

Rail

Solutions for the rail industry



plastics for longer life[®]

igus[®].co.uk...

www.igus.co.uk/railway



Flame-retardant motion plastics® for the railway industry according to EN 45545

Your technical innovator and cost reducer,

Dave Spence

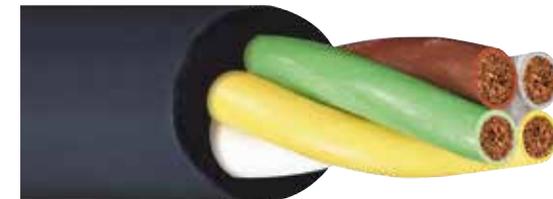
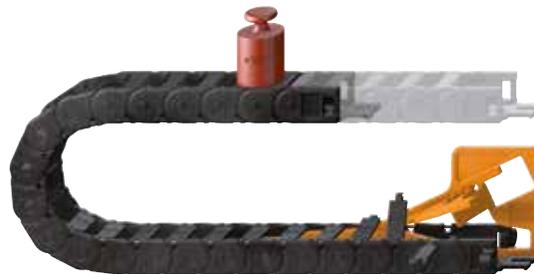
dry-tech® Product Engineer
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www.igus.co.uk/railway

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 such 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 a wide range of applications wherever movement is involved; tram doors is a typical example. www.igus.co.uk/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.co.uk/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 failsafe 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



www.igus.co.uk/railway

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

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 special materials are suitable for use in extreme temperatures, from as low as -100°C to as high as +250°C.

www.igus.co.uk/railway



igidur® H2 in brake callipers: resistant to vibration

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

 www.igus.co.uk/H2



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

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

 www.igus.co.uk/KGLM



igidur® TX1 in couplings: reliable under shock and dirty conditions

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

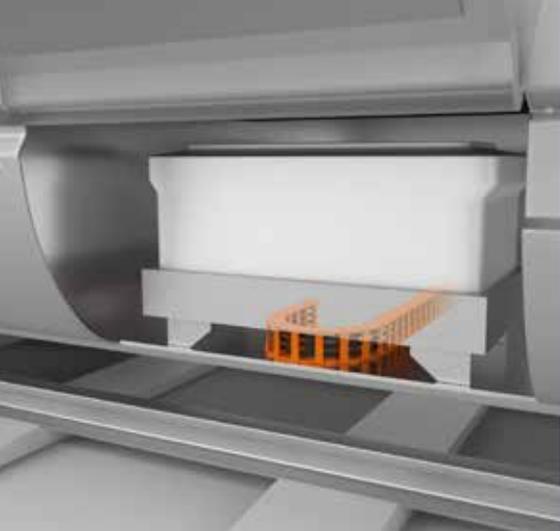
 www.igus.co.uk/TX1



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.co.uk/E2.1



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

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

 www.igus.co.uk/J



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

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

 www.igus.co.uk/J

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.co.uk/railway

iglidur® G in door hinges: resistant to dirt

- High static loads
- Corrosion-free and dirt-resistant
- Resistant to edge pressure



www.igus.co.uk/G



dryspin® lead screws in doors: vibration-free operation

- Dry operation
- Dirt-resistant
- Various designs



www.igus.co.uk/dryspin

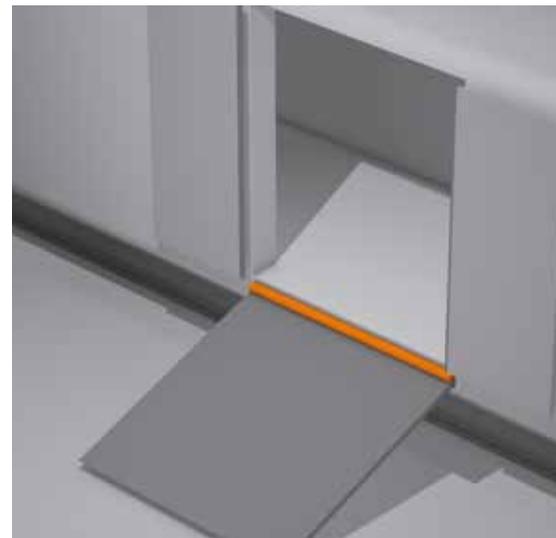


iglidur® Q in ramps: long-lasting high load capacity

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



www.igus.co.uk/Q



www.igus.co.uk/railway



chainflex® CF98 control cable : safe trap detection

- Extremely small bend radius of less than 4 x d
- 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.co.uk/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

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

 www.igus.co.uk/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

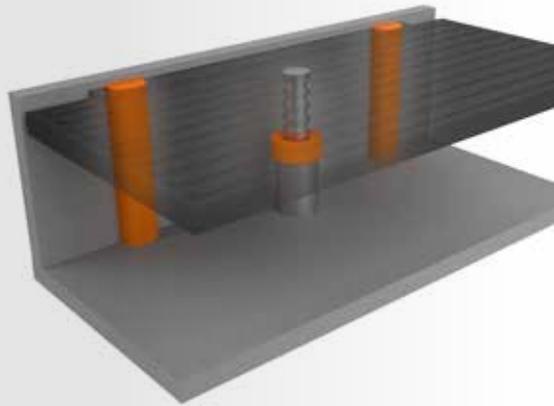
 www.igus.co.uk/E2.1

www.igus.co.uk/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. For example, adjustable armrests, folding tables and seats use iglidur® G. These plain bearings are wear-resistant and available, from stock, in a wide range of shapes and sizes.



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

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

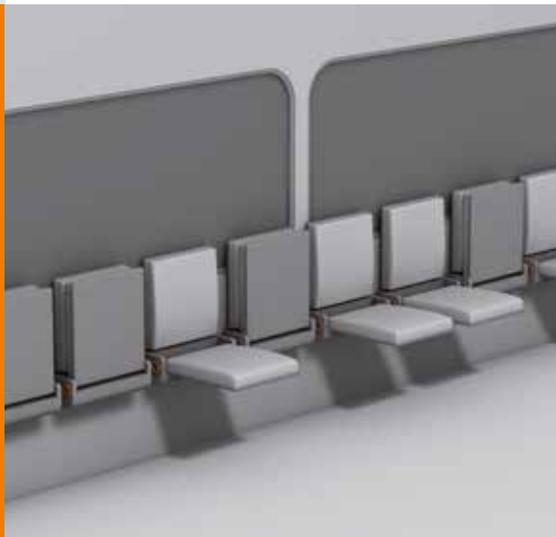
 www.igus.co.uk/dryspin



igidur® M250 in switchgear: high pitches possible

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

 www.igus.co.uk/m250



igidur® J in folding seats: lightweight, quiet and cost-effective

- Lightweight
- Low-noise
- Cost-effective

 www.igus.co.uk/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.co.uk/drylin

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

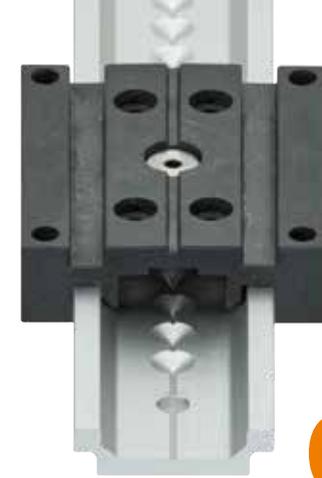
- Quiet operation
- Dirt-resistant
- Corrosion-free

 www.igus.co.uk/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.co.uk/MDM



www.igus.co.uk/railway

Always safe
on track –
motion plastics®
in maintenance

A high-speed train is shown on a maintenance platform. The platform is supported by a vertical column with a horizontal arm extending from it. An orange igus e-chain is used to guide the cables between the platform and the train. The train is white with black accents and is positioned on a track. The background is a plain, light-colored wall.

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.

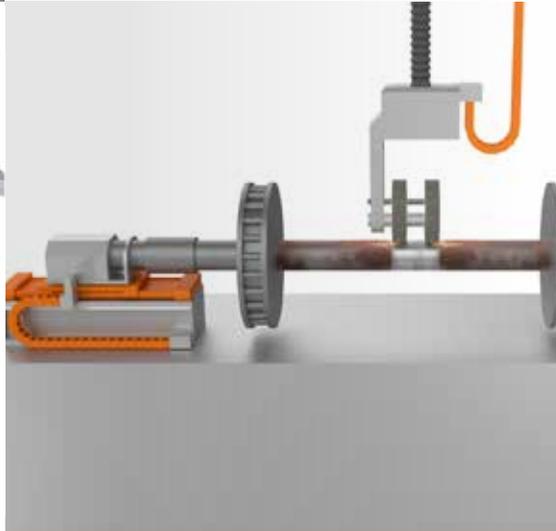
www.igus.co.uk/railway



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

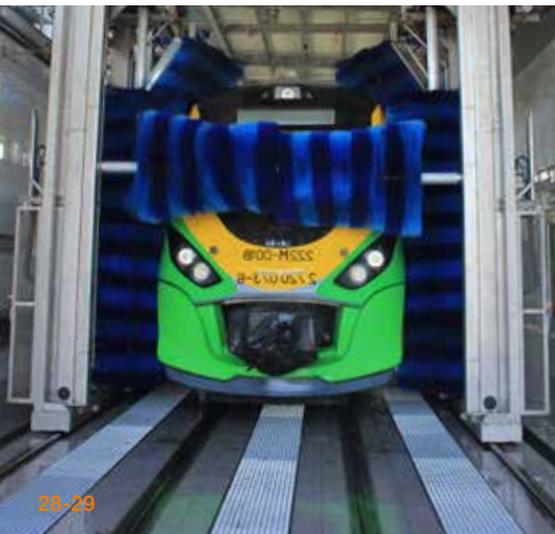
 www.igus.co.uk/flizz



readychains® 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

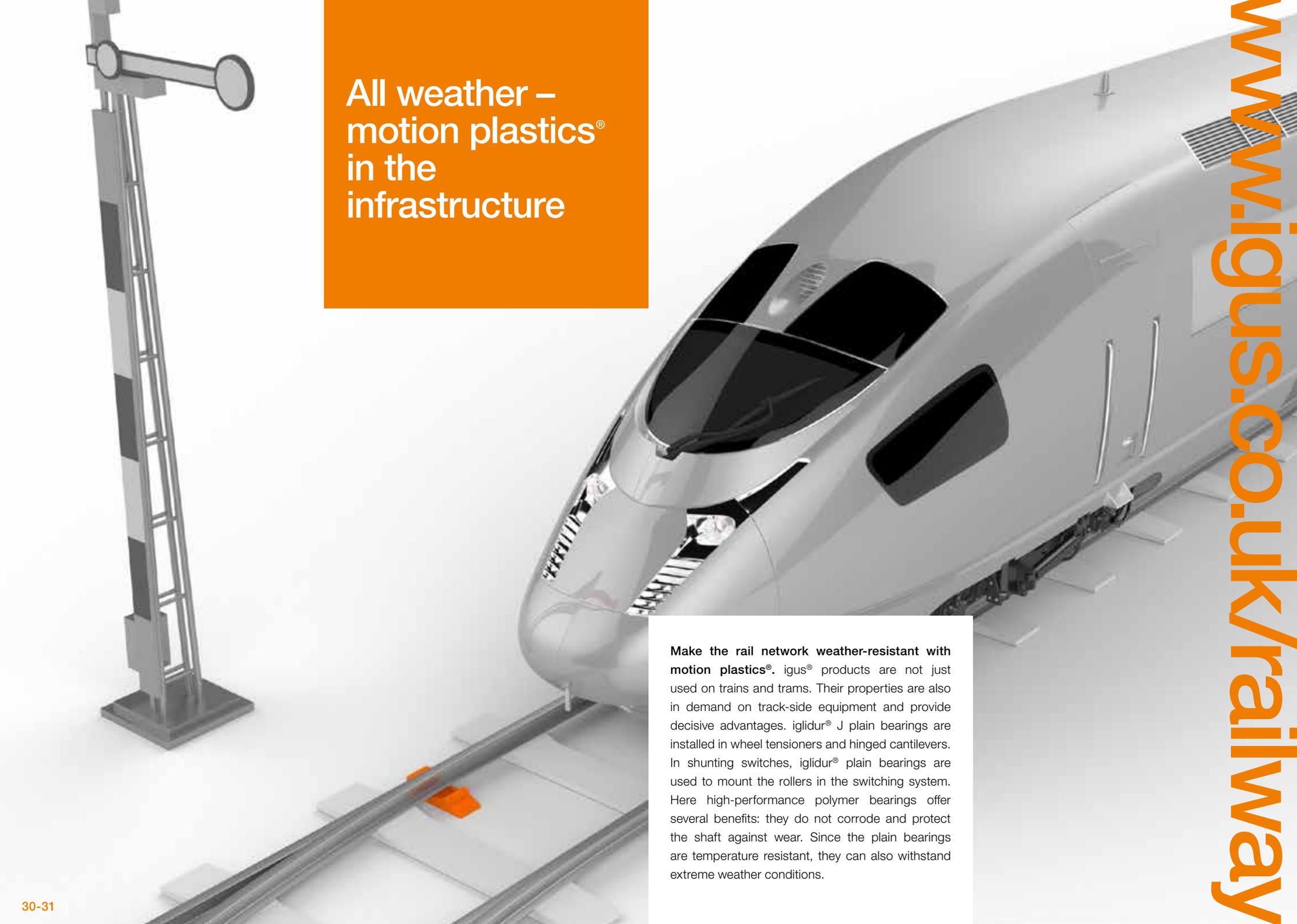
 www.igus.co.uk/readychain



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

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

 www.igus.co.uk/E4.1



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.co.uk/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

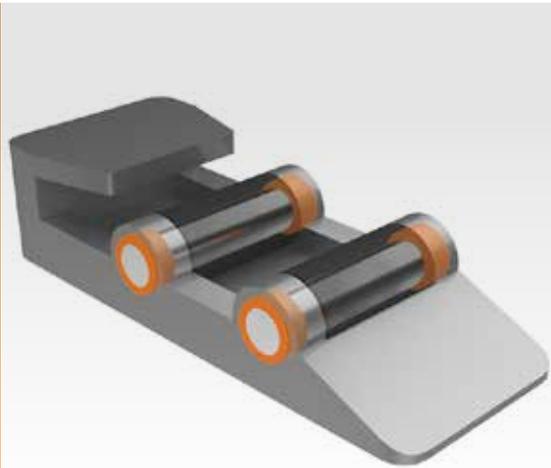
 www.igus.co.uk/J



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

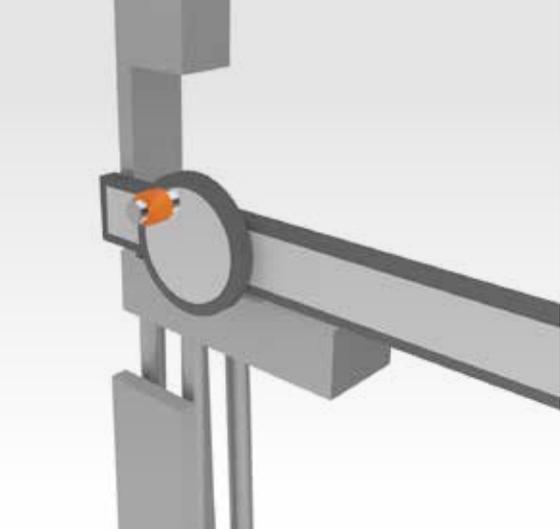
 www.igus.co.uk/G



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

- Excellent wear resistance on (virtually) all shafts
- Very low coefficient of friction
- Cost-effective and maintenance-free

 www.igus.co.uk/P210





Weatherproof components – motion plastics® in special vehicles

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.

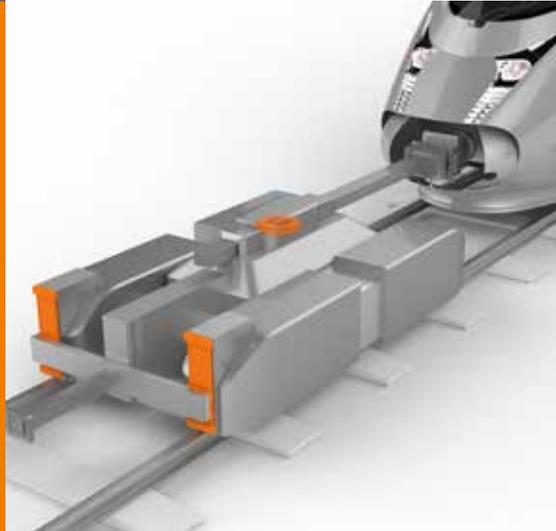


E4.1L e-chain® in railway crane vehicle: secure guidance and protection for cables

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



www.igus.co.uk/E4.1L

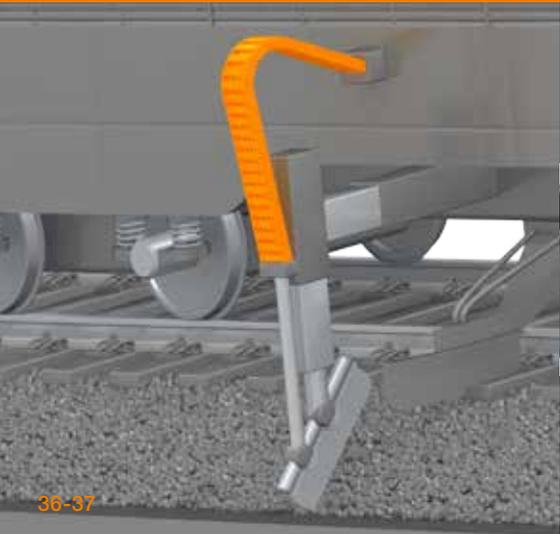


igidur® PRT in shunting vehicle: the perfect solution for high mechanical forces

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



www.igus.co.uk/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.co.uk/E4/4

smart plastics®
as a driver of
innovation in rail
transport

www.igus.co.uk/railway



Intelligent high-performance polymers
from igus® make maintenance and
repair predictable.



igus® smart plastics® enable predictive
maintenance: rail operators are making a
quantum leap towards fail-safe cables, energy
chains, linear units and slewing rings. Because
smart components are "aware" of the physical
requirements placed on them, they "know" when
they will reach their stress limits. The effect: In
future, important components will no longer report
the sudden defect to the traffic controller, they will
announce their own maintenance requirements in
advance. The result: Railway operators can schedule
maintenance tasks accurately.



www.igus.co.uk/smartplastics

When it is all about the 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 feature, 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.co.uk/speedigus
www.igus.co.uk/barstock

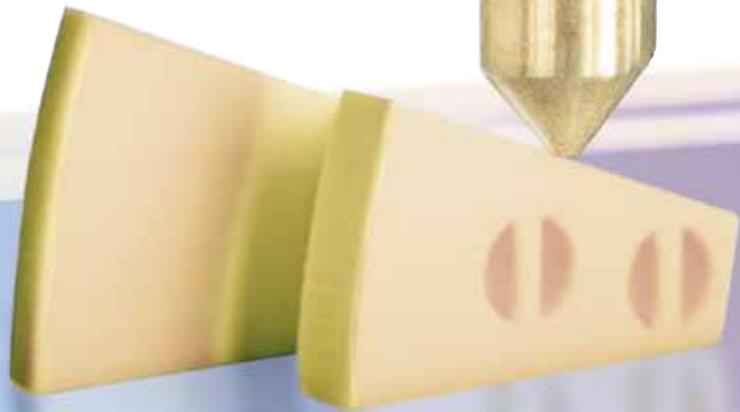


New: iglidur® RW370 tribo-filament

Developed for applications in the high-temperature range



3D printing service - for customised parts made from high-performance plastics. New: iglidur® RW370 tribo-filament for high temperature applications.



3D printing service – reduced downtime through replacement of old components even without a drawing

Two simple steps to 3D printed components - with instant price. We print custom components using lubrication-free, wear-resistant iglidur® high-performance plastics. 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 wear-resistant materials made of iglidur® high-performance plastics, which are especially suited for moving applications. They guarantee a long service life as well as a high wear resistance of custom-made parts.

Selection	Description	Preload*	Building strength	Delivery time
<input checked="" type="radio"/>	IGlidur® Q-PL Colour yellow High wear resistance combined with maximum strength	40.1 mm	40 N/mm ²	> 10 working days
<input type="radio"/>	IGlidur® T189-PP Colour white Excellent wear and abrasion properties, high strength and elongation at break	40.2 mm	40 N/mm ²	7-8 working days**
<input type="radio"/>	IGlidur® T189-BL-PP Colour black Excellent wear and abrasion properties, high strength and elongation at break	40.3 mm	40 N/mm ²	7-8 working days**
<input type="radio"/>	IGlidur® Z180-PP Colour yellow Improved chemical resistance and wear resistance at higher operation temperatures	40.2 mm	33 N/mm ²	7-8 working days**
<input type="radio"/>	IGlidur® T170-PP Colour yellow Improved wear resistance of the Tribo-Filament	40.2 mm	33 N/mm ²	7-8 working days**

Quantity: 1

Total price:

* For component sizes up to 50 mm. More information here!
** Complex components must be printed in the Aachen headquarter in Germany. If necessary, the delivery time is extended by 3-5 working days.

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



www.igus.co.uk/3dprintservice



www.igus.co.uk/railway

Fitting



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

www.igus.co.uk/assembly



Fully-assembled, ready-to-install: www.igus.co.uk/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.co.uk/engineering



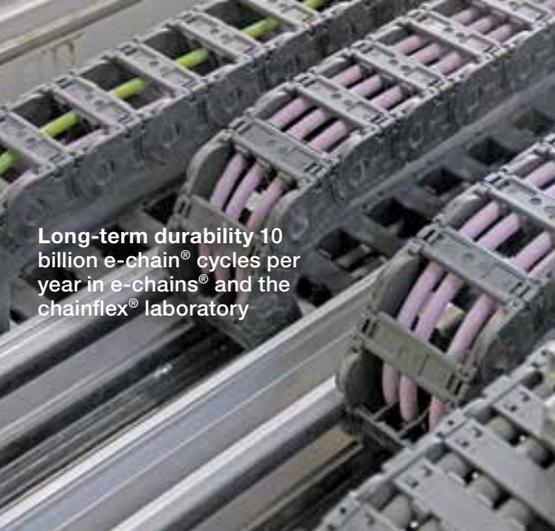
The most used harnessing in the rail industry

Basic
e-chain® with cables and suitable connectors; marked and labelled according to your requirements

www.igus.co.uk/RCbasic



www.igus.co.uk/railway



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

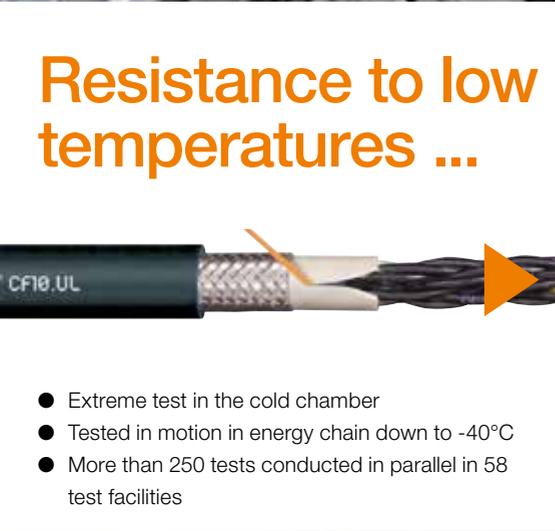
Vibration ...



- 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 ...

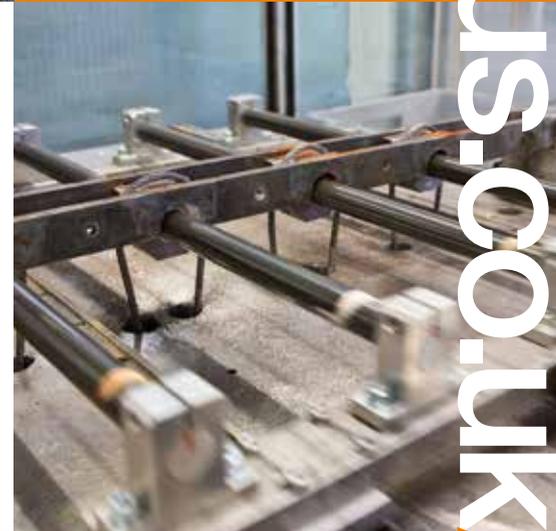
- Extreme test in the cold chamber
- Tested in motion in energy chain down to -40°C
- More than 250 tests conducted in parallel in 58 test facilities



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.

46-47

High load test rig ...

...



- More than 3 billion test cycles per year
- Special test set-ups for specific industries
- Further information at

www.igus.co.uk/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.co.uk/test

igus.co.uk/24

Buy online - 24hrs!

Visit our industry web pages for more information, products, application examples and useful online tools. Quickly find and configure products and calculate service life - all online. With the help of our product finders, you can quickly find the right component or assembly and obtain an exact prediction of service life. All online tools also enable you to reduce process costs. igus® delivers from stock in 24-48 hours!

The screenshot shows the igus website interface. At the top, there is a navigation bar with the igus logo and the tagline 'plastics for longer life!'. Below the navigation bar is a search bar and a shopping cart icon. The main content area features a large banner image of a train in a railway station with the text 'igus® solutions for application in railway technology...'. Below the banner, the page title is 'Motion plastics® solutions for railway technology' followed by the sub-headline 'Maintenance-free ... low cost ... fire retardant ... from 24 h'. The text describes the benefits of igus products in the railway industry, mentioning their maintenance-free operation and high reliability. Below this, there are three product categories: 'Small and stable' (with an image of a cable), 'Maintenance-free and calculable online' (with an image of a bearing), and 'Fail-safe cables' (with an image of a cable). Each category includes a brief description and a link to the product page.

Always the right solution for the rail industry.

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

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© 2019 igus® GmbH
Published by igus® GmbH, Germany
MAT0072987.2 Issue 04/2019.
Subject to technical alterations.

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