

Automotive

Costs less. Lasts longer.
Light weight. Solutions for the
automotive industry



• motion plastics®

igus®.eu...

www.igus.eu/automotive



Markus Feth
Head of Automotive at igus®

**Costs less.
Lasts longer.
Light weight.**

Silent operation and variable interior concepts place enormous demands on today's automotive bearings. BSR (Buzz, Squeak and Rattle) are becoming essential product development challenges not only in the automotive industry. Cost and weight are also crucial components of every new concept. igus® has been helping engineers, designers and buyers to meet the high demands of their automotive industry since 1964. From material selection and design to tolerance calculation, we guide you in your application. Below you will find information about igus®, our materials and manufacturing processes as well as automotive applications. Often, initial samples of our wear-resistant tribopolymers can be produced quickly and cost-effectively using 3D printing or "print2mold" before the series tools are produced. igus® supplies over 500 million plain bearings annually for automotive applications. The essential tools for bearing design are available online for you at www.igus.eu/automotive. We would also be pleased to advise you personally: by telephone, via chat, at teams/Skype meetings or on site at your company. We hope you enjoy reading the brochure.

e-chain®



iglidur® plain bearing



igubal® spherical bearings



drylin® linear bearings



dryspin® lead screw drives



From a Cologne garage to the world market with ideas and tribopolymers. What began in 1964 with a single injection moulding machine and confidence in the potential of polymer materials in a Cologne backyard has developed over the past decades into a globally active company. Today, around 4,250 employees worldwide ensure new ideas, high-quality products, lean processes, short delivery times and proximity to the customer every day. The igus® Cologne hub consists of over 800 injection moulding machines. To ensure fast service and individual consulting, 14 warehouses and assembly centres are available to customers worldwide.

Plenty of room
for innovations
- the flexible
igus® factory

4,250 employees in 31
branches worldwide

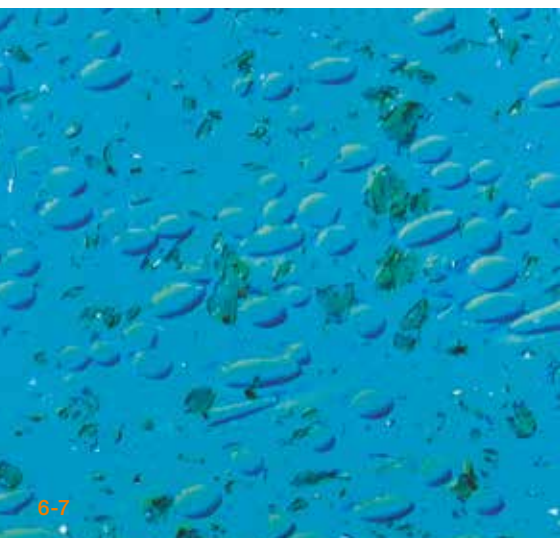
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iglidur® – what is it?

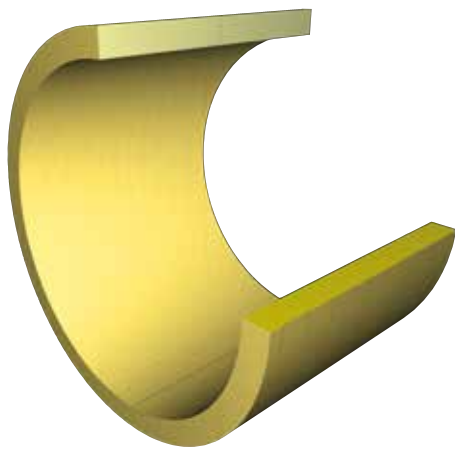
What is iglidur® and what can it do? Polymers, improved by solid lubricants, tested thousands of times and proven millions of times - that is iglidur®. The individual components are not applied in layers, but homogeneously mixed with each other. There is no sliding film that can be pushed away under loads, as is the case with traditional solutions "hard shell - soft coating". **What does iglidur® do in automobiles?**

- Weight reduction
- Excellent price/service life ratio for your application
- Customised materials and solutions
- Bearings with optimised clearance, precisely matched to your housing and shaft tolerance
- Bearings can be calibrated for tolerance adjustment
- Rattle-free bearings to compensate for tube tolerances for pedal systems
- Vibration dampening for mounting shift forks in gearboxes
- Dirt-resistant and self-lubricating bearings in the chassis
- All from a single source: research and development, application consulting, production and worldwide logistics

iglidur® compounds: base polymers with fibres and solid lubricants, magnified 200 times and coloured



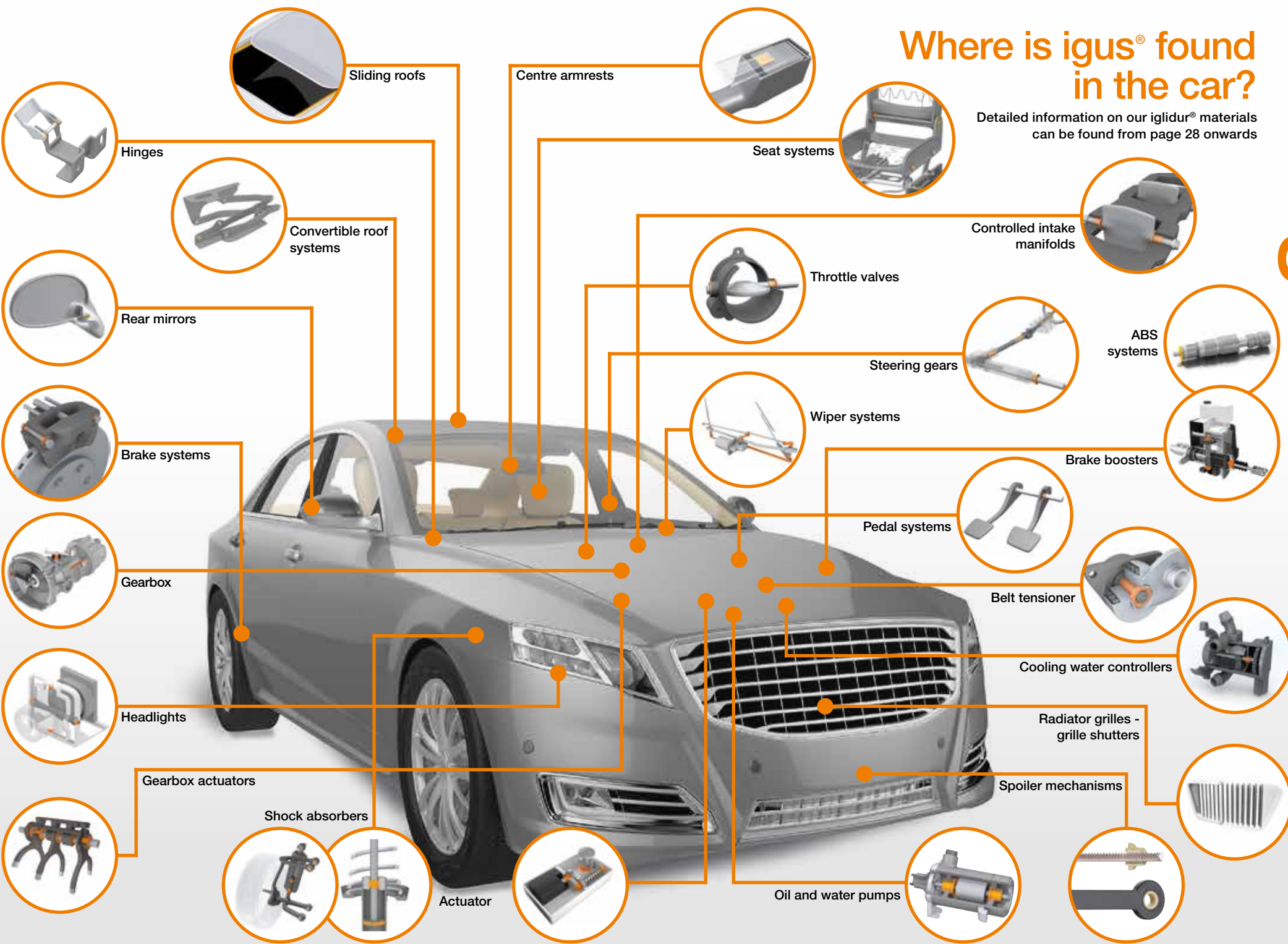
iglidur® plain bearings have a homogeneous structure, base polymers, composites and solid lubricants complement each other



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Where is igus® found in the car?

Detailed information on our iglidur® materials can be found from page 28 onwards



Seat systems

Applications: e. g. seat height adjustment, seat tilt adjustment, armrest, lumbar support

- Prevention of buzz, squeaks and rattle
- Tolerance compensation for e-coating
- High static load up to 120MPa
- Simple sliding partners possible

Materials: among other iglidur® M250/K230/G/RN89gs



www.igus.eu/info/plain-bearings-automotive-seats



Hinges

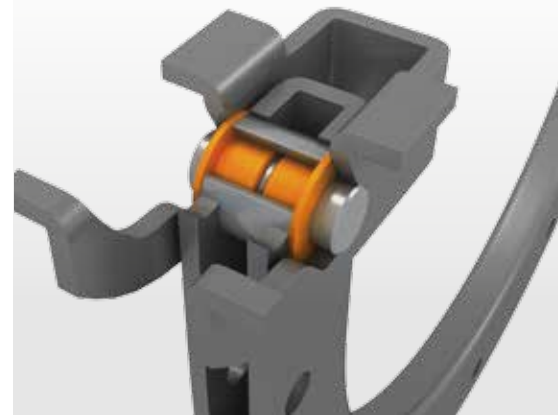
Applications: e. g. boot hinges, multi-link hinges, door hinges

- Suitable for e-coating
- Electrically conductive and insulating materials
- Corrosion-free
- Door hinges, multi-link hinges and others possible
- For more information, see p. 38-39

Materials: among other iglidur® RN89/RN312



www.igus.eu/info/plain-bearings-multiple-joint-hinges



Aerodynamic systems

Applications: e. g. spoiler kinematics, active air dams, active grille shutters

- Lubrication-free
- Corrosion-free
- Low moisture absorption
- Suitable for e-coating

Materials: among other iglidur® RN89/RN346



www.igus.eu/info/industries-overview-automotive



www.igus.eu/automotive



Convertible roof systems

- Tolerance compensation for e-coating
- Silent operation
- Low demand on rivet/shaft
- Corrosion-free

Materials: among other iglidur® G/RN89



www.igus.eu/info/plain-bearings-plain-bearing-convertible-system



Thermal management

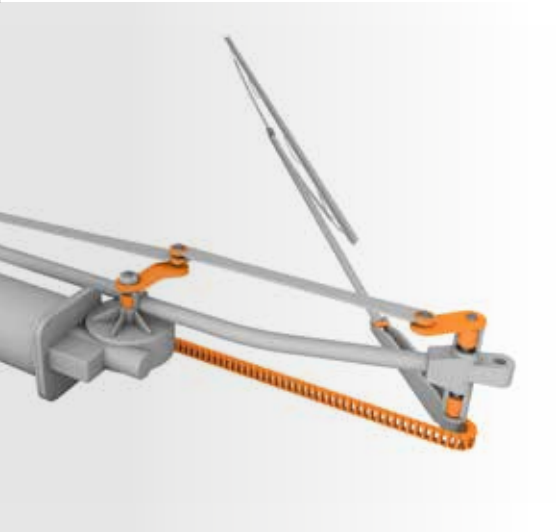
Applications: e. g. water pumps, gear pumps, cooling water regulators, cooling water valves

- High surface speed
- Cost-effective compared to coal/graphite
- Water/glycol resistant
- Replaces carbon/graphite bearings
- Overmoulding possible

Materials: among other iglidur® H1/H370/H4



www.igus.eu/info/coolant-pump-automotive-bearings



Windscreen wipers

- Corrosion-free
- High permissible surface pressure
- Media resistance
- Low friction
- High alternating bending strength

Materials: among other iglidur® H370/HLW/H4



www.igus.eu/info/windshield-wiper-automotive-bearings

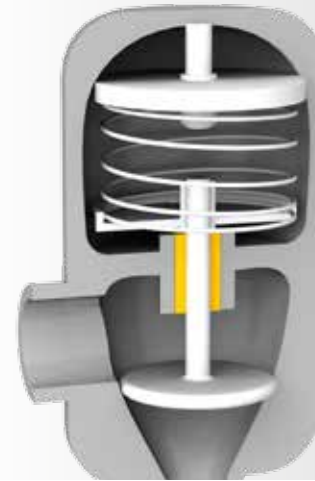
EGR valves and turbochargers

- Media-resistant
- Wear-resistant
- Insensitive to soot contamination
- High temperature resistance

Materials: among other iglidur® H4/X/C500



www.igus.eu/info/industries-overview-automotive



Throttle valves

- Cost-effective
- Bearing can be over-moulded with plastic
- Wear-resistant
- Plain bearings replace needle bearings

Materials: among other iglidur® H2



www.igus.eu/info/plain-bearings-throttle-valves



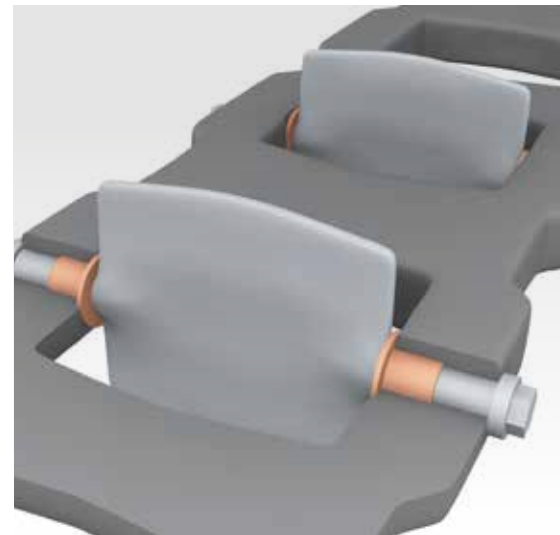
Controlled intake manifolds

- Easy to install design, e. g. for lead screw support block for lead screw support block
- Floating bearing arrangement
- High wear resistance, even against plastic shafts

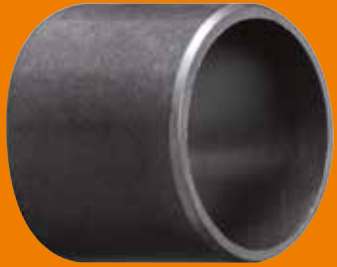
Materials: among other iglidur® G



www.igus.eu/info/plain-bearings-air-intakes



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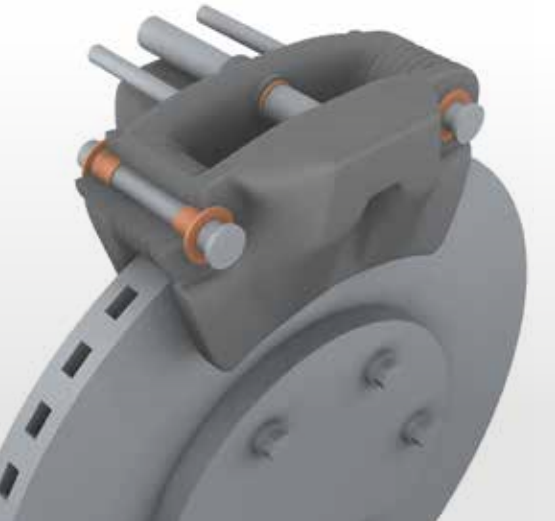
Gearbox

Applications: e. g. shift fork, external connection shift fork, external connection

- Noise dampening
- Resistant to gear oil
- No contact corrosion
- Cost-effective

Materials: among other iglidur® X/H2/H4

 www.igus.eu/info/plain-bearings-gearboxes



Brake systems

Applications: e. g. electronic brake booster, brake caliper, parking brake

- Cost-effective
- Low wear
- Minimise vibrations

Materials: among other iglidur® H1

 www.igus.eu/info/plain-bearings-brake-calipers



ABS + ESP pumps

- Wear-resistant
- High precision
- Meeting residual dirt requirements

Materials: among other iglidur® X

 www.igus.eu/info/industries-overview-automotive

Selector lever

- Lightweight
- Quiet
- Low friction
- Runs well against plastics
- Cost-effective

Materials: among other iglidur® RN293 - see also fogging requirements page 30



www.igus.eu/info/bearings-selector-lever

Interior systems

Applications: e. g. centre armrest, centre console, screen adjustments, rear window blinds

- Low static friction
- Low fogging materials available (see page 33)
- Design freedom
- Lightweight

Materials: among other iglidur® RN293



www.igus.eu/info/plain-bearings-armrest

Actuator

Applications: e. g. seat adjusters, engine compartment actuators, brake boosters

- Noise-dampening
- Self-lubricating
- Vibration dampening

Materials: among other iglidur® H4/J



www.igus.eu/info/actuator-automotive-bearings



www.igus.eu/automotive

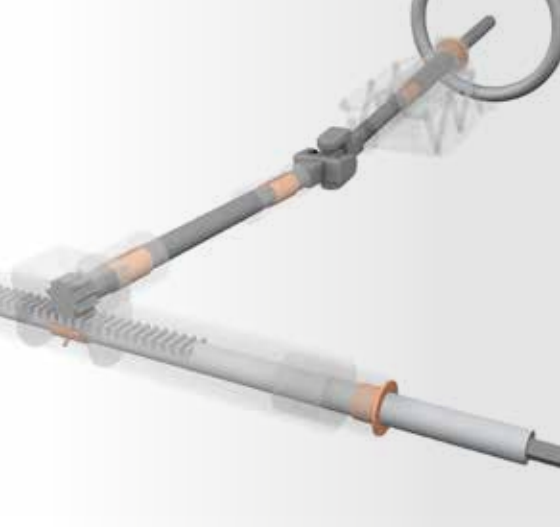


Pedal systems

- Tolerance compensation possible
- Resistant to edge loads
- High static load capacity
- Silent operation

Materials: among other iglidur® J

 www.igus.eu/info/plain-bearings-pedal-boxes



Steering systems

- Withstands high shock loads
- Wear-resistant
- Noise dampening
- Tolerance compensation

Materials: among other iglidur® P210

 www.igus.eu/info/plain-bearings-steering-systems



Lighting systems

- Vibration compensation with adaptive cornering lighting
- High temperature resistant
- Low fogging

Materials: among other iglidur® J350

 www.igus.eu/info/headlights-automotive-bearings

Change bearings now: Cost down, Range up

Change now!

Replace metallic bearings with iglidur® polymer plain bearings. Whether bronze or sintered bearings, PTFE-coated metal bushings or needle bearings, by replacing with iglidur® polymer plain bearings, you reduce costs by up to 40%. A weight advantage of up to 80% with possibly longer service life clearly shows the advantage of using tribopolymers from igus®. Which iglidur® material is used in your application can be easily determined via an igus® online tool. A service life that can be calculated via this facility, without additional maintenance, offers enormous planning security.

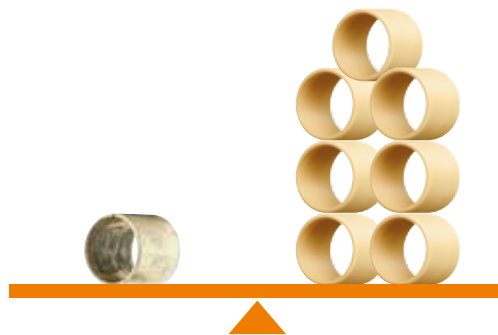


Change your bearing now! Plastic instead of metal: 100% maintenance-free, 80% weight reduction, up to 40% cost savings and increased service life.



Consistent weight reduction lowers consumption and reduces emissions

In addition to dynamic advantages in driving, strict environmental and emission specifications force automobile manufacturers to keep the weight of every component as low as possible. By replacing bearings made of metal with iglidur® plain bearings there is a significant weight advantage due to iglidur® plain bearings being 7 times lighter than a metallic plain bearings.



Weight of a metallic, rolled plain bearing compared to iglidur® plain bearings

iglidur® materials for the automotive sector

An overview of the most important igus® materials for automotive applications. To make your selection easier, we have divided the materials into groups. Over 7,000 standard dimensions from Ø2-150mm are available from stock, in over 30 materials. Short delivery times for special dimensions.

Specialists



P210

iglidur® P210

- For soft shafts
- Low wear
- Low friction
- e. g.: steering, pedal system, interior



RN312

iglidur® RN312

- Temperature-resistant
- Suitable for e-coating
- Impact-resistant
- e. g.: multi-link hinges, seat systems, spoiler kinematics



RN293

iglidur® RN293

- Low fogging
- Cost-effective
- Wear-resistant
- e. g.: steering, pedal system, interior

Economy



M250

iglidur® M250

- Excellent vibration dampening
- Resistant to edge pressure
- Cost-effective
- e. g. seating systems, interiors



K250

iglidur® K250

- Low sliding paths, high static loads
- Suitable for e-coating
- e.g. seat and convertible roof systems



HLW

iglidur® HLW

- Low cost
- High temperature resistant up to 200°C
- Media-resistant
- e. g. engine compartment applications

Premium



H4

iglidur® H4

- Resistant to fuels, gear oils etc.
- Minimal moisture absorption
- e.g: throttle valves, gearboxes, suction tubes, braking systems



X

iglidur® X

- High compressive strength
- High chemical resistance
- +250°C continuous operating temperature
- e.g.: EGR systems, turbochargers, braking systems

Basic



G

iglidur® G

- Extremely wear-resistant
- Suitable for e-coating
- e. g. hinges, seat and convertible roof systems



J

iglidur® J

- Good coefficients of friction in dry operation
- Sliding partner for "soft" materials
- e.g.: mirror-base-adjustment, pedal system, interior



RN89

iglidur® RN89

- Conductive material
- For applications with e-coating
- e. g. hinges, seat and convertible roof systems



H2

iglidur® H2













- For high temperatures
- High chemical resistance
- Cost-effective
- e.g.: throttle valves, gearboxes, suction tubes, braking systems

Customised



Customer solutions: individually adapted materials with special properties: we develop the right plastic for your application and find the optimal solution.

iglidur® material data

| | | General specifications | | | | | | Mechanical specifications | | | | | Physical and thermal properties | | | Electric Specifications | | Wear coefficients, various shaft materials, oscillating p=1MPa, v=0.01m/s | | | | | Wear coefficients, various shaft materials, rotating p=1MPa, v=0.3m/s | | | | | | | |
|----------------|---|------------------------------|---|-------------------------------------|---|----------------------------------|------------|---------------------------|----------------------------------|------------------------------------|---|------------------|--|--|--|--|------------------------|---|--------------------|-------|-----------------|---------------------|---|-------------------------|--------------------|-------|-----------------|---------------------|------------------|--|
| | | Density [g/cm ³] | max. Moisture absorption at +23°C/50% relative humidity [% by weight] | max. Water absorption [% by weight] | Sliding friction coefficient, dynamic against steel [μ] | pv value, max. (dry) [MPa · m/s] | Fire class | Flexural modulus [MPa] | Flexural strength at +20°C [MPa] | Compressive strength (axial) [MPa] | Max. recommended surface pressure (+20°C) [MPa] | Shore D hardness | Max long-term application temperature [°C] | Max. short-term application temperature [°C] | Min. continuous application temperature [°C] | Specific transitional resistance [Ωcm] | Surface resistance [Ω] | Hard-anodised aluminium | Free cutting steel | Cf53 | HR carbon steel | 304 stainless steel | High grade steel | Hard-anodised aluminium | Free cutting steel | Cf53 | HR carbon steel | 304 stainless steel | High grade steel | |
| iglidur® M250 |  | 1.14 | 1.4 | 7.6 | 0.18-0.40 | 0.12 | V-2 | 2700 | 112 | 52 | 20 | 79 | +80 | +170 | -40 | > 10 ¹³ | > 10 ¹¹ | 12.9 | 9.5 | 10.9 | 12.9 | 11.2 | 11.2 | 2.5 | 3.0 | 5.82 | 2.26 | 2.7 | 5.2 | |
| iglidur® K230 |  | 1.36 | 1.3 | 5.5 | 0.1-0.24 | 0.3 | HB | 7700 | 235 | 74 | 80 | 78 | +100 | +160 | -40 | > 10 ¹¹ | > 10 ¹¹ | 4.5 | 17.1 | 5.0 | 22.0 | 18.5 | 1.5 | 11.7 | 98.1 | 9.3 | 28.5 | 14.2 | 16.5 | |
| iglidur® HLW |  | 1.71 | 0.1 | 0.3 | 0.07-0.20 | 1.37 | V-0 | 11000 | 160 | 81 | 89 | 87 | +200 | +240 | -40 | > 10 ⁶ | > 10 ² | 6.80 | 10.60 | 11.90 | 11.40 | 3.10 | 2.50 | 5.74 | 14.95 | 22.40 | 12.45 | 12.20 | 8.88 | |
| iglidur® G |  | 1.46 | 0.7 | 4.0 | 0.08-0.15 | 0.42 | HB | 7800 | 210 | 78 | 80 | 81 | +130 | +220 | -40 | > 10 ¹³ | > 10 ¹¹ | 1.9 | 12.0 | 2.7 | 19.0 | 2.5 | 1.9 | 1.0 | 4.3 | 2.7 | 1.88 | 11.9 | 7.6 | |
| iglidur® J |  | 1.49 | 0.3 | 1.3 | 0.06-0.18 | 0.34 | HB | 2400 | 73 | 60 | 35 | 74 | +90 | +120 | -50 | > 10 ¹³ | > 10 ¹² | 0.6 | 4.7 | 1.1 | 1.3 | 1.0 | 1.9 | 0.3 | 1.2 | 0.4 | 0.57 | 0.5 | 0.6 | |
| iglidur® RN89 |  | 1.44 | 0.9 | 3.9 | | | | 5900 | 150 | | 45 | 79 | +90 | +170 | -40 | > 10 ⁴ | > 10 ⁴ | 3.4 | 4.0 | 1.5 | 1.4 | 0.7 | 0.5 | 0.2 | 0.9 | 1.5 | 0.7 | 2.7 | 1.7 | |
| iglidur® H2 |  | 1.72 | 0.1 | 0.2 | 0.07-0.30 | 0.58 | V-0 | 10,300 | 210 | 109 | 110 | 88 | +200 | +240 | -40 | > 10 ¹⁵ | > 10 ¹⁴ | 4.5 | 18.7 | 14.6 | 32.3 | 6.4 | 8.5 | 14.6 | 4.8 | 18.76 | 11.9 | 18.3 | 3.8 | |
| iglidur® P210 |  | 1.40 | 0.3 | 0.5 | 0.07-0.19 | 0.40 | HB | 2,200 | 65 | 50 | 50 | 75 | +100 | +160 | -40 | - | > 10 ¹¹ | 1.9 | 1.86 | 0.9 | 1.9 | 1.0 | 1.9 | 0.6 | 0.7 | 0.4 | 4.3 | 1.0 | 0.4 | |
| iglidur® RN312 |  | 1.44 | 0.3 | 1.6 | 0.08-0.2 | 0.45 | V-0 | 2,000 | 55 | 60 | 60 | 80 | +180 | +220 | -100 | > 10 ¹³ | > 10 ¹⁰ | 0.3 | 5.36 | 0.9 | 2.58 | 0.6 | 0.9 | 2.67 | 2.4 | 1.34 | 1.34 | 1.72 | 1.14 | |
| iglidur® RN293 |  | 1.38 | 0.2 | 0.7 | | | | 2,350 | 76 | | 32 | 75 | +90 | +110 | -40 | < 10 ¹⁴ | < 10 ¹⁴ | 0.67 | 3.13 | 0.63 | 1.66 | 0.98 | 0.66 | | | | | | | |
| iglidur® H4 |  | 1.79 | 0.1 | 0.2 | 0.08-0.25 | 0.70 | V-0 | 7,500 | 120 | 50 | 65 | 80 | +200 | +240 | -40 | > 10 ¹³ | > 10 ¹² | 2.6 | 7.7 | 2.1 | 4.3 | 1.7 | 2.2 | 6.3 | 3.2 | 2.2 | 2.1 | 9.6 | 5.9 | |
| iglidur® X |  | 1.44 | 0.1 | 0.5 | 0.09-0.27 | 1.32 | V-0 | 8,100 | 170 | 100 | 150 | 85 | +250 | +315 | -100 | < 10 ⁵ | < 10 ⁹ | 12.6 | 6.3 | 5.3 | 9.9 | 8.0 | 9.0 | 20.5 | 1.9 | 8.1 | 5.1 | 5.9 | 12.2 | |
| PA 6 | | 1.14 | 2.8 | 8.5 | | | V-2 | 3200 | | | | | +85 | +160 | -40 | 10 ¹⁵ | 10 ¹³ | 39.3 | | 19.9 | | 34.9 | | | | | | | | |
| PBT | | 1.30 | 0.3 | 0.5 | | | HB | 10,000 | 85 | | | | +110 | +200 | | 10 ¹³ | 10 ¹⁵ | 9.9 | | 50.6 | | 36.7 | | | | | | | | |
| POM | | 1.41 | 0.2 | 0.8 | | | HB | 1,900 | 97 | 23 | 23 | 78 | +90 | +120 | -50 | > 10 ¹² | > 10 ¹² | 3.7 | | 1.7 | | 1.7 | | | | | | | | |
| PTFE | | 2.18 | 0.1 | 0.1 | | | V-0 | | 14 | | | 51 | +260 | +300 | -200 | 10 ¹⁶ | 10 ¹⁶ | | | | | | | | | | | | | |
| PEEK | | 1.31 | 0.20 | 0.45 | | | V-0 | - | 140 | | | | +250 | +310 | | | | 5.2 | | 7.7 | | 3.7 | | | | | | | | |



Avoid fogging in the car

How does the fogging effect occur in cars? The collective term VOC refers to the group of volatile organic compounds. VOC describes gaseous and vaporous substances of organic origin in the air. These are accompanying substances that are not always integrated into the molecular structure of plastics or adhesives. The cause of the formation of volatile organic compounds in the air are plastic surfaces of furnishings, they accumulate indoors with increasingly airtight building shells and can contribute to the "fogging" phenomenon. Excessive VOC levels in vehicle interiors thus lead to irritation of the eyes, nose, throat and skin. **How do you prevent fogging in the car interior?** Almost all plastics used in the passenger compartment with which car occupants come into contact while driving are now made of low-emission materials, such as dashboard and steering wheel coatings, interior door panels, sunshades or gear knobs. Recently, carmakers have also been paying more attention to the smaller parts, such as plain bearings. **What requirements must a material meet for low fogging?** The type of plastics used in vehicle interiors is regulated by specifications of the vehicle manufacturers, which are essentially based on legal requirements. igus® offers a wide range of high-performance polymers for movable applications that meet the following requirements. For individual advice on your application, we are available and would be glad to visit you (see contact details from page 58)

| Tested materials | Odour test according to VDA 270 variant B | Fogging according to DIN 75201-B in mg | Emission of organic compounds according to VDA 277 in µC/g | Formaldehyde emission according to VDA 275 in mg/kg | Burn test according to FMVSS 302 in mm/min |
|------------------|---|--|--|---|--|
| iglidur® G | 3.0 | 0.11 | ≤ 8 | < 0.25 | < 8 |
| iglidur® M250 | 2.5 | 0.24 | ≤ 4 | < 0.25 | < 0 |
| iglidur® P210 | 2.0 | 0.08 | ≤ 10 | < 0.25 | < 26 |
| iglidur® K230 | 3.0 | 0.45 | ≤ 6 | < 1.3 | < 27 |
| iglidur® GLW | 3.0 | 0.10 | < 1 | < 0.25 | < 23 |
| iglidur® RN205 | 3.0 | 0.82 | ≤ 2 | < 0.25 | < 15 |
| iglidur® RN293 | 2.0 | 0.64 | ≤ 4 | < 1.3 | < 40 |
| iglidur® RN329 | 2.0 | 0.21 | < 1 | ≤ 3 | < 38 |

Research and development: over 15,000 tests annually in the igus® laboratory

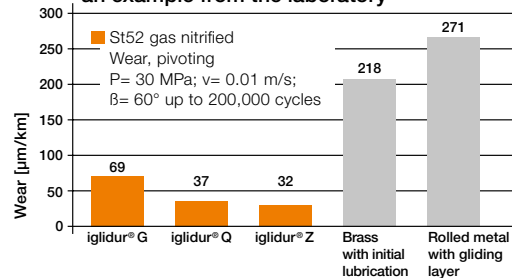
Better products, but more cost-effective - a key component: the largest test laboratory in the industry. 3,800m² laboratory, over 15,000 tests and 2 billion test strokes a year. In the largest test laboratory in the industry, more than two billion test cycles are performed each year at 107 test stations. Extensive test databases are created, and testing for customer parts is possible. **The quality policy of igus® GmbH** is oriented towards the goal of finding out and fulfilling the needs of customers and always being a competent and reliable supplier. igus® is therefore committed to manufacturing products with the highest possible quality standard and also constantly developing innovative solutions. For over 50 years, we have been driven by a vision - **motion plastics®**: innovations made of plastics that move machines. Our core technology is tribopolymers - high-performance plastics that we optimise in terms of friction and wear. This technology makes us a world leader in the development and manufacture of energy supply systems and plastic plain bearings. **Precisely predictable material specifications** iglidur® plain bearings mean the step from the plastic bearing to the tested and predictable bearing element. Probably the world's largest database for polymer plain bearings helps to select the right material for your application.



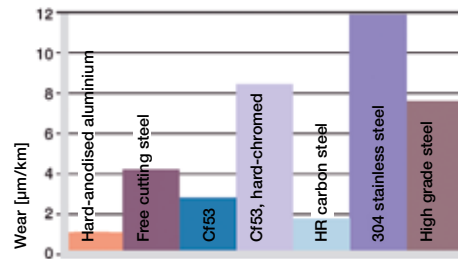
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The most wear-resistant igus® material

Heavy-duty test, an example from the laboratory

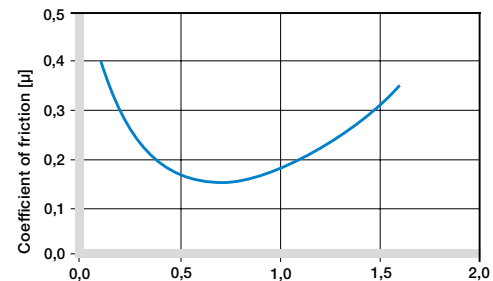


The ideal bearing for your shaft



Wear iglidur® G with various shaft materials (rotating 0.3m/s, 1.0MPa). With low loads, it is often possible to work with inexpensive shaft materials.

Shafts may be rougher

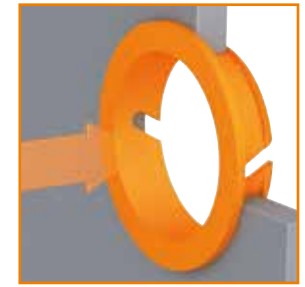
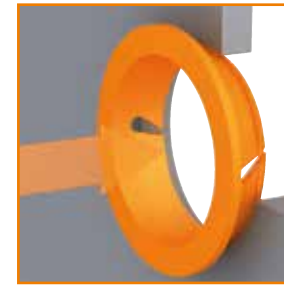
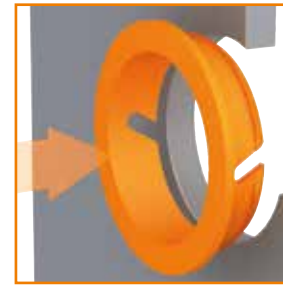
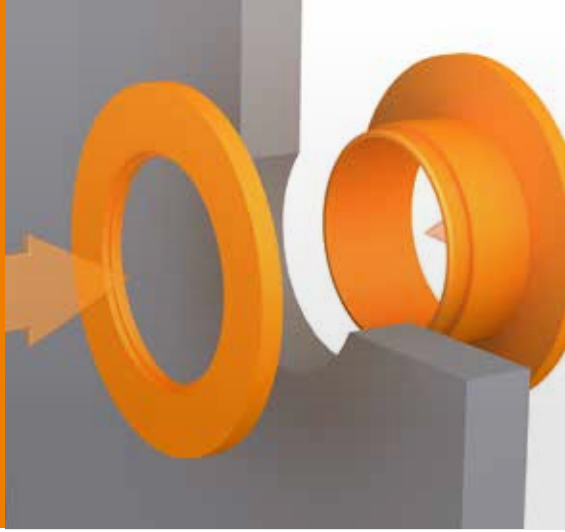


Shaft roughness Ra [µm] Coefficients of friction of iglidur® G depending on the shaft surface (shaft Cf53)

Service life test involving contact with dirt

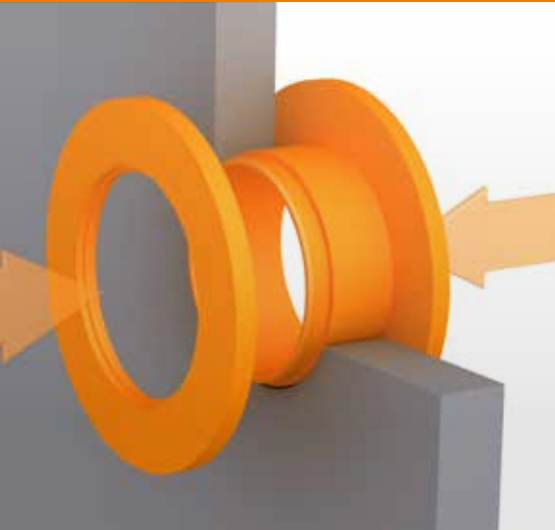


iglidur® solutions for sheet metals



iglidur® easyclip

- Easy installation
- Can be automated
- Axial securing by 2nd flange
- 1-sided approach



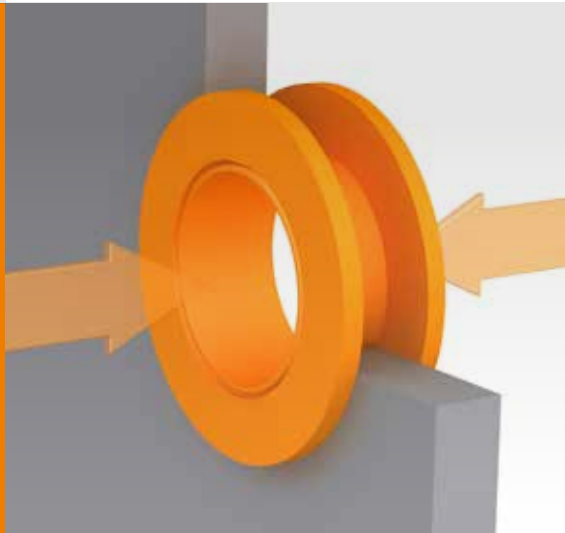
iglidur® SnapOn

- Disc is clipped onto the flange bearing with undercut
- Compensation of axial clearance
- Recalibration/tolerance compensation for e-coating
- Captive for assembly handling



iglidur® MKM flanged bearing

- Both sides "appropriate" axial thrust surface
- Simple flanging with screws or rivets
- Tolerance compensation through axial pre-load



iglidur® MDM double flange bearing

- Press together and insert
- Loose and safe assembly
- Both sides "appropriate" axial thrust surface
- No flanging necessary

Low clearance iglidur® plain bearings: solution for e-coating processes

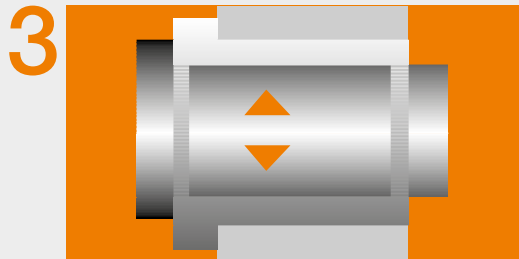
Low clearance iglidur® plain bearings through recalibration with e-coating
 In seat and hood systems and multi-joint hinges, extruded parts are often used as bolts. A bearing with as little clearance as possible should be achieved in order to reliably avoid noise. Here is our solution: iglidur® plain bearings use the high temperatures for calibration that arise after the e-coating during drying.



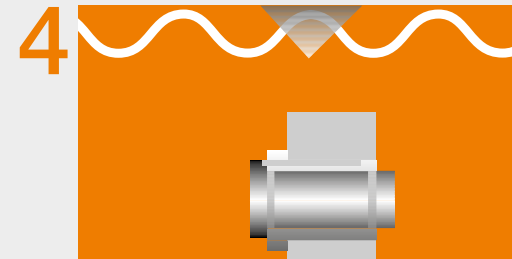
1 Rough punched hole/collared groove



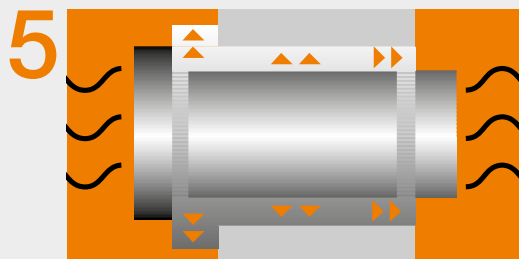
2 Assembly iglidur® plain bearing with sliding fit



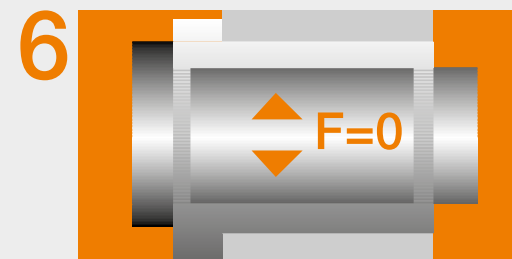
3 Assembly rivet/pin with cap



4 E-coating (cathodic dip painting)



5 Automatic recalibration during drying (max. 60min. at up to 220°C)

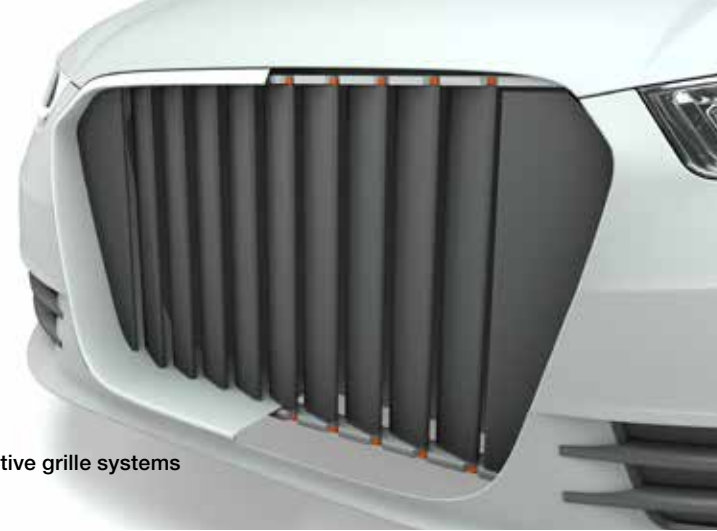


6 Result: low clearance bearing despite "inaccurate" hole/pin

xiros® polymer ball bearings in automobiles

Wherever low weight is important, our light plastic ball bearings are ideal.

- Lightweight
- Special material for low outgassing (low fogging)
- No lubricants
- Cost-effective
- High wear resistance



Active grille systems



www.igus.eu/info/grille-shutter-automotive-bearings



xirodur® B180

xirodur® S180

xirodur® C160

Custom shapes – custom-made drawing parts or prototypes, based on your technical drawing. We have 55 years of experience with complex shapes, demanding contours and special materials.



Rotary push-button



igubal® maintenance-free and lubrication -free spherical bearings in automobiles

igubal® is a system of self-aligning bearing elements made entirely of plastic. They are easy to install, adapt to all angular deviations and have already been able to replace special housings in many cases.

- igubal® maintenance-free spherical bearings with diameters from 2mm to 50mm
- Resistant to chemicals and corrosion
- Very good dampening behaviour
- High pulse frequency possible
- Predictable service life



Gearbox connection



Turbocharger

igubal® double joints and polymer coupling joints as mechanical connecting element between 2 components

- Up to +250°C operating temperature
- Lightweight
- Lubrication-free
- Corrosion-free
- Custom designs
- Rapid prototypes ready in 5 days



Rod ends with male/female thread; right/left, also as HT version for up to +200°C



Angle and in-line ball and socket joints, fitting screws



Clevis joints and spring-loaded fixing clips, individually or in combination (also with rod ends)



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



Flanged bearings with 2 or 4 holes, also as HT version for up to +200°C



Spherical bearings and self-aligning clip bearings



Spherical balls made of iglidur® materials



drylin® linear guides and dryspin® lead screw technology

Smooth sliding: drylin® linear guides. Pre-load prism slide for constant displacement forces

Hold in place

- Constant drive forces
- Corrosion-free
- Lubrication and maintenance-free
- Quiet, compact and lightweight
- Also available as a curved rail



drylin® W rail guide in the vehicle interior

Flexible solutions and great variety due to modular design

- Silent
- Space-saving
- Ergonomic and aesthetic



drylin® curved rail for ergonomically mounted operating elements



dryspin® lead screw technology

The patented dryspin® high helix thread technology offers numerous advantages in contrast to conventional high helix threads.

- Low wear
- Higher efficiency
- Silent running
- Lightweight



drylin® stop motion adjustment guides in headrests: very light, defined locking points



drylin® telescopic extensions

The interlocking rails reduce the space required for suspension and bearing arrangement to a minimum.

- Continuously extendable up to 2,000mm
- Quiet operation
- Full extension, partial extension and overextension possible

igus® e-chains® in the automobile - energy supply made easy

Specially adapted to your installation space, to your weight and load limits

igus® energy chains for use in vehicle interiors, doors and flaps. Energy supply solutions for the permanent supply of kinematic systems with energy and signals. Successfully tested by various customers in climate change tests.



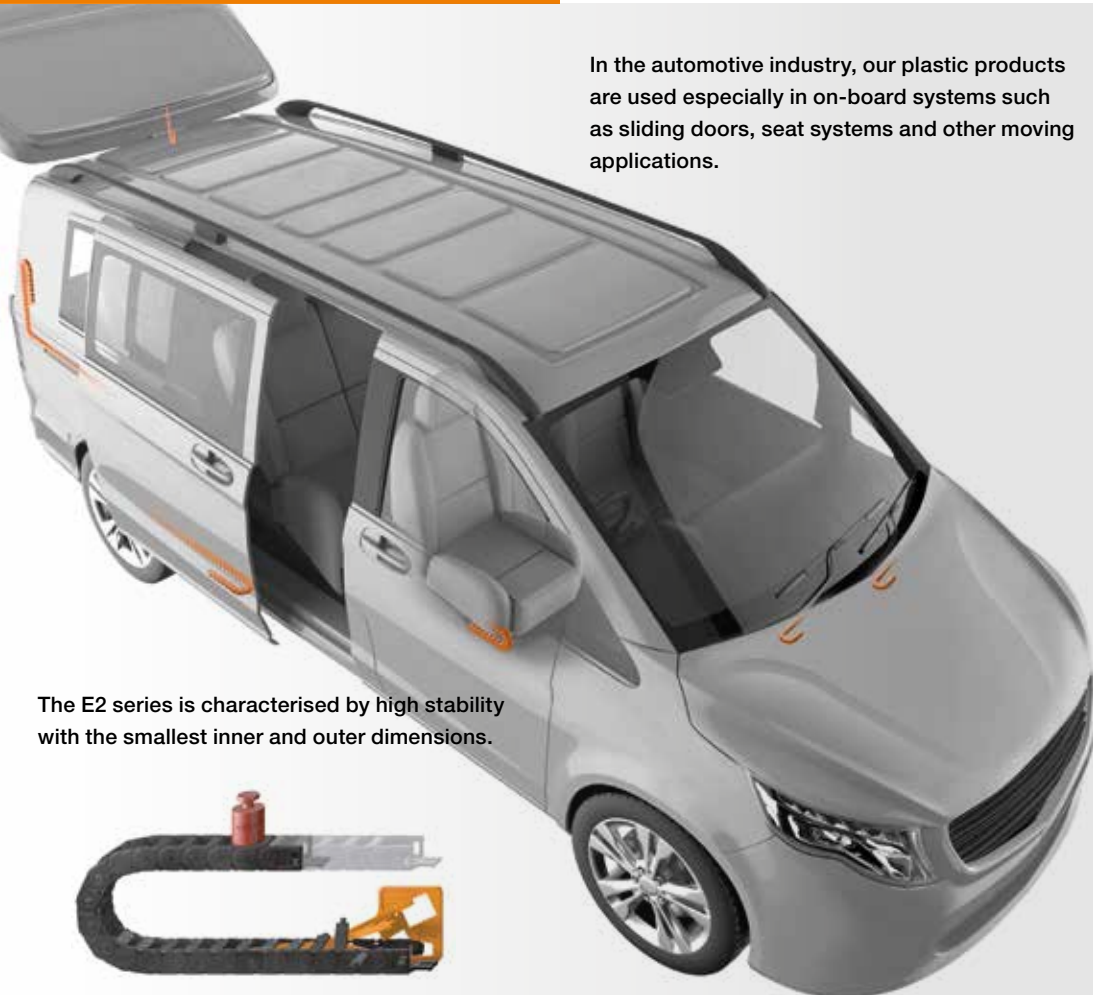
3 igus® e-chains® from over 100,000 possibilities

E1.10 series: modular, one-piece strip for simple applications.

Cost-effective and lightweight, ideal for low dynamic applications > 1m/s.

- Inner heights 10-20mm
- Bend radii from 18mm
- UL94-V2 classification
- Can be opened
- UL-94-V2 classification upon request
- ESD/ATEX versions upon request

In the automotive industry, our plastic products are used especially in on-board systems such as sliding doors, seat systems and other moving applications.



The E2 series is characterised by high stability with the smallest inner and outer dimensions.

04 series: smallest sizes, low weight

The Series 04 from the E2 micro family is very suitable for small installation spaces and is also available as an openable version.

- Inner heights 5-15mm
- Bend radii from 10mm
- UL-94-V2 and UL-94-V0 classification for many types
- ESD/ATEX versions upon request



E2.10 series: strong, quiet, light and easy to install

Suitable for highly dynamic applications > 1m/s, such as in sliding doors.

- Inner heights 10-15mm
- Bend radii from 18mm
- 3 versions: not openable, openable along the inner and outer radius
- UL-94-V2 classification upon request
- ESD/ATEX versions upon request



From prototypes and small numbers up to small volumes and large-scale production



With igus® special bearings, your ideas can take any shape you like

www.igus.eu/automotive



3D printing/SLS For prototypes and small quantities from tribofilaments or in laser sintering Highly wear-resistant materials for 3D printing and the laser sintering process - print them yourself or have them printed at igus®.

- Up to 50 times more abrasion-resistant than common 3D printing materials
- Various iglidur® materials available for FDM/FFF, iglidur® I3, iglidur® (filament) and laser sintering (powder)
- No tool costs, cost-effective, no minimum order quantity

Milled/Turned For small volumes made of iglidur® bar stock For free design: bar stock to make it yourself or in mechanically finished desired shapes.

- As round bar in Ø10-100mm
- As plate material in 2-40mm thicknesses
- Lengths 100-1,000mm

Printed tools For small volumes made of iglidur® granules 3D-printed injection moulds. Wear-resistant parts with simple geometry possible from most iglidur® materials.

- Customised from 72hrs
- Up to 80% more cost-effective than conventional injection moulding tools
- For prototypes and small volumes

Injection moulding For series production from iglidur® granules Modern injection moulding systems enable the cost-effective, controlled production of standard and special parts.

- Online orders and calculations
- 100,000 products from stock
- Proven millions of times
- Own toolmaking
- FastLine service - special dimensions received in maximum 7 days

When it's all about the car - igus® catalogue parts, special parts, bar stock and 3D-printed solutions



Customer-specific solutions, special designs and special materials - (almost) everything is possible. The standard is not the right solution for everyone. Therefore, igus® also manufactures several customer-specific special designs. Special design and material solutions, such as plain bearings for multi-edge shafts, clearance-reduced bearings, bearings with anti-rotation protection and special lead screw support blocks are specially adapted to your requirements. We can make almost anything possible.



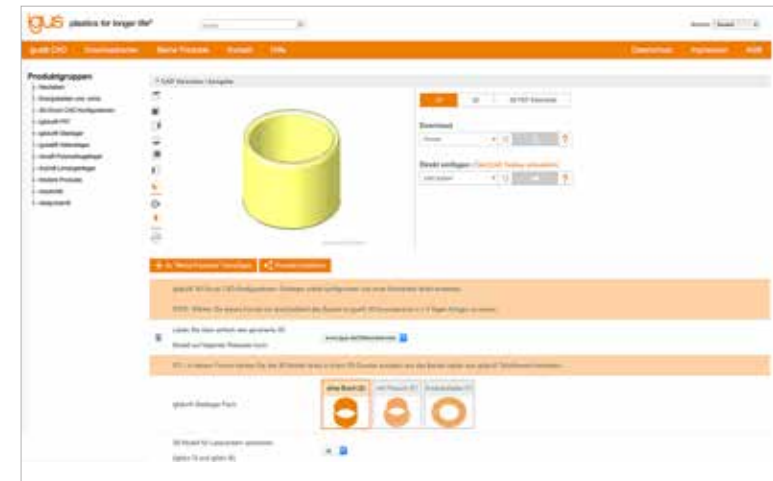
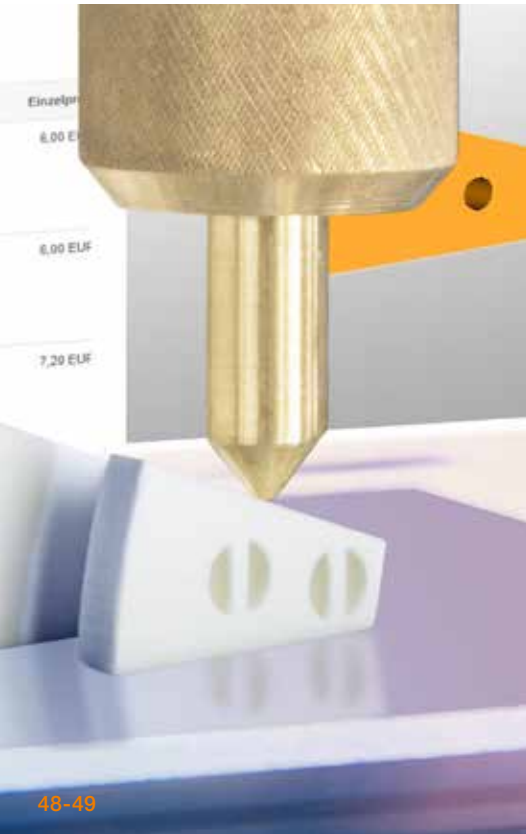
www.igus.eu/special-design

www.igus.eu/automotive

3D printing service online – for individual parts made of high-performance plastics

In just two steps to the 3D-produced component - with direct price display.

We print your individual component from lubrication-free and abrasion-resistant iglidur® high-performance plastics. Upload your drawing in STEP (STP) format, check the 360 degree view and select a special filament. We deliver your desired-product - depending on the complexity - from 24 hours. **Strong when tested against milled and injection-moulded parts.** 3D printing materials from igus® are also wear-resistant due to being made of iglidur® high-performance plastics. These are particularly suitable for moving applications. They therefore guarantee a long service life, as well as high abrasion resistance of individual wear-resistant parts.



igus® 3D printing service: simple, fast & transparent

 www.igus.eu/3dprintservice



igus® automotive specialists

Competent advice from our on site specialists.



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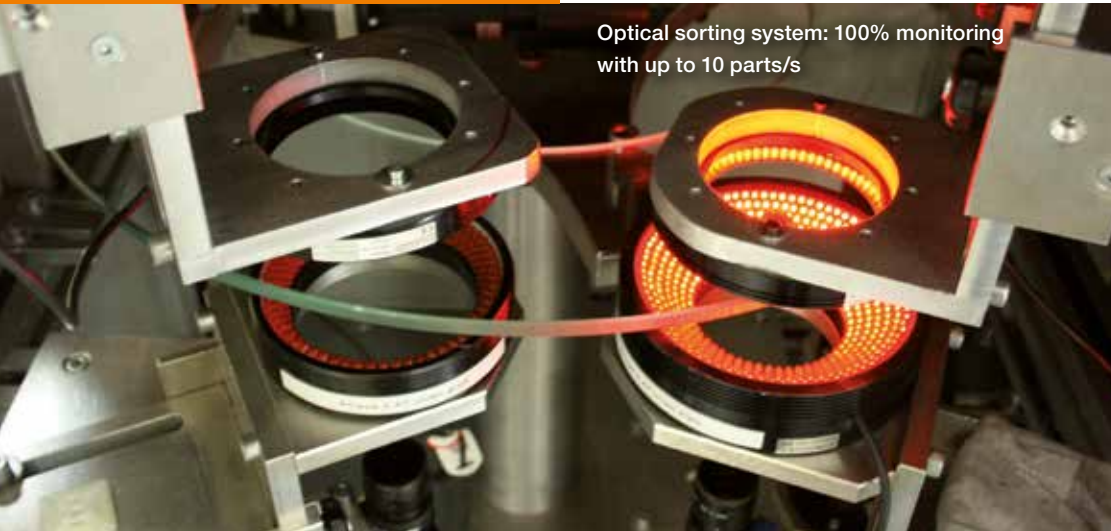
You can rely on igus® quality

igus® quality is confirmed. In accordance with the ISO 9001 and IATF 16949:2016 standards, the implementation of which is regularly audited and certified, igus® has been operating a distinctive quality management system for years. The quality policy of igus® GmbH is guided by the goal of finding out and fulfilling the customer's needs and being a competent partner and reliable supplier. igus® has always been committed to manufacturing products of the highest possible quality standard and also to developing innovative solutions.

Sustainability at igus®



ISO 14001



Optical sorting system: 100% monitoring with up to 10 parts/s

Test certificates and seals of approval Examples of certificates and seals of approval, further information is available on request.



DIN EN ISO 9001:2015
igus® is certified according to DIN EN ISO 9001 in the area of energy chains with cables and harnessing as well as plastic plain bearings.



IATF 16949:2016 igus® is certified according to ISO/TS 16949 in the field of energy chains with cables and harnessing as well as plastic plain bearings.



Our products are extremely durable and need to be replaced less frequently.



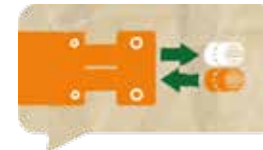
Our plastics generate little friction. As a result, less micro-abrasion is released into the environment



Our bearing technology does not require lubrication. This also avoids lubricating oil polluting the environment.



We recycle our plastics ourselves and reprocess a good 99% into granules for production.



No need to replace the entire application when it wears out, which saves resources.



Smart plastics. Sensors indicate wear and parts are replaced when really necessary; resources are used carefully and rationally.



Plastic is lighter than steel and saves weight and therefore energy, which has to be applied for the movement.



With iglidur® N54 we have developed a standard plain bearing that can be used universally and consists largely of renewable raw materials.

www.igus.eu/automotive

/9001:2015 /16949:2016

igus® is certified in accordance with ISO 9001:2015 and ISO/TS 16949:2016 in energy supply systems, cables, harnessing, and plastic plain bearings.

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igus® is certified according to ISO 14001:2015. This environmental management systems supports us on our way to becoming a CO²-neutral factory.

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