



# 3D

igus<sup>®</sup> solutions for the 3D printing industry

plastics for longer life<sup>®</sup> ... igus

# printing

... [www.igus.eu/3D-printer](http://www.igus.eu/3D-printer) ...

# igus® solutions for 3D printers



**Michael Hornung**

Product manager  
drylin® linear and drive systems  
Phone +49-2203 9649-156  
E-mail: mhornung@igus.de



**Tom Krause**

Product manager  
iglidur® ribo filament  
Phone: +49-2203 9649-975  
E-mail: tkrause@igus.de

igus® can supply designers of 3D printing machines with their every need, from linear bearings, plain bearings, energy chain and cables, not only this we can now supply the tribologically enhanced 3D printing filament - lubrication free. Delivered from 24 hours and with no minimum order quantities and online.

3D printers can print three-dimensional parts. Complete printer systems are being developed and manufactured world-wide for rapid prototyping or for mass production. The automated, digital printing process uses drylin® linear and drive technology, as well as e-chains®. Many development and design engineers for 3D printers and scanners are already relying on igus® technologies and our products are incorporated into most construction kits and plans.

Quiet operation is one benefit of using linear plain bearings made from high-performance plastics in 3D printers or scanners, since there is no mechanical rolling noise, compared with metal or ceramic balls. With the extremely abrasion-resistant iglidur® tribo filament, we offer users more freedom in the design of the bearing points.

igus® energy supply chains and flexible, energy chain® compatible cables prevent cable failures, thus extending machine service lives.

Advantages of igus® products are:

- Lubrication free
- Quiet and smooth
- Long service life
- Corrosion resistance
- Wide range of sizes and options
- Lightweight, easy assembly and cost-effective
- Available from stock

30 online tools also enable you to reduce process costs. igus® delivers from stock in 24-48 hours! Also visit our industry website

 [www.igus.eu/3d-printer](http://www.igus.eu/3d-printer)

I look forward to speaking to you.



drylin® R bearings ensure accurate distribution of the print material.  
Dry-running drylin® R linear bearings ensure accurate travel.



... innovative machinery elements from igus®

# Lubrication free for 3D-printers ...

Reduce costs ... .. improve technology ...  
... with igus® lubrication free products

## Custom-made from stock

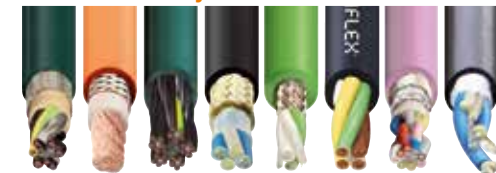


### e-chainsystems® – large construction kit

- 90,000 types from stock
- Safe guiding of cables and hoses
- Inner heights from 5 to 350 mm
- For all kind of applications

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

## Tested and very flexible



### chainflex® cables – with guarantee

- More than 1,040 types from stock
- Suitable for very small bending radii
- Abrasion resistant jacket materials
- Halogen free and/or flame-retardant

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

## Sliding instead of rolling



### drylin® linear technology

- Five type series based on rail profiles and shafts
- Single bearings, shafts, carriages and complete systems
- Versatile
- Replaceable liners

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

## Efficient and durable



### drylin® lead screw drives

- Quiet dryspin® high helix thread technology
- Trapezoidal and metric threads
- Lead screw nuts made from 5 iglidur® materials

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

## Lubrication free drives



### drylin® drive technology

- Ready to install linear axis with lead screw drives or toothed belts
- Choose your own stroke length
- For manual adjustments or electrically with motor (NEMA/DC)

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

## Wear-resistant polymers



### igidur® and igubal® bearing technology

- The world's largest standard range of lubrication free bearings
- Self-aligning bearing components made from plastic
- Predictable
- Versatile

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

Possible applications of igus® products in 3D printers:

- 1 Cable guide through tightest bending radii:  
igus® e-chainsystems®

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



- 2 Low noise, light and clean:  
drylin® R linear bearings for round shafts

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



- 3 Compact and low profile:  
drylin® N linear guides

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



- 4 Abrasion-resistant, wear-resistant, tested:  
igidur® tribo filament

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



- 5 Efficient, long service life, lubrication free:  
drylin® SD lead screws and lead screw nuts

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



# Tribo filament for 3D printing



## igidur® tribo filament for 3D printing

The new materials are **50 times more abrasion-resistant than conventional** 3D print materials.

This provides a new degree of freedom when designing sliding components subject to wear: custom parts and prototypes from a 3D printer with a tested service life.

- Wear-resistant
- Can be processed by commercially available 3D printers
- Diameters: 1.75 mm and 3 mm
- Processing instructions online

Choice of 3 materials:

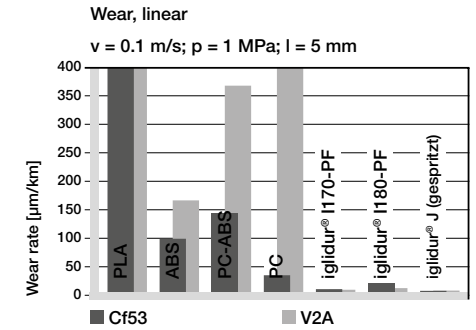
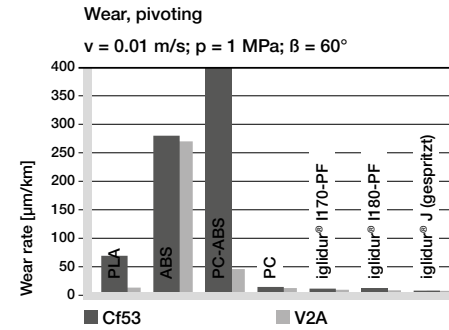
- 1.) **igidur® I180-PF**: with high wear resistance and good mechanical properties
- 2.) **igidur® I170-PF**: harder to process, but meets the highest requirements in terms of wear resistance of the printed parts
- 3.) **NEW iglidur® J260PF**: wear resistant, especially in connection with plastic shafts. First printable material, available as bar stock and injection molding part

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

## igidur® tribo filament material table

		I170	I180	J260
Colour		yellow	white	yellow
Max. moisture absorption at +23 °C and 50 %r.h.	% weight	0,5	0,3	0,2
Max. water absorption	% weight	1,6	0,9	0,4
Max. long term application temperature	°C	+75	+80	+120
Max. short term application temperature	°C	+85	+90	+140
Min. application temperature	°C	-40	-40	-100

## Up to 50 times more abrasion-resistant than conventional 3D print filaments



## NEW 3x more material


With the new spool size, each spool contains 750 g filament, which corresponds to about 300 m filament in 1.75 mm diameter or about 90 m filament in 3 mm diameter.

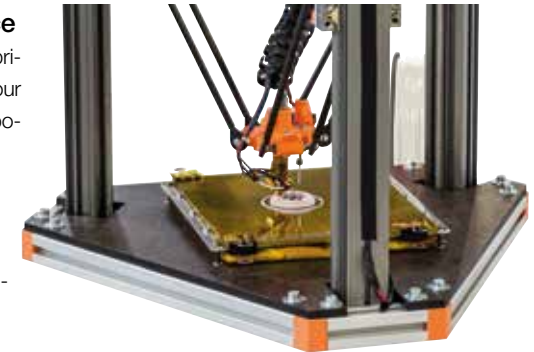


## NEW iglidur® I180-PF 3D printing service

We print your required component made from lubrication free and wear-resistant iglidur® plastic for your application. This enables you to quickly install components that are stressed by friction and wear.

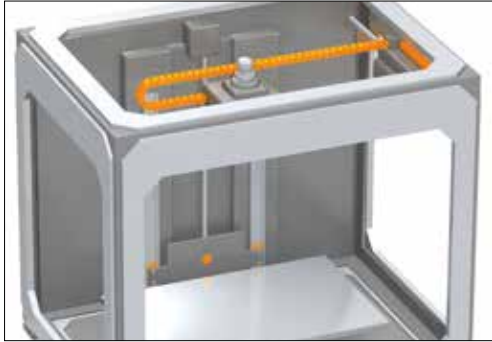
- Design freedom
- Accuracy approx. ±0.2 mm

Send us your request and 3D data for your component  [www.igus.eu/3dprintservice](http://www.igus.eu/3dprintservice)



# igus® solutions for 3D printers

# ... 100% lubrication free



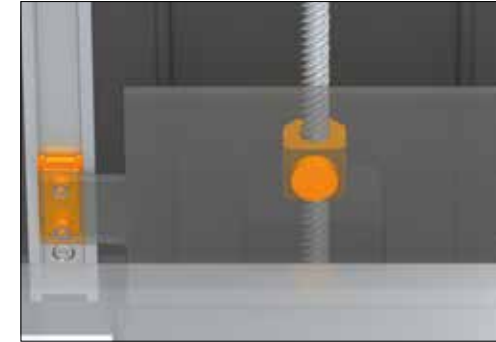
## Cable guide for print head

### igus® energy chains® and cables

- Solutions for tight bending radii
- Low weight, high speed
- Versatile, modular interior separations
- Quiet rolling movement and high stability
- chainflex® cables for bending radii up to 4 x d

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

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

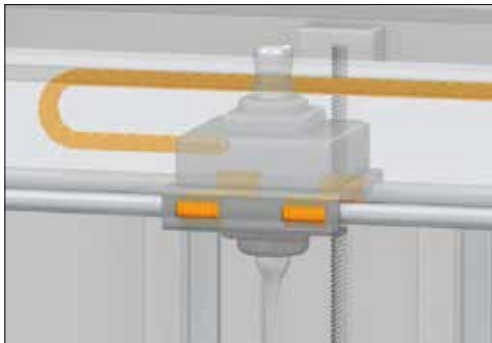


## Print table/bed lowering mechanism

### drylin® lead screw drives

- Self-locking trapezoidal and metric threads
- Efficient and durable dryspin® high helix thread
- Maintenance free dry running and quiet
- Lead screw nuts made from 5 iglidur® materials

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



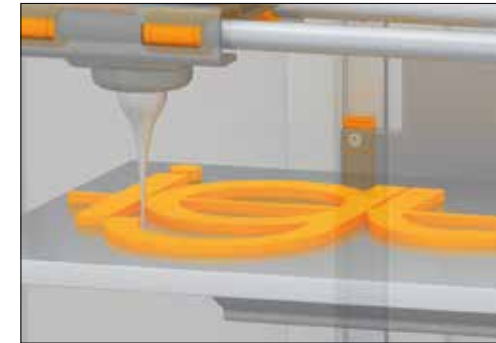
## Linear movement of XY axes

### drylin® R round shaft guides

- Superior operating properties, long service life
- Wear-resistant, and resistant to dirt
- Compatible with ball bearings
- Extremely quiet operation
- Suitable for soft shafts

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

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

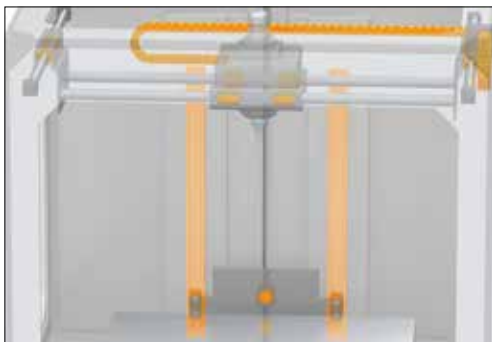


## Print material

### igidur® Tribo filament

- Extremely wear-resistant
- Suitable for commercially available 3D printers using FDM process
- Choice of 3 iglidur® materials
- Diameters: 1.75 mm and 3 mm

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



## Height-adjustable Z axis

### drylin® linear guides

- Linear construction kit based on rails, linear bearings and carriages
- Light, clean, quiet
- Maintenance free dry running operation
- For high speeds/accelerations
- Short strokes possible

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

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

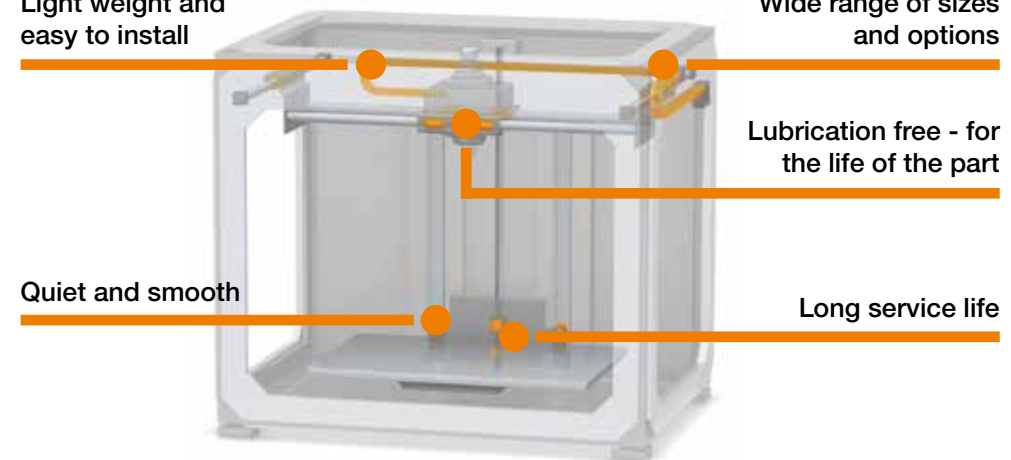
Light weight and easy to install

Wide range of sizes and options

Quiet and smooth

Lubrication free - for the life of the part

Long service life



# Lubrication free bearings ...



The assembly of this Delta 3D printer is carried out with a variety of lubricant-free igus® products from the standard range:

- Ready-to-install drylin® SAW linear axes with stepper motors
- igubal® spherical bearings with hard anodised drylin® aluminium shafts
- Printed with maintenance free iglidur® tribo-filament

In both models, the triflex® R energy chain is used in combination with chainflex® motor cables. By its extremely lightweight construction, high flexibility and movements in tight bending radii, the 3D printers be-



This compact and completely lubrication-free 3D printer kit is based on the hard-anodised drylin® W high profile for the adjustment in the y and z directions. The torsion-resistant linear profile gives the printer the necessary stability without an additional frame structure, while providing a variety of connection options. The direct drive via drylin® E lead screw motors is precise and saves space. Linear carriage including threaded nuts were printed from the iglidur® tribo filament I180.

nefit from a compact design. Due to their smooth running and excellent stability even at high accelerations, both types of printers achieve a high reliability.

# ... lubrication free printing

## 3D printer manufacturer uses ready-to-install system solution

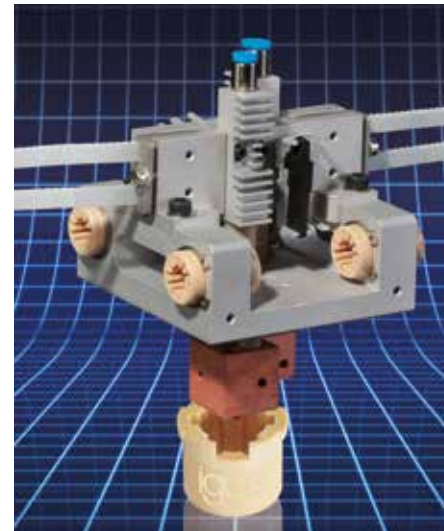
For both, rapid prototyping or mass production – 3D technology provides fascinating options.

### 3D printers with dry running and maintenance free plain bearings

Quiet operation is essential, as is the quality of the parts produced. In addition, contaminants from lubricated bearings can cause considerable difficulties if coming into contact with either the printed part or raw material. Plain bearings from igus® are made from high-performance polymers and run completely dry due to the integrated solid lubrication. This eliminates the risk of contamination. The dry-running properties also render 3D printers maintenance-free and increase operational reliability. Factors such as acceleration and positioning accuracy also play a role on 3D printers to accurately reproduce the product based on CAD models. Regardless of the travel, the drylin® linear guides can be used in combination with either slow or fast movement.

### Everything from a single source: system solutions for the 3D print industry

In addition, igus®- energy chains ensure that connection cables are supported during the computer-controlled print process. Due to their low-profile and tight bending radii, the micro-chain series are particularly suited for dynamic applications in any direction of movement on 3D printers. As is the case for linear plain bearings, micro-chain series also have a very low weight. The chainflex® control and motor cables guided in these are specifically designed for continuous motion applications, guaranteeing a long service life for 3D printers. Combined with motorised drylin® linear axis, which include motor flanges, couplings and drylin® E stepper and DC motors, igus® can supply a fully complete, ready-to-install operating unit from a single source. [EVO-tech GmbH]



# Successful applications ...

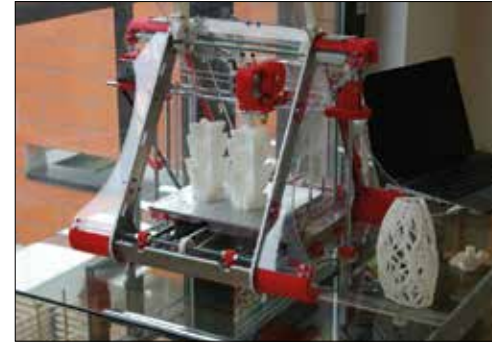


## energy chain® and drylin® low-profile linear slides with lead screw drive systems unit in a 3D printer

The witbox 3D printer combines technology in an aesthetically compact housing, and relies on lubrication free products from igus®. igus® components perform important tasks for each print process and ensure reliable operation..

drylin® N low-profile guide systems and drylin® SD lead screw drives perform the height adjustments. Using black anodised profile, the drylin® N ideally integrates into the design of the 3D printer. The E045 e-chainsystem® reliably guides all connection cables for all directions of travel. In parallel, drylin® R round slides guide the print head in the other directions.

All components are completely lubrication free, travel accurately, are very quiet, low in weight, and corrosion resistant.



Accurate printing of 3D plastic models: drylin® linear guides and iglidur® plain bearings in use at high speeds



Precision printing even after extended use: igubal® spherical bearings and drylin® linear bearings in this 3D printer

## A small "YES" with big impact

The "young engineers support" from igus® donated a 3D printer to Otto-Hahn-Gymnasium in Bensberg (Germany) to participate in a technology competition

The students needed a specific wheel that allows their robot to travel in any direction. In August, the students from the Robot team are planning their second year entry in the "First Lego League", a robotics competition. Using the igus® sponsored 3D printer, the students are now able to fabricate the missing wheel on their own.



# Successful applications ...



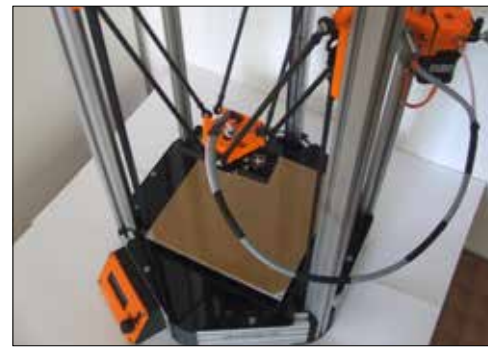
## Perfect cloning

This 3D scanner can digitalise people precisely. The recorded data can be transmitted to a 3D printer, for example, which can prepare a miniature clone of the person scanned. To scan as precisely as possible, the scanners must make even linear movements at high speed. To achieve this, the developers used a compact ready-to-install configured drylin® ZLW toothed belt axis equipped with drylin® NEMA stepper motors. [Sicnova 3D]



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

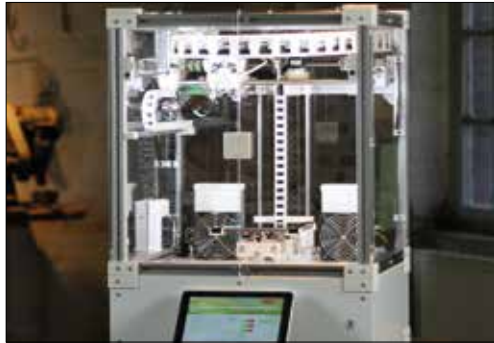
[www.igus.eu/drylinE](http://www.igus.eu/drylinE)



The drylin® N low profile guides and igubal® rod end bearings in this 3D printer kit are impressive due to the maintenance-free dry running with qualitatively matching printing results. [FabLab Karlsruhe e.V.]

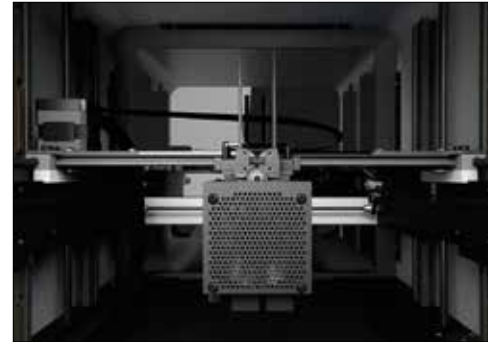


This 3D printer prints reliably and precisely thanks to the lubrication and maintenance-free plastic components from igus®. [GLOBAQ srl and New 3D Printing Life srl]

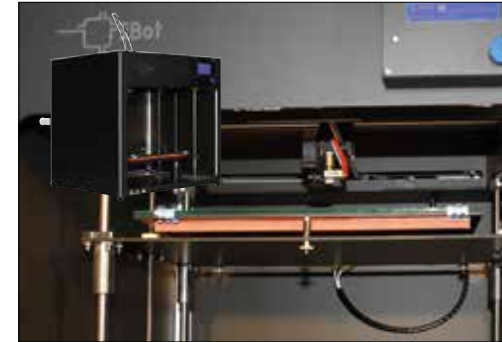


## Smooth printing

The use of easy-to-install, low-cost and long-lasting components with a suitable printing result was the objective of the development of this 3D printer. The use of maintenance-free drylin® linear bearings eliminates the regular greasing, and they move quietly and dampen the vibrations occurring during high accelerations while printing. With their stability and soft rolling movements, the igus® energy chains increase the operational reliability even in the smallest bending radii. [Kühling&Kühling GbR]



drylin® T & drylin® N linear guides, as well as drylin® lead screw units move in the 3D printer fully free of lubrication without any risk of contamination of the housing, filament and the printed products. [Cobot]



This 3D printer runs quietly and precisely. This is made possible by trapezoidal lead screw nuts and plain bearings from igus®, which are mounted on all axes of the printer. [Reprap Austria]



[www.igus.eu/E7](http://www.igus.eu/E7)

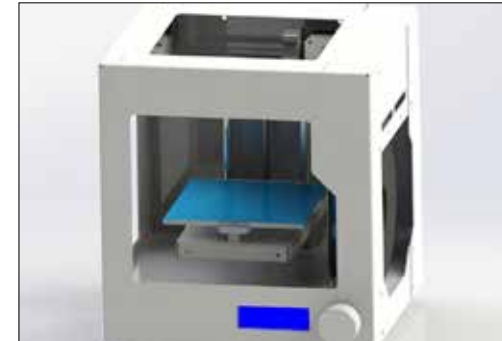
[www.igus.eu/RJ4JP](http://www.igus.eu/RJ4JP)



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



This 3D Delta printer has been designed for official or private use. To achieve a maximum printing output, the drylin® N flat guides are used. [Pel3o]



Precise printing: made feasible by a drylin® linear guide system from igus®, which enables precise and smooth movement of the print head. [edu3DP]



# plastics for longer life® ...



## What are the origins of igus®?

Everything began on 15th October 1964 in a double garage in Cologne-Mülheim. During the first 20 years, igus® operated as a supplier for complex plastic components; igus® is now an important supplier for energy motion systems made from plastics and the specialist for polymer plain bearings.

With more than 2,700 employees and a network of 36 subsidiaries and dealers in more than 50 countries, igus® has a global footprint.



## Modern economic injection moulding technology

Cost-effective high-tech solutions. Modern injection-moulding technology allows more than 7,000- standard and countless custom components to be manufactured with precision and reliability! We produce on more than 200 machines with closing pressures up to 130 t. Our "7 to 8 + Saturday to 12" service gives you the ability to respond quickly to those urgent requirements.



## Extensive test database

igus®-plain bearings represent the step from plastic bearings to tested and therefore predictable machinery components. What is probably the world's largest database for tribological properties of polymer plain bearings which has been developed from more than 15,000 tests annually. This database allows us to select the bearing with the best price/service life ratio for your specific application.

## Better for the environment

Because iglidur® is free of lubricants, no contaminants are discharged to the environment. Even the low weight of iglidur® polymer plain bearings make them ecologically valuable.



## The igus® quality assurance

The igus® GmbH quality policy is based on the objective of identifying and meeting customer needs, and of always being a professional partner and reliable supplier. igus® has always been committed to producing products of the best possible quality and consistently developing innovative solutions.



[www.igus.eu/3D-printer](http://www.igus.eu/3D-printer)

Our extensive industry website with further information, applications, videos, and product details online.

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

## Reduce process costs ... a selection of our useful online-tools

Expert system for drylin® linear bearings  
– system selection & lifetime calculation with CAD  
[www.igus.eu/drylin-expert](http://www.igus.eu/drylin-expert)

Configurator for the drylin® drive technology  
[www.igus.eu/quicklin](http://www.igus.eu/quicklin)

Lifetime calculator for drylin® lead screw drives  
[www.igus.eu/screwdrivequick](http://www.igus.eu/screwdrivequick)

Lifetime calculator for e-chains® – unsupported and gliding applications  
[www.igus.de/quickchain100](http://www.igus.de/quickchain100)

Product finder for short travels – up to 13 m unsupported applications  
[www.igus.de/quickchain13](http://www.igus.de/quickchain13)

Expert system for iglidur® plain bearings – product selection and lifetime calculation  
[www.igus.eu/igidur-expert](http://www.igus.eu/igidur-expert)

iglidur® 3D printing service – material selection and price information  
[www.igus.eu/3dprintservice](http://www.igus.eu/3dprintservice)

For any task – in any batch size

Different industries need different solutions. Ranging from mechanical engineering, automotive assembly, to the robotics industry - igus® offers customised solutions for specific applications. igus® already has many years of experience and specialised resources in many industries.

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

# /9001:2008 /16949:2009

igus® is certified in accordance with ISO 9001:2008 and ISO/TS 16949:2009 in the field of energy chains®, cables and harnessing, as well as plastic plain bearings.

# /newsletter

Free of charge! Discover more about the latest trends and innovations from the world of igus® motion plastics®. Many exciting applications and videos for your industry.

Register here: [www.igus.eu/newsletter](http://www.igus.eu/newsletter)

# /contact

Your contact person for your industry and your country: [www.igus.eu/contact](http://www.igus.eu/contact)

# igus®

igus® GmbH  
Spicher Str. 1a  
51147 Cologne  
Phone +49-2203 9649-145  
Fax +49-2203 9649-334  
[info@igus.de](mailto:info@igus.de)  
[www.igus.eu](http://www.igus.eu)

© 2015 igus® GmbH

Published by igus® GmbH, Germany  
MAT0072905.20 Issue 06/2015  
Technical changes made without notice

