

bike

PLASTIC COMPONENTS FOR THE BICYCLE INDUSTRY
Increase tech, reduce weight and eliminate maintenance



igus[®].eu ■■■
www.igus.eu/bike

Editorial

Means of transport, sports equipment, lifestyle object: Today, bicycles serve many purposes. Bearing technology requirements vary accordingly: In mountain bikes, dirt and moisture and short, strong shock and impact loads act on the bearings. In cargo bikes transporting heavy loads, continuous forces are applied to the bearing points. And racing bikes often require especially lightweight components because every gram counts.

This is where our iglidur® products come in. The versatile bearings made of dry-operating high-performance polymers are not only lubrication-free, but also especially lightweight, extremely wear-resistant, and characterised by extremely low coefficient of friction. They can withstand impact and shocks and are more resistant than metallic bearings – especially under the influence of dirt, temperature, cleaning agents, and moisture.

Our products are developed and tested in our 3,800m² in-house test laboratory. With 135 trillion test movements per year, we determine the limits of our bearings and various other products and develop new materials for any application.

This development work moves us closer to our dream of a maintenance-free, fully recyclable bike. igus, mtrl.bike, and other partner companies hope that the igus:bike project will add a whole new dimension to sustainability in urban transportation.



igus:bike
You can find all the information you need on page 32

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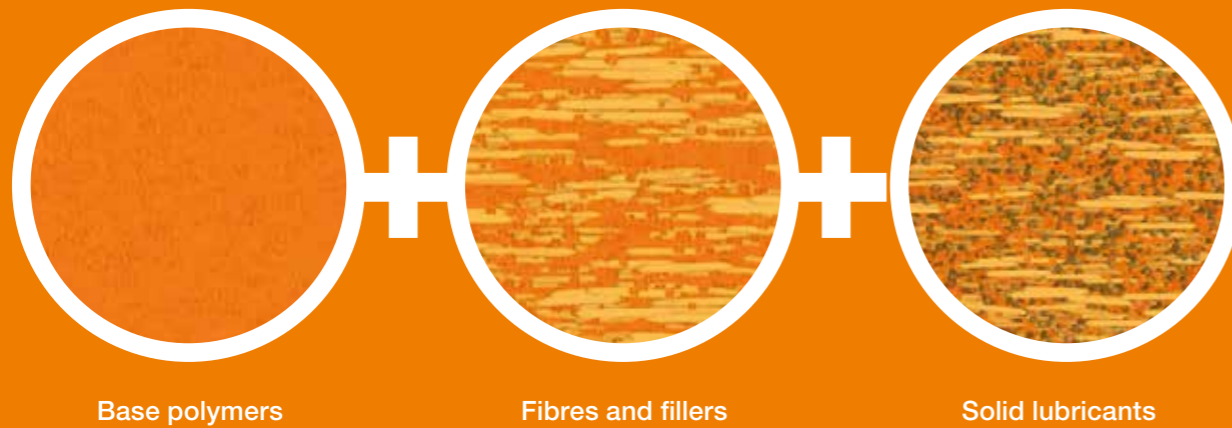
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iglidur®

What is iglidur®, and what can it do?

Technical polymers created by precisely measured additives consisting of reinforcing components and solid lubricants, tested thousands of times and proven millions - that is iglidur®. The individual components are not applied in layers, but instead blended together homogeneously. For instance, there is no sliding film that can be pushed away under loads, as is the case with traditional "hard shell - soft coating" solutions.



What does iglidur® do in bicycles?

- Weight reduction
- 100% corrosion-resistant
- Vibration-dampening
- Self-lubricating, no maintenance
- Excellent price/service life ratio for your application
- Customised materials and solutions
- Everything from one source: research and development, application consulting, production, and worldwide logistics



igus® plain bearings in bicycles

Less weight, no corrosion, no maintenance.

Lightweight plastic components reduce the strain on the frame and can make the bicycle easier to manoeuvre. And the lighter the bike, the easier it is to travel uphill. Our plain bearings are around 80% lighter than metal bearings.

Dirt and moisture are no problem for iglidur® plain bearings thanks to their dry operation. If the bicycle frame is covered with dust or mud after a ride, it can be washed without worries. Even cleaning with a high-pressure cleaner will not affect the bearings. You can stop stressing about corrosion due to water ingress and dispense with regular relubrication.



Plain bearing shop:
www.igus.eu/iglidur

Online configurator:
www.igus.eu/iglidurConf

igus® USA
employee
Garrison Rios
receives four titles
in a row

"Racing is full of challenges, having to worry less about maintenance and reliability is key to remaining focused on all the aspects of racing. Seeking out products which use igus® bearing technology gives me peace of mind knowing my equipment is going to last and work every time I need it to and everywhere in between. Saving weight is an added plus, whether it's my dropper post, pedals or suspension pivots I find comfort in the lightweight reliable option of igus® bearings."

As a professional cross-country racer, Garrison has ridden different bikes with a wide variety of components over the years. Many of them had iglidur® plastic plain bearings, including shock absorbers from DVO, Fox, and Cane Creek; seat posts and pedals from crankbrothers; frames from Ibis; and rear derailleurs from SRAM.

- 2015 CA State CX Champion
- 2015 2nd Overall Kenda Cup Series
- 2016 2nd National Championships Cat 1
- 2016 3rd Overall Kenda Cup Series



www.igus.eu/bike



motion plastics®

Tech up & cost down



in the mountain bike



1. Brake lever
iglidur® P plain bearings: Insensitive to dirt, shocks, and impacts. No squeaking or creaking when they get wet.



2. Telescopic seat post
iglidur® J guide rings: For linear movements, insensitive to edge loads.



3. Battery cover
iglidur® GLW plain bearings: Affordable and resistant to corrosion and dirt.



4. Shocks
iglidur® J3B plain bearings: Maximum service life, more pressure-resistant than PTFE-coated alternatives.



5. Freewheel
iglidur® W300 plain bearings: Especially for high speeds and temperatures. Dirt cannot stick.



6. Dérailleur
iglidur® G plain bearings: Insensitive to dirt, no relubrication necessary after cleaning.



7. Drive/motor
iglidur® gears: Maintenance-free, vibration-damping characteristics, and long service life.



8. Pedals
iglidur® TX2 plain bearings: With felt seal for extremely high resistance to dirt.



9. Brake calipers
iglidur® H plain bearings: Can be used at high temperatures. Reduces costs in the long term with durability and freedom from maintenance.

Fast and continuous shock and impact loads, dirt and dust, moisture, and thermal stress - the many challenges of riding fast over rough terrain, through mud, and over rocks require top performance from components built into mountain bikes. In addition to our all-rounder materials, we also offer a wide range of specialised plain bearings for any requirement. All are lightweight and require absolutely no lubrication or maintenance.



1. www.igus.eu/P
2. www.igus.eu/info/guide-rings
3. www.igus.eu/GLW
4. www.igus.eu/J3
5. www.igus.eu/W300
6. www.igus.eu/G
7. www.igus.eu/gears
8. www.igus.eu/TX2-seal
9. www.igus.eu/H

Wear-resistant bearings reduce weight and increase rigidity in the rear frame



Ibis Bicycles, California

Installed for the first time in the Ripley trail bike in 2013 and now in all fully-balanced bikes: Ibis uses iglidur® plain bearings on the lower rocker of the DW-link rear frame. They are perfect for small rotations with high forces. The sealed deep groove ball bearings originally used felt worn after just a short time. This is not the case with the plastic bushings, which ensure high rigidity in the rear frame. It also reduces weight by 80g, greatly extends service life, and eliminates maintenance costs.



"In more than two years, our Enduro team has not broken a single igus® bearing. They definitely hold up better than I originally thought. They are also lighter and much easier to maintain than the bearings I used before."

Robin Wallner,
Ibis Bicycles Enduro Race Team

www.igus-eu/bike

Constant performance on the trail, resistant to shocks, mud and dust



Crankbrothers, California

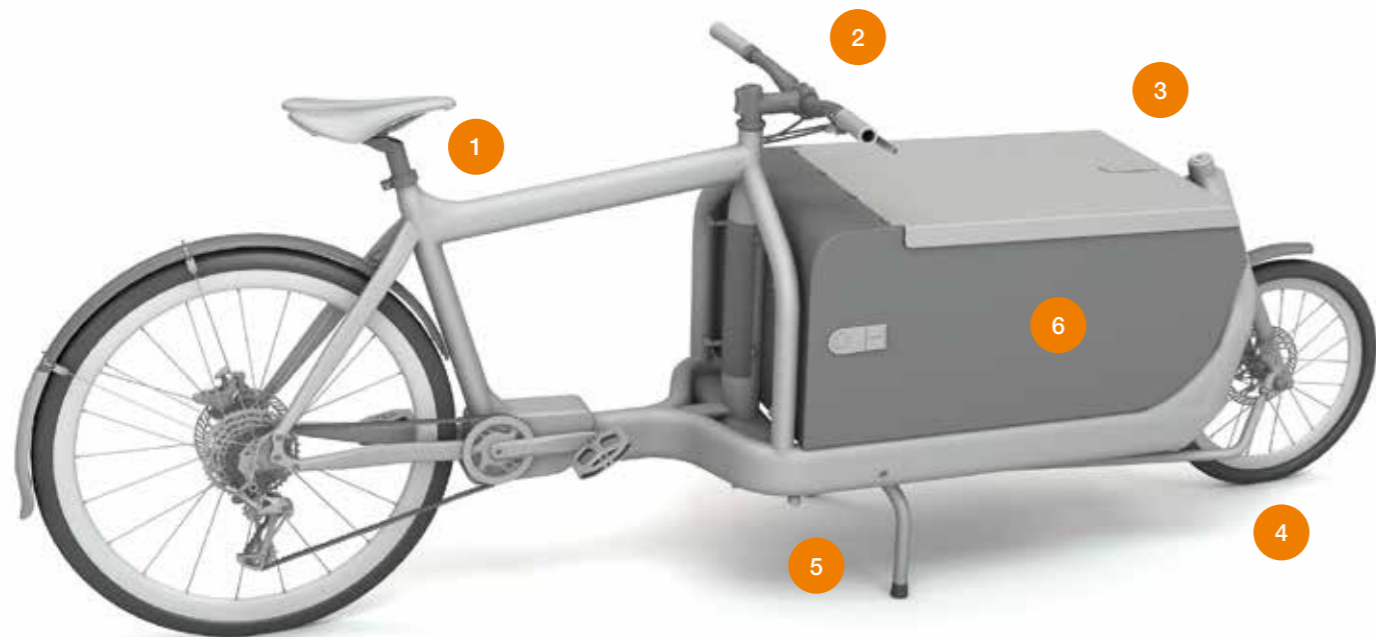
Crankbrothers, an MTB component manufacturer, is a household name for every mountain bike fan because of its pedals. iglidur® JB plain bearings are used in its click models and in the flats. They feature low weight, smooth operation even with high levels of dirt, and a long service life under heavy shock loads. In our laboratory, we tested various bearings for crankbrothers. iglidur® JB plain bearings achieved a service life eight times that of those originally intended by Crankbrothers metallic solutions.



www.igus-eu/bike

motion plastics[®]

Tech up & cost down



in the cargo bike



1. Suspension seat post

iglidur[®] P plain bearings: Vibration-dampening properties, lubrication-free and resistant to shocks and impacts.



2. Steering kit

iglidur[®] Q plain bearings: Specifically for high loads, shocks, and impacts, very good coefficient of friction against edge loads.



3. Box lid

iglidur[®] GLW plain bearings: Affordable, resistant to shocks, impacts, dirt, and dust.



4. Handlebar

igubal[®] rod end bearings: Steel housing for very high loads, resistant to dirt and to humid and wet environments.



5. Stand

iglidur[®] R plain bearings: Low-cost material, resistant to edge pressure, dust, and dirt.



6. Box sliding door

drylin[®] N linear guides: Low profile and lightweight, dirt-resistant thanks to dry operation, resistant to high impacts and edge loads.

In order for cargo bikes to cope the task of transporting heavy loads or bulky objects safely through the city in the long term, they need bearing points and joints that can easily cope with high forces and with shock and impact loads. Good coefficient of friction and resistance to dirt, dust, humidity, and moisture are also prerequisites for reliable outdoor cargo bikes. Our bearing technology, which requires no lubrication or maintenance, ensures that the cargo bikes – from the seat post to the track rods – remain user-friendly for a long time.



1. www.igus.eu/P
2. www.igus.eu/Q
3. www.igus.eu/GLW
4. www.igus.eu/rod-end-bearing
5. www.igus.eu/R
6. www.igus.eu/drylin-n

Robust spherical and plain bearings in the heavy-duty e-cargo bike



B&P engineering mobility, Deutschland

The B&P heavy-duty e-cargo bike can take payloads of up to 250 kilograms. To support the handlebars, the designers were looking for an alternative to classic rolling or plain bearings made of metal. The solution was igubal® EGLM spherical bearings which can autonomously compensate for edge loads and misalignments and are resistant to moisture, UV light, and salt. It does not need seals to protect it from corrosion. The slim, maintenance-free solution is also lightweight (just 26 grams).



"A good plastic bearing can withstand whatever a steel bearing can. The bearings are strong enough for all everyday biking situations, even with a full load of 250 kilograms. This is supported by our trial tests, in which the vehicle covered 80,000km with a full load."

Vincent Okroy,
b&p design engineer

Heavy-duty bearing technology for the last mile of city logistics



Fulpra Motors B.V., Netherlands

It can transport a payload of up to 350 kilograms and is almost as easy to ride as a two-wheeled e-bike: The Fulpra Cargo Bike is the ideal vehicle for the last mile of city logistics. Each component is designed for high loads and minimal maintenance. The design engineers use iglidur® X plain bearings for the bearing points in the drive train and in the parking brake, which must securely fix 600kg at a 20 percent incline. They are particularly pressure-resistant and lightweight while remaining compact. The sliding doors of the cargo space move smoothly thanks to dry-operating drylin® W profile rails that have a long service life under adverse conditions.



www.igus-eubike



Folding mechanism for folding bicycle
iglidur® J3 plain bearings: Low moisture absorption, resistant to thermal expansion and edge loads.



Steering head bearing and bottom bracket bearing in a children's bicycle
iglidur® J3 plain bearings: Lightweight, cost-effective, resistant to impacts.



E-scooter head tube
iglidur® G plain bearings in the suspension fork: Wear-resistant, vibration-dampening, zero slip-stick effect **iglidur® Q plain bearings** in the head tube: dirt-resistant, rustproof, and maintenance-free.



Pram bearing
iglidur® G plain bearings in folding and swivel joints: Cost-effective, corrosion-resistant, and maintenance-free.



Bicycle assembly stand
 Lifting mechanism with a quiet, dry-operating **drylin® W linear guide** and a lightweight, compact **energy supply system**.



Bicycle rack
iglidur® J plain bearings and thrust washers in folding mechanisms: Wear-resistant and weatherproof.



Trike front suspension
iglidur® G plain bearings: Small, lightweight, and resistant to dirt, water, and shocks.



Cantilever brakes
iglidur® J plain bearings: Vibration-dampening, weather-resistant, lightweight.



Small, light,
robust: iglidur®
plain bearings in
the AZUB TRIKE



AZUB Bike s.ro., Czech Republic

With the "Trike of the Year", AZUB Bike secured a prestigious prize for its TRIcon 26 with an innovative rear fork back in 2015. It also uses high-performance components such as high-strength Grade 5 titanium in the front suspension. It is complemented by dry-operating plastic bearings made of iglidur® G. The all-round bearing not only requires no lubrication or maintenance, but is also resistant to dust and dirt, so it has a long service life. Unlike metallic plain and ball bearings, it is corrosion-free at a fraction of the weight.



www.igus.eu/bike

Materials for the Bicycle industry

An overview of the most important iglidur® materials for bicycle applications

To make your selection easier, we have divided the most important materials for the bicycle industry into groups. More than 7,000 standard sizes, Ø 2 to 150mm, are available from stock. We have short delivery times, even for special dimensions. And, in general, we do not require a minimum quantity.



www.igus.eu/material-selection

Economy



igidur® R

- Resistant to edge pressure
- Resistant to dirt and dust
- Insensitive to shocks and impacts
- In such applications as bicycle stands

www.igus.eu/R



igidur® HLW

- High temperature resistance
- Very good for use in high-humidity environments and under water
- Resistant to high loads (>60N/mm²)
- In such applications as disc or rim brakes

www.igus.eu/HLW



igidur® GLW

- Resistant to shocks and impacts
- Insensitive to dirt and dust
- Resistant to high loads (>60 N/mm²)
- In such applications as disc or rim brakes or the battery cover

www.igus.eu/GLW

Specialists



igidur® H

- Suitable for especially high temperatures
- Low moisture absorption
- Good wear resistance under water
- In such applications as disc brakes

www.igus.eu/H



igidur® Q

- Designed for especially high loads
- Resistant to shocks and impacts
- Very good coefficient of friction
- In such applications as the steering kit

www.igus.eu/Q



igidur® M210

- Thick-walled, especially strong bearing
- Very good wear resistance
- Resistant to edge pressure, shocks, and impacts
- In such applications as the rear wheel swing arm

www.igus.eu/M210



igidur® P

- For high edge loads
- Low moisture absorption
- Dirt-resistant and corrosion-free
- In such applications as the brake lever

www.igus.eu/P



igidur® W300

- For high speeds
- Excellent coefficient of friction
- Low moisture absorption and high media resistance
- In such applications as freewheeling and brake systems

www.igus.eu/W300



igidur® Z

- Wear-resistant, especially at high loads and speeds
- High thermal resistance (up to +250°C)
- Impact-resistant and insensitive to edge pressure
- In such applications as the freewheel

www.igus.eu/Z

Basic



igidur® G

- Very good coefficient of friction
- Resistant to edge pressure
- Insensitive to shocks and impacts
- In such applications as dérailleurs

www.igus.eu/G



igidur® J

- Good wear resistance at medium temperatures
- Excellent coefficient of friction
- Zero stick-slip effect
- In such applications as the telescopic seat post

www.igus.eu/J



igidur® J3

- For high edge loads
- Excellent coefficient of friction
- Very good wear resistance
- In such applications as bicycle shock absorbers

www.igus.eu/J3

Eco

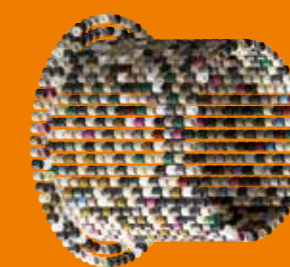


igidur® ECO

- Reused raw materials
- Different ECO series for different requirements
- For applications in high temperatures or corrosive environments or for especially affordable applications, for example

www.igus.eu/ECO-plain-bearings

Customised



Customer solutions:

Individually adapted materials with special properties. We develop the right plastic for your application and find the ideal solution.

www.igus.eu/special-bearings

To your specification.

Special parts: injection moulded, printed, or from bar stock



We can do things differently: customised solutions, special designs, special materials, special quantities – (almost) anything is possible. Standard parts do not suit every application. That is why we also manufacture several customer-specific special designs. Structural and material special solutions, from plain bearings for multiple-edge shafts to bearings with reduced-clearance or anti-rotation features to special lead screw support blocks and glide pads, are adapted to your needs. From prototypes and small batches to small series to large-

scale production: the right production process for an affordable product. 3D-printed, turn or milled from bar stock, or injection moulded: We have a wide range of manufacturing options for manufacturing drawing parts. We would be happy to advise you on the most technically and economically efficient manufacturing method and recommend the perfect plastic material.



www.igus.eu/special-design

Sample box

Our products for bicycles in a box



Order the free sample box with products and further information about our motion plastics® for the bicycle industry.

Research and

More than 15,000 tests annually –
in the igus[®] test laboratory



Proven, predictable, tested – Research in an area of 3,800m²

Push and pull forces, coefficient of friction, wear, and abrasion and drive forces. In order to ensure the quality of our materials and develop new products, we push them to their limits in our in-house test laboratory. With 135 trillion test cycles and over 15,000 tests a year, we determine the behaviour of our plain bearings, spherical bearings, and many other products. The data obtained in this way can be used to make precise statements about material service life under different environmental conditions.

Have a virtual tour through the laboratory

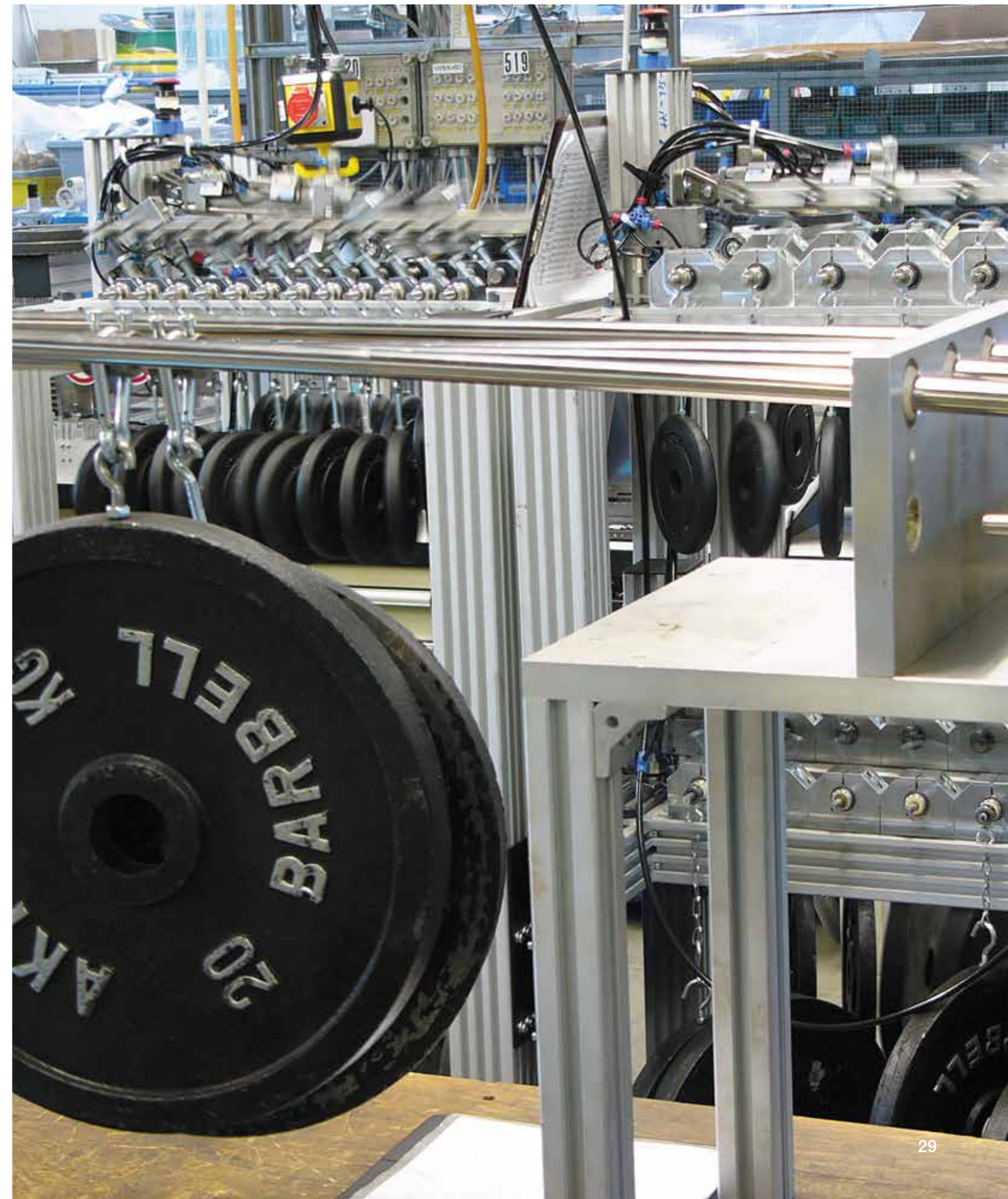
Would you like to take a look around our laboratory? No problem: you can visit all areas easily from your home or office in a virtual tour. Just go to the our test laboratory page, start the 360° tour, select the lab area you want, and follow the arrows to the next stop.



www.igus.eu/test-lab



Development





1. Continuous load

How does friction change under constant load, and how much does the material wear? This endurance test determines bearing reliability.

2. Seat post test rig

This test rig was specially developed to determine the performance of our plain bearings in seat posts. The plain bearings and guide rings are subjected to continuous loading and to impacts and shocks.

3. Edge pressure

If leverage forces subject the outer edges of a plain bearing to higher loads, edge loads result. This test measures bearing behaviour in the shock absorber, in the frame or seat post.

4. Linear wear, short stroke

Short linear travels occur in such applications as the suspension. This test station determines the effects of a repetitive stroke on the material.

5. Pivoting wear

With pivoting angles of 60° and loads of 25 to 200N, this test rig simulates wear in such applications as dérailleurs, pedals, and shock absorbers.

6. Coefficient of friction

Up to 1,300 RPM, various outdoor temperatures, and wet environments. The rotation test rig simulates bearing environments such as those that occur in freewheeling and measures the coefficient of friction.

7. Wear from sand

Dirt, dust, and sand play a role in bearing points built into mountain bikes. This test rig determines the extent to which grains of sand affect the service life of our bearings and the shaft.

The vision

Yesterday's waste for tomorrow's mobility

The idea for the igus:bike project was born with this vision. The project aims to use plastic waste dumps worldwide as resources for a recycled bicycle. On the newly created igus:bike platform, we want to work with other bicycle and component manufacturers to create a sustainable, rust-free, maintenance-free alternative for urban mobility. To start with, we are developing a bicycle with mtrl that consists of more than 90% plastic, most of which is recycled.



www.igus.bike



SUSTAINABLE

The plastic in rubbish dumps around the world is becoming a valuable resource: most of the material used will come from recycled plastics.



LOW MAINTENANCE

A bike made almost entirely of plastic. Nothing needs to be lubricated or greased here.



LONG SERVICE LIFE

The bike consists of motion plastics®, which have been extensively tested in the test laboratory for wear and safety.



ZERO CORROSION

Resistant to weather, water and UV light. Garage or covered parking spaces are no longer required.

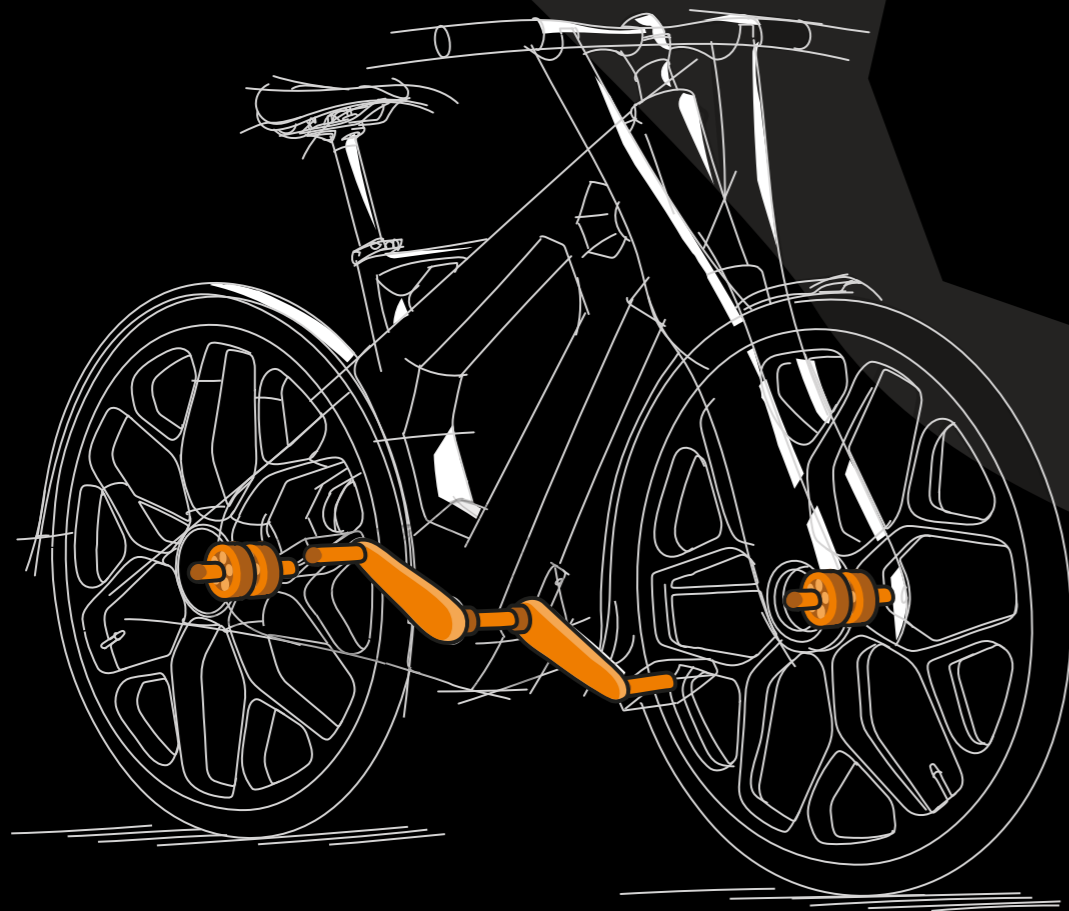
igus:bike



We answer frequently asked questions on p. 37

The platform

The first components made of motion plastics®



With the Dutch start-up mtrl, we are well on the way to creating a recycled solid plastic bike. mtrl developed the frame, wheels and the new fork, which are made of recycled plastic, e.g. discarded nets from tulip fields or old fishing nets.

In future, these components will contain a chip - an integrated material passport - so that every bicycle can be returned at the end of its service life in exchange for a deposit. The old plastic can be used as raw material for a new bicycle and doesn't end up as waste.

All bicycle parts are to be made of plastic. To achieve this, we have applied our tribo-research expertise, proven in industry, to the development of completely new moving parts, resulting in smooth-operating, quiet, durable bicycle components that do not rust and require no lubrication.



Metal-free: The wheel bearings contain maintenance-free xiros® plastic ball bearings that require no lubrication. They are wear-resistant, quiet, and resilient.



One unprecedented challenge we met was the maintenance-free all-plastic freewheel. Integrated solid lubricants eliminate the need for relubrication.



Cranksets must be highly resilient, since they absorb all the drive force users generate. Our cranks can cope with these stresses and are extremely light and rustproof.



A new type of pulley developed for toothed belts, durable, user-friendly and low-maintenance.



Unthinkable for a long time until we made it possible: a gear system made of plastic. Its minimalist design makes it lightweight and durable. It is self-lubricating, requires no maintenance, and operates quietly.



With plastic, igus® is introducing a new material for bicycle frames onto the market. Plastic is significantly less energy-intensive to process than steel, aluminium or carbon and is easy to recycle.



Become a partner

We are looking for strong corporate partnerships to achieve our vision: sustainable, durable, maintenance-free bicycles from recyclable materials. If you would like to enter into cooperation with us, we would be happy to hear from you.

An orange and black bicycle is leaning against a tree trunk in a grassy field. The bicycle has a distinctive frame with a large orange section. The background shows a bridge and some buildings under a clear sky.

FAQs

Our answers to frequently asked questions about the igus:bike project

How much does the bike weigh?

We expect the weight to be around 17kg. Please keep in mind that the bike will be a city bike. It will offer an urban mobility alternative; it is absolutely not intended to replace mountain bikes or racing bikes.

Is it an e-bike?

No, not yet. The first bike will not be sold as an e-bike. However, its date of launch is still uncertain.

How much will the bike cost?

The igus:bike made from recycled plastic will cost approx. €1,200.

Does igus® sell bikes?

Yes, the igus:bike is sold by igus®. Although we specialise in motion plastics®, internal parts that move, and have been supplying these to the worldwide bicycle industry for more than 25 years, we are broadening our expertise. Together with the Dutch start-up mtrl, we are entering the market as bicycle and parts producer.

Why did igus® start the project?

We have been dreaming of a lubrication-free, rust-free bicycle made entirely of plastic for 15 years. This initial product and the igus:bike platform is intended to allow an additional type of bicycle production and, in the future, supply other parts such as wheel, bottom brackets, gears, cranksets, pedals and sprockets made of plastic.

Where can I get more information?

At www.igus.bike

igus® worldwide

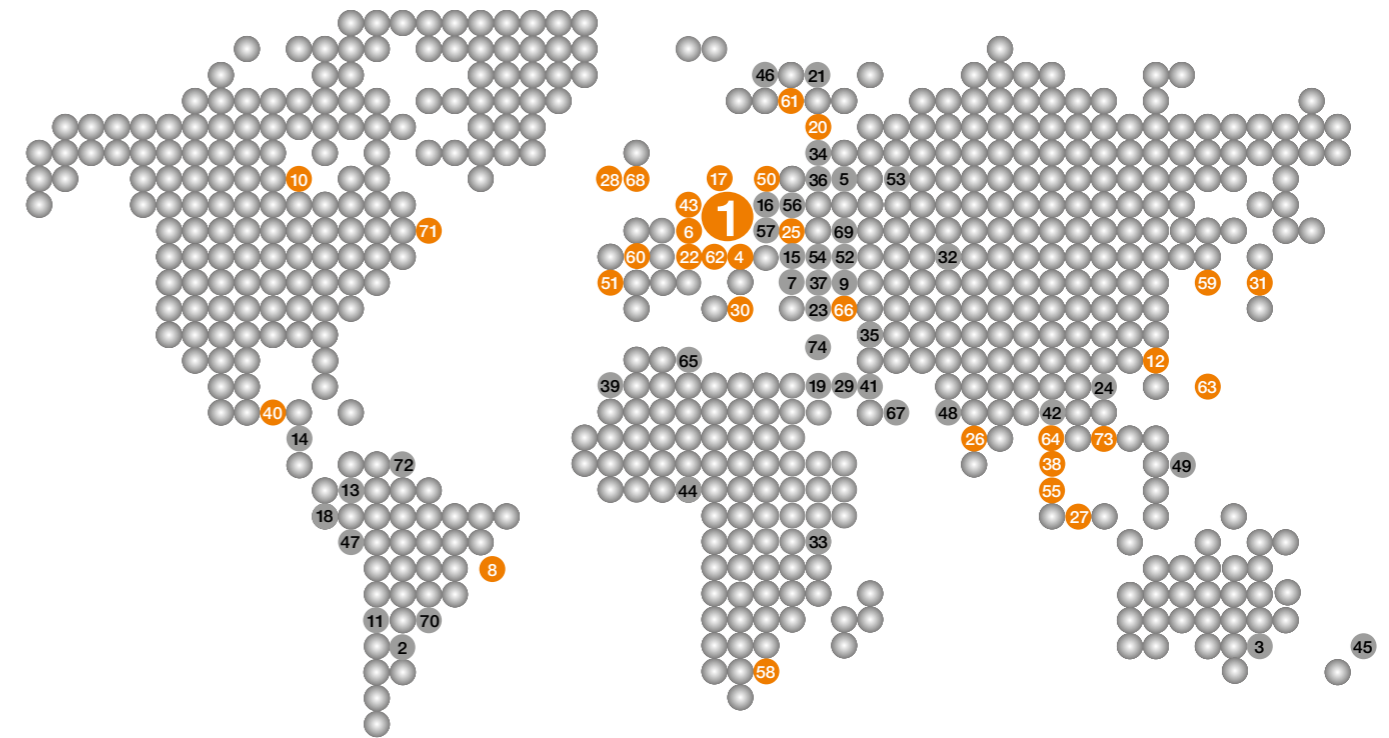
igus® Offices	11 Chile Vendortec Avda. Los Pajaritos 3195, Oficina 1410 Edificio Centro Maipú Maipú – Santiago Phone +56 22 710 58 25 +56 23 245 02 00 ventas@vendortec.cl
igus® Distributors	12 China igus® Shanghai Co., Ltd. No.50, North Huancheng Road Fengxiang district Shanghai 201401 P. R. China Phone +86 21 8036 6999 Fax +86 21 8036 6116 cnmaster@igus.net
1 Germany igus® GmbH Spicher Str. 1a 51147 Köln P.O. Box 90 61 23 51127 Köln Phone 02203 9649-0 Fax 02203 9649-222 info@igus.de	22 France igus® SARL 49, avenue des Pépinières Parc Médicis 94260 Fresnes Phone +33 1 49840404 Fax +33 1 49840394 info@igus.fr
2 Argentina Borintech SRL Av. Elcano 4971 C1427CIH Buenos Aires Phone +5411 4556 1000 Fax +5411 4556 1000 igus@borintech.com	23 Greece J. & E. Papadopoulos S.A. 12 Polidefkhous str Piraeus, 185 40 Phone +30 210 4113133 Fax +30 210 4116781 sales@papadopoulos-sa.com
3 Australia Treotham Automation Pty. Ltd. 14 Sydenham Road Brookvale NSW 2100 Phone +61 2 9907-1788 Fax +61 2 9907-1778 info@treotham.com.au	24 Hong Kong Sky Top Enterprises Ltd. Room 1806 ; Block C; Wah Tat Industrial Center; Wah Sing Street; Kwai Chung Hong Kong Phone +852 23318928 Fax +852 24269738 info@skytopy.com.cn
4 Austria igus® polymer Innovationen GmbH Photo-Play-Straße 1 4860 Lenzing Phone +43 7662 57763 Fax +43 7662 57751 igus-austria@igus.de	25 Hungary igus® Hungária Kft. Ipari Park u.10. 1044 Budapest Phone +36 1 4306486 Fax +36 1 4310374 info@igus.hu
5 Belarus SOOO Hennlich Biryuzova street, 4/5, office 1012 220073 Minsk Republik Belarus Phone +375 17 258 88 28 Fax +375 17 373 39 26 info@hennlich.by	25 Hungary Tech-Con Kft. Véső utca 9-11 1133 Budapest Phone +36 1 4124161 Fax +36 1 4124171 tech-con@tech-con.hu
6 Belgium/Luxemburg igus® B.V.B.A. Jagersdreef 4A 2900 Schoten Phone +32 3 330 13 60 Fax +32 3 313 79 91 info@igus.be	26 India igus® (India) Pvt. Ltd. 36/1, Sy No. 17/3 Euro School Road, Dodda Nekkundi Industrial Area, - 2nd Stage Mahadevapura Post Bangalore 560048 Phone +91 80 68127800 Fax +91 80 68127802 info-in@igus.net
7 Bosnia + Herzegovina HENNLICH industrijska tehnik d.o.o. Tvornička 3 (Energoinvest-zgrada C&O) BIH-71210 Ilidža - Sarajevo Phone +387 33 451 439 Fax +387 33 451 439 info@hennlich.ba	27 Indonesia PT igus® Indonesia Headquarter Indonesia Taman Tekno BSD Sektor XI, Blok L1 No. 15 Tangerang Selatan 15314 Phone +62 21 7588 1933 Fax +62 21 7588 1932 info@igus.co.id
8 Brazil igus® do Brasil Ltda. Rua Antônio Christi, nº 611 Parque Industrial III – FAZGRAN Jundiá – CEP 13213-183 – SP Phone +55 11 3531-4487 Fax +55 11 3531-4488 vendas@igus.com.br	27 Indonesia PT igus® Indonesia Headquarter Indonesia Taman Tekno BSD Sektor XI, Blok L1 No. 15 Tangerang Selatan 15314 Phone +62 21 7588 1933 Fax +62 21 7588 1932 info@igus.co.id
9 Bulgaria Hennlich OOD, BG 4003 Plovdiv, Bulgaria 147A, Brezovsko shose Str., Rota center, fl. 3 Phone +359 32 511 326 Fax +359 32 621 929 office@hennlich.bg	28 Ireland igus® Ireland Caswell Rd Northampton NN4 7PW Phone +44-1604 677240 Fax +44-1604 677242 sales@igus.ie
10 Canada igus® Office Canada Suite 100-180 Bass Pro Mills Dr Vaughan, ON L4K 5W4 Phone +1 905 7608448 Fax +1 905 7608688 webmaster@igus.com	29 Israel Conlog LTD P.O. Box 3265 17 Hamefalssim Str. Industrial Zone Kiryat Arie Petach-Tikva 49130 Phone +972 3 9269595 Fax +972 3 9233367 conlog@conlog.co.il
20 Estonia igus® OÜ Vana-Tartu mnt 79a 75312 Peetri Phone +372 667 5600 info@igus.ee	30 Italy igus® S.r.l. Via delle Rovedine, 4 23899 Robbiate (LC) Phone +39 0395906.1 Fax +39 0395906.222 igusitalia@igus.it
	31 Japan igus® k.k. Arcacentral 15F, 1-2-1 Kinshi, Sumida-ku Tokyo JAPAN Zip 130-0013 Phone +81 358 192030 Fax +81 358 192055 info@igus.co.jp
	32 Kenya Mantrad Ltd. Sterling House, 1St. Floor Moi Avenue, Mombasa Phone +254 722 706 830 Fax +254 720 765 566 info@mantrad.co.ke
	33 Latvia Techvitas SIA Daugavas iela 38-3 Mārupe, LV-2167 Phone +371 22 325 004 i_igus.Lettland_G@igus.de
	34 Lebanon Mecanix Shops SAL Horsh Tablet - Ste Rita blvd P.O.Box: 55384 Beirut Phone +961 1 486701 Fax +961 1 490929 sales@mecanixshops.com
	35 Lithuania Hitech UAB Terminalo g. 3 54469 Biruliskiu k. (Kauno LEZ) Kauno raj. Phone +370 37 323271 Fax +370 37 203273 info@hitech.lt
	36 Mazedonien, Albania, Kosovo Hennlich doo Beograd Radomira Markovića 1/3 11222 Beograd Phone +381 11 63 098 17 Fax +381 11 63 098 20 office@hennlich.rs
	37 Malaysia igus® Malaysia Sdn Bhd Suite 1601-1, Level 16, Tower 2, Wisma AmFirst, Jalan SS 7/15 (Jalan Stadium), 47301 Kelana Jaya, Selangor Phone +603 7803 0618 Fax +603 7886 1328 info@igus.my
	38 Morocco AFIT 5, Rue Amir Abdelkader 20300 Casablanca Phone +212 522 633769 Fax +212 522 618351 souria.vu@premium.net.ma
	39 Mexiko igus® México S. de R.L. de C.V. Boulevard Aeropuerto Miguel Alemán 160 Int. 135 Col. Corredor Industrial Toluca Lerma Lerma, Estado de México C.P. 52004 Phone +52 728284 3185 Fax +52 728284 3187 fmarquez@igus.com
	40 Middle East (except of UAE) JISig Middle East FZE FF07, Jebel Ali Free Zone PO Box- 17483 Dubai, United Arab Emirates Phone +971 4222 1185 Fax +971 4222 1186 info@jisig.com
	41 Myanmar Sea Lion Co. Ltd. 181 Bo Myat Tun St Botataung Yangon 11161 Myanmar Phone +95 1 29 97 97 Fax +95 1 20 27 51 zaw.m.thant@sealionmyanmar.com
	42 Netherlands igus® B.V. Sterrenbergweg 9 3769 BS Soesterberg Phone +31 346 353932 Fax +31 346 353849 info@igus.nl
	42 Netherlands – dry-tech® Elcee B.V. Kamerlingh Onnesweg 28 NL-3316 GL Dordrecht Phone +31 (0)78-654 47 77 Fax +31 (0)78-654 47 33 info@elcee.nl
	43 Nigeria Deepee Industrials Ltd. 11 Ishaga Road Surulere Lagos Phone +234 803 3899107 ovoachinike@deepeeindustrials.com
	44 New Zealand Treotham Automation Pty Ltd. Level 4, 21 Putney Way Manukau, Auckland 2104 Phone +64 9 278 6577 Fax +64 9 278 6578 info@treotham.co.nz
	45 Norway ASI Automattikk AS Sankt Hallvards vei 3, port 8 3414 Lierstrand Phone +47 9006 1100 info@asiflex.no
	46 Peru PROIGUS S.A.C. Calle Bolivar 388/of. 203 Miraflores Lima 18 – Perú Phone +51 1 2414370 Fax +51 1 2428608 profacoventas@profaco.com
	47 Pakistan GEMS International Trading 501, Windsong Place, Block 7&8, K.C.H.S, Off Shaheed-e-Millat Rd. Karachi - 75350 Phone +92 21 34531505 marketing@gemsinter.com
	48 Philippines Silicon Exponents Corp. Unit 1-B, 8414 LMN Bldg. Dr. A. Santos Avenue Brgy.BF Homes Sucat Parañaque City 1700 Philippines Phone +63 2 8250 126/135 Fax +63 2 8250 141 ryemrigor@sieplus.ph
	49 Poland igus® Sp. z o.o. ul. Działkowa 121C 02-234 Warszawa Phone +48 22 8635770 Fax +48-22 8636169 info@igus.pl
	50 Portugal igus® Lda. R. Eng. Ezequiel Campos, 239 4100-231 Porto Phone +351 22 6109000 Fax +351 22 8328321 info@igus.pt
	51 Portugal igus® Lda. R. Eng. Ezequiel Campos, 239 4100-231 Porto Phone +351 22 6109000 Fax +351 22 8328321 info@igus.pt
	52 Romania Hennlich SRL Str. Timotei Cipariu, Nr. 5-7 310213 Arad Phone +40 257 211119 Fax +40 257 211021 igus@hennlich.ro
	53 Russia OOO Hennlich Room 14 Naberezhnaya reki Lazuri, 15A 170028 Tver Russian Federation Phone +7 4822 787 180 Fax +7 4822 787 180, add. 380 hennlich@hennlich.ru
	54 Serbia + Montenegro Hennlich doo Beograd Radomira Markovića 1/3 11222 Beograd / Srbija Phone +381 11 63 098 17 Fax +381 11 63 098 20 office@hennlich.rs
	55 Singapore – ASEAN HQ igus® Singapore Pte Ltd 84 Genting Lane #06-03 Axxel Innovation Centre Singapore 349584 Phone +65 6487 1411 sg-info@igus.net
	56 Slovakia Hennlich s.r.o. Na Bystricku 16 SK-036 01 Martin Phone +421 43 421 2352 litech@hennlich.sk
	57 Slovenia Hennlich d. o. o. Ulica Mirka Vadrnova 13 SI-4000 Kranj Slovenija Phone +386 4 53206-10 info@hennlich.si
	58 South Africa igus® Pty. Ltd. Unit 29 Midline Business Park Cnr Le Roux & Richards Drive Midrand 1682 Phone +27 11312-1848 Fax +27 11312-1594 sales.sa@igus.de
	59 South Korea igus® Korea Co. Ltd. Venture-ro 12-42, Yeonsu-gu Incheon city, 22011 Phone +82 32 82129-11 Fax +82 32 82129-13 kr-info@igus.net
	60 Spain igus® S.L. Ctra. Llobatona, 6 Polígono Noi del Sucre 08840 Viladecans – BCN Phone +34 93 647 39 50 Fax +34 93 647 39 51 igus.es@igus.es
	61 Sweden igus® AB Berga Allé 1 254 52 Helsingborg Phone +46 42 329270 Fax +46 42 211585 info@igusab.se
	61 Sweden – dry-tech® Colly Components AB Raseborgsgatan 9 PO Box 76 164 94 Kista Phone +46 8 7030100 Fax +46 8 7039841 info@me.colly.se
	62 Switzerland igus® Schweiz GmbH Winkelstr. 5 4622 Egerkingen Phone +41 62 388 97 97 Fax +41 62 388 97 99 info@igus.ch
	63 Taiwan igus® Taiwan Company Ltd. 5F, No. 35, 24th Road Taichung Industrial Park Taichung 40850 Phone +886 4 2358-1000 Fax +886 4 2358-1100 info@igus.com.tw
	64 Thailand IGUS MOTION PLASTICS (THAILAND) CO LTD. 1340 Soi Bangkok-Nonthaburi 30, Bangkok-Nonthaburi Rd., Bangsue, Bangsue Bangkok 10800 Phone +66 (0)2 587 4899 Fax +66 (0)2 587 4898 th-info@igus.net
	65 Tunisia BOUDRANT 53, Avenue de Carthage 1000 Tunis – Tunisia Phone +216 71340244 Fax +216 71348910 info@boudrant.com.tn
	66 Turkey igus® Turkey Güzeller Org. San. Bölğ. Galvano Teknik San. Sit. Cumhuriyet Cad. 2/32 P.K. 41400 Gebze / Kocaeli Phone +90 262 502 14 08 Fax +90 262 502 14 19 info@igus.com.tr
	67 UAE + Oman Unigroup FZE Plot of Land M6-01 Sharjah Airport Free Zone PO Box 120300 Sharjah - U.A.E. Phone +971 6 5578386 Fax +971 6 5578387 automation@unigroup.ae
	68 United Kingdom igus® Caswell Rd Northampton NN4 7PW Phone +44 1604 677240 sales@igus.co.uk
	69 Ukraine Hennlich Ukraine LLC (HQ) Kramatorska Street 15 84100 Sloviansk City, Donetsky Region Phone +38 06262 33540 hennlich@hennlich.com.ua
	70 Uruguay Larrique Rulemanes SA Galicia 1204 Montevideo-Uruguay Phone +598 29021773 Fax +598-29084824 larrique@larrique.com.uy
	71 USA igus® inc. 257 Ferris Avenue PO Box 14349 East Providence RI 02914 Phone +1 401 4382200 Fax +1 401 4382720 webmaster@igus.com
	72 Venezuela Neumatica Rotonda C.A. Prolong Av. Michelena C.C. Atlas Locales B-10 y B-11 Valencia, Edo. Carabobo Phone +58 241 832.64.64 +58 241 832.32.50 +58 241 838.88.19 Fax +58 241 832.62.83 ventas@neumaticar.com
	73 Vietnam igus® Vietnam Company Ltd Unit 4, 7th Floor, Standard Factory B, Tan Thuan Export Processing Zone Tan Thuan Street District 7, HCM City, Vietnam Phone +84 28 3636 4189 vn-info@igus.net
	74 Cyprus G.C.V. Spare Parts & Services Ltd (HQ) Industrial Area Anatoliko 8068 Pafos Phone +357 26 812444 Fax +357 26 812447 igus@gcv-parts.com

Offices and distributors worldwide

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www.igus.eu/contact





iglus® GmbH
Spicher Str. 1a
51147 Cologne
Phone +49 2203 9649-145
Fax +49 2203 9649-334
info@iglus.de
www.iglus.eu



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