

FLUX

The magazine for bulk ingredients technology

CIRCULAR ECONOMY FOR PLASTICS: VALUABLE RAW MATERIAL

Strategic Integration:
Brabender Technologie
joins Kubota Corporation

FDDW Liquid Feeder:
The custom one

BRUNO DAUTZENBERG

CEO

Kubota Brabender Technologie

HIDEKI SAIKI

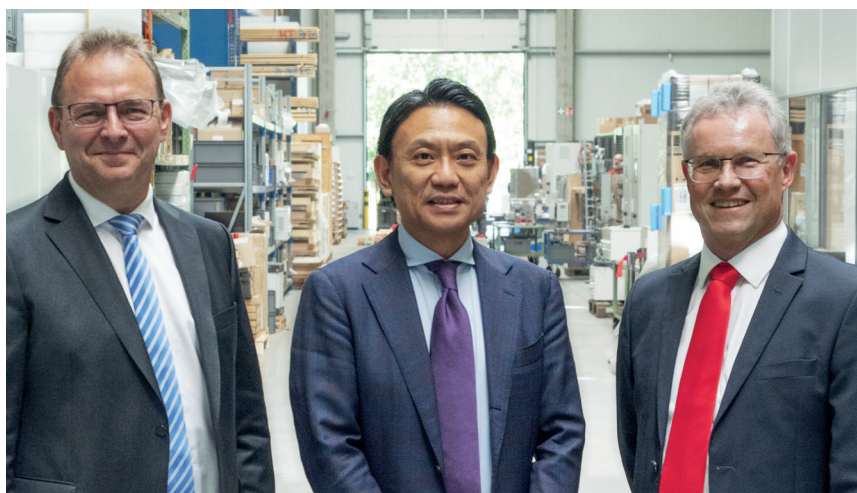
CEO

Kubota Brabender Technologie

DR. GÜNTER KUHLMANN

CEO

Kubota Brabender Technologie



Dear business partners, dear colleagues,

Brabender Technologie officially joined Japan-based Kubota Corporation in August. The merger with Kubota's feeding systems division makes sense at all levels, as it will enable the new division to play to each company's product development, service and sales strengths even more efficiently in future. Going forward, we will utilize resultant synergies to strategically enhance Kubota Brabender Technologie's global market leadership in innovative feeding systems. You can read all the details starting on page 10.

We take a closer look at the plastics industry's global responsibility in this edition's top topic, while in an interview with Head of Business Development Bernhard Hüpmeier, you can find out which feeding technology is the right one to use for recycling management purposes. Read more starting on page 4.

At Powtech in Nuremberg we will be presenting the DDSR20 2.0, our first feeder that is designed to feed toxic hazardous substances up to and including OEB Classification 5. You can find out what is important in this regard in the Technology Column on page 27.

We wish you an exciting read.

Bruno Dautzenberg, Günter Kuhlmann und Hideki Saiki



Kubota Brabender Technologie GmbH

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> profund



- 04 Circular economy for plastics
Valuable raw material
- 08 Feeding technology as part of plastics recycling processes
Proper feeding in the circular economy

> global



- 10 Strategic Integration
Kubota and Brabender Technologie
- 14 Anuga FoodTec 2022
Successful reboot for the foodtech industry

> innovation



- 16 Relaunch RotoTube 2.0
- 18 FDDW Liquid Feeder The custom one

> usus



- 20 Liquid feeding applications
Viscous to fluid

> persona



- 24 Software Development Team
Effective, flexible, available

> news



- 26 News
- 27 Technical Column

Circular economy for plastics

Valuable raw material

> Industry has now recognized the merits of plastic as a raw material. Yet the different plastics are difficult to separate and the bulk of packaging waste still ends up in landfills and incinerators. How can the plastics manufacturing and processing industry ensure a more effective circular economy?



Plastics have fundamentally changed the way we live today. They have revolutionized medical technology and are often the only available option in the construction, electrical and automotive industries. Nowadays, synthetic, plastic-based materials with a wide range of different properties are in use almost everywhere. “Plastics” have long since shed their reputation for being cheap substitutes and are increasingly replacing materials such as metal, glass, wood and cotton.

This is also due to the fact that plastics offer a **wide range of production options**. On the one hand they can be specific “made-to-measure materials”, while they are suitable for use as typical materials in large-scale manufacturing on the other, because they are very easy to process – even into complex molds in just a few operations. It is no wonder that the quantity of plastics produced worldwide has risen very sharply in the last 70 years. Packaging accounts for the largest proportion of popular plastic products, while careless consumption and improper disposal have led to major environmental problems. Too much plastic waste ends up discarded in the environment and pollutes global ecosystems, particularly the world’s oceans and soils. At the same time, valuable resources are being lost – even though the proportion of plastic waste that could be recycled after usage and reused to manufacture new plastic products could be increased significantly.

More plastics recycling, greater use of recyclates

In its biennial “Circular Economy for Plastics – A European Overview” report, trade association Plastics Europe examines what progress the European plastics industry has made in transitioning to circular, climate-neutral manufacturing. The recently published report with facts and figures dating from

i WHAT IS PLASTIC?

Plastic includes thermoplastics, polyurethanes, thermosets, elastomers, adhesives, coatings and sealants. The type of plastic most commonly used in Europe is PP (polypropylene). The most important plastics application in Europe is packaging.

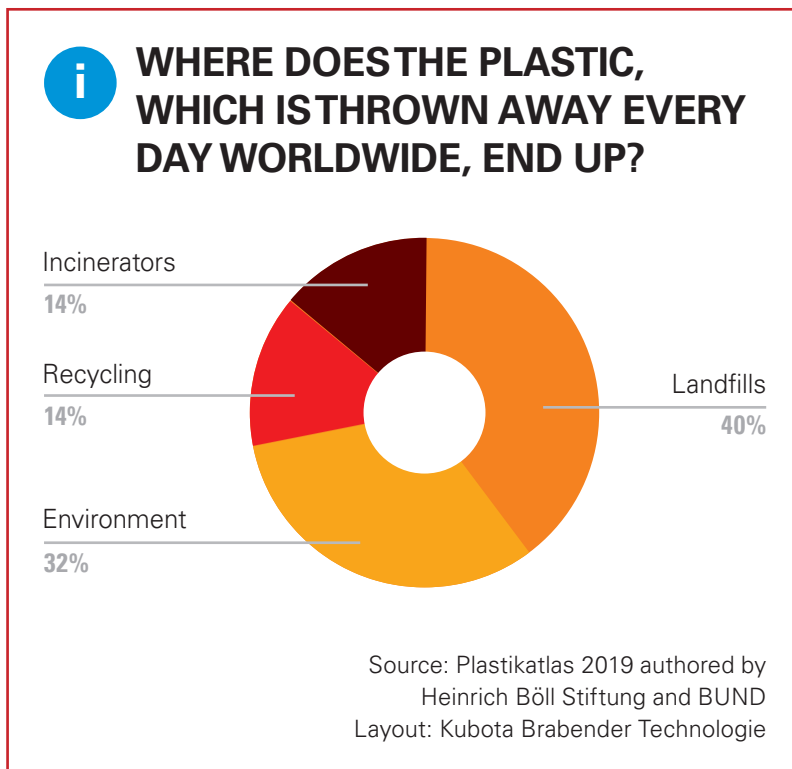


2020 focuses on the production, consumption and recycling of plastics as well as the use of recyclates in Europe.

According to the report, the quantity of plastic waste recycled throughout Europe in 2020 more than doubled, compared to 2016. At the same time, the quantity that had to be disposed of in landfills decreased by 50 percent. **Throughout Europe, the recycling rate for plastics rose to 35 percent in 2020.** In Germany, it was 55.2 percent in 2019.

The proportion of recycled plastics that were returned to the production cycle also increased significantly, compared to 2018. In 2020, around 4.6 million metric tons of post-consumer recycled (PCR) plastics were used to manufacture new products – an increase of 15 percent, and as much as 43 percent in the packaging segment. Probably the most important factor in this trend is **the separated collection of plastic waste**. This is the prerequisite for cost-effective, high-quality recycling.

These figures are the result of taking a range of effective approaches: political guidelines such as



be contaminated during previous use by substances that impair their properties.

This is where so-called **chemical recycling** comes into play. It is suitable for plastics that, from a cost effectiveness and (environmental) technology perspective, cannot be mechanically recycled in accordance with the required standards. Unlike mechanical recycling, which is based on reusing plastic waste, the chemical recycling process breaks plastic waste down into its chemical building blocks. In turn, these basic materials are then processed into synthetic oil or gas, for example.

The role of the plastics industry

The circular economy has become the plastics industry's greatest

price incentives, recycling rules, bans on single-use products, waste separation and recycling, industrial solutions such as ecological product design, as well as increased social awareness of social trends like selling food unprepackaged, and the general trend towards reducing and doing without plastic in everyday life.

Challenges involved in recycling plastics

The main problem with plastics recycling is that the reprocessing method most commonly used in Germany at present, **mechanical recycling**, only works for certain types of plastic, primarily polyethylene and PET. These types of plastic can be easily shredded, melted and remolded, and account for well over 40 percent of all plastic – roughly the proportion of plastic that is already recycled in Germany. During this process, plastic waste is processed into secondary raw materials without changing its basic structure. But that does not work with every type of plastic: hard plastics (thermosets), for example, remain dimensionally stable even at high temperatures and do not melt. Furthermore, not all recyclates are the same. They can be of the same type, of the same or a similar grade, compounded or

challenge in the history of its still relatively young material. The question of how to deal with plastic waste was neglected for a very long time. Instead, the focus was on the many possible uses and variations of plastic. However, many of the material properties that the market expects nowadays conflict with the objective of circularity.

Dr. Alexander Kronimus, Head of the Climate Protection and Circular Economy Business Unit at the Plastics Europe Germany trade association, emphasizes in this context the role of the plastics manufacturing industry: "We [editor's note, plastics manufacturers] nowadays increasingly regard plastic waste as a source of recyclable materials, which we want to use efficiently for as long as possible and then recover, in order to use as secondary raw materials. (...) I can definitely see that the transformation to a circular system of adding value needs to be accelerated, as the climate crisis, the extinction of species and loss of biodiversity means we cannot afford to delay this transformation."

According to the Association of German Engineers (VDI), plastics producers can make a significant

contribution to ensuring that recycled raw materials increasingly find their way into the cycle, for example by processing recycled raw materials. "To this end, they need to adapt their process and product development approaches," the "Rethinking the circular economy for plastics" paper states. In reference to the essential properties of plastics, which differ depending on intended use, plastics producers need to develop the necessary material property profiles. However, compounding and skillful blending of mechanically produced recyclates, chemical recyclates and virgin materials could achieve this. "They can also play a key role in building up knowledge for different processes and therefore exert considerable influence on solutions that make overall environmental sense," is one prospect that the paper provides.

Growth potential in bioplastics

However, the plastics processing industry is also tapping into a wide range of opportunities offered by innovative bioplastic products. Although most plastics are still made from fossil resources, and biobased plastics still only account for a tiny fraction of total plastics output, use of bioplastics is increasing steadily and they have enormous growth and innovation potential. The best example of this is French company Eranova's AlgX technology, which has already been patented in 30 countries. The approach involves green algae being transformed into green plastic. AlgX enables biobased, recyclable,



Dr. Alexander Kronimus, Head of the Climate Protection and Circular Economy Business Unit at the Plastics Europe Germany trade association



The material used for the rotor blades of a wind turbine needs to be both extremely strong and extremely light. Plastic can do just that!

biodegradable and compostable plastics to be produced from green algae.

Taking global responsibility seriously

All this shows how much the industry has understood what global responsibility it has and that real progress can only be made, if all stakeholders in the plastics value chain work together in a solutions-focused way. This shared commitment applies to creating sustainable supply chains, to closing the raw material loop more effectively and addressing global waste management challenges. "Our sector is undergoing a transformation towards a circular, climate-neutral industry," says Dr. Ralf Düssel, chairman of trade association Plastics Europe Germany. "Climate-compatible solutions or the use of alternative raw materials are enabling us to play an active role in driving this transformation forward – and indeed in an increasingly volatile market environment. The fact is that the vital course for the future of our industry is being set right now."

Reducing resource consumption in production processes

In addition to the properties of new plastics, issues relating to their manufacture, recycling and subsequent use as well as process optimization play a key role. The general requirement of modern manufacturing is reducing resource consumption while maintaining a high degree of functionality. This not only increases profitability, it is also a key approach to achieving sustainability and therefore gaining acceptance of industrial production in general.

To find out what approaches Kubota Brabender Technologie is taking and which feeding technology is the right one for the circular economy, why not read the interview with Bernhard Hüppmeier, Head of Business Development at Kubota Brabender Technologie, on the following two pages. ■

Feeding technology as part of plastics recycling processes

Proper feeding in the circular economy



Kubota Brabender Technologie's feeding systems are used in many different plastics applications. FLUX spoke with Bernhard Hüppmeier about the right feeding technology for the circular economy in the plastics industry. As Head of Business Development, he has been observing trends and developments in the industry for years.

FLUX: What trends and developments relating to the topic of "recycling in the plastics industry" have you observed in the last few years?

Bernhard Hüppmeier: Plastic is a resource that occurs in all spheres of life. Recyclable plastics are needed, as our world does not function without plastic. Sorting plants are vital, given the diversity of available plastics. There are already a number of technically feasible solutions for identifying different types of plastic for recycling purposes. Plenty of

research projects are also heading in this direction. The trend is increasingly towards single-type plastics. In this case, an end product is made from one type of plastic and can therefore be recycled after use. However, attempts are also being made to recycle the oddments that are generated during production of end products, during processing, injection molding or cutting, straightaway. More and more companies are specializing in the plastics recycling market. Furthermore, the European Union is attempting to develop sustainability standards and certification.

FLUX: How can Kubota Brabender Technologie and its feeding systems help producers in the plastics industry to manufacture their products as sustainably as possible?

Bernhard Hüppmeier: Some recycling processes in the plastics industry need reliable feeding systems to be feasible. In turn, the feeding process is very much dependent on what form the recyclates come in. How it is processed has a major impact on flowability. Is it a regrind or a scrap (uneven shape with dust component)? If the material has already been repelletized, it is easier to feed.

FLUX: What type of feeding technology is used if recyclates lack flowability?

Bernhard Hüppmeier: Some applications are only feasible with the aid of high-precision feeding technology. Enabling materials that intertwine, snag and are very light to be handled effectively, requires a feeding technology rethink. These materials can also have compacting and energy-absorbing properties. Conventional feeders are not suitable for handling these "zero-flowability" recyclates, and special feeding methods have therefore been developed.



Bernhard Hüppmeier, Head of Business Development of Kubota Brabender Technologie



FLUX: What sustainability aspects were factored into the development of the feeders?

Bernhard Hüppmeier: In product development terms, priority was given to reducing the number of intermediate processing steps, in order to achieve improved flow properties. At the same time, however, power needs and pollution caused by transport, packaging and thermal disposal are reduced, which in turn protects the environment as a whole. Last but not least, these specialty feeding technologies save time. This applies in particular to processes that produce high-quality end products again and therefore require gravimetric feeding solutions in order to accurately log and document the quantity of recyclates added.

FLUX: What key features do the feeders used in this circular economy need to have?

Bernhard Hüppmeier: As far as feeders are concerned, process reliability, which results from a high degree of reproducibility, plays an important role. Feed reliability is also very important in this context. In the case of

loss-in-weight feeders, this of course also applies to filling and co-operation together with processing machinery like extruders, kneaders or mixers. Not only recyclates but also additives, which are used to enhance properties or reduce odors, as well as virgin material content may be required.

FLUX: Which Kubota Brabender Technologie feeders are suitable for recycling use?

Bernhard Hüppmeier: We have developed a fiber feeder, our patented FiberXpert, specifically to feed long, uneven fibers. In recycling terms, these include PA, PET as well as PE fibers from woven fabrics, like for example the fiber trim from the weaving process or fabrics with or without a silicone coating. The FiberXpert is also used for feeding film edge clippings or carbon fibers generated by the pyrolysis process or from recycled or cut mats. Our customers like using the SiloTray discharge aid for uneven, unsorted film recyclates. It ensures controlled discharge from silos and containers or can be used to feed weigh-belt feeders or combined as a vibrating tray

feeding system with loss-in-weight feeders – even materials with challenging flow properties like scraps, bottle flakes and woven fibers.

These are just some examples of the feeder technology that can be used for recycling purposes. We are very happy to provide specific advice.

Thank you for the interesting interview!



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Strategic Integration



Brabender Technologie joins Kubota Corporation

Japan's Kubota Corporation and Brabender Technologie will in future be joining forces in the feeding technology sector.

This far-reaching step was preceded by almost one year of thorough preparation: Kubota acquired all the shares in Brabender Technologie GmbH & Co. KG with effect from June 16, 2022 – and since then, the latter has been a wholly owned subsidiary of Kubota Holdings Europe B.V. Following the successful completion of the legally necessary operations, the new company, which has been integrated into Kubota Corporation, is now called **Kubota Brabender Technologie GmbH.**

Wide range of synergies with Kubota

A closer look soon reveals how many commonalities there are. Both Kubota Corporation and Brabender Technologie have a huge amount of top-level gravimetric feeder technology expertise. Kubota Corporation holds substantial gravimetric feeder market share in Japan, China, Korea and the rest of Asia. This equipment is mainly used in powder and pellet production processes in this region.

Historically speaking, Brabender Technologie's sales and service networks have grown besides Asia in particular in Europe and America. Both businesses have acquired expertise in key industries, like plastics, over the course of decades.

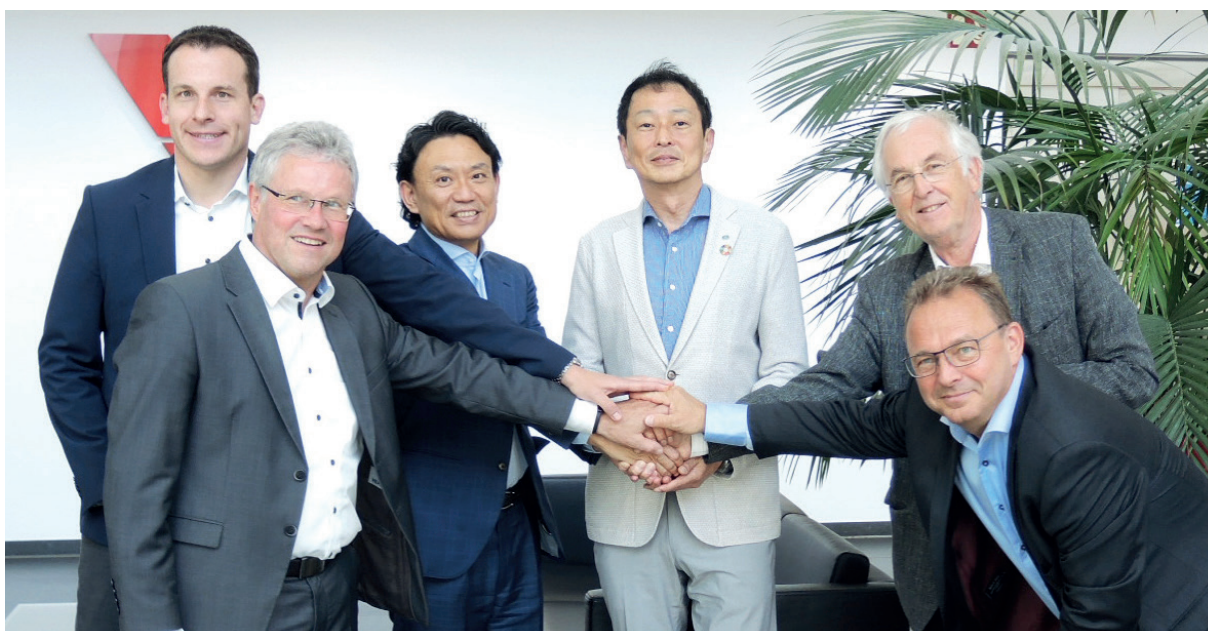
Bruno Dautzenberg, Managing Director of Kubota Brabender Technologie, explains: "Kubota Corporation's strengths in the Asian market complement our technology, our technical expertise and our existing service and sales networks in the European and American markets perfectly."

Future strategy

As part of the same corporation, Kubota and Brabender Technologie are aiming at the targeted expansion of their business in the gravimetric and volumetric feeder market in the future. Business is

to be ramped up in battery manufacturing, pharmaceutical applications and the food sector in particular. Steadily increasing demand for continuous industrial production processes will also be met jointly in the future. That is because growth is expected in a range of different sectors as a result of the global shift in manufacturing processes towards automation.

Hideki Saiki, Managing Director (CEO) of Kubota Brabender Technologie, puts it in a nutshell: "Integration into Kubota Corporation will generate synergies and new market potential that can be exploited to the optimum by harnessing the technical capabilities and comprehensive expertise of both businesses. In the future, we will jointly be able to drive forward the development of innovative technical solutions and therefore the expansion of our product range in a targeted way."



Happy faces at the signing of the contract:
 f.l.t.r. Jan Pardon (Managing Director Kubota Brabender Dienstleistungs GmbH/ Brabender Services),
 Dr. Günter Kuhlmann (Managing Director Kubota Brabender Technologie), Hideki Saiki (Managing Director
 Kubota Brabender Technologie), Tomohiro Fukihara (Managing Director Precision Equipment Business Unit),
 Peter Eßer (Managing Director Holzhauser Holding), Bruno Dautzenberg (Managing Director Kubota
 Brabender Technologie)

Who is behind the name Kubota?

To understand how Kubota evolved as a company, it is worth looking at the years after the business was established in 1890. Among other things, founder Gonshiro Kubota had the idea of using ductile iron water pipes to prevent the spread of cholera bacteria in Japan. This bacterial infectious disease caused multiple pandemics with many fatalities in the 19th century that repeatedly affected other parts of Asia too.

Kubota's mission

Today, you can still find this approach of wanting to contribute to society in Kubota Corporation's code of values. Its mission statement says: "Food, water and the environment are vital to human beings. Kubota Corporation is supporting the future of Planet Earth and of humanity by provid-



The team at the Kubota Precision Equipment business unit in Japan

ing outstanding products, technologies and services that help to ensure abundant, steady food production, to supply and recycle water sustainably and to create a pleasant living environment."

Ductile iron pipes are still part and parcel of the product portfolio, which has evolved over the last 130 years to cover a broad spectrum of business activities:

- > agricultural solutions that help to feed the world,
- > water-related solutions that produce and supply safe water and
- > solutions for the living environment, that support a comfortable lifestyle as well as industry.

History of Kubota feeders

The achievements and offerings of the Precision Systems business unit – weighing and measurement control systems – will play an important role in the shared future with Brabender Technologie. Weighing systems and gravimetric feeders account for a large portion of precision equipment sales. Control systems, measuring systems and air purifiers are also sold.

Data from 12,000 feeding tests was collected during the course of acquiring more than 40 years of gravimetric feeder manufacturing experience. Kubota obtained a



The current Kubota NX Feeder model

„Our objective is to become the world leader in gravimetric feeding systems.“

Hideki Saiki,
Department Manager Precision Equipment
Sales Department, Kubota Corporation

license to manufacture scales as early as 1924, and in 1981 the first gravimetric feeders were developed in Japan. This was followed in 2000 by the development of the first digital load cell, and in 2013 by the launch of the NX Feeder, which has been continuously enhanced up to the present day.

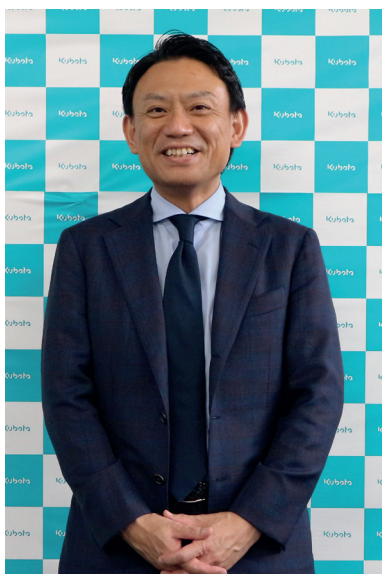
In addition to a technical center (Feeder Technology Center, FTC) in Kyuhoji, Osaka (Japan), feeding tests involving a wide range of different requirements can be conducted in three other technical centers at Kubota subsidiaries in Shanghai (China), Korea and India.

Strategy for a successful future

Hideki Saiki is one of the new Managing Directors of Kubota Brabender Technologie and will be instrumental in integrating Brabender Technologie into the Kubota corporation. He provides an outlook on post-merger ob-

jectives: “In the future we want to make effective use of the strengths of both companies to manufacture new, innovative feeders and sell them worldwide. We are aiming to develop new

feeders for almost all applications and to keep enhancing the digital load cell jointly with Kubota Brabender Technologie. Our objective is to become the world leader in gravimetric feeding systems. ■

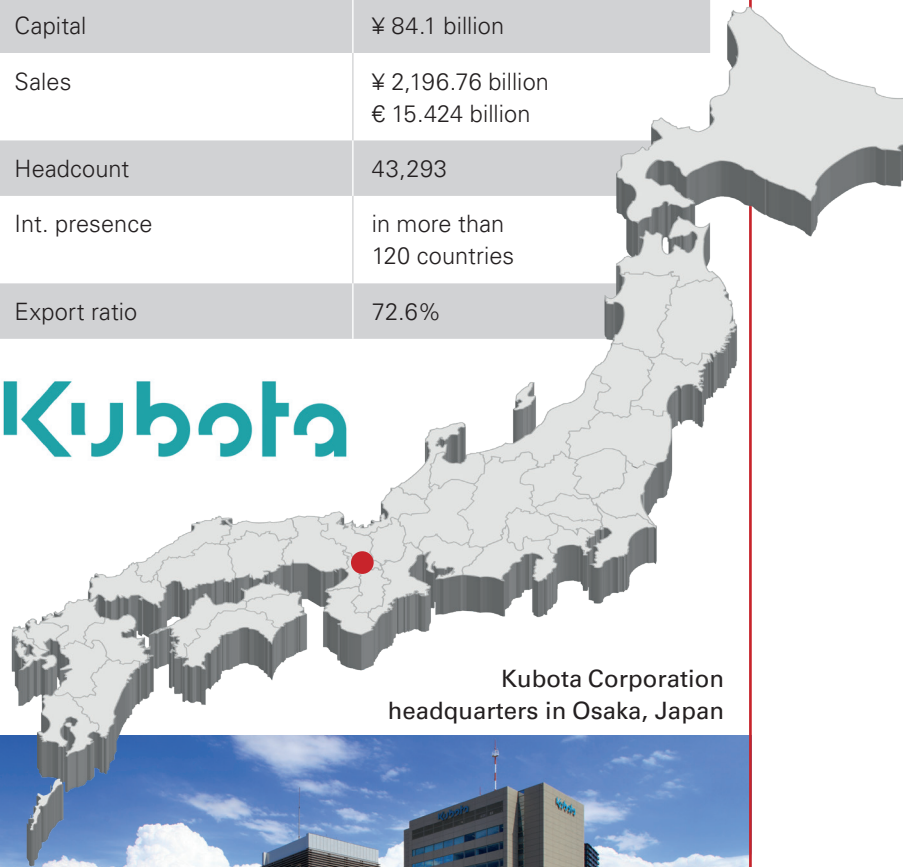


Hideki Saiki is Managing Director of the new Kubota Brabender Technologie

i KUBOTA CORPORATION

Established	1890
Capital	¥ 84.1 billion
Sales	¥ 2,196.76 billion € 15.424 billion
Headcount	43,293
Int. presence	in more than 120 countries
Export ratio	72.6%

Kubota



Kubota Corporation headquarters in Osaka, Japan





Anuga FoodTec 2022

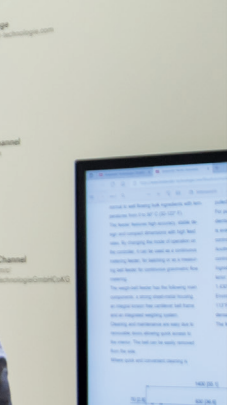
Successful reboot for the foodtech industry

For the first time since 2018, Anuga FoodTec was staged again in the form of compact, face-to-face trade fair – with around 25,000 trade visitors and over 1,000 exhibitors, including Kubota Brabender Technologie, which showcased several highlights from its food portfolio.

When the Anuga FoodTec trade fair opens its doors in Cologne every two years, the exhibition halls are transformed into an international meeting place for the food and beverage industry, including its supplier sector. "The successful reboot of the trade fair here in Cologne has clearly underlined this leading position in the industry," said a delighted Gerald

Böse, CEO of Koelnmesse GmbH. High-caliber trade visitors came in from more than 120 countries and met with well-prepared and thoroughly committed exhibitors.

After Anuga FoodTec was cancelled entirely in 2020 in the wake of the pandemic, it was supplemented this time by the digital industry platform, Anuga FoodTec@home.



However, you could not miss the fact that all visitors and exhibitors were delighted that the trade fair was an in-person event, providing opportunities for face-to-face meetings on each trade fair day.

Successful trade fair, personal contacts

On the four trade fair days, Kubota Brabender Technologie also successfully highlighted its position as the go-to partner for all issues relating to feeding/metering in the food industry. Intensive discussions, new contacts, and high-quality inquiries characterized the trade show activities at the booth of the Duisburg-based feeding specialists. Visitors from the Netherlands and Belgium were out in substantial numbers. The local Kubota Brabender Technologie representative, Rob van

Buitenen, who was at the trade fair himself, feels vindicated: “We are doing very well in the Benelux countries on the topic of food. Anuga FoodTec is a superb opportunity to gather broad, in-depth intelligence on this subject at first hand”. Representatives of many other nationalities also took an interest in the trade fair booth.

The exhibits: special food equipment featuring hygienic design

The focus was on highlights from the food portfolio, including the DDSR20 2.0 HD twin-screw feeder and the FlexWall® FW40 HD. The systems, which were specially developed for applications in the food industry, ensure highly accurate feeding at absolute adherence to formulations – the perfect basis for permanent quality control. Featuring food grade hygienic design, they are ideally suited to safe food production using any raw materials. The DDSR20 HD attracted particular interest, appearing for the first time as the new equipment generation 2.0 version. Its modular design enables easy, fast cleaning, which in turn leads to less equipment downtime and greater time efficiency for the entire application.

But there was also a need to talk about process engineering issues, such as continuous and batch processes. “For many years, we have advised a wide variety of customers from the

food industry on finding optimum custom solutions. We successfully demonstrated this at Anuga FoodTec,” said Guido Obler, Food sales executive at Kubota Brabender Technologie. “Once again, we experienced how important personal dialog is for our business,” said Obler, summing up the impressions gained by the trade fair team. “Anuga FoodTec offers the perfect platform for this.” ■



Rob van Buitenen, representative for the Netherlands and Belgium, was personally on site

Serie: MiniTwin | RotoTube

RotoTube 2.0



A new sealing concept and other useful features give the relaunch version of the reengineered RotoTube even greater appeal.

The RotoTube is a specialty device for feeding small to very small quantities of pellets and fine-grained bulk materials. Its feeding detail consists of a rotating conical feeding tube, into which a screw has been inserted. This enables the RotoTube to convey

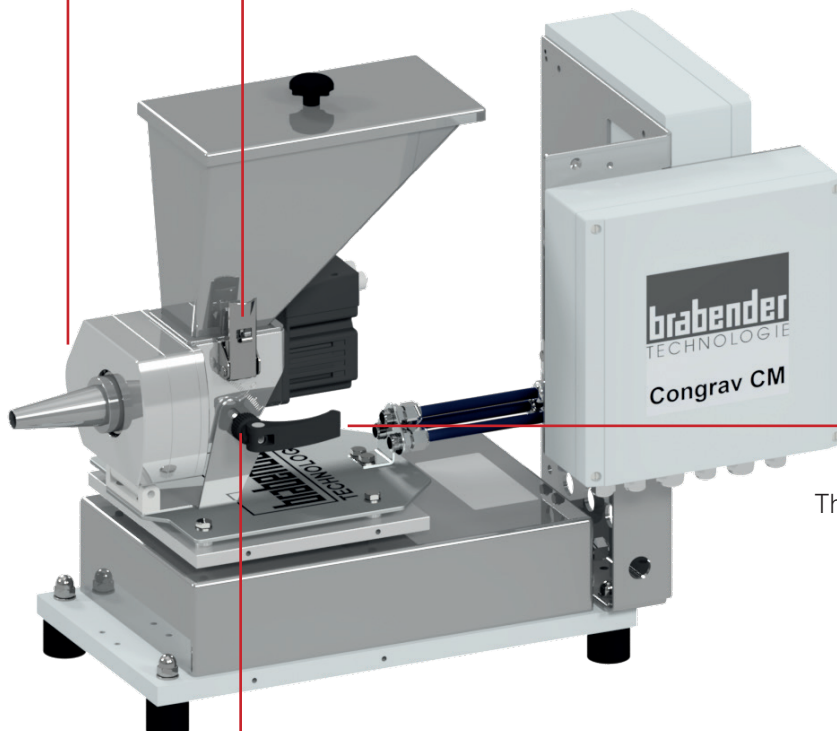
product particles effectively to the outlet, where they exit the device in free fall and are fed into the next process.

Jürgen Knez, Head of Mechanical Systems Development at Kubota Brabender Technologie, explains:

“The outlet features a zero-contact connection to downstream equipment. However, we can fit the device with an appropriate enclosure if the customer requests us to do so.” Feeding tubes of different sizes are available for different power ranges.

The gear mechanism remains in place when seals are changed

The hopper can be secured in place quickly and conveniently using quick-release fasteners



The parallel cable guide no longer reduces tilt angle options

Increase of the tilt adjustment range to $\pm 10^\circ$



Relaunch: RotoTube 2.0

The relaunch version incorporates some interesting new features. For example, **a new sealing system**, that enables the gear mechanism to remain in place when the seal is changed. A 3-lip seal with a sealing ring made of polytetrafluoroethylene (PTFE) has also been added. The material can also be used at a very wide range of temperatures. What is also new is the gage glass that enables seal tightness to be checked quickly and easily.

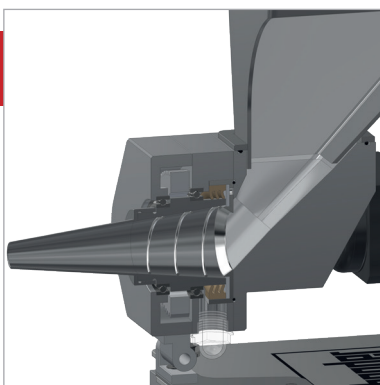
Feed rates can be adjusted using tilt system

The feeding tube is powered via a gear mechanism by a servo motor with integrated frequency converter. The feed rate can be set via the servo motor's speed. These settings are determined via the external pilot signal, which is used to actuate the integrated drive controller. A special feature of the RotoTube is the option of tilting the feeder at different angles. Lowering or raising the feeding tube improves discharge characteristics and enables uniform product flow.

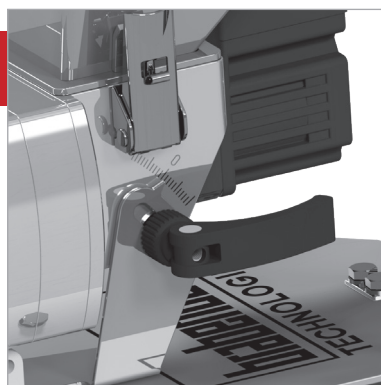
The RotoTube is generally available as a loss-in-weight feeder. However, volumetric product feeding is also feasible. Jürgen Knez says: "This device is ideal for uniform feeding, even if it does not feature a digital load cell."

Some product flow innovations have also been unveiled: **hopper and infeed geometry** has been adapted to avoid product jams caused by bridging. The **tilt adjustment range** has also been increased to ± 10 degrees and a parallel cable guide enables larger tilt angles. The new eccentric clamp enables the tilt mechanism to be secured without using any tools, and the engraved scale, which is also new, makes it easy to reproduce previous settings. Quick-release fasteners also enable the hopper to be secured in place quickly and conveniently.

Having enhanced the RotoTube sealing concept, product flow and user-friendliness, Kubota Brabender Technologie is now offering a significantly improved device, the RotoTube 2.0, for feeding small and micro quantities. ■



Adapted hopper and infeed geometry avoids product jams caused by bridging. The tilt adjustment range has also been increased to ± 10 degrees.



The tilt mechanism is secured using an eccentric clamp and does not involve using any tools, while the engraved scale enables previous settings to be reproduced.



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FDDW Liquid Feeder

The custom one

The sensitive nature of liquid products sometimes makes their feeding process a challenge. In marketing its liquid feeder, Kubota Brabender Technologie is demonstrating its expertise in specialty feeding solutions for these exacting substances.

Liquid products can have a wide range of different properties: chemically aggressive, toxic, flammable, explosive, crystallizing or hygienically sensitive. The viscosity of fluids also changes as a result of temperature fluctuations. That is why Kubota Brabender Technologie's FDDW liquid feeder is always designed to match the relevant product perfectly. Feed rate, backpressure and density are other key criteria alongside viscosity.

"Each of our liquid installations is specially modified to meet feeding requirements, and is often unique, because we customize feeders to dovetail with each

customer's specific application," Thomas Neuhaus, liquids feeding expert at Kubota Brabender Technologie, states. "The core of the installation is formed by the feeder, the weighing system and the pump, usually a piston diaphragm or gear pump. That depends, among other things, on the viscosity of the substance."

Basic design: the "Classic"

Kubota Brabender Technologie provides a design platform in the form of the FDDW-Classic to enable the device to be customized in terms of design and options (more about that starting on P.20). On this version of the liquid feeder, the motor and pump are located on

the side of the device and liquids can be heated thoroughly up to 150 degrees Celsius. The digital load cell can record even the lowest feed rates. On request, the FDDW-Classic can also be fitted with an analog load cell and provided in a volumetric version.

Emergency draining is a standard feature on the FDDW-Classic, and its easy to clean Hygienic Design configuration means it is suitable for feeding liquid foods or pharmaceutical products. The FDDW-Classic is available in the following hopper sizes: 3 liters, 6 liters, 50 liters and 100 liters, as well as in nonstandard hopper sizes. The hopper covers are also available as manual refill versions.

The basic design also includes the refill valve, which prevents dripping. Flexible sleeves are located in front of and behind the weighing unit, featuring a hopper and gravimetric load cell. They decouple the weighing unit's anchor point from the pump and thus protect the digital load cell. The pump is connected to the lower sleeve.

„Each of our liquid installations is specially modified to meet feeding requirements, and is often unique, because we customize feeders to dovetail with each customer's specific application.“

**Thomas Neuhaus,
Liquids Feeding Expert at Kubota Brabender Technologie**



FDDW-Classic Liquid Feeder

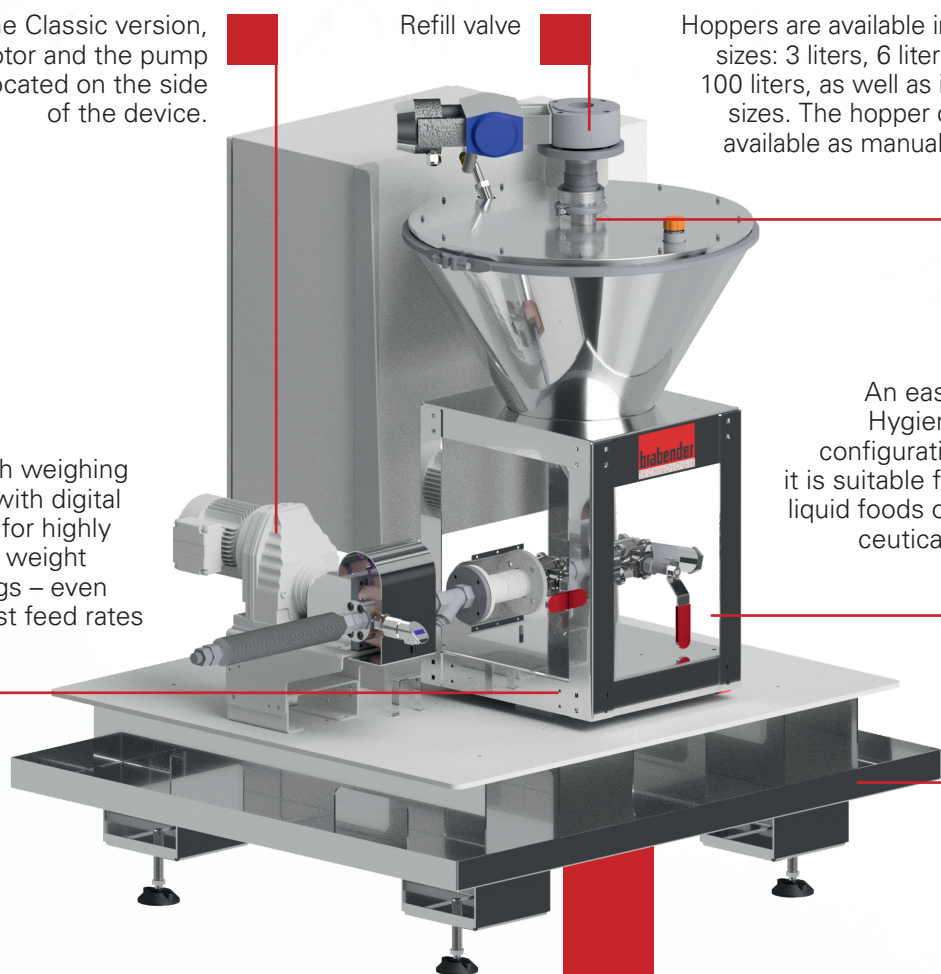
On the Classic version, the motor and the pump are located on the side of the device.

Refill valve

Hoppers are available in the following sizes: 3 liters, 6 liters, 50 liters and 100 liters, as well as in nonstandard sizes. The hopper covers are also available as manual refill versions.

High-tech weighing system with digital load cell for highly accurate weight recordings – even for lowest feed rates

An easy to clean Hygienic Design configuration means it is suitable for feeding liquid foods or pharmaceutical products



Collecting tray

Standard for familiar processes

Its vertical, space-saving configuration gives the standard FDDW-S version of the liquid feeder a compact design. Liquids can be heated to 100 degrees Celsius in both the 6-liter and 50-liter sizes. The FDDW-S is fitted with an analog load cell and is easy to clean, even using an emergency drain detail.



BROCHURE

To download "Feeding Liquids" Brochure



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Liquid feeding applications

Viscous to fluid

> Liquid is one of the three aggregate states alongside solid and gaseous. But is feeding these substances always a “fluid” process?

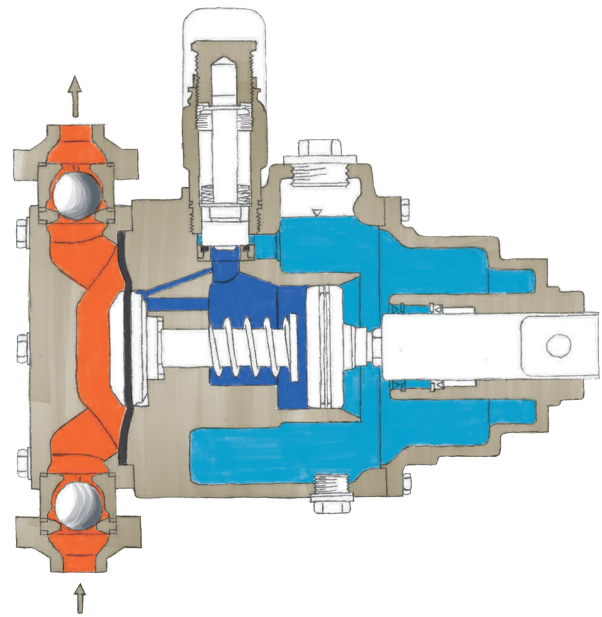
Some substances liquefy as the temperature increases. Everybody knows that happens with honey. The same applies to oils, iron, copper or oxygen. And every child learns that water changes to solid ice or to gaseous water vapor, depending on the temperature. But there are also temperature-resistant substances like silicones.

However, temperature not only determines the aggregate state of a product in general, but also its dynamic viscosity. This describes the force needed by a liquid to overcome its own internal friction in millipascal-seconds. For example, water at 20 degrees Celsius has a dynamic viscosity of 1 millipascal-second (mPa·s), while the value for grape

juice is between 2 and 5, for shampoo is 3,000, for olive oil is 40, for honey is 10,000 and for tar is 100,000. These values also change as pressure conditions vary.

Piston diaphragm pumps

Piston diaphragm pumps, which function in a similar way to the heart muscle, are normally used for low-viscosity substances like water, plasticizers or silanes. A piston creates a vacuum that raises a diaphragm, allowing liquid to flow in through an inlet valve. The backmovement causes the liquid to contract and flow out through the outlet valve. The advantage that such pumps have over simple piston pumps is that the liquid to be conveyed does not come into contact with the drive mechanism and associated lubricants or deposits at any stage.



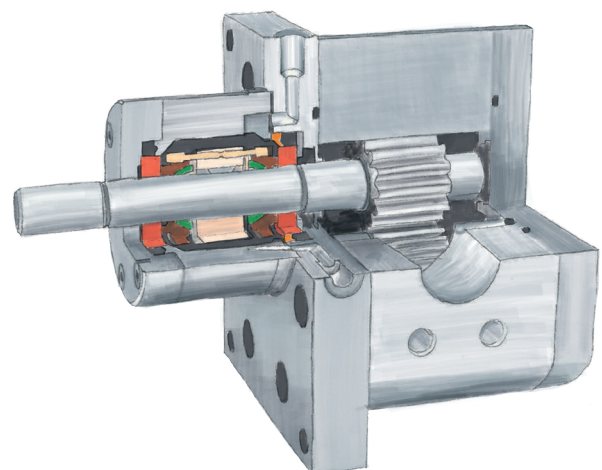
Piston diaphragm pump

One disadvantage of the piston diaphragm pump is its amplitude. The alternation of inflow and outflow caused by the piston stroke creates a pulsating flow. "We use a pulsation damper in processes that react sensitively to this," Thomas Neuhaus, liquids feeding expert at Kubota Brabender Technologie, explains. The pulsation damper is a hopper with a diaphragm, which separates gas content from pumped media. During the pumping stroke, a partial quantity of the liquid is pressed into the pulsation damper and then released again during the suction phase. This means that the pulsation damper and the pump always operate on a push-pull basis.

frequently. Kubota Brabender Technologie partners closely with pump manufacturers to provide the optimum pump for each application.

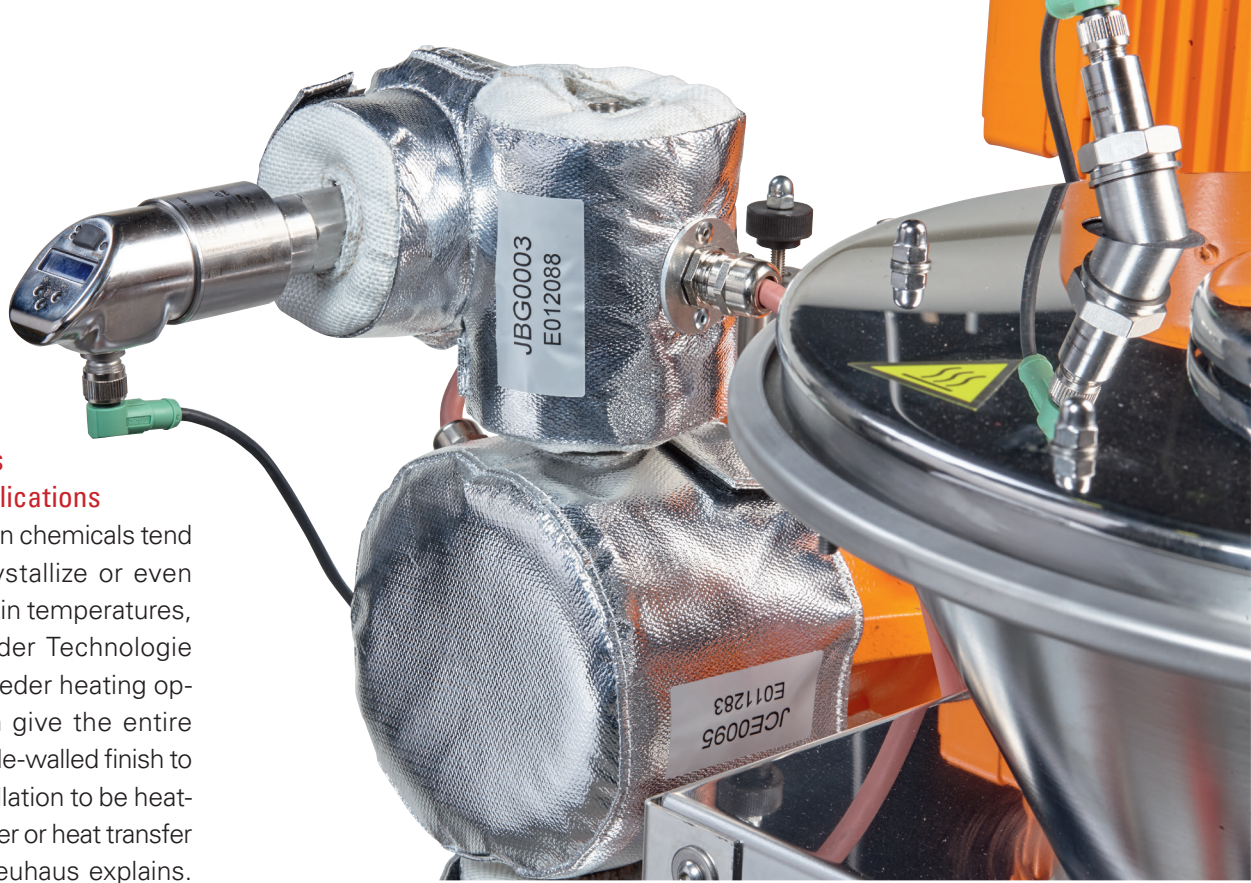
Gear pumps

"We use several pump heads or – if feasible – switch pump type, if the process requires a very high degree of consistency," says Thomas Neuhaus. That is when gear pumps are used. They are classified as zero-pulsation continuous flow pumps. They are used in processes involving medium to high viscosity liquids. They can withstand large amounts of pressure and high temperatures, and are accurate at low rates and compact at high rates.



Gear pump

Depending on requirements and tasks, other pumps, e.g. **eccentric spiral pumps**, are also used for pumping glutinous and highly viscous media, such as liquid paint or honey. Pump types like **rotary piston pumps** or **hose pumps** are used far less



Heating sleeves for delicate applications

Given that certain chemicals tend to degrade, crystallize or even explode at certain temperatures, Kubota Brabender Technologie provides two feeder heating options. "We can give the entire structure a double-walled finish to enable the installation to be heated using hot water or heat transfer oil," Thomas Neuhaus explains. This finish is suitable if waste heat is produced by another process, or if explosive substances are processed. However, these can only be heated using water.

Alternatively, the installation can be **heated electrically** using suitably sewn heating sleeves. "The advantage that this method provides is that each component gets its own heating and therefore its own control loop. For example, the line leading away from the pump can then be heated more than the feeder." This can add up to 10 to 15 control loops. The heating system that is ultimately used depends on a wide range of factors. Electric heating, for example, is not suitable for use in processes involving explosive substances or environments (ATEX). However, the user's existing peripherals or energy concept also play a role. In extrusion processes, there is also the option of connecting a central **continuous flow heater** upstream of the extruder. This is used, for example, to heat fillers for plastics before they are fed into the extruder, in

order to keep energy consumption and throughput time in the process as low as possible.

For substances like peroxide that react explosively with oxygen, there is also the option of obtaining the feeder with a **nitrogen inertization (N2 inertization)** detail. The constant addition of (flushing with) nitrogen makes the product sluggish to react or inert.

Versions and options for every application

To protect sensitive load cells, the mass plates of which need to be protected against interference caused by ambient vibrations, the liquid feeder is also available as a **mobile trolley**. One version for laboratory applications, which feeds **microquantities** of less than 10 grams per hour, is designed to be filled manually. This device is completely enclosed and has no flexible connections, due to its size. A micro annular gear

pump, which operates to a high degree of sensitivity with the aid of mini gears, is used in this case. Heating with oil or water does not work on the microquantity feeder, as this interferes with weighing. Heating sleeves have to be used here, as they do not cause any motion within the system.

Coriolis flow measurement

When weighing systems reach their limits, Kubota Brabender Technologie installs a so-called Coriolis system on request. This

Electric heating sleeves



Mobile design

is a high-precision flow meter that can be integrated directly into liquid flows or pipelines. It is mainly used for very large volumes in excess of 1,000 liters per hour and high-viscosity media, which cannot be handled by loss-in-weight feeders. On this version, the meter is placed directly behind the pump and it determines motor speed.

Applications and methods

Basically, every liquid feeder is designed by Kubota Brabender Technologie to match the properties of the medium to be fed, in terms of density, viscosity, solids content, temperature, reaction behavior and toxicological properties. Process requirements such as accuracy, feed rate, adjustment range and backpressure are also factored in.

Application-specific design means that the liquid feeder is at home in a wide range of industries. It is equally adept at feeding thermoplastic polyurethanes (TPU) in the plastic manufacturing industry, separator foil components for battery production, liquids in the food industry, tire manufacturing, the adhesives industry as well as in the production of cable compounds. ■

Typical liquid feeding applications



Fish oil for animal feed



Separator foils for batteries



Cable compounds



Adhesives



Components for the production of TPU



Tires

Software Development Team

Effective, flexible, available

The in-house software development team at Kubota Brabender Technologie is the essential point of contact for all issues relating to the testing and continuous development of the Congrav® software platform.

As a technology leader, Kubota Brabender Technologie is known for its sophisticated, innovative feeding systems for all types of bulk materials. What is less well known is that the company has a substantial amount of software expertise – located at the company’s headquarters in Duisburg. The software development team ensures that all issues relating to the testing and development of the software are actioned promptly and flexibly. The multi-member team is therefore a key operating unit working alongside the mechanical and electronic development teams.

High level of expertise within the company

Ingo Röpling, Head of Software Development at Kubota Brabender Technologie, says: “As an operating unit located within the company, we are really well placed to respond directly to problems and requests. Employees can always approach us and discuss their concerns with us in person. That is quite different

from partnering with an external service provider, where a project has to be commissioned first. By being in-house, we are able to test software on a continuous basis and are completely independent and flexible.” Another bonus is that Röpling and his team are familiar with the equipment and can therefore accurately factor this knowledge into their development work.

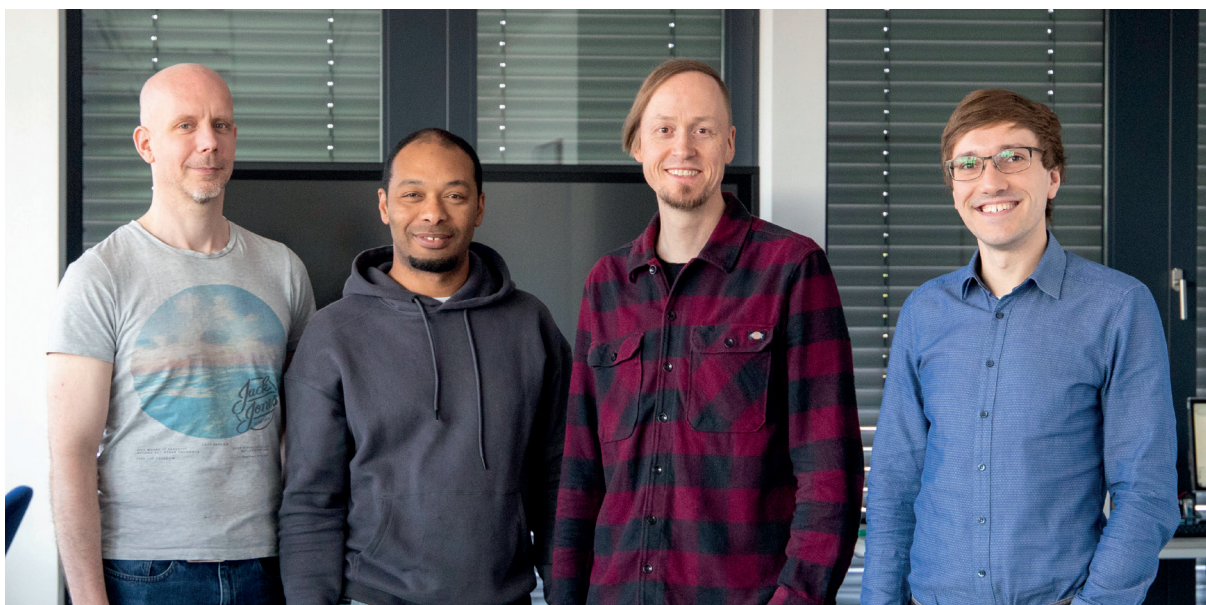
Teamwork – yet interdisciplinary

The team is broadly based and comprises hardware and software developers, designers and computer scientists. Röpling adds: “Everyone has their own specialisms, but they can still do everything. We cannot afford ‘minds to be monopolized’, because that would have a detrimental impact, if somebody were to be sidelined.” The team also has electronics expertise, which was harnessed to conceptually design the new control technology. “This project confronted us with a number of unique challenges, because we

had to populate the processor with software, for example. That is why we always partner with our internal specialist colleagues on projects. That’s the great thing about working as an in-house team at Kubota Brabender Technologie – that we can do so on an interdisciplinary basis.” There is regular communication with the ‘Electronics Development’ and

“As a capable and effective development team, we play a key role directly from the company’s headquarters in helping Kubota Brabender Technologie to maintain its technology leadership.”

**Ingo Röpling, Head of Software Development
at Kubota Brabender Technologie**



Software Development team at Kubota Brabender Technologie

Service teams. “In the end, we all benefit from each other by helping each other out with insider knowledge. This is a key factor in ensuring that projects are conducted efficiently, accurately and to the highest standards,” Ingo Röpling explains.

Remit: testing and development

For example, during the tests, which one colleague on the team manages. A test involves all the software units in a device, including its peripherals, being checked. “Every motor is ‘tripped’ once and the different dischargers, such as screw or vibrating tray, also have to be checked,” says the Head of Software Development. “But we are not feeding experts, and if there are any anomalies, we ask the in-house specialists to assess the situation.”

The software division also involves Kubota Brabender Technologie’s external locations, such as the branch in Canada, in testing. The tests conducted there provide us in particular with insights into the feeders specifically developed for the North American market. “In workflow terms, the time difference is also ideal: we commission a test, which is conducted overnight, and we can continue working on it the next morning,” Ingo Röpling is delighted to say.

Another portion of the team’s remit consists of conventional software development. Although the new software has been fully programmed, it is continuously enhanced – for example, when new features need to be added. Röpling states: “We

continue to work step by step on new functions within the software and ensure they are integrated.”

Outlook – Internet of Things (IoT)

The agenda for the coming period includes further steps towards IoT applicability of the controller generation 3.0, which was unveiled two years ago. The web server on the controller is also being developed – with the same user interface, as part of the new Congrav® operating concept. Another issue will be service portals providing realtime support via the hotline – with connected smartglasses or via predictive maintenance. “Our objective for the future is that we are able to inspect our customers’ plant and equipment remotely – without a service technician always having to be on site,” is how Ingo Röpling describes one of the team’s desired outcomes. In the software development team, ‘the future’ has already commenced. ■



CONTACT

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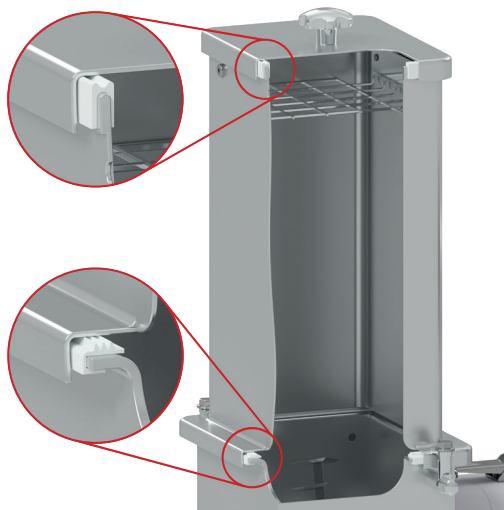
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News

Silicone seals gaining ground

FlexWall® as well as DSR feeders will in future be fitted with silicone profile seals only. This type of seal is characterized by enhanced cleanability and stability combined with a high degree of tightness. The distinct, new design enables the seals to adhere to components entirely without using adhesives, and they can be easily removed and replaced in the event of wear. Silicone seals meet all Hygienic Design requirements for pharma and food applications.

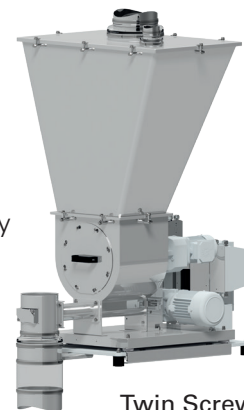


18th Duisburg Extrusion Convention

If you wish to enhance your contacts within the extrusion industry, discuss your own problems and challenges and benefit technically from a strong community of experts, the Duisburg Extrusion Convention is the right place for you. This networking event took place for the 18th time at the 'Haus der Unternehmer' in Duisburg from **September 14 to 15, 2022**. Delegates were able to look forward to an exciting program of convention events with speakers giving fascinating presentations on the subject of the circular economy, including Head of Business Development at Kubota Brabender Technologie, Bernhard Hüpffeimer.

Modular feeder concept 2.0 is broadened

Two more modular feeder generation 2.0 feeders, the DDSR60 and the DSR103, will be commercially available in the fall. Practical benefits of the modular design include being easy to dismantle and therefore easy to clean. Agitator modules as well as components are also interchangeable between the various product family sizes.



Twin Screw Feeder DDSR60 2.0



International Trade Fairs 2022

You can meet with our experts at these in-person trade fairs in 2022:

IBIE 2022, Las Vegas, NV, USA	September 17 – 21, 2022
Powtech, Nuremberg, Germany	September 27 – 29, 2022
EHEDG World Congress 2022, Munich, Germany	October 12 – 13, 2022
K 2022, Dusseldorf, Germany	October 19 – 26, 2022
Expoplast, Montreal, Canada	November 09 – 10, 2022
Compounding World Expo 2022, Cleveland, OH, USA	November 09 – 10, 2022
Plast Eurasia 2022, Istanbul, Turkey	November 23 – 26, 2022

Technology Column

Successfully OEB certified

> The DDSR20 2.0 has succeeded in obtaining OEB certification that covers the feeding of hazardous substances up to and including Class 5. At the same time, the “OEB feeder” is one of the first of its kind in the feeding systems market.

It is vital that occupational exposure limits, which indicate the upper limits of acceptable substance concentration, are consistently complied with, particularly when processes involve feeding pharmaceutical applications or handling hazardous substances. This is where OEB classifications come into play: these so-called Occupational Exposure Bands are used to divide substances into “classes” or “ranges” based on the health effects and efficacy aspects of the chemicals involved.

At the end of September, we will be showcasing a newly developed, dust-tight OEB version of one of our feeders for the first time at Powtech, the powder and bulk solids technology trade fair in Nuremberg. This DDSR20 2.0 OEB twin screw feeder underwent extensive testing in June and succeeded in obtaining the currently top OEB classification grade, OEB 5.

What characteristics does the OEB version have?

In short, it is 100 percent leak-proof. The transfer points within

the product chamber feature specially designed sealing systems. Even the leakage check aperture in the gear mechanism is closed off using sealed sight glass – on the one hand to maintain functionality, and on the other to prevent product leakage in the event of the shaft seal failing. Given that all junctures feature a smooth surface and good dimensional accuracy, the sustainable leak tightness of the DDSR20 2.0 OEB really does appeal.

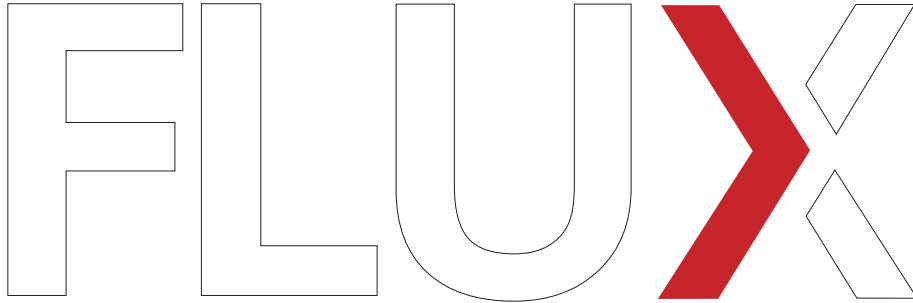
The quick-release fasteners on the cover, hopper and screw tube of the OEB version can only be unlocked using tools, to prevent them being opened by accident. They nevertheless remain in place on the feeder when it is being disassembled and therefore cannot be mislaid.

The OEB version also features a modular design and can easily be converted to other models within the DDSR and DSR product lines by using standardized components. There is also the option of getting the regular feeder converted to the OEB version.



Dr. Günter Kuhlmann, CEO of Kubota Brabender Technologie

We look forward to showing you our latest innovation at the trade fairs! ■



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Keep the Flow