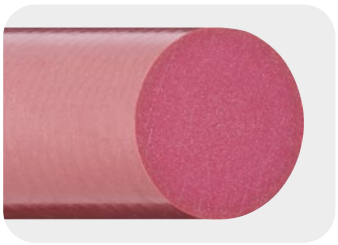
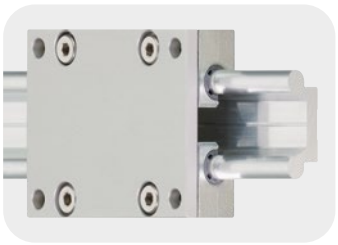
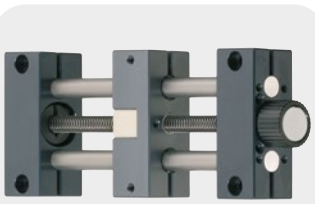
dryspin®
lead screw technology



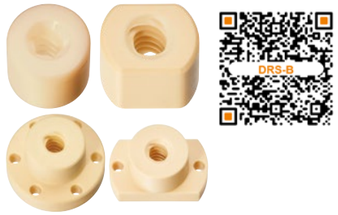


dryspin® lead screw technology

dryspin® lead screw technology

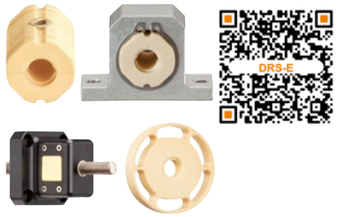
Lead screws



Lead screw nuts

Low-clearance lead screw nuts

Linear module lead screw nuts

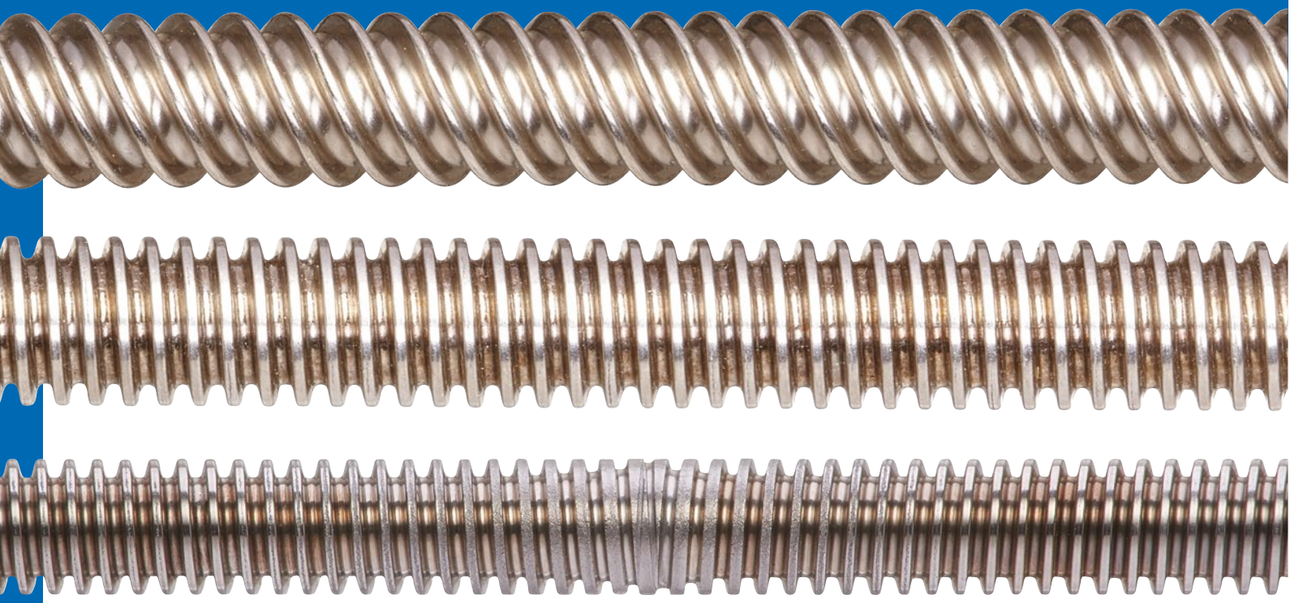


Special types

Accessories

dryspin® lead screw technology

Lead screws



dryspin® thread and dryspin® high helix thread

Lead screw drives are machine elements that convert rotary movement into linear motion. dryspin® lead screw drives are always based on self-lubricating plastic nuts, enabling long-lasting operation without external lubrication. The dryspin® technology offers a longer service life and greater efficiency for high helix threads thanks to the properties and geometries being tailored to the plastic nut and the lead screw.

- ▲ Quiet due to thread geometry, longer service life
- ▼ Up to 30% longer service life
- ■ Ongoing test program in the in-house test laboratory
- ● Lubrication-free operation and clean

Threads and high helix threads with dryspin® technology

Maintenance-free, quiet, resistant to dirt

More than 100 dimensional options with up to 10 nut versions in up to 7 different materials

Benefits
- Efficient and durable dryspin® threads and high helix threads
- Self-locking trapezoidal and metric threads
- Maintenance-free dry operation
- Quiet
- Corrosion-free
- Resistant to dirt

Typical application areas
- Format adjustments
- Drive technology
- Optical equipment
- Furniture industry
- Automotive industry

The dryspin® lead screw technology includes a wide product range of shapes and dimensions for lubrication and maintenance-free lead screw drives, with pitches between 0.5 and 100mm.

These include:
- dryspin® threads and high helix threads with optimised thread profile
- Metric thread according to DIN 976
- Trapezoidal thread according to DIN 103
- American ACME threads according to ANSI/ASME B1.5

In addition to the freedom from maintenance and lubrication, the main focus is always the insensitivity to external influences such as dirt, water, chemicals or impact loads. A dryspin® lead screw drive consists of a metallic lead screw made of steel, stainless steel or aluminium and a lead screw nut made of tribologically optimised iglidur® high-performance polymers. There are seven different standard materials available for different purposes: iglidur® J, iglidur® J350, iglidur® A180, iglidur® E7, iglidur® R, iglidur® J200 and iglidur® W300. The use of different tribologically optimised materials enables lead screw technology to meet many required specifications, e. g. withstanding high loads, temperature resistance or FDA conformity. In addition to a large selection of standard materials for the lead screw technology, igus® also offers a large number of variants in the lead screw nut geometry itself. Moreover, lead screw nuts made by injection moulding or machined from iglidur® bar stock have already been able to improve many applications.

Custom lead screws
Take advantage of our machining service - we manufacture ready-to-fit lead screws based on your requirements.

dryspin® technology: longer service life due to asymmetry

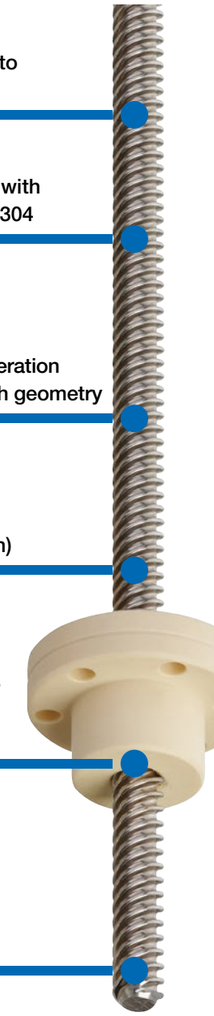
Best media resistance with stainless material AISI 304

dryspin® technology: quiet, vibration-free operation thanks to rounded tooth geometry

Minimum backlash with low-clearance lead screw nuts (option)

Lead screw nuts made from lubrication-free iglidur® high-performance polymers

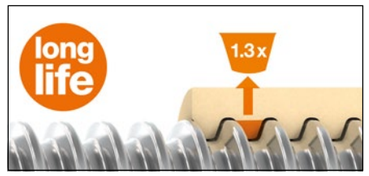
dryspin® technology: precision / nominal dimension -0.1 along the diameter



Threads and high helix threads with dryspin® technology

What distinguishes the dryspin® geometry from standard commercial geometries?

General
The dryspin® lead screw technology patented in 2016 by the development team. Particular emphasis was placed on increasing service life and improving efficiency. The dryspin® thread geometry offers improved efficiency due to the specifications and geometries matched to the plastic nut and lead screw. Efficiencies of up to 82% and a longer service life are achieved compared to metal lead screw drives. In combination with an igus® lead screw nut, clean and dry operation is possible, without dust and dirt sticking. The dryspin® high helix threads are not self-locking. This means that the lead screw nut and lead screw can be moved even without applying external force.



Asymmetry - increasing the proportion of wear material in the thread pitch

Higher efficiency due to optimised flank angle
Due to a flatter thread angle in dryspin® high helix lead screws (similar to a trapezoidal thread), the applied force is converted into a linear motion. Compared with a steeper thread angle, this means a lower power loss.

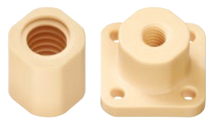
Silent and vibration-dampening due to rounded tooth geometry
Due to the rounded tooth geometry, the contact surface between the lead screw nut and the lead screw is reduced. This allows dryspin® lead screw nuts move almost silently and without vibration. The round teeth minimise this effect and the thread moves without lubrication or noise.

Reduction of the radial contact surfaces through rounded tooth geometry

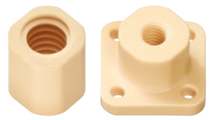
Longer service life thanks to asymmetry
Due to the larger distances between the individual dryspin® thread pitches, the thread perfectly matches the properties of the lubrication-free igus® high-performance polymers. The proportion of the tribologically optimised polymer in the thread pitches can be extended by a factor of 1.3 for all sizes. More wear-resistant material and higher efficiency are crucial for up to 5 times longer service life of standard geometries. The larger the lead screw diameter, the stronger the impact of this effect. Backlash can be minimised life-long with the use of dryspin® zero-backlash lead screw nuts with integrated spring pre-load.

Cylindrical lead screw nuts
- High efficiency at all speeds

Lead screw nuts with flange
- High efficiency at all speeds



Injection-moulded lead screw nuts with machined thread
- High efficiency at all speeds



Injection-moulded lead screw nuts with machined thread
- High efficiency at all speeds

Real-world experience

Shock absorbers in an autonomous racing car

The High-Octane association from Erlangen is developing an autonomous racing car for Formula Student

Profile

What was needed?
dryspin® high helix lead screw in left-hand thread and stainless steel with suitable dryspin® injection-moulded lead screw nut

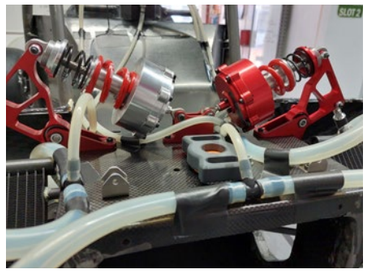
Requirements:
Small installation space, high load, great efficiency, 100% lubrication- and maintenance-free, lightweight

Success for the customer:
By using the lubrication-free dryspin® lead screw technology, High-Octane was able to save costs totalling €1,093 and reduce the amount of lubricant and hydraulic oil CO_2 footprint by 1.1kg

The High-Octane Motorsports association from Erlangen is developing an autonomous racing car for the Formular Student university competition. A special feature: an active damper for the underbody. For this, the young engineers, who rely on lightweight construction, use light, robust and compact high-helix lead screws of the dryspin® series from igus®.

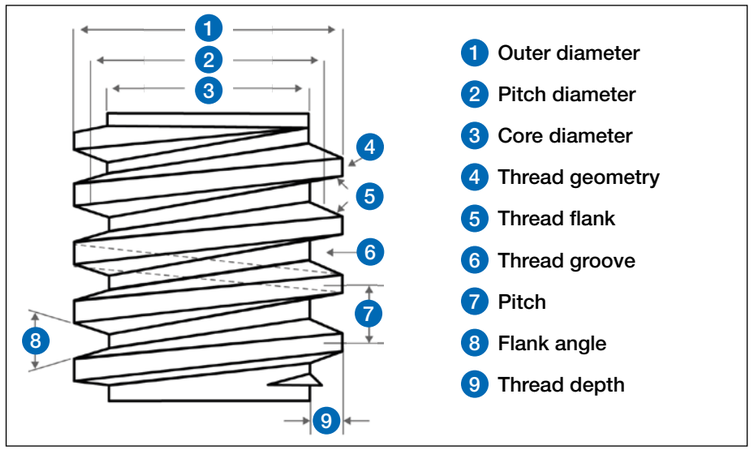
Problem
As part of the Formula Student program, the team developed an active damper for the chassis. Formula Student is an international student design competition in which university teams compete against each other in various disciplines, creating and producing their own racing car every year. The chassis is of particular relevance as it is the interface between the vehicle and the tarmac. The targeted adjustment of the spring/damper units to transfer power from the ground via the tyres to the chassis is essential for a successful race. The system converts the linear movement originating from the vertical wheel movements into a rotary one. Based on a BLDC electric motor as a damper, it is possible to actively influence the driving characteristics (e.g. rolling and pitching behaviour) of the autonomous electric racing car while driving. Due to the given regulations of the "Formula Student Germany", ±25mm spring length of the wheel assemblies must be maintained. As lightweight and aerodynamics are two important goals of the team, it was also necessary to find the lightest and smallest possible solution (1.2kg incl. steel springs per unit) so as to install these in the carbon monocoque. The high forces acting on the racing car and the damper while driving also play an important role.

Solution
To accomplish this task, a dryspin® high helix lead screw was used in combination with an injection-moulded lead screw nut. These components have been specially designed for a small installation space with a diameter of less than 11mm. In addition, selecting the right pitch of 25mm was also essential.
A particular challenge was to avoid jamming due to insufficient pitches while taking into account the required transmission ratio. Despite a high load of around 4.2kN, this is no problem for the dryspin® lead screw drive. The high efficiency of the dryspin® thread proved advantageous as it leads to improved damping and reduces energy loss in the system. This enables more efficient control by the damping motor. With this solution, it is easy to influence the aerodynamic position of the vehicle, for example to optimise air resistance and significantly reduce fuel consumption. It is especially noteworthy that this solution was developed entirely independently by the student association. This makes it a unique innovation in the world of Formula Student.



Active damper for the chassis

General definition of a lead screw drive



1. Outer diameter
2. Pitch diameter
3. Core diameter
4. Thread geometry
5. Thread flank
6. Thread groove
7. Pitch
8. Flank angle
9. Thread depth

Outer diameter:
The distance between the outermost edges of the opposite lead screw flanks is called the lead screw outer diameter, i.e. it is the largest possible diameter on the lead screw. The outer diameter is also known as the nominal diameter.

Core diameter:
The distance between the base of the lead screw, i.e. the lowest point, and the opposite base of the lead screw gives the core diameter. This means it is the smallest diameter on the lead screw.

Pitch diameter:
The distance perpendicular to the axis between two opposite flanks, or the space between the profile centre lines, is called pitch diameter.

Thread flank:
The flank results from the extension of the line from the lead screw base to the tooth flanks or to the end of the profile centre line.

Flank angle:
The flank angle is present on all lead screws. It describes the angle from one flank of the lead screw to the other.

Pitch:
The pitch describes the distance, measured parallel to the axis, between two adjacent and parallel flanks of the same lead screw. It thus indicates in mm the linear travel per revolution of the lead screw. In contrast to a metric or a trapezoidal lead screw, the high helix lead screw has a high pitch. The high helix lead screw can convert a small radial movement into a relatively large axial movement with one revolution.

Thread pitch:
The full circumference of the helical curve of a lead screw.

Manufacturing tolerances:
Trapezoidal threads are manufactured according to DIN 103, metric lead screws according to DIN 976 and the dryspin® high helix and plain lead screws with an outer diameter tolerance of -0.1mm.

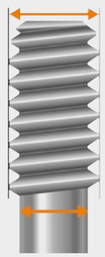
Lead screw straightness:
The dryspin® lead screws are designed in the igus® standard for a straightness of 0.3mm per 300mm or part thereof. For higher requirements, the dryspin® lead screws can be aligned to a straightness of 0.1mm per 300mm or part thereof.

Self-locking:
Single start trapezoidal screw drives are self-locking in most cases. This means that the flank angle and the sliding friction prevent the nut or lead screw from moving without outside forces being applied. As soon as the static friction is exceeded, the components are no longer self-locking. Multi start trapezoidal screw drives have a "residual self-locking" feature; high helix screw drives have no self-locking feature. Since the self-locking depends both on the pitch angle and on the coefficient of friction of the sliding pair, a loss of self-locking can occur with very low coefficients of friction even with single start trapezoidal threads.

Manufacturing processes:
The thread rolling is a non-cutting manufacturing process that, according to DIN 8580, belongs to the forming manufacturing process. The thread is rolled into the surface of the raw material by cold forming. The forming is generated by compressive stress of the tool on the workpiece. Cold forming achieves a high surface quality and high strength. For large quantities of rolled sold by the metre products, the production process is faster and more cost-effective than the "thread whirling" production process.

Benefits
- Rounded thread flank tips
- High surface quality, high strength
- Producibility of multi start threads with high pitches

Rolled thread

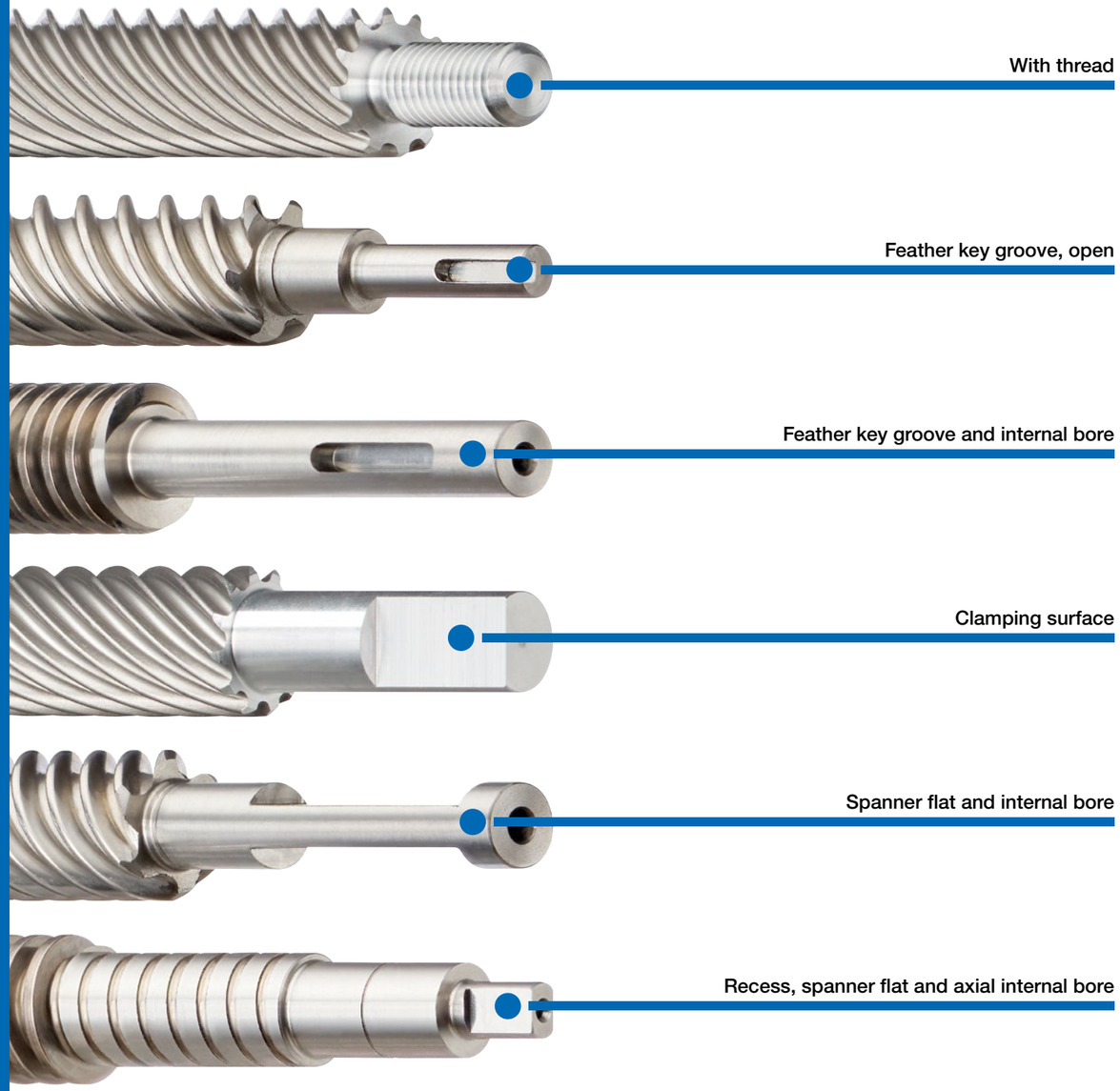


Large thread diameter

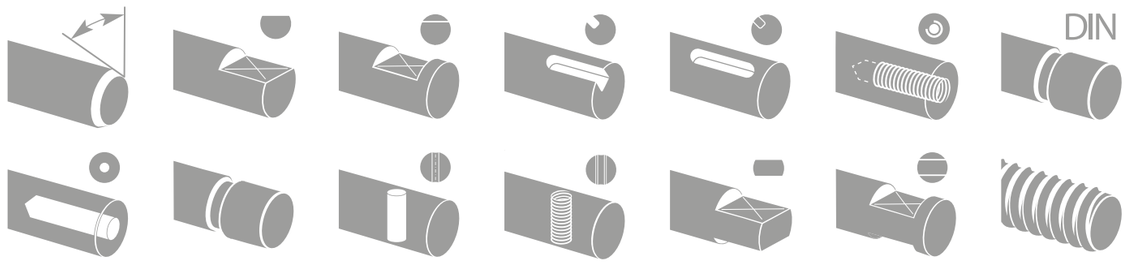
Diameter of the raw material

Threads and high helix threads with dryspin® technology

dryspin® configurators



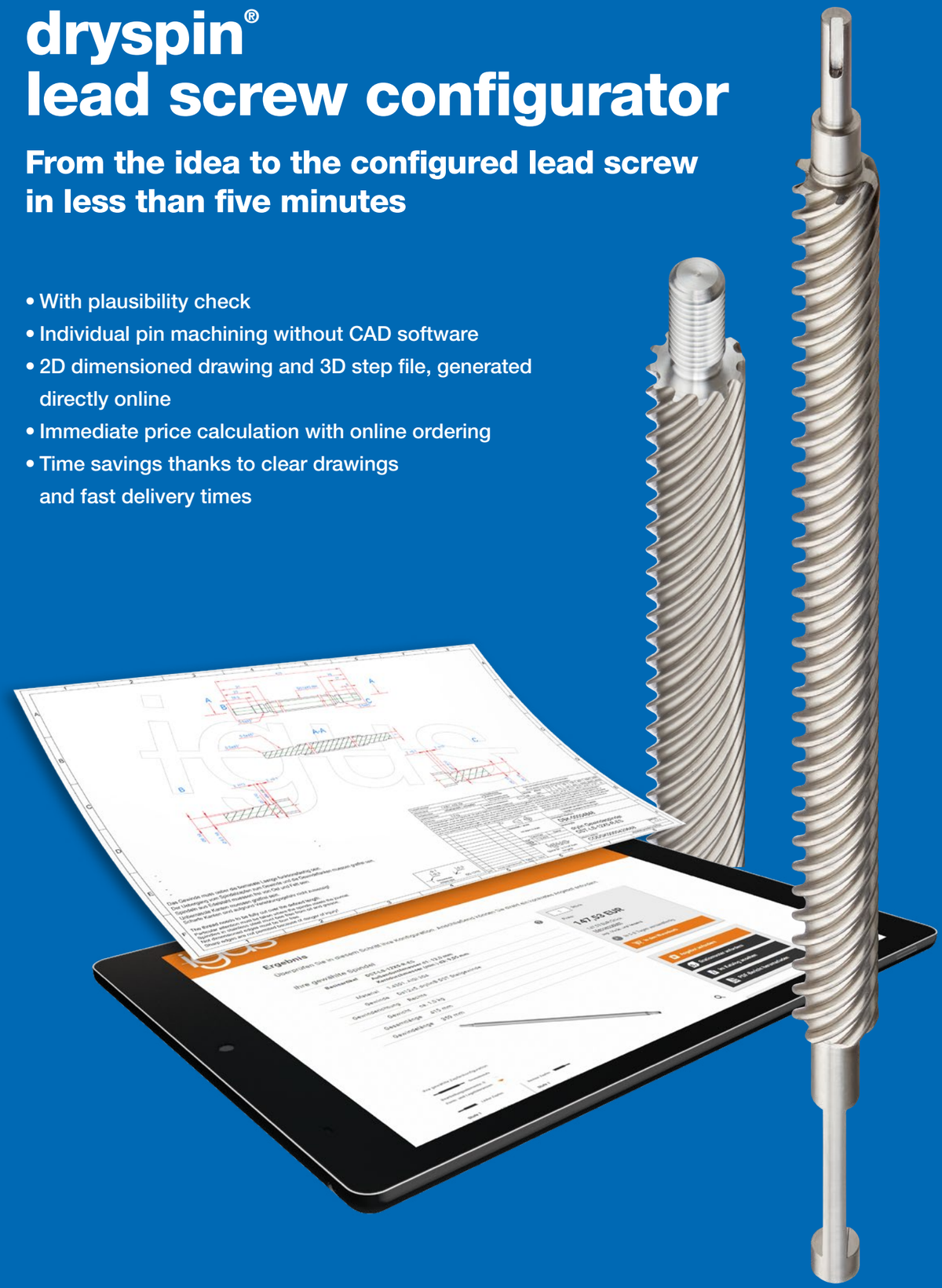
A host of machining elements:



dryspin® lead screw configurator

From the idea to the configured lead screw in less than five minutes

- With plausibility check
- Individual pin machining without CAD software
- 2D dimensioned drawing and 3D step file, generated directly online
- Immediate price calculation with online ordering
- Time savings thanks to clear drawings and fast delivery times



dryspin® sliding thread technology

dryspin® high helix thread

DST-LS-□X□-R-□-ES
High helix lead screw, right-hand thread

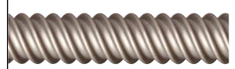
Direction of rotation	**RH**
Max. pitch	**100mm**
Material	**AISI 304 stainless steel**

DST-LS-□X□-L-□-ES
High helix lead screw, left-hand thread

Direction of rotation	**LH**
Max. pitch	**100mm**
Material	**AISI 304 stainless steel**

DST-LS-□X□-R/L-□-ES
High helix lead screw, reverse

Direction of rotation	**RH/LH**
Max. pitch	**100mm**
Material	**AISI 304 stainless steel**



DST-LS-□X□-R-AL
High helix lead screw, right-hand thread

Direction of rotation	**RH**
Max. pitch	**100mm**
Material	**aluminium EN AW 6082**

dryspin® thread

DST-LS-□X□-R-□-ES
Lead screw, right-hand thread

Direction of rotation	**RH**
Max. pitch	**10mm**
Material	**AISI 304 stainless steel**

DST-LS-□X□-L-□-ES
Lead screw, left-hand thread

Direction of rotation	**LH**
Max. pitch	**10mm**
Material	**AISI 304 stainless steel**

DST-LS-□X□-R/L-□-ES
Lead screw, reverse

Direction of rotation	**RH/LH**
Max. pitch	**10mm**
Material	**AISI 304 stainless steel**

Beer lift for DIY application
A second refrigerator in the garden requires lots of space and energy. To avoid having to use one, Mr Kessler of Kessler Engineering designed a beer lift. The DIY beverage lift is installed in a hole in the garden.

Trapezoidal lead screws

Trapezoidal thread according to DIN 103

PTGSG-□X□-01-R-□-ES
Trapezoidal lead screw, single start, right-hand thread

Direction of rotation	**RH**
Max. pitch	**8mm**
Material	**Stainless steel**

PTGSG-□X□-01-L-□-ES
Trapezoidal lead screw, single start, left-hand thread

Direction of rotation	**LH**
Max. pitch	**8mm**
Material	**Stainless steel**

PTGSG-□X□-01-R-□
Trapezoidal lead screw, single start, right-hand thread

Direction of rotation	**RH**
Max. pitch	**8mm**
Material	**C15 steel AISI 1015**

PTGSG-□X□-01-L-□
Trapezoidal lead screw, single start, left-hand thread

Direction of rotation	**LH**
Max. pitch	**8mm**
Material	**C15 steel AISI 1015**

PTGSG-□X□-02-R-□-ES
Trapezoidal lead screw, multi start, right-hand thread

Direction of rotation	**RH**
Max. pitch	**8mm**
Material	**Stainless steel**

PTGSG-□X□-02-L-□-ES
Trapezoidal lead screw, multi start, left-hand thread

Direction of rotation	**LH**
Max. pitch	**8mm**
Material	**Stainless steel**

PTGSG-□X□-02-R-□
Trapezoidal lead screw, multi start, right-hand thread

Direction of rotation	**RH**
Max. pitch	**8mm**
Material	**C15 steel AISI 1015**

PTGSG-□X□-02-L-□
Trapezoidal lead screw, multi start, left-hand thread

Direction of rotation	**LH**
Max. pitch	**8mm**
Material	**C15 steel AISI 1015**

PTGSG-□X□-01-R/L-□-ES
Trapezoidal lead screw, reverse

Direction of rotation	**RH/LH**
Max. pitch	**5mm**
Material	**AISI 304 stainless steel**

PTGSG-□X□-01-R/L-□
Trapezoidal lead screw, reverse

Direction of rotation	**RH/LH**
Max. pitch	**5mm**
Material	**C15 steel AISI 1015**

PTGSG-□X□-01-R-□-AL
Trapezoidal lead screw, single start, right-hand thread

Direction of rotation	**RH**
Max. pitch	**4mm**
Material	**aluminium EN AW 6082**

Metric lead screws, ACME lead screws, motorised lead screws

Metric lead screws according to DIN 976 6g

PTGSG-M□-01-R-□-ES
Lead screw, metric thread, right-hand thread

Outer diameter	**3-10mm**
Pitch	**0.5-1.5mm**
Material	**AISI 304 stainless steel**

ACME lead screws ANSI/ASME B1.5 class 2C

ACME-□X□-R-□-ES
Lead screw, ACME, right-hand thread

Direction of rotation	**RH**
Pitches from	**1.59-3.08mm**
Material	**AISI 304 stainless steel**

Motorised lead screws (ready to install)

DST-LS-MOTP7M6-□X□-R-□-ES
Lead screw with machined end for drylin® E lead screw motors, right-hand thread

Suitable for NEMA	**17M, 23**
Fitting	**7g7, M6**
Fixed length	**310, 490mm**

DST-LS-MOTP4M3-□X□-R-□-ES
Lead screw with machined end for drylin® E lead screw motors, right-hand thread

Suitable for NEMA	**11, 17S**
Fitting	**4g7, M3**
Fixed length	**310, 490mm**

PTGSG-MOTP7M6-□X□-R-□-ES
Trapezoidal lead screw with machined end for drylin® E lead screw motors, right-hand thread

Suitable for NEMA	**17M, 23**
Fitting	**7g7, M6**
Fixed length	**310, 490mm**

PTGSG-MOTP4M3-□X□-R-□-ES
Trapezoidal lead screw with machined end for drylin® E lead screw motors, right-hand thread

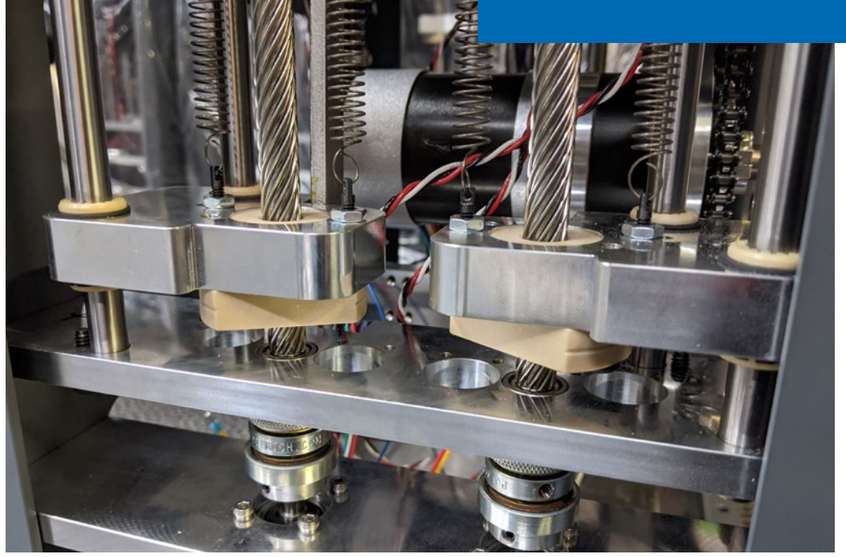
Suitable for NEMA	**11, 17S**
Fitting	**4g7, M3**
Fixed length	**310, 490mm**

DST-LS-MOTK-□X□-R-1000-ES
Motorised lead screw with spline for drylin® E lead screw motors, high helix thread

Outer diameter	**10-18mm**
Pitch	**12-50mm**
Fixed length	**1,000mm**

PTGSG-MOTK-□X□-R-1000-ES
Motorised lead screw with spline for drylin® E lead screw motors

Outer diameter	**10-18mm**
Pitch	**2-5mm**
Fixed length	**1,000mm**



dryspin® high helix lead screws with matching lead screw nuts in 50mm pitch

Automatic throttle system in the aircraft simulator

What was needed?
A replica of the throttle flaps for simulated 737 NG and 737MAX type aircraft, which can be adjusted automatically by the autopilot or manually without any problems

Requirements:
Reduced installation space with the same functionality, robust enough for long-term use in all climate zones of the world, possible reverse drive, cost-effective, lubrication-free and maintenance-free, corrosion-free

Products used:
dryspin® high helix lead screws with matching lead screw nuts in 50mm pitch, supported by drylin® R linear slide bearings

Success for the customer:
The lead screw drives were used to control the two throttle levers. The system worked so well that a similar system was used to drive the speed brake lever (to control the simulated air brakes), which is mounted in the same throttle valve module. The products were the perfect blend of low cost, high reliability, and very simple reverse control. The low costs made it possible to meet the target price for the simulated throttle valves. The high reliability means that there was no need to worry about the units wearing out or failing during use. Simple reverse control means that the lead screws are very easy to turn back, giving the levers the perfect feel and power.

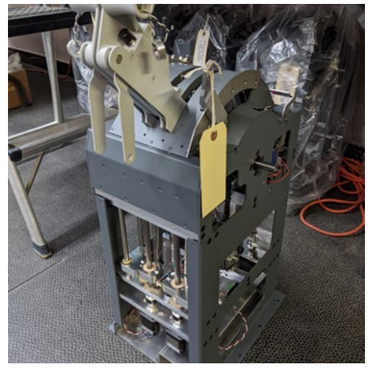
Application description of the aircraft throttle from Flightdeck Solutions

Please describe your project
Our application is a simulated throttle valve for a simulated 737 NG and 737MAX aircraft. The high-pitch lead screws we selected are used to replicate the auto-throttle system in the real aircraft. This system allows the autopilot to move the throttle automatically to control airspeed. Manual control can be assumed when the automatic throttle is deactivated. There can also be a manual override if the automatic throttle is activated, but manual control system is still required.

What challenges did you have to overcome?
The environmental conditions are typical indoor conditions worldwide. These can be very hot and humid places as well as very cold and dry areas and everything in between. The biggest challenge in recreating the automatic accelerator pedal system was to make it smaller while maintaining full functionality. The real aircraft system is connected with cables that run throughout the aircraft. We had to put the whole system into the part of the throttle above the floor. The next major challenge was designing a system that would allow both automatic and manual throttle control and manual override of the automatic throttle system.

What requirements did the lead screw drives have to fulfil?
The lead screw nuts and lead screws had to be robust enough to be used in all climate zones around the world in the long term. And they had to be able to be driven in reverse so that the pilots could override the automatic throttle system and control the throttle manually.

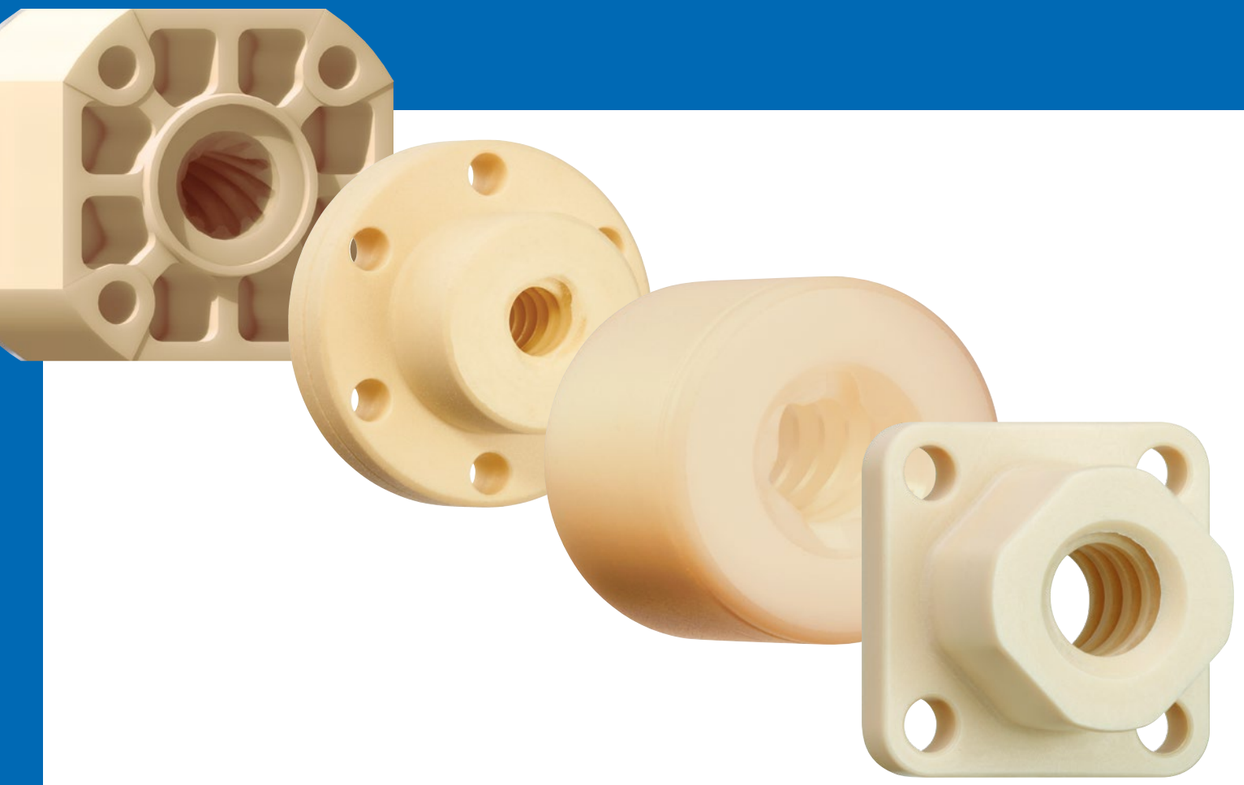
What alternatives to lead screw drives were considered?
We considered options such as belt drives, standard bronze lead nuts and direct servo drive. All of these options were either too big, too expensive or could not be adequately driven backwards.



A replica of the throttle flaps for simulated aircraft

dryspin® lead screw technology

Lead screw nuts



dryspin® thread and dryspin® high helix thread

There are seven different standard materials available for different applications: iglidur® J - high efficiency at all speeds, iglidur® J350 - for temperatures up to +150°C, iglidur® A180 - FDA-compliant for the food and pharmaceutical industry, iglidur® E7 - for high speeds with low loads, iglidur® R - anti-oscillation and anti-vibration, iglidur® J200 - the best mating partner for aluminium and iglidur® W300 - for high-load applications.

- Quiet operation due to tighter manufacturing tolerances and rounded tooth geometries by default
- Up to 50.9% more cost-effective than non-lubricated metal lead screw nuts
- Up to 25% less wear compared to POM+PTFE
- No lubricating grease or oil in the lead screw drive

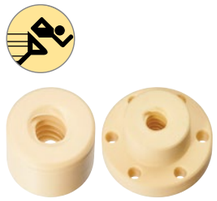
dry-tech® tribo-plastics

igus® high-performance polymers are used in all dryspin® linear and drive units as well as lead screw drives. Due to the homogeneously incorporated solid lubricants, the bearing materials are designed for continuous dry operation, i.e. maintenance-free over the complete service life. The base material is also reinforced by technical fibres or filling materials. The solid lubricants are microscopic particles, embedded in millions of tiny chambers of the material. This is adequate to sufficiently lubricate the immediate surrounding area and to reduce the friction of the system. These additives stabilise our lead screw nuts decisively for wear resistance.

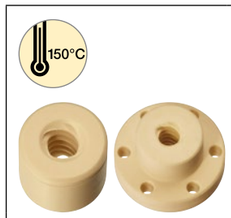
Material selection
dryspin® lead screw nuts are made from tribologically optimised materials. Already during the development phase, the focus is on optimising the friction properties of the dryspin® lead screw drives, with the objective of attaining the lowest possible coefficient of wear and friction.

Radial loads
dryspin® lead screw nuts are designed to absorb axial forces. By using tribologically optimised iglidur® sliding materials, dryspin® lead screw drives can also absorb slight radial forces in contrast to ball screws. However, uncontrolled radial forces lead to uneven wear and thus to a reduced service life. Any radial forces occurring in the application should be absorbed by additional linear guides.

Axial clearance
Axial clearance is the gap between the thread flanks of the lead screw and the lead screw nut. It outlines the movement of the lead screw nut in the axial direction without movement of the lead screw. Lead screw drives require a minimum clearance to maintain their function. If the axial clearance is too small, the torque required to move the lead screw nut also increases. There are various ways to reduce the axial clearance, e. g. the right choice of material or a pretensioning mechanism.



Lead screw nuts made of iglidur® J
- High efficiency at all speeds



Lead screw nuts made of iglidur® J350
- High-temperature material for temperatures up to +150°C

Lead screw nuts made of iglidur® R
- For medium to high speeds - dampening

Lead screw nuts made of iglidur® J200
- Best mating partner for aluminium lead screws

Lead screw nuts made of iglidur® A180
- FDA-compliant for the food and pharmaceutical industries

iglidur® W300 lead screw nuts
- For heavy duty applications up to 5MPa

Lead screw nuts made of iglidur® E7
- For high speeds at low loads

Seven standard materials

General properties	Unit	iglidur® J (yellow)	iglidur® J350 (yellow)	iglidur® R (red)	iglidur® A180 (white)	iglidur® E7 (dark grey)	iglidur® W300 (yellow)	iglidur® J200 (matt grey)
Density	[g/cm³]	1.49	1.44	1.39	1.46	1.05	1.24	1.72
Max. moisture absorption at +23°C and 50% relative humidity	[% weight]	0.3	0.3	0.2	0.2	0.1	1.3	0.2
Max. waterabsorption	[% weight]	1.3	1.6	1.1	1.3	0.1	6.5	0.7
pv value, max. (dry)	[MPa·m/s]	0.34	0.45	0.27	0.31	0.08	0.23	0.30
Mechanical properties								
Max. permissible surface pressure on the thread (DS/TR) at +20°C	[MPa]	2.5 / 4.0	2.5 / 3.0	2.0 / 2.0	2.5 / 3.5	0.5 / 0.5	- / 5.0	2.0 / 2.0
Shore D hardness		74	80	77	76	61	77	70
Physical and thermal properties								
Max. continuous operating temperature	[°C]	+90	+150	+90	+90	+70	+90	+90
Max. short-term operating temperature	[°C]	+120	+150	+90	+90	+70	+180	+90
Min. application temperature[191)]	[°C]	–20	–20	–20	–20	–20	–20	–20
Thermal conductivity	[W/m · K]	0.25	0.24	0.25	0.25	0.25	0.24	0.24
Coefficient of thermal expansion at +23°C	[$K^{-1} \cdot 10^{-5}$]	10	7	11	11	11	9	8
Electrical properties								
Specific contact resistance	[Ωcm]	> 10^{13}	> 10^{13}	> 10^{12}	> 10^{12}	> 10^{9}	> 10^{13}	> 10^{8}
Surface resistance	[Ω]	> 10^{12}	> 10^{10}	> 10^{12}	> 10^{11}	> 10^{9}	> 10^{12}	> 10^{8}
Chemical resistance								
Alcohols		+	+	+	+	x	+ up to 0	+
Hydrocarbons		+	+ up to 0	+	+	x	+	+
Greases, oils without additives		+	+	+	+	x	+	+
Diluted acids		0 up to –	+	0 up to –	0 up to –	x	0 up to –	0 up to –
Diluted alkalines		+	+	+	+	x	+	+
Lubricants, mineral		+	x	+	+	x	+	+
Lubricants, synthetic		0	x	0	0	x	0	0
More material properties at: www.igus.eu/dryspin-material								

Resistance classification: + resistant; 0 conditionally resistant; - not resistant; x no data available
The lead screw nuts are not chemically attacked by these substances. However, there may be a dimensional change due to total moisture absorption.
[191)] With falling temperatures, the required drive torque can increase due to the material

Solar-powered car and railway sliding steps

Solar-powered car with retractable carbon aerofoil profile

What was needed?
dryspin® trapezoidal lead screw nut with matching lead screw, iglidur® plain bearing and xiros® polymer ball bearing

Requirements:
Smooth operation, lubrication-free and maintenance-free, no adhesion of dust and dirt, water-resistant, stabilisation of aerodynamic and driving-related vibrations, no clearance

Success for the customer:
The rapid retraction of the carbon aerofoil profile saves the energy of the car's solar battery. The lightweight feature of the igus® components also increases overall efficiency

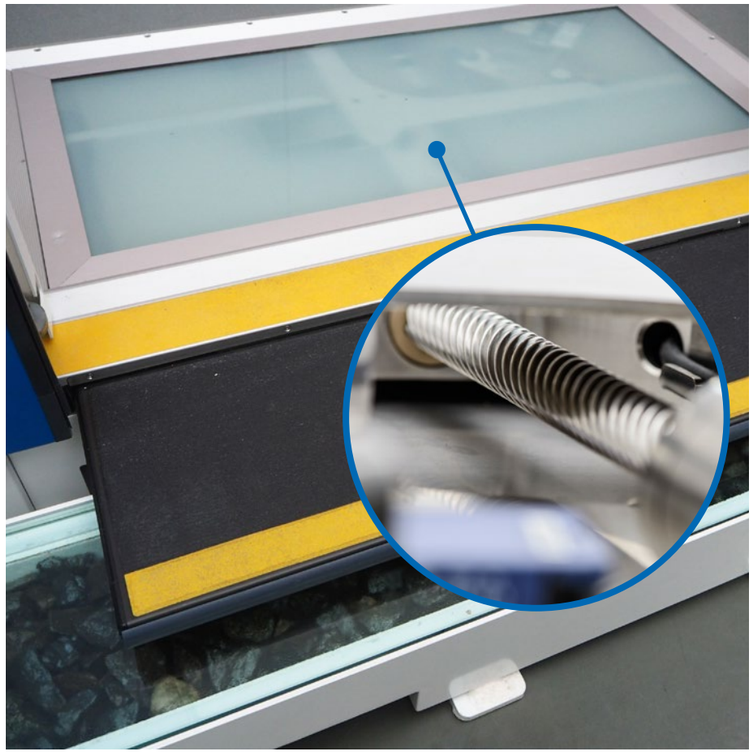
Gap bridging in trains

What was needed?
No jamming or sluggishness during continuous sliding step operation

Requirements:
Lightweight, weather-resistant, few components, low clearance height, reduced costs

Products used:
dryspin® high helix lead screw made of stainless steel, dryspin® lead screw nut made of iglidur® J

Success for the customer:
By substituting the belt drive, this reduces weight, the number of components and ensures a compact system compared to the more expensive modified drive concept.



Lead screw nuts in cylindrical design or with flange

dryspin® thread

DST-□S□M-□□DS□X□
Lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Cylindrical**

DST-□S□M-□□□DS□X□
Lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Cylindrical, SW**

DST-□S□M-C-01-DS□X□
Injection moulded lead screw nut with machined thread

Material	**iglidur® J, E7**
Direction of rotation	**RH, LH**
Type	**Cylindrical, SW**

DST-JGRM-C-01-DS□X□
Heavy-duty lead screw nut with identical connection dimensions to standard ball threads

Material	**iglidur® J**
Direction of rotation	**RH**
Type	**Cylindrical, SW**

DST-JGRM-HD-02-DS□X□
Heavy-duty lead screw nut with stainless steel plate with identical connection dimensions to standard ball threads

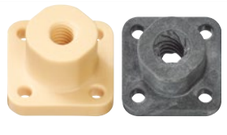
Material	**iglidur® J**
Direction of rotation	**RH**
Type	**Cylindrical, SW**

DST-□F□M-□□DS□X□
Lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Flange**

DST-□F□M-□□□DS□X□
Lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Flange/SW**



DST-□F□M-C-01-DS□X□
Injection moulded lead screw nut with machined thread

Material	**iglidur® J, E7**
Direction of rotation	**RH, LH**
Type	**Flange/SW**

Trapezoidal thread DIN 103

□S□M-□□TR□X□
Trapezoidal lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Cylindrical**

□S□M-□□□TR□X□
Lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Cylindrical, SW**

Lead screw nut with machined metric thread

□S□M-C-01-TR□X□
Injection moulded lead screw nut with machined thread

Material	**iglidur® J, E7**
Direction of rotation	**RH, LH**
Type	**Cylindrical, SW**

JSRM-M-01-TR□X□
Injection moulded lead screw nut with injection moulded thread

Material	**iglidur® J**
Direction of rotation	**RH**
Type	**Cylindrical, SW**

□F□M-□□TR□X□
Trapezoidal lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Flange**

□F□M-□□□TR□X□
Trapezoidal lead screw nut made from bar stock with machined thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH, LH**
Type	**Flange/SW**

□F□M-C-01-TR□X□
Injection moulded lead screw nut with machined thread

Material	**iglidur® J, E7**
Direction of rotation	**RH, LH**
Type	**Flange/SW**

JFRM-M-01-TR□X□
Injection moulded lead screw nut with machined thread

Material	**iglidur® J**
Direction of rotation	**RH**
Type	**Flange/SW**

Metric thread

□SRM-□□M□
Lead screw nut made from bar stock with machined metric thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH**
Type	**Cylindrical**

□FRM-□□M□
Lead screw nut made from bar stock with machined metric thread

Material	**iglidur® J, R, A180, J350...**
Direction of rotation	**RH**
Type	**Flange**

O'zapft is! Let the drinking begin - in a matter of seconds thanks to automatic beer dispenser

The Austrian company One Two Beer is building an automated beer dispensing system for festivals and major events. A fast and lubrication-free linear guide is essential to enable hygienic dispensing in a matter of seconds.

ACME thread

ACME thread
Class 2C

JSRI-01-☐-☐
Lead screw nut made from bar stock with machined ACME thread

Material	**iglidur® J**
Direction of rotation	**RH**
Type	**Cylindrical**

JFRI-01-☐-☐
Lead screw nut made from bar stock with machined ACME thread

Material	**iglidur® J**
Direction of rotation	**RH**
Type	**Flange**

J4FRI-C-01-☐-☐
Injection moulded lead screw nut with machined ACME thread

Material	**iglidur® J4**
Direction of rotation	**RH**
Type	**Flange**

3D printer replacement

DST-RF☐M-3D-02-DS☐X☐
dryspin® lead screw nut made from bar stock with machined thread

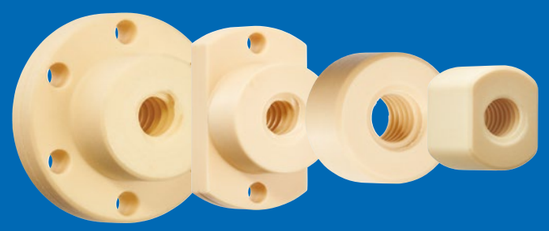
Material	**iglidur® R**
Direction of rotation	**RH**
Type	**Flange**

DST-RF☐M-3D-01-DS☐X☐
dryspin® lead screw nut made from bar stock with machined thread

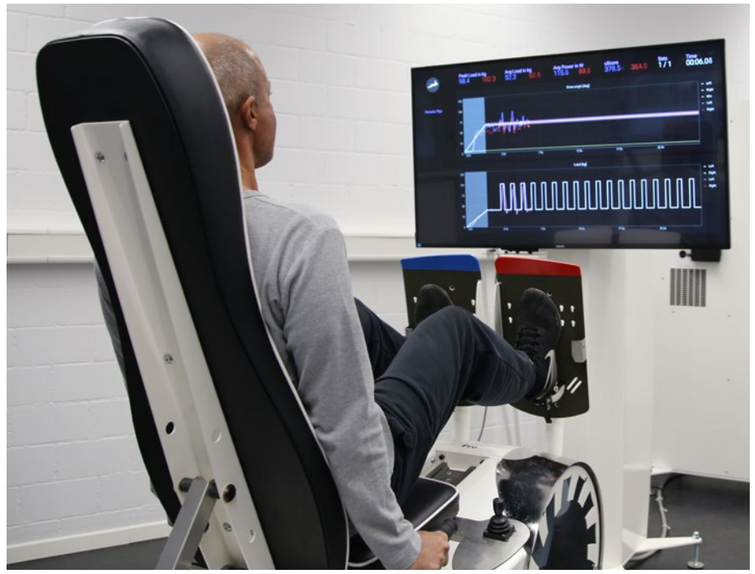
Material	**iglidur® R**
Direction of rotation	**RH**
Type	**Flange, SW**

DST-RF☐M-3D-04-DS☐X☐
Injection moulded dryspin® lead screw nut with machined thread

Material	**iglidur® R**
Direction of rotation	**RH**
Type	**Flange, SW**



Fit for the future



The core of the soft-robotic training robot is a pneumatic muscle, which generates this variable force and dynamics on the two pedals

Technical data

What was needed?
A robotic system for the sports and health sector that promotes fitness, strength, balance and walking speed in a playful and motivating way

Requirements:
100% freedom from lubrication and maintenance, dust and dirt resistance, robustness, durability, quiet

Products used:
dryspin® trapezoidal screw drives, iglidur® plain bearings, drylin® shafts and profile guides, igus® energy chains

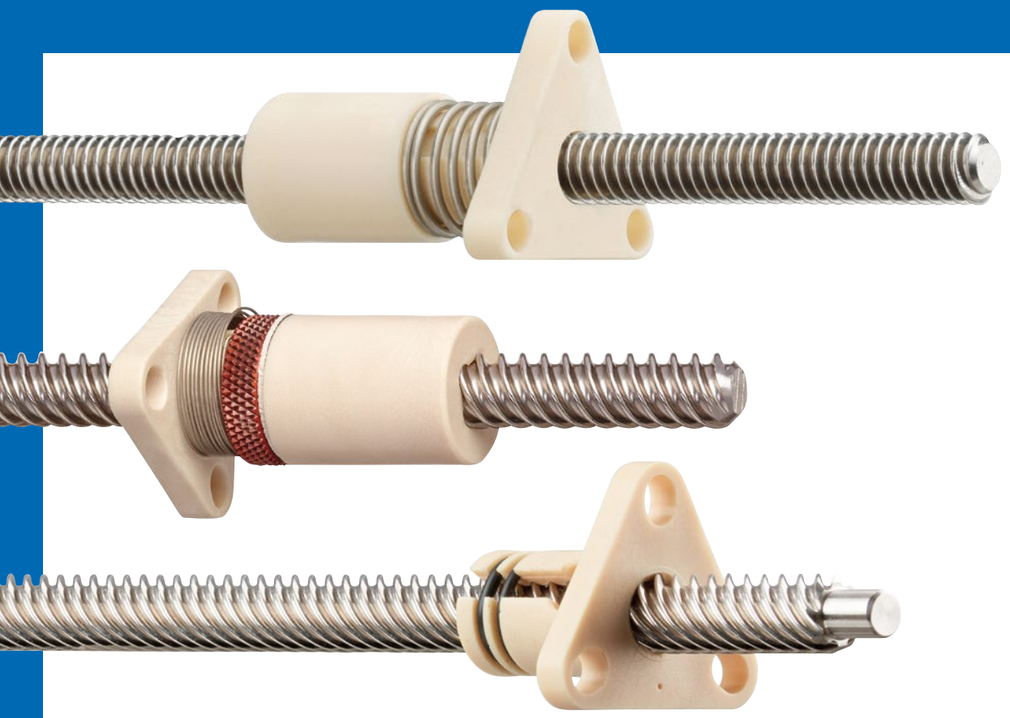
Success for the customer: "The igus® components used are quiet, clean, lubrication and maintenance-free and we have been using them for more than ten years without complaints. The decision to rely on igus® is based not only on the excellent products, but also on the high level of commitment. The people in charge at igus® were always very committed, interested, customer-oriented, and ready to try out new things, constantly trying to find a solution together with us. This impressed us from the very beginning, and I can say today that the cooperation is truly exemplary. I am already looking forward to the next ten years", concludes Raja Dravid.

Problem
The training robots are self-learning systems that adapt to the specific needs, fitness level and progress of each user. The training experience is completely digitised and cloud-based. "The original idea was to simulate the interaction of humans with their environment. 80-year-old people can easily jump over a garden fence in our simulation. They can't do that in the real world. ddrobotec promotes physical and cognitive fitness in a fun and motivating way, and there is nothing like it in the world", states Raja Dravid, CDO of ddrobotec. The core of the soft-robotic training robot is a pneumatic muscle, which generates this variable force and dynamics on the two pedals. High-precision sensors and real-time visual feedback enable accurate measurement of coordination, strength, speed and endurance. Another important point for the quality of the "made in Switzerland" training robots is a maintenance-free and absolutely safe system. [...] "At first I was a little sceptical about replacing our bronze nuts, metal ball bearing guides and brass parts with plastic components. [...]" says Raja Dravid.

Solution
A solution was sought for the plain bearings - without oil and constant lubrication - as dirt, dust and contaminants constantly collected here. [...] "We then replaced more and more plain bearings and nuts with igus® components. This even went so far that we made design changes so that we could switch the entire bearing technology to igus® products", says Raja Dravid. A decisive advantage is that the igus® products not only work without maintenance and lubrication, but are also robust and durable. In both training robots, lead screws, shafts, energy chains and linear guides from igus® are used in addition to the aforementioned plain bearings and lead screw nuts. [...] Two lead screw systems with a linear guide are used for seat adjustment and for an additional safety feature. "In the drylin® W profile guides, the rails are made of hard-anodised aluminium, which ensures the best friction and wear results for profile guides. The lack of lubrication makes the profile guide system extremely resisitant to dirt and its cleanliness also makes it suitable for applications in clean and hygienic environments such as in hospitals and rehabilitation facilities," explains Axel Ebert.

dryspin® lead screw technology

Low-clearance lead screw nuts

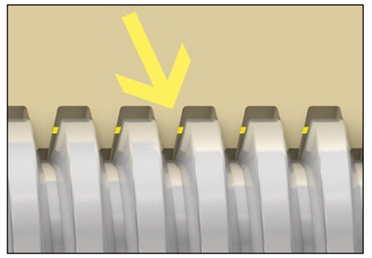


Consistent minimum axial clearance for high positioning accuracy

In addition to the axial clearance caused by the manufacturing tolerances, the application-specific influences must also be taken into account (thermal and hygroscopic environmental influences). Our backlash-reducing lead screw nuts impress with minimal axial clearance and maximum positioning accuracy.

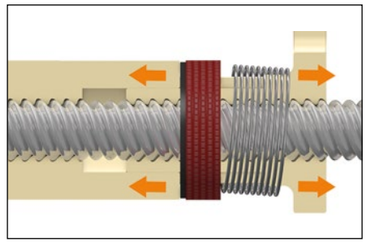
- Consistent minimum axial clearance for high positioning accuracy
- PL variant as a cost-effective alternative to the ZB lead screw nut due to fewer components and injection moulding production process.
- Reduced axial clearance due to various preload mechanisms
- No grease or oil in the lead screw drive

How exactly is axial clearance defined? What must we watch out for? And what possibilities does igus® offer for reducing axial clearance?



The axial clearance describes the lost motion, i.e. the "dead travel" on the lead screw, or in other words the gap between the thread flanks of the lead screw and the lead screw nut. The term clearance is often used in general. In this context, the correct technical term is axial clearance. It outlines the movement of the lead screw nut in the axial direction without movement of the lead screw. Lead screw drives require a minimum clearance to maintain their function. If the axial clearance is too small, the torque required to move the lead screw nut will also increase.

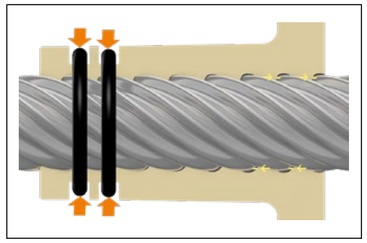
How does axial pre-load work?



Zero-backlash (ZB)
One of the most precise solutions is the ZB lead screw nut. It consists of several components and adjusts itself to the service life. The lead screw nut consists of a support nut, an adjusting ring with torsion spring, a friction disc and the axial element. With the help of the torsion spring, the pretension is brought into the lead screw system.

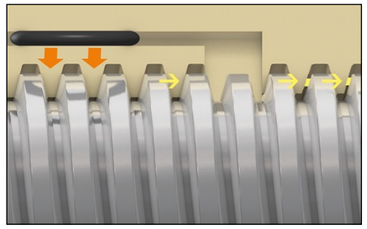
Pre-load (PL)
The new pre-load lead screw nut convinces with minimal axial clearance and highest positioning accuracy. It is the cost-effective alternative to zero-backlash and perfectly suited for small pitches. This is the proven preload principle from SHT-PL linear modules.

How does radial pre-load work?



Low clearance (LC)
Our LC lead screw nuts are all equipped with two elastomer O-rings. The functional principle is similar to the AB lead screw nut. However, with the help of the LC lead screw nut, a reduction in clearance can be achieved in this case. The O-rings apply a circumferential radial pretension to the thread system, pressing the flanks of the lead screw nut and the threads of the lead screw. This ensures a constant axial and radial pretension of the nut. The high operational smoothness and cost-effective purchase are further advantages of the LC lead screw nut.

How does partial radial pre-load work?



Anti-backlash (AB)
Lead screw drives can generally produce noise and vibrations. In particular, long lead screws and great travel distances can cause self-induced vibrations in the sliding system. Due to their good sliding properties, lead screw nuts made from the tribologically optimised iglidur® materials tend to develop significantly less noise than conventional plastics or metals, such as bronze or brass. To reduce noise, a preloading mechanism is also an effective measure in addition to the right choice of material. In the case of the AB lead screw nut, an elastomer ring applies a force on an insert with a matching thread, which is pressed into the threads of the lead screw. It is important that this pretension is not present over the entire length and not all around. This ensures low axial clearance only in a small range. The functional principle of this lead screw nut differs significantly from that of the zero-backlash lead screw nut.

Low-clearance lead screw nuts

Low-clearance lead screw nuts
Axial pretension

DST-JFRM-ZB-0001-DS□X□
Lead screw nut with flange, dryspin® thread, zero-backlash

Thread geometry	**dryspin®**
Max. static axial load	**75-500N**

DST-JFRM-PL-0001-DS□X□
Lead screw nut with flange, dryspin® thread, pre-load

Thread geometry	**dryspin®**
Max. static axial load	**30-40N**

DST-RFRM-PL-3D-01-DS□X□
Lead screw nut with flange, round flange, 3D printer replacement range

Thread geometry	**dryspin®**
Max. static axial load	**144N**

DST-RFRM-PL-3D-02-DS□X□
Lead screw nut with flange, flange with spanner flat, 3D printer replacement range

Thread geometry	**dryspin®**
Max. static axial load	**192N**

Low-clearance lead screw nuts
Radial pretension

DST-JFRM-LC-0001-DS□X□
Lead screw nut with flange, dryspin® thread, low-clearance

Thread geometry	**dryspin®**
Max. static axial load	**40-125N**

JFRM-LC-0001-TR□X□
Lead screw nut with flange, trapezoidal thread, low-clearance

Thread geometry	**TR**
Max. static axial load	**75-125N**

JFRM-LC-0001-TR□X□
Lead screw nut with flange, multi-start trapezoidal thread, low-clearance

Thread geometry	**TR**
Max. static axial load	**40-125N**

Low-clearance lead screw nuts
Partial radial pretension

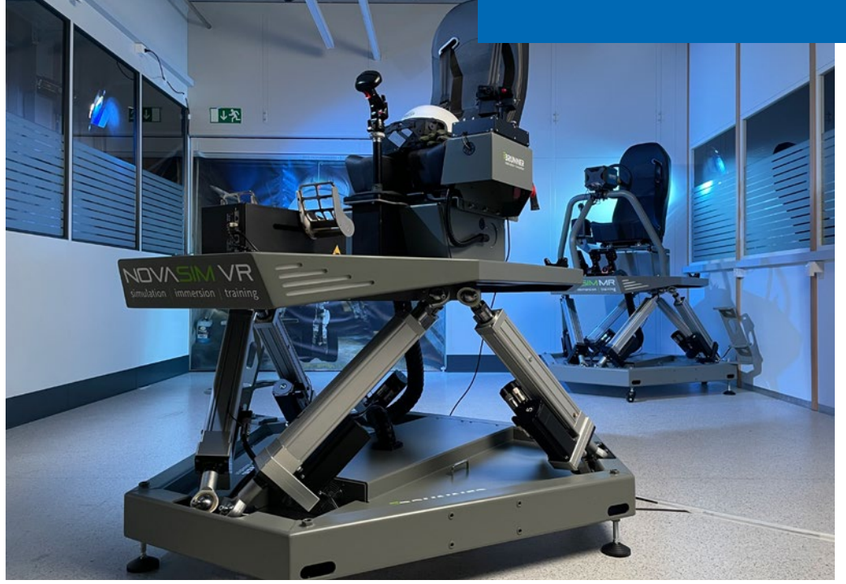
xSRM-AB-□-TR□X□
Cylindrical AB lead screw nut to reduce vibrations

Thread geometry	**TR**
Max. static axial load	**683-4,863 N**

xFRM-AB-□-TR□X□
AB lead screw nut with flange to reduce vibrations

Thread geometry	**TR**
Max. static axial load	**683-4,863 N**

The max. static axial load is a recommended load limit at which the spring effect is still guaranteed.



Precise adjustment for flight simulation of helicopters, jets, drones, etc., with the help of zero-backlash lead screw nuts

Profile
What was needed?
A zero-backlash lead screw nut with matching lead screw from dryspin®

Requirements:
Quiet travel, minimal nut and lead screw clearance, quiet and vibration-free operation even under load, lubrication-free and maintenance-free

Industry: Aerospace

Success for the customer:
"The use of dryspin® lead screw technology has significantly improved the entire behaviour of the drive, from the feel and noise level to the extremely clean and quiet operating behaviour," says Thomas Brunner, Head of Mechanical Engineering at BRUNNER Elektronik.

Reliable lead screw technology for a precise and sensitive joystick control system

Improved motion sequences for the flight simulation of helicopters, jets, drones and the like.
"Simulation products from Brunner include our powerful and innovative control loading systems, which are becoming key success factors as drop-in devices across the entire spectrum of modern flight simulation applications, and our simulation components, which we develop and manufacture for the flight simulation of jets, airliners, helicopters and, most recently, drones," reports BRUNNER. The dryspin® lead screw technology supports its movements and offers a more precise and sensitive solution than the used metal alternative.

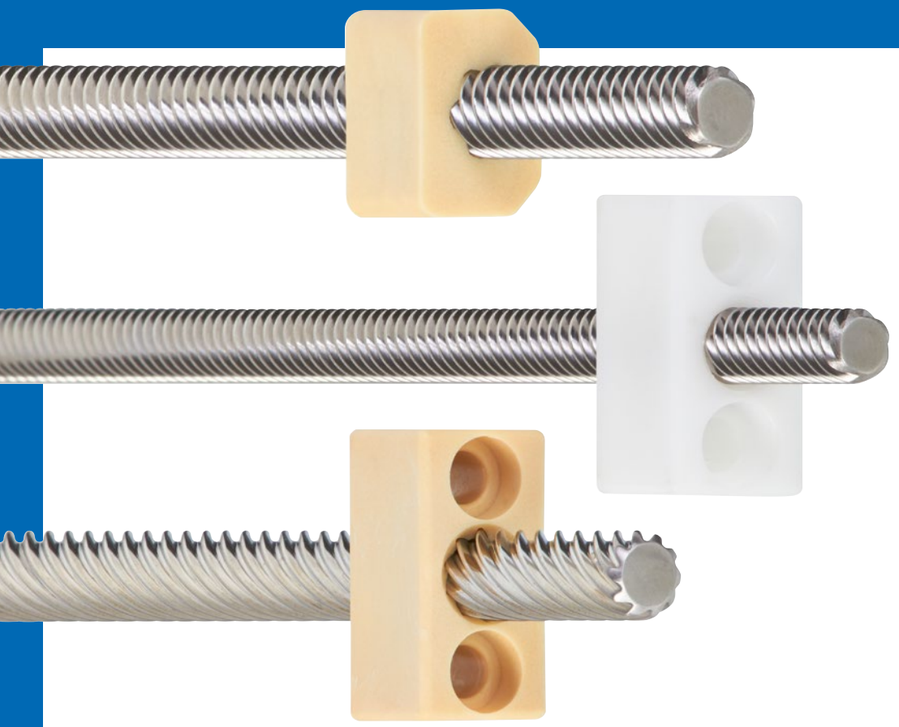
Problem
"We use metal recirculating ball screws for our joystick. They were relatively expensive, noisy and the behaviour of the lead screw was never 100 percent satisfactory for us. We have been working successfully with igus® for over 20 years, and when Axel Ebert visited us again, he presented a new igus® lead screw with a new type of lead screw nut. He raved about the many advantages of the system at the time, so we tested it a short time later - and what can I say, we were thrilled from the start!", recalls the Head of Mechanical Engineering. The specifications and geometries of the lead screw technology, which are matched to the plastic nut and lead screw, guarantee efficiency levels of up to 82 per cent and a service life that is up to 30 per cent longer than conventional lead screw drives. Axel Ebert, Key Account Manager for Bearing Technology at igus® Switzerland, explains: "The rounded tooth flank geometry reduces the contact surface between the lead screw and lead screw nut, which means that the threaded systems run almost noiselessly and vibration-free under load." However, the special requirement of reducing the clearance of the nut still had to be solved.

Solution
The solution: the zero-backlash lead screw nut. A preload mechanism has proven to be an effective measure for reducing unwanted axial clearance. The zero-backlash lead screw nut proposed by Axel Ebert is also used here. It is specially designed for fast and efficient applications and consists of a support nut, an adjusting ring with torsion spring, a friction disc and the axial element. "The joystick uses two lead screws. With the ball screw used in the past, the two bearing sides had to be exactly aligned in order to guarantee smooth operation of the lead screw. Not so with the igus® lead screw, which has a fixed bearing at the bottom and a floating bearing with some clearance at the top thanks to an iglidur® plain bearing. As a result, we achieve a much higher degree of efficiency and a much better feel during the movements," states BRUNNER and Ebert adds: "effective alternative to used are an igus® standard catalogue item. The lead screws themselves are manufactured by us according to BRUNNER's requirements and drawings."

Low-noise and low-vibration lead screw drive

dryspin® lead screw technology

Linear module lead screw nuts



Lead screw nuts for SHT and SLW linear modules

Lead screw nuts are available in a number of materials for a wide range of application areas. Whether dry or wet, high or low temperatures, food-compliant or hygiene-sensitive areas, almost anything is possible with the igus® materials. The lead screw technology is also available in a wide variety of geometries to ensure simple 1:1 replacement. This means that all wear components can be easily replaced in the linear module and selected specifically for the application.

- Smoother operation thanks to tighter manufacturing tolerances and rounded tooth geometries
- Cost-effective production with injection moulding
- Ongoing test program in the in-house test laboratory
- No grease or oil in the lead screw drive and long-lasting use due to asymmetry

Linear module lead screw nuts

Linear module with dryspin® lead screw in a special measuring setup from Art Robotics

Benefits
- Efficient and durable dryspin® threads and high helix threads
- Self-locking trapezoidal and metric threads
- Maintenance-free dry operation
- Quiet
- Corrosion-free
- Resistant to dirt

Typical application areas
- Format adjustments
- Drive technology
- Optical equipment
- Furniture industry
- Automotive industry

The lead screw drive is one element of the drive systems. The linear movement of the moving body is generated by a rotating lead screw and transmitted to the lead screw nut. So it is a rotary movement converted into a linear motion.

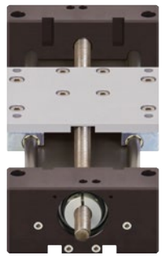
drylin® linear axes with lead screw drive are designed for positioning tasks of all kinds. The linear adjustment takes place via trapezoidal lead screws of different sizes or via high helix lead screws, which can be set in motion either manually or electrically. The max. travel speed is up to 1.6m/min, depending on thread and load. Stroke length is freely selectable for any linear drive system. A plain-bearing-mounted lead screw has a maximum stroke of 1,500mm, a ball-bearing-mounted one 1,000mm.

Our lead screw axes at a glance

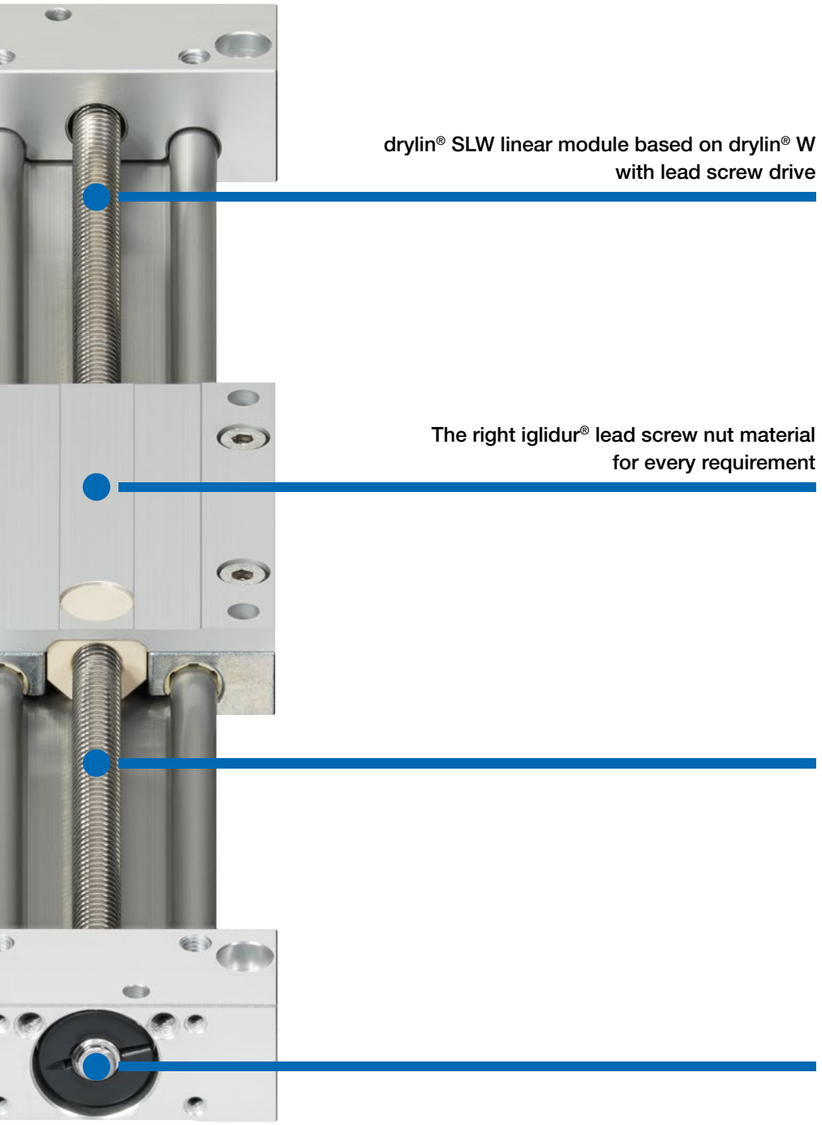
Linear axes SHT
- Drive: trapezoidal or high-helix lead screw
- Lead screw drives with plain ball bearings
- Lead screws made from steel, stainless steel or aluminium
- Carriage in either quad block or compact design
- Configurable online

SLW linear axes
- Linear axes based on drylin® W guides
- Drive: Trapezoidal or high helix lead screw
- Torsion-resistant double shaft systems
- Many carriage and rail options
- Manual and motorised adjustments possible

SAW linear axes
- Linear axes based on drylin® W guides
- Drive: Trapezoidal or high helix lead screw
- Robust design
- Ready-to-install with stepper or DC motors
- Ball bearing



Linear module lead screw nuts



drylin® SLW linear module based on drylin® W with lead screw drive

The right iglidur® lead screw nut material for every requirement

dryspin® lead screw in the guidance for TV lift
What was needed: A maintenance-free, vibration-resistant and durable motorised TV lift
Requirements: Limited installation space, no vibrations at a stroke of 500mm despite the weight of around 7.5kg of the 32-inch screen, long service life, quiet operation, simple installation

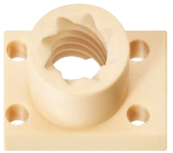
Linear module lead screw nuts

DST-SHT-1210-□-□-□
Lead screw nut for linear modules SHT-12

Thread geometry	**dryspin®**
Direction of rotation	**RH, LH**

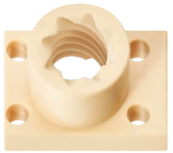
SHT-1210-□-□-□
Lead screw nut for linear modules SHT-12

Thread geometry	**TR**
Direction of rotation	**RH, LH**



DST-SHT-2018-□-□-□
Flange lead screw nut for SHT-20 linear modules

Thread geometry	**dryspin®**
Direction of rotation	**RH, LH**



SHT-2018-□-□-□
Flange lead screw nut for SHT-20 linear modules

Thread geometry	**TR**
Direction of rotation	**RH, LH**

SLW-25120-□-□-□
Lead screw nuts for linear modules SWZ-0630 left-hand thread

Thread geometry	**TR**
Direction of rotation	**RH, LH**

DST-SLW-063001-□-□-□
Lead screw nut for linear module SLW-0630

Thread geometry	**dryspin®**
Direction of rotation	**RH, LH**

SLW-063001-□-□-□
Lead screw nut for linear module SLW-0630

Thread geometry	**TR**
Direction of rotation	**RH, LH**

DST-SLW-1040-□-□-□
Lead screw nut with locating spigot for linear module SLW-1040

Thread geometry	**dryspin®**
Direction of rotation	**RH, LH**

SLW-1040-□-□-□
Lead screw nut with locating spigot for linear module SLW-1040

Thread geometry	**TR**
Direction of rotation	**RH, LH**

DST-SLW-1660-□-□-□
Lead screw nut with locating spigot for linear module SLW-1660

Thread geometry	**dryspin®**
Direction of rotation	**RH, LH**

SLW-1660-□-□-□
Lead screw nut with locating spigot for linear module SLW-1660

Thread geometry	**TR**
Direction of rotation	**RH, LH**

DST-SLW-2080-□-□-□
Lead screw nut with locating spigot for linear module SLW-2080

Thread geometry	**dryspin®**
Direction of rotation	**RH, LH**

SLW-2080-□-□-□
Lead screw nut with locating spigot for linear module SLW-2080

Thread geometry	**TR**
Direction of rotation	**RH, LH**

dryspin® lead screw technology

Special types

Our lead screw nut solutions for special requirements

What do our special types such as an angle-compensating lead screw nut with spherical ball, a lead screw nut with quick-release mechanism or a split lead screw nut have in common? They are all lubrication-free and maintenance-free!

- Smoother operation thanks to tighter manufacturing tolerances and rounded tooth geometries of the dryspin® geometry
- Cost-effective production with injection moulding
- Components tested in the igus® laboratory
- Lubrication and maintenance-free

Special types

Special types

JTRM-☐
Split lead screw nuts with anti-rotation feature by means of DIN934 nut

Thread geometry	**TR**
Material	**iglidur® J**

RGAS-JTRM-☐
Alternatively available with housing block and circlips

Thread geometry	**TR**
Nut material	**iglidur® J**

JFRKM-EFOM-☐
Spherical lead screw nuts with spherical ball in flanged bearing housing

Thread geometry	**dryspin®**
Spherical ball material	**iglidur® J**

JFRKM-EFOM-☐
Spherical lead screw nuts with spherical ball in flanged bearing housing

Thread geometry	**TR**
Spherical ball material	**iglidur® J**

JFRKM-ESTM-☐
Spherical lead screw nuts with spherical ball in pillow block bearing housing

Thread geometry	**dryspin®**
Spherical ball material	**iglidur® J**

JFRKM-ESTM-☐
Spherical lead screw nuts with spherical ball in pillow block bearing housing

Thread geometry	**TR**
Spherical ball material	**iglidur® J**

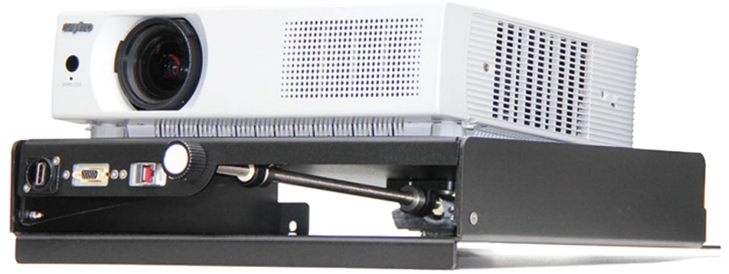
FTRM-FF-10x2
Trapezoidal lead screw nut with flange housing, Fast Forward quick-release fastener, iglidur® J

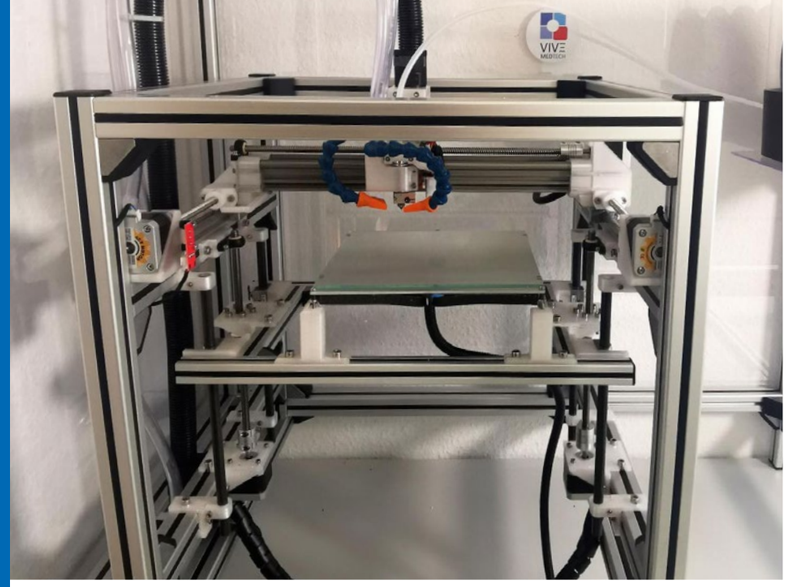
Thread geometry	**TR10x2**
Direction of rotation	**RH**

JDRM-☐
drylin® lock disc

Thread geometry	**TR**
Direction of rotation	**RH**

The setting up angle adjustment: Set in no time at all
The company easybeam was looking for cost-effective products that would allow for a smooth adjustment of the tilt angle of projectors in their MultiMedia design furniture. The application should be completely lubrication and maintenance-free. In addition, the adjustment of the tilt angle should be quiet in order to support the user-friendliness of the projector.





Precise, reliable cleanroom 3D printer for processing thermoplastics.

Processing thermoplastics with the VIVECube - Clean Precision

Cleanroom 3D printer

Go to application
VIVE-MedTech GmbH develops and produces customisable and user-centred medical devices. The product range extends from surgical instruments and catheters to artificial lungs for use during temporary lung replacement therapy. The products must fulfil high safety and performance requirements, in particular in terms of cleanliness and purity from foreign substances. VIVE-MedTech uses a 3D printing production system developed in-house in a cleanroom: the VIVECube - Clean Precision is a precise and reliable cleanroom 3D printer for processing thermoplastics.

Requirements:
Absolutely lubrication-free and maintenance-free, long service life, suitable for cleanrooms, no abrasion, cost-efficient

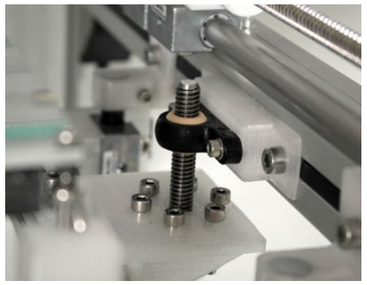
Products used:
Simple encapsulated stepper motors with coupled dryspin® high helix lead screws and flange lead screw nuts with spanner flat made of iglidur® A180, stepper motors with coupled trapezoidal lead screws and flange lead screw nuts made of iglidur® A180, igus® WSX double rail, drylin® W single rails, drylin® R aluminium shafts, igubal® pillow block and flange bearings, xiros® radial deep groove ball bearings

Success for the customer:
Design freedom was gained on all linear guides by utilising the drylin® bearings with replaceable liners. This significantly accelerated the VIVECube – Clean Precision design process. The liners effectively prevent unwanted particle release while providing process stability. There were other advantages from using suitable rail and shaft guides for system implementation. The use of high helix and trapezoidal lead screws with high efficiency for all drive axes was the solution to the VIVECube - Clean Precision's cleanroom capability problem. It was the only suitable solution for low-abrasion linear drives.

Which solutions from igus® are used?
X-axis plain bearing: an igus® WSX double rail is used here as the "bridge axis". This offers very good flexibility and stiffness for our application. A bespoke designed carriage with drylin® fixed and floating bearings and liners made of iglidur® A180 runs on the rail.
Y-axis plain bearings: drylin® W single rails run parallel on both sides of the bridge axis. On each of them, a bespoke-designed carriage with drylin® fixed and floating bearings and iglidur® A180 liners are also used.

Z-axis plain bearings: Four parallel drylin® R aluminium shafts are used for robust printing platform guidance. The printing platform is guided with a bespoke-designed carriage featuring drylin® fixed and floating bearings and iglidur® A180 liners on the shafts.

X/Y drive train: Simple encapsulated stepper motors with coupled dryspin® high helix lead screws are used both on the bridge axis in the X direction and on both parallel individual rails in the Y direction. The carriage of the X-axis as well as both parallel carriages of the Y-axis are then driven with matching dryspin® flange lead screw nuts with spanner flat made of iglidur® A180. The high helix lead screws are each guided at the end by means of igubal® pillow block and flange bearings.



Spherical equalisation despite linear movement

Z drive train: Two synchronously running encapsulated stepper motors with coupled trapezoidal lead screws are also used to raise and lower the printing platform. The printing platform is driven by means of a matching flange lead screw nut made of iglidur® A180.

Filament guide on the print head:
A xiros® radial deep groove ball bearing made of xirodur® B180 is used as a contact pressure element on the filament feed of the print head.

Threads and high helix threads with dryspin® technology

Individually adjustable lifting floors in floating systems

The dryspin® lead screw technology enables the water level to be changed smoothly at the touch of a button

Profile

What was needed?
Plain bearings, linear guides, lead screws and lead crew nuts

Requirements:
Chlorine resistance, weather resistance, low wear and maintenance, reliability and precision

Sector: Furniture construction and industrial design

Success for the customer:
Savings of approx. €30,000 and 1kg of lubricant per system compared to previously used gearboxes. In addition, a flawless appearance of the luxury product is guaranteed.

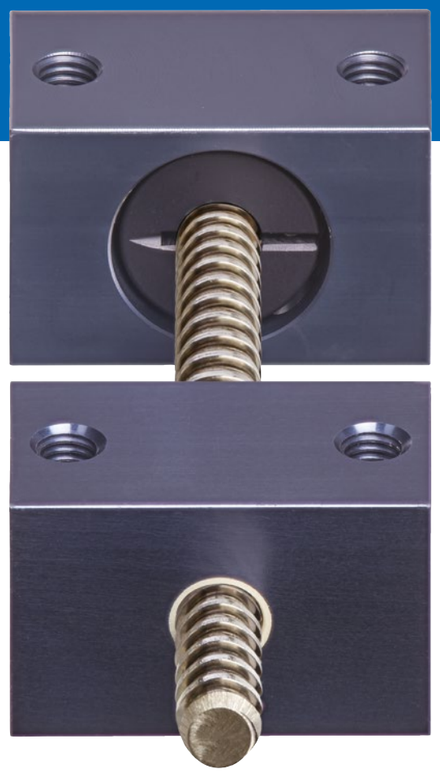
Changing the water depth at the push of a button: adjustable lifting floors for swimming pools with an integrated counter-current system is built by the Conmag Engineering GmbH from Austria. Since the entire mechanism is under water and is very difficult to access, all bearings must be maintenance-free and as low-wear as possible.

Problem
The components of the lifting floors are constantly in contact with chlorinated water and must be weather-resistant. Direct contact with the end user means that reliable as well as safe operation is essential to prevent injuries or damage to the system. As this is a luxury product, a flawless appearance also plays a decisive role. When lowering the lifting floor from the maximum vertical position, the aim is to minimise the forces resulting from water displacement in order to ensure a sustainable design without jeopardising the stability of the system. In addition, the constant use under chlorine water places the highest quality demands on components and materials. There are also numerous restrictions during installation due to work in the visible area or subsequent integration into existing systems.

Solution
Vertically adjustable lifting floors with thermal insulation effect for swimming pools: the aim of this development in swimming facilities with integrated counter-current systems so that the pool depth can be individually adjusted. This makes it possible to use the pool surface as a terrace extension when raised and to adjust the water depth for non-swimmers to a depth of 1.5 metres as required. In addition, the lifting floor is fitted with 10cm of insulating material on the underside, thereby drastically minimising heat loss and the energy requirements of the system. In this task, which at first glance appears simple, constant compliance with the permissible gap dimension between the mobile floor unit and the stationary inner pool, which must not exceed 8mm, poses a special challenge when the pool size increases, as the water pressure increasingly deforms the pool walls, which are predominantly made of polypropylene. For this reason, the core competence to be developed is to design a linear movement of the lifting floor that is as continuous, precise and particularly reliable as possible.

Individual adjustment of the pool depth

Accessories



Lead screw support blocks and lead screw nut holders for every thread dimension

Lead screw support blocks: the plastic blocks with a metallic clamping ring and iglidur® plain bearings as a fixed bearing version are 1:1 identical to metallic bearing blocks. In addition, they are up to 60% more cost-effective and 80% lighter compared to conventional metal lead screw support blocks. Lead screw nut holder range for iglidur® standard lead screw nuts: connect the lead screw nuts from above with the lead screw nut holder using the screws supplied. One holder can be used for different thread pitches and therefore offers almost endless combination possibilities.

- Easy to replace - connection compatible with standard metallic solutions
- Variable design for all threads in various sizes - everything from a single source
- Components tested in the igus® laboratory
- Lubrication-free and maintenance-free operation

Accessories

Accessories

MHM-2835-AL-☐-☐ / MHM-3244-AL-☐-☐
Complete lead screw nut housing, including screws, can be fixed from above

Suitable for	**FRM-2835/FRM-3244**
Design	**With lead screw nut**

MHM-ZB-0810-AL-☐-☐
Complete lead screw nut housing, including screws, can be fixed from above

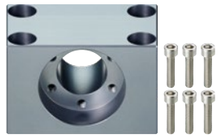
Suitable for	**Zero-Backlash**
Design	**With lead screw nut**

MHM-1210-AL-☐-☐
Complete lead screw nut housing, including screws, can be fixed from above

Suitable for	**SHT-1210-TRM**
Design	**With lead screw nut**

MHM-2018-AL-☐-☐
Complete lead screw nut housing, including screws, can be fixed from above

Suitable for	**SHT-2018-TRM**
Design	**With lead screw nut**



MH-2835-AL / MH-3244-AL
Complete lead screw nut housing, including screws, can be fixed from above

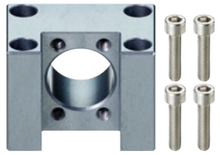
Suitable for	**FRM-2835/FRM-3244**
Design	**Without lead screw nut**

MH-ZB-0810-AL
Complete lead screw nut housing, including screws, can be fixed from above

Suitable for	**Zero-Backlash**
Design	**Without lead screw nut**

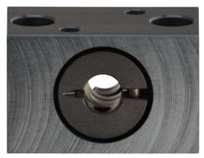
MH-1210-AL
Complete lead screw nut housing, including screws, can be fixed from above

Suitable for	**SHT-1210-TRM**
Design	**Without lead screw nut**



MH-2018-AL
Complete lead screw nut housing, including screws, can be fixed from above

Suitable for	**SHT-2018-TRM**
Design	**Without lead screw nut**



SLS-S☐-BB
Lead screw support block, fixed bearing with threaded metal ball bearings

Clamping ring	**Without thread**
Max. static axial load	**150-1,500 N**

SLS-☐x☐-LL
Lead screw support block, floating bearing with iglidur® plain bearings

Clamping ring	**–**
Plain bearing material	**iglidur® J**

SLS-S☐-LL
Lead screw support block, floating bearing with iglidur® plain bearings

Clamping ring	**–**
Plain bearing material	**iglidur® J**

Accessories

SLS-□x□-FL
Lead screw support block, fixed bearing with metal clamping rings without thread

Clamping ring	**With thread**
Max. static axial load	**700-2,500 N**

SLS-S□-FL
Lead screw support block, fixed bearing with threaded metal ball bearings

Clamping ring	**Without thread**
Max. static axial load	**700-2,500 N**

SLS
Lead screw support block, fixed bearing with metal ball bearings without thread

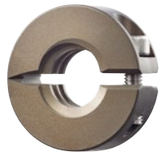
Clamping ring	**With thread**
Max. static axial load	**350-1,500 N**

SLSP-S□-FL
Moulded lead screw support block, fixed bearing with metal clamping ring

Clamping ring	**Without thread**
Max. static axial load	**150-350N**

SLSP-S□-LL
Moulded lead screw support block, floating bearing with iglidur® J plain bearings

Clamping ring	**–**
Plain bearing material	**iglidur® J**



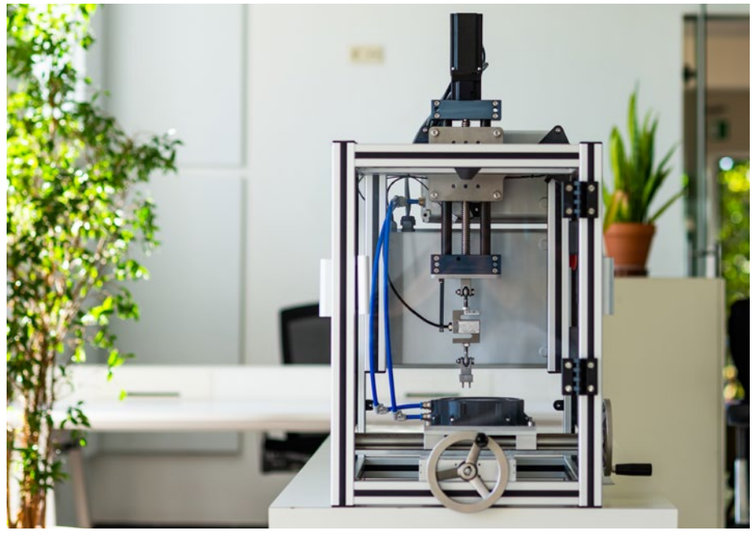
CRR-01-□
Clamping rings, right-hand thread, CRR

Outer diameter	**8-24mm**
Thread geometry	**TR**

KRM-S□-V
Clamping rings, without thread, KRM

Outer diameter	**10-24mm**
Pitch	**Without thread**

Special measurement setup



Compact, ergonomic table system

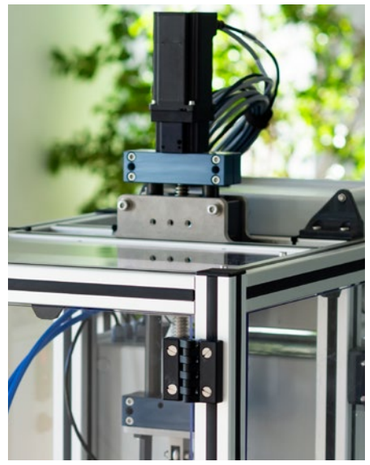
What was needed?
Two different lead screw axes, motor and motor control system
Requirements:
Innovative, cost-effective and, above all, customised solutions are needed for research and development in the field of sustainability. Furthermore, the solution had to be suitable for cleanrooms
Industry:
Robot
Success for the customer:
In combination with the motor and control system, our lubrication-free lead screw axes ensure a cost-effective turnkey solution.

Art Robotics is a Belgian tech start-up active in the fields of robotics, IoT and AI. The company would like to act sustainably and use modern technology, e.g. for robotic solutions in energy and recycling technology. The company was commissioned to develop a new measuring system for their customer Unimore. You can read about the special features and challenges of this in this application report.

Problem
Belgian company Art Robotics uses smart technology to create, sustainable solutions for the energy and recycling industries. The core competencies are in the areas of robotics, IoT and AI. Art Robotics faced a special challenge with one of their customers called Umicore. Umicore is a leader in circular materials technology, producing materials for high-performance optoelectronic, photovoltaic and electronic devices. The company's R&D department is constantly looking for new methods to offer cost-effective materials with the same quality, lightweight and less waste. In order to support these innovation processes, new measurement systems and tools for wafers are needed. The problem: these are not available off the peg and have to be developed from scratch. An experienced partner is needed who develops innovative, turnkey solutions quickly and cost-effectively. Furthermore, the system had to function in a cleanroom environment.

Solution
Art Robotics developed a completely new solution with the help of the igus® components. All components, e.g. the lead screw axes, the motor and the motor control system were integrated into a complete system that was able to meet the customer's requirements. The result is a special measurement setup for quantifying the specifications of wafers. The system, which consists of parts from igus® drive technology, among others, can handle very thin next-generation wafers (< 200µm) as well as apply high forces in a controlled manner and provide accurate measurements. The plug-and-play software with a special graphical user interface, in combination with the D1 motor control system, enables easy configuration and measurements. Since the measurements are carried out in a cleanroom environment, all components are suitable. It is a desktop system that is compact, ergonomic and safe to use.

Just like the products from igus® drive technology, the system is designed for modularity in order to expand its capabilities in the future.



Motor and motor control system are integrated into a complete system

motion plastics®