusion of the program, MassChallenge awards over $2 million to the startups demonstrating the highest impact and highest potential. Ian Roberts, CTO Bühler states: “The Bühler innovation model centers upon collaboration and entrepreneurship. We believe that a proven global accelerator, bringing not only the process and access to a huge international network, but also a sense of urgency and commercial focus, will provide an excellent opportunity for promising startups to become viable businesses.”

Bühler Group, Nestlé, Inartis Foundation, the Swiss Economic Forum and Givaudan are founding partners of MassChallenge Switzerland.

Sustainable food processing

We face enormous challenges in food production. Along the path that food takes from field to fork, unnecessary amounts of food, resources, and energy are being lost. Only two-thirds of the grains grown and harvested every year for example are actually used to feed humans.

The findings are clear: We will not be able to feed the growing world population in the year 2050 the way we do today. By then, 9 billion people will populate our planet. They all need sufficient and safe basic foods.

To support research and development in environmentally friendly and sustainable food processing solutions, Bühler will give together with Migros, Switzerland largest retail company, a total of five million Swiss francs to finance a newly created professorship for Sustainable Food Processing of the Swiss Federal Institute of Technology Zurich (ETH Zurich).
BÜHLER AT VIV MEA 2016

Feed safety as key topic

The new specialized Feed-To-Meat trade show (VIV MEA) serving the poultry, aqua feed and dairy industries in the Middle East, North Africa, India and Central Eurasia has for the first time opened its doors in Abu Dhabi (United Arab Emirates). More than 6,000 visitors and over 200 exhibitors joined the event in Abu Dhabi in February.

Bühler experts were on the ground arousing a lot of interest among the visitors with their insights on burning topics in the feed and aqua feed industry; for example the feed safety challenges when it comes to biological or chemical hazards. Bühler’s capabilities in mycotoxin reduction along the value chain and insights about the effects of extrusion technology on the quality of extruded fish feed clearly met the expectations of the audience.

The customer feedback acknowledged Bühler’s technology leadership status in process, nutritional aspects as well as customer service: “A reliable and performing customer service in close proximity to our installations is a strong argument for our customers and a clear differentiator against our competition”, explains Raphael Krucker, Head of Customer Service and Business Development for the Middle East and Africa Region at Bühler.

INTERNATIONAL YEAR OF PULSES

Healthy and climate friendly

The UN has proclaimed 2016 the “International Year of Pulses” to raise awareness of the benefits pulses provide. When it comes to providing a growing world population with plant protein, pulses come top of the list. Their cultivation preserves soil fertility, thanks to their ability to biologically fix nitrogen in the soil, encompasses a low water footprint, and delivers valuable protein in a climate friendly way. Pulses also have many nutritional merits; they are high in protein and dietary fiber; low in fat; rich in minerals and vitamins. All these benefits mean that demand is growing in industrialized nations. Pulses are valued as protein-rich ingredient in gluten-free and vegan foods. Flour made from ground pulses is increasingly finding its way into a variety of foods such as pasta, bread, tortillas, as well as snacks. These food trends are set to expand further in 2016 and Bühler is helping processors around the globe to adopt complete post harvest stabilization, cleaning, dehulling, sorting, grinding and further processing operations to generate greater value from pulses.
Extrusion technology is used especially in the production of breakfast cereals or animal feed. However, applications with high growth potential also include modified flours and textured proteins for use as meat substitutes.

TEXT: BORIS SCHNEIDER
Extruders are genuine all-rounders: According to the functional principle of a screw conveyor, they expel solid or viscous mass under high pressure and at a high temperature out of a shape-giving opening. The trick here is that they integrate various processing steps such as mixing, kneading, pressing and forming in a single, continuous process. Compared to traditional production methods, this is much cheaper and also much more energy efficient. A central aspect is also precise process control: “All parameters such as moisture content, temperature or specific mechanical energy can be flexibly adjusted and controlled. The same plant can be used to produce various final products with different characteristics,” explains Konrad Munz, Process Engineer Nutrition at Bühler. An added bonus is that extrusion processes are highly reproducible.
**Efficient and versatile**
Hot or cooking extrusion is mainly used in the area of foods and feed. The mass is briefly heated to well over 100 degrees. Upon exiting the nozzle, the steam evaporates and the extrudate promptly expands. This is how peanut puffs, for example, are produced. Besides snacks, common applications are also breakfast cereals or animal feed. “By cooking in the extruder, the starch contained in the raw materials is gelatinized. Only once this structural change takes place can the building blocks of carbohydrates be digested by humans and animals,” clarifies Munz.

In recent years, an increasing number of companies from the food industry have discovered extrusion as a cost-efficient and reliable finishing process for different carbohydrate or protein-based raw materials. The number of applications has therefore increased by leaps and bounds. “In grain processing, for example, the margins tend to be very low. With an extruder, milling companies are able to process a portion of their by-products with relatively little effort into higher value products and with additional functionality sell them for a higher profit,” adds Carsten Petry, Product Manager Nutrition at Bühler.

“All parameters such as moisture content, temperature or specific mechanical energy can be flexibly adjusted and controlled.”

Konrad Munz, Process Engineer Nutrition, Bühler
**Increasing revenues with modified flours**

One application, for example, is the production of modified flours. This source flour plays an important role as a raw material, semi-finished product or additive of processed foods. They primarily set themselves apart due to their modified water absorption capacity and their solubility properties and are used in a wide range of end products – for example, as binders, fillers, or freshness extenders in bakery products, as a binder for soups or sauces or as a thickener for instant drinks.

In production, the flour is first heated and pre-swelled in a preconditioner. Subsequently, the mass is processed in the extruder and milled to the desired degree of granulation after drying. “The viscosity of water-flour suspensions can be adjusted precisely to the source flour’s intended use during the extrusion process,” says Munz regarding its main advantage.

**Extruding innovative new products**

In addition to modified flours, innovative new products can also be produced by means of extrusion – for example, nutritious pea flour, which is especially rich in dietary fibers and high-quality protein. When pea flour is made in a traditional manner by grinding dried peas, it has an unpleasant bitter taste. However, it also contains harmful substances such as protease inhibitors and lectins. Only through the processing of peas in an extruder and subsequent grinding can flour be produced, which reduces the critical substances while also producing an impressive taste. “Extruded pea flour can, for example, be added as a
Nutrition Open House Days presents new business opportunities

How can food manufacturers develop new products and open up new markets? How can companies from the grain processing industry process secondary products or by-products such as wheat bran into higher quality products and sell at a better margin? These and similar questions were at the heart of the “Nutrition Open House Days,” which took place for the first time from November 3–5. Around 50 Bühler customers from around the world visited the Bühler headquarters in Uzwil and gained first-hand information about opportunities, especially regarding extrusion technology. The program included various lectures and practical demonstrations. Specialists from Bühler provided firsthand information about the production of modified flours, breadcrumbs or cornmeal. A thematic focus was also on the processing of pulses by means of extrusion and the production of meat substitute products made from soy as well as other plant-based proteins. The event was rounded off by presentations on trends in the food industry and food safety.

Meat substitutes are a growing market
An emerging area of application for extruders is also textured proteins called Textrudates™. Given the fact that a growing world population must be supplied with proteins, plant-based meat substitutes are a growth market. Bühler is also working on the further development of this process for producing meat equivalents from plant-based raw materials.

Thereby, a concentrate consisting of proteins is strongly heated in the extruder. At high temperatures, the native protein chains denature and anti-nutritional components are broken down. Upon exiting the nozzle, the proteins are realigned and cross-link themselves again. “These meat equivalents, which are produced as dry or wet extrudates, have a fibrous structure which comes very close to that of animal meat. Unlike tofu, for example, they feel like lean meat in your mouth and when chewed,” explains Munz. These products are especially interesting for consumers who eat less meat, but do not want to go without the sensory experience associated with its consumption. Another advantage is that almost all plant proteins can be processed in this way, e.g. peas, gluten, rice, sunflowers, or potatoes. This is important as more and more people seek alternatives to soya.
With extrusion technology, grain processors can extract additional value from by-products such as wheat bran.

Whether modified flour, the utilization of by-products from grain processing, or the production of meat substitute products: Bühler possesses leading plant technology and many years of expert knowledge in the field of extrusion processes. “In our application centers and extrusion labs, we help our customers develop entirely new products that are tailored to their specific needs and open up new markets,” concludes Petry.

Further information:
Dr. Carsten Petry
Product Manager Human Nutrition
Business Unit Nutrition, Uzwil
T +41 71 955 28 78
carsten.petry@buhlergroup.com

ADDED VALUE
+++ 
+ Cost and energy efficient
+ Broad application spectrum
+ Manufacture products with higher value
Precise roll corrugations enable millers to achieve the best possible product yields. With its WAFA innovation, Bühler supports its customers in achieving this goal.

With neatly reconditioned rolls, milling customers are able to increase their yields substantially: flutes with smooth surfaces and sharp edges lead to better milling properties of rolls in service.

To ensure a consistent quality of the roll corrugations (flutes), a group of corrugating specialists at Bühler Braunschweig put the roll reconditioning process to the test. They analyzed the tools and materials used as well as the control system and further refined them. The outcome: a new corrugating machine, the WAFA. This sophisticated tool concept is capable of gently reworking the rolls during the forward and the return stroke within the same corrugation, resulting in more precise angles and high-quality corrugated surfaces. Thanks to the state-of-the-art control system as well as the tool guiding mechanism, the new machine is more accurate and the quality can be reproduced more easily.

The first three WAFA machines went into operation exclusively in the Bühler corrugation workshops at the end of 2015. Further locations worldwide will follow.

Further information:
Markus Brockfeld
Team Leader Manufacturing & Logistics
Engineering
Bühler Braunschweig
+49 5315 942 328
markus.brockfeld@buhlergroup.com

ADDED VALUE

<table>
<thead>
<tr>
<th>+++</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Gentle corrugating</td>
</tr>
<tr>
<td>+ High-precision rolls</td>
</tr>
<tr>
<td>+ Local service</td>
</tr>
</tbody>
</table>
The central management and analysis of performance data from optical sorters allows rice processors to increase their productivity and maximize yield.

Optical sorters process large quantities of raw materials such as rice. They detect and remove foreign objects or defective products with high speed and accuracy. By monitoring and controlling the performance of such machines, processors can increase their efficiency and productivity as well as maximize yield. Until now, each optical sorter’s performance had to be monitored and analyzed individually – if that was even possible. This is why Bühler has developed AnywarePro™. This software collects all relevant data such as machine status, sorting performance, fault alerts or component lifetime indicators and conveniently displays that information on a computer, tablet or even a smartphone.

Statistics on the sorting performance such as historical throughput and ejection data can be filtered to display specific modes and defects. When two or more sorters that are connected to the AnywarePro™ system are owned by the same customer, the performance of these can be compared even if they are installed in different plants – to measure relative efficiency.

Through having this wealth of machine data at their fingertips anywhere and anytime, operators can optimize the performance by, for instance, locally adjusting machine settings. The monitoring of historical sorting performance trends and different levels of defects over time also allows them to better track the quality of each supplier. Another major advantage is traceability: Because all data is recorded and safely stored on secure servers, processors can at any time validate their quality levels towards a customer in case of complaints.

But AnywarePro™ also enables innovative, pre-emptive service models: With the customer’s permission, Bühler engineers can remotely monitor sorting performance and offer real-time assistance for optimizing settings or solving problems. If a component nears the end of its lifetime, Bühler can expedite the delivery of a spare part, thus reducing downtime and increasing availability. In a first phase, AnywarePro™ will be available for optical sorters of the SORTEX S UltraVision™ family. Later, the software will also be launched for other SORTEX machines.

Further information:
Neil Dyer
Global Product Manager – Optical Sorting
Buhler Sortex Limited London
T +44 (0)20 7055 7798
neil.dyer@buhlergroup.com
Mike is a sunny young man. Aged 28, he is a carefree kind of person – but quite the opposite of careless. He is deliberate. Calm. Calculated. Even as a child, he started kneading, building, shaping things. Engineering is in his DNA. Mathematics came naturally to him. As a little boy, he pestered his mother at the table to give him more ogali, the African maize porridge. But not to eat. The porridge was Mike’s first engineering material. He used it to shape houses, cars, and faces – in such a lifelike way that he continually astounded his family and friends.

At the end of 2014, it appeared that the world was doomed. The media had already declared Ebola the epidemic of the century. They flooded the world with pictures of the misery like a tsunami. The global temperature curve measured the fever daily, with West Africa at the center. Every slightly suspected case landed under the global microscope in real time. When the Ebola temperature curve had reached fever pitch at the end of the year, one person remained cool: Mike Muriithi, Bühler automation engineer based in Nairobi, Kenya. On Mike’s desk lay a request – now of all times – to travel to Guinea for a few weeks. To the epicenter of the disease. There, the Sonoco Group was busy building a flour plant of four mills with Bühler – and now they were ready for start-up. Would he go?

Mike is a sunny young man. Aged 28, he is a carefree kind of person – but quite the opposite of careless. He is deliberate. Calm. Calculated. Even as a child, he started kneading, building, shaping things. Engineering is in his DNA. Mathematics came naturally to him. As a little boy, he pestered his mother at the table to give him more ogali, the African maize porridge. But not to eat. The porridge was Mike’s first engineering material. He used it to shape houses, cars, and faces – in such a lifelike way that he continually astounded his family and friends.

After successfully finishing school, Mike studied mechanical engineering and mechatronics in Nairobi. Here he could indulge his passion for designing things in a professional fashion. He won a national science contest with a robot
Happy customers

Mike’s travels to our customer Sonoco in Guinea is only one extraordinary example of how Bühler is living up to the claim of “engineering customer success”. We put ourselves in the shoes of our customers thinking and acting from their perspective. Therefore, services are becoming more and more important: to ensure high uptime, constant quality, high yield and less energy consumption. And in cases like Sonoco to support our customer even in difficult situations to guarantee the start of production.
design, which was capable of moving on its own through uncharted terrain.

Would he go? To Ebolaland? His mother encouraged him to go, but his father advised him against it, and his girlfriend almost fainted. “I knew that the epidemic was dangerous,” says Mike. He too had been swept away by the flood of pictures. Bühler allows its employees to make the decision of whether to travel to risky countries or not. It was therefore his own personal decision. In order to reach a decision, Mike calculated the risk, relating the number of people affected by the disease to the country’s population. He asked for information from independent sources on how people were infected. He balanced the risks and opportunities. And Mike went.

Three things spurred him on: the obligation he felt toward customers, the distress of the people in Guinea, and the unique opportunity for him personally. As a Swiss family-owned company with a global presence, Bühler is present in many crisis regions across the world.

A new service station had just opened in Pakistan. In Tehran, the Group has operated a factory for decades, which continued to manufacture Bühler products even during the embargo. “We are at our customers’ side especially when things get rough,” says Mike. That is Bühler. And the Sonoco flour mill in Conakry, Guinea was not just any facility. It was a firm part of plans to supply food to the population of this crisis-ridden country. “On site, we saw that the storage bins were almost empty,” explains Mike. More than once, government officials came to check on the progress being made in the construction of the Sonoco mill. “To have failed to start up the mill would have further aggravated the suffering of the people living in Guinea,” says Mike. And personally, the project offered him, who has been with Bühler for two years now, the opportunity to become part of an international team under Swiss management. Moreover, an automation system – WinCos, to be precise – was to be installed, which he had never worked with before. “For me, this project was the right challenge at the right time,” says Mike.

The trip was painstakingly planned to minimize the risks. For this purpose, Bühler collaborated closely with SOS International, an institution specializing in such cases. The team was carefully instructed on how to behave: Measure your body temperature every day. Determine the best routes to be taken between the hotel and the mill. Refrain from going to a hospital in case of an emergency and instead immedi-
ately contact SOS International. Evacuation plans were drawn up to ensure that those involved could leave the country within a few hours. The Bühler Executive Board, which must approve every journey to a maximum-risk country, gave the go-ahead.

And Mike went.

He was not alone. Mike was part of a project team that was managed out of Uzwil, Switzerland and was supported by automation specialists from Bangalore, India. Olivier Galy, the head miller accompanying Mike on his assignment was from Casablanca, Morocco.

“I was a member of the global Bühler family,” says Mike. Traveling via Côte d’Ivoire – direct flights from Kenya to Guinea had been suspended – he reached the place where it all was taking place. “When I passed the border control, I must admit I was feeling a bit queasy,” says Mike.

But there was no time for doubts. The project was calling. The team’s task was to start up four finished grain-grinding systems with a total capacity of 600 tonnes a day. 600 tonnes translates into 480 tonnes of flour, which is equivalent to 1 million one-kilogram loaves. Loaves of bread for the population of Ebola- ridden Guinea. The hardware – storage bins, building structures, roller mills, sifters, bagging lines – was all ready to turn the project into a reality.

Mike did not hesitate to tackle the job. He was supported by his colleagues at Bühler and the customer Sonoco, and assisted by the head miller Olivier from Casablanca, who was in charge of start-up and trial operation. Install and start up software, perform in/out tests, check sensors, grind the first grain batches, inspect the flour quality, finetune operation, continue to grind,
check and readjust – until a smooth and reliable operation is achieved and the mill can be handed over to the customer.

Mike must travel twice to Guinea to complete his assignment. The hotel he is staying in along with his colleague is deserted. His colleague and he himself are the only guests. He notices how little his own experiences match the reality described in the media. He does not learn of one single case of illness. The Ebola virus has not even arrived anywhere near the customer’s employees, who he befriends and who invite him to their homes. Yet still, the oppressive feeling just won’t go away. “You simply can’t switch it off,” says Mike. At last, on January 25, 2015, his courage, competence, and commitment are rewarded: Bühler successfully commissions the mill and ceremoniously hands it over to Sonoco.

Mike returns home – relieved and his baggage full of experiences and successes. “This was my best installation job ever,” he says. He is proud. He boards the plane.

His assignment is over. Almost.

One day later, Mike feels unwell. Feverish. He must go to the hospital. The doctors immediately place him under quarantine. Total isolation. When they visit him, they are wrapped entirely in protective clothing. They carry out tests. In the afternoon, his condition worsens. Mike’s nose starts to bleed. He is alarmed. The longest hours of his young life start.

In the evening, the doctors enter his room. Still wrapped up. Then suddenly they take off their masks and laugh: “Everything’s okay with you.”

Now Mike’s assignment is over. Really.
Bühler, three times over

Goel International, a producer of Basmati rice and a loyal Bühler customer, has not only boosted rice production capacities from 10 to 40 tonnes per hour but also increased its export rates to 50 percent – all within a few years. How is this possible?

TEXT: GÉRARD MOINAT – PICTURES: GOEL INTERNATIONAL / GÉRARD MOINAT
In 2010, the three brothers, Vinod, Vijay, and Krishan Goel, found themselves at a crossroads. The company they run together, Goel International Pvt. Ltd., a producer of Basmati rice, was going smoothly. But with the domestic market largely saturated and production capacities running at their limits, the time had come to decide whether they wanted to make a huge investment: to buy or not to buy their first paddy processing and drying line from Bühler, with a mill input capacity of 12 tonnes per hour.

“It wasn’t a decision we took lightly”, the three brothers admit today. The initial investment costs for the Bühler drying system were noticeably higher compared to local batch solutions. But they also understood that the management of the traditional drying process was imposing a huge demand, both in time and stress, on the three brothers and Vijay in particular, who was responsible for this process.

Would this massive investment pay off? Would the planned development of foreign markets pay off?

**Uniformity in end product quality**
Basmati – or the King of Scents, as the long-grain rice is called in Hindi, is cultivated at the foot of the Himalayas, in the Indus-Ganges plain. It is fitting, then, that large-scale rice industries such as Goel International Pvt. Ltd., based in Taraori (Haryana) to the north of Delhi, are established in this region.
The company processes parboiled rice, which is marketed under the brand name Galaxy Rice. Parboiled rice is rice that is partially boiled: the parboiling process involves the hydrothermal treatment of paddy before milling. The three basic steps in parboiling are soaking in water, steaming and drying. This process boosts the nutritional profile of the rice.

The drying stage is critical for the uniformity in quality of the end product and above all to maintain the texture and length of the rice, after final processing. The proportion considered broken is particularly decisive, because producers receive a vastly reduced price for broken rice. With regard to Goel, the price differential is in the ratio of 5:2, in other words, they receive 50 Rupees (approx. USD 0.75) per kilogram for whole rice grains, but 20 for a kilo of broken rice (approx. USD 0.30). This has a huge effect on the overall operating costs, as the graphic shows (see right page).

Inefficient batch drying
In India, rice is traditionally dried in batches. The toughest challenge posed by conventional batch drying systems is that the rice does not dry uniformly. There is little automation and the process is totally dependent on the skills of the operating personnel. This leads to inconsistency in the percentage of broken rice, and the system also expends a great deal of energy.

Capacities are also very restricted. The drying process depends on natural conditions, like the ambient temperature and relative humidity. Hence the throughput can vary widely, depending on the season. To compensate, either more batch dryers have to be installed or the capacities reduced. Modern systems which are fully automated and designed for optimal conditions ensure that the miller gets the best results.

With Bühler EcoDry paddy dryers, the drying process is carried out in several stages of drying and tempering, ensuring gentle drying and equalization of moisture in tempering bins, at the same time maintaining continuity in production throughput, unlike batch drying. This automated control of the drying process has an effect on the physical properties of rice. The dwell time can be adjusted precisely, in a continuous system, which produces a uniform drying result. This system provides consistent results, and without having to be constantly regulated and monitored. Plus the throughput is perceptibly higher. Another big advantage is the saving in energy costs – largely for the creation of steam. Bühler dryers have been designed to optimize the use of the steam for drying the paddy rice and hence the energy consumption is comparatively lower than that of batch dryers.
Goel growing with Bühler

All these arguments persuaded Goel International to take up the challenge in 2010, and to buy its first paddy processing and drying line, with a mill input capacity of 12 tonnes per hour. And their decision paid off. It proved possible for the production results to be maximized and for control over the drying process to be improved immensely, with less expenditure and effort in monitoring and supervision.

The three brothers were so satisfied with the Bühler system that in 2012 they decided to supplement their processing lines with additional flow column dryers. The expansion of Line 2 was completed in 2012, followed in 2013 by Line 3, both with a capacity of 12 tonnes per hour – and 24 hours a day, 340 days a year. Besides using set Bühler EcoDry dryers in parboiled paddy rice drying, Goels extended the use of a Bühler EcoDry single dryer into their specialized operation of converting raw paddy rice into steamed paddy and in the process they benefitted hugely, ensuring uniformity in end product along with throughput.

Within a few years, Goel International boosted rice production from 10 to 40 tonnes per hour. “Once we had the Bühler machines in opera-

“Once we had the Bühler machines in operation, we at last had free rein to concentrate on our market expansion.”

Vijay Goel, Managing Director Goel International

**UP TO 25 PERCENT LOWER ENERGY COSTS**

A look at the energy consumption of drying solutions from Bühler in comparison with conventional solutions shows that Bühler creates a huge potential for savings. Up to 25 percent lower energy costs can be achieved by adjusting the following parameters:

- the roof arrangement and product flow distribution
- the design of the discharge system
- the optional Ecomation moisture regulation system
- the optimized process control – such as the adjustment of the dwell time in the temperature controlled cells
- the dimensioning of the dryer
- the appropriate ventilators, fans, and heat exchangers
- and the insulation of the dryers

**Breakdown of total operating cost:**

<table>
<thead>
<tr>
<th>100% operating costs</th>
<th>97.5% energy costs</th>
<th>2.5% service and maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>92% energy for hot air generator</td>
<td>4% energy for fans</td>
<td>1.5% energy losses</td>
</tr>
</tbody>
</table>

And that is not all. In addition to the lower energy consumption, less brokens will further improve the return on investment of a Bühler dryer solution: Increasing the proportion of whole rice grains, by just 0.5 percent generates an extra profit of USD 270,000. (Calculations based on a rice mill with 20 tonnes per hour output operating 300 days a year for 20 hours per day.)

Hot air generation accounts for more than 9/10 of the total operating cost of an average dryer installation.
CUSTOMER STORIES / Goel International

Investment in automation

Ever since they went into the rice business 25 years ago, the Goel family has used alternative energy sources for heat. The rice husk, by-product of paddy rice milling, is burned in a boiler house to produce steam and to generate electrical energy, which is needed among other things to heat the air for the drying process. The use of steam heat exchangers and good insulation are a further means of increasing energy efficiency.

When the Goels bought the first system, their competitors were skeptical about their decision. “At the time, the system was an absolute luxury”, remembers Vijay Goel. But the investment in automation paid off. The demands for increases in productivity are rising faster today amid shortages of labor. In many parts of India, rice processing still requires a great deal of manual work. In the case of Goel, there are more than 500 people engaged at the company. Particularly personnel-intensive are the unloading of the trucks, the conveying of the rice sacks into the plant, and the monitoring of the batch dryers.

But thanks to the dryers from Bühler, massive progress has been achieved in the final stage. Previously 20 people were needed for the drying process, nowadays only six are required to monitor entire Bühler drying systems. Furthermore, with the price of land rising enormously in the past few years, the Bühler solution is also ideal for delivering great results in a smaller footprint.

The company is now exporting 50 percent of their rice.

In India rice is a staple food.
Now the brothers are planning how they might expand further. What else do they want from Bühler? Nothing, at the moment they are entirely happy all round, says Managing Director Vijay Goel. Goel have in the meantime become Bühler’s strategic client for paddy dryers in India and a good example of what can be achieved with Bühler solutions when it comes to paddy drying systems.

Further information:
Devaraj S
Head of Sales Grain Logistics
Bühler Bangalore
+91 98459 39039
devraj.s@buhlergroup.com

Goel International is one of many rice processors in the Indus-Ganges plain.
100 percent yield

Agrana is the leading sugar company in Central and Eastern Europe. In response to the foreseeable end of the sugar regime, Agrana has reacted by increasing the area of starch. In the new wheat starch plant in Pischelsdorf, Austria, 100 percent of surplus wheat is processed into starch, gluten, bran, and bioethanol products thanks to Bühler.

TEXT: HERBERT BOSSHART – PICTURES: AGRANA
Sugar is among the most important foods in the world. In South America, sugar is obtained from sugar cane and in Europe from sugar beets. Each year (2012) about 270 million tonnes of sugar beet and 1.7 billion tonnes of sugar cane are harvested worldwide. Since 1968, the European sugar market has been highly regulated by quotas, tariffs and subsidies. In 2014/2015, a total of 109 sugar refineries in the EU countries produced a total of 19 million tonnes of sugar from 1.6 million hectares of cultivated sugar beet. However, the sugar market regime that has been in effect since 1968, is due to expire in 2017. Therefore, European sugar producers anticipate an increase in price and competitive pressure.

**Growth in fruit and starch**

Agrana Group, with approximately 8,500 employees at 56 production sites, the leading sugar company in Central and Eastern Europe, began to push the areas of fruit and starch in addition to its original main segment, sugar, several years ago with regard to the expected changes in the sugar market.

In the fruit segment, Agrana has already come one step closer to this goal. Today, the fruit segment contributes – with Agrana Fruit S.A.S. – more than one third of the consolidated sales of over 3 billion euros. Agrana has thus become the world leader in the production of fruit preparations for the dairy industry and one of the leading producers of fruit juice concentrates in Europe.

**Industrial starch made from wheat**

In 2011, the AGRANA Group Executive Committee decided to expand the activities of the Agrana Stärke GmbH and to add the production of industrial starch made from potatoes and corn with the raw material wheat, in order to advance its starch segment. In addition to the factories operated until then in Austria and Hungary for corn and potato starch, it was also decided that a unique wheat starch factory would be built on the Agrana factory premises in Pischelsdorf on the Danube. This site in the federal state of Lower Austria was chosen by the refiner of agricultural raw material to enhance synergies, as Agrana has operated a special factory there that produces bioethanol since 2007.
Between 2011 and 2013, the Pischelsdorf plant was expanded with the wheat starch plant. Josef Eisenschenk was responsible for implementing this project amounting to 70 million euros. He has headed the Agrana Pischelsdorf plant since 2009. “Our goal was to build a factory where we can internally utilize 100 percent of the raw material wheat,” he explained. Bühler was instrumental in the implementation of the new wheat starch mill: The technology Group undertook the complete engineering for the construction, including the entire cleaning and grinding process as well as bran pelleting.

Processing of surplus wheat
The new wheat starch factory in Pischelsdorf consists of four parts. Delivered by ship, rail and truck, the wheat is stored in four raw material silos with a total capacity of 9,000 tonnes. The wheat itself originates from Austria, Czech Republic, Slovakia and Hungary. There, around 28.5 million tonnes of grain is harvested each year – 5 to 9 million tonnes of which as surplus. A portion of this surplus wheat is processed by Agrana in the new plant in Pischelsdorf.

In the wheat mill with a capacity of 735 tonnes per day, the wheat is cleaned, scrubbed, weighed on one line after delivery, then milled into flour on two lines with four- and eight-roller mills from Bühler. The bran is pelletized, cooled, and then transferred to the bran flat store. The flours are stored in silos before being processed into dough in wet starch processing and divided into A-type starch, gluten/B-type starch and C-type starch in the separator. In a large dryer, the A-type starch is finally dried and then stored.

The remaining mixture of gluten and B-type starch is separated in a curved sieve; the separated gluten is also dried and stored. The residual products (B and C-type starch and fibers) from the wet starch processing are conveyed directly to bioethanol production.

0 percent waste
The wheat starch obtained is utilized mainly in technical applications such as in the paper industry, as well as in the food industry – for example for the production of pasta, bread or other baked goods. Wheat gluten is employed in the baking industry for improving flour or for the production of pet food and for the production of fish feed. The wheat bran is used as animal feed.

Thanks to close integration of the wheat starch plant and the existing bioethanol plant, Agrana is able to use 100 percent of the surplus grain “in house.” As a result, the unused residual raw material elements from the production of wheat starch and gluten are directed into bioethanol production and the manufacturing of the high-quality, GMO-
free protein feed “ActiProt.” Along with ultrapure CO₂, which the industrial gas company Air Liquide obtains from the fermentation tanks of the bioethanol plant, four quality products are created at the Pischelsdorf site from just one raw material.

**The plant paid for itself**
The Bühler plant has been running smoothly since its commissioning in June 2013. “We selected Bühler as a partner because of its know-how and experience,” explains Eisenschenk. “And last but not least, because it is the worldwide number 1 in the milling industry. The cooperation worked out perfectly,” commented Eisenschenk. “Our expectations were not let down – quite the contrary.”

Since commissioning, production in the factory is conducted in three shifts, 24 hours a day, 340 days a year. Production is interrupted only for short cleaning intervals. “Currently, we produce 900 tonnes of flour per day at the plant, although the wheat mill is actually designed for only 735 tonnes,” said Eisenschenk. “This is possible only because it comes from Bühler!”

In the Pischelsdorf plant, Agrana now produces about 105,000 tonnes of wheat starch, 23,500 tonnes of wheat gluten, and 55,000 tonnes of wheat bran from 250,000 tonnes of wheat each year. Furthermore, 240,000 m³ of bioethanol, 180,000 tonnes of protein animal feed and 100,000 tonnes of CO₂ are produced.

Expanding Agrana Stärke GmbH to utilize surplus wheat has already paid for itself. The company has now – also thanks to Bühler – developed into a European-leading supplier of starch specialty products and the largest producer of bioethanol in Austria and Hungary.

**Further information:**
Dirk-Michael Fleck
Account Manager Biorefinery Grain Milling
Bühler AG, Uzwil
+41 71 955 27 70
dirk-michael.fleck@buhlergroup.com
Once in a lifetime

With the construction of its new production with an integrated aluminum foundry in Neuss, the automotive supplier Pierburg has created a sustainable high-tech factory – and Bühler was right at its side in critical situations.

TEXT: BURKHARD BÖNDEL – PICTURES: RALPH RICHTER
As Rolf Linsen took on his new job at the automotive supplier Pierburg on August 1st, 2014, a very special challenge awaited him. His task: prepare the relocation of the foundry from Nettetal to Neuss and start up the new foundry located in the Neuss industrial port, a suburb of Dusseldorf, directly adjacent to downtown. The Executive Board of the parent company KSPG had decided in 2012 to merge two older plants in the region into a new factory, in order to generate synergies – an investment of around 50 million euros. Construction started in 2013, moving began in 2014, and mid-2015 the foundry went into production. “For me, it was the chance of a lifetime,” says the 39-year-old engineer and Head of Foundry and Mechanical Processing. His colleague Lutz Plasmeier, who is responsible for the plant technology as Senior Manager Industrial Engineering Casting & Machining, said, “This is something you do only once in your life.”

Plasmeier had the task of planning the new foundry from the ground up; bringing together various ideas; organizing the dismantling and relocation of the existing systems; deciding which new cells are needed; inspiring and motivating the teams at the sites. Above all, he was in charge of ensuring that customers were supplied with components without interruption and that the new factory was commissioned as planned. In addition to relocating to the new foundry, a new serial product was planned to start simultaneously. But would this work out according to plan?

In the worldwide network of the KSPG Group’s Pierburg production division, the Lower Rhine factory played a key role. The site with 700 employees and a processing capacity of up to 30 tonnes of aluminum per day in eight die casting cells is in its final expansion stage, not the largest. But with 125,000 solenoid valves leaving the factory every day, it holds a key competence for this important mechatronic component. Also for pump housings, cooling modules and exhaust gas recirculation systems, the Lower Rhine factory in Neuss is an essential production site.

Absolute reliability

For decades, the automotive supplier has placed great confidence in Bühler: Even in the old factory in Nettetal machines of all dimensions exclusively from the Swiss supplier were operated. “Focusing on a single supplier has proven successful,” says Plasmeier. “Technologically the die casting process with regulated shots from Bühler is unmatched,” says the engineering specialist, “Aside from Bühler, no other company is able to
“Technologically the die casting process with regulated shots from Bühler is unmatched.”

Rolf Linsen, Engineer and Head of Foundry and Mechanical Processing

achieve this level of reproducibility.” The company’s numerous service and training offerings are an important advantage: “Our people have participated in just about every training program available.” And Plasmeier continued: “We can absolutely rely on Bühler in any situation.”

For such a mammoth project, this reliability is crucial. Two locations had to be operated simultaneously for four months with a team staffed for only one site. Redesigned casting cells were made and the products for customers were sampled. To bridge this period, Linsen drove production to the extreme in the weeks prior, in order to establish sufficient stocks to be able to supply customers. The challenge: getting the most from old cells, some of which were 25 years old, in three-shift operation. “Machine availability was a particularly critical factor,” recalled Linsen.

Finally, the foundry will have eight die casting machines.
Since its beginnings more than 100 years ago, the company Pierburg has ranked among the drivers of innovation in the automotive industry. Founded in 1909 in Berlin as a steel trading company, Pierburg began producing carburetors in 1928 and soon became virtually the sole supplier in this product area for all German automobile companies and many international car manufacturers and engine manufacturers. In 1986, the company was acquired by the Rheinmetall Group and in 1998 it merged with Kolbenschmidt to form today’s KSPG AG.

Today, Pierburg is the expert with regards to emissions reduction, butterfly valves and pumping within the KSPG Group. Reducing consumption and reducing pollutant emissions along with optimizing performance, comfort and safety is becoming ever more important in the development of new generations of engines. Components made from aluminum die casting play an increasingly important role, as they save weight and the method also allows for complex geometries.

Bühler and Pierburg, respectively KSPG, are linked by a long-standing and trusting partnership. Since 1982 the KSPG Group has ordered 68 cold-chamber die casting machines. High-performance casting cells, competent and comprehensive technical support, and a strong local customer service team have convinced KSPG to invest in Bühler technology, over and over again.

Four new Bühler machines have been delivered to Neuss near Düsseldorf.
Then, in June 2015 alarm bells rang: Shortly before the final whistle, a die casting machine of the SC series manufactured in 1992 stopped operating due to issues with the proportional valves. It is the heart of the machine and controls the injection of aluminium in real time. If this valve fails, production goes into standstill. Due to its age, only a few people are familiar with the inner workings of the control system. One of them is Helmut Heiken, Service Engineer at Bühler. The specialist arrived immediately at the scene and actually got the machine up and running again. This example, says Linsen, is representative of the cooperation between Pierburg and Bühler. To successfully accomplish the relocation and new construction, several Bühler colleagues spent over half a year on site. “The close cooperation and execution of this task has turned Bühler and Pierburg employees into colleagues.”

“Our people have participated in just about every training program available.”

Lutz Plasmeier, Senior Manager Industrial Engineering Casting & Machining, responsible for the plant technology
Die casting machines are an enormous investment: they cost between USD 0.5–3 million. If maintained properly, they can cast parts for the automobile, construction or electronics industries for more than 20 years – without restrictions nor complaints. In practice however, their accuracy decreases after around 10 years and the manufacturers have to do more and more maintenance. Now it is time for a decision: to buy new or to overhaul? The latter, the so called refurbishment, costs normally only half of the initial investment price, which is still a large sum. The price however is easily explained when considering all the highly specialized and experienced experts involved in such a revision. The work is highly demanding and takes eight to sixteen weeks. The experts of Bühler Brescia touch each component, cylinder and every screw. After the machine has arrived in Brescia, the Bühler specialists disassemble, clean, examine, and measure each and every part with know-how and expertise. They grind, clean and polish all the parts that are worth keeping. If they are not, they provide replacement parts. Spare parts of very old die casting machines are usually out of stock. In such cases, Bühler specialists have to reconstruct them manually. In other cases the specialists cannot even get their hands on engineering drawings and they have to reconstruct these first. Often, Bühler replaces software as well as the electronics completely. Finally, the team in Brescia puts the machine together and tests it until it runs flawlessly. “When keeping the original control unit, the machine can be used for another six to ten years. If the latest generation of software and electronics are included, the life of a machine can be extended by 10 to 15 years”, says Paul Stucki, Head of Production at Bühler Brescia.
Expectations were exceeded
Thanks to this connection, the project succeeded. In December 2014, moving into the new factory began. Meanwhile, six Bühler die casting machines were casting around 16,000 parts each day in three shifts – with a productivity that exceeds expectations of the new, ultra-modern foundry. The units are in operation about 75% of the time – in other words, the machines are up and running on average 16 hours per day. Modern plant technology with state-of-the-art controls and a maximum degree of automation culminate to maximize efficiency.

In the final expansion, which will be reached in spring 2016, there will be eight machines of types Carat, Evolution, SC with a closing force of 660–1,050 tonnes. Pierburg has ordered four new machines from Bühler and four machines were overhauled, retrofitted and brought up-to-date in the Bühler European revision factory in Brescia, Italy (box on the left).

Gold medal for sustainable building
Now it is a factory, which is a long way from the dusty and dirty foundries of the past. A factory that can be admired. Even in terms of sustainability, the foundry in Neuss from Pierburg is a real showpiece. As a result, the German Sustainable Building Council (DGNB) has awarded the site a gold medal. Its certification procedure takes into account six areas, namely ecology, economy, socio-cultural aspects as well as technology, processes and location. Accordingly, during construction only eco-friendly materials were used, which had to be approved by construction specialists in advance. Heat recovery, air pollution control, noise level, lighting quality in the factories, waste treatment – Pierburg received high marks across the board. Even the formwork boards came from sustainable sources.

Further information:
Michael Parbel
Area Sales Manager
Bühler GmbH – Die Casting
+49 6023 9194 514
michael.parbel@buhlergroup.com

Rolf Linsen, Lutz Plasmeier: enjoying the new plant.
Alternative proteins

A growing population leads to an increasing demand for proteins. Bühler engages in the development of industrial processing solutions for alternative protein sources such as algae and insects.

In feeding our population we need 525 million tonnes of protein per year. 65% of this goes to the animal feed industry and 35% goes directly to human food. With our growing population expected to approach 9 billion people in 2050 this demand will exceed 700 million tonnes per annum by 2050. This places an unsustainable burden on our food, water, agricultural and animal feed systems.

As the leading solutions provider for food and animal feed we focus on developing scalable and economically viable options for alternative proteins such as pulses in the short term and emerging sources like algae and insects in the long term. 2016 is the International Year of Pulses. Pulses can fix atmospheric nitrogen, thus having a reduced need for fertilizer and providing an excellent source of protein. Our strong portfolio of products in pulse processing including optical sorting, milling and extrusion allow to offer complete solutions for incorporation of these sustainable seeds into staple products, such as breads, snacks and pasta, as well as in meat alternatives.

In a collaboration with TNO, a Dutch Organization for applied scientific research, we have identified our first role in the algae bio-refinery. The Cenomic bead mill has been identified as the most efficient and cost effective cell disruption technology that is able to maintain the desired functionality of components extracted. This allows us to utilize a proven industrially robust technology and combine it with the in-depth knowledge developed within our collaboration to open up new opportunities for customers in the fields of biotechnology.

An exciting opportunity lies in insect protein. Insects use waste as a feed material and provide not only a high protein content with good amino acid profile for animal and human consumption, but also valuable lipids and fertilizers. In the short term we focus on ‘clean’ and traceable feed stocks, with technology partners, customers and leading scientific institutes, to provide solutions for aquafeed & poultry.

Within the World Food System Center at ETH Zurich, Bühler is pleased to co-found the new chair in the field of Sustainable Food Processing. Alexander Mathys has assumed this position on January 1st, 2016 and sustainable protein is one of his main focus areas. As always, collaboration is key and we would be pleased to engage, discuss and partner further on the topic of protein sustainability.
Scientific Publications

BESIDES THEIR DAILY JOB, BÜHLER SPECIALISTS CONTRIBUTE TO SCIENTIFIC PUBLICATIONS. HERE’S A SELECTION.

1. Bringing together traditional products and urban lifestyle
Yam (Dioscorea spp.) based foods are an important source of calories for many people in West Africa and are mainly consumed as “foutou”, a dough-like paste rolled into small balls. In order to reduce post-harvest losses of yam and provide convenience food to urbanites, drum-dried flakes are proposed as a valuable alternative to fresh yam. The authors compared pastes prepared from drum-dried flakes with standard foutou and analyzed product quality.

Reference:

2. How to choose the optimal mill for coatings and inks
Manufacturing top-quality coating and ink products is getting more and more expensive. The authors discuss the importance and benefits of choosing the most suitable milling equipment and grinding media size for a specific grinding task. They analyze different cost factors and benchmark the Bühler Cenomic full volume bead mill against the industry standard.

Reference:

3. Superior product properties through partial germination
Consumer interest in germinated grains is increasing since germinated grains are both nutritionally superior to non-germinated grains, are widely applicable and have desirable taste and textural properties. In this paper, an industrial process for the partial germination applicable to a wide range of grains and seeds is described.

Reference:

Imprint

#173
Published by Bühler AG, Corporate Communications, CH-9240 Uzwil (Switzerland) Layout: Calyo, Steinhausen (Switzerland) Production: gateB AG, Steinhausen (Switzerland) Printers: Körner Premium GmbH, Sindelfingen (Germany) Issue: 1/2016

Diagram #173