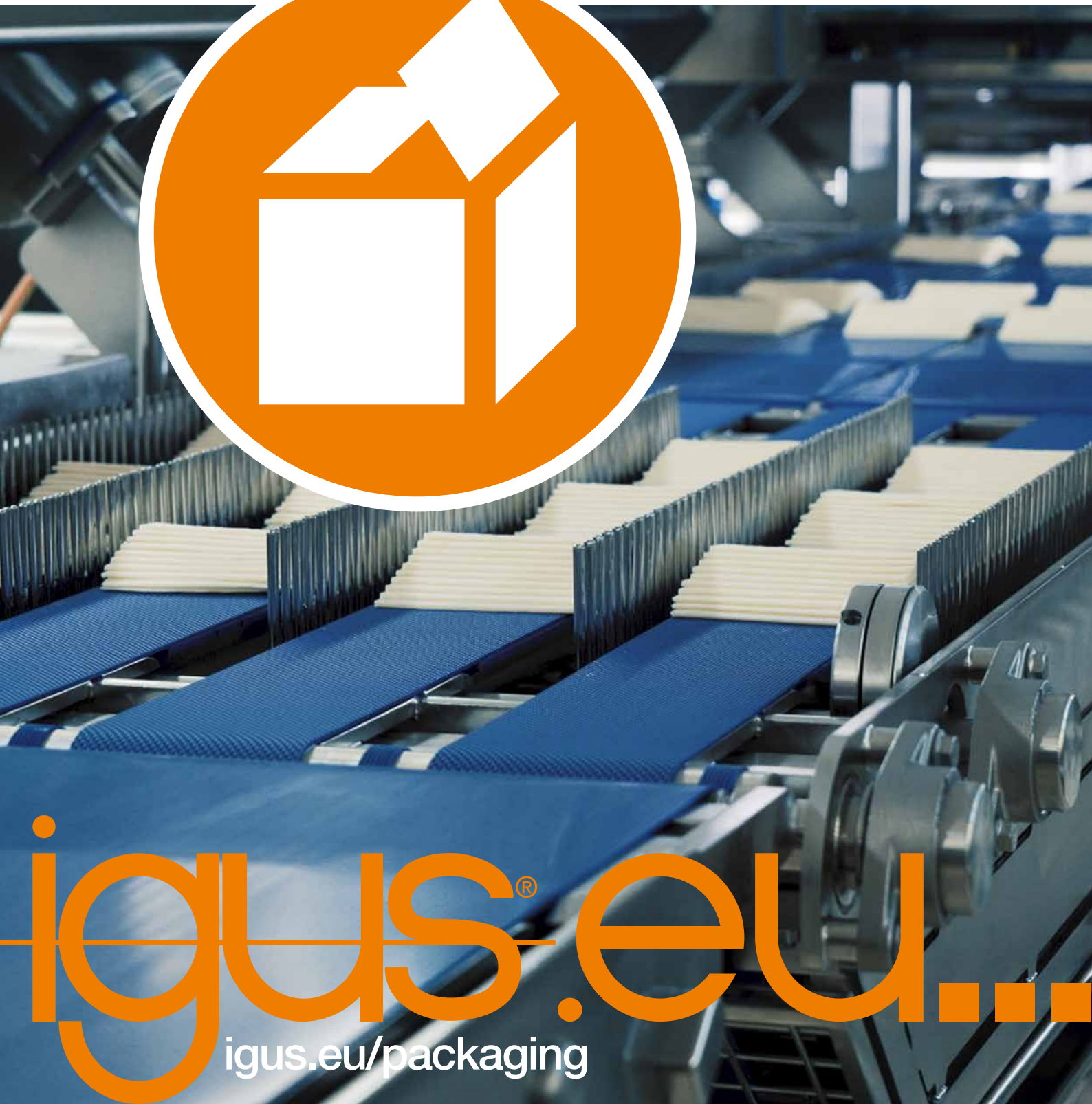
motion

Components for the packaging industry.
Tech up ... Cost down.



igus®.eu...

igus.eu/packaging

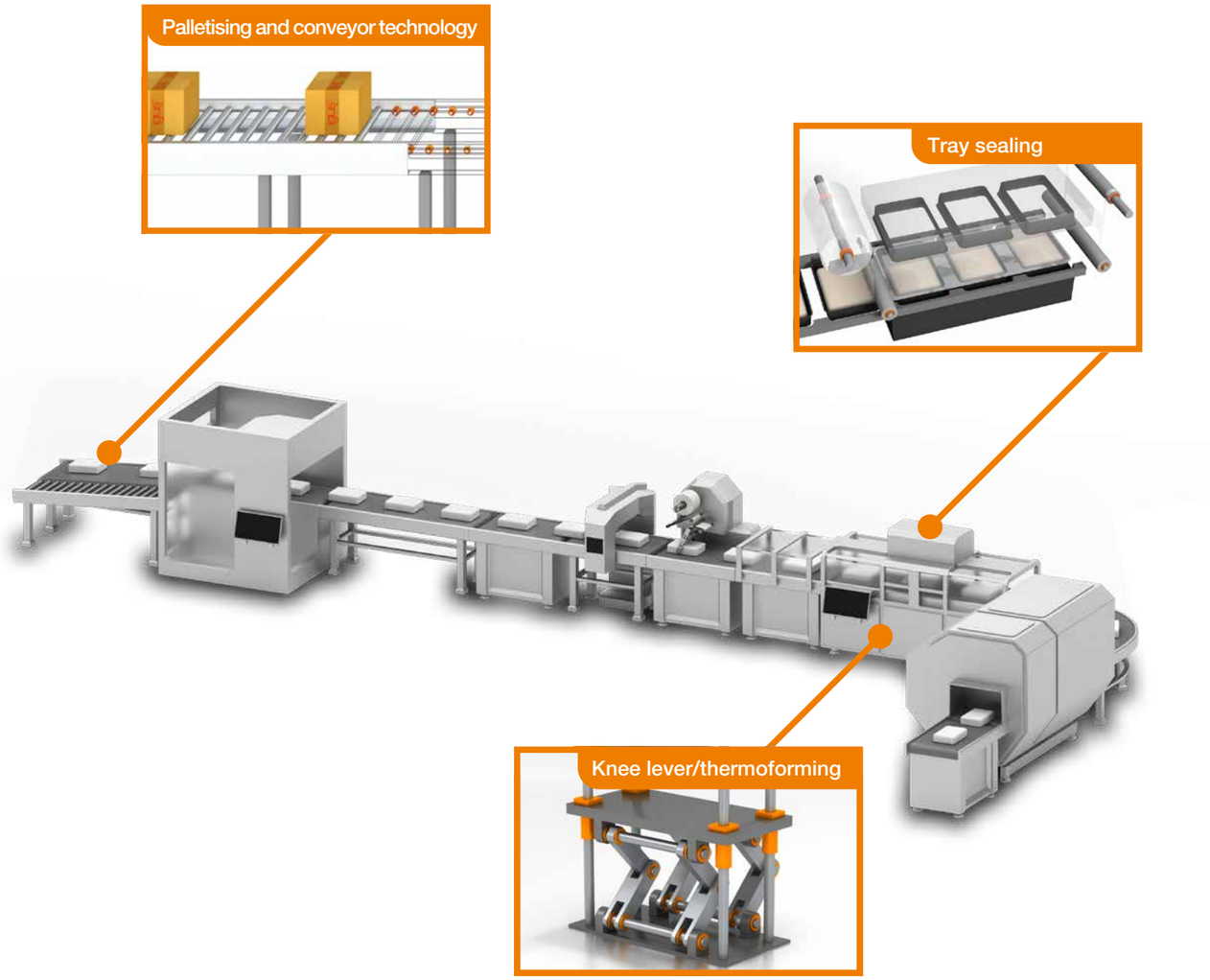
Food-compliant, media-resistant, digital, sustainable

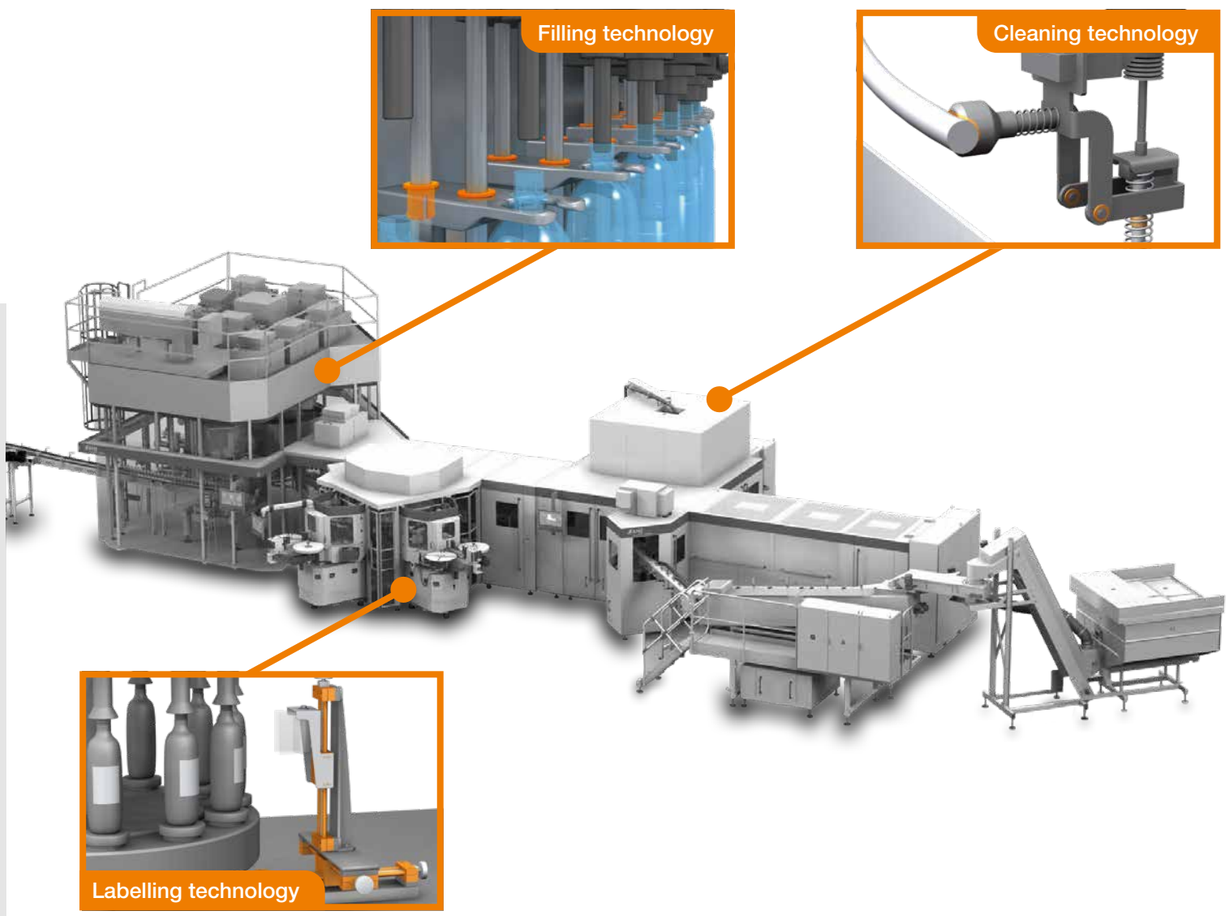
motion plastics® for every station and requirement in the packaging industry

As in most industries, systems in the packaging, food and beverage sector are also characterised by the trend to pack even more output in the same or smaller installation space. At the same time, the increasingly automated systems must fulfil consistently high standards. Machine manufacturers are responding to this with even more sophisticated hygienic designs or lubrication-free system technology to ensure product safety in the future. But digital technologies are not stopping at the packaging industry. Not only can packaging systems be controlled and monitored ever more precisely. In future, users will be able to keep an eye on the wear and tear of even the smallest components and calculate the optimum time for maintenance work.

All these issues are increasingly being considered in the context of the responsibility of manufacturers and business intermediaries, who are adding sustainability goals in their agendas. Resource-saving packaging measures, recycling programmes, but also decisions regarding the technology used in the machines can have a significant impact on the environment. A new study by RWTH Aachen University and igus® quantifies for the first time the effects of switching from lubricated metal bearings to lubrication-free and maintenance-free polymer bearing technology. Heineken Brasil and Krones were also involved in the study and it shows, among other things, how the conscious choice of radial bearings in conveyor technology brings decisive benefits in terms of cost, time and the environment; more on this study on pages 6 - 7. Many other topics, challenges and product solutions for the packaging, food and beverage industry can also be found on our website:

igus.eu/packaging-industry





Bearing technology and energy chains for every system station and requirement can be found here:

... and many other areas of application

igus.eu/packaging-technology

igus.eu/food-technology

igus.eu/beverage-technology

Contents

How Heineken can save 28.8 tons of CO_2 per year with polymer bearings

A joint study by scientists at RWTH Aachen University and igus® shows the costs that can be saved in applications if lubrication-free polymer bearings from igus® are used instead of conventional metal bearings: up to 14 million euros per year. The study also calculates the environmental effect. The nine participants in the study include the Brazilian branch of the Heineken brewery group and Krones, the mechanical engineering company for beverage technology.

If all of Heineken's branches were to switch to polymer bearings, the company could save 28,814kg of CO_2 equivalents.

Interviews with experts from RWTH Aachen University in nine industries

The WBA Werkzeugbau Akademie was commissioned to conduct the study. WBA is a research company that works on the RWTH Aachen campus as part of one of Europe's largest research laboratories in the field of production technology, together with the Machine Tool Laboratory WZL and the Fraunhofer Institute for Production Technology (IPT).

Once the researchers in the study had defined the applications in which plastic plain bearings replaced previously used metal bearings, research was carried out and data collected to calculate the cost savings, time savings and environmental impact of the change in bearing technology. The data is based on expert interviews in nine participating companies in the agricultural industry, automation technology, food industry, filling and packaging industry and construction machinery industry.

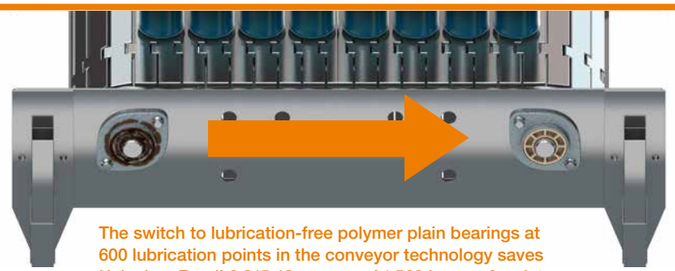
Cost savings of up to 14 million euros per year

Classic metal bearings require constant relubrication. Bearings made from high-performance plastics from igus® thanks to integrated solid lubricants. This saves purchasing costs for lubricants. While the advantages of plastic plain bearings were known, the differences to metal bearings could not previously be quantified in concrete terms. The study by the RWTH scientists, which analysed 11 specific applications from various industries, has now changed this. The result: depending on the application, the cost savings amount to between 7,000 and 14 million euros per year. In addition, between 8,000 and two million man-hours are saved annually on the manual relubrication of bearing points. "The figures impressively demonstrate how a supposedly small changeover can save enormous sums of money and resources," emphasises Stefan Loockman-Rittich, head of the iglidur® plain bearing business unit at igus®.

Heineken Brasil: Radial bearings in conveyor technology

The RWTH study is the first to calculate the positive environmental impact of plain bearings made of high-performance plastics from igus®. Heineken Brasil, for example, saves 180kg of CO_2 equivalents per year by replacing metal bearings with polymer bearings at 600 bearing points. "If all of Heineken's branches were to switch to polymer bearings, the company could save 28,814kg of CO_2 equivalents . And that is a considerable amount for such a small adjustment screw," says Loockman-Rittich. For comparison: when a vehicle consumes one litre of petrol, it emits around 2.37 kilograms of CO_2. The saving would therefore correspond to over 12,000 litres of petrol. "More and more manufacturers of machines, systems and vehicles are feeling the pressure to disclose the CO_2 footprint of their products. Our customers are therefore delighted that there is now a scientifically proven assessment detailing the environmental benefits of the self-lubricating effect of our plain bearings."

The RWTH Aachen University study conducted expert interviews and analysis in nine companies to find out how switching to lubrication-free bearings affects costs, maintenance time and the environment.



The switch to lubrication-free polymer plain bearings at 600 lubrication points in the conveyor technology saves Heineken Brasil 2,815.49 euros and 1,560 hours of maintenance time per year.

You can find out more about our products for conveyor technology on pages 20 - 21 or visit:

igus.eu/conveyor-technology

Krones: Radial and axial plain bearings in labelling station

Two applications were investigated at Krones, the machinery and plant manufacturer for filling and packaging technology. In addition to container transport in a bottling plant, the RWTH scientists took a closer look at a replaced bearing point at a labelling station in beverage technology. The example clearly shows how even a single lubrication point that has been eliminated can make a difference. Krones saves 3.79kg of CO_2 equivalents and 3.27kg of oil equivalents per year by replacing the bearing point at the labelling station. By multiplying the expected lubricant quantity per year by the cost of lubricant, the researchers also arrived at a cost saving of 52.5 euros. As it was determined during the interviews with experts that the bearing point needs to be serviced every eight hours on average, this also results in an annual time saving of 13 hours due to the lack of maintenance.

Heineken Brasil

Radial bearings in conveyor technology

600 lubrication points replaced

€2,815.49 savings
1,560 hours of time saved
180kg CO_2-eq savings
155kg oil-eq *

* Data per year

KRONES

Radial and axial plain bearings in labelling station

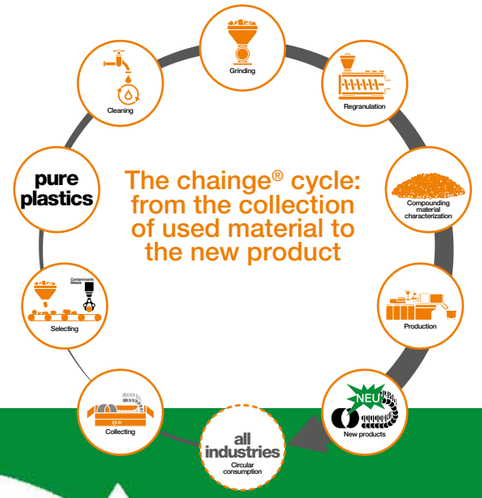
1 replaced lubrication point

€52 savings
13 hours time saving
3.79kg CO_2-eq saving
3.27kg oil-eq *

Marketplace and recycling platform ...

Chainge
engineering plastics recycling

We collect technical and industrial plastics and recycle them. To this end, we have launched the recycling platform chainge®, which can be used to return old energy chains, bearings and other plastic products to us. It does not matter whether the material originally comes from us or from our competitors. At the same time, the platform serves as a marketplace for the purchase and sale of recyclates by plastics processors, recycle traders and compounders, as well as a network that you can join as a recycling partner.



The chainge® cycle: from the collection of used material to the new product

The aim of the chainge® program is to recover or reuse plastics without changing the chemical structure of the material. In mechanical recycling, the old material is collected, sorted, cleaned, shredded, melted down and processed into recyclate. In this way, the raw material is processed to virgin material quality and can then be used for new plastic products.

igus.eu/chainge

... for new products made from up to 100 % regranulate

Based on the igus® chainge® program, a number of catalogue parts have already been created, such as the E2.1 – the world's first e-chain® made from 100% recycled material. More and more product areas are now being added, such as plain bearings, ball bearings and linear bearings made from up to 100% regranulates.

Ball bearing xirodur ECO B180
Low moisture absorption and high media resistance. Tested in the ball bearing test laboratory.

cradle-chain E2.1.CG
Same technical specifications and load limits as energy chains made of standard material igumid® G.

Linear housing iglidur® ECO
Shaft guide with 100% recycled linear housing. Quick bearing change directly on the round shaft.

Plain bearing N94
Made from 94% renewable raw materials. Wear-resistant and optimised for lubrication-free dry operation.

Plain bearing ECO P210
For contact with chemicals. Cost-effective due to reuse of already processed raw materials.

Plain bearing ECO H
For highly corrosive and hot environments.

Carriage for curved rail drylin® econ
Ready-to-install entry-level series for simple positioning and adjustment tasks. 100% recycled carriage for curved rail.

Slewing ring bearing PRT-02-30-ECO
Made from at least 97% regranulate. Long service life thanks to optimised material combination.

Find out more about our recycled products:
igus.eu/recycled-products

How engineering plastics return to us – in five simple steps

1.
Collect materials by type

2.
Remove dirt from the material

3.
Weigh the materials

4.
Register and send the return

5.
Receive a voucher for new igus® products

igus.eu/chainge

Sustainability at igus®. Plastic is a much-discussed material. We know that high-performance plastics can contribute to protecting resources and the environment, and we have made this the focus of our activities.

igus.eu/sustainability

Lubrication-free and maintenance-free: from the bottom film unwinding unit to the labelling station

GEA has combined a large number of innovations in its PowerPak PLUS packaging systems. The linear bearings, plain bearings and drive elements from the igus® modular design system have helped here.

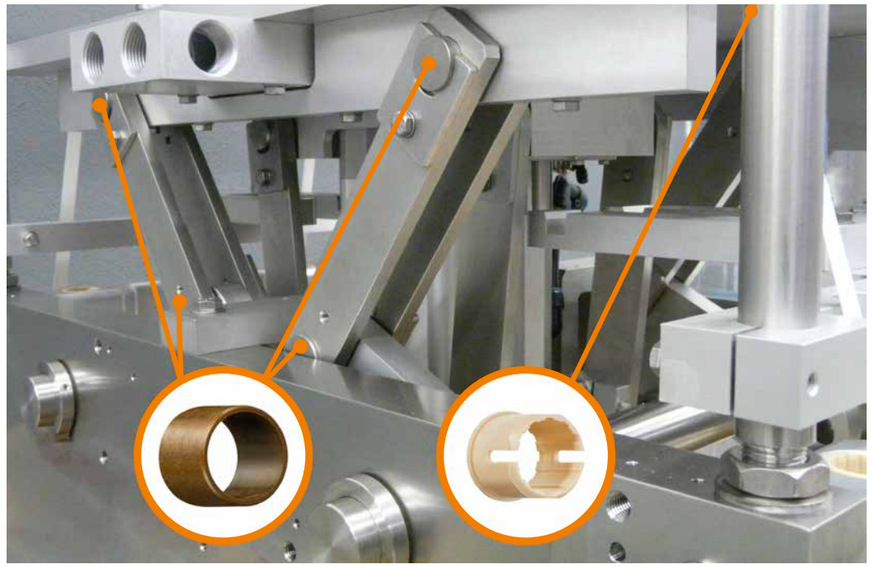
Important selection criteria for the bearing technology for GEA included the absence of active lubrication, a long service life, hygienic design and suitability for intensive cleaning processes. This is because cleaning with hot steam, acids, alkalis or even dry ice would quickly wash out the lubricant at the bearing points. As the machines package food, the lubrication could also lead to contamination.

Application video

GEA also used igus® components to implement the design in the further course of film processing components. The guide rollers, for example, are supported by xiros® polymer ball bearings. Thanks to electrostatic discharge, sparks cannot occur here. The combination of polymer housing and stainless steel balls ensures lubrication-free and maintenance-free operation, and the FDA approval documents the suitability for food packaging. In addition, a new type of film web tensioning system with drylin® linear bearings and electrically conductive iglidur® plain bearings replace the dancer roller.

For the linear bearings, GEA therefore relies on aluminium or stainless steel guides from igus® on which sliding elements made of tribopolymers with incorporated lubricant operate. This combination of materials requires no additional lubricants and has proven itself under the adverse environmental conditions of food processing and packaging. At GEA, for example, it is used in the sliding safety housing in the bottom film unwinding system. And a sliding door, which replaces the classic protective bonnets, can also be moved up and down smoothly across the entire working width of up to three metres thanks to the drylin® W series.

However, the film run must not only be regulated with regard to the tension, but also in the longitudinal direction. A sensor detects the web edge and sends the signal to the control system of a servomotor in the roller drum for readjustment. Technically, the web edge adjustment is implemented with the igus® modular drive system: a DC motor drives a drylin® trapezoidal lead screw and the nut made of iglidur® triboplastic moves the roller axially.



The bottom film unwinding: here, the sliding safety housing is moved with smoothly operating drylin® W linear guides in a curved version.

The heavy moulds of the thermoforming and sealing stations, in which the bottom film is formed under the influence of pressure and heat, must be movable in a vertical direction. This is ensured by lifting stations with linear lifting and toggle lever systems. Their axes are guided in iglidur® plain bearings, whereby depending on the application two different polymer materials – iglidur® J and iglidur® Z – are used and absorb high forces. For the linear strokes, drylin® liners and linear clip bearings of the iglidur® JUCM series were installed.

Properties of tribopolymers

iglidur® Plastics for every requirement

iglidur® High-performance polymers – that's what we call our now more than 50 different material compositions with specific properties. There is also a good reason for the diversity of our materials. Dependent on the industry, area of application or even individual customer, very specific material behaviours of bearings or energy chains are often desired. While particularly low wear and continuous operation are advantageous for ball bearings in transport technology, the focus in beverage technology may be on plain bearings with low moisture absorption, high temperature tolerance or chemical resistance. In order to fulfil these broad requirement criteria, the iglidur® materials offer the right material answer for every requirement.

Metal and plastic bearings in packaging technology

The completely lubrication-free and maintenance-free polymer bearings really come into their own in the food and beverage industry. This is because external lubricants are often not allowed to be used in packaging technology systems and machines. And although metal ball bearings and pillow block bearings are indispensable in mechanical and plant engineering, this is precisely where the classics reach their limits.

The external lubricants required for the metal bearings are not only a hygiene risk in the food industry. The next cleaning also washes the lubrication out of the bearings or the material oxidises as a reaction to chemical cleaning agents. Water lubrication, which is often used in conveyor technology or in rinsers in the beverage industry, solves many of these problems, but involves increased use of resources and maintenance costs.

Classic materials for food and beverage machines

iglidur® A181
The universal material for food contact with FDA and EU 10/2011 conformity.

iglidur® H370
For high loads. High resistance to media and chemicals.

iglidur® A500
The media specialist for temperatures from -100°C to +250°C.

iglidur® A160
Food storage with high media resistance up to +90°C.

iglidur® X
The chemical and temperature specialist, suitable for extremely high speeds.

Find all materials
igus.eu/materials-packaging
Conformities of all materials
igus.eu/conformities

Why are iglidur® bearings suitable for the food and beverage industry?

While the iglidur® materials are basically lubrication-free and maintenance-free, various additional specifications of the bearing material can be created depending on the specific material mixture. In this way, the different requirements in the food and beverage industry can be fulfilled.

- Lubrication and maintenance-free
- Chemical resistance
- Food conformity
- Wear resistance
- Low moisture absorption
- Temperature-resistant

PTFE FREE

Chemical resistance put to the test

The safety of food and drink is crucial to the well-being and health of people around the world. The cleaning and disinfection of food and beverage machines is therefore extremely important. Cleaning agents and disinfectants such as those from the manufacturer Ecolab are used here. Such cleaners are typically used in beverage bottling machines. However, intensive cleaning is also carried out in butchery and dairy plants as well as vegetable processing machines.

We have therefore tested the materials commonly used in our products for the food, beverage and packaging industries for resistance to various Ecolab cleaners.

Test specimens were completely immersed in the respective cleaner for a period of 28 days (equivalent to 672 hours), where the room temperature was maintained. They were then examined under various aspects, such as a visual assessment (swelling, cracks, colour changes, surfaces, outer diameter and wall thickness) or in comparison with the zero value (initial material and demineralised water).

The following materials proved to be resistant to the Ecolab cleaning agents used in the test:

- iglidur® A160, A180, A181, A350 and A500
- iglidur® C500
- iglidur® H, H1 and H370
- iglidur® J, J3, J200 and J350
- iglidur® P210
- iglidur® X and X6
- iglidur® Z
- igumid® TH-NB

ECOLAB®

The most important iglidur® materials in one box

Convince yourself now of the performance of the iglidur® materials. With a selection of 38 different plastic plain bearings and templates to find the perfect material for your application.

igus.eu/samplebox-iglidur

Hygienic design energy chains for hygienic cable routing in high-performance slicing systems

The family-owned company Dipl.-Ing. Schindler & Wagner GmbH & Co KG (SCHIWA for short) has been one of the leading manufacturers of customised and standardised slicing systems in the sausage, ham and cheese industry for over 50 years. FDA-compliant e-chains® from igus® help to fulfil the strict safety and hygiene requirements.

Dipl.-Ing. Schindler & Wagner GmbH & Co. KG was founded in 1965 by Manfred O. Schindler, the developer of the first electronic scales.

This system has been further developed over the years and forms the basis of today's high-tech slicer/checkweigher machine combinations, which the medium-sized family business offers for slicing, portioning and weighing a wide variety of meat and cheese products. "We build high-performance slicers, mainly for cheese, bacon and ham, with maximum precision and reliability," says Martin Hüttenrauch, Sales Manager at SCHIWA. In addition to the solid integral construction, the high-performance slicers are characterised by the globally unique "SCHIWA walk-in design". This design allows the operator to enter the interior of the machine in an upright posture, e.g. to remove the blade ergonomically and stand upright when changing blades. The entire machine area is also easily accessible and easy to clean. In terms of design, SCHIWA machines are characterised by a completelyopen construction, which facilitates daily cleaning of all surfaces.

At the end of 2017, a new hygienic design for the facilities was launched, in line with the motto "You can only clean what you can see". The new hygienic design influenced all details - including the cable guides up to the grippers, which lead the cheese to the cutting blade. "We used to run the cables somewhere, fix them with loops, put them in a housing, period. Here we were looking for a visually appealing solution with a flexible chain made of detergent-resistant materials and an open construction that is easy to clean," explains Tobias Wahl, head of mechanical development at SCHIWA.

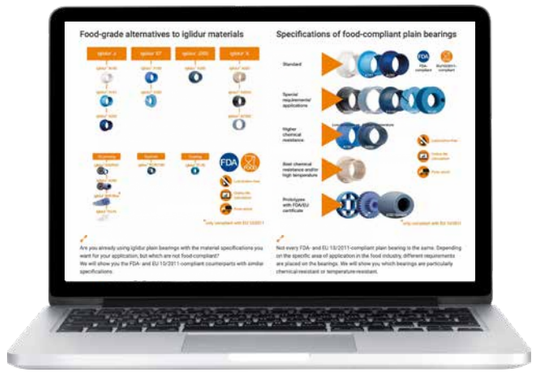
We have been using the energy supply systems for more than two years and have not had any complaints so far. They are exactly what we wanted. The cables are guided safely and the blue chain is also an eye-catcher.

Tobias Wahl, head of mechanical development at SCHIWA

Since then, the e-chains® of the TH3 type have been used. "Our Hygienic Design e-chain® TH3 is used wherever the highest hygiene requirements apply and cables and hoses need to be guided safely. It is easy to clean, FDA-compliant, has no screw connections and is ideally suited for aggressive cleaning agents and chemicals," says Bastian Mehr, Industry Manager Packaging Industry at igus®. The igus® Hygienic Design e-chain® is available in two inner heights and four inner widths. Up to four fixed interior segments are possible for both sizes. This means that cables and hoses can be laid neatly separated from each other and still have sufficient gap for cleaning. Another advantage of the TH3 e-chain® are the rounded edges, which prevent dead spaces and the resulting formation of germs. "When we developed the e-chain® according to 'hygienic design guidelines', it was important to us that it was easy to clean. This requires a screw-free construction and an open design. With the TH3, we have achieved all of this," states Florian Strobel, Technical Sales Consultant at igus®.

First, the TH3 energy chains were used in the 4-lead screw slicer from SCHIWA. The line delivers up to 6,000 cuts and 240 packs per minute. About three tons of cheese per hour are processed on such a machine. 99.5% "first-time on-weight", less than 0.2% give-away and 98.5% technical availability is guaranteed. The grippers move back and forth intermittently for 20 hours a day, which puts an immense strain on the chain. "We carry all the necessary media such as pneumatics, sensors and electrics in the chains. We have been using the energy supply systems for more than two years and have not had any complaints so far. They are exactly what we wanted. The cables are guided safely and the blue chain is also a real eye-catcher," says Tobias Wahl. With the choice of the colour blue, the company is also following the idea of "optical detectability", an increasingly important requirement in food technology.

Products and materials with conformity according to FDA and EU 10/2011 specifications



Plain and linear bearings, ball and spherical bearings, conveyor rollers, e-chains® and other products for hygiene-sensitive areas

Which regulations do the materials of igus® products fulfil? Where can I find the certificates for the individual materials? And what material specifications do our food-compliant materials have? You can find the most important information on the subject of hygiene in the food industry at:

igus.eu/food-compliant

		FDA	FOOD EU 10/2011	A3	GB4806.1 (China)	Food Sanitation Act (Japan)
iglidur® bearings	A160	✔	✔			✔
	A180	✔	✔			✔
	A181	✔	✔		✔	✔
	A200	✔	✔			
	A290					
	A350	✔	✔		✔	✔
	A500	✔	✔	✔	✔	✔
	AC500	✔	✔			
	AX500	✔	✔		✔	
bar stock	A160	✔	✔			
	A180	✔	✔			
	A181	✔	✔			
	A350	✔	✔			
	A500	✔	✔			
	AC500	✔	✔			
	AD500	✔	✔			
tribo-tape A160		✔	✔			
3D printing	i6		✔			
	i6-BLUE		✔			
	i150		✔			
	i151	✔	✔			
	A350	✔	✔			

Status 03/2024

Our materials and their conformity

With a wide range of materials for our plain bearings, bar stock, liners and 3D printing filaments,we also offer solutions specifically for the food and beverage industry. Depending on the installation location and purpose of the component in the machine, but also depending on the country, the requirements for the materials used differ significantly. In addition to FDA specifications or Regulation EU 10/2011, there is the 3-A-standard, which is used specifically in the production of dairy products. In addition, country-specific regulations must also be observed, such as GB4806.1 (China) or the Food Sanitation Act (Japan). This raises the question: which material is actually compliant with which regulation?

igus.eu/food-compliant

The advantages of igus® products for the packaging, food and medical industries at a glance:

- Authorisation of many materials acc. to requirements of the FDA, EU 10/2011, the 3-A standard or other country-specific regulations
- Lubrication-free and maintenance-free, no product contamination
- Temperature and corrosion resistance
- Low moisture absorption
- Resistant to chemicals, acids, alkaline and alcoholic cleaning agents
- High wear resistance

The guide for food machinery designers

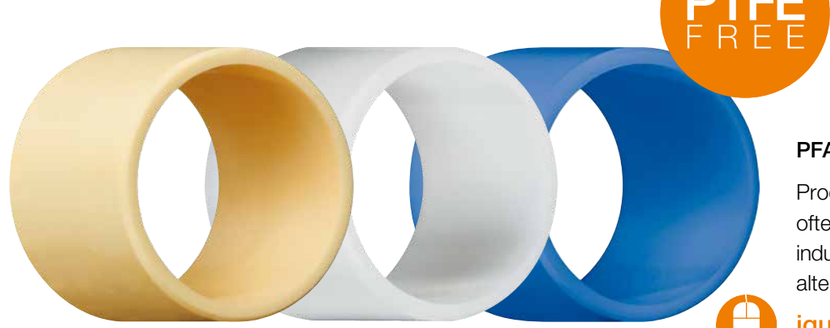
What is hygienic design and what do the standards require?

What are the requirements for cable guidance in food-contact machines?

What successful practical examples are there?

igus.eu/design-in-hygienic-design

Download the guide:



PFAS/PTFE in iglidur® plain bearings?

Products containing PFAS/PTFE are often undesirable, not only in the food industry. We will show you the available alternatives for our plain bearings.

igus.eu/pfas-iglidur

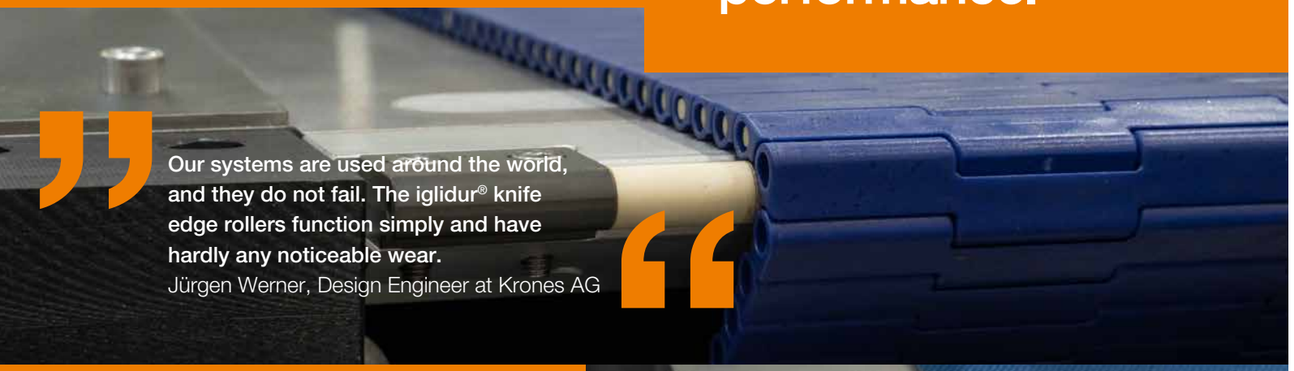
The blue sample box: products for direct food contact

Our lubrication-free and maintenance-free bearing range made of FDA- and EU 10/2011-compliant materials, TH3 energy chain and much more in one box.

Order sample box now: igus.eu/blue-sample-box

How plastic knife edge rollers ensure maintenance-free transport technology ...

... and packaging systems to increase performance.



> **Our systems are used around the world, and they do not fail. The iglidur® knife edge rollers function simply and have hardly any noticeable wear.**
> Jürgen Werner, Design Engineer at Krones AG

The packaging industry never sleeps. So it's hardly surprising that Krones' plants also have to break their own speed records time and again. The problem arises when a component cannot withstand the pressure and there is not yet a more efficient alternative. This is why igus® GmbH developed knife edge rollers made of tribopolymers for Krones, with which the leap to new records was achieved.

The Variopac Pro processes cans and glass or PET bottles that hold between 0.2 and 5 litres, packaging them in boxes or wrapping them in film.

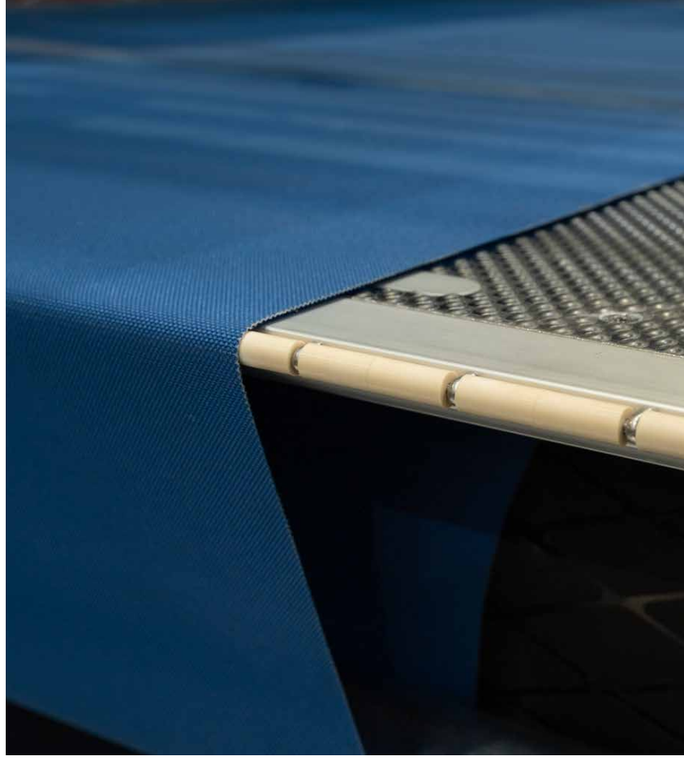
The capacity of the fully automatic all-round packaging system was to be increased by 20 packs per minute. This resulted in an urgent need for intervention on the conveyor belt deflection. Originally, metal rollers with needle roller bearings were used here, but they couldn't meet the higher performance requirements and were cost-intensive.

Continuous operation, sugar, heat and no solution in sight?

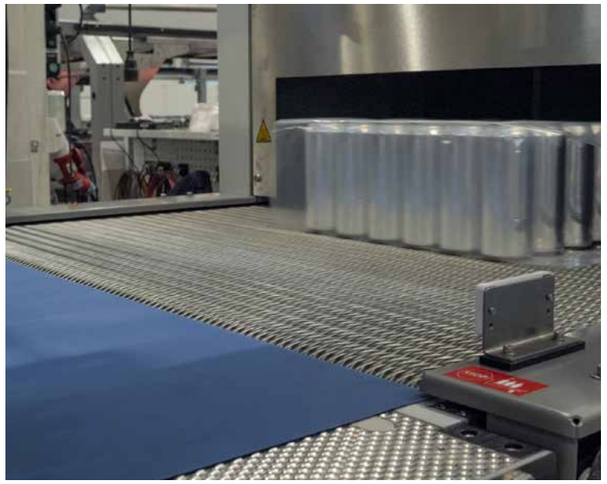
Parts and components have to fulfil high requirements because the system is in use around the clock. Sometimes there are sugar particles in the production environment, which act like sandpaper on the moving machine components , and this at belt speeds of up to 0.9m/s. Dust, sand and moisture are also part of everyday life at the Variopac Pro's places of use. But that's not all. Directly at the shrink tunnel of the system, the conveyor belts are permanently exposed to temperatures of up to 100°C. The problem: a product that could fulfil these performance requirements did not even exist at that time. In their search for an alternative, the Krones design engineers came across the products from igus® GmbH. The goal was clear: a joint solution had to be developed that would fulfil the requirements of the Variopac Pro.

igus® and Krones jointly developed a suitable solution

After various solutions were tested in the igus® test laboratory, the answer was clear. An injection-moulded solid plastic roller made from a material specially developed for this application. The pv values in the Krones systems are very high. It was therefore necessary to ensure that the knife edge rollers could withstand these loads and were suitable for use as a series product. The best test results were achieved with the material iglidur® P210 material. This is characterised by its high wear resistance, low coefficients of friction and the resulting low drive power of the conveyor belts. In addition, like all iglidur® materials, it is suitable for maintenance-free and lubrication-free use. When it was clear that the knife edge rollers made of iglidur® P210 by far exceeded the required service life of one year, Krones decided to install them in the Variopac Pro.

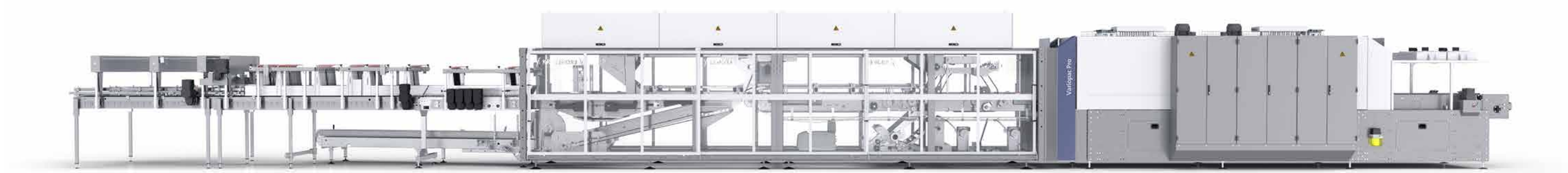


In the Variopac Pro, Krones now installs the iglidur® knife edge rollers wherever there is a transition between two conveyor belts or plastic modular chains. The summary from Krones is consistently positive: "Our systems are used all over the world and there are no failures. The iglidur® knife edge rollers work simply and have hardly any noticeable wear. They are also easy to install and save our customers time-consuming maintenance work".



Another advantage: as the knife edge rollers have small diameters, the conveyor belts and module chains can be guided very closely and the gap between two belts is therefore very small.

What sounds banal is extremely important in beverage production. If beverage containers tip over during transfer from one conveyor belt to the next because the gap is too large, this can lead to massive production losses and costly cleaning work. Even if the system is running at a low speed, tipping can be avoided with iglidur® knife edge rollers. This means that even tilt-prone star bottom bottles can be packed without any problems.



Knife edge transitions, roller conveyors, conveyor belt bearings and more. Lubrication-free products for conveyor technology

Products for lane adjustment can be found on pages 24 - 25 or on:

igus.eu/format-adjustment

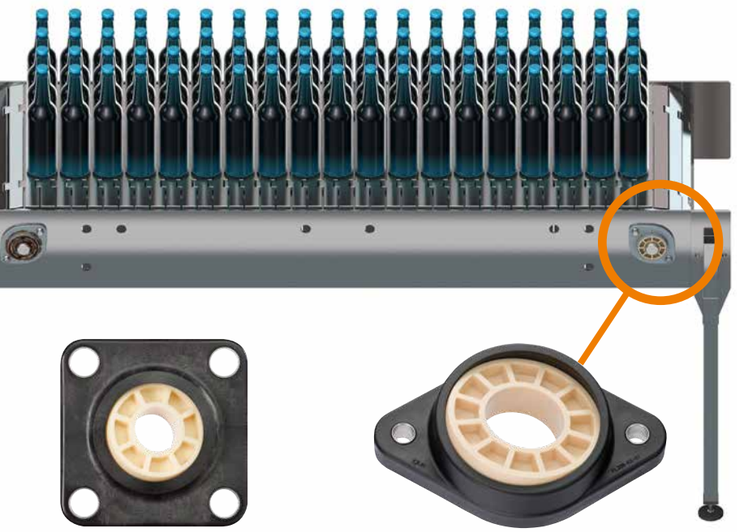
Metal bearings and plastic bearings in comparison

Although metal bearings are true classics in mechanical and plant engineering, they are inferior to polymer bearings in many applications in the packaging industry. External lubrication of the bearings, for example, is not compatible with the high hygiene requirements in many food processing machines. In addition, high demands are placed on the corrosion behaviour and chemical resistance of the bearings. This is precisely where lubrication-free pillow block and ball bearings based on special tribopolymers are increasingly coming into play, which can save the user external lubrication, time and money.

igus.eu/conveyor-technology

The example of Heineken Brasil

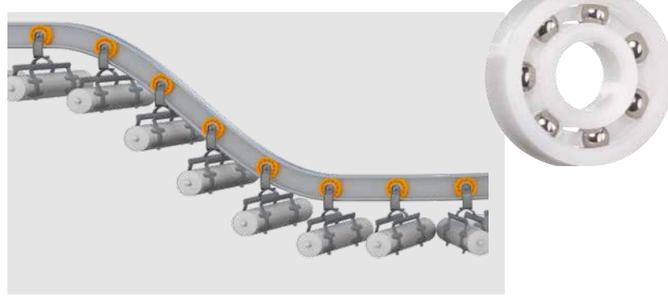
As part of a new study, RWTH Aachen University has quantified the cost, time and CO_2 savings at Heineken Brasil after switching from metal bearings to lubrication-free and maintenance-free polymer bearing technology. Calculated for all Heineken branches, the brewery group can save more than 28 tons of CO_2 as well as considerable personnel and material costs per year in its conveyor technology. You can find out more about the study on pages 6 - 7.



Two hole flange bearings, four hole flange bearings and spherical insert bearings made of tribopolymers

- Lightweight and cost-effective
- Wear-resistant
- Housing in various materials such as cast iron or low-cost sheet metal housings
- FDA-compliant spherical insert bearings also available

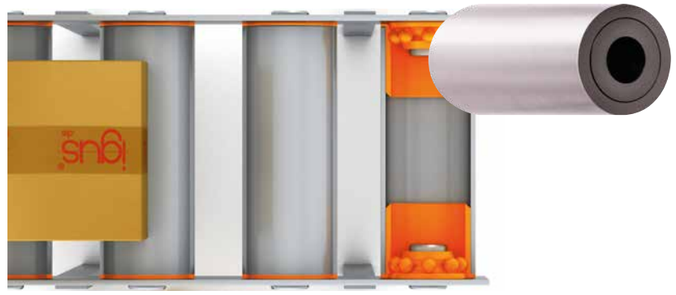
igus.eu/flange-bearings



Deep groove ball bearings

- Wide range of lubrication-free and maintenance-free deep groove ball bearings
- For example in overhead conveyor systems or as a bearing for conveyor rollers
- From all-rounder materials with the longest service life to temperature specialists and experts in the field of chemical resistance

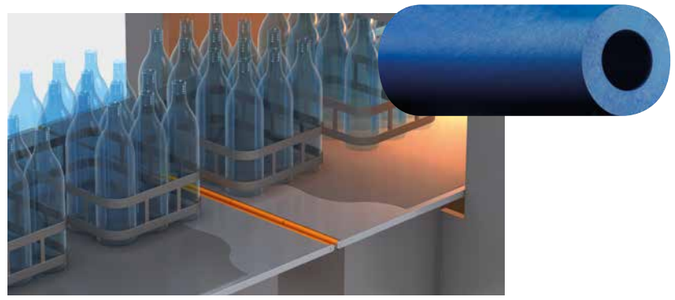
igus.eu/ball-bearings



Conveyor rollers

- Low wear with high running performance
- Tube available in aluminium, stainless steel, carbon or PVC
- Also available as variants for direct food contact, for example, with ESD protection or metal-free

igus.eu/guide-rollers



Knife edge rollers

- The right material for every application
- Whether for high temperatures, FDA and EU 10/2011-compliant or for high speeds

igus.eu/knife-edge-rollers

igus.eu/white-paper-guide-rollers

Seven tips for selecting the optimum conveyor rollers

This white paper contains tips to help conveyor system design engineers find the ideal guide roller for their application

9 format adjustments. motion plastics® in labelling machines from Krones

Labelling up to 50,000 containers per hour with just one labelling station – this figure alone is impressive with the Sleevematic TS from Krones AG.

A special feature of the machine: instead of the classic cutting of the sleeves, they are micro-perforated. Also installed are a large number of lubrication-free plain bearing components from igus® which have been proving their worth at Krones for years.

Krones AG is not only a pure machine manufacturer, but also offers its customers turnkey systems that are customised to their needs.

From beverage production through packaging, labelling and inspection to palletising. There are various labelling processes, including the stretch and shrink technology of the Sleevematic series. The Sleevematic TS (TS stands for Top Speed) of that series can label up to 50,000 containers per hour with just one unit. To put this into perspective, this is double the output of the previous series.

Micro-perforated sleeves

Before the individual sleeves are shot onto the bottles, cans or other containers, they are no longer cut individually from the roll as in the previous technology, but the sleeve is micro-perforated. This eliminates the need for intermittent operation during the cutting process and enables the sleeves to be moved continuously. Instead of cutting knives, the Sleevematic TS uses two rotating perforation knives. The advantage: increased output and a significantly longer service life for the knives.

Application video

For the various adjustments and other moving components, Krones continues to rely on lubrication-free plastic solutions from motion plastics® specialist igus®. Since the highest safety standards apply in food and beverage technology to protect consumers, designers must be able to rely on products that do not require external lubrication and thus prevent contamination of the food or beverages. **Nine different points in the machine are used to adjust the height or crosswise position of formats, sensors and guide rollers.**

1

The guide rollers are supplied by igus® to Krones as a completely finished system solution consisting of two xiros® polymer ball bearings and an anodised aluminium tube. The metal bearings previously used by Krones did not run smoothly enough, as a result of which the entire roll sometimes came to a stand-still and the label tape just 'slid over it'. With the lower mass in the xiros® ball bearings, these problems are now a thing of the past. Glass balls are used as rolling elements, which are held in the bearing by plastic races. The inner and outer races of the ball bearings are made of xirodur® high-performance plastics, which are characterised by very good friction and wear coefficients.

2

3

For the cross and height adjustment in the belt station and the height adjustment of the sleeve brush, Krones relies on dry-operating drylin® plastic nuts and drylin® linear bearings for round shafts (drylin® R).

4

5

For the adjustment of inlet and outlet sensors, flexible drylin® profile guides (drylin® W) and carriages including manual clamps are used.

6

7

Complete drylin® SLW lead screw modules including clamping, position indicator and crank enable manual height and cross adjustment in the pre-shrinking process.

8

9

Finally, the safety gate can be adjusted using the drylin® N-27 miniature rail.

Manual, automated ... or simply modular. Adjusting formats in packaging machines

Manual ... drylin® linear bearings and axes

The drylin® drive technology offers lubrication-free linear axes that are driven with a lead screw, toothed belt or gear rack.

Both manual and electric drives via electric motors are possible. In addition to numerous standard designs, at igus® you will also find linear actuators for special requirements, such as lightweight and ready-to-install linear axes made of plastic or solid stainless steel linear modules for heavy loads.

All products for format adjustment

igus.eu/format-adjustment

Configure customised solution

All linear modules can also be customised in our drive technology configurator. Our pre-configured products are ready to ship from 24 hours, and customised products in as little as 48 hours!

igus.eu/configurator-drive

Automated ... drylin® E drive technology

If format adjustments are required regularly and at many points in the packaging machine, positioning systems with actuator connections are indispensable.

Discover our large portfolio of hybrid stepper motors now.

igus.eu/stepper-motors

Modular ... The Apiro modular gearbox system

The Apiro modular system makes format adjustment easier, more modular and more flexible than ever before.

Equip your packaging system with Apiro now or retrofit it easily and benefit from minimised installation times and a fast return on investment.

igus.eu/apiro-format-adjustment

Apiro format adjustment in video

Adjusting formats on entire packaging lines: fast, modular and synchronised. With Apiro gearboxes for the packaging industry.

Four reasons to choose drylin®. The benefits at a glance:

Lubrication and maintenance-free

Thanks to plastic plain bearings made from high-performance polymers, the drylin® linear technology requires no external lubricants.

Quiet

The technology is based on the plain bearing principle and not on recirculating ball bearing systems. This results in significantly lower noise and vibrations.

No corrosion

The materials used have been tested for use under water.

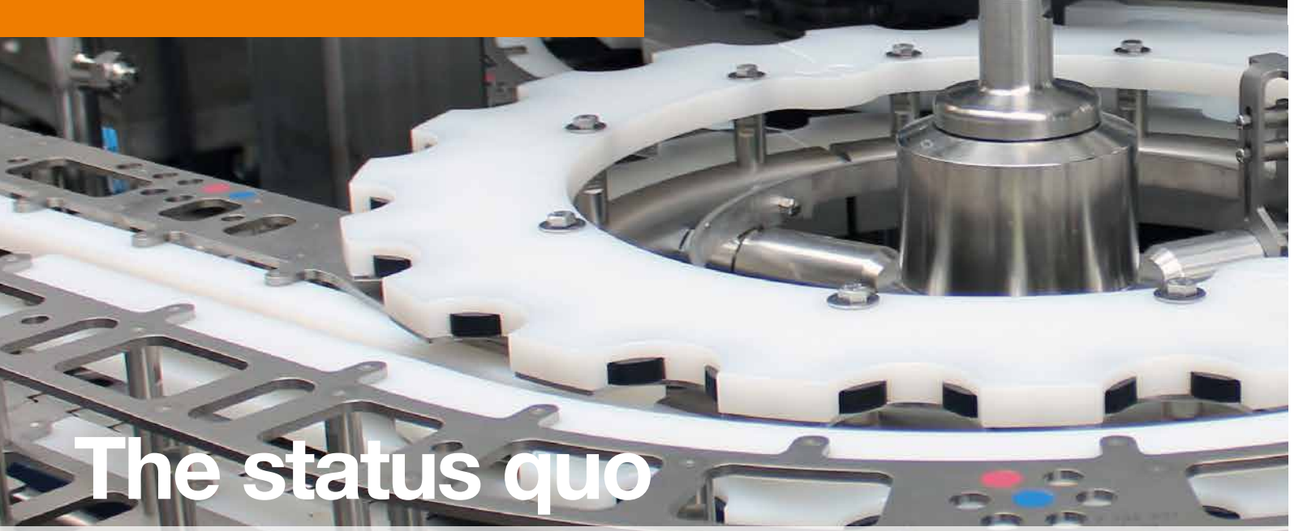
Tested in the laboratory

Our drive technology is suitable for almost any application.

Clamping stars without conversion? Krones MultiGuide Base and iglidur® plastic clamps make it possible.

The company Krones AG worked with igus® to develop MultiGuide Base, a cam-controlled bottle gripping system that gives bottlers higher production quantities and a completely new level of flexibility.

Changeover times are eliminated, since bottles of different sizes and shapes can be transferred with one single system. And, best of all, the MultiGuide Base is very easy to retrofit.



The status quo

Until now, Krones AG has used pocket stars to move bottles through its system. However, to fill different bottle sizes and shapes, the machine must be converted. If 330ml bottles are filled followed by 0.5l bottles, the pocket stars must be changed. This takes about two hours and is usually necessary about once a day. Various sets of pocket stars are stored for use, and an employee inserts them into the system. Unfortunately, system susceptibility to errors increases with every conversion. If the pocket stars are not inserted correctly, the bottles can be damaged when production resumes. In addition to the long conversion times and the risk of conversion errors, there is another point. There is a very clear trend in filling technology: individual bottle sizes and shapes are being used more and more frequently. That is why flexibility and individuality are becoming increasingly important for bottlers.

The solution

Application video

Krones AG counters these three problems with the MultiGuide Base, also known as the clamping star wheel: an active, cam-controlled gripping system that replaces pocket stars. However, during the development of the clamping star, it quickly became clear that the idea was not so easy to realise.

In order to fulfil all of Krones' material requirements, igus® developed a new material for the MultiGuide Base clamps. It was particularly important that the material abrasion of the clamps on contact with glass was as low as possible.

Customised clamps, rollers and plain bearings made of iglidur® X and E7UM liners are now used in the MultiGuide Base. One huge advantage of the clamping star for Krones customers is the reduced conversion time. Thanks to the new clamping star, the conversion of a system now only takes a few minutes.

There is no longer any need to swap fixtures, as different bottle sizes and shapes can be transported with the clamping star. This also eliminates the need to store interchangeable parts and reduces stock levels. The use of materials and resources is also greatly reduced by the clamping star. A whole 2.5 tons of material can be saved.

The requirements we had for the components used were high. The materials had to be durable in contact with glass. Hygienic design and the use of chemical cleaning agents also played an important role in ensuring that the clamping star is easy to clean and the germ load is as low as possible.

Marco Leidel, development engineer at Krones AG and developer of the clamping star

Since 1983, igus® has been developing its own materials, which are called iglidur®. The special composition of the high-performance polymers makes them extremely wear-resistant, resilient and self-lubricating. Their service life can be determined precisely. In addition, each iglidur® material has individual specifications and strengths that make it suitable for special applications.

You can find out more on pages 12 - 13.

Disposable or reusable: flexibility regarding keg filling

A lubrication-free drylin® linear toothed belt axis ensures clean conditions when filling beer kegs.

Normally, brewers have to decide between purchasing a cleaning and filling system for disposable kegs or one for re-usable kegs. The Innokeg AF-C Transversal of KHS can do both. This is possible due to the unique concept of transport and machining stations. A maintenance-free special linear axis with considerable dimensions is used when changing between the stations.

Application video

The Innokeg AF-C Transversal from KHS is characterised by a particularly high degree of flexibility in the inspection, cleaning and filling of kegs. It is possible to switch between returnable and non-returnable kegs without conversion - and this at an output of up to 700 kegs per hour. This is made possible by the innovative machine layout: the processing stations are arranged transversely, i.e. from both sides, next to the central conveyor belt, so that the kegs are simply conveyed through the system to the filler as the last machine without having to go through the entire cleaning process or individual steps. The drylin® system uses three driven pushers per processing station (of which there are up to four) to push them sideways from the belt into this station and out again.

Wanted: compact and strong axis for the transverse transport of kegs

Unlike glass and PET bottles and cans, kegs are heavy containers with specific requirements in terms of handling technology. One of the challenges facing the designers of the Innokeg AF-C Transversal was therefore to develop a compact, robust and powerful axis for transverse keg handling.

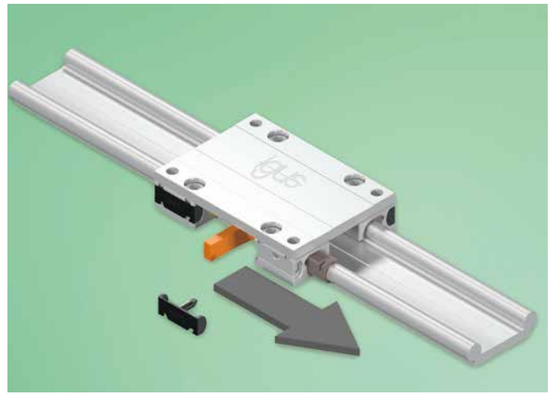
In figures this means:

In the system, kegs weighing two times **80kg have to be moved** over a distance of **1,820mm** at right angles to the transport direction at a speed of **1.5m/s** and an acceleration of **2m/s²**. The system must also function under the hygienic conditions of beverage filling in **24/7** operation with very high availability and a long service life.

Special linear unit for complex motion sequences

Those responsible for mechanical design analysed the market and examined the solutions proposed by various suppliers, who recommended pneumatic axes and electromechanical roller systems, among others. Ultimately, however, the multifunctional drylin® ZLW linear axis was the winner. A total of four guide rails, two of which are used for parallel guidance, are combined to form a compact system for KHS. This allows the three "push arms" (the centre one for pushing the kegs into the station, the two outer ones for returning them to the central conveyor belt) to be operated on a common linear axis. In order to adapt the guide length of the carriages to the high torques that occur when the kegs are pushed over, the carriages are arranged on two levels. Recesses in the carriage plates extend the reach of the gripper arms. The carriages are moved by three centrally arranged toothed belts. The motors are housed in the extension of the deflection axis on both sides of the unit to save space.

The simplest possible maintenance was also taken into account during engineering: an intelligently designed and easy-to-remove locating spigot enables the liners to be changed quickly – without dismantling the entire system. Overall, the unit supplied by igus® is a good two metres long, 41cm wide, 10cm high and weighs 126kg. It is supplied ready for installation and can be assembled in a very short time. In addition to this large linear unit for the precise handling of kegs weighing up to two times 80kg, there are also numerous points in and on the Innokeg AF-C Transversal where linear bearings are used. According to Sebastian Eckes, design engineer at KHS, the motto here is: "No movement without igus®. "For example, the axes of the lifting stations are equipped with drylin® stainless steel linear bearings.



An intelligently designed and easy to dismantle locating spigot enables the liners in the housing bearings to be replaced quickly

The axes of the lifting stations move without lubrication with the help of drylin® stainless steel linear bearings

Always better! Beverage bottling at KHS

"Better and better" – that is the principle according to which KHS engineers develop bottling plants. They have been expanding their position as one of the world's leading manufacturers for decades.

The principle also applies to detailed design – to such applications as the plain bearings in the PET bottle capping stations. After several stages, KHS has found a solution where the hygienic requirements are met with a special bearing from the motion plastics® specialist igus®.

A PET bottle filling line from KHS can fill and cap up to 82,000 bottles per hour. That's 1,367 bottles per minute and 22.8 per second. During the capping process, the filled bottles are fed tangentially onto a carousel-shaped station with up to 36 "Servo 2" capping units. In each unit, a cap is applied and closed. The cappers move in synchronisation with the bottle in order to achieve the high speed. The high speed also results in a high load. In the highest expansion stage with 36 capping units, the million mark for cycles is exceeded after just 12.35 hours. Each element can cap up to 2,400 PET bottles per hour. When the cap is applied, the unit performs a stroke of around 80mm.

All figures at a glance

The filling lines fill and cap up to 82,000 bottles per hour, which equates to 22.8 bottles per second.

It takes **12.35 hours to reach 1 million** cycles (with 36 capping units).

Bearing r eplacement is recommended at the earliest after 7,000 hours.

During this time, the capping unit has covered 2,880 kilometres in eight-centimetre increments.

You can find even more facts in the application video

Resistant

When selecting the bearing for the stainless steel shafts of the capper's lifting elements, a standard plain bearing bush would have been a perfectly good solution, which is common throughout the beverage and food technology industry: no external lubricants are required, the bearing is hygienic and extremely durable, the stainless steel/tribo-plastic material pairing has excellent sliding properties and the bearings can be exposed to water and a wide variety of cleaning agents without any problems.

Better

However, KHS has deliberately opted for a different solution. Capping and the filling process in general is a microbiologically sensitive area. Germs must not be allowed to go inside under any circumstances. The smooth inner surface of the standard plain bearings is not ideal under these conditions. KHS wanted a bearing that could be completely rinsed. This wish was fulfilled – with an igus® liner of the type drylin® JUM-01-30 made of the standard material iglidur® J with incorporated lubricant. Since this liner is provided with longitudinal crossbars in the inner diameter, the running surface can be easily flushed.

Prior to the market launch of these bearings, KHS carried out tests with targeted disinfection and sterilisation. Germs are applied and the percentage of germs is measured after rinsing. This is time-consuming, but makes sense. In this case, for example, it was possible to prove that the solution also fulfils very high hygiene requirements. The bearings went into series production after igus® had built the appropriate injection moulds. We recommend replacing the bearings after 7,000 hours at the earliest." With 2,400 sealing processes per hour and a stroke of 80mm, this corresponds to 2,880 kilometres in eight-centimetre increments: a more than impressive performance for a compact plain bearing on a stainless steel shaft without external lubrication and with frequent thorough cleaning processes.

Better and better

This is where the aforementioned motto "always better" comes into play. For the KHS designers it was clear that the solution was already good, but that there was still room for improvement. Uwe Wolf, Group Manager for moulded parts design at KHS: "The bearings were easy to flush, but the vertical grooves or recesses meant that running marks were visible on the shafts after flushing. This is more of a visual problem. But our components also have to be visually clean, because any apparent contamination can be a dirt ingress."

A third step was therefore required, which KHS and igus® implemented together. Viktor Siemens, Design Engineer at KHS and specialist for capping units: "On the inside, on the sliding surface to the bearing, the groove is coiled, i.e. spiral-shaped. This ensures a complete coverage during movement and prevents streaking. On the outside, the film is provided with studs to maintain a distance from the bearing housing. This side can now also be flushed through."

Not found what you were looking for? Order your customised special part made to measure

Whether small batches with no minimum order quantity or high volume - with our toolmaking department, we can produce your desired component cost-effectively and promptly. You can choose between special parts from 3D printing, injection moulding or CNC machining of bar stock. And because we manufacture the components from iglidur® materials, their prototypes or large series are lubrication-free and maintenance-free, durable and, depending on the requirements, designed for contact with chemicals, food or for high temperatures or heavy loads.

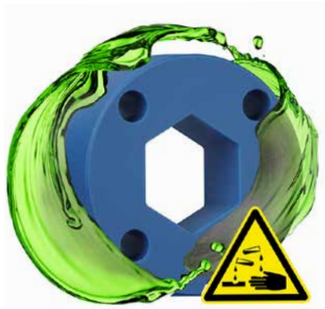
Further information igus.eu/info-special-parts

Request a special part now: igus.eu/special-part

Your advantages with special parts made from the iglidur® material:

Lubrication and maintenance-free

Large selection of materials



Tribologically optimised

igus® Corner

motion plastics® corner

Equipped with igus® samples on site as required

Would you like to always have the latest igus® products on hand to try out? Then simply order the igus® corner for your premises. A sales colleague will bring the display unit to you, set it up on request and equip the compartments with the products of your choice.

You can use the corner as a permanent exhibition or for a limited period of time. We will also pick it up again or refill it if you need supplies or want to try other products.

Find out more now and order your own igus® Corner.

igus.eu/igus-corner

The machine works with really high stroke rates in a relatively small installation space. For this reason, we needed cables with high flexural strength. In addition, we had to find a preventive warning system to avoid a possible cost-intensive breakdown of this machine with its high output.

Dipl.-Ing. Oliver Tausch,
Head of Electrical Engineering
at GHD Georg Hartmann Maschinenbau

Intelligently wrapped toast

GHD Georg Hartmann Maschinenbau is one of the world's leading manufacturers of machines and systems for cutting and packaging bakery products and foodstuffs.

Those in charge were looking for a reliable energy supply with pneumatic and electrical cables for the further development of a packaging machine with high processing cycles. Supported by igus®, a monitored smart solution is used that indicates faults even before the machine fails. The Module Connect construction kit also ensures that the ready-to-install readychain energy chain system can be replaced quickly and safely during maintenance.

GHD Hartmann offers machines for cutting, packaging, sealing, grouping, transporting and handling bakery products and foodstuffs.

In 1969, the VS 700 was the prototype of the first packaging machine – continuous new and further developments have accompanied the company's successful history ever since. The modern GBK 440 automatic packaging machine, for example, offers secure packaging and sealing of product bags for industrial baked goods. e.g. toast bread. A wide variety of food formats can be packaged on the machine with the shortest possible cycle times. The speed can be varied according to your requirements and application. The machine is designed for up to an incredibly fast 80 cycles per minute, i.e. more than one packaged unit per second. The right energy supply had to be found for precisely these fast movements.

If there are cables in an energy chain, the minimum bend radius describes the load capacity as a factor.

Falling below this value can lead to premature failure due to core rupture. The limited installation space for the energy chain in the GBK 440 was one of the biggest challenges. A maximum bend radius of 63mm was specified. The choice fell on an E4.1L series energy chain for very high forces and highly flexible chainflex® cables. The shielded chainflex® cable CF10.UL.05.04 with a minimum bend radius of 5 x d is used as the servo cable - only a few manufacturers offer electrical cables with such a factor. It is resistant to oil and bio-oil, flame-retardant, PVC-free, flexible at low temperatures and resistant to hydrolysis and microbes. The control cable CF9.03.04.INI with the same specifications is also used, as well as the chainflex® measuring system cable CF113.028.D with a minimum bend radius of 7.5 x d, which is designed for high requirements. The chainflex® measuring system cable CF113.028.D with a minimum bend radius of 7.5 x d is also designed for high requirements. A 6mm pneumatic hose and two further CF9 sensor cables complete the range. The customer receives the e-chain® and cables as a ready-to-install and 100% quality checked readychain system.

Preventive maintenance with smart plastics

igus® offers up to four years guarantee on every chainflex® cable. The basis for this is provided by the in-house igus® test laboratory, in which over 4,100 tests and more than 7,500 test results with over two billion test cycles are generated every year. However, the high number of cycles on the GBK 440 packaging machine and the small bend radii placed a particularly high load on the energy supply components. This is where intelligent solutions for predictive maintenance come into play:

igus 4-year chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

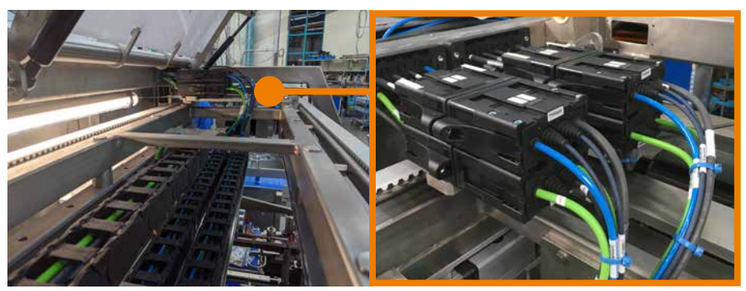
Predictive maintenance planning with CF.Q

The principle of the so-called smart plastics is quickly explained: a wide variety of sensors record the condition of the igus® components and report this to the i.Cee module, which transmits the data to a cloud system. Maintenance and service calls become more predictable and therefore more efficient. An important component of the i.Sense sensor family is the CF.Q module, which is responsible for cable monitoring. A second, identical cable from the same production batch is used in addition to the measuring system cable for measuring purposes.

The CF.Q system continuously monitors the two additional cores of this measuring cable. The device recognises the onset of core rupture from the changes in the electrical specifications using the stored algorithms and signals this via the NO contact. Thanks to the many tests in the igus® test laboratory, the system is able to identify an incipient core rupture at a very early stage and thus inform the user in good time of the need to replace the cable. In this way, cable breaks can be effectively prevented in the application.

igus® reinvents the interface

Furthermore, a plug-and-play system had to be made available for maintenance in order to complete this task quickly. Previously, such processes took around four hours, some of which could only be completed by two employees. Thanks to the clever new interface concept – the Module Connect – the changeover time is now reduced to around 45 minutes with just one person.



Module Connect – under this name, igus® offers the plug-in connector concept for connecting electrical cables, fibre optic cables and pneumatic hoses. The space-saving, flat housing is used wherever several or a large number of cables need to be plugged into the smallest possible space. Thanks to the simple modular system, an individual connection/disconnection point can be configured as a module from several connector housings.

Bearing technology, e-chain® and cable become smart. Avoid machine failures with sensor technology

My system must never stand still.

What are "smart plastics"?

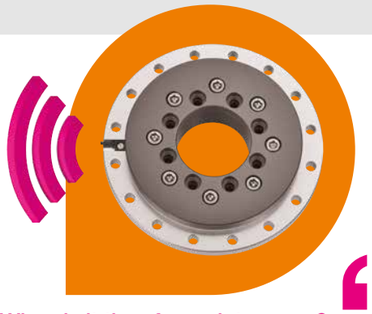
By equipping products such as energy chains, cables or bearing technology with sensors, the planning reliability of systems and machines can be increased. We call these intelligent products "smart plastics". Whether condition monitoring or predictive maintenance recommendations, the digitalised products avoid expensive failures in the application and thus save money and time. The basic idea is not to replace drive elements "on suspicion" or after defined running times, but also not to wait until they fail. Instead, the components themselves give an early signal when irregularities occur or when their individual service life is coming to an end. The result: the user can utilise the components as long as possible and sensibly, but no longer, i.e. until shortly before the end of their service life.

igus.eu/smart-plastics

Smart bearing technology

The following applies to every machine operator: even a defective plain or linear bearing can paralyse the machine or even the system. With smart bearings, such unforeseen failures can be avoided in future. As the need for maintenance can be recognised immediately via remote diagnosis, bearing points that are difficult to access no longer need to be checked manually. The software also calculates the optimum replacement time for a bearing position. This can save valuable time and costs, especially in larger systems.

igus.eu/smart-bearings



When is it time for maintenance?

Bearings, e-chains® or cables equipped with sensors measure values such as push/pull forces or wear around the clock.

i.Sense and i.Cee modules in the switch cabinet collect the data and analyse it, transmit it to a dashboard or initiate an emergency stop of the system.

Users can view the status data of the smart plastics products and maintenance recommendations at any time on a dashboard.

i.Sense-condition monitoring

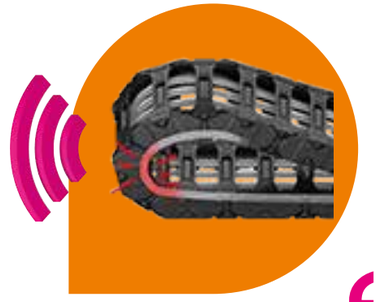
Condition monitoring is the easiest and quickest way to turn many igus® products into a self-monitoring product. By attaching sensors, values (e.g. temperature, forces, sound waves/vibrations) are measured within a previously defined limit value and an alarm or information message is issued if these are exceeded. If desired, an automatic switch-off can also take place. The sensor data is analysed in an i.Sense module installed in the switch cabinet on the basis of igus® algorithms, which informs the system control if necessary.

i.Cee: predictive maintenance

Predictive maintenance utilises the elements of condition monitoring and uses sensors and software to create a system that enables a dynamic service life calculation and optimum maintenance times for igus® products. Predictive maintenance is therefore the next stage in the realisation of a comprehensive concept for intelligent energy supply and bearing technology. Always with the aim of maximising system and user safety as well as product service life. For this purpose, an i.Cee module collects the sensor data in the switch cabinet and stores it locally or in the cloud.

Smart energy chains and cables

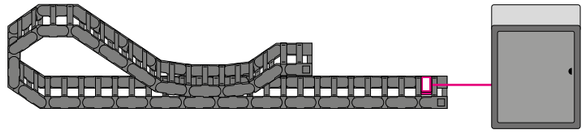
If the energy supply fails and/or a cable breaks, the entire machine often comes to a standstill. As a system failure or unplanned machine downtime is one of the biggest cost drivers in industry, monitoring using sensor technology is worthwhile. It may be important for the system operator to be informed about the push/pull forces of the energy chain and to recognise any breaks in cables before they occur. An automated emergency shutdown of the machine or system can also be important to prevent major damage.



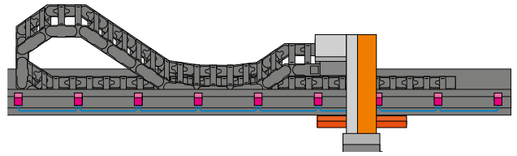
My energy supply and plain bearing technology should finally be fit for Industry 4.0.

Sensors for e-chains®

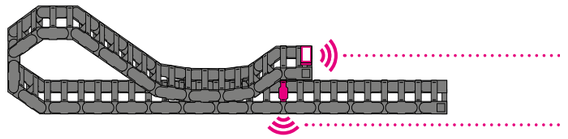
EC.W Measures the wear on the crossbar, pin/bore connection or liner.



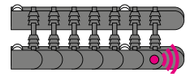
EC.PP Provides information on position-dependent push/pull forces.



EC.M Recognises values such as acceleration, speed, temperature and cycles.

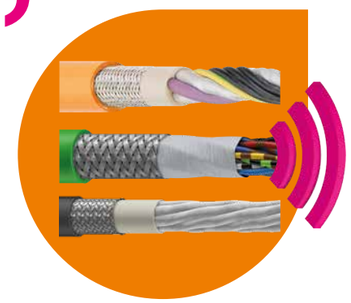


EC.i Measures the percentage wear of the pin/bore connection without contact.



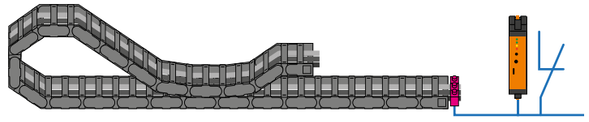
igus.eu/smarte-chains

Always watching the remaining service life ... that would be science fiction.

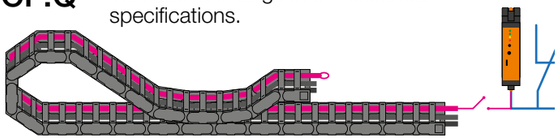


Sensors for chainflex® cables

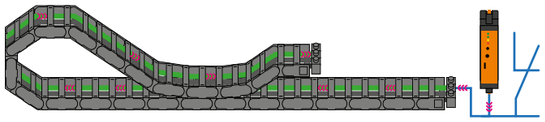
CF.P Measures the tensile forces acting on the cables.



CF.Q Indicates a change in the electrical specifications.



CF.D Package losses are recognised in good time.



igus.eu/smart-cables

What should you consider when selecting e-chains® in terms of maintenance?

igus.eu/white-paper-maintenance

Low Cost Automation. Packaging systems ...

What is Low Cost Automation for the packaging industry?

Automating small and large applications in the service sector or in large-scale industry, as simply and cost-effectively as possible: this is the idea behind our Low Cost Automation. Modular and flexible articulated arm robots, delta robots for pick-and-place applications and linear robots are now making it possible to enter the automated factory.

The automation of packaging processes such as the labelling of packages or the execution of pick-and-place tasks on conveyor belts can also be implemented easily and cost-effectively with Low Cost Automation products.

igus.eu/low-cost-robotics

ReBeL cobot

At just 8kg, the ReBeL cobot is a lightweight. The lightweight robot is designed to be as flexible and easy to adapt to the respective machine environment as possible. The compact and space-saving design with integrated control system in the base contributes to this. The low-cost robot with 4 or 6 degrees of freedom does not require a switch cabinet.

igus.eu/rebel-cobot

In the video: A ReBeL cobot with cab label printer labels parcels.

robolink

The robolink robotics modular system makes it possible to automate manual work steps quickly, easily and cost-effectively at any time. Articulated arms in various lengths and sizes are available. The number of lubrication-free joints used ranges from two to six, and the robot can be equipped with various tools (e.g. gripper, suction cup or camera).

igus.eu/robolink

In the video: a robolink picks products from a conveyor belt and places them in a box.

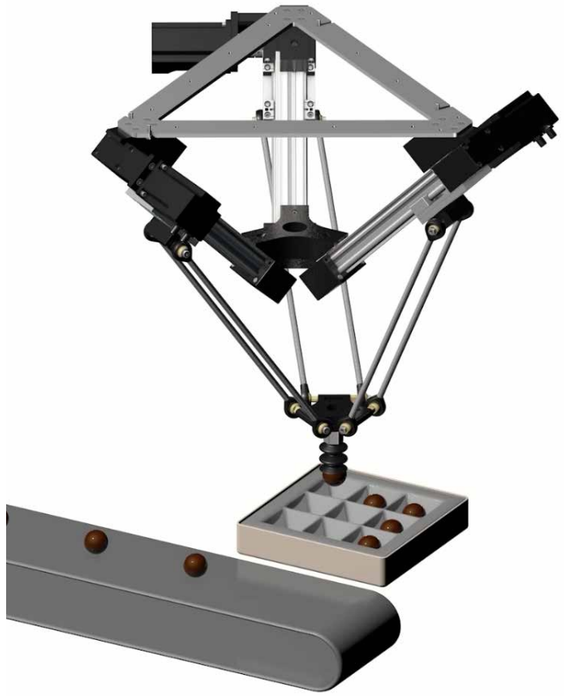
... automate quickly and cost-effectively.

Delta robots

Thanks to the simple modular system, the drylin® delta robot can be easily assembled - or ordered directly as a pre-configured kit. The lightweight, lubrication-free and maintenance-free bearing technology enables a durable and precise solution for pick-and-place tasks - at a pick rate of 60/minute.

igus.eu/delta

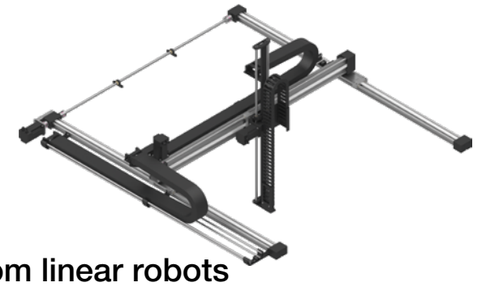
In the video: A delta robot takes chocolates from a conveyor belt and places them in a box.

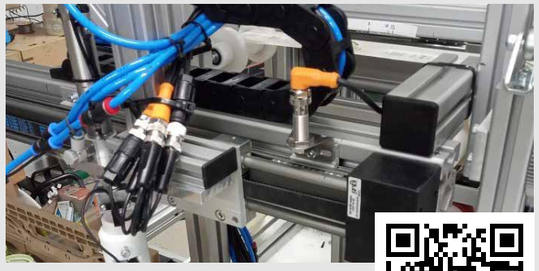


Room linear robots

Consisting of linear axes, motors and motor control system, drylin® linear robots enable a wide range of movements in the x, y and z directions. The components are lubrication-free, corrosion-free and lightweight. Pick-and-place applications are typical, but the areas of application are diverse.

igus.eu/linear-robots





In the video: An automatic labelling machine, consisting of a drylin® room linear robot, labels farmhouse ice cream.

RBTX - the marketplace for robotics components and complete solutions

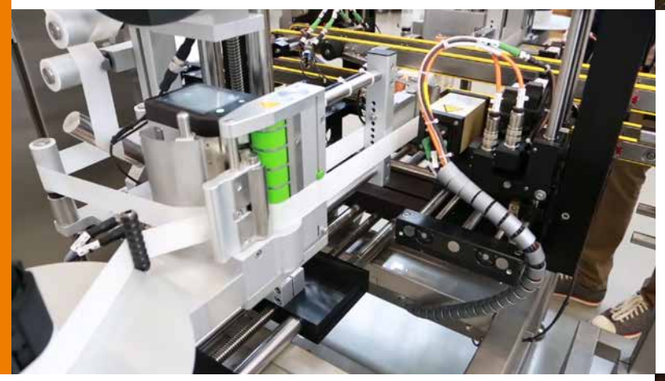
The RBTX platform brings users and suppliers of low-cost robotics components together quickly and easily. Users can access linear robots, robot arms, end effectors, camera modules, control systems and much more centrally in one place - and can find individual components or assemble entire robots.

rbtx.eu

Tested, packaged ... designed to be compact. Adjust formats in flexible and space-saving serialisation solution from Wipotec

This module for product serialisation is precise and robust thanks to drylin® and iglidur® bearing technology.

The drylin® lead screws used are robust and enable adjustment even under high loads and with long stroke lengths.



A highly wear-resistant round bar made of iglidur® JB is used as a transfer roller in the system. It also offers low coefficient of friction and operates without lubrication.

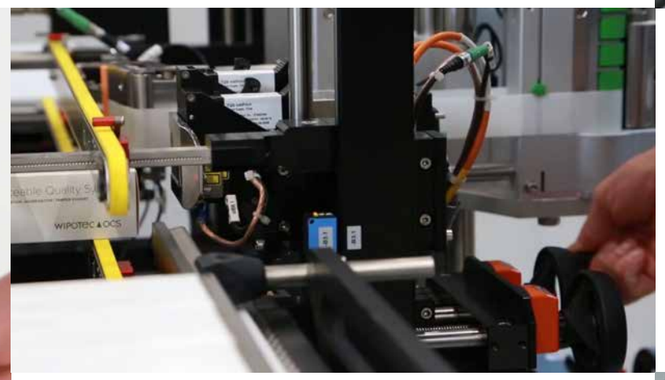
It is the high flexibility of this testing and packaging machine from Wipotec that demands maximum performance from all system components. The machine manufacturer's module can be easily integrated into existing packaging systems and has been designed for the tightest of spaces. Bearing products from the igus® drylin® and iglidur® modular systems prove themselves here for numerous format adjustments and rollers in conveyor technology.

Several pressure rollers are used for product transport, which keep the products securely on track and ensure the short processing cycles. In the rollers, completely lubrication- and maintenance-free plain bearings made of iglidur® J also prove themselves in continuous operation.

The TQS-SP TE from Wipotec is a solution for product guidance, printing using an integrated Tamper Evidence unit and for tamper-proof sealing of folding cartons. The system forms the last station in packaging machines and can be easily integrated into existing systems. The machine focuses on serialisation in the smallest possible installation space in order to save as much space as possible in existing systems. This is made possible, among other things, by the particularly flexible components, which can be individually adjusted to different packaging sizes in the smallest possible space. The print head, camera positioning and sensors in the TQS-SP TE can be precisely adjusted by hand without any tools. The machine performance can also be demonstrated. With up to 600 packaged products per minute, fast serialisation and sealing of the goods is achieved. Robust and maintenance-free bearing components were sought in order to be able to guarantee the various format adjustments under FDA requirements as well as the transport under high loads and in continuous operation. For this reason, drylin® linear bearings are primarily used at various points within the testing and packaging system, but also e.g. plasticplain bearings made of iglidur®.

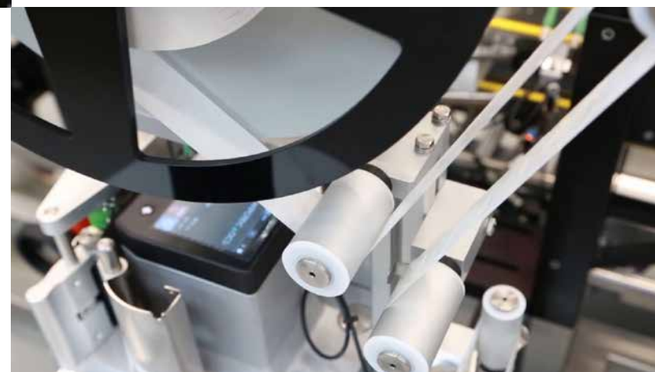
Today, drylin® SHT linear systems, which can be precisely adjusted by hand, are used for side and format adjustments to set the machine for different folding carton dimensions.

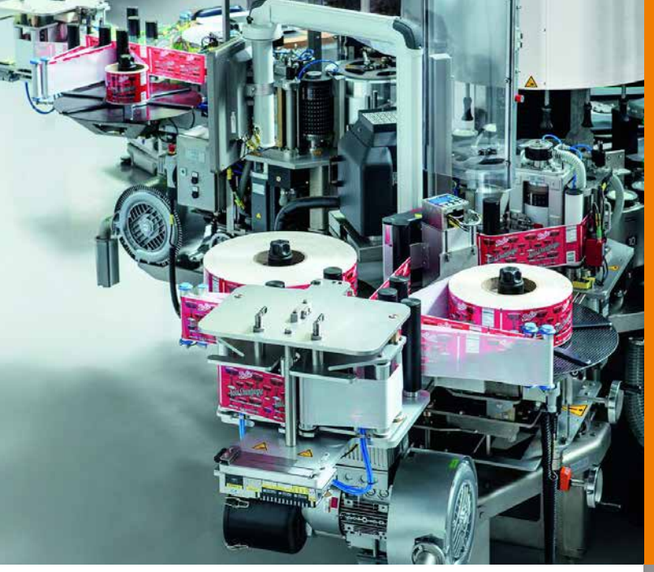
Application in the video



In addition to the format adjustments of the inspection and packaging unit, drylin® SHT lead screw linear systems are also used for the fine adjustment of the sensor system. Their precision and robustness guarantee convenient operation with maximum availability.

And finally, the module from Wipotec also uses xiros® ball bearings in the guide rollers. Like all components, they are also FDA-compliant.





Adjusted quickly – precisely mounted

igus® as a module supplier for labelling machines.

Not only are numerous rotary and linear bearings from the igus® range installed in the labelling machines from KHS GmbH. igus® also supplies complete ready-to-install modules such as adjustment systems and guide rollers. From KHS' point of view, this not only simplifies assembly. It also ensures a high level of precision in the work processes, which run at extremely high speed.

Watch the labelling machine video now.

60,000 bottles per hour or 1,000 bottles per minute and almost 17 every second

This is the output of a typical KHS beverage filling and packaging system. The distribution of sales in the Labelling Technology division shows the company's impressive international presence: more than 80% is generated outside Europe.

Labelling technology has traditionally been one of the core competencies of KHS. From the point of view of the customer, the label – just like the bottle design – is becoming more and more important because there is great competition in the beverage market and consumers take only a few seconds to decide between one product and another.

KHS offers bottlers labelling stations for different technologies (hot glue, cold glue, rolled or self-adhesive). One development in the "Innoket Neo" modular system is the roll-fed station.

The entire labelling process of the roll-fed station - from cutting the labels and gluing them to applying and brushing them off – takes place at breathtaking speed. The Innoket Neo RF labels more than 300 bottles in 20 seconds. This places high demands on all movable components, in particular also on their precision.

Roll-fed – the technology explained

But what does Roll-fed actually mean? The wrap-around labels are "fed" from a roll, cut to the correct length in the cutting unit and glued by a roller. Then they are applied to the bottle. The bottle rotates during delivery of the label, which is directly brushed down. A typical feature of this technology is the "autosplicer", which glues the two label rolls seamlessly, thus ensuring uninterrupted operation of the machine.

Ready-to-install components instead of single parts

For new developments in labelling technology, KHS is increasingly purchasing modules and systems for individual functions - for example horizontal adjustment or guide rollers - as ready-to-install components.

A whole series of requirements must be met. It is actually always wet or at least moist in a bottling plant. For this reason, the components must be highly resistant to corrosion and common cleaning media. High wear resistance and hygiene are at least as important. Lubrication-free components help to avoid contamination - especially when labelling empty, open bottles. For such applications, iglidur® bearing bushes and drylin® linear technology are often used, which have also been used in various KHS systems for around 20 years. What is new, however, is not only are the bearings supplied here, but also completely ready-to-install functional components.

The solutions at a glance

Numerous examples of this can be seen on the Innoket Neo roll-fed station – such as the height adjustment of the cutting mark sensor (Picture 1). Whereas at KHS this function was always assembled from numerous parts, it is now supplied as a complete system: with linear adjustment, clamping, scale tape measure and fastening for assembly. The basis is a drylin® W linear guide of type WS-10-40.

A second example is the guide rollers for guiding the labels through the roll-fed station (Picture2). The rollers – which are of course also lubrication-free and corrosion-resistant – are fitted with xiros® polymer ball bearings (Picture 3). The roller material was selected in practical tests to ensure exactly the desired frictional resistance.

Another complete system is the horizontal adjustment of the entire work table. It is used to adjust the distance between the roll-fed station and the basic machine. The adjustment is made by hand crank via a lead screw (Picture 4). The rear guide was designed with drylin® W linear guides of type WSQ-16 (Picture 5). And because the labelling station is movable, an energy chain from the igus® range takes over the flexible supply of energy, signals, vacuum and compressed air (Picture 6).

Conclusion: High flexibility thanks to fast changeover times and format changeovers

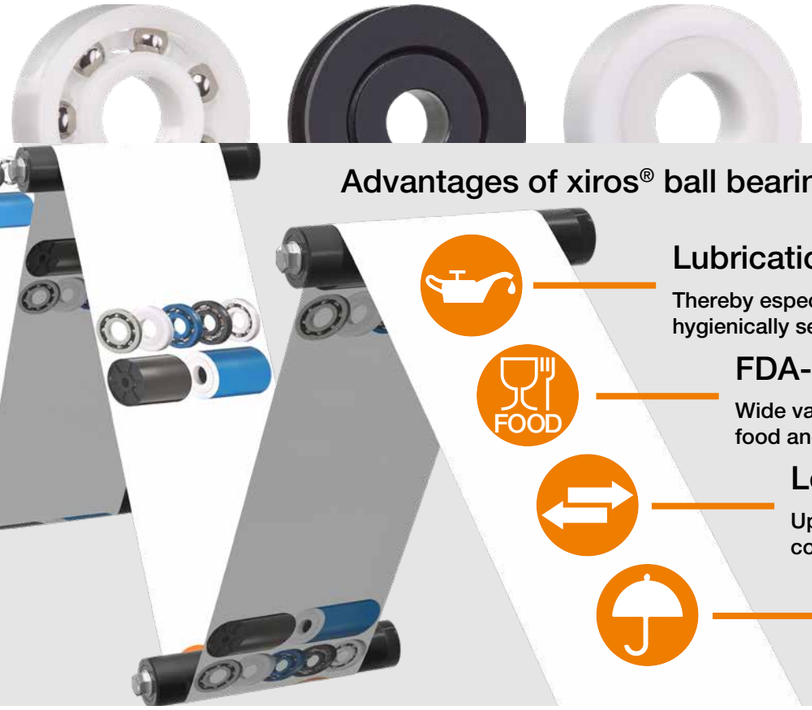
Many KHS customers run non-returnable and returnable bottles on one line and therefore require two different labelling processes on one machine. Changeover time is therefore an important criterion, as is fast format changeover depending on bottle and label sizes. The igus® components help to ensure that these requirements are met economically and with high reproducibility. Despite all the flexibility, the latter is always a decisive factor for beverage producers. Even if 60,000 bottles are labelled per hour: one bottle must look exactly like another. The functional systems and components from igus® also make an important contribution to this result.

Ball bearings and guide rollers in labelling technology

xiros® polymer ball bearings are lubrication-free, maintenance-free, hygienic and have a very low breakaway torque.

Due to these specifications, they are mainly used in the field of packaging and food technology. As fully harnessed systems with a tube made of aluminium, carbon, PVC or stainless steel, the ball bearings prove their worth as conveyor rollers for guiding films and labels. Thanks to the use of wear-resistant high-performance polymers and thin-walled tubes, they provide weight savings of up to 48% compared to metal solutions. Their inertia is thus 42% lower, the energy required for acceleration is considerably lower and the rollers reach the conveying speed more quickly.

Discover now in the shop:
igus.eu/xiros/ball-bearings



Advantages of xiros® ball bearings and conveyor rollers:

Lubrication and maintenance-free

Thereby especially suitable for hygienically sensitive applications

FDA-compliant upon request

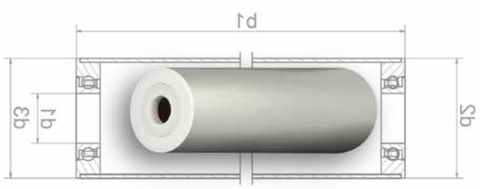
Wide variety of solutions for the food and beverage industry

Low break-away torque

Up to 42% lower mass inertia compared to metallic bearings

Lower weight

Up to 48% weight saving compared to metal bearings



Which conveyor roller is the right one for my application?

With the online tool for configuring xiros® conveyor rollers, you can obtain the right product in just a few steps.

Configure now:
igus.eu/conveyor-roller-configurator

Experience products online – Pack & Food

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Experience packaging technology products virtually – alone or with a guide

Did you miss the last packaging industry trade show? We have the solution. Our most important products for the packaging, food and beverage industry can be viewed at any time from the comfort of your own home.

Because our virtual trade show stand is open day and night. And if you wish, you can also arrange a virtual guided tour with us via video call.
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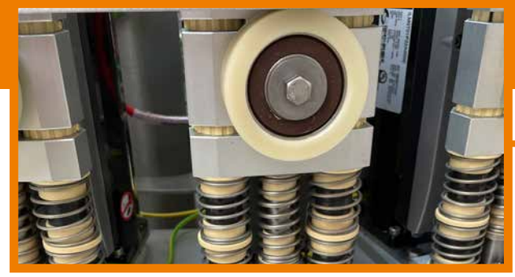
82,000 bottles per hour with maximum efficiency: stretch blow-moulding, labelling and filling in one system

The KHS Group's portfolio of filling and packaging systems also includes the KHS InnoPET TriBlock.

It combines the production, labelling and filling of PET bottles. This makes production particularly effective and space-saving. In the labeller, KHS relies on various lubrication-free and maintenance-free plain and ball bearings as well as liners from igus®.



Bearing points without lubrication

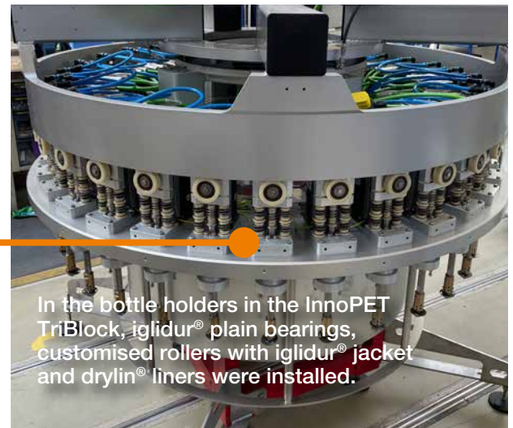
"The bottle holders in the InnoPET TriBlock have three functions. They grip the bottles, stabilise them with compressed air and rotate them so that the labels can be applied," explains Andreas Ullrich, Head of Mechanical Design at the KHS Labelling Technology Product Center. KHS was looking for suitable plain bearings, rollers and linear bearings for the bottle holders. When selecting the components, it was important that they did not require grease in order to prevent contamination of the containers. KHS therefore decided in favour of plain bearing products from igus®. Various iglidur® J plain bearings (JSM-80-20, JFM-1618-17) are now used to guide the springs. These prevent the springs from rubbing against the shafts. The drylin® R liners (JUMO-01-20) used enable a lifting movement for clamping the bottles. "As the liners are subject to high loads, our colleagues at igus® calculated their service life in advance. This meant we had no problems with premature wear," reports Andreas Ullrich. Rollers are also used in the bottle holders, which igus® has manufactured especially for KHS.

They are used to initiate the linear movement with which the plastic bottles are clamped into the bottle holders. Originally, other rollers were used here, but they were damaged. "These rollers were then fitted with a jacket made from our iglidur® material and passed the test. So we fitted the rollers in the entire assembly with our plastic coating for KHS," adds Florian Blömker, salesman at igus®.

Labeller saves material and energy

As the bottles are labelled when they are empty and then filled, the labeller requires no dryer to remove condensation from the bottles. Transport and buffer sections have also been eliminated, so the system reduces space requirements and energy consumption. Another special feature of the InnoPET TriBlock is that the PET bottles are gripped above or below the support ring and transported through the labeller. Bottle holders secure the containers by the neck ring so that they are transported gently through the entire system.

The fact that material savings play a very important role for the beverage industry is also recognised by KHS in other areas. PET bottles are becoming lighter and thinner, as bottlers can thus save material. The problem here is that fixing the containers during the labelling process, as described above, can lead to them being deformed or not being clamped at all, especially in the case of PET bottles with thin walls. This risk does not exist with the InnoPET TriBlock thanks to neck handling and stabilisation with sterile air. The PET bottles can be held and labelled without any problems. The system can handle up to 82,000 bottles per hour with low energy consumption.



In the bottle holders in the InnoPET TriBlock, iglidur® plain bearings, customised rollers with iglidur® jacket and drylin® liners were installed.

The InnoPET TriBlock stretch blow moulding/labelling/filling block from KHS combines the production, labelling and filling of PET bottles. This makes production especially effective and space-saving.

Lightweight guide rollers with xiros® ball bearings guide the labels into the labeller.

Station adjustment below the labeller using drylin® linear technology.

Label guidance with lightweight guide rollers

To feed the labels into the machine, carbon tubes are used into which xiros® ball bearings are pressed. Like all igus® products, these bearings are maintenance-free and self-lubricating. The ball bearings also give the deflection rollers low self-locking and weight. The deflection rollers can guide up to 82,000 labels per hour into the labeller. This requires speeds of up to 16km/h.

Last but not least, a compact linear module with lead screws (drylin® SLW-1660) and two single rails (drylin® WSQ-16) specially manufactured for KHS are used in the system. They are used to move the labelling unit, which weighs around 600kg and whose weight now rests on three points: at the front on the drylin® SLW-1660, which is used for adjustment; at the rear on two drylin® WSQ-16 guides. The fact that drylin® linear technology moves on sliding elements made of the proven iglidur® materials, means it is not only maintenance-free and lubrication-free, but also absorbs vibrations.

Practical test passed

Ullrich gained an initial overview of the igus® products online before the assignment. "It is very helpful that all the important technical information is available directly on the igus® website. Some manufacturers make you send a query," he says.

After a subsequent consultation with igus®, the right plain bearings and liners were quickly found. When it came to assembling the components, the igus® plain bearings in particular proved to be very robust. "The price was also an important factor for us. Non-ferrous metal bearings can't compete with that." The other igus® products have already proven themselves in practice. The rollers with iglidur® jacket have been tested by KHS together with igus® for a year at a customer and little wear has been detected so far. These rollers work so well that they are also used in a modified form in the mechanical capping technology of other KHS systems. "Before we used the igus® rollers here, central lubrication had to be carried out every four hours. KHS can now completely dispense with this," says Florian Blömker, describing the changed process.

The solution in detail in the application video

Wear-resistant and food-compliant thanks to powder coating

iglidur® coating

Wear-resistant and food-compliant surfaces for the packaging industry

As "iglidur® coating" is how we describe the process of powder coating electrically conductive components with a tribologically optimised polymer powder. The applied powder mixture forms a uniform surface on the component and can subsequently - depending on the powder used - give it various specifications such as increased wear resistance or stability at higher temperatures.

In the packaging industry, for example, the frictional resistance of guide plates and chutes in conveyor technology can be reduced or surfaces in hygiene-sensitive applications can be prepared for food contact.

The advantages of iglidur® coating in the packaging industry

- Wear resistance
- Temperature-resistant
- Chemical resistance
- Food conformity

You will find the right coating powder for your application in the shop.

igus.eu/coating-shop

Get customised components coated with the iglidur® Coating Designer.

igus.eu/coating-designer

How to increase the service life of your parts.

This white paper covers the following topics, among others

- Functionality and processing of iglidur® coating
- The optimum coating for your application
- Instructions for self-coating
- Application examples from practice

igus.eu/coating-white-paper

Product catalogue? Water under the bridge

Shop and tools

Poring through thick product catalogues? The product shop and our online tools will help you find the right solution faster.

Plain bearings, flanged bearings, guide rollers, knife edge rollers ... or customised products tailored to your own application? You will quickly find what you are looking for in the clearly organised product shop.

And with useful online and offline tools, we can also help you with customised solutions. For example, did you already know our online expert for selecting and calculating the service life of iglidur® bearings?

You can find an overview of our tools under:

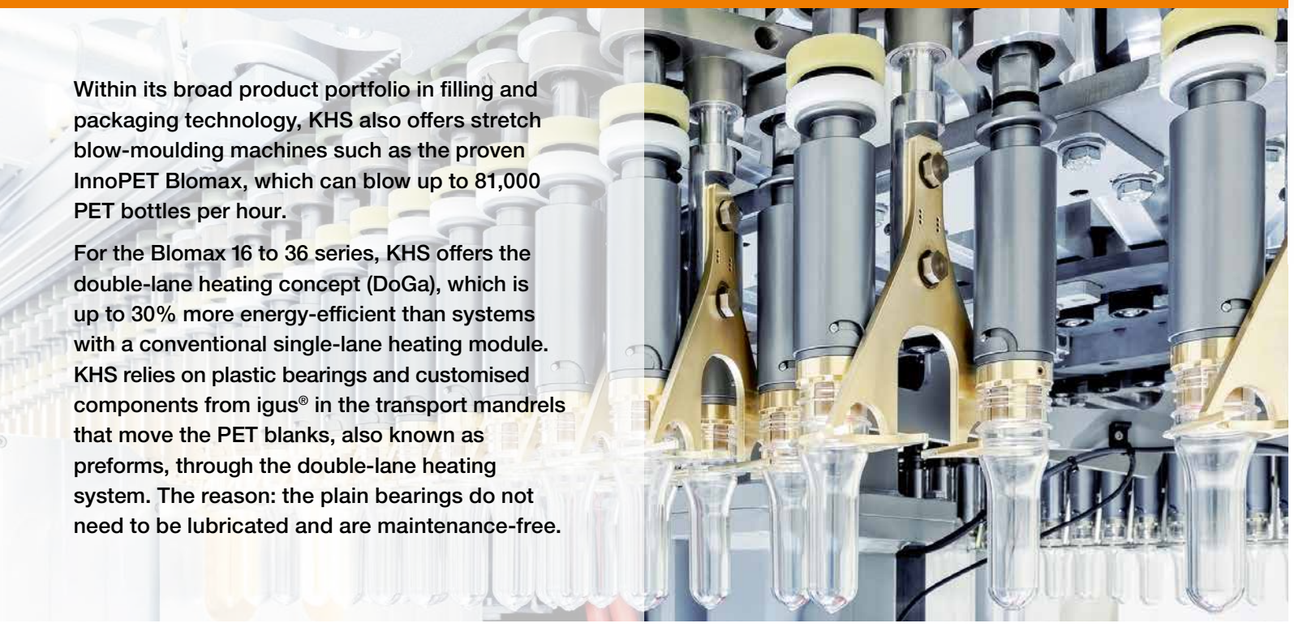
igus.eu/tools

And here is the link to the shop:

igus.eu/shop

14,000 Service life in hours. igus® plain bearings in KHS stretch blow moulding machines

The double-lane heating system from KHS makes stretch blow moulding machines more energy-efficient and uses iglidur® plain bearings for lubrication-free and maintenance-free bearing points.



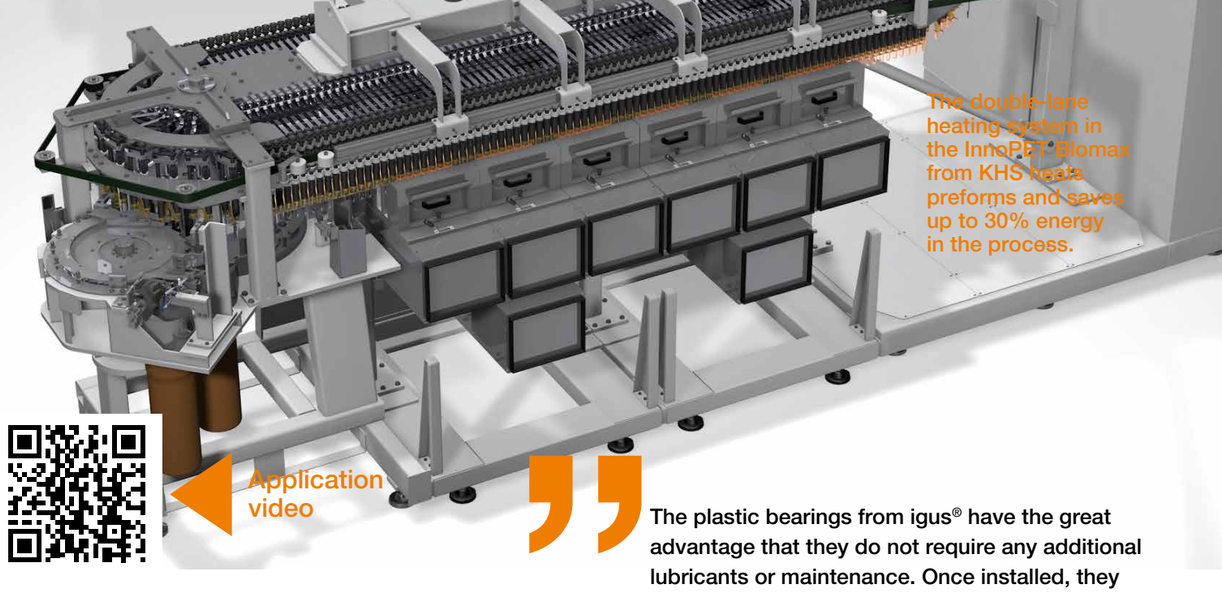
Within its broad product portfolio in filling and packaging technology, KHS also offers stretch blow-moulding machines such as the proven InnoPET Blomax, which can blow up to 81,000 PET bottles per hour.

For the Blomax 16 to 36 series, KHS offers the double-lane heating concept (DoGa), which is up to 30% more energy-efficient than systems with a conventional single-lane heating module. KHS relies on plastic bearings and customised components from igus® in the transport mandrels that move the PET blanks, also known as preforms, through the double-lane heating system. The reason: the plain bearings do not need to be lubricated and are maintenance-free.

To give the preforms in the InnoPET Blomax the desired shape, they are heated before being inflated to make them mouldable.

Transport mandrels pick up the blanks, guide them through the double-lane heater and then into the blow mould. The special feature of the heating concept is that it has a folding transport chain with which the preforms are transported very compactly in two rows through the near-infrared heater. KHS was looking for suitable plain bearings for the transport mandrels. As the system provider, headquartered in Dortmund, already had good experiences with igus® products in similar applications, the decision was made to ask for the igus® plain bearings.

"The plastic bearings from igus® have the great advantage that they do not require any additional lubricants or maintenance. Once installed, they simply work," recalls Frank Lewin, R+D designer at KHS. The iglidur® bearings passed the subsequent test in a prototype of the double-lane heating system by the manufacturer, which were then put to the test once again in a specific customer application.



The double-lane heating system in the InnoPET Blomax from KHS heats preforms and saves up to 30% energy in the process.

Application video

The plastic bearings from igus® have the great advantage that they do not require any additional lubricants or maintenance. Once installed, they simply work.

Frank Lewin, R+D Designer at KHS

Tested in the laboratory

Two plain bearings are used in each of the transport mandrels. It was therefore important for KHS that both plain bearings have the same service life. As igus® puts all its plain bearing materials through their paces in its own test laboratory, KHS was able to use this test data to estimate the service life of the plain bearings in advance.

In the igus® test laboratory, the largest in the industry, application and material tests are carried out under real conditions on an area of 3,800m². Bearings are tested here for their wear and friction properties. Depending on requirements, this includes tests under high loads or speed, dirt and weather conditions, for example. After all the tests had been carried out, the most suitable bearing materials were determined: iglidur® J for the plain bearings in the so-called tulip and A180 for the sliding elements.

Since the iglidur® catalogue range could not provide a solution for all bearing points on the transport mandrels, an individual mould had to be produced in the case of the sliding elements. For such cases, igus® offers various manufacturing processes to produce the components from iglidur® materials: injection moulding, machining and 3D printing. KHS decided in favour of machining, as it was the most suitable process for the sliding elements. So the components were made from iglidur® bar stock and were ready for use.

No detectable wear

In the transport mandrels, the iglidur® plain bearings and sliding elements now run against aluminium. It was particularly important for KHS that the iglidur® materials may come into contact with food, as they are used above the preform mouth. Further requirements for the use of the bearings were cleanroom suitability and resistance to temperatures of up to 60°C. "So far, no wear has been detected on the igus® components," reports Lewin from practical use. **KHS currently specifies a maintenance interval of up to 14,000 hours for the igus® components, which corresponds to two years of production.** "Of course, our requirements are constantly increasing because the market wants more efficient machines. Food conformity is becoming increasingly important, and longer service life and running performance are in demand. To achieve this, our systems and components naturally have to be even more resilient and grow in terms of running performance," concludes Lewin.

Proven, predictable, tried and tested. Research on 3,800m²: What is actually tested in our test laboratory, what do the test stations look like and what happens to the data?

You can find out more on pages 52 - 53.

Long life guaranteed

Service life, wear, chemical resistance and more.

Product tests and research laboratory on 3,800m²

Ensuring safety for the highest demands in the packaging industry

iglidur® plain bearings have to absorb enormous forces in the lifting stations for the heavy thermoforming and sealing stations and function incessantly. xiros® ball bearings must have only low friction and wear coefficients in the guide rollers of labelling machines, despite high running speeds and continuous operation, in order to enable the labelling of up to 50,000 bottles per hour. And chainflex® cables should be able to withstand 80 cycles per minute for years in automatic packaging machines without breaking, and this with a minimum bend radius of 5 x d.

As in many industries, machines and systems in the packaging sector are running at full speed and each new generation of machines brings more speed, service life and wear resistance than the previous one.

Only with extensive tests can we say with certainty what service life an iglidur® J plain bearing has, how many double strokes a chainflex® cable can take before it breaks, or how many cycles a linear, ball or spherical bearing can achieve. New product developments are also created with the help of test data from the laboratory.

Individual areas within the > 3,800m² laboratory*

igus.eu/testlab

1,500m² chainflex® cables

300m² iglidur® plain bearing, drylin® linear bearing and Low Cost Automation

2,000m² outdoor test area for energy chains with long travels

Cleanroom laboratory

Laboratory for noise tests

Climate chamber with -40°C

* Illustration does not correspond to the building plan

1. Rotational wear

Testing of the rotating wear rate of igubal® pillow block bearings with loads per bearing point between 100 and 1,000N.

2. Pivoting wear

Determination of the wear rate of igubal® spherical plain bearings at a pivoting angle of 60° and loads between 25N and 300N.

3. Wear rates under water

Determination of the wear rate of drylin® linear bearings with loads of up to 100N.

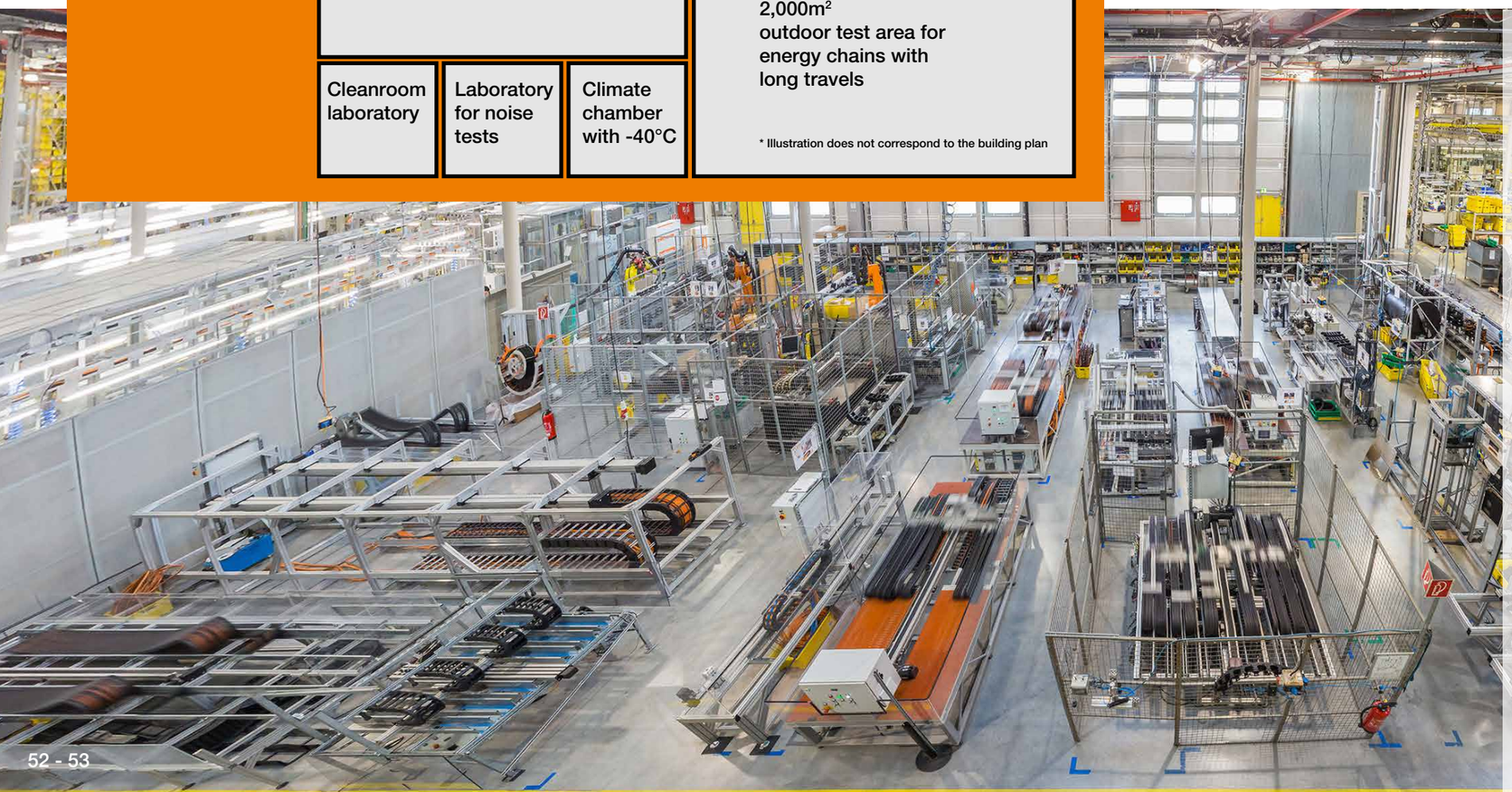
4. Tumble test rig

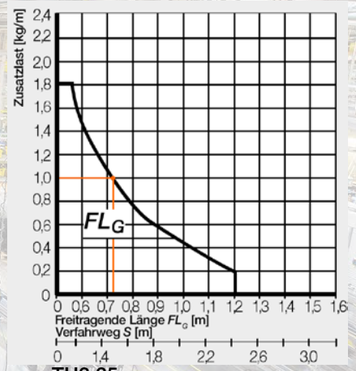
Testing the rolling and tumbling wear of, for example, iglidur® knife edge rollers at loads between 10N and 600N.

5. Dynamic test

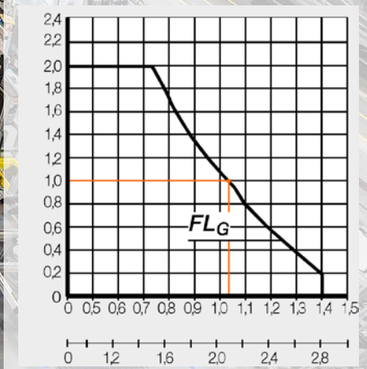
Here: Test of a TH3.45 energy chain that has completed over 16 million cycles in 6 months.

Everything about the laboratory at igus.eu/testlab





TH3.25



TH3.45

Successfully tested in millions of cycles – the example of the TH3 (Picture 5).

Before its market launch, the TH3 series – like all new series from igus® – was extensively tested in the laboratory over many millions of cycles. Tests to determine the additional load as a function of the unsupported length showed that the smaller TH3.25 installation size can carry up to 1kg of additional load with an unsupported travel of 1.5m without its service life being impaired. The larger TH3.45 has a travel distance of 2.10m with an additional load of 1kg (Diagram left).

Dynamic tests with the aim of determining service life and causes of energy chain failure are especially revealing. An example: In the endurance test for a TH3.45 chain (unsupported, additional load 1.7kg/m, travel 1.80m, speed 4.0m/s, acceleration 20m/s²) the result after almost six months of running time was a service life of over 16 million cycles.

Facts

The story behind igus®

"Give me your most difficult part and I will give you a solution", said Günter Blase. He had to take a risk in order to win over Pierburg, his very first customer. There were two children at home who needed looking after. Money was in short supply. He had just set up igus® with his wife (tax consultant) and the first injection moulding machine still had to be bought. The order from Pierburg carburettors was urgently needed.

And Günter Blase received that enquiry from Pierburg. Their complicated problem part was a valve cone for a carburettor. In 1964, no-one would have come up with the idea of using plastic to make this small metal component and, what's more, to do so with an injection-moulding machine. The manufacturing process was simply too complicated. For Günter Blase, this was no reason to lose heart. He went into his double garage and experimented until the first perfect plastic valve plug emerged from the injection-moulding machine.

The double garage in Cologne-Mülheim soon became too small. Just like the new location in Bergisch Gladbach. Today, the headquarters of igus® GmbH is still located in Cologne – in the Lind district – but houses over 800 injection moulding machines on an area of over 200,000m². In addition, igus® has over 30 locations worldwide.

The business areas have expanded, from plastic energy chains and plain bearings to other components for moving applications and complex automation solutions. The core philosophy is still the same as in 1964, improve anything that moves.

"Give us your most difficult part and we give you a solution."

4,600
employees worldwide

€1.115 billion
turnover

31 locations,
dealers in over 80 countries

188,000
customers

243,000
parts from stock

800
injection-moulding machines

Trends, topics and products

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