

# Aerospace

igus® solutions for aviation and aerospace

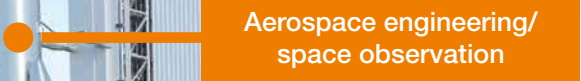


• Tech up, Cost down. It's our job.

igus®.eu

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

# motion plastics® for all aviation and aerospace applications



Aerospace engineering/  
space observation

This callout points to a large, silver rocket standing vertically on a launch pad. The rocket is sleek and cylindrical, with a conical nose cone. It is surrounded by various support structures and scaffolding. In the background, a large, white, multi-story building is visible, likely a hangar or manufacturing facility. The scene is set against a clear blue sky.



Exterior/structural parts

This callout points to the nose and cockpit area of a large white commercial airplane. The nose is rounded and features several windows. The cockpit windows are visible above the nose. The aircraft is parked on a tarmac, and other ground support equipment is visible in the background.



Ground support equipment

This callout points to a white ground support vehicle (GSV) parked on a tarmac. The vehicle has a large, flatbed-like structure on its back, which is used for transporting cargo or equipment. It has a cab with a driver's seat and a steering wheel. The vehicle is parked on a paved surface, and other ground support equipment is visible in the background.

Drones/charging stations



Interior



Airport equipment

Passenger boarding bridges



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

# Reduce cost ... improve technology ...



## Florian Schiller

Industry Manager Aerospace

Mobile +49 172 2628038

e-mail fschiller@igus.net

**Lightweight, quiet, fail-safe and as small as possible. igus® products fulfil these requirements for aircraft interiors with the added benefit of being lubrication and maintenance-free.**

The development of components for aircraft interiors focuses on specific criteria. igus® offers the optimum solution for virtually any moving application in the interior.

- **Lubrication-free** – entirely clean operation and 100% maintenance-free thanks to igus® high-performance polymers (**FAR 25.853 or UL94 V0 certification upon request**)
- **Lightweight** – thanks to the use of lightweight components such as plastic, aluminium or carbon
- **Quiet** – igus® bearings, linear guides and energy chains slide smoothly and virtually silently since they are designed without balls
- **Small** – igus® products adapt to any installation space ... while remaining fully functional

For these reasons, igus® products are ideally suited for a variety of applications in the aircraft interior, including seating kinematics, in headrests that can be height-adjusted in fixed steps, in table extensions, footrest adjustments, mobile cabin partitions or for the adjustment, function and maintenance of entertainment systems.

Customised special parts as well as machined prototypes are always possible.

## Advantages of igus® products at a glance:

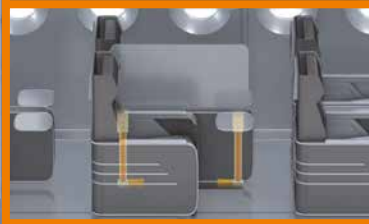
- **Lubrication-free and maintenance-free**
- **Weight saving**
- **Quiet operation**
- **Vibration-dampening**
- **Available from stock**

Our 30 online tools can calculate function and service life, and our product finder quickly guides you to the igus® product you need. Also visit our industry website!

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

We hope you enjoy reading this edition.

... in the aircraft interior ...



... with motion plastics® from igus®

# Save weight ...

with motion plastics® from igus® ...



## Adjustable armrests



### iglidur® GV0 bearings

- Wear-resistant
- Many standard dimensions; also available in accordance with FAR 25.853/UL94 V0

 [www.igus.eu/GV0](http://www.igus.eu/GV0)

### drylin® N low-profile guide

- Lightweight
- Low installation height between 6 and 12mm
- Many carriage options

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



## Adjustable leg support/footrests



### iglidur® MCM clip bearings

- Easy assembly
- Captive with double flange
- Abrasion-resistant

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

### drylin® T rail guide

- Corrosion-free
- Lightweight
- Compact design
- Lightweight and quiet

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



## Height-adjustable headrests



### drylin® NT telescopic guide

- Adjustable
- Optional adjustments in fixed steps
- Extremely quiet

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

### drylin® W profile guide

- Large linear modular system
- Single or double rails
- Linear bearings and complete carriages

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

# ... dispense with lubrication ...

## ... in aircraft cabins

### Table adjustment (economy class)



#### iglidur® J plain bearings

- Vibration-dampening
- Extremely low coefficient of friction
- For rotary, pivoting and linear movements

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



#### drylin® R shaft guides

- Dimensionally interchangeable with standard recirculating ball bearings
- Durable due to hard anodised aluminium shafts

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



### Table extension (business class)



#### iglidur® JVSM plain bearings

- Clearance-free, pre-loaded
- Rattle-free
- Maintenance-free

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



#### drylin® T low-profile linear guide system

- Compact design:
- Same dimensions as recirculating ball bearings
- Carriages with V0 certification optional

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



### Cabin doors



#### iglidur® J350 plain bearings

- Temperatures up to 180°C
- Classification in accordance with UL94 "Safety Tests for Flammability", V0 rating
- Extreme wear resistance

 [www.igus.eu/J350](http://www.igus.eu/J350)



#### SFRJ350 bar stock

- Round bars up to  $\varnothing$  100mm
- For prototypes and small quantities
- Media-resistant

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



# ... reduce noise level ...

with motion plastics® from igus® ...



## Adjustments of tablets, pads, smartphones



### igubal® EGLM spherical bearings

- Angle compensation
- Lightweight
- Shock-resistant

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



### drylin® W curved guide

- Customised radii
- Best possible field of view
- Adjustable without the need for lubrication

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



## Luggage compartment flap



### igidur® M250 plain bearings

- Excellent level of vibration dampening
- Durable against edge loads
- Thick-walled, DIN 1850

 [www.igus.eu/M250](http://www.igus.eu/M250)



### drylin® W profile guide

- Precise guidance
- Curved; can be delivered with customised radii
- Hybrid bearings with integrated roller for easy movement

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



## Horizontal seat adjustment



### e-chain® micro

- For extremely small installation spaces and bend radii
- UL94-HB (optional V0)
- Cable-friendly

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



### e-chain® easychain®

- Easy to fill even with connectors or cable bundles
- Flexible, highly dynamic and quiet
- UL94-V2

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

# ... dampen vibrations

## ... in aircraft cabins

### TV monitor



#### igubal® KSTM + ESTM pillow block bearings

- Lightweight
- Compensation for misalignments
- For all shaft materials
- Lubrication-free
- High durability
- Compensation for edge loads

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



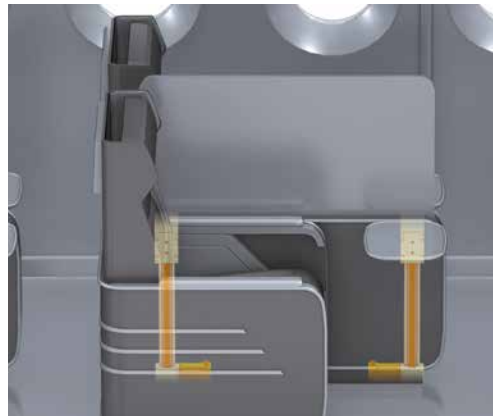
### Partitions



#### drylin® ZLW toothed belt axis

- Ready-to-install linear axes
- Lead screw or toothed belt drive
- Customised stroke lengths
- Can be configured with NEMA stepper motors or DC motors
- Lightweight and low noise
- Can also be delivered with a carbon linear guide (100% metal-free)

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



### Seat adjustment



#### e-chains® for rotary applications

- Lightweight, quiet and abrasion-resistant
- Reliable cable guidance
- V0 and V2 fire classes possible
- Easy to fill and assemble
- Can be delivered harnessed with chainflex® cables

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



# igus® solutions for the ...

## Not only in the aircraft ...

### Failsafe energy chain systems and maintenance-free linear guides

... improve technology and reduce costs of the vehicles on the runway.

### Weather-resistant igus® polymer solutions

... help you to reduce logistics and assembly times as well as throughput times and virtually eliminate the need for maintenance.

### Our energy supply solutions

... for failsafe guidance of cables and hydraulic / pneumatic hoses for almost all vehicles.

### Eliminating the need for lubrication

... makes our polymer plain bearings and linear bearings maintenance-free and ideally suited for outdoor use.



Learn more at:

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

# ... Ground support equipment

... but also on the runway: igus® has the necessary experience



Boarding bridges: guide heavy cables and hoses safely and reliably



Ambulifts: strength and reliability even with large vibrations



Aircraft tractors: high resistance against dirt and other environmental conditions



De-icing vehicles: failsafe operation for temperatures between -40°C and +120°C



Container stackers: e-chain® E4.1 – easily openable from both sides



Boarding bridges: for any movement and environment – e-chains® and chainflex® cables

# igus® solutions for aerospace engineering

## Robust components for aerospace engineering

In aerospace and related disciplines, such as space observation, component reliability and robustness are especially important. Our **energy chains and cables** represent 60 years of experience with high-performance plastics. That is why they are installed in aerospace applications all over the world. Areas of use include space telescopes and rocket launch pads. Thanks to our engineering team and with certified chainflex cables, we also offer ready-to-connect complete systems that are tailored to meet your needs.

igus® **bearing and guide technology products** allow high load capacities to be achieved in tough environments. Application examples include space exploration vehicles such as the Mars Rover and model and prototype construction in research and development.

### Advantages of igus® products

- Complete solution from a single source
- No minimum order quantity
- High load capacity
- Materials for a wide variety of environmental conditions
- Maintenance-free and durable
- 36-month guarantee



Satellites and ground stations



Space shuttles, rockets and launch pads



Space exploration



Space observation

# igus® solutions at the airport

## Lubrication-free components for airports and runways

Worldwide, about 50 million planes take off every day. A complex infrastructure is necessary if such operations are to go smoothly. Airports are a central component of this infrastructure. Wherever something has to move in an airport, igus® products win over customers with their reliability, quiet operation and freedom from lubrication: at automated checkpoints, luggage transport, body scanners and in flight simulators.

To minimise ground times for planes, ground support equipment that remains functional in all weathers is indispensable. Our energy chains and cables have proven themselves for years with their corrosion-resistant, maintenance-free materials and long service life. They are used in passenger boarding bridges, de-icing vehicles and systems, cargo lifters and conveyor belt vehicles.

### Advantages of igus® products in the airport:

- Quiet and low vibration
- Lubrication-free and maintenance-free
- Worldwide 24/7 service



Airport security



Passenger boarding bridges



Luggage management



Flight simulators

# igus® solutions for drones

## Lightweight bearing technology without lubrication for drones and UAVs

Unmanned flights will affect our lives more and more in the form of flying taxis and drones delivering packages. Low weight, all-weather use and long service life are among the stringent requirements of drone components. Our products made of high-performance polymers are ideal for such applications, since they require no additional lubrication and are quiet and corrosion-free. Many iglidur® materials also fulfil the requirements of the FAR 25.853 fire protection standard.

### Advantages of igus® products

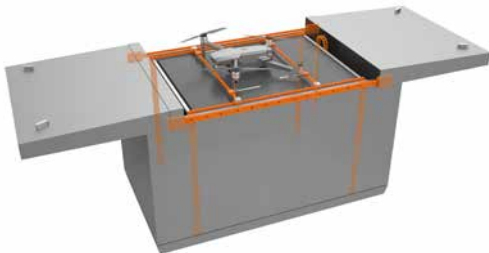
- Cost-effective
- Save installation space and weight
- Quiet and low vibration
- Resistant to chemicals, dirt and corrosion
- Fast delivery
- Complete systems or individual components from batch size 1



Fixed-wing aircraft



Drones with rotors



Drone-in-a-Box

# Materials certified according to ...

## ... Fire protection standard FAR 25.853

iglidur® plain bearing materials such as the three standard materials iglidur® X, J350 and A350 as well as iglidur® H and GV0 now officially fulfil the fire prevention requirements of the Federal Aviation Administration of the USA (FAA) for aircraft interiors. The plain bearing materials have been tested by an independent test institute in accordance with the FAR CS 25.853 fire test method, App F, Part 1a 1(ii) with positive results.

- All five materials have V0 classification in accordance with UL94
- iglidur® bearings are used inside aircrafts for folding tables, seat adjustment mechanisms, door hinges and overhead lockers
- Extensive standard range from stock



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

## ... Fire protection standard UL94 V0

The iglidur® polymer plain bearing material GV0 achieves the UL94 V0 rating and is therefore ideally suited for applications with stringent fire protection regulations (vehicle and aircraft interiors, building interior systems, etc.). Other properties are similar to the all-rounder material iglidur® G.

- Lubrication-free and maintenance-free
- UL94 V0 rating
- Abrasion-resistant
- Universal application
- Vertical burn test; CS-25.853 APP F Part 1a 1(ii) (12 seconds) is available for a selection of iglidur® materials



 [www.igus.eu/GV0](http://www.igus.eu/GV0)

# ... the right solution ...

## Maintenance-free plain and linear bearing solutions ...

... extremely low profile

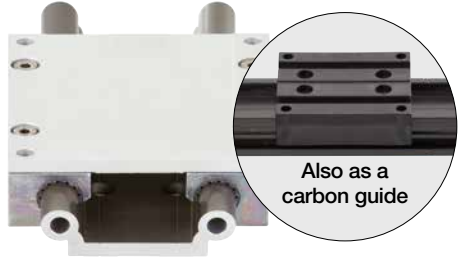


### drylin® N low-profile linear guides

- 100% lubrication-free
- Low installation height between 6 and 12mm
- Lightweight
- Numerous carriage options - also with pretension

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

... for almost unlimited leeway in design

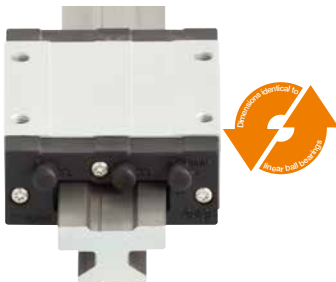


### drylin® W linear system

- Easy installation, maintenance-free
- Resistant to dirt due to dry operation
- Lightweight and quiet
- Square rail with floating bearing function for 90 degree installation
- Manually adjustable bearing clearance (optional)
- VA stainless steel version or full carbon version: non-magnetic, lightweight and strong

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

... as an alternative to recirculating ball bearing guides



### drylin® T linear guides

- 100% lubrication-free
- Automatic clearance adjustment
- High static load capacity
- Dirt resistance
- Low vibration and quiet

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

... linear drive through rotational motion



### drylin® lead screw technology

- Efficient and durable dryspin® technology
- Self-locking trapezoidal and metric threads
- Split lead screw nuts made from 5 iglidur® materials
- High helix thread from ¼ inch to 20mm diameter and 1/10 inch to 90mm pitch

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

# ... available from stock.

## For example ...

### ... the best shaft for your linear plain bearings



#### drylin® R shaft guides and shafts

- 100% lubrication-free
- Dimensions identical to standard commercial ball bearings
- Shafts, shaft support blocks and accessories available from stock
- Replaceable liners
- 8 different shaft materials
- Lightweight, round or supported

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

### ... complete systems

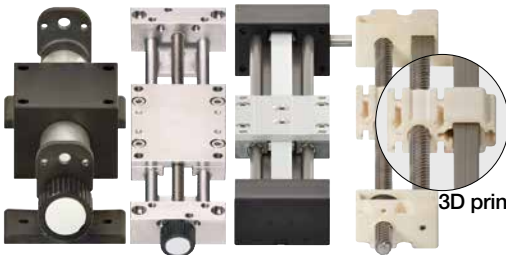


#### Lift/swivel unit

- Very light and dynamic due to plastic and aluminium
- Lubrication-free and maintenance-free
- Compact structure and modular design
- 4-square profile with hollow chamber suitable for supply cables and media
- Delivered ready to install with NEMA stepper motors

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

### ... drive: trapezoidal, high helix thread or toothed belt



3D printed

#### drylin® linear axes

- 100% lubrication-free, extensive accessories
- For format adjustments up to quick small parts handling
- **NEW:** The first lubrication-free linear carriages 3D printed using iglidur® I3 material



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

### ... linear axis with motor and control unit, ready-to-connect



#### drylin® E drive technology

- Complete systems delivered in 3-4 days
- NEMA stepper motors / DC motors
- Can also be configured online
- With dryve control unit (optional)

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

# More igus® products ...

## Lubrication-free bearing made easy ...

... moves neatly without lubricants



### igidur® plain bearings

- Wear-resistant polymers
- FDA-compliant and antibacterial materials
- Customised special solutions - no minimum order quantity
- High wear resistance
- High load capacity and good coefficient of friction
- Service life can be calculated online

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

... lubrication-free, compact slewing ring bearing



### igidur® PRT slewing ring bearing

- Cost-effective, low maintenance, lubrication-free
- Easy to install and replaceable sliding elements
- High wear resistance
- For high loads and high rigidity
- Extensive accessories (e.g. tothing, locking, ...)

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

... ball bearings with completely dry operation



### xiros® polymer ball bearings

- Lubrication-free and maintenance-free
- High corrosion resistance for temperatures up to +150°C
- Non-magnetic
- Lightweight


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

... insensitive to dirt



### igubal® spherical bearings

- Self-aligning bearing elements, made of polymers
- Different types of designs, e.g. spherical, double, joint, flanged and pillow block bearings
- Different spherical ball materials
- Extremely cost-effective
- Service life can be calculated online

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

# ... and solutions

... as you need it.

... material from prototypes to volumes

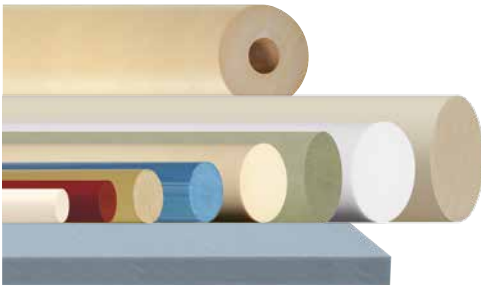


## igidur® tribo-filament for 3D printing

- Can be processed by commercially available 3D printers
- Choice of 5 materials: iglidur® I150 excellent wear resistance. iglidur® I170-PF sophisticated processing. iglidur® I180-PF good wear resistance. iglidur® I210 chemical resistance. iglidur® J260PF extremely wear-resistant, especially when used with plastic shafts

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

... for free design



## igidur® bar stock

- iglidur® materials as round bars, tubes and plates
- Currently 26 iglidur® materials to choose from
- Cut to required size without offcut removal
- Machining with no minimum order quantity
- Maintenance-free and predictable

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

... special geometries



## Special parts made of tribo-polymers

- Special solutions
- Self-lubricating and maintenance-free plain bearing solutions in accordance with your requirements
- Specifically tailored to your application
- Machined or moulded

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

... cut and glue



## tribo-tape

- Suitable for lining surfaces and shapes where wear is an issue
- Easy to cut and glue
- Less space required
- Optional self-adhesive back

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

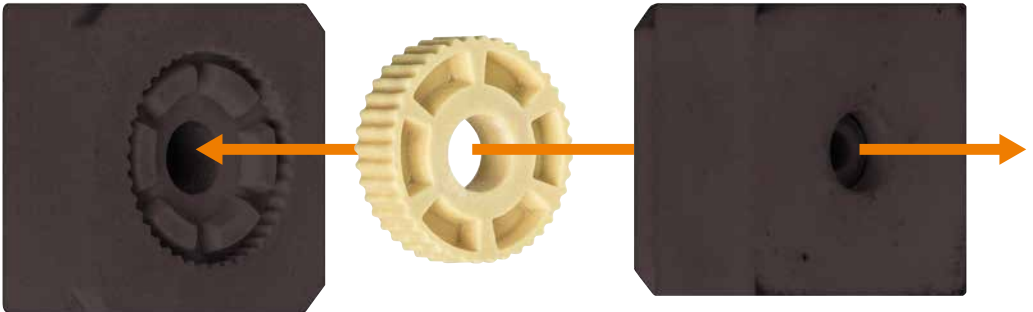
# iglidur® tribo 3D printing ...

## 3D printing for wear-resistant parts ...



### 3D printed wear-resistant polymer parts

iglidur® tribo-filaments are the only 3D printing materials specially developed for moving applications. The printed parts can be used directly in the moving application and convince their users due to the typical tribo characteristics - they are lubrication-free and extremely wear-resistant. The degree of wear is up to 50 times lower than that of other 3D printing materials.



### Injection moulding tools, quick and inexpensive from the 3D printer

Due to 3D printing, igus® is able to make customised injection moulds in a short time with up to 80% lower costs. Maintenance-free polymer plain bearings in the required shape can be made quickly and, above all, cost-effectively.

- A wide array of material types: iglidur® J - extremely wear-resistant,
- iglidur® W300 - withstands high stress
- iglidur® A180 - FDA-compliant
- iglidur® UW - for underwater applications and much more
- Cost-efficient and delivered quickly, no minimum order quantity
- For simple geometries

Find more information at  [www.igus.eu/tribo-printing](http://www.igus.eu/tribo-printing)

# ... as good as injection-moulded

... made of high performance polymers

... makes printing even easier



## igidur® I150

- Very good resistance to wear with a pv value of up to 0.2Nm/s
- Can be processed even without a heated printing plate
- Recommended printing surface: igus® adhesive film or "BuildTak"

... highly abrasion-resistant for printing



## igidur® C210

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

... highly abrasion-resistant, lubrication-free



## igidur® I180-BL

- Wear-resistant
- Can be processed by commercially available 3D printers
- Diameters: 1.75mm and 3mm
- Now also in black

... specifically developed for laser sintering



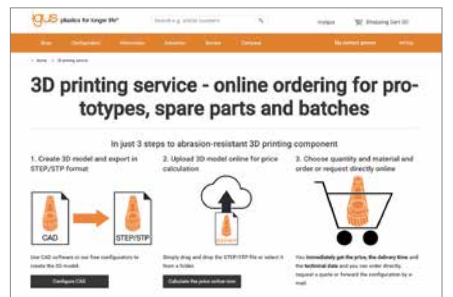
## igidur® I3

- At least 3 times more wear-resistant
- Detail accuracy with exact surfaces
- Processing similar to commercially available SLS materials

## Just shop for individual 3D parts.

Wear parts from the 3D printing service: online and at lightning speed.

We print your individual component made of lubrication-free and abrasion-resistant iglidur® polymers; easy to order and quickly installed: everything from prototypes to complex special parts.



# Energy chains for large-scale applications

## Large e-chains® for ground support equipment

### e-chains® – designed to guide and protect.

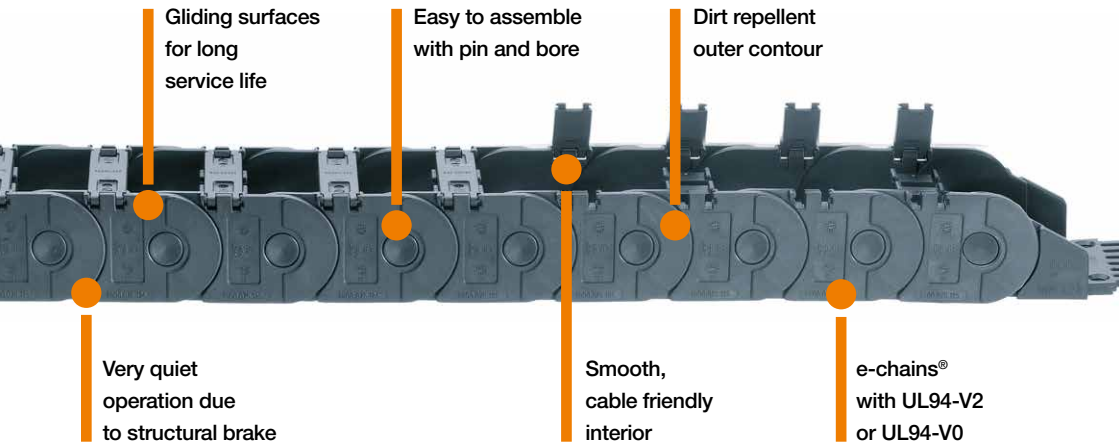
e-chain systems® are the "umbilical cord" of modern machines. They reduce downtime and increase the service life of cables and hoses. Polymer energy chains have been developed, produced and tested by igus® since 1971. e-chain systems® carry sensitive bus, data and fibre optic cables, as well as energy forms such as electricity, gas, air and hydraulics.

- Up to 350mm inner height/200-1,000mm inner width
- Fill weights up to 600kg/m
- Travel speeds up to 600m/min.
- Maintenance-free – no grease or oil needed to lubricate the joints
- Modular design reduces assembly time
- Highly resistant to wear, corrosion and sea water
- Easy to lengthen and shorten
- The polymer material reduces noise and has a vibration dampening effect
- Electrically insulating
- Resistant to dirt, sea water, chemicals, extreme temperature
- Diverse modular interior separations
- Lightweight and high strength



# ... and the smallest installation spaces

## ... and small e-chains® for aircraft cabins



### Small, strong, flexible – E2 micro

- For the smallest installation spaces
- UL94-V2 (optional V0)
- Strong, light and quiet
- For all installation types

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



### Excellent stability/size ratio – E2 mini

- Good size/strength ratio
- Quiet operation
- UL94-V2
- Openable, quickly filled

 [www.igus.eu/E2mini](http://www.igus.eu/E2mini)



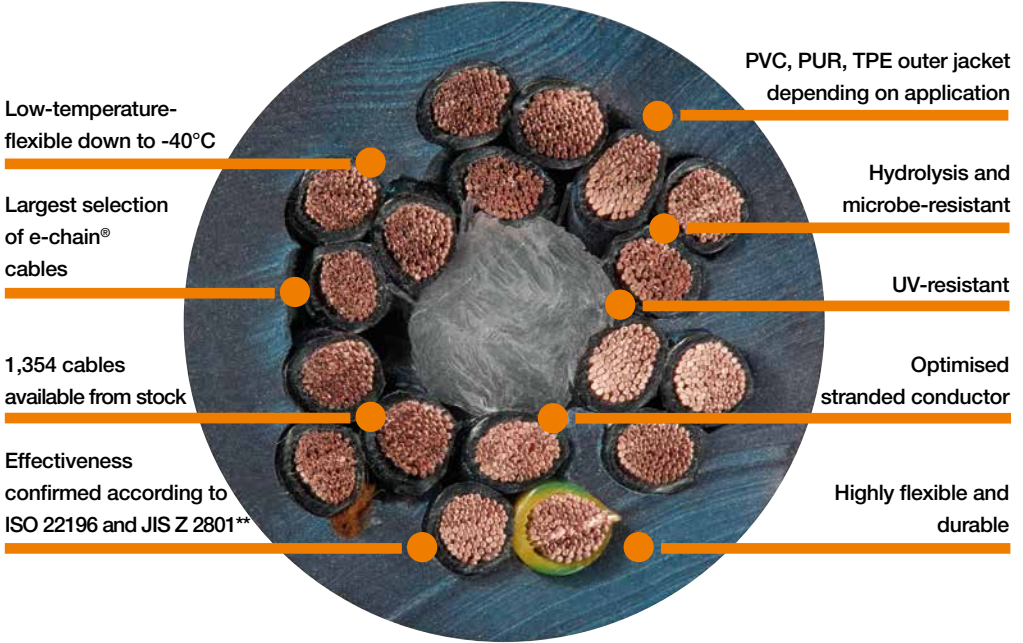
### Light, flexible, easy to fill - easychain®

- Easy to fill
- UL94-V2 (optional V0)
- Flexible, highly dynamic and quiet
- Lightweight and low-cost

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

# chainflex® works ...

## More than 1,354 chainflex® cable types from stock



## Almost 30 years of chainflex® - cables with the special structure for a very long service life in energy chains and unique 36-month guarantee\*.

Flexible cables in energy chains need special features to last through many cycles, high speeds and accelerations, as well as demanding environmental conditions. Electromagnetic compatibility and compliance with standards and guidelines, such as DIN EN 45545, NFPA 79, UL, CSA, VDE, Inter and Profibus are also taken for granted today. The igus® chainflex® product line ranges from control cables, servo cables, motor cables and robot cables to bus cables, data cables, encoder cables and fibre optic cables; all have been specially developed for e-chains®.

- Temperatures  $-40^{\circ}\text{C}$  to  $+90^{\circ}\text{C}$
- For highly dynamic applications in energy chains
- Special design prevents cable failure and "corkscrewing"
- Highly abrasion-resistant jacket materials (PUR, PVC, TPE)
- 36-month guarantee for all cables\*
- Effectiveness in line with ISO 22196 and JIS Z 2801 and achieved an R value  $\geq 2$  in the test\*\*
- Cleanroom-compatible, ISO Class 1 or 2




\* 36 months or up to 10 million double strokes (5 million for cables of the chainflex® M family); whichever is first

\*\* CFSPECIAL.544.001

# ... guaranteed

## Special solutions for your industry, for example:



e.g. **chainflex® CF9 / CF10** - shielded TPE control cables for extreme demands in outdoor applications, for small bend radii, hydrolysis and bio-oil resistant  [www.igus.eu/CF10](http://www.igus.eu/CF10)




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




e.g. **chainflex® CFBUS.052** - largest selection of e-chain® bus cables for extremely small radii, e.g. CAT7, CAN bus, USB 3.0, DVI cable etc.  [www.igus.eu/CFBUS](http://www.igus.eu/CFBUS)



e.g. **chainflex® CFLG88** - preferably indoor applications, PVC outer jacket, maximum EMC protection, flame-retardant  [www.igus.eu/CFLG88](http://www.igus.eu/CFLG88)



e.g. **chainflex® CFSPECIAL.544** - antimicrobial, for use in moving applications with greater hygiene requirements, effectiveness in line with ISO 22196 and JIS Z 2801  [www.igus.eu/CFSPECIAL544](http://www.igus.eu/CFSPECIAL544)



**Save money with reliability and innovation ...  
3 year igus® guarantee for every chainflex®  
cable.**

Guarantee statements are often associated with considerable risks in plant construction. With our unique igus® guarantee for ALL chainflex® cables, we are providing predictable security for 36 months, or up to 10 million double strokes (5 million double strokes for the very cost-effective chainflex® M cables).

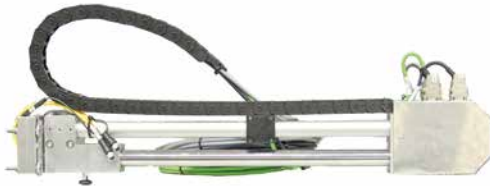
**Guarantee**  
igus chainflex

**36**

**month guarantee**

# Harnessed systems ...

**readychain®**: chain - cable - guarantee ... delivered in 3-10 days



**igus® drylin®** linear systems completely assembled with cables and e-chains®

## **readychain® - fully harnessed systems in 3-10 days**

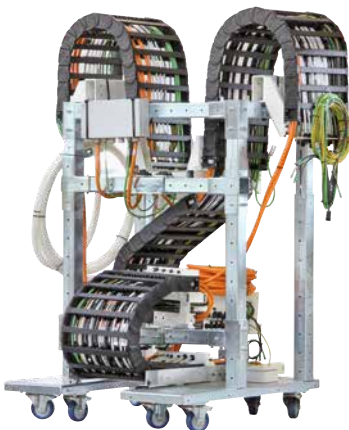
1,600 systems produced per week in 12 readychain® factories around the world – assembly time optimised to increase your cash flow. The largest factory for harnessed readychain® systems with 4,700m<sup>2</sup> and 160 employees in Cologne.

- Eliminate storage costs for cables, e-chains® and connectors
- Cut lead times by half
- Flexibility when orders vary
- Reduce the number of suppliers and orders by 75%
- Minimise your machine downtime
- System guarantee – depending on the application

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

## **readychain® assembly rack**

80% savings during prototyping. Assembly transport rack for ready-to-install energy supply systems.



# ... delivered ready to install

**readycable®**: harnessed drive cables ... in 24-48hrs



## **readycable® - in 24-48hrs or today**

igus® provides more than 4,400 harnessed drive cables according to 24 different manufacturer standards. Professionally produced, 100% tested.

- Servo, motor and signal/encoder cables
- No cutting costs, no surcharges for small quantities and packaging

- Cable length accurate to the centimetre to customer specifications
- Smallest bend radii from 7.5xd
- Reduce storage costs and increase cash flow

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



## **Intercontec SpeedTec**

Connector service packs (starting at 1 piece) or harnessed directly to your specifications. Also available as over-moulded version.

## Condition monitoring ...

**smart plastics eliminate downtime.**

**Intelligent products predict failures in advance and can be integrated in your predictive maintenance processes.**

The isense family of igus® products consists of various intelligent sensors and monitoring modules. They measure wear during operation and alert the user early enough to plan a repair or an exchange. The igus® Communication Module (icom) makes the seamless integration into your IT infrastructure possible. This enables scenarios such as continuous monitoring or automatic triggering of maintenance work. An optional connection with the igus® data centre widens the options: individual lifetime optimisations and faster operational processes like automatic ordering of external maintenance teams or ordering of spare parts. These include maintenance commissioning or spare parts ordering. Thanks to smart plastics your equipment runs continuously and your maintenance costs go down. Improved safety is an additional benefit.



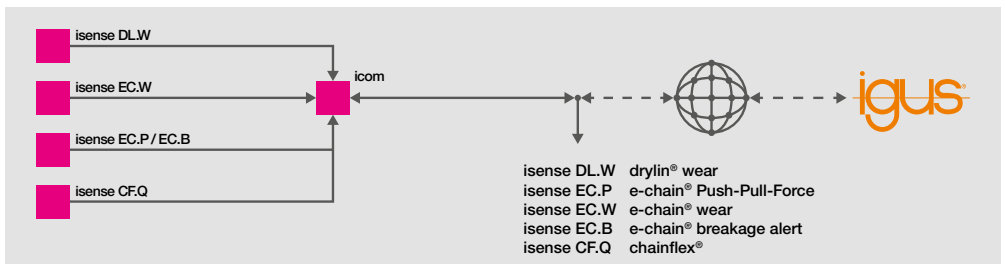
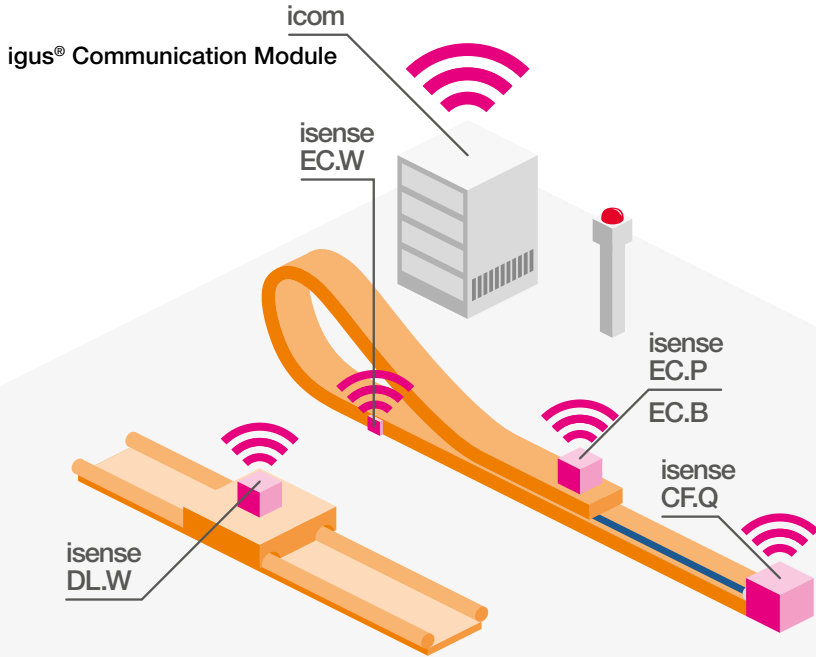
## Integrated sensors indicate maintenance and issue warning before critical wear occurs

The engineers in the igus® 3D printing team have now achieved a further great step: sensors are printed into the tribo-component via multi-material printing. Long before failure, it signals that a replacement is imminent. It can also detect overload in order to stop the application immediately and prevent further damage to the bearing position and the entire system. This enables predictive maintenance for special parts as well, with the result that machine downtime and maintenance work can be reduced. Due to additive manufacturing, such intelligent 3D isense components can now be delivered in a cost-effective way from five business days.

3D isense is suitable for the manufacture of intelligent plain bearings, sliding elements, lead screw nuts and all other special parts that are susceptible to friction and wear.

# ... eliminate downtime

... with intelligent igus® products



- Reduce maintenance costs
- Eliminate unplanned downtime
- Increase service life
- Increase equipment efficiency
- Save time - faster detection of the reasons for anomalies
- Reduce energy consumption
- Typical application areas: wherever predictive maintenance is required, e.g. harbour installations, cranes, car plants, etc.

**motion plastics® for aviation and aerospace**

... as above the clouds, every gram counts

The aerospace industry consists of many different areas: the air vessel itself (e.g. airplanes, helicopter or drone/UAV), the airport surroundings including ground support (GSE) as well as aerospace. Here, the various segments have different requirements. Lightweight, a long service life, quiet operation and high strength are just a few of the most important specifications. With our wide range of products of motion plastics we offer cost-effective solutions in all segments - always according to the needs. Touch up and Contact.

**Air vessels**

Whether airplane interior or helicopter drive shaft, our products made of F43-certified materials stand out due to their low weight and high security.

**Drones/UAVs**

Whether fixed wing aircraft or unmanned charging stations, our expert equipment and individual systems for your drone application.

**Airport & GSE**

Whether passenger boarding bridge or air-cargo vehicle, we will find reliable and cost-effective solutions and bearing technology solutions for your application in airport infrastructure.

**Space travel**

Whether a Mars rover or satellite ground station, our products made of high-performance polymers withstand even the highest demands of aerospace.

Visit our industry web pages for more information, products, application examples and useful online tools.

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

**Selected products for the aviation industry**

**energy chains**

- Quiet and vibration-free
- Highly mobile and long-lasting
- Long service life

**chamflex cables for motion**

- For extremely heavy-duty applications
- Large extension ratio (3:1 cable ratio)
- 20 years experience - 20 years guarantee
- Use our **simulation tool**

**drylin linear technology**

- Proven **recessed drive shaft** with **drive pin**
- 300 mm length - **very light**
- Linear guides - **made up to 60°C**
- Individual special bearings**

**igubal spherical bearings**

- Up to 60°C, noise and vibration-free
- Light and quiet
- Resistant to dust
- With **lighting**
- Low maintenance

**iglidur plain bearings**

- Light and quiet
- Resistant to dust
- Low maintenance

**individual special bearings**

- Tailored to your own needs
- Variety of wear-resistant materials

**Application examples of our customers**

**Reliable navigation**

The aircraft uses recessed iglidur plain bearings, which stand out by their low weight. Inside bearings on top of the number or weight plate in the air traffic control room have been replaced with recessed linear bearings.

**Passenger boarding bridges**

The use of energy chains and highly flexible chamflex cables in the telescopic extension system is ideal for passenger boarding bridges that can still be used in the winter. The cables are used to bring the passenger boarding bridge up to the height of the plane. The telescopic movement must be smooth. Without passenger boarding bridges, entry into modern aircraft becomes difficult. Only a short length of cable has more than the plane, and high stress would be necessary, making it complicated for safety purposes to build, for example, the parts whose failure can be very expensive. We can help you with this.

**Further information**

**igus® online tools: simple online configuration**

Are you looking for a possibility to configure your product exactly the way you need it for your application? Our tools provide you with suitable equipment so that you can set together your desired product quickly and easily. Whether for a recessed, chamflex® cable, iglidur® bearings, drylin® linear bearings and many other product areas - we offer you a wide range of suitable configurations and calculation tools. Reduce your process costs with our online tools and make our useful advice services. Do you require support? We're happy to help you - feel free to call us!

Here you can find an overview of our online tools for:

- **energy chains**
- **chamflex® cables**
- **chamflex® recessed extension cables**
- **iglidur® plain bearings and low-noise**
- **iglidur® spherical bearings**
- **drylin® linear bearings, drive technology and load sense units**
- **aircraft passenger boarding bridges**
- **aircraft ground support equipment**
- **space travel**
- **aircraft ground support equipment**
- **space travel**
- **aircraft ground support equipment**
- **space travel**

**Six highlights in a six-minute video**

Our innovations 2023 for the aerospace industry

Touch up, Contact. The example with motor-free telescopic passenger boarding bridge, quiet and up to 70% lighter than steel components.

You can find more information on these and further product innovations on our **YouTube page** and in our **eNews** "trade show stand". You can also **request a sample** or you can **visit us together with an industry expert**. Make an appointment now for a global virtual tour with individual consultation.

**Customize more innovations?**

Click to discover innovation and the virtual tools that make them possible.

**Free linear technology sample box**

See for yourself the quality of our roller plastics

Order the sample box with products and further information about our drylin® linear technology for the linear profile rails, a carriage and linear bearings, offset bars, a telescopic guide rail and some ball and a drive shaft with bearing ball.

**Order a sample box**

Quickly find and configure products and calculate service life – all online.

Using our online product finders, you can find the right igus® product and get a service life prediction.

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

# ... fast and reliable.



## igus® delivery service

Over 97% availability of all catalogue parts

- Over 100,000 products from stock
- No minimum order value
- No surcharges for small quantities
- No costs for cutting cables
- No packaging costs

 [www.igus.eu/24](http://www.igus.eu/24)



## Modern injection moulding technology

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.



## The igus® lab

The industry's largest test lab (3,800m<sup>2</sup>) conducts more than two billion test cycles per year on a total of 107 test rigs.

- Extensive test databases
- Customised tests upon request

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



## igus® motion plastics®

One vision has been driving us for 50 years – motion plastics®: moving parts made of plastic that cost less and last longer. Our core technology consists of tribo-polymers – high-performance plastics, which we have optimised for friction and wear. The technology has made us into a world-wide leader for developing and manufacturing energy supply systems and plain bearings.



# /9001:2015 /16949:2016

igus® is certified in accordance with ISO 9001:2015 and ISO/TS 16949:2016 in the field of energy supply systems, cables and harnessing, as well as polymer bearings.

# /14001:2015

igus® is certified according to ISO 14001:2015. This accepted basis for environmental management systems supports us on our way to a CO<sup>2</sup>-neutral factory.

# /newsletter

Get more information about motion plastics® innovations and trends: exciting applications, videos, test results, online seminars and much more. Compact and free of charge. Register here:  
[www.igus.eu/newsletter](http://www.igus.eu/newsletter)

# /online

You can find out more about aerospace technology at [www.igus.eu/info/industries-aviation](http://www.igus.eu/info/industries-aviation)



igus® GmbH  
Spicher Str. 1a  
D-51147 Cologne, Germany  
Phone +49-2203 9649-800  
Fax +49-2203 9649-222  
[info@igus.de](mailto:info@igus.de)  
[www.igus.eu](http://www.igus.eu)

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