

# Rail...

Solutions for the rail industry



• Tech up, Cost down. It's our job.

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

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



## Flame-retardant motion plastics® for the rail industry according to EN 45545 and NFPA 130

Your technical innovator and cost reducer,

### Thorsten Mersch

Industry Manager Rail Industry

Phone: +49 2203 9649-7038

e-mail: [tmersch@igus.net](mailto:tmersch@igus.net)

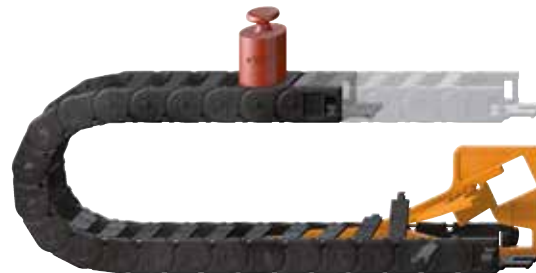
[www.igus.eu/railway](http://www.igus.eu/railway)

**igus® motion plastics®: Cost-effective high-performance polymers and cables for extreme operating conditions ensure greater reliability and comfort in trains and trams.**

The number of passengers on public transport has been increasing steadily for 20 years. This is confirmed by figures from the Association of German Transport Companies. Good news for the industry, but also an increasing load on the rail network, trains, trams and equipment. Durable components are required that can withstand the high requirements and yet meet stringent fire safety standards. But how about reducing maintenance effort and costs or making regular lubrication unnecessary? Is that impossible? Not at all! igus® has given the name motion plastics® to these components, which simplify many applications wherever movement is involved; tram doors is a typical example. [www.igus.eu/railway](http://www.igus.eu/railway)

### Advantages of motion plastics® for the rail industry

- Maintenance and corrosion-free
- Many products according to EN 45545
- Vibration dampening
- Compact for confined installation spaces
- Long service life
- Cost-effective
- For temperatures from -50 °C up to +250 °C



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

# Reduce cost and improve technology in the rail industry

## Tested in the laboratory, proven in the field.

igus® will help you master your challenges with outstanding properties that have been successfully tested in the igus® test laboratory, the largest in the industry, and proven in the field. Here igus® polymer bearing technology, energy chains and fail-safe cables are tested. **Numerous igus® products meet Hazard Level 3 according to EN 45545.** This includes bearings made from high-performance polymers and durable cables. Special plain bearing materials meet the **R22/R23 test requirement**, and certain **cables fulfil R15/R16**. Another benefit of using motion plastics® is to save weight because heavy metals are replaced by lightweight and long-lasting polymer components. Due to their special material properties, they are resistant to dirt, heat, cold, moisture and road salt. That's why they are used inside and outside in rail bound traffic and transport.

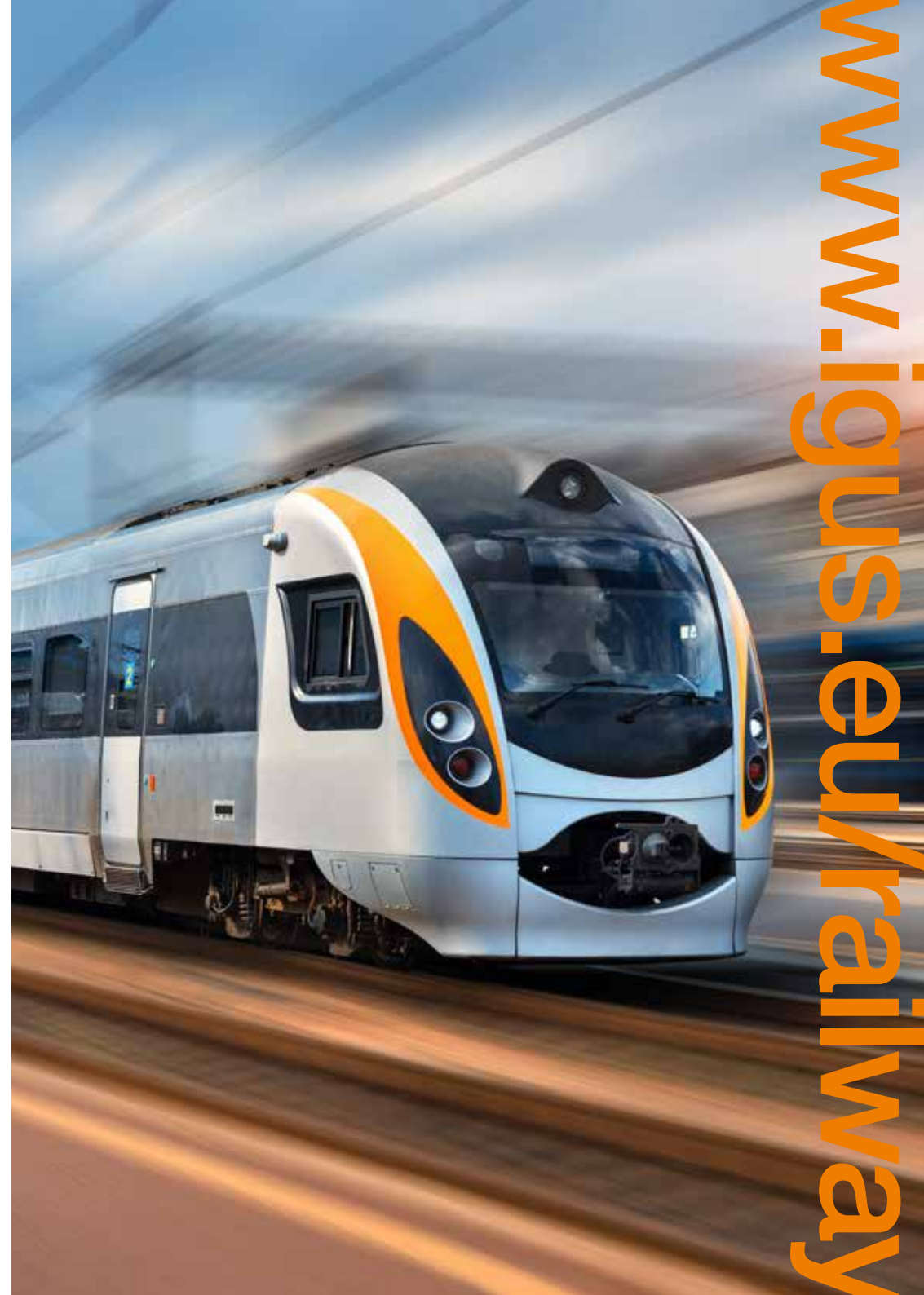
**Reliable entry-level systems.** When boarding a tram or train, passengers encounter the first igus® components. chainflex® cables, dryspin® lead screw technology and energy supply systems are used to make door systems maintenance-free and, above all, reliable.

**Maintenance-free and clean applications in the passenger compartment.** iglidur® polymer plain bearings and drylin® linear guides ensure clean adjustment, low coefficient of friction and silent movements without the need of additional lubricant. This is due to the incorporated dry lubricants, which are within the igus® materials.

**motion plastics® are in use everywhere, from the driver's cab to the braking system.** The properties of motion plastics® also benefit the control elements of the train. drylin® linear guides are installed in the brake levers, for example. For high wear resistance, bearings in control panels and emergency brakes are equipped with iglidur® G plain bearings. iglidur® plain bearings are also incorporated in the brakes themselves, ensuring perfect function in the event of bumps and dirt. They are also corrosion-free.



dryspin® lead screw systems: trouble-free operation in dirt, road salt and rain

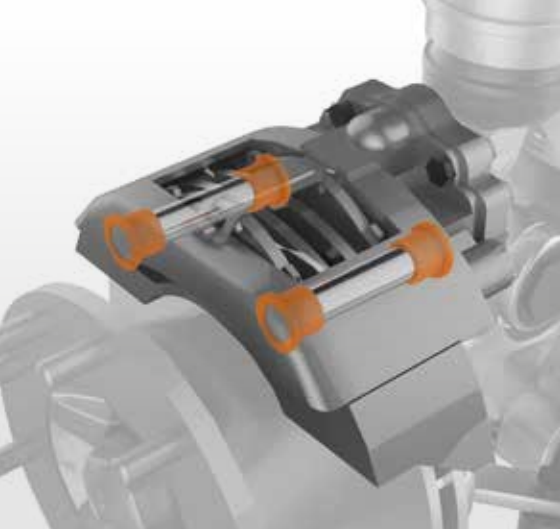


Maintenance-free  
and weather-  
resistant - motion  
plastics® outside

**Insulating high-performance polymers in pantographs.**

As igubal® spherical bearings are made of non-conductive high-performance polymers, they can be used as insulating components on pantographs. iglidur® plain bearings are also installed **in brakes**, because they allow trouble-free operation in the event of bumps. They are also corrosion-free and are unaffected by dirt. The materials are suitable for use in extreme temperatures, from as low as -100°C to as high as +250°C.

www.igus.eu/railway



## igidur® H2 in brake calliper: resistant to vibration

- High media resistance
- Lightweight
- Cost-effective
- Corrosion-free

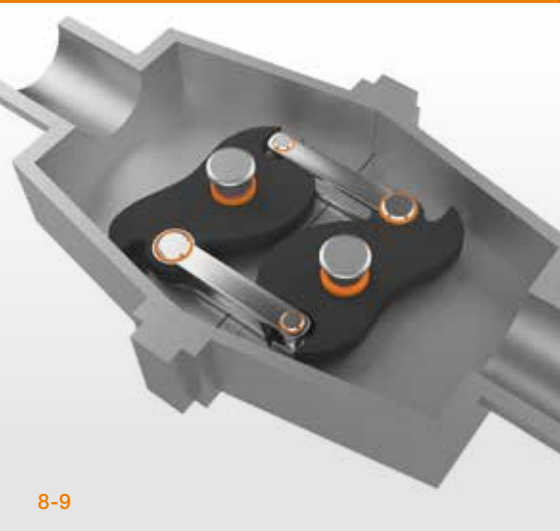
 [www.igus.eu/H2](http://www.igus.eu/H2)



## igubal® KGLM spherical bearings in pantographs: insulating and extremely flexible


- Compensation of misalignment errors
- Resistant to edge loads
- High vibration-dampening

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



## igidur® TX in couplings: reliable under shock and dirty conditions

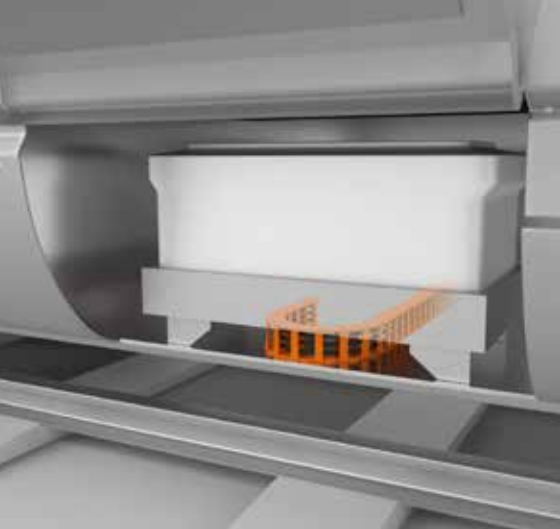
- Resistant to high edge loads
- Dirt-resistant
- High wear resistance



## Durable, robust and tough - motion plastics® in wagon construction

**Many different forces act in all directions on the transitions and rotating joints between individual carriages.**

These include push and pull forces, impacts and continuous vibrations. For such applications, robust and reliable bearings are especially important. iglidur® plain bearings are a preferred choice for such use because of their high contact pressure, which can be up to 150MPa. The robust iglidur® materials withstand even high edge loads without breaking. The wide variety of iglidur® materials makes it possible to find exactly the right plain bearing for every possible application.



## E2.1 e-chain® in battery boxes: robust, space-saving and weatherproof

- Space-saving and lightweight
- Resistant to dirt and humidity
- Corrosion and maintenance-free

 [www.igus.eu/E2.1](http://www.igus.eu/E2.1)



## igidur® J in emergency door: guaranteed to function safely and reliably at all times

- Maintenance-free
- Large standard range
- Extreme wear-resistance

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



## igubal® coupling joint in pressure protection cap: maintenance-free and dirt-repellent

- Angle compensation
- Dirt-resistant
- Maintenance and lubrication-free

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

## Please climb on board – motion plastics® in door systems



The dryspin® lead screw systems are used to open and close doors.

Their self-lubricating high-performance polymer lead screw nuts eliminate the need for extra lubrication, reducing maintenance and cleaning costs. The drive for the lead screw systems can be igus® DC motors or stepper motors. E2-micro e-chains®, chainflex® cables and dryspin® lead screw systems are also used in the sliding step under the door because they remain unaffected by dirt, road salt and rain.



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



## iglidur® high-performance rollers in door guidance system

- High static loads
- Low adjustment forces
- Long service life



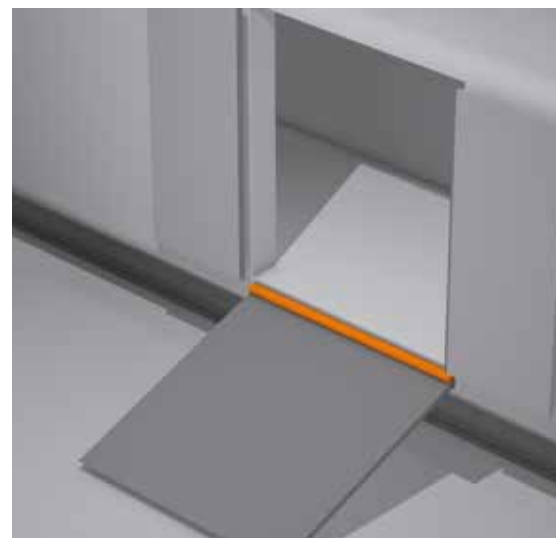
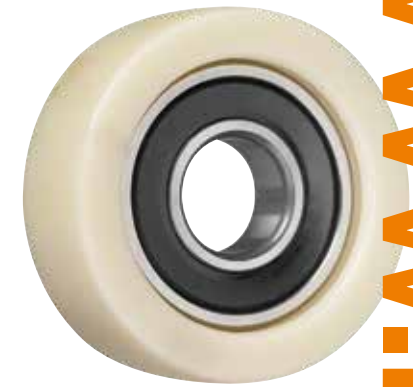
## dryspin® lead screws in doors: vibration-free operation

- Dry operation
- Dirt-resistant
- Various designs



## iglidur® Q in ramps: long-lasting high load capacity

- For high loads - wear-resistant on many shafts
- Excellent wear resistance, especially for extreme loads
- Recommended for extreme pv values



www.igus.eu/railway

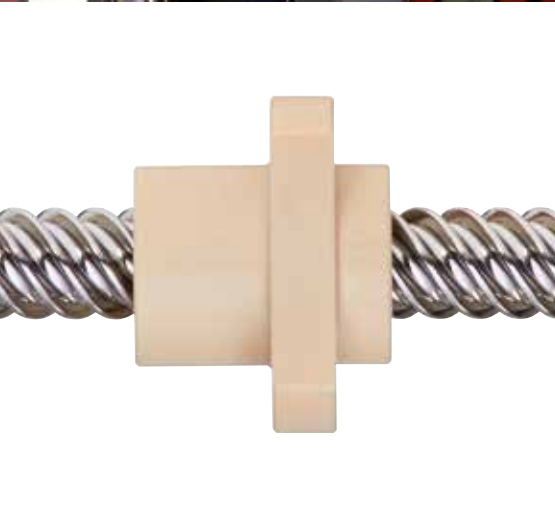


## chainflex® CF98 control cable - safe trap detection

- Small bend radius of less than 4xd
- Service life of over 30 million double strokes, at least 20 years
- Tested for 450,000 door cycles in the lab without any interruption

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

\*Avoid failures, guaranteed – more than 2 billion test strokes and 1.4 million electrical measurements per year. For more than 25 years, igus® has been carrying out tests in the industry's largest laboratory for moving cables and energy chains.



## Robust high helix lead screws and nuts in sliding steps

- Very robust, reliable and durable
- Designed for temperatures down to -25°C
- 1 million cycles tested with no problems or failures

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



## E2.1 micro e-chain®: reliably closing doors of the VAG Nuremberg

- 70,000 open/close cycles per year
- Weather-resistant
- chainflex® cable CFSPECIAL.414, halogen-free and flame-retardant

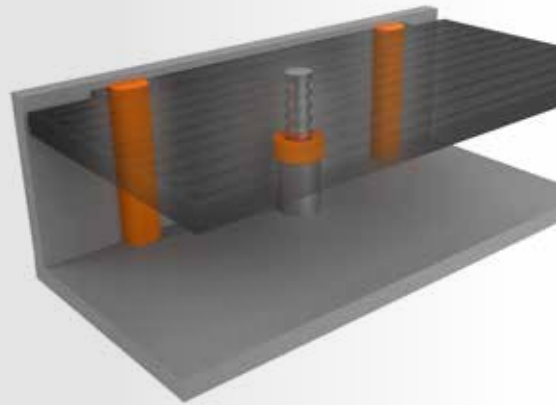
 [www.igus.eu/E2.1](http://www.igus.eu/E2.1)

www.igus.eu/railway



Comfortable and  
quiet – motion  
plastics® interiors

The properties of motion plastics® also benefit the driver's controls for operating the train as well as in the interior. drylin® linear guides are installed in brake levers, for example. For high wear resistance, bearing points in control panels and emergency brakes are equipped with iglidur® G plain bearings. igus® plain bearings and linear technology are also used where they need to be clean and a high level of comfort is required, such as in the passenger compartment. iglidur® G is used in adjustable armrests, folding tables and folding seats. These plain bearings are wear-resistant and available, from stock, in a wide range of shapes and sizes.



## dryspin® in height adjustment for foot platforms: extremely wear-resistant

- Resistant to high edge loads
- Dirt-resistant
- High wear resistance
- Cost-effective

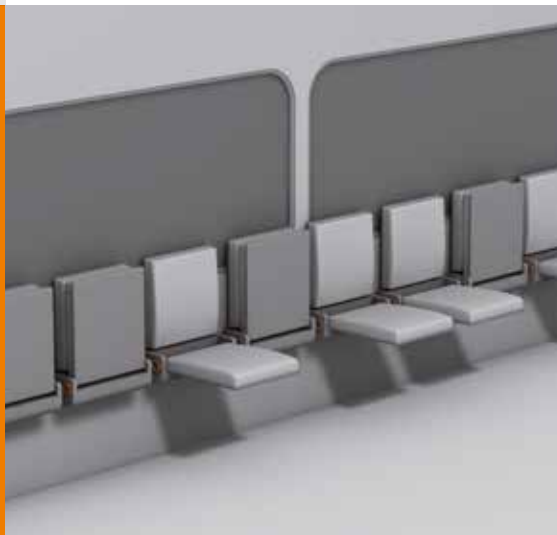
 [www.igus.eu/dryspin](http://www.igus.eu/dryspin)



## igidur® M250 in switchgear: high pitches possible

- Excellent vibration dampening
- Resistant to edge pressure
- High impact resistance

 [www.igus.eu/m250](http://www.igus.eu/m250)



## igidur® J in folding seats

- Lightweight
- Low-noise
- Cost-effective

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

## drylin® pre-defined positional systems in head-rests: light weight, defined positioning

- Easy movement with roller support
- Wide range of sizes and options
- For exact re-positioning

 [www.igus.eu/info/low-profile-guide-drylin-n](http://www.igus.eu/info/low-profile-guide-drylin-n)

## drylin® W in windows: ergonomic operator control, smooth operation and silent

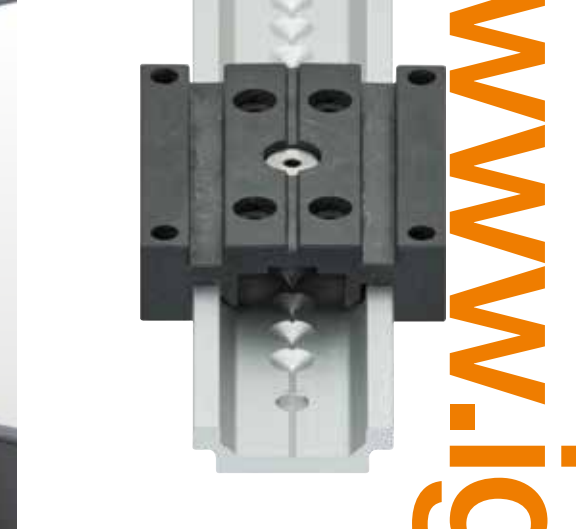
- Dirt-resistant
- Corrosion-free

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

## iglidur® M250 MDM in seat systems: rattle-free positioning

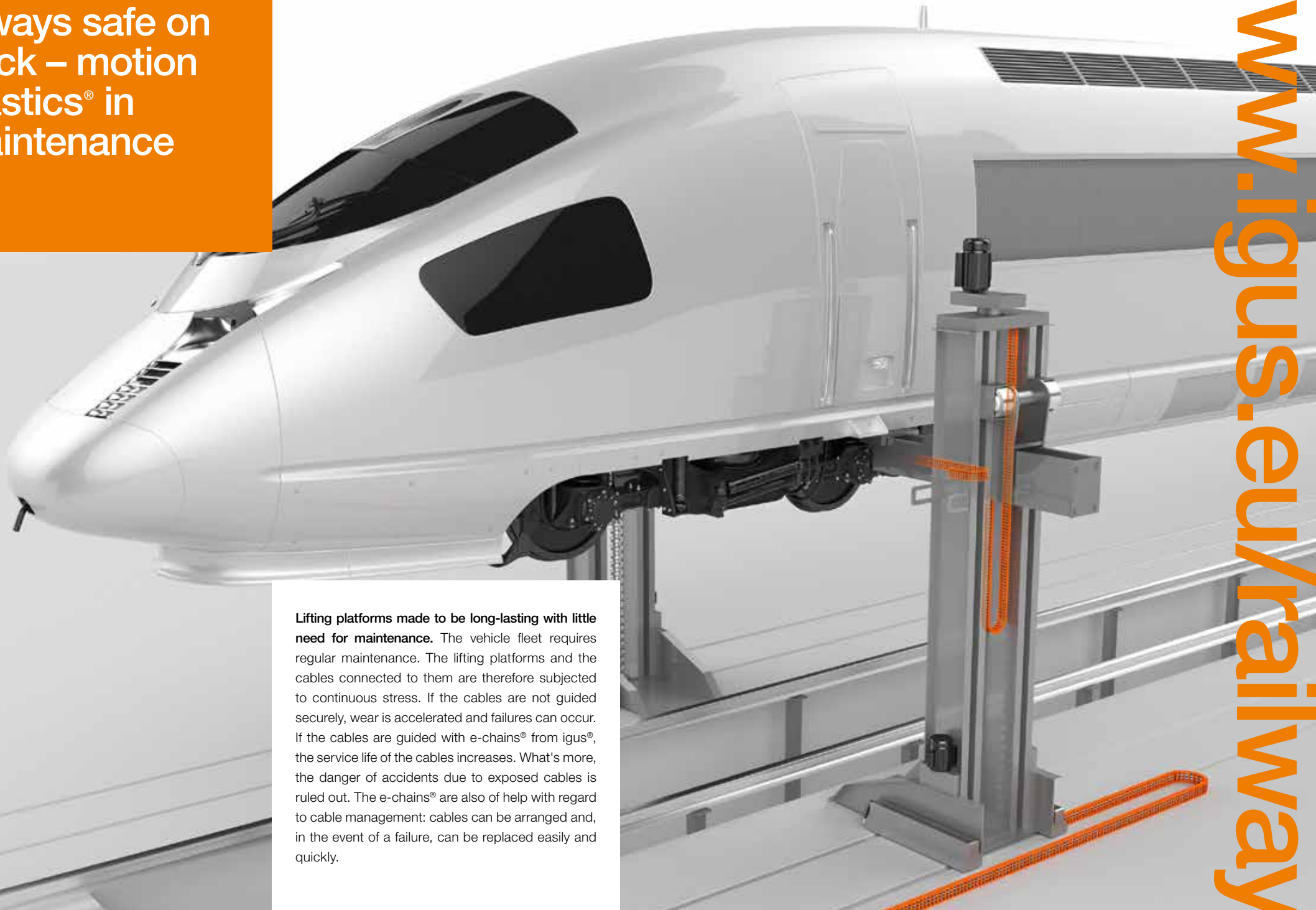
- Tolerance compensation possible
- Suitable for e-coating
- High static load up to 120MPa

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



www.igus.eu/railway

Always safe on track – motion plastics® in maintenance



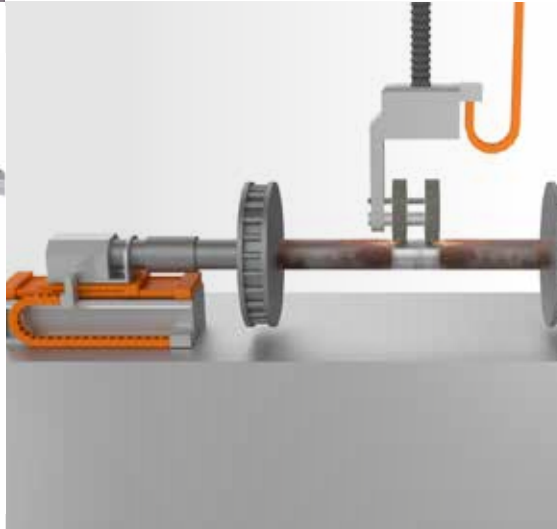
**Lifting platforms made to be long-lasting with little need for maintenance.** The vehicle fleet requires regular maintenance. The lifting platforms and the cables connected to them are therefore subjected to continuous stress. If the cables are not guided securely, wear is accelerated and failures can occur. If the cables are guided with e-chains® from igus®, the service life of the cables increases. What's more, the danger of accidents due to exposed cables is ruled out. The e-chains® are also of help with regard to cable management: cables can be arranged and, in the event of a failure, can be replaced easily and quickly.

www.igus.eu/railway



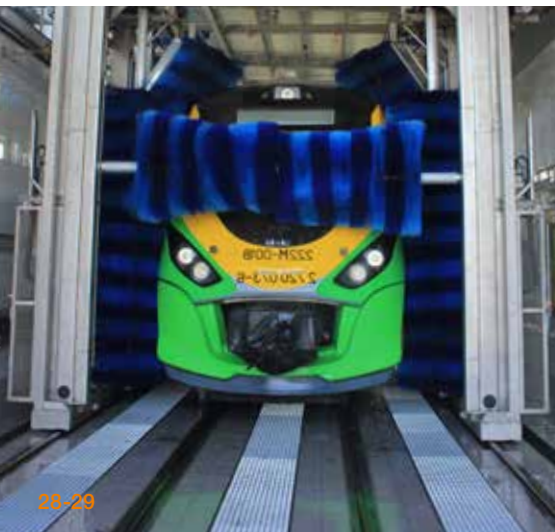
## E4.1 e-chain® with flizz® trough system in track traversers

- Robust and compact design
- More cost-effective than most steel chains or elaborate gliding systems
- Resistance to dust, cold and heat



## readychain® and drylin® SLW in wheelset maintenance machine: immediately ready to install

- Harnessing time is reduced by up to 95%
- Reduction in manufacturing costs
- Minimal amount of logistics work



## E4.1 e-chain® in train washing systems: no corrosion

- Highly stable in all axes
- Resistant to corrosion and chemicals
- Moisture and temperature-resistant





All weather –  
motion plastics®  
in the  
infrastructure

**Make the rail network weather-resistant with motion plastics®.** igus® products are not just used on trains and trams. Their properties are also in demand on track-side equipment and provide decisive advantages. iglidur® J plain bearings are installed in wheel tensioners and hinged cantilevers. In shunting switches, iglidur® plain bearings are used to mount the rollers in the switching system. Here high-performance polymer bearings offer several benefits: they do not corrode and protect the shaft against wear. Since the plain bearings are temperature resistant, they can also withstand extreme weather conditions.

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



## iglidur® J in signal systems: weatherproof and long-lasting

- Extremely long service life and UV-resistant
- Lightweight and maintenance-free
- Quiet, vibration-free operation

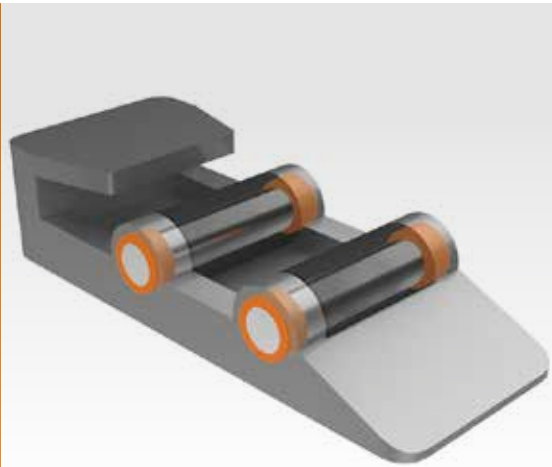
 [www.igus.eu/J](http://www.igus.eu/J)



## iglidur® G in roller switching system: shaft-friendly and robust

- Corrosion and weather-resistant
- Very good wear resistance
- Good for edge loads
- Vibration- and shock-resistant

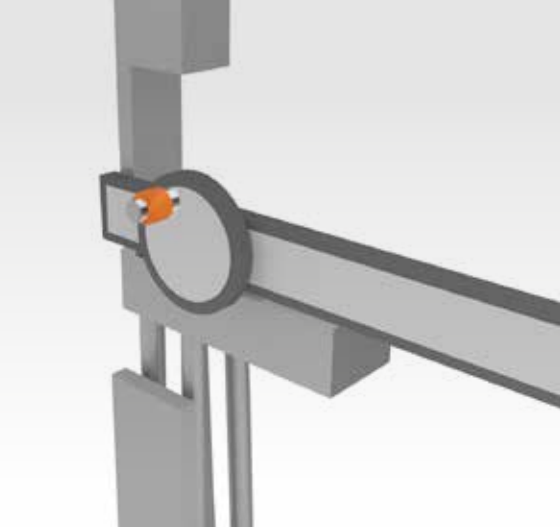
 [www.igus.eu/G](http://www.igus.eu/G)



## iglidur® P210 in circuit breakers and earthing switches: long- lasting in applications involving pivoting movements

- Wear-resistant on most shafts
- Very low coefficient of friction
- Cost-effective and maintenance-free

 [www.igus.eu/P210](http://www.igus.eu/P210)

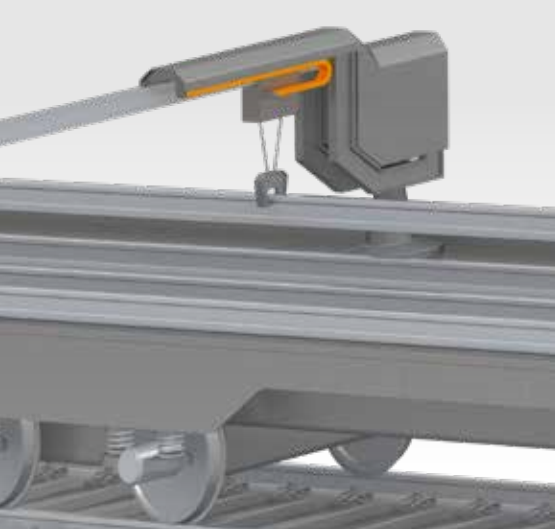




Weatherproof  
components –  
motion plastics®  
in special vehicles  
and tools

**In order to built new tracks for trains or trams,  
complex machinery is needed.**

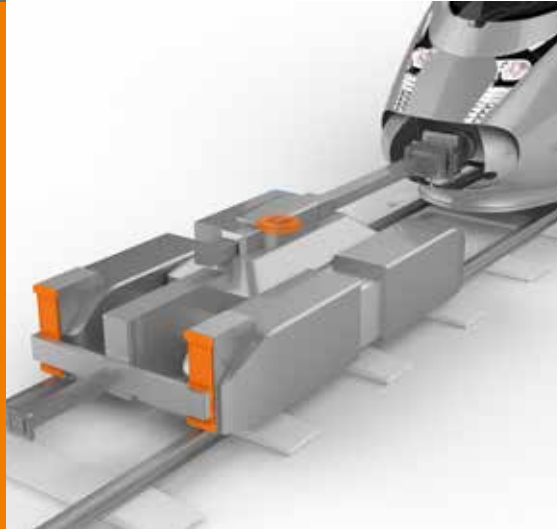
Bearing points in track construction machines are exposed to considerable mechanical forces, vibrations, dirt and weather influences. All these factors are no longer a problem if iglidur® plain bearings are used. Energy supply systems and chainflex® cables are also used in track construction machines. Due to their special design, they are very stable and durable. As a result, they also enable safe and reliable cable guidance and protection even in extremely stressful environments.



## E4.1L e-chain® in railway crane vehicle: secure guidance and protection for cables

- Highly stable even when long unsupported lengths are used
- Reliable guidance and protection of cables and hoses
- Corrosion, dirt and weather-resistant

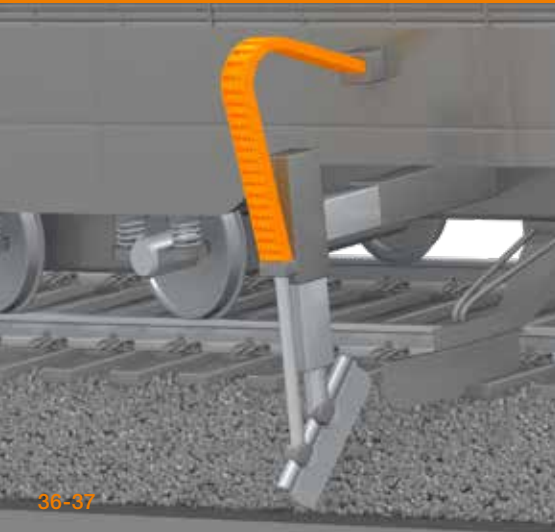
 [www.igus.eu/E4.1L](http://www.igus.eu/E4.1L)



## igidur® PRT in shunting vehicle: the perfect solution for high mechanical forces

- Slewing ring bearings for high loads
- Easy adjustment by hand or by a motor
- Low-friction and wear

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



## E4/4 e-chain® in ballast machine: dirt and dust-resistant

- High strength and lateral rigidity
- Resistant to dirt, dust and water
- Good damping where vibrations occur

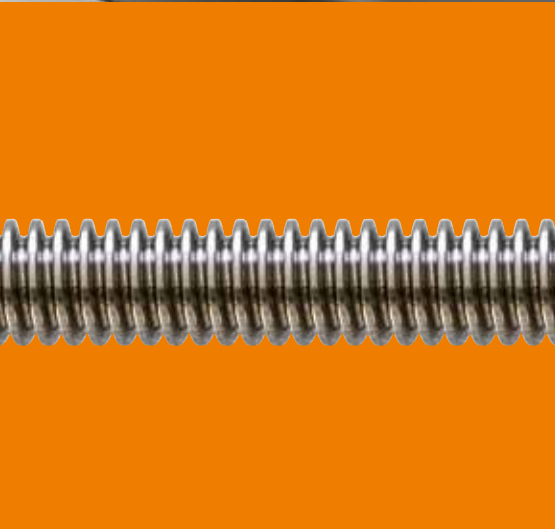
 [www.igus.eu/E4-4](http://www.igus.eu/E4-4)



## Platform gap measuring device with drylin® N

- Maintenance and lubrication-free
- Very low profile – small installation space
- Resistant to dirt, dust and humidity

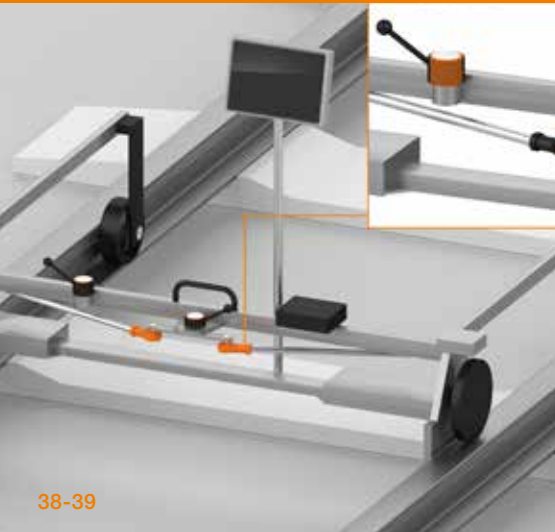
 [www.igus.eu/drylinN](http://www.igus.eu/drylinN)



## Grinding machine with trapezoidal lead screws

- Lubrication and maintenance-free
- Longer service life due to asymmetry
- Self-locking
- Corrosion-resistant

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



## Measuring machine with igubal® rod end bearings

- Maintenance-free dry operation
- Weight reducing
- Vibration-dampening

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

# Freight wagons

The service life of freight wagons can be much longer than 30 years. Designed for rough weather, high loads and contact with chemicals, igus® products are ideal for the achievement of this service life with only little maintenance work being needed. The plain bearings and sliding plates that we supply are part of the versatile solutions we offer for tankers, car transporters and bulk freight wagons.



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



## iglidur® plain bearings with felt-ring seal in manual braking system

- Cost-effective
- Protects against dirt and dust
- Longer service life

 [www.igus.eu/sg03](http://www.igus.eu/sg03)



## igubal® spherical bearings in opening flap

- Angle compensation
- Dry operation
- No corrosion

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



## igubal® two-hole fixed flange bearing for shaft bearing

- Easy assembly
- Angle compensation
- Cost-effective

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

# When it is all about railway technology - igus® catalogue parts, special parts, bar stock and 3D printed solutions



We can also go your way: customised solutions, special designs and special materials - (virtually) everything is possible.

Standard parts do not suit every application. Therefore, igus® also manufactures a number of customised special designs. Structural and material specials are equally possible, whether it is plain bearings for multiple-edge shafts, bearings with reduced clearance or anti-rotation features, special lead screw support blocks and glide pads, and so on, igus® will adapt to your needs. Starting from medium quantities we make almost everything possible.



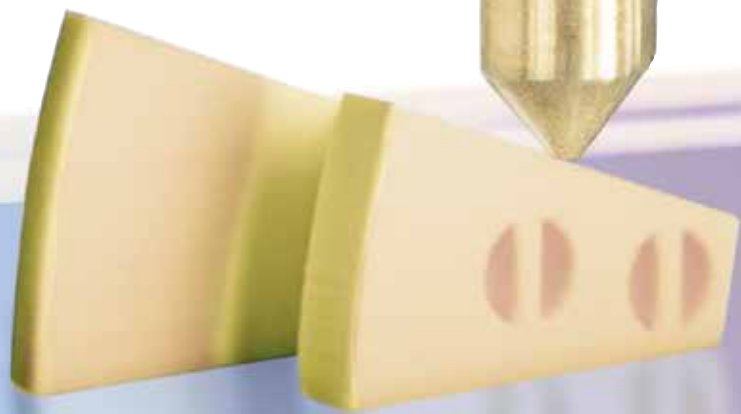
[www.igus.eu/speedigus](http://www.igus.eu/speedigus)  
[www.igus.eu/barstock](http://www.igus.eu/barstock)



# New: iglidur® RW370 tribo-filament: developed for applications in the high-temperature range



3D printing service – for individual parts made of high-performance polymers. New: iglidur® RW370 tribo-filament for high temperature applications.

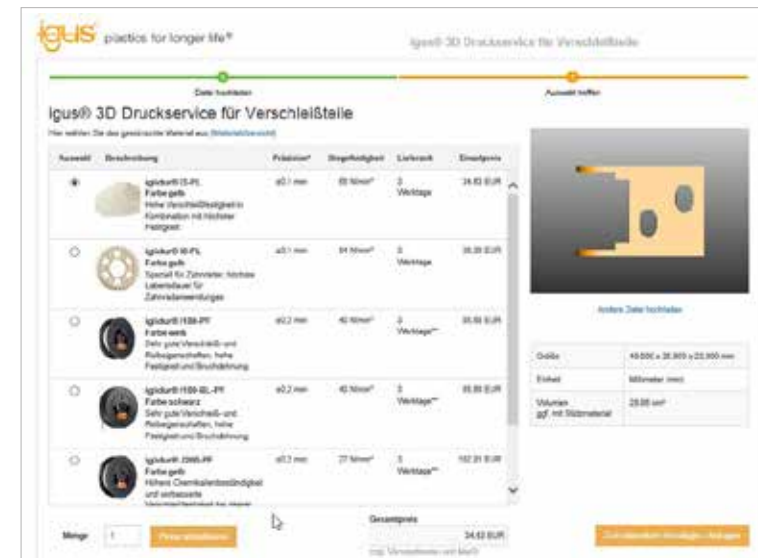


# 3D printing service – reduced downtime through replacement of old components even without original drawings

Two simple steps to 3D printed components - with instant price. We print custom components using lubrication-free, wear-resistant iglidur® high-performance polymers.

Upload the drawing in the STEP (STP) format, check the 360° view and select the filament material. Upon order, it is printed and shipped - depending on the complexity - from 24 hours.

**Tested strength when compared to machined and injection-moulded parts**  
3D print materials from igus® are robust and composed of wear-resistant materials made of iglidur® high-performance polymers, which are especially suited for moving applications. They guarantee a long service life as well as a high wear resistance of custom-made parts.



igus® 3D printing service:  
easy, fast and transparent

[www.igus.eu/3dprintservice](http://www.igus.eu/3dprintservice)



www.igus.eu/railway



## Fitting



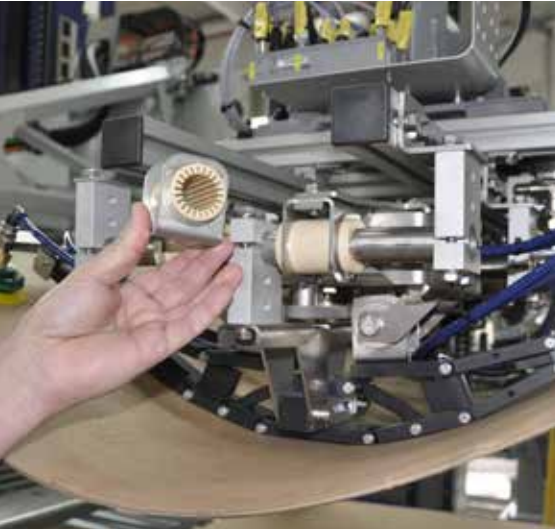
- Service for fast, error-free installation
- Specialised assembly team

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



## Fully-assembled, ready-to-install: [www.igus.eu/readychain](http://www.igus.eu/readychain)

Always the right harness for your application. Ready-to-fit, readychain® e-chain system,® configured and delivered in 3-8 days. Possible due to the large selection of energy chains for all kinds of motion, cables for e-chains® with a 36-month guarantee plus the relevant connectors. Reduce the number of suppliers and orders by 75%. Maximise machine uptime. System guarantee – depending on the application.



## Labelling



- Harnessing and labelling of the cable according to customer requirements

**Basic**  
e-chain® with fitted cables - strain relief in the system

**Standard**  
e-chain® with cables and relevant connectors

**Standard+**  
Harnesses e-chain systems® with associated sheet metal parts

**Premium**  
Ready-to-install complete system mounted on transport rack



## Engineering



- Customised products
- Many solutions from the "modular construction kit"

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



### The most used harnessing in the rail industry

**Basic**  
e-chain® with cables and suitable connectors marked and labelled according to your wishes.

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





Long-term durability  
10 billion e-chain® cycles  
per year in the e-chains®  
and chainflex® laboratory

## Vibration ...



- Service life test for vibration
- Test for energy chains and cables
- Vibration levels from 30 up to 60Hz



Extensive  
test  
database

## Resistance to low temperatures



- Extreme test in the cold chamber
- Tested in motion in energy chain down to -40°C
- More than 250 tests conducted in parallel in 58 test facilities



## Investigation of coefficient of friction



- Constant load test
- Tests of wear and coefficient of friction
- Test of functioning, service life, strength and failure scenarios



Long-term durability CF298 data  
cable with TPE outer jacket for  
the smallest bend radius up to  
4xd withstands more than 138  
million strokes.

50-51

## High load test rig



- More than 3 billion test cycles per year
- Special test set-ups for specific industries
- Further information at [www.igus.eu/frontloadertest](http://www.igus.eu/frontloadertest)



Polymer bearings in a  
heavy-duty test with a  
maximum load of 500kg

From more than 15,000 tests  
performed per year, we have  
created what is probably the  
world's largest database. This  
database gives us the ability to  
always select the right product  
for your specific application.  
Individual tests for your industry  
are also possible.

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

# /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 CO2-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 railway technology at [www.igus.eu/railway](http://www.igus.eu/railway)



igus® GmbH

Spicher Str. 1a

51147 Cologne

Phone +49 2203 9649-800

Fax +49 2203 9649-222

info@igus.de

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

Published by igus® GmbH, Germany  
MAT0072987.20 06/2020  
Subject to technical alterations.



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