



# machine

igus® solutions for machine tools

plastics for longer life® ... igus

# tools ...

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

# safe quality & save money

Increase reliability, confront challenges, avoid expensive downtime

## e-chains®

- Chip-resistant
- Oil-resistant
- Corrosion free
- Low vibration
- Energy-efficient
- Lightweight and cost-effective

## chainflex® cables

- Specifically developed for highly dynamic applications
- Oil-resistant (UL-/EAC-/CTP compliant)
- Coolant resistant
- Tested & guaranteed
- For smallest installation spaces
- Cost-effective, also as harnessed cables

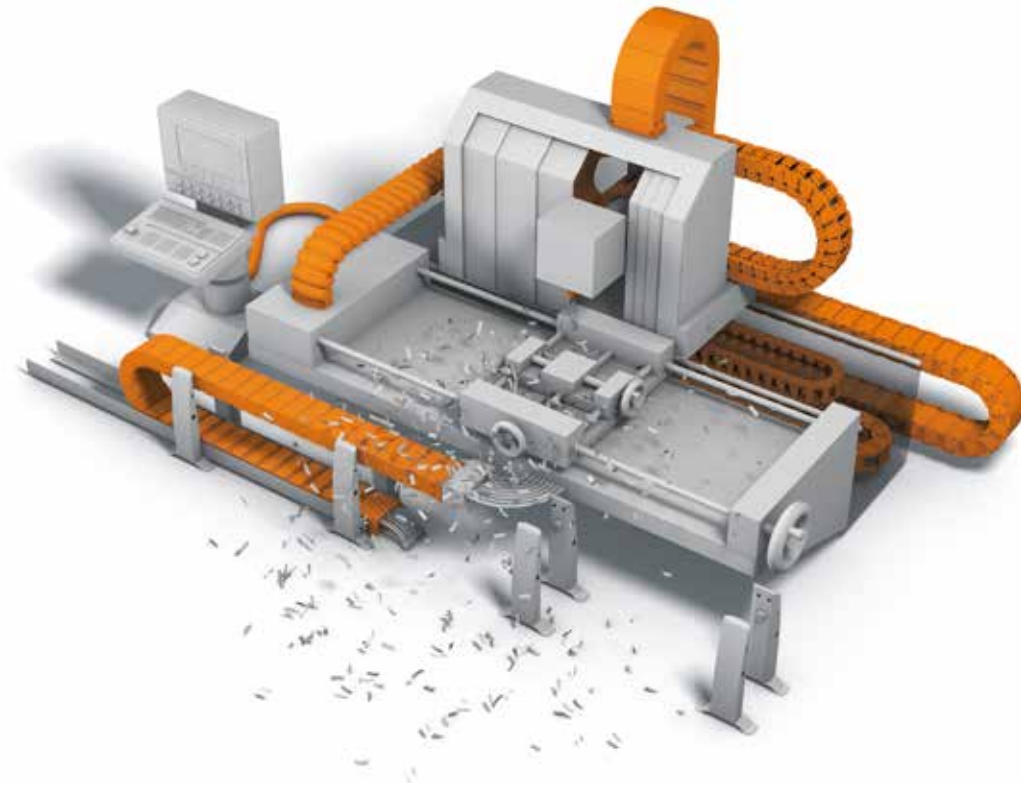
## dry-tech® bearings

- Lubrication free
- Dirt-resistant
- Maintenance free
- Predictable service life
- vibration dampening
- Corrosion resistant

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

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

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



# Challenges ...

... in the machine tool industry.

## Hot chips

igus® solutions as protection for cables and hoses

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## Oil and coolant flow

igus® solutions for use in oily environments

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## High dynamics

igus® lightweight solutions for high cycle times and low wear

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## High vibrations

Low-noise and low-vibration solutions for better milling, turning, and machining finishes.

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## High maintenance effort

igus® solutions for "fit and forget"

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## High design-engineering effort

Time and cost-effective igus® solutions from a single source

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## High pressure of cost

igus® solutions custom-made according your demands on quality

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## Benefits:

### + Cost savings

reduce process costs by outsourcing design-engineering

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### + Guaranteed reliability

Unique guarantee model for cables

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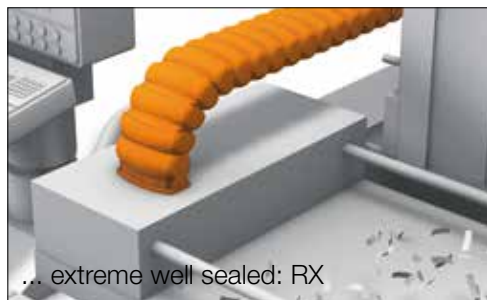
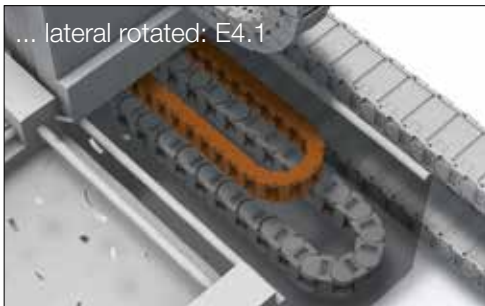
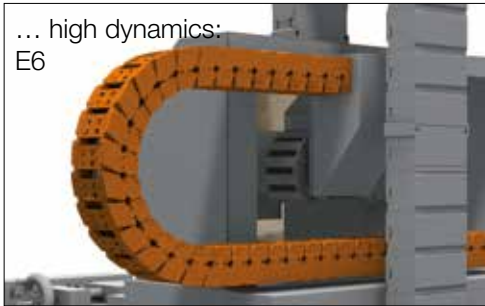
### + Energy efficiency

Reduce power and operating expenses

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# igus® in machine tools

## Energy chains® and cables.



Ready-to-install, maintenance-free, reliable, and cost-effective – igus® solutions for machine tools.

Particularly for the machine tool industry, high machine productivity is the basis for sustainable competitiveness in world markets. You depend on suppliers who can guarantee high process reliability under challenging operating conditions.

igus® provides lab-tested solutions for any challenge in the machine tool sector that will increase the reliability of your machine.

Your contact for the igus® machine tools sector



UK/ ES/ CN/ JP/ KR/ TW/ TH/ PL/ RU

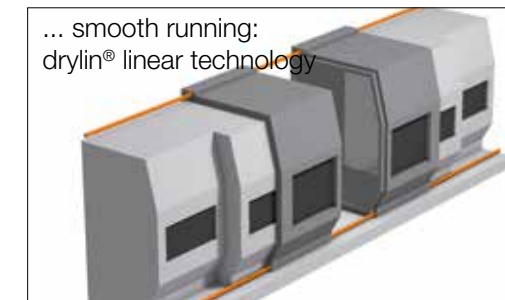
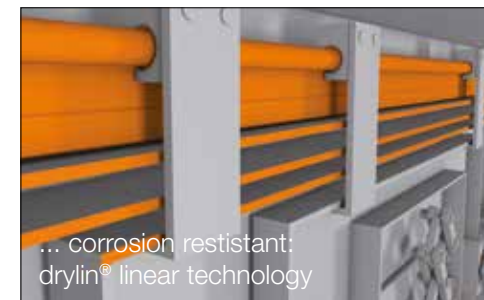
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## Polymer plain bearings.







igus® RX e-tube - ideal in the direct chip area,  
IP protection class 40



Dry-running igubal® plastic spherical bearings  
- no chip adhesion



Brass chips and oil/coolant  
- igus® RX e-tube protects reliably



For long travels in the chip area - guidelok  
horizontal guides up to 50 m



igus® E2 e-tubes, upright and rotated by 90° in  
the chip area



chainflex® cables for highly dynamic applications  
in e-chains® - tested!



# Reliably in use ...



A wide range of e-chains® in a CNC machine tool – hanging, upright, rotated, and unsupported.



Combined motion with an igus® E6 readychain®.



Horizontal guidelok upper run guide for long travels in chip areas.

# ... increase service life



e-chain® E6 in a CNC grinder: The low weight supports particularly smooth motions.



Top condition even after 9 years: e-chain® in a high-precision lathe and grinding machine.



Enormous cost advantages and high resistance to wear favour the use of iglidur® D plain bearings.



igidur® plastic plain bearings in lathes and grinding machines for the printing industry.



Saving space: the X-axis of the energy chain® lies on the upper machine cover.



RX e-tube: problem-solver on the machine tool in the chip area.



# Cut costs ...



Sliding column machine: to keep installation space and costs for the e-chainsystem® very low, an igus® E4.42 Series was installed upright with single-sided radius in the travel.



The ready-to-install igus® readychain® saves costs and time.



The e-chain® can also be supplied without camber if space is limited.

# ... improve technology



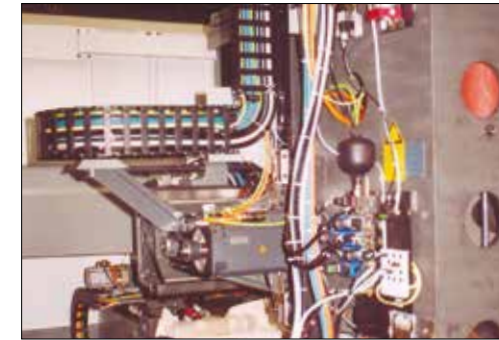
Machine doors with maintenance free guide using drylin® linear technology.



Dirt and chip-resistant – drylin® linear technology.



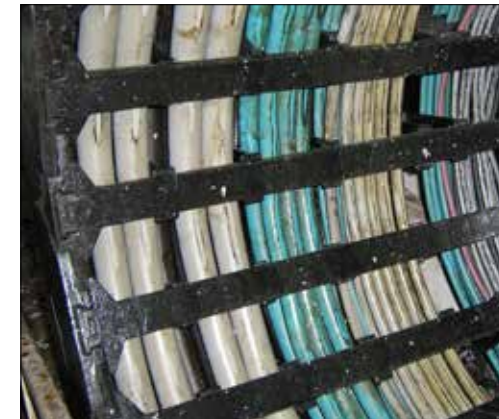
Several e-chains® and chainflex® cables in various installation methods.



Many igus® e-chains® with chainflex® cables in an X/Y gantry.



Permanently reliable data transmissions, e.g. with chainflex® cables harnessed to DriveCliq standard.



chainflex® cables are reliable even in oil and coolant.



# Protecting cables ...



Heat-resistant against 850°C hot chips: igus® RX e-tube as HT configuration (optional).

Components in machine tools are exposed to rough operating conditions. High machining speeds and the continuously optimised production capabilities of numerically controlled machine tools result in large machining volumes per unit of time. Hot chips significantly compromise the service life of cables and hoses. Over the mid-term this results in machine failures accompanied by expensive downtime. Downtime negatively influences the most important quality characteristic: machine productivity.

The need to ensure the reliability of your machine tools calls for the use of chip-resistant products.



Leakage test in the igus® lab, Cologne.

# ... even against hot chips

Chip tight igus® e-chain®, for example:



**New R2.75:** cost-effective e-tube with 75 mm inner height.

[www.igus.eu/R275](http://www.igus.eu/R275)



**RX:** extremely tight tube for the direct chip area.

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



**R4.1 light:** lightweight, tough, and snap-open e-tube.

[www.igus.eu/E41](http://www.igus.eu/E41)



**E2/000 e-tube:** small e-tube, snaps open on both sides.

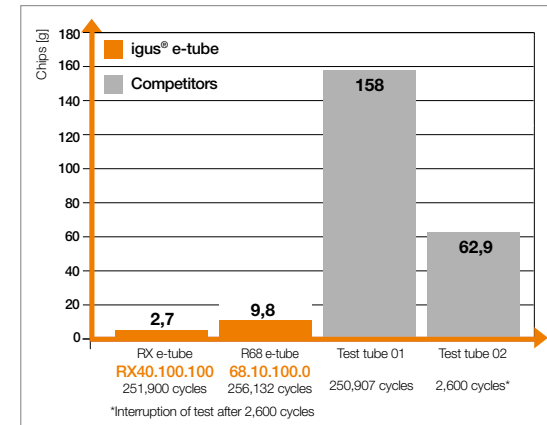
[www.igus.eu/E2000](http://www.igus.eu/E2000)

Explore more e-chain® solutions for machine tools at:

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

## Tested!

In the largest lab of its kind, igus® Cologne



## Extreme chip tightness

Reliable tightness under realistic environmental conditions

Chip penetration test - Various types of tube were exposed to a defined quantity of chips. After 251,900 cycles, only 2.7 g of chips were found in the interior of the RX tube

In the field





# Long service life ...



Cable service life test at the igus® lab, Cologne

Flexible cables in energy chains® need special properties to tackle many cycles, high speeds and accelerations, in addition to challenging environmental conditions. In particular, resistance to aggressive media, such as oil or coolant, must be ensured. In particular, resistance to aggressive media, such as oil or coolant, must be ensured.

Components in machine tools must comply with extreme demands, such as EMC safety and compliance with standard, such as NFPA 79, UL, CSA, VDE, EAC & CTP to ensure the reliability of your energy supply and world-wide use.



Media resistance testing on chainflex® cables

# ... in oils and coolants

Media-resistant igus® chainflex® cables, for instance:



CF77.UL.D control cable for high load requirements, resistant to oils and coolants, flame retardant, notch proof, free of PVC and halogen, minimum bending radius up to 6.8 x d



CF240.PUR data cable for high load requirements, shielded with 90% cover, resistant to oils and coolants, notch proof, PVC-free/halogen-free, flame-retardant, minimum bending radius up to 10 x d



CF111.D / CF113.D measuring system cable for high load requirements, shielded, resistant to oils and coolants, notch proof, flame-retardant, minimum bending radius up to 7.5 x d



CF270.UL.D / CF27.D servo cable for high load requirements, shielded, resistant to oils and coolants, notch proof, flame-retardant, PVC-free/halogen-free, minimum bending radius up to 7.5 x d

Explore more chainflex® solutions for machine tools at:

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

 **Tested!**

In the largest lab of its kind, igus® Cologne



**Test: chainflex® cables in oil**

Service life and durability tests on various igus® chainflex® cables, moving in e-chains®, in a selection of oils.

In the field





# High cycles and dynamics ...



High dynamics test on igus® chainflex® cables in e-chains®.

The economic use of machine tools depends on the speed at which the tool can be moved across the workpiece contour. The maximum attainable travel speed and acceleration determine the cycle time of the production process and therefore the production costs.

In addition to using highly dynamic and high-performance drive systems, reducing the moving mass by employing lightweight components is necessary to keep speeds high and machine vibrations as low as possible.

The machine tool industry depends on lightweight products that can tackle highly-dynamic applications.

**No corkscrew after 5 million double-strokes.**



**Competitive products:**

Corkscrewing after 145,000 double strokes.

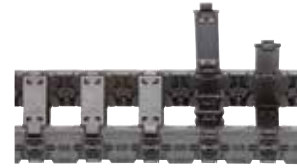


**igus® CF27:**

No wear, even after 5 million double strokes!

# ... no failures

Lightweight igus® e-chains®, for example:



**E6.1:** maximum dynamics and lower weight. 37 dB(A), filled quickly.

[www.igus.eu/E61](http://www.igus.eu/E61)



**E4.1 light:** Lightweight and solid e-chain®. Cost effective and filled quickly.

[www.igus.eu/E41](http://www.igus.eu/E41)



**E2.1:** small, lightweight, tough. Smallest e-chains® from 10 mm.

[www.igus.eu/E21](http://www.igus.eu/E21)



**E2/000:** cost-effective allrounder. Lightweight and versatile.

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

Explore more e-chain® solutions for machine tools at:

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

In the field



**Tested!**

In the largest lab of its kind, igus® Cologne

Due to the wide range of cable grades, the best possible customer solution is selected based on the customer's specific dynamic requirements.

Tested: CF5.10.25 control cable lasts more than 41 million double strokes at 25% under-bending.

chainflex® lasts - proven in test No. 2233 of more than 600 parallel tests conducted by the 1,750 m² test lab, the largest of its kind for flexible cables.



# Minimise vibration ...



Smooth operation is a condition for clean machining and milling finishes.

The precision of machine tools continues to increase. In combination with the increased level of automation, machinery is subjected to increasing characteristic vibration requirements to ensure the best possible machining and milling finish.

As the level of technology increases, the use of cables and hoses that need to be guided with energy chains® also increases. The required motions create vibrations in the trough and the moving end that can negatively influence the machining result and the entire production process when these exceed a certain tolerance band.

With international competition, the machine tool industry depends on premium products that are differentiated from competitive products based on productivity and accuracy. Factors that limit the performance of machine tools must be overcome with innovative technologies. Suppliers of quality machines therefore depend on energy supply systems that minimise vibrations and chatter.

# ... smooth operation

Easy running igus® e-chains®, for example:



**E6:** high dynamics e-chain®, 38 dB(A), 10 m/s<sup>2</sup>, 29 - 80 mm inner height. [www.igus.eu/E6](http://www.igus.eu/E6)



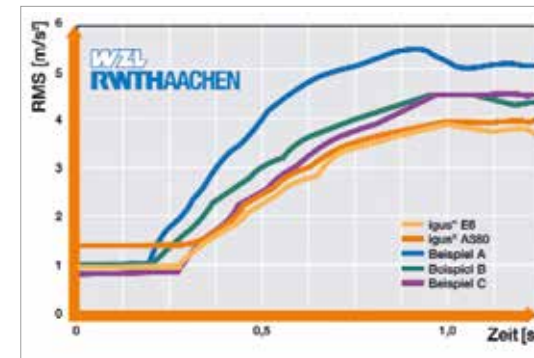
**R6:** high dynamics e-chain, from 38 dB(A), 10 m/s<sup>2</sup>, 29 - 52 mm inner height. [www.igus.eu/E6](http://www.igus.eu/E6)

Explore more e-chain® solutions for machine tools at:

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

**Tested!**

In the largest lab of its kind, igus® Cologne



**Vibration properties WZL RWTH Aachen.**

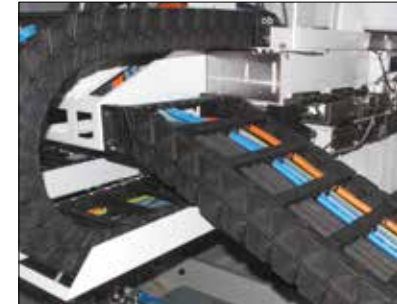
Chart: Study by the Machine Tools Laboratory and Business Operations (WZL) at RWTH Aachen on "Vibration Tests in Energy Supply Chains".

Results: the "E6" energy supply system made by igus® GmbH, Cologne, is characterised by extremely low vibration and smooth operation.

Free whitepaper regarding this topic at:

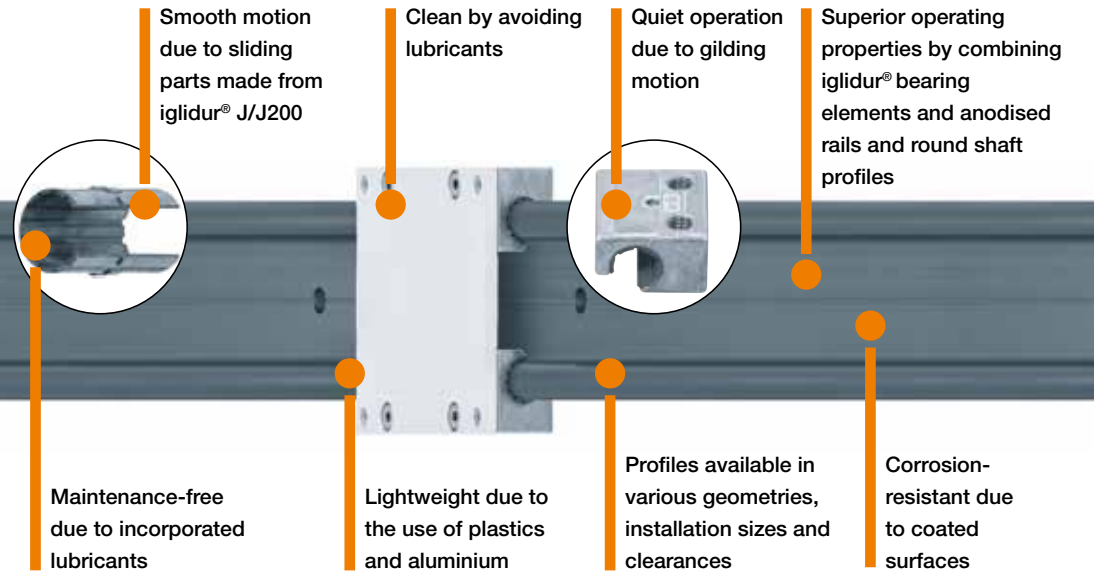
[www.igus-machinetools.eu](http://www.igus-machinetools.eu)

In the field





# Reduce maintenance effort ...



# ... avoid lubricating

## drylin® lubricant-free linear technology

drylin® is a product range of lubricant-free linear plain bearings based on the principle of gliding instead of rolling. Tribo-optimised iglidur® high-performance polymers are used as plassen surfaces. drylin® linear systems travel in dry-running mode and are maintenance-free. Linear guides on rails or round shafts are available. Linear guides on rails or round shafts are available. drylin®-drive technology can supply ready-to-connect systems with lead screw drives or toothed belt drives, with or without motor. In addition to the lack of maintenance and lubricants, the focus is also always on toughness and resistance to influences, such as dirt, water, chemicals, heat, or shocks.

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

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

## In the field



## Maintenance free drylin® linear technology solutions.



### drylin® W

- Large linear construction kit
- Single and dual shaft profiles
- Many options of bearings, housings, functions, complete carriages

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



### drylin® N

- Low-profile guide in 4 sizes
- Low installation height 6 - 12 mm
- Rail widths from 17 mm to 80 mm
- Numerous carriage options – also with camber

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



### drylin® Q

- Torque resistant square linear guides
- Carriages with individually adjustable clearance
- Variable fastening options

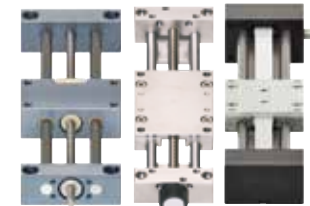
 [www.igus.eu/drylinQ](http://www.igus.eu/drylinQ)



### drylin® SD

- Systems consisting of lead screw nut and lead screw
- dryspin® high-helix threads, efficient and long-lasting
- Self-locking trapezoidal and metric threads

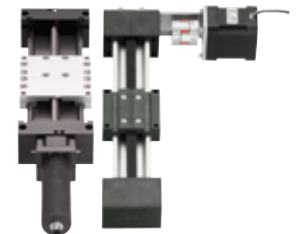
 [www.igus.eu/drylinSD](http://www.igus.eu/drylinSD)



### drylin® drive technology

- Linear modules with lead screw drive or toothed belt
- For manual or electrical adjustments
- Can be configured with custom stroke lengths

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

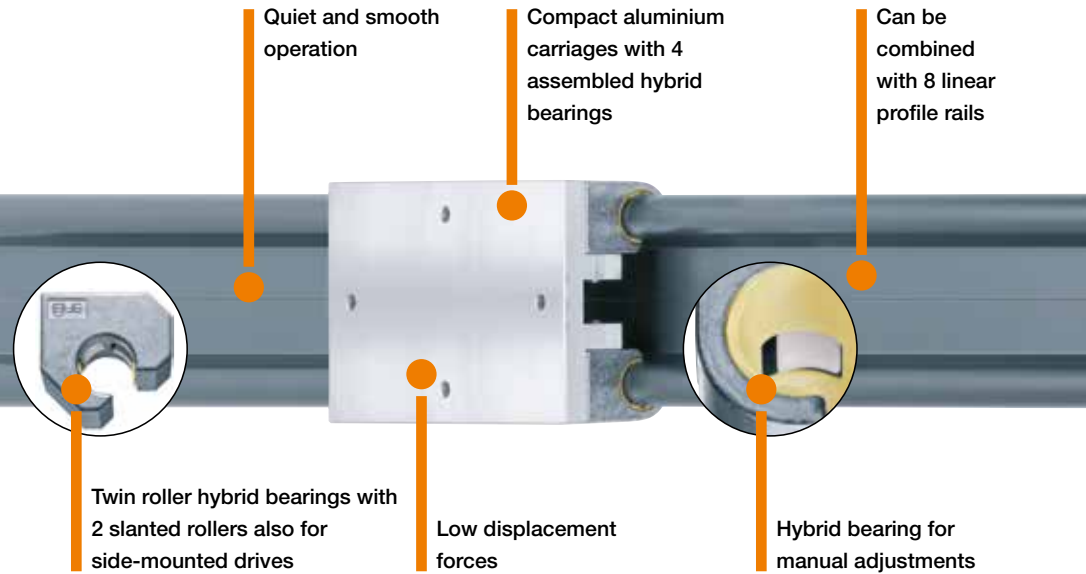


### drylin® E drive technology

- Linear axes with stepper motors/ DC motors
- Fail-safe due to the use of encoders and initiators
- Can be combined for gantry configurations

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

# Dry operation ...



## Maintenance free drylin® linear technology solutions.



### drylin® WJRM

- With one or two rollers
- Plain bearing plastic rollers
- Use with 8 linear profile rails

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

### drylin® WWH

- Complete system: hybrid carriage with rollers
- Low displacement forces
- Smooth and quiet operation

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

### drylin® WWR

- For lateral adjustments
- Compact design
- Guided by twin rail, no support required

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

# ... no chip adhesion

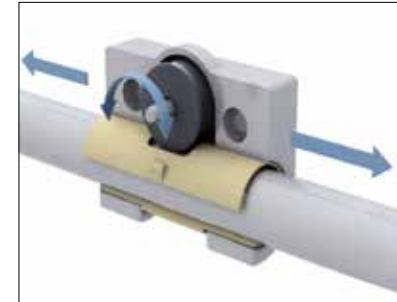
## Combined gliding and rolling for low drive forces – drylin® WJRM.

drylin® WJRM hybrid bearings offer a unique lubricant-free combination of plain and roller bearings. The integrated rollers achieve low drive forces, while the gliders protect against lateral forces at the same time. This makes drylin® WJRM-hybrid bearings ideal for manual adjustments in door applications (e.g. machine doors, safety doors), but also in mobile operator panels. The efficient design with plastics and zinc die-casting also cuts costs. WJRM hybrid bearings can be used on various hard-anodised aluminium profiles from the drylin® W linear construction kit.

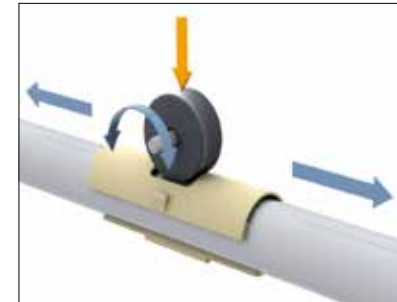
- Smooth operation
- Low-profile installation method
- Transverse and abuse forces are easily absorbed by gliding elements
- Location on rail eliminates seizures
- Matching guide rails from coated aluminum
- Low drive force requirements
- Cost effective

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

## In the field



### WJRM mechanism



## Tested!

In the largest lab of its kind, igus® Cologne



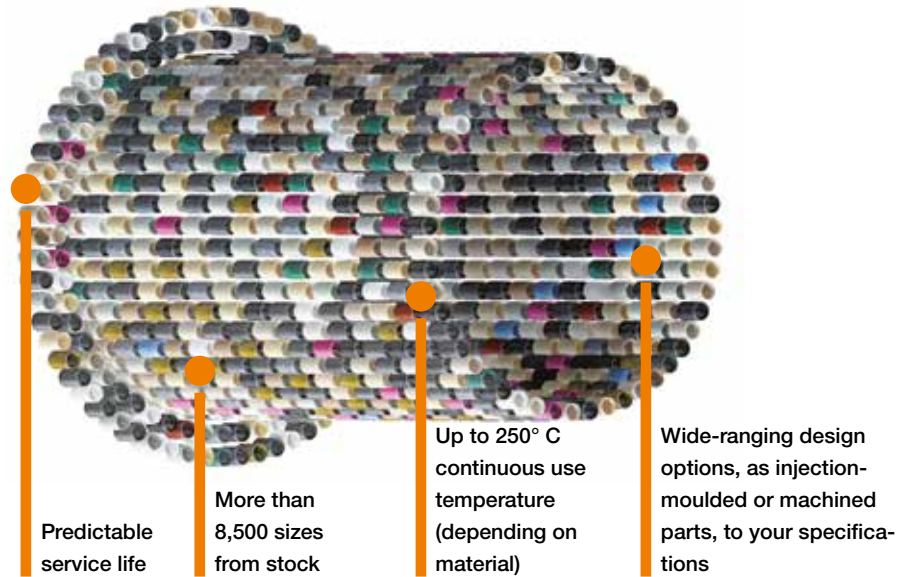
### Chip test drylin® linear technology.

Service life and wear test on a drylin® linear guide in a chip drum with aluminium chips





# Fit and forget ...



Predictable service life

More than 8,500 sizes from stock

Up to 250° C continuous use temperature (depending on material)

Wide-ranging design options, as injection-moulded or machined parts, to your specifications



**igidur® G – the allrounder.**  
The best-selling iglidur® plain bearing world-wide.

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



**igidur® J – fast and slow motion.**  
Low friction, low wear.

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



**igidur® Q – suited for high loads.**  
Plain bearing solution for long service lives at high to extreme loads.

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



**igidur® M250 heavy and rugged.**  
Excellent vibration damping.

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



**igidur® W300 – the endurance runner.**  
Low wear on all shafts.

[www.igus.eu/W300](http://www.igus.eu/W300)



**igidur® X – The high-tech problem-solver.**  
High resistance to temperature and chemicals.

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

# ... Increase service life

## Lubricant and maintenance-free plain bearings

### made from high-performance plastics – iglidur®.

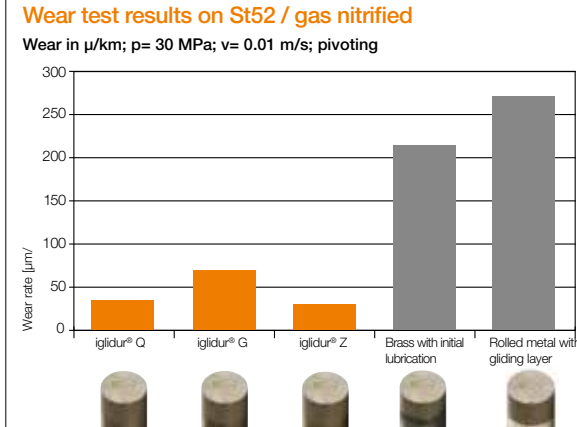
No lubricating and reduced maintenance effort, while cutting costs and increasing service life, everything from stock and delivered promptly - that is the essence of the idea. iglidur® plastics have been extensively tested with respect to wear and friction values, including other relevant material properties. iglidur® polymer plain bearings from igus® represent the step from plastic bushings to tested and therefore predictable machine component.

- Highly wear-resistant polymers, improved with fine-tuned additives of reinforcement materials and solid lubricants
- Tested by the thousands, proven by the millions
- Lubrication free, maintenance free, cost-effective, predictable, and versatile

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

## Tested!

In the largest lab of its kind, igus® Cologne



## "Swivel" test

**Objective:** To test the wear of iglidur® plastic plain bearings compared to metallic plain bearings

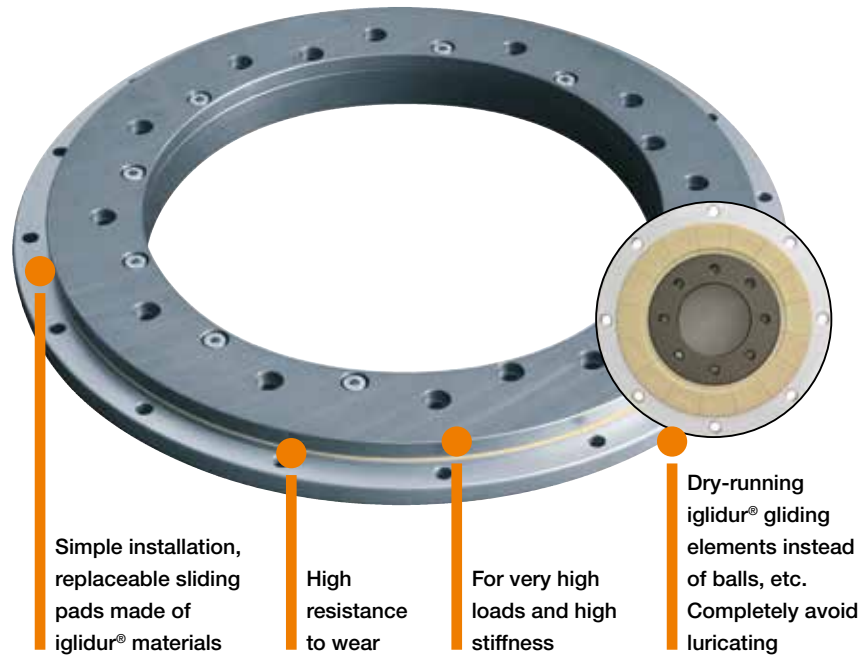
**Test setup:** Swivel test on a shaft with a weight of 1,200 kg.

**Result:** All tested iglidur® materials show considerably less wear than the metallic plain bearings. The shafts of the metallic bearings are very strongly shrunk and thus not fit for further use.

## In the field



# Ready-to-install solution ...



Simple installation, replaceable sliding pads made of iglidur® materials

High resistance to wear

For very high loads and high stiffness

Dry-running iglidur® gliding elements instead of balls, etc. Completely avoid lubricating

## Maintenance-free iglidur® PRT slewing ring bearing solutions.



**Slewing ring bearing - design 01.**

Slewing ring with high stiffness, useable up to +180° C, high chemical resistance.



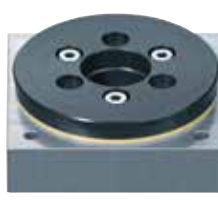
**Slewing ring bearing - toothed.**

For all 6 sizes of the design 01, 4 standards are available for the toothing of the outer ring.



**Slewing ring bearing - design 02.**

Slewing ring with extremely low weight. Outer ring made of anodised aluminium or stainless steel (V4A)



**Slewing ring bearing with square flange.**

The smallest PRT slewing ring bearing in installation size 20, with space saving square flange for direct assembly onto flat surfaces.

# ... lubrication free bearings

## Polymer slewing ring bearing - iglidur® PRT

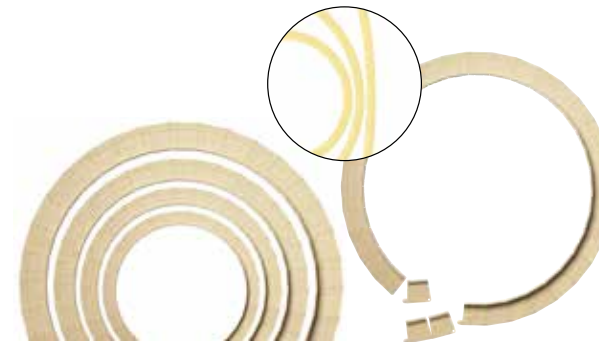
igidur® PRT is a low priced, low maintenance slewing ring bearing with tribo-optimised iglidur® polymer sliding pads. The gliding elements operate completely without maintenance and lubrication. The housing components of the slewing ring bearings are made of aluminium, and the counter-partners of the bearings are hard-anodised. All fastening screws are made of stainless steel. Depending on the number of elements, slewing ring systems are possible with inner diameters from 0.5 to 5 m.

- Ready-to-install solution
- Tough, corrosion-resistant for high loads
- For use in changing ambient media
- Maintenance and lubrication free
- For low to medium surface speeds
- Also with toothed outer ring
- Perfect for pulpits and control panels
- Central holes ideal for passage connectors control unit

Explore more slewing ring bearing solutions for machine tools at:

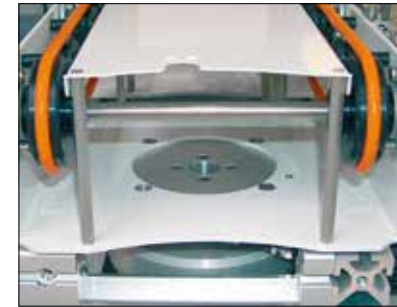
 [www.igus.eu/igidurPRT](http://www.igus.eu/igidurPRT)

## In the field



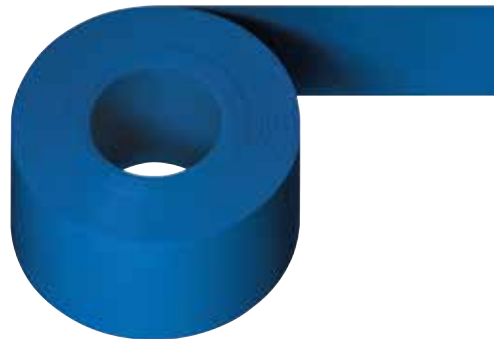
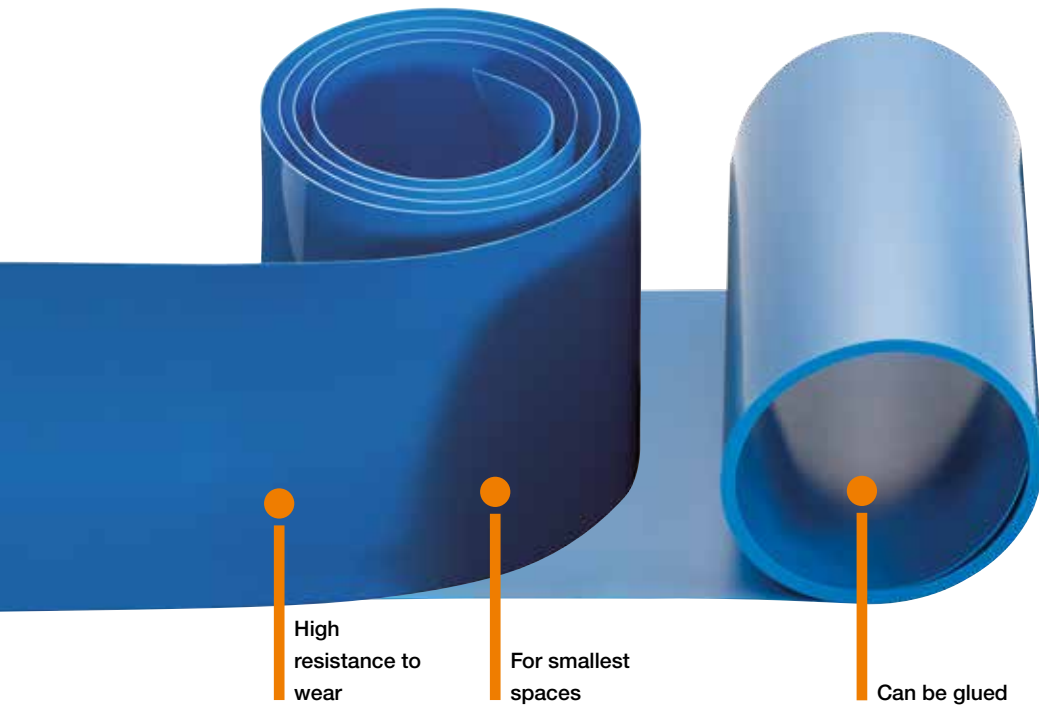
## Universal glide elements – customise your own plain bearing supported slewing ring systems.

Using the flexible iglidur® PRT universal gliding elements, large, plain bearing supported slewing ring systems can be custom fabricated based on design 01. Depending on the number of elements, slewing ring systems are possible with interior diameters from 0.5 to 5 m. - We will happily support you with the design and detailed layout.





# The versatile liner for ...



## iglidur® Tribo-Tape A160

The low cost iglidur® A160 tape has very high wear resistance compared to similar, thin plastic films. Temperature resistant up to +90°C, FDA compliant



## iglidur® Tribo-Tape V400

iglidur® V400 tape is not only highly wear resistant but also extremely media and temperature resistant. In fact, it has been proven in tests to be up to 10 times more wear resistant than special products for machine beds.

# ... unrestricted operation

## iglidur® off the reel: Tribo-Tape

iglidur® Tribo-Tape is designed for lining areas of wear and where frequent maintenance is required, an example is for machine beds etc. At just 0.5 mm thick (0.65 mm including the adhesive back), the space requirement is extremely low. The ease of use (the tape can simply be cut using scissors) and optional self-adhesive back open up almost endless possibilities for the product's use.

The iglidur® tribo-tape liner is also available with a self-adhesive back for quick and easy installation. With a self-adhesive back, iglidur® A160/B160 can be used at temperatures of up to 70°C and V400 at temperatures of up to 170°C. Whether as a specially tailored by-the-metre product or freely designed prefabricated parts: We produce your desired product in desired width from our iglidur® Tribo-Tape.

- Materials: iglidur® A160, iglidur® V400, iglidur® B160
- Lubrication and maintenance free
- Easy to cut
- Can be glued
- For smallest spaces
- More Tribo-Tape materials and even smaller thickness under deployment - please consult us!

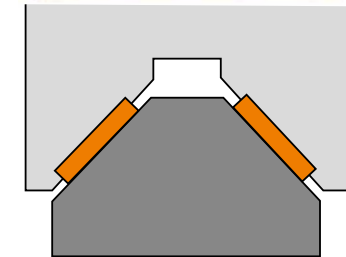
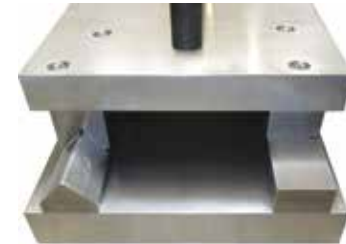
 [www.igus.eu/tribotape](http://www.igus.eu/tribotape)



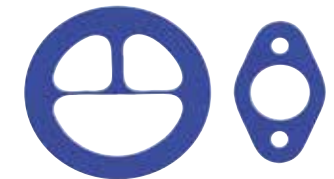
## iglidur® Tribo-Tape B160

Especially where the iglidur® tribo-tape is a visible part, the new black option now offers even more creative freedom. In addition, the wear resistance has been improved once again compared to the option from iglidur® A160.

## In the field



For quick and easy installation



Design Tribo-Tape flexibly

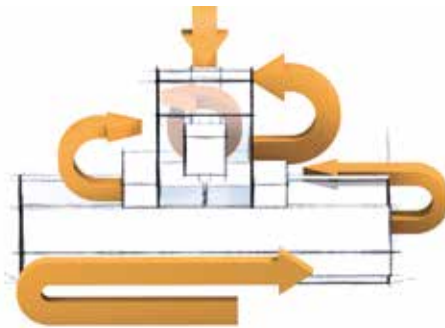
# Reduce design-engineering effort ... ... save time and reduce costs



Delivered ready-to-install – igus® readychain®.

When considering the increasingly dynamic requirements of the machine tool industry, designing energy supply systems is becoming increasingly complex. The trend is going toward compact designs and energy-efficient lightweight solutions, which are driving ever more difficult design specifications.

Designing the energy supply system involves mechanical and electrical engineering experts. Regular project review meetings are necessary. The interfaces between the functional departments invariably results in efficiency losses. Valuable time is lost in world-wide competition, while process costs are also increasing. Besides the process costs will be increase. The need for fully harnessed energy supply systems grows. By deciding to work with a specialised supplier, efficient project management can be ensured at maximum quality.



## Open-Space Service: cut down on design, engineering and development time

Provide us with your installation space and your requirements and we will design our energy supply system with mounting parts or bearing technology for your machine.

Find an in-depth OpenSpace video and more information online [www.igus.eu/openspace](http://www.igus.eu/openspace)

igus® solutions from a single source.

## readychain® – fully harnessed energy chain systems® in 3-10 days

1,000 systems produced per week in 11 readychain® factories around the world – assembly time optimised to increase your cash-flow

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

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

## readycable® – fully harnessed cables from 24-48 hrs or same day.

igus® provides more than 3,200 harnessed cables for drive technology to 22 different manufacturer standards. Professionally produced, 100% tested.

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

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

## Tested!

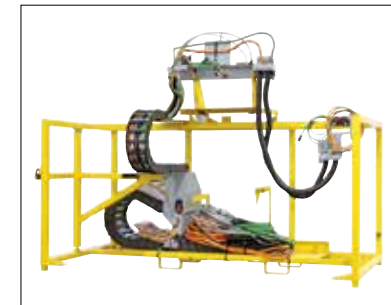
In the largest lab of its kind, igus® Cologne



## Cable testing

100% testing of all harnessed cables – extensive quality assurance during assembly.

In the field





# Reduce costs ...



Cable service life test at the igus® lab, Cologne

Highly flexible cables are required in every energy chain®. However different cable qualities can be used depending on the bending radius of the energy chain®. In order to offer for machine tools the optimal solution at the best price we have developed the chainflex® M cable family.

If, for example, you are guiding stiff hydraulic hoses in the energy chain® and thus the bending radius is specified, then chainflex® M cables for transmitting data, energy and signals are ideally suited for reducing costs. chainflex® M cables are available as oil-resistant iguPUR cables from a minimum bending radius of 12.5 x d as control cables, motor cables, servo cables, measuring cables, data cables and bus cables.

If the technical requirements imposed on minimum bend radii, service life or dynamics are high, then you can avail yourself of the complete chainflex® cable product range. 1,040 cables starting from a minimum bending radius of 3.8 x d at [www.igus.eu/chainflex](http://www.igus.eu/chainflex)

## When to use chainflex® M?

- When the focus is on a particularly affordable solution
- If a UL, EAC and CTP approval is required for international implementation
- If a DESINA-compliant cable is desired
- If oil-resistance is required (iguPUR)

## When not to use chainflex® M?

- If the smallest bending radii at high cycles are required
- For minimum bending radii 7.5 x cable diameter
- For maximum dynamics
- For long travels
- For torsion applications

# ... with inexpensive cables

chainflex® M is an inexpensive cable product line, for example:

chainflex® CF27.D PUR servo cable compared with igus® chainflex® M CF897 iguPUR servo cable



Part no.	List price €/m	Savings with chainflex® M
CF27.25.15.02.01.D	13,80	<b>56%</b>
CF897.25.15.02.01	6,01	

chainflex® CF113.D PUR measuring system cable compared with igus® chainflex® M CF894 iguPUR measuring system cable



Part no.	List price €/m	Savings with chainflex® M
CF113.028.D	7,12	<b>47%</b>
CF894.028	3,76	

chainflex® CFBUS TPE Profibus cable compared with igus® chainflex® M CF898 iguPUR bus cable



Part no.	List price €/m	Savings with chainflex® M
CFBUS.001	5,19	<b>57%</b>
CF898.001	2,22	

Explore more chainflex® solutions for machine tools at:

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



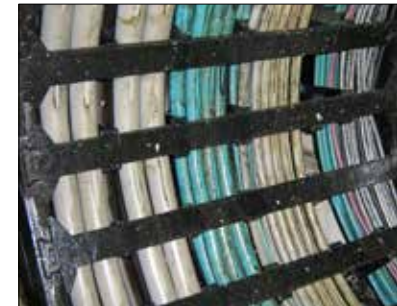
In the largest lab of its kind, igus® Cologne

## Test: Service life

**Tested:** 66 million strokes at a bending radius of 75 mm.

chainflex® lasts – proven in test no. 3479 of more than 700 parallel tests conducted in the 1,750 m² test lab, the largest test lab for flexible cables.

In the field





# Reduce process costs ...

Hours instead of days: the modular rack for ready-to-install e-chainsystems®

## Leaner design, even more economical

The telescoping and modular transport and assembly rack for harnessed energy supply systems in small and large version.

- Use on significantly smaller applications now even more economical
- Adaptability from the large to the small readychain® rack is possible
- More detailed adaptation to customer applications

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



... Standard.

... light.

# ... assembly racks

## The assembly-transportation - readychain® rack

igus® has been relying on harnessed readychain® systems for approximately 20 years. In order to bring the chain quickly and reliably to the machine, igus® has developed a telescoping, modular transportation rack that can be adjusted down to the millimeter to the interface of the respective machine within one working day.

- Modular supports and braces
- Telescoping, length adjustment possible at any time
- Indexing mechanism for retroactive attachment of components
- Moving and transporting is child's play due to purpose-built travelling unit
- Continued use of resources due to reuse of individual components
- 50% reduction of process costs across the entire process

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

## A detailed look:





# Benefit ...

readychain® partner programme.



## 3 paths to a harnessed e-chain®.

System guarantee for fully harnessed energy supply systems, regardless of who performs the assembly (you, your harnesser, or igus®), on request, including project planning and production support for your production/partner when igus® does not perform the assembly.

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

### What we also do:

- Customer-specific guarantee documentation
- Customer-specific fabrication certificate
- Fabrication/training certificates
- Project development

Tested and proven igus® components, strain reliefs, accessories, e-chains®, cables and connections.

Project planning, prototype production, guarantees, online tools, and other services

readychain®: harnessing by igus®

Harnesser

Mechanical engineer: Cables for internal harnessing

New: igus® readychain® partner programme

# ... cost savings

Reduce process costs online with new igus® services and igus® online tools.



### readychain® truck: cut production time

The readychain® truck serves a variety of purposes, including on-site prototype building, series supply to customers, or training in the "rolling igus factory". We will demonstrate our readychain® rack directly on your machine or at our facility in Cologne.

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



### Cut down on configuration time ... of harnessed cables.

- Download the free QuickPin add-in from the igus® website without registering
- Key parameters of existing cable types are cross-referenced
- Fast and easy editing of macros

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



### Save money with the readycable® finder

Quickly find harnessed drive cables iaw. manufacturer standards: the output is an overview of the most important information, such as jacket material, oil-resistance, and bending radius.

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

# Benefit ...

We are confident enough to give a guarantee because...



Quality assurance: permanent batch testing to ensure the quality level

**...we conduct more than 2.0 billion test strokes and 1.4 billion electrical measurements per year.**

Our customers often need to give a guarantee for their systems to the end user. They do this to represent safety and reliability of their systems. It is understandable that end users want a guarantee, but this poses a commercial risk for system manufacturers. With our guarantee we now offer security to system manufacturers as our customers. This guarantee is different from a standard guarantee. In Germany, quality and durability guarantees are used.

Many customers do not want to extend the warranty period but instead want a binding statement about durability. We understand this, and offer this through our guarantee program.

### Predictable reliability

Durability and lifetime statements are what our customers require. For over 20 years, we have been conducting test in what is now the largest test laboratory for cables and energy chains®. Due to our series of tests we are now in the position to make reliable and clear statements in order to make durability and service life of our cables more predictable for every user.

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

# ... guaranteed reliability

Save money with reliability and innovation ...

**... 3 year igus® guarantee for every chainflex® cable. 100% tested at the igus® lab.**

Guarantee statements reduce risk plant engineering. 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 very cost effective chainflex® M cables).



**Guarantee**  
igus chainflex

**36**

**months**

or up to 10 million double strokes or for cables from the chainflex® M family up to 5 million double strokes

**guaranteed**





# Benefit ...



e-chains® for "green" automation provide a wide range of savings potentials, e.g. for sheet-metal fabrication.

## Green, fast, saves money.

### Energy efficient plastic energy chains® and cables reduce consumption by up to 57%

energy chain systems® not only transport energy, data and media to machinery and equipment. They also have an influence on their energy costs. How much pull and push force, in other words drive power, is required at a given speed to move an energy chain®? How light but at the same time rugged must energy chains® be designed so that as little energy as possible is consumed and motors including drive control areas small as possible, and frequency converters and mechanics are adequate? Modern plastic energy chains® and chainflex® cables help in this case to equip and operate machinery in an energy-efficient and cost-effective manner.

#### Benefits:

- Saving energy - helps the balance sheet and the environment
- Smaller motor with less power sufficient
- Smaller, lower cost motor control modules sufficient
- Smaller sized machines and equipment possible

# ... energy efficiency

## Breakthrough in "green" production automation.

System P4 helps to dramatically cut costs, since a combination with chainflex® cables can reduce the drive forces required to move the system by as much as 57%. This is possible because the P4 e-chain® does not glide but rolls instead when moving. This is possible because the P4 e-chain® does not glide but rolls instead when moving.

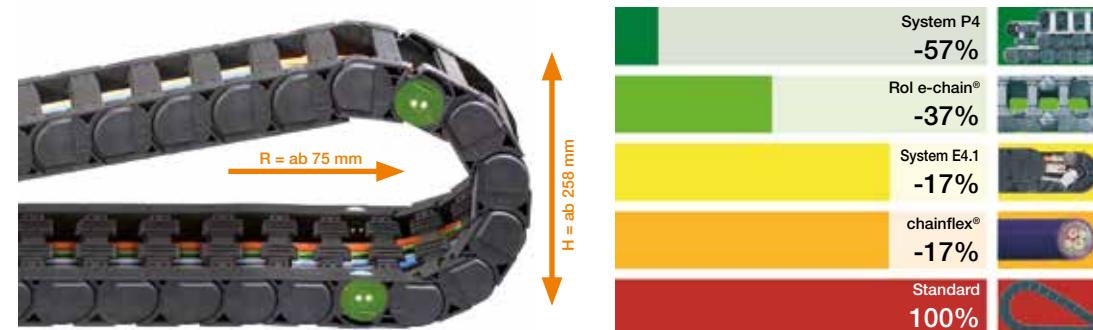
This is only one option for designing more energy-efficient machinery with igus®-products. For instance, igus® has been relying on "light" energy configurations, which are 30 percent lighter than dimensionally equivalent products while still being very tough. igus® lightweight solutions need less drive power, are lower cost than standard products and facilitate energy-efficiency by reducing energy consumption, and promote compact design approaches by way of appropriately smaller motors.

chainflex® cables also reduce the weight. Employing high-grade jacket and insulation materials can result in weight savings of 5 to 30 percent. This reduces drive power by 17 percent. High-grade abrasion resistant jacket materials facilitate particularly thin-walled extrusions, which results in weight savings of up to 18 percent. In addition, using high-grade materials for insulating materials facilitates high electrical performance with small electrical cross-sections. Weight reductions of up to 30 percent can be achieved this way.

## In the field



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



Energy-efficient e-chainsystem® P4 – rolling instead of gliding.

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

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

[www.igus.eu/quickchain100](http://www.igus.eu/quickchain100)

Expert for system design and calculations for travels up to 100 m

Simply enter your application's environmental parameters into the e-chain® expert. The expert will propose the matching solution.

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

**i For any task - in any quantity**

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

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

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



# Research & Development ...



Better products for less - a key element: the industry's largest test lab. Better products for less - a key element: the industry's largest test lab. 1,750 m<sup>2</sup> lab, more than 15,000 tests and 2 billion test strokes per year.

## The igus® lab and field experience

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

Our mechanical engineering components pass the litmus test presented by production reality because they have already passed this test before leaving the igus® warehouse.



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

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

# ... 15,000 tests per year



## The igus® quality assurance

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



## Extensive test database

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

## 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 render it ecologically valuable.



## motion plastics®

One vision has been driving us for more than 50 years – motion plastics®: innovative moving parts made of plastic.

Our core technology is tribo-polymers - high-performance plastics that we optimise for friction and wear. The technology has made us into the world-wide leader for developing and manufacturing energy supply systems and plain bearings.



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