

# Packaging

igus® solutions for the packaging industry ...



plastics for longer life® ... igus

# ..industry..

... [www.igus-packaging.eu](http://www.igus-packaging.eu) ...

# Most hygienic ...

Precise and fast processing, pure and safe.

## **dry-tech® bearing technology:**

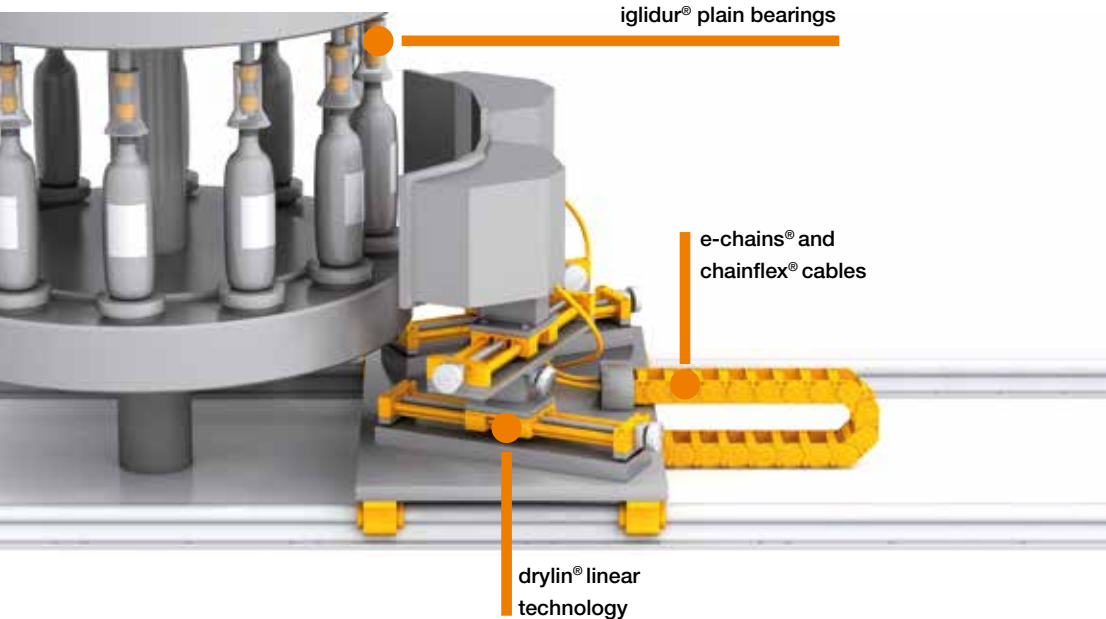
- Any elimination of Lubrications  
= no product contamination
- Resistance against acids, alkalis  
and alcoholic cleaning agents
- Food-friendly design
- Cleaning-friendly
- Excellent value stainless steel  
in application
- FDA- and/or EU-compatible  
materials possible
- Stability even at high temperatures
- Lightweight aluminium construction

 [www.igus.eu/dry-tech](http://www.igus.eu/dry-tech)

## **e-chains® and chainflex® cables:**

- Reduce downtimes, increase service  
life of cables and hoses
- Various types of motions and  
installation types
- Carry sensitive bus, data and fibre  
optic cables, as well as media
- In different environments such as cold,  
heat, humidity, etc.
- Compact installation
- High accelerations, long travels

 [www.igus.eu/the-chain](http://www.igus.eu/the-chain)



# ... in the packaging industry

Reduce costs ... improve technology ... with igus®...



... in the beverage industry

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... in the food industry

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... in the general packaging industry

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Practical applications

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No product contamination –  
iglidur® plastic bearing

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Avoid lubricating  
xiros® polymer ball bearing

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Reduce maintenance –  
drylin® linear technology

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Compensate easily –  
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Holds permanently in e-chain® –  
chainflex® cables

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For all types of applications and installation  
methods – e-chains®

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# igus® solutions ...



Your team for the packaging industry (igus® Cologne):  
Jan Michels, Bastian Mehr, Lars Braun and Andrej Schmidt (from left)

## **motion plastics® from igus® in the packaging industry – free from Lubrications, maintenance-free, FDA and/or EU conformity.**

Solutions in the packaging, food or beverages industry are mostly very sensitive. Particularly when in contact with food, special requirements must be met, while cleanliness and economic feasibility is at the forefront within the packaging industry by means of accurate and fast processing.

Tuned to the specific needs of the packaging industry, such as food hygiene or FDA and/or EU compliance, we are able to provide you with our maintenance-free and Lubrication-free machine elements made of high-performance plastic solutions that optimise your packaging machines.

Also visit our industry website

 [www.igus-packaging.eu](http://www.igus-packaging.eu)

Discover many other igus® benefits for your industry in this brochure, on our website or in a personal conversation with us.

We look forward to your call or E-mail.

Your team for the packaging industry.

# ... for the packaging industry



**Cost down,  
service life up!**

# igus® in the packaging, beverages and food industry

## igus® solutions for the beverages industry



### Filling technology

Cam-guided carousel filler, lifting elements, filling valves, guides, centring bell

- Chemical resistance
- Corrosion resistance
- Extreme wear resistance



### Inspection technology

Bottle inspection, height level and volume control, sealing and label inspection

- Complete solutions from one source
- Chemical resistance
- No damage of soft stainless steel shafts



### Palletising technology

Bottle gripper, size adjustment, bottle stacker

- Low weight = Reduction in moving masses
- Freedom from Lubrications = no product contamination
- Corrosion resistance



### Labelling technology

Bottles ejectors, bottle guides, labellers and cutting machines

- No product contamination
- Lubrication-free



### Cleaning technology

Bottle and crate washers, rinsers

- Custom plain bearing available
- High chemical resistance
- Maintenance-free



### Blow moulding machines

Bottle ejector, PET bottle grippers

- No product contamination
- Reduction of moving mass
- Reduced installation space needed

## igus® solutions for the food industry



### Food industry, general

Can openers, cutters, peeling machines

- Low moisture absorption
- Maintenance-free
- Low weight



### Sausage, meat and fish processing

Sausage filling machines, bag fillers, slicing machines

- FDA compliant
- Corrosion resistance
- Lubrication-free



### Sweets processing

Adjustment conveyor belt, wafer baking machines

- No damage to soft stainless steel shafts
- Temperature resistance
- Chemical resistance



### Knife-edge applications

- No lubrication to contaminate the belt
- Low drive power
- Increased service life of the belt
- Cost advantage
- Better wear values

## igus® solutions for the general packaging industry



### Forming, filling and sealing machines

Guide thermoforming unit, filling process, film welding unit

- Resistance against cleaning agents
- Lubrication-free
- No damage of soft stainless steel shafts



### Tray sealing

Sealing stations, tool changers, toggle lever mounting

- High wear resistance
- Corrosion resistance
- Use of soft shafts possible



### Dosing systems

Multi-head weighers, damper bearing

- Vibration dampening
- High chemical resistance
- Corrosion resistance



### Cartoning machine

Product feeder, format adjustment, carton stop

- Reduction of moving masses
- Lubrication-free
- Corrosion resistance



### Tubular bag packing machines

Sealing bar adjustment, bag folder, sensor adjustment

- Wear resistance
- Short and fast strokes possible
- Finished complete solutions



### Pharma Packaging

Circle filler, dosing systems, blister packaging

- Lubrication-free
- Autoclaving possible
- Corrosion resistance



### Weighing technology

Weighing and dosing heads, multi-head weighing systems

- Vibration dampening
- Chemical resistance
- Use of soft shafts possible



### Strapping machines

Position guide, format adjustment

- Resistance to dirt
- Maintenance-free dry operation
- Corrosion resistance



# Media-resistant ...

## Filling technology



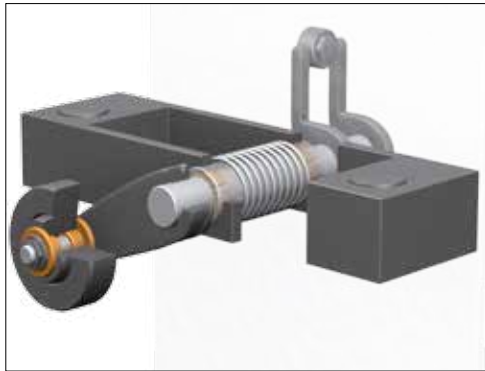
### Circle filler – lifting element

igidur® J, drylin® JUM films or plain bearings made of iglidur® H group in curve-guided lifting element for bottles.

- Maintenance-free
- No production contamination through Lubrications
- Resistant to typical cleaners (PES, hydrogen peroxide)

#### More information:

igidur® ► page 34-39, drylin® ► page 44-47



### Circle filler - control valve

igidur® J piston ring for pivoting movement and iglidur® plain bearings in the link rollers.

- Easy installation
- Low cost
- More wear resistant than conventional plastics
- Defined clearance

#### More information:

igidur® ► page 34-39



### Screw capper

drylin® RJUM linear bearings for the curve-guided linear movement.

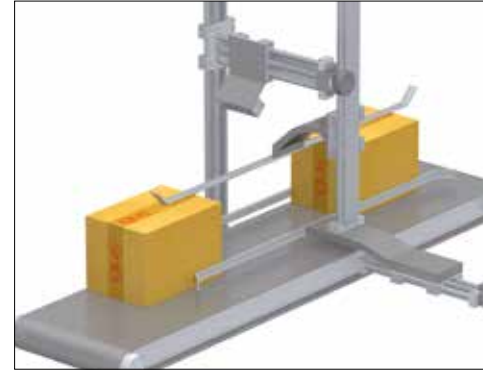
- Cleanable solution
- Maintenance-free
- No production contamination through Lubrications
- Resistant to the typical cleaners (PES, hydrogen peroxide)
- Low adhesion, even with "blunt" shafts after cleaning

#### More information:

drylin® ► page 44-47

# Beverages industry

## Inspection technology



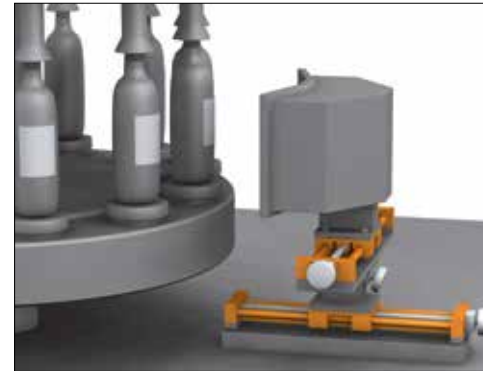
### Camera adjustment

drylin® SLW lead screw unit for the format adjustment of cameras.

- Ready to install solution saves time and money
- Corrosion-free solutions possible
- Low clearance lead screw unit due to adjustable housing bearings
- High static forces possible
- Maintenance-free

#### More information:

drylin® ► page 44-47



### Camera box adjustment

drylin® SLW-2080 lead screw unit for the XZ adjustment of the inspection camera

- Customer-specific solution
- Total solution saves time and money
- Low clearance due to adjustable housing bearing
- High static loads possible

#### More information:

drylin® ► page 44-47



### Format adjustment inspection head

drylin® SHT-20 lead screw unit for XYZ adjustment

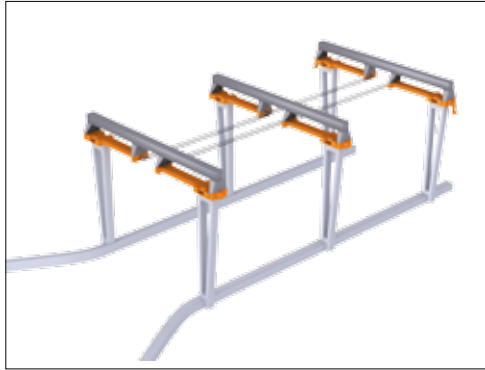
- Complete solution from a single source
- Cost savings
- Torsional stiffness solution
- Clearance-minimised system
- Maintenance-free

#### More information:

drylin® ► page 44-47

# No lubrication ...

## Palletisation / Transport / End of Line



### Lane adjustment – bottle packer

Lubrication-free drylin® SLW-2080 for lane adjustment of the incoming bottles.

- Ready to install series solution, saves time and money
- Adjust all six positions with a single drive point via linked systems.
- Corrosion-resistant solution possible
- High torsional stability

**More information:**  
drylin® ► page 44-47

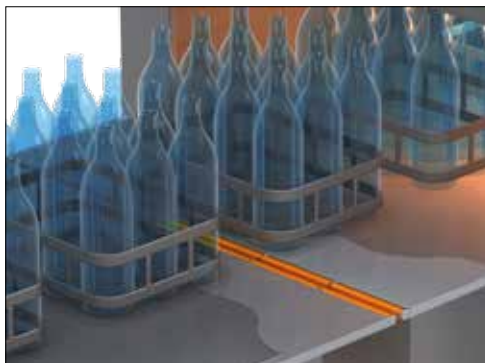


### Handle dispenser

iglidur® J and iglidur® W300 plain bearings and igubal® rod end bearings in a carrier handle dispenser.

- Low coefficients of friction
- Resistant to typical cleaning agents (PES, hydrogen peroxide)
- Low weight = Low moving mass
- Wear-resistant

**More information:**  
iglidur® ► page 34-39, drylin® ► page 44-47



### Knife-edge rollers

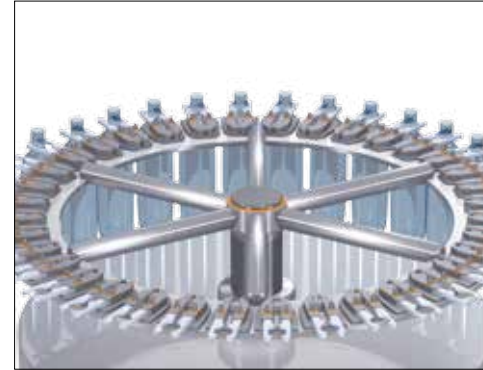
iglidur® P210 knife edge roller for mounting the knife edge in bottle transport.

- No Lubrication on the belt (compare needle bearing)
- Lower drive power and longer service life of the belt than the gliding knife edge
- Price advantage for the rotating part made of PETP
- Higher wear resistance than PETP
- Cost advantage compared to needle bearing and PETP

**More information:**  
drylin® ► page 44-47

# Beverages industry

## Labelling



### Transfer spider on transfer table

iglidur® J for mounting the main shaft for rotating the transfer spider.

- No elaborate, continuous lubricating system necessary as with previous solution (gunmetal bush)
- No lubrication required
- Maintenance-free solution

**More information:**  
iglidur® ► page 34-39

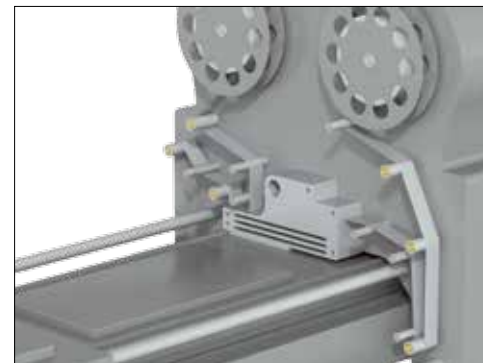


### Label inspection

Maintenance-free drylin® SLW or SHT lead screw unit for the height adjustment of cameras or sensors.

- Ready to install solution saves time and money
- Corrosion-free solutions possible
- Many customer-specific applications
- "Clearance-free" solutions (fixed housing)
- High static forces possible

**More information:**  
drylin® ► page 44-47



### Inline labelling machine

xiros® plastic ball bearings in film guide rollers

- No washing required
- Corrosion resistant
- Lower coefficients of friction than as plain bearing
- Chemically resistant solution
- Low cost compared to sealed ES ball bearing

**More information:**  
iglidur® ► page 34-39, xiros® ► page 40-43

# Low friction ...

## Cleaning



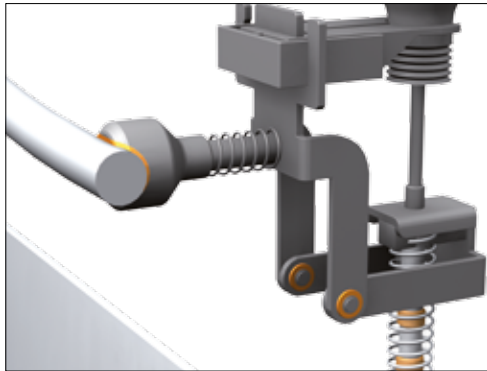
### Bottle cleaning – washing chain.

igidur® RN plain bearing for mounting the washing chain rollers.

- Reduction of the driving force
- Longer service life
- Resistant to sodium hydroxide solutions
- Noise reduction of the machine

#### More information:

igidur® ► page 34-39



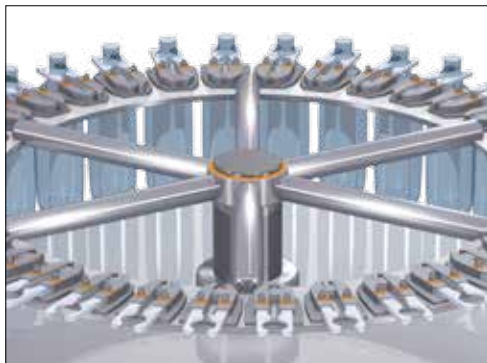
### Rinser – spray pipe guide.

igidur® J plain bearing for the pivoting motion, iglidur® J-special plain bearing as inlay and iglidur® J double flange bushing for the spraying tube bearing.

- Low friction against soft stainless steel shafts
- Longer running rates than UHMPE
- Wear-free solution - no water lubrication required

#### More information:

igidur® ► page 34-39



### Neck handling of PET bottles

igidur® X, J, H370 or X6 plain bearings in the gripper for PET blanks and PET bottles.

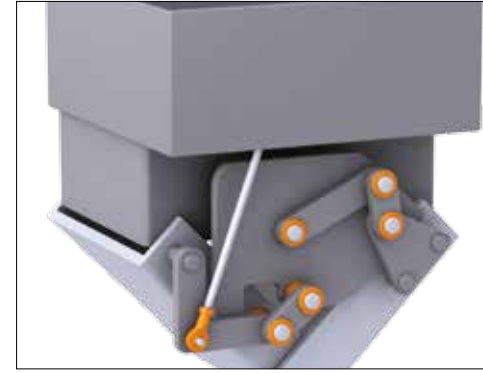
- Pivoting motion
- High forces due to edge load
- High wear resistance

#### More information:

igidur® ► page 34-39

# Beverages industry

## Packing machines / Multi-head weighers



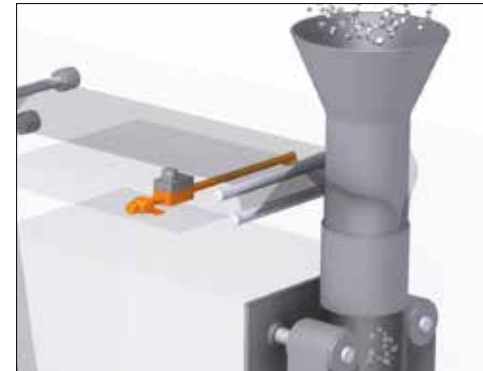
### Dosing of the unpackaged product.

igidur® plain bearings or igubal® spherical bearings implement the pivoting movements of the multihead weigher flaps.

- Low noise, vibration dampening
- Maintenance-free
- No production contamination through Lubrications
- Resistant to the typical cleaning agents
- Very low humidity absorption

#### More information:

igidur® ► page 34-39, igubal® ► page 48-49



### Sensor adjustment.

drylin® SLW-1040 for sensor adjustment.

- Adjustment from outside possible (no reaching into the machine)
- Installation between machines walls or "table-top solution"
- Complete solution saves time and money

#### More information:

drylin® ► page 44-47



### Sealing bar guide.

drylin® R for the linear motion of the sealing bar and igubal® rod end bearings for the synchronous drive of the sealing bar.

- More resistant than recirculating ball bearings: drylin® JUM for temperatures up to 60°C; drylin® XUM for temperatures > 60°C
- Soft stainless steel shafts possible
- Chemical resistance
- No shaft wear

#### More information:

igubal® ► page 48-49, drylin® ► page 44-47

# General packaging industry

## Cartoning machine / Thermoforming machines



### Format adjustment of carton stop.

Using synchronised drylin® SLW-2080 lead screw units, the format adjustment of the carton stop is implemented.

- Ready to install complete system from one source
- Cost and time savings
- Maintenance-free

#### More information:

drylin® ► page 44-47



### Product inserter.

drylin® W linear guides.

- Reduction of moving mass
- No product contamination, Lubrication-free

#### More information:

drylin® ► page 44-47



### Lifting stations.

drylin® R linear bearing for guiding the lifting columns and iglidur® Z plain bearing for the toggle lever movements.

- Maintenance-free lifting stations, no lubrication
- No product contamination
- Can be washed down
- iglidur® Z can be used even at high

#### More information:

igidur® ► page 34-39, drylin® ► page 44-47

# Foodstuffs ... FDA compliant

## Sweets processing



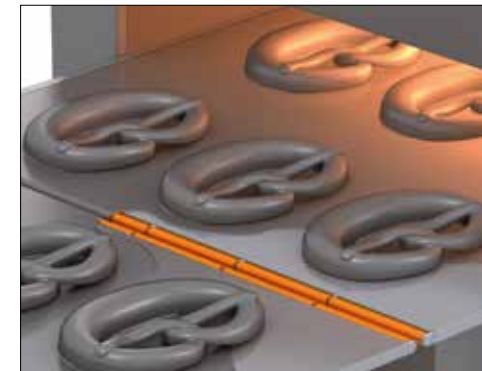
### Wafer baking.

igidur® X6 plain bearings are used in the hinge bolt and the chain link bearing of a pair of wafer baking tongs.

- Pivoting movements possible at temperatures of up to 200°C
- No corrosion despite high air humidity
- High wear resistance

#### More information:

igidur® ► page 34-39



### Knife-edge rollers.

igidur® P210 knife-edge rollers for mounting the knife edge in the bakery equipment.

- No Lubrication on the belt
- Lower drive power and longer service life of the belt than the gliding knife edge
- Price advantage for the rotating part made of PETP
- Quiet operation
- Higher wear resistance than PETP
- Cost advantage compared to needle bearings and PETP

#### More information:

igidur® ► page 34-39



# General packaging industry

## Thermo-forming packaging machinery



Standardised toggle lever stroke system in the sealing station (overall view): the vertical guide of the upper stroke is accomplished with iglidur® J plain bearings, the togglelever bearing with the heavy duty material iglidur® Z.

Primary linear bearing support for the lower film tensioner using igubal® flange bearings



Vibration-free energy and data guidance E6 e-chain® on the inline labeller.



# Practical examples

## Tubular bag packing machines



Adjustment of the long seal jaws using "drylin® W" linear guide including manual clamping for fast, simple and manual positioning.

Format adjustment of the sensors for web edge detection and print mark detection through drylin® SLW lead screw unit solution with position indicator and hand wheel.



Main bearing of the sealing bar with drylin® R linear liners in combination with hard anodised aluminium shafts for maximum running performance.

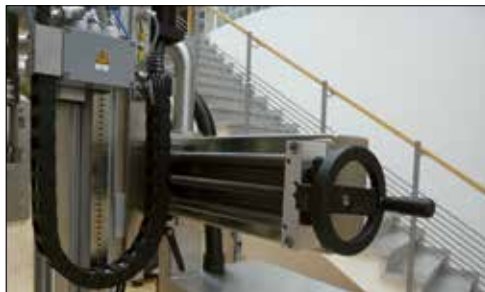


# General packaging industry

## Filling plants



The filling systems are modular and easily adaptable to the most varied requirements. The compact drylin® linear unit in the installed state. igus® energy chains transmit energy and signals to the moving parts of the system.



Using a hand wheel, the operator can position the filling head weighing at least 80 kg without much effort.



Concealed mounted drylin® W guide rail ensures smooth movements in the supply of container for the filling.

# Practical examples

## Disinfection machines



The drylin® W linear guide with housing bearings is made as a special part according to the customer's drawing.



The xiros® polymer ball bearings are also used in a series of packaging machines. They are sturdy, smooth and often replace more expensive metallic roller bearings.



Overall view of the disinfection machine.



# General packaging industry

## Diaper packaging machine

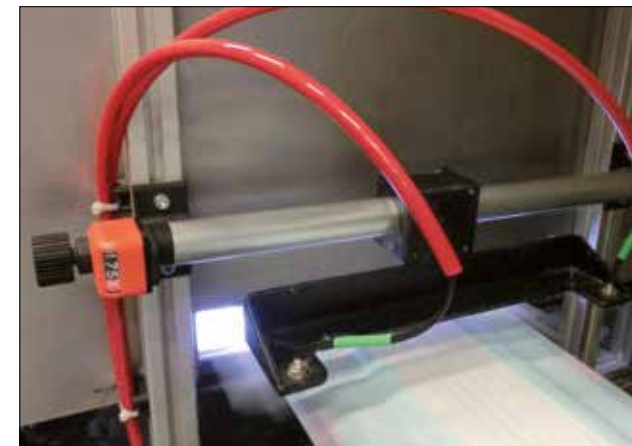


Middle adjustment of a four-web 90° deflection using drylin® lead screw unit SHT-12-AWM for non-woven webs. A total of eight systems are in use.

# Practical examples



drylin® SLW-2080 lead screw units provide the synchronised height adjustment for pressing the packed diapers into cartons.



Format adjustment of the sensors for the web centre monitoring via drylin® lead screw unit easytube SET-25. The lead screw is reliably protected by the rugged aluminium tube.



# Beverages industry

## Unscrewing and uncorking bottles



Automatic plant for bottle emptying. The valves on this plant are equipped with cylindrical drylin® linear bearings.



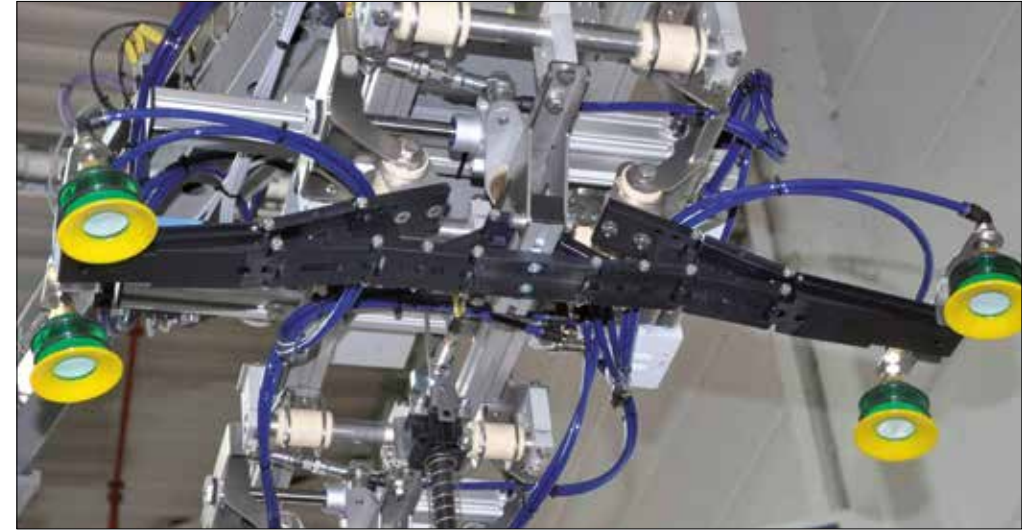
drylin® W linear guide systems are used in the neck sleeve removers. These are also maintenance-free and resistant against cleaning agents used by the beverages industry.



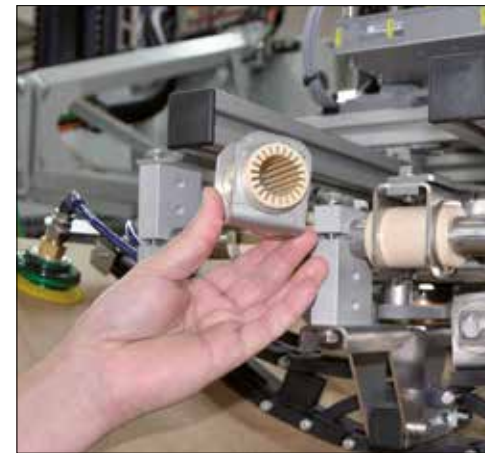
Maintenance-free iglidur® X6 plain bearings are used in the toggle lever systems that grab onto the bottles.

# Practical examples

## Butterfly gripper – End of Line



The butterfly gripper is a construction kit that is assembled from small modules depending on the grasping task. drylin® linear technology is a major component of this construction.



The grooves allow dirt to pass through the drylin® linear plain bearing RJMP-01-25.



The linear plain bearings RJMP-01-25 are very robust.

# Food industry

## Wafer-baking machines



Adjustment and format adjustment of a prism beam in the stripping station of ice cream cones using drylin® easytube SET-25-AWM.



Position adjustment of the batter spray pipe with a clearance-adjustable drylin® SLW-1040 lead screw unit.



Safety adjustment with maintenance-free drylin® WJRM hybrid bearings for the lowest adjustment forces.

# Practical examples

## High-speed stacking system in slicers



Linear stroke of the pre-gripper for feeding the material to be cut. Thereby soft stainless steel shafts and linear films of the type series drylin® JUM-01-40 are used.



Mounting of the holder of the material to be cut in tray and fork design. It is driven by a pneumatic cylinder for implementing the pivoting movement with iglidur® J plain bearings.



Pivotal mounting of the feed arm with iglidur® X6 plain bearings.



# Beverages industry

## Bottle washing/filling plants



By the use of iglidur® plain bearings in washing chain rollers, the drive energy required for the bottle washing machine could be significantly reduced.



A component for successful mechatronics – Mounting with high-temperature material iglidur® X.

# Practical examples

## Beverages bottle filling



Cost effective: 90% cost saved, as Lubrication-free, affordable iglidur® plain bearings have a long life.



iglidur® X in a filling valve for beverages bottle filling.

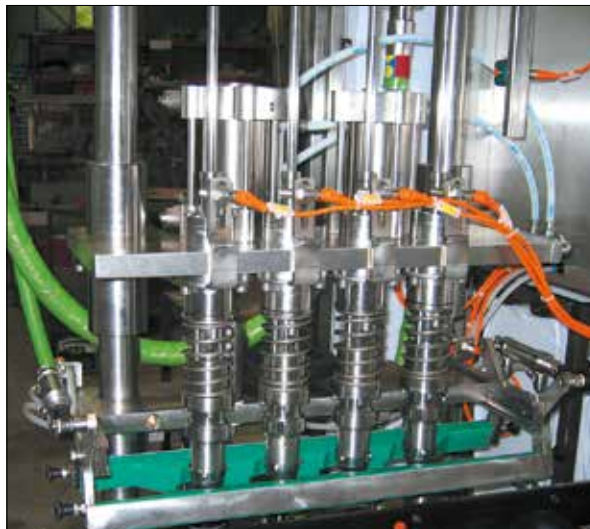


# Beverages industry

## Beverages filling machines



Pneumatic lifting device for filling machines – iglidur® H370 gives you a low coefficient of friction in dry operation, chemical resistance and low moisture absorption.



No wear after 5 years: iglidur® polymer plain bearings and drylin® R liners in a beverages can emptying system.

# Practical examples

## Bottle packing machine



Bottle packing machine: The redevelopment of a gripper using igus® plain bearing elements resulted in a very thin, rugged and Lubrication-free gripper tool that is right now not available in the market.



igubal® spherical bearing in pneumatically driven flap bearing.



# Foodstuffs

## Packaging plants

Sought by Mr. Clean – The Lubrication-free bearing system is highly recommended for the food and hygiene industry.



Packaging line for profiles: With igubal® spherical bearings, flange bearings and rod end bearings, maintenance and downtime was reduced almost to zero.

# Practical examples

## Bulk goods handling



Bulk goods handling: pressing device with pull-off technique for pressing bulk goods in a packaging process. igus® polymer bearings and an igus® e-chain® were used in the construction.



A major reason for the use of igus® polymer bearings is the freedom from Lubrication. In this pressing device numerous igubal® spherical bearings were installed.



# e-chains®/chainflex® cables

All axes and clean room



Carry energy, data and media – in any orientation – igus® e-chains® and chainflex® cables.

Cleanroom-suitable  
e-chains® – virtually no  
abrasion, IPA Class 1.



# Practical examples

The smallest installation spaces and solutions from a single source



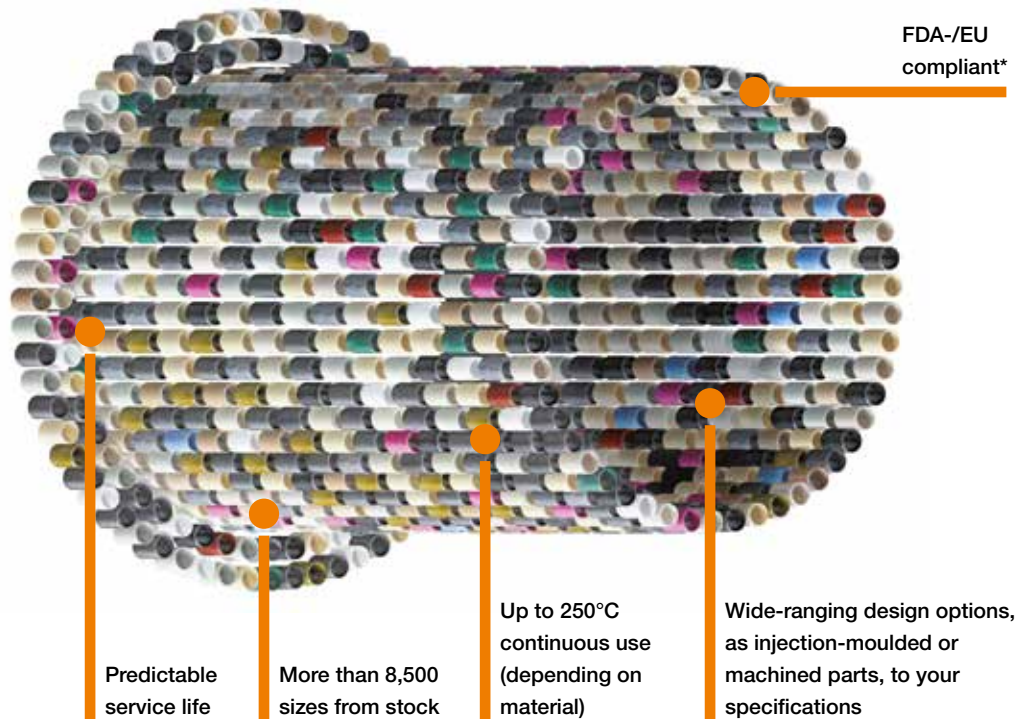
Even for the narrowest installation space – bending radii from  $4 \times d$  with e-chains® and chainflex®.



drylin®, e-chains® and  
chainflex® cables –  
all parts from one source in  
thermoforming machine.



# iglidur® plastic plain bearings ...



## Lubrication and maintenance-free plain bearings made from high-performance plastics – iglidur®.

No lubrication or maintenance required, while cutting costs and increasing service life, everything from stock and delivered promptly – that is the central idea of all igus® products. iglidur® plastics have been extensively tested with respect to wear and friction values including other relevant material properties. iglidur® polymer plain bearings from igus® signifies the step from the plastic bushing to the tested and therefore predictable machine element.

- Highly wear-resistant polymers, improved with fine-tuned additives of reinforcement materials and solid Lubrications
- Tested by the thousands, proven by the millions
- Lubrication-free, maintenance-free, cost-effective, predictable and versatile
- Compliant to the EU regulation 10/2011 EC and/or FDA-compliant (FOOD AND DRUG ADMINISTRATION)
- For direct use in the vicinity of (or in contact with) food or drugs
- Short delivery times even for special dimensions.

 [www.igus.eu](http://www.igus.eu)

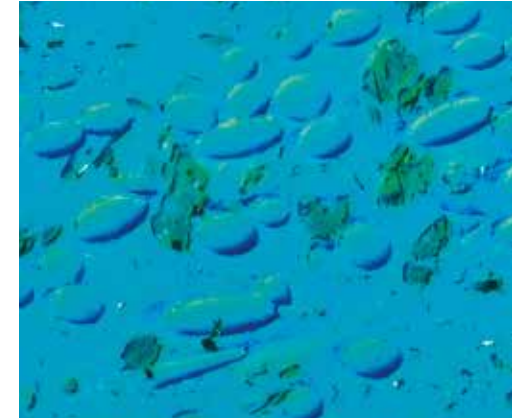
\*iglidur® A180, A350, A500, A181, A160

# ... no product contamination

## The iglidur® solution: The self-lubricating effect.

The high-performance polymers of the iglidur® plain bearings consist of:

- The base polymers are crucial for the wear resistance.
- Fibres and filling materials reinforce the bearing to absorb high forces or edge loads.
- Finally, the solid Lubrications automatically lubricate the bearings and reduce the friction in the system.



## Integrated lubrication.

As microscopic particles, millions of the solid Lubrications are embedded in minute chambers in the solid, mostly fibre-reinforced material. The bearings release tiny amounts of Lubrications from these chambers. This is adequate to sufficiently lubricate the immediate surrounding area.

The Lubrications help to reduce the iglidur® bearing's coefficient of friction.

## Tested!

In the largest lab of its kind, igus® Cologne

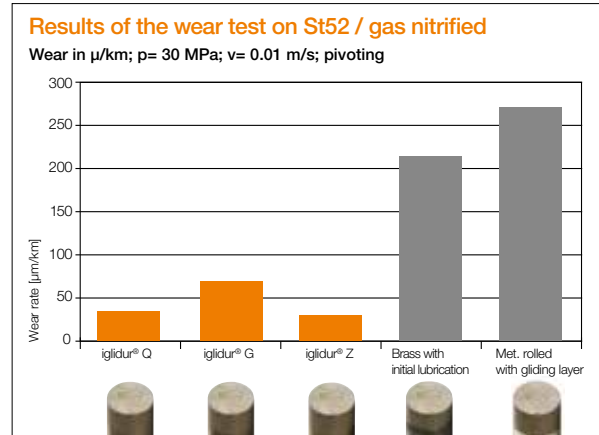
## Test: "swivel test"

**Objective:** To test the wear of iglidur®

plastic plain bearings compared to metallic plain bearings

**Test setup:** Swivel test on a shaft with 30 MPa.

**Result:** All tested iglidur® materials show considerably less wear than the metallic plain bearings. The shafts of the metal plain bearings exhibit significant wear and are therefore unsuited for further use.



# iglidur® materials ...

... for the packaging industry

## Standards



### iglidur® G – the allrounder

- Maintenance-free dry operation
- High abrasion resistance
- Resistance to dust and dirt
- Over 700 sizes available ex stock
- Low-cost



### iglidur® J – the Fast and Slow Motion Specialist

- Low wear against many shaft materials
- Low friction coefficients in dry operation
- Vibration dampening
- Good resistance to chemicals
- Best performance with soft shafts
- Low moisture absorption



### iglidur® W300 – the endurance runner

- For especially long service life
- Low coefficient of friction
- Extremely high abrasion resistance
- Suitable for rough shafts and stainless steel shafts - dirt-resistant

## FDA- and/or EC-compliant



### iglidur® A160

- Compliant with EC Directive 10/2011 EC
- FDA-compliant
- Very high media-resistance
- Average temperature range
- Low-cost



### iglidur® A500

- Resistant to temperature from -100°C to +250°C
- Very high resistance to chemicals
- Compliant with EC Directive 10/2011 EC
- FDA-compliant



### iglidur® A181

- Compliant with EC Directive 10/2011 EC
- FDA-compliant
- Good media-resistance



### iglidur® A350

- Temperature resistant allrounder material
- Compliant with EC Directive 10/2011 EC
- FDA-compliant



### iglidur® A180

- For wet environments
- FDA-compliant

## High loads



### iglidur® Z

- Excellent wear resistance with high loads
- High thermal resistance
- For high surface speeds



### iglidur® Q2

- Lubrication and maintenance free
- Wear resistant and dimensionally stable at high loads
- Good price/performance ratio

## High temperatures



### iglidur® H370

- Wear resistant; especially under water
- High temperatureresistance (-40 to +200°C)
- High chemical resistance



### iglidur® X

- For operating temperatures of -100°C to +250°C in continuous operation
- Excellent chemical resistance
- High compressive strength



### iglidur® J350

- Temperature-resistant
- Wear-resistant
- Impact resistant

## Specialists



### iglidur® P210

- Also suitable for soft shafts
- Low wear
- Low friction



### iglidur® X6

- Low-cost material for mass production
- Low coefficients of friction
- Good media-resistance
- Low moisture absorption



### iglidur® J4

- Low-cost material for mass production
- Low coefficients of friction
- Good media-resistance
- Low moisture absorption



### iglidur® T220

- Free from undesirable and prohibited contents in the tobacco industry



### iglidur® L250

- Specially made for fast rotating applications
- Very low coefficients of friction
- Excellent wear resistance



### iglidur® J3

- Low coefficients of friction
- Good media-resistance
- Low moisture absorption
- PTFE-free

## Special solutions



### Customer solutions

Individually adapted materials with special properties: We develop the plastic that's needed for your application and find the ideal solution.



# More products ...



## igidur®-piston rings minimise efforts.

Replace elaborately stamped PTFE tapes with a single clip-on guide ring, such as in lifting elements, control valves and fittings. We offer iglidur® piston rings made of freely selectable materials for a wide range of applications, for instance, made of the FDA-compliant material iglidur® A180.

- Defined clearance
- Piston rings in desired material and dimension based on the iglidur® materials
- Lubrication and maintenance free
- Low installation effort
- More wear-resistant than PTFE tapes
- Low-cost
- High load capacity

 [www.igus.eu/pistonrings](http://www.igus.eu/pistonrings)



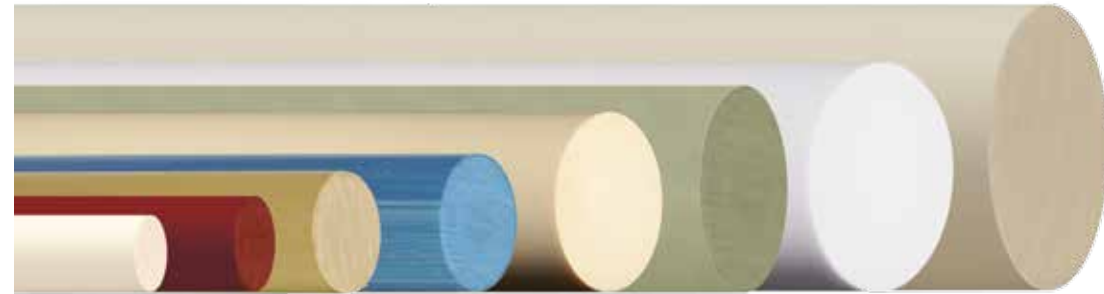
## igidur® knife-edge rollers. Precise and Lubrication-free.

igus® has developed its own knife-edge rollers to implement conveyor belt deflection for conveyor technology applications. The first standard product range has three iglidur® materials available: the universal iglidur® P210 and the FDA compliant iglidur® A180 (up to 90°C) and iglidur® A350 (up to 180°C). The iglidur® solution is characterised by tight deflection radii and low, required driving power.

- "Sharp" deflection of conveyor belts
- Small radii ensure maximised space utilisation
- To transfer difficult to handle transport goods
- Insert for rolling knife edge
- Usually high PV values (belt pretension / high peripheral speed with small radii)
- Typical values:  $v_{max} = 0.3$  to  $0.5$  m/s ;  $p_{max} = 0.5$  to  $1$  MPa

 [www.igus.eu/knifeedgerollers](http://www.igus.eu/knifeedgerollers)

# ... from the iglidur® product range



## igidur® for free design.

### Bar stock made of technical plastic.

As plastic bar stock to make your own or as mechanically finished special components - for prototypes, test specimens and small quantity needs. Many materials available, including: iglidur® A180 that meets the requirements of the FOOD AND DRUG ADMINISTRATION (FDA) for direct use (or contact) in environments with foodstuffs.

- Compliance with EC Directive 10/2011 EC possible
- FDA-compliance possible
- Very high media-resistance
- Lubrication and maintenance free
- Low-cost
- Wear-resistant

 [www.igus.eu/barstock](http://www.igus.eu/barstock)



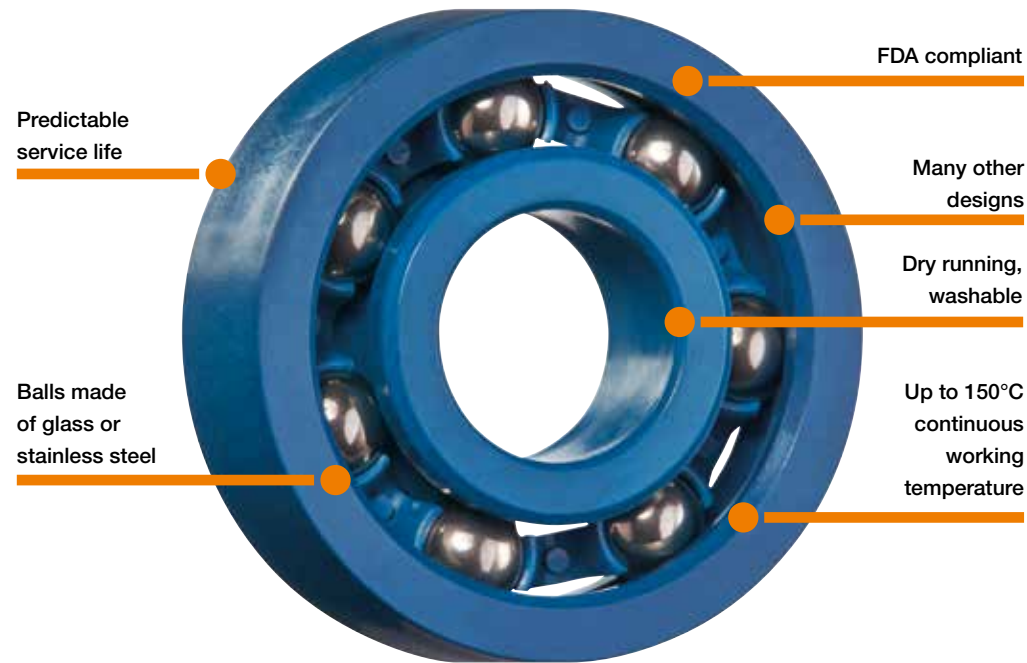
## igidur® off the reel: Tribo-Tape

The igus® Tribo-Tape is suitable for a variety of lining for tribologically stressed surfaces and shapes. Thus, by bonding with laminated tape, for example, the dampening properties are increased in applications with shocks and vibrations. The tape made of, for example, iglidur® A160 is characterised by low friction coefficients and high wear resistance, and complies with EU Regulation 10/2011 EC and FDA requirements.

- Materials: iglidur® A160, V400
- Lubrication and maintenance free
- Easy to cut
- Can be glued
- Wear-resistant
- Less installation space required

 [www.igus.eu/tribotape](http://www.igus.eu/tribotape)

# xiros® polymer ball bearings ...



Lubrication and maintenance-free ball bearings made from high-performance plastics – xiros®.



**xirodur® A500** – Heat, chemicals, electrical insulation, wear-resistant.

[www.igus.eu/xirosA500](http://www.igus.eu/xirosA500)



**xirodur® B180** – for the food sector. Washable, temperature up to 80°C.

[www.igus.eu/xirosB180](http://www.igus.eu/xirosB180)



**xirodur® C160** – Media resistance. Resistant to corrosion and chemicals.

[www.igus.eu/xirosC160](http://www.igus.eu/xirosC160)

# ... avoid lubricating

xiros® polymer ball bearings revolutionise the ball bearing market. Where conventional metallic ball bearings are not expedient, many applications can be successfully implemented by their maintenance-free dry operation and the use of xirodur® high-performance polymers.

- Lubrication and maintenance free
- High corrosion resistance
- For temperatures up to +150°C
- High media resistance, washable, non-magnetic
- Low weight

[www.igus.eu/xiros](http://www.igus.eu/xiros)

## Service life calculation for xiros® polymer ball bearings

Select the installation size and enter the rotary speed and loads of your application. The material combinations available in your required size are displayed in the "Select material combinations" window. There you can select the option for which you want to calculate the service life in dry operation.

[www.igus.eu/xiros-expert](http://www.igus.eu/xiros-expert)



**xirodur® M180** – Detectable and media-resistant.

[www.igus.eu/xirosM180](http://www.igus.eu/xirosM180)



**xirodur® F180** – ESD protection and FDA compliant in one.

[www.igus.eu/xirosF180](http://www.igus.eu/xirosF180)



# Special parts and more ...



## xiros® system solution aluminum tubes with xirodur® B180 flanged ball bearings.

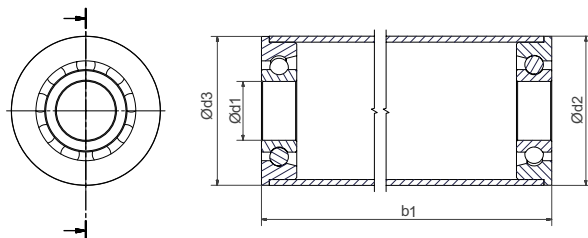
The complete solution combines lightweight, anodised aluminum tubes with maintenance-free and cost-effective flanged ball bearings from xirodur® B180.

- Low coefficient of friction
- Low-cost
- Maintenance-free
- Various diameters possible

 [www.igus.eu/xirosAlu](http://www.igus.eu/xirosAlu)

### Dimensional example [mm]

Inner Ø	Outer Ø	Flange Ø	Length
d1	d2	d3	b1
10	38	38	500



 **Part No. structure**  
BBT-AC38-6000-B180-10-ES-500

# ... dry-tech® solutions

Ready made or custom made.

**Everything is possible – iglidur® special parts and solutions.**

Constructive special solutions such as double flanged bushings, piston rings, washable bearings, 2-component rollers, virtually everything is possible. iglidur® offers self-lubricating and maintenance-free plain bearing solutions absolutely according to your wishes, "off the shelf" or specifically "tailored" to your applications:

For you, "ready made" means ...

- Selection from over 7,381 standard dimensions
- Quick availability
- Low-cost

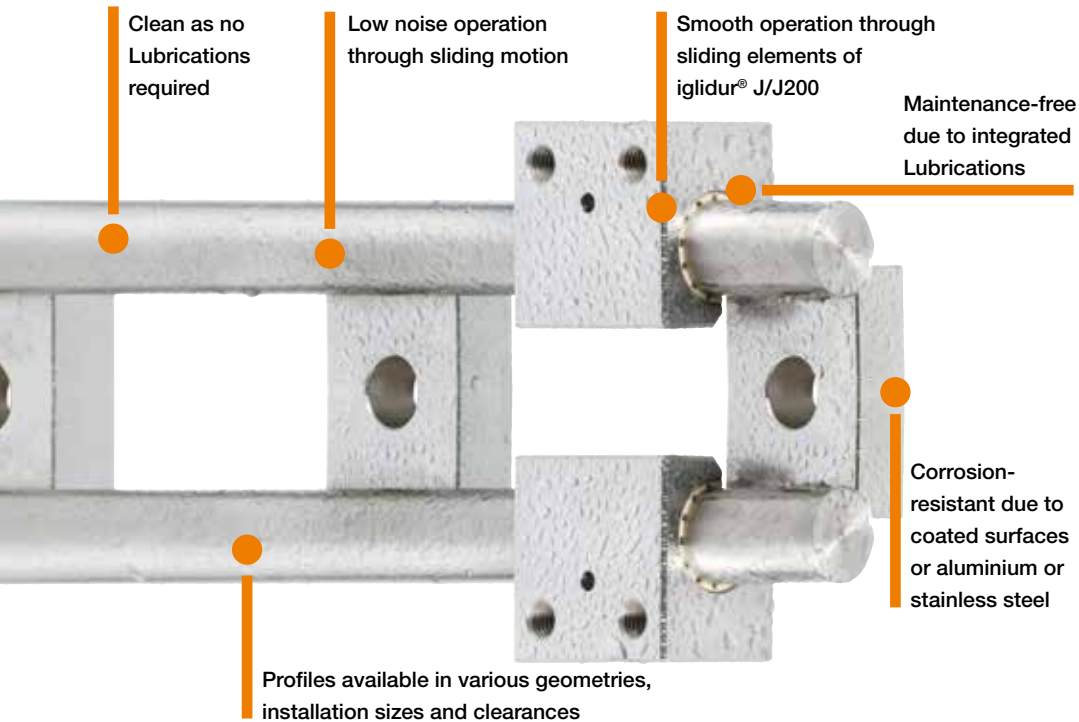
For you, "custom made" means ...

- "Custom made" problem solutions for your application
- Washable design
- Double flange bushings
- Spherical knife-edge rollers

 [www.igus.eu/specialparts](http://www.igus.eu/specialparts)



# drylin® linear technology ...



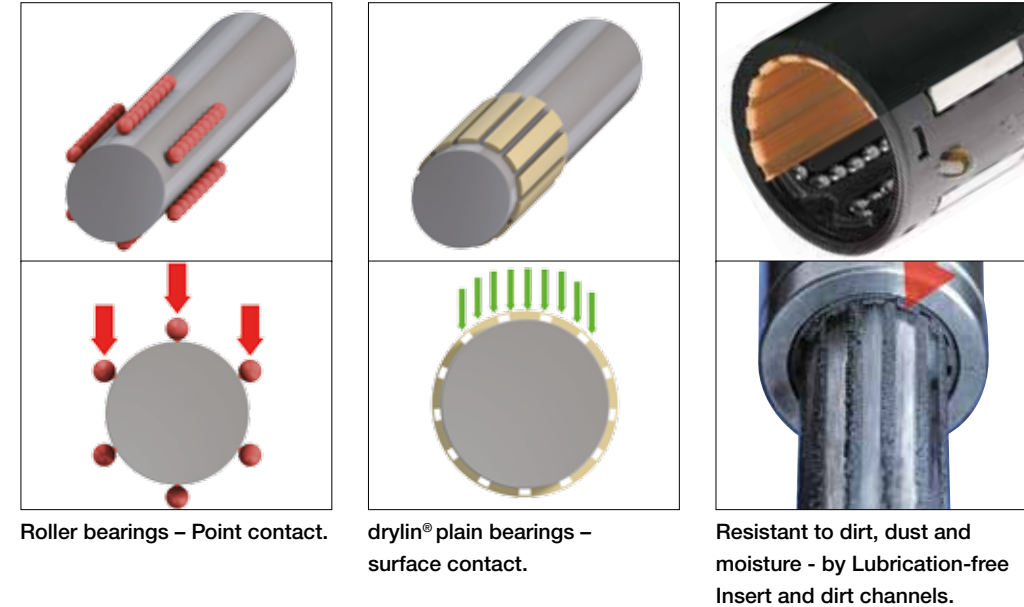
## Lubrication and maintenance-free linear technology solutions – drylin®.

drylin® is a product range of Lubrication-free linear plain bearings based on the principle of sliding instead of rolling. Tribo-optimised iglidur® high-performance polymers are used as sliding surfaces. The drylin® linear systems traverse in dry operation and are maintenance-free. Available are linear guides on rails or round shaft base. drylin® drive technology can supply ready-to-connect systems with lead screw drives or toothed belt drives, with or without motor. The focus is on, besides the freedom from maintenance and lubrication, the ruggedness and insensitivity to influences such as dirt, water, chemicals, heat or impacts.

- Resistant to dirt due to dry operation
- Insensitive to impacts and vibrations
- High static load capacity
- Suited for short-stroke applications
- High speeds possible up to 10 m/s and accelerations up to 100 G
- Low magnetism

 [www.igus.eu/drylin](http://www.igus.eu/drylin)

# ... Gliding instead of rolling



## Tested!

In the largest lab of its kind, igus® Cologne

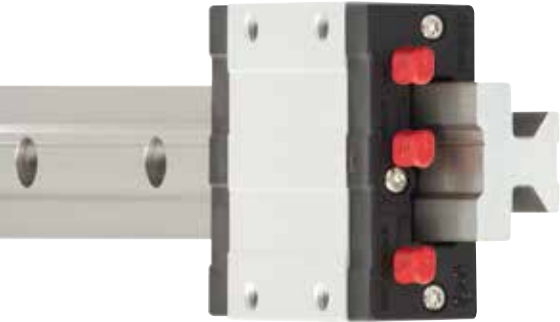
## Media test drylin® linear technology.

Service life and wear test of a drylin® linear guide in the "under-water basin".





# drylin® product overview



## drylin® T rail guides

- Specially made for applications in the automation and handling sectors
- Free of Lubrication and corrosion
- Adjustable bearing clearance
- High static load capacity

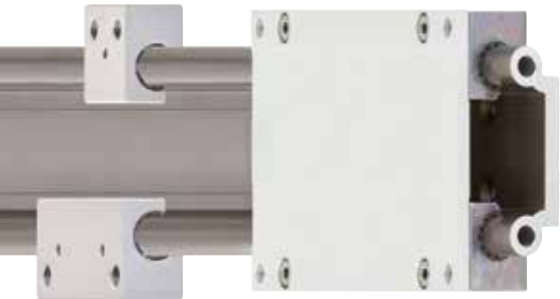
 [www.igus.eu/drylinT](http://www.igus.eu/drylinT)



## drylin® N flat guides

- Low installation height and installation surface
- High speed and acceleration possible
- Numerous carriage options – also with pretension

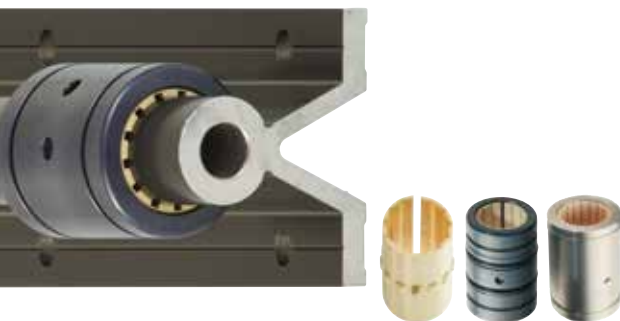
 [www.igus.eu/drylinN](http://www.igus.eu/drylinN)



## drylin® W profile guides

- Easy installation
- Lubrication-free application
- 14 different profiles, over 50 carriage options
- Versatile use, space-saving and compact

 [www.igus.eu/drylinW](http://www.igus.eu/drylinW)

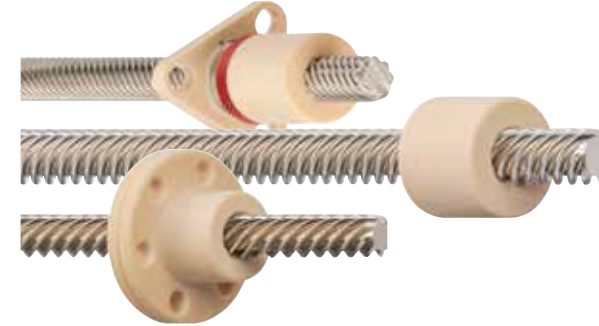


## drylin® R shaft guides

- Corrosion-free, wear-resistant
- Low friction coefficient and low noise operation
- Dimension identical to standard commercial ball linings
- Shafts, shaft support blocks and accessories available from stock
- Replaceable liners

 [www.igus.eu/drylinR](http://www.igus.eu/drylinR)

# Linear drive systems



## dryspin® technology and drylin® SD lead screws

- Maintenance-free dry operation
- Low noise
- Resistance to dust and dirt
- Corrosion-free
- Trapezoidal thread and high helix thread
- High levels of efficiency
- Anti-backlash function available

 [www.igus.eu/dryspin](http://www.igus.eu/dryspin)



## drylin® SHT/SLW linearmodule

- 100% Lubrication-free through polymer bearings and nuts
- For format adjustments
- Trapezoidal or high helix thread pitches
- Lightweight plastic units up to solid stainless steel solutions
- Freely selectable stroke length
- Drive optional via hand wheel or motors
- Numerous accessories

 [www.igus.eu/drylinSHT](http://www.igus.eu/drylinSHT)

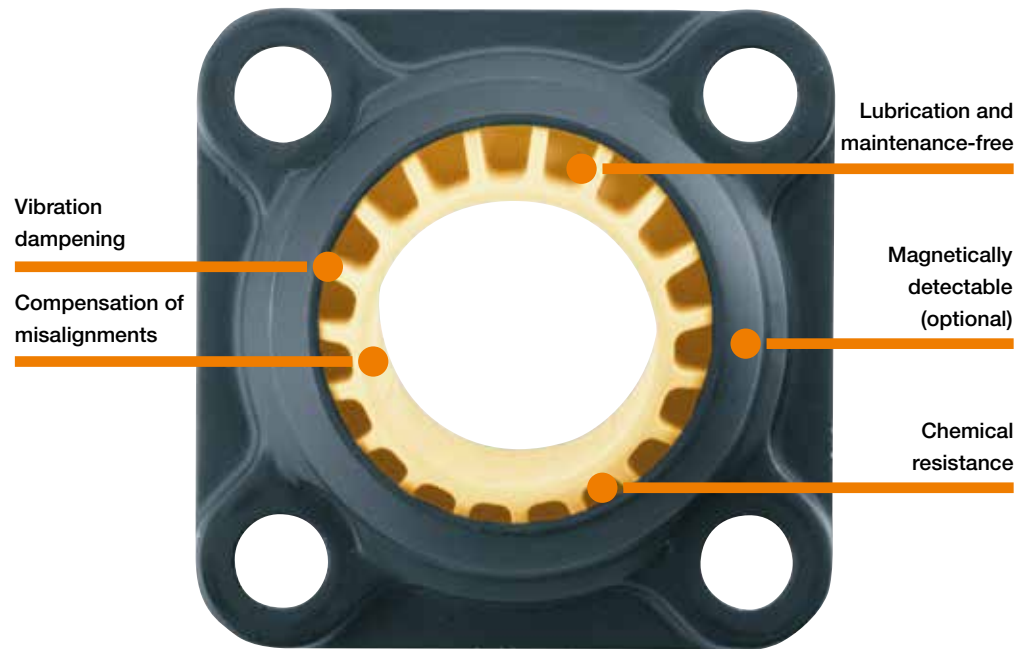


## drylin® E drive technology

- Construction kit: Linear axis plus motor, ready to install, can be configured online
- Ready to install with motor
- Cable and limit switches available in 3-4 days

 [www.igus.eu/drylinE](http://www.igus.eu/drylinE)

# igubal® spherical bearings ...



## Lubrication and maintenance free spherical bearings from igus® – igubal®.

igubal® is a system of self-aligning bearing elements completely made of plastic.

The igubal® series provides developers with a complete system of self-adjusting bearing elements: rod end bearings, clevis joints, flange bearings, spherical bearings and pillow block bearings. Self-adjusting bearings are easy to install, adaptable to all angular variations and have already been used to replace special housings in many cases.

igubal® utilises all the advantages of the high performance plastics employed. They can be used in dry operation

and have excellent vibration dampening properties. They are insensitive to dirt, can operate in liquids and even in chemicals and are completely resistant to corrosion.

- igubal® maintenance-free spherical bearings with a diameter of 2 to 50 mm
- Resistant to chemicals and corrosion
- Excellent damping properties
- High frequency possible
- Predictable service life

 [www.igus.eu/igubal](http://www.igus.eu/igubal)

# ... Compensate easily



Rod end bearings with outer/inner thread; right/left, also as HT version for up to +200°C.



Angle and axial joints, fitting screws



Clevis joints and spring loaded pins, individual or combined (also with rod end bearings).



Various types of pillow block bearings, with split housing and/or spherical ball (optional).



Flange bearing with 2 or 4 bore holes, also as an HT version for up to +200°C.



Spherical bearings and self-aligning clip bearings.



Spherical balls made from iglidur® materials.



Double spherical bearings and coupling bars.



# chainflex® cables ...

1,244 cables available  
from stock

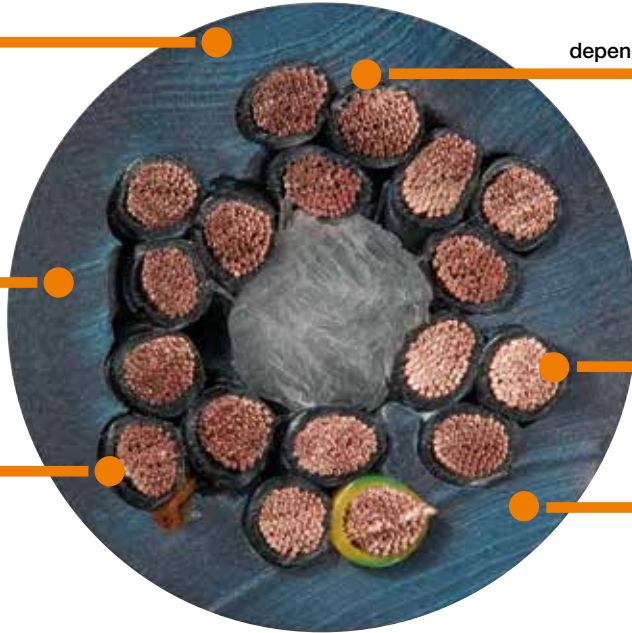
PVC, PUR,  
TPE outer jacket  
depending on application

Highly flexible  
and durable

Cold flexible down  
to -40°C

Hydrolysis and  
microbe-resistant

UV-resistant



Cables for constantly flexing movements and long service life  
in energy chains® – chainflex®.



e.g. chainflex® CF130.UL/140.UL – PVC control cable for medium loads. Cost effective, flame-retardant, temperatures -5°C to +70°C. [www.igus.eu/CF140](http://www.igus.eu/CF140)



e.g. chainflex® CF38 – TPE motor cable for extreme requirements in outdoor applications, UV-resistant, -40°C to +90°C. [www.igus.eu/CF38](http://www.igus.eu/CF38)



e.g. chainflex® CF98 / CF99 – for heavy duty use and especially for small radii. TPE- outer jacket, PVC- and halogen-free, cold-flexible, resistant to hydrolysis and microbes. [www.igus.eu/CF99](http://www.igus.eu/CF99)



e.g. chainflex® CF THERMO – PUR thermocouple cable for high load requirements, PVC and halogen-free, resistant to hydrolysis and microbes. [www.igus.eu/CFThermo](http://www.igus.eu/CFThermo)

# ... last in e-chains®

Flexible cables used in energy chains need special design and manufacture to last through many cycles, high speeds and accelerations, as well as demanding environmental conditions. Electromagnetic compatibility and compliance with standards and guidelines such as UL, CSA, VDE, Inter- and Profibus are also taken for granted today. The igus® chainflex® product range extends from energy chain compatible control cables, servo cables, motor cables, as well as robot cables to bus cables, data cables, encoder cables and fibre optic cables.

- Temperatures -40°C to +90°C
- For highly dynamic applications in energy chains
- Special design prevents cable failure and "corkscrewing"
- Over 1,040 types off the shelf
- Highly abrasion-resistant jacket materials (PVC, PUR, TPE)

[www.chainflex.eu](http://www.chainflex.eu)



**Tested!**

In the largest lab of its kind, igus® Cologne



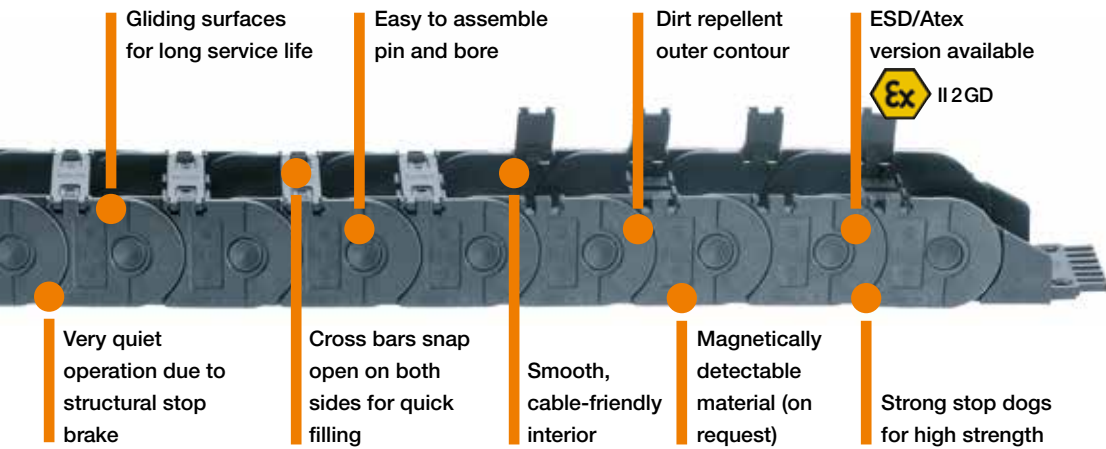
## Cold test -40°C

**Objective:** To determine the maximum service life of igus® chainflex® TPE cables at temperatures of -40°C.

**Test setup:** An igus® CF35 TPE cable was moved in an e-chain® in the igus® climate container at a travel of 7 m and a speed of 1.5 m/s at -40°C.

**Result:** The test was ended after 3.7 million double strokes. The cable exhibits little wear and is fully functional.

# e-chains® for any application ...



A system for carrying energy, data and media – e-chains®.



## The small, strong allrounder chain – E2 micro system

Small e-chain® with rugged stop dog system and large pin/bore for up to 25% longer unsupported length and 100% higher additional loads (compared to identical igus® types). A built-in "brake" minimises impact noise and very smooth contours ensure optimum cable protection. A chain opener (included) saves significant time when opening the e-chain®.



## The versatile one – System E2/000

The E2/000 system combines easy and versatile assembly and installation with ruggedness – high strength combined with low-noise operation, long service life for cables and many mounting options. The design features are uniform in all E2/000 models. Mechanical engineers all over the world rely upon this range.



## The Allrounder – System E4.1

The E4.1 system is the best igus® e-chain® in our product range. With the igus® E4.1 system, the service life of your application can be extended even further and costs are further lowered. E4.1 is easy to open, quiet in operation and versatile in use. Whether standing, hanging, circular on short or long travels, at high speeds or harsh environment. E4.1 is often the first choice.

[www.igus.eu/E2micro](http://www.igus.eu/E2micro)

[www.igus.eu/E2000](http://www.igus.eu/E2000)

[www.igus.eu/E4.1](http://www.igus.eu/E4.1)

# ... and installation methods

igus® e-chains® and e-chainsystems® are suitable for universal applications

- Carry sensitive bus, data and fibre optic cables, as well as energy forms such as electricity, gas, air and liquids in one system
- Many types of orientation and application
- For high dynamic loads and tough service life requirements
- For all environments and climates (from -40°C to +120°C)
- Easy to clean
- Compact installation
- Also as detectable material or as ESD/ATEX version
- Enclosed or open construction types
- Simple modular assembly on site, as well as quick retrofitting of cables

[www.igus.eu/e-chains](http://www.igus.eu/e-chains)




## Tested!

In the largest lab of its kind, igus® Cologne

Over 5,000 tests for e-chains® in the largest lab of its kind, igus® Cologne. On a floor area of 2,750 m² igus® tests the durability of e-chains® and cables, always suitable for the application and place of use.






plastics for longer life®


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[Home](#) > [Packaging Industry](#)

with igus® products



**- Service life up**

- chemical and corrosion-resistant
- very good damping properties
- compensation of misalignments
- low weight
- resistance to dirt


**Costs down -** in the packaging industry 







### Packaging Industry

Dear packaging machinery manufacturers,

the »[packaging industry](#)«, the »[food industry](#)« or the »[beverage industry](#)« typically handle sensitive products. Particularly when food contact is involved, special requirements must be met, while cleanliness and economic feasibility must also enter into a symbiosis in the packaging industry by means of accurate and fast processing.

Tuned to the specific needs of the packaging industry, such as food hygiene or FDA compliance, we are able to provide you with our maintenance-free and lubricant-free machine elements from high-performance plastic solutions that optimize your packaging machines.



-  No minimum order value
-  7<sup>00</sup> - 20<sup>00</sup>
-  Delivery + Consultation
-  Delivery from 24h\*
-  Free samples
-  Is something not to your liking? Free of charge

#### Your contact

Lars Braun  
 ☎ +49 2203 9649 218  
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 » [Igidur® - Expert System](#)

**Your requirements**

☐ Maximum service life in dry operation

☐ Cost effective

☐ Dirt resistant

☐ Underwater application

☐ Low coefficients of friction

☐ Used in misalignment

☐ High resistance to chemicals

☐ Vibration damping

☐ Low moisture absorption

☐ FDA compatible / Foodstuff

**Part selection (only for parts with a delivery program)**

Shaft diameter:

No selection


☐ metric ☐ imperial


**The SKF bearing suited for you**

Standards	Specialist models from stock	Order related specialists
<a href="#">SKF 6000</a>	<a href="#">SKF 6000-2</a>	<a href="#">SKF 6000-2</a>
<a href="#">SKF 6001</a>	<a href="#">SKF 6001-2</a>	<a href="#">SKF 6001-2</a>
<a href="#">SKF 6002</a>	<a href="#">SKF 6002-2</a>	<a href="#">SKF 6002-2</a>
<a href="#">SKF 6003</a>	<a href="#">SKF 6003-2</a>	<a href="#">SKF 6003-2</a>
<a href="#">SKF 6004</a>	<a href="#">SKF 6004-2</a>	<a href="#">SKF 6004-2</a>
<a href="#">SKF 6005</a>	<a href="#">SKF 6005-2</a>	<a href="#">SKF 6005-2</a>
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<a href="#">SKF 6040</a>	<a href="#">SKF 6040-2</a>	<a href="#">SKF 6040-2</a>
<a href="#">SKF 6041</a>	<a href="#">SKF 6041-2</a>	<a href="#">SKF 6041-2</a>
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<a href="#">SKF 6044</a>	<a href="#">SKF 6044-2</a>	<a href="#">SKF 6044-2</a>
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<a href="#">SKF 6050</a>	<a href="#">SKF 6050-2</a>	<a href="#">SKF 6050-2</a>
<a href="#">SKF 6051</a>	<a href="#">SKF 6051-2</a>	<a href="#">SKF 6051-2</a>
<a href="#">SKF 6052</a>	<a href="#">SKF 6052-2</a>	<a href="#">SKF 6052-2</a>
<a href="#">SKF 6053</a>	<a href="#">SKF 6053-2</a>	<a href="#">SKF 6053-2</a>
<a href="#">SKF 6054</a>	<a href="#">SKF 6054-2</a>	<a href="#">SKF 6054-2</a>
<a href="#">SKF 6055</a>	<a href="#">SKF 6055-2</a>	<a href="#">SKF 6055-2</a>
<a href="#">SKF</a>		

 [www.igus.eu/iglidurfinder](http://www.igus.eu/iglidurfinder)

The Iglidur® product finder shows you the right plain bearing solution for your application with just a few clicks. With a direct link to the online catalogue with much more information and direct price display.

A wide range of other online tools, such as configurators, service life calculators, and product finders, can be found at  [www.igus.eu/online](http://www.igus.eu/online)

 For all tasks -  
for all batch sizes

Different industries need different solutions. Whether in mechanical engineering, automotive manufacturing or in the robot industry – igus® offers customised support for specialised applications.

igus® already has many years of experience and specialised resources for many industries.

 [www.igus.eu/industry](http://www.igus.eu/industry)



### Innovative solutions



### Energy technology

Developing new energy technologies for power, heating, cooling, and other applications

- Energy efficiency
- Renewable energy
- Energy storage



### Food technology

Developing new food and beverage technologies for food safety, food security, food quality, and food processing

- Food safety
- Food security
- Food quality
- Food processing



### Medical technology

Developing new medical technologies for diagnosis, treatment, and prevention of disease

- Medical diagnosis
- Medical treatment
- Medical prevention
- Medical research



### Automotive technology

Developing new automotive technologies for transportation, mobility, and safety

- Automotive transportation
- Automotive mobility
- Automotive safety
- Automotive research



### Artificial intelligence

Developing new artificial intelligence technologies for data analysis, decision making, and automation

- Artificial intelligence data analysis
- Artificial intelligence decision making
- Artificial intelligence automation
- Artificial intelligence research

### Key performance indicators

- Revenue
- Profit
- Market share
- Customer satisfaction
- Employee satisfaction
- Environmental impact
- Social impact
- Legal impact
- Reputation

### Key challenges

- Regulation
- Competition
- Market volatility
- Technological change
- Environmental impact
- Social impact
- Legal impact
- Reputation

### Key opportunities

- Market growth
- Technological innovation
- Environmental sustainability
- Social responsibility
- Legal compliance
- Reputation enhancement

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General packaging



**Food packaging: Wrapping and sealing**

Food packaging is a critical part of the food supply chain, ensuring the safety and quality of the product. It involves the use of various materials and techniques to protect the food from contamination, spoilage, and damage during transportation and storage.

**Services:**

- Food packaging design and development
- Food packaging material selection and procurement
- Food packaging production and manufacturing
- Food packaging inspection and quality control
- Food packaging distribution and logistics



**Sealing solution for liquids**

Sealing solutions for liquids are designed to provide a secure and leak-proof seal for liquid products. They are typically made of high-quality materials and are designed to be easy to use and maintain.

**Services:**

- Sealing solution design and development
- Sealing solution material selection and procurement
- Sealing solution production and manufacturing
- Sealing solution inspection and quality control
- Sealing solution distribution and logistics



**Storage solutions**

Storage solutions are designed to provide a secure and safe storage environment for food products. They are typically made of high-quality materials and are designed to be easy to use and maintain.

**Services:**

- Storage solution design and development
- Storage solution material selection and procurement
- Storage solution production and manufacturing
- Storage solution inspection and quality control
- Storage solution distribution and logistics



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- Storage solution inspection and quality control
- Storage solution distribution and logistics

 [www.igus-packaging.eu](http://www.igus-packaging.eu)

Visit our industry website for more information, products and application examples as well as online tools.

[illegible]

**iglidur® special parts for packaging machines**

**flexibly made or custom made**  
 Everything is possible - iglidur® special parts and solutions  
 Special engineering solutions like roller feet and low clearance bearings, axial and circumferential compensation, and barrel profile for  
 pinching, lubrication and more - always at your disposal.

**iglidur® offers you solutions for any maintenance task situation, and accordingly your wishes: "left the shelf" or "custom made" - depending on your application.**



**For you: "flexibly made" measures...**

- Selection from over 7000 standard components
- Quick availability
- Low prices



**For you: "custom made" measures...**

- Customized from over 7000 standard components
- Table made: problem solutions for your application
- Best material
- Tailor-made compensation systems

# Research & Development

# 15,000 tests per year



Better products for less - a key element is the industry's largest test lab. 2,750 m<sup>2</sup> lab, more than 15,000 tests and 2 billion test strokes per year.

## The igus® lab and field experience

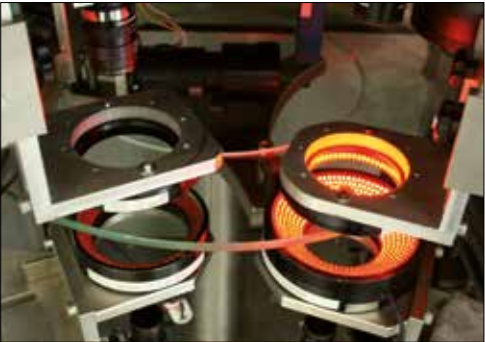
Cutting costs while also guaranteeing maximum process reliability – only those who conduct intensive research and testing will successfully bridge this gap. The industry's largest test lab conducts more than two billion test cycles per year on a total of 107 test rigs.

This means they can be relied upon completely in the field.

 [www.igus.eu/test](http://www.igus.eu/test)



Tribology testing in the plain bearing lab, igus® Cologne.



## The igus® quality assurance

The quality policy of igus® is to identify and meet customer needs, and to always be a competent and reliable supplier. igus® has always been committed to produce products at the best available quality level, and to consistently develop innovative solutions.



## Better for the environment

Because iglidur® is free of lubrications, no contaminants are discharged to the environment. The low weight of iglidur® polymer plain bearings also help make them environmentally attractive.

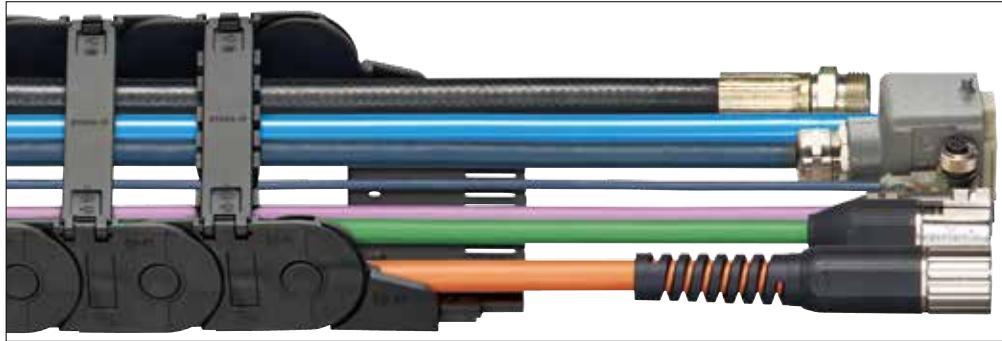


## Extensive test database

What is probably the world's largest database was created from more than 15,000 test. This database gives us the ability to select the right product for your specific application.



Harnessed energy supply systems with cables and connectors.



## readychain®

Fully harnessed systems in 3-10 days, 1,600 systems per week in 12 readychain® factories world-wide – optimised assembly time and better cash flow.

- Eliminate storage costs for cables, e-chains® and connectors
- Cut turnaround times by half
- Flexibility for order fluctuation
- Reduce the number of suppliers and orders by 75%
- Minimise your machine downtime
- System guarantee - according to application

 [www.igus.eu/readychain](http://www.igus.eu/readychain)

## readycable®

igus® provides more than 4,000 harnessed cables for drive technology according to 24 different manufacturer standards. Professionally produced, 100% tested.

- Servo, power and signal-/encoder cables
- No cutting charges, no surcharges for small quantities and packaging
- Cable length accurate to the centimetre per customer spec
- Smallest bending radius from 7.5 x d
- Reduce storage costs and increase cashflow
- From stock in 24-48 hrs

 [www.igus.eu/readycable](http://www.igus.eu/readycable)

## The igus® installation service

Ensure professional installation, avoid downtimes and additional costs - with the igus® e-chainsystem® installation service

- Products and services from a single source – with low logistics costs for you
- igus® system guarantee, customised for each application

 [www.igus.eu/assemblyservice](http://www.igus.eu/assemblyservice)



igus® delivery service - fast & reliable.



## From 24 hrs or same day\*

All catalogue parts and individual components  
*for instance:* one e-chain® link, 6 metre e-chain®, 3 strain reliefs, one iglidur® Q2 plain bearing, one drylin® linear plain bearing

## 24 - 48 hrs\*

### Customised systems

*for instance:* 11.46 m e-chain® with interior separation, guide rails, mounting brackets; 2.46 m drylin® profile rail with 2 carriages

## 3-5 business days

### Harnessed systems

*for instance:* simple, harnessed e-chainsystems® with cables without connectors; lead screw unit based on specific requirements

## 10 business days

### Complex systems and machined components

*for instance:* harnessed e-chainsystem® with cables of all types and connectors, interfaces, fittings, machined shafts to drawing, or mechanically shortened plain bearings, or tool-based injection-moulded parts

\* Products leave our facility within the indicated time.

The indicated delivery time means time until shipping of goods.

## motion plastics®

For over 50 years, we have been driven by a single vision – motion plastics®: Innovations from plastics that move machinery.

Our core technology are tribo-polymers - high-performance plastics, that we engineer for optimised friction and wear. This technology makes us a world-leader in the development and manufacturing of energy supply systems and plain bearings.



# igus® specialists ...

... for the packaging industry –  
close to you worldwide.



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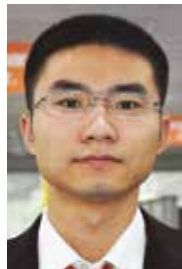
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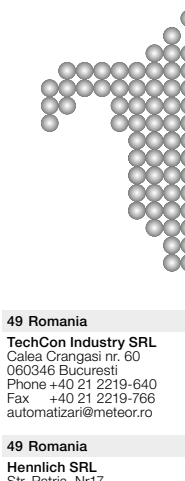
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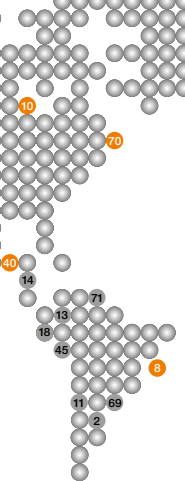
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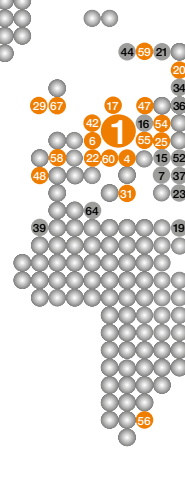
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