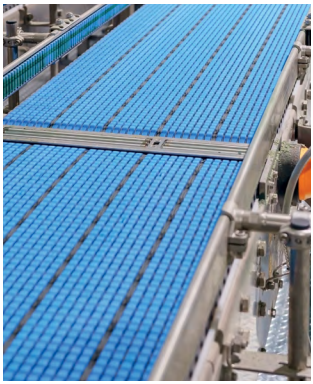
igus®

tech talk

igubal® split flange bearings as an efficient solution for conveyor systems



In production halls, where space is often at a premium, the maintenance and servicing of bearings is often associated with increased effort. A central element of many machines and systems is the shaft bearing. But what if this essential component becomes a bottleneck that is difficult to reach?

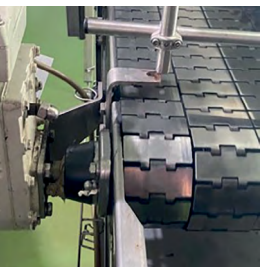
This is where igubal split flange bearings come into play. Developed for confined installation spaces and hard-to-reach areas, they set new standards in bearing technology. The split design not only enables time savings of up to 80% during installation, but also offers complete freedom from maintenance up to the wear limit thanks to its grease-free design. In an environment where 36% of machine failures are due to inadequate lubrication, this specification is invaluable as such failures can lead to costly production downtime, significantly impacting efficiency.

In addition, igubal spherical insert bearings made of tribologically optimized, high-performance iglide® polymers offer up to 12 times longer service life compared to conventional metallic solutions. Since there is no grease that dirt and dust can adhere to, the risk of premature bearing failure due to contamination is minimized. In addition, the vibration-damping specifications ensure quiet machine operation.

This Tech Talk provides detailed insights into the technical specifications of split flange mounted bearings as well as their practical advantages during installation and maintenance and the economic aspects. Read on to find out how split flange bearings can solve complex challenges simply and sustainably.

Application in conveyor belts

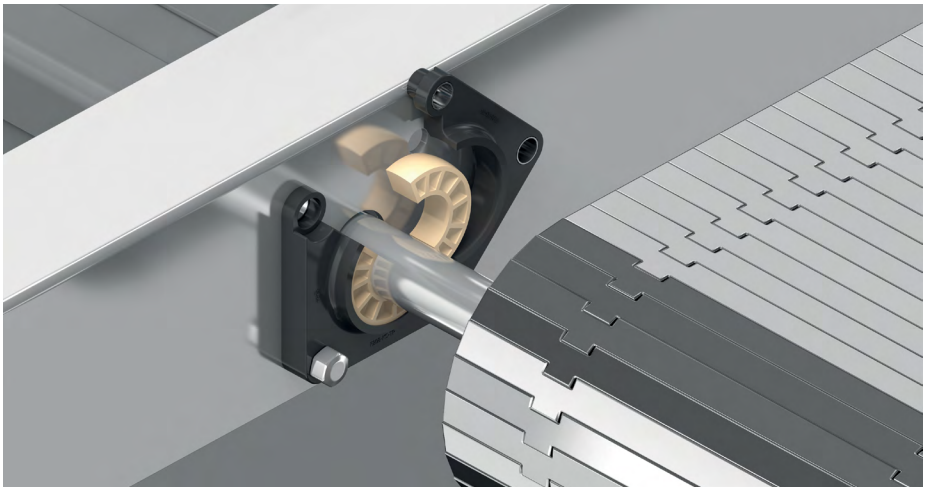
The maintenance and servicing of shaft bearings in conveyor belt systems is often a challenge. Bearing points that are difficult to access can be found in almost every conveyor belt — be it at the connection between the shaft and the motor, at bearings on the inside of the conveyor belt or at points that can only be reached by dismantling other components. The replacement of such bearings can be extremely time-consuming and complicated.



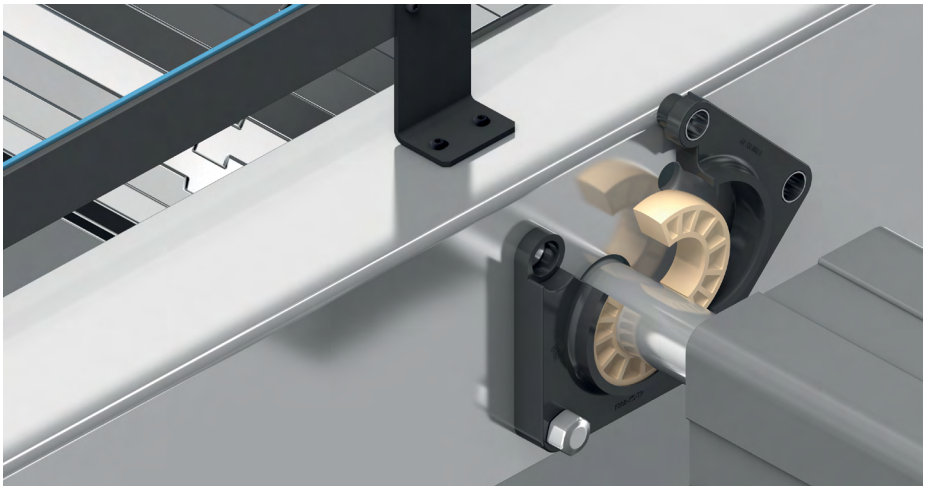
Source: igus

Learn more at www.igus.com/spherical-bearings/bolt-flange-bearings

Split spherical bearings offer an innovative solution here. In contrast to conventional one-piece bearing units, they consist of two pillow block and spherical insert bearing halves that are joined together around the shaft. This design enables particularly easy handling and quick installation. In addition, the hole spacing corresponds to that of F and FL housings, which ensures problem-free replacement.



Inside of a conveyor belt: Split bearings allow for quick replacement without dismantling the entire system; source: igus



Connection to the motor: The bearing can be easily replaced even in highly restricted installation spaces; source: igus

Technical specifications and features

The split flange mounted bearings consist of two main components: the housing and the spherical insert bearing. The materials used are resistant to corrosive environments and various chemicals, making them ideal for demanding industrial applications.

The housing is made of igumid G, while high-performance iglide polymers in the spherical insert bearings ensure grease-free dry operation and are characterized by high wear resistance, low coefficient of friction and low moisture absorption.

Housing material
igumid® G

The standard for igubal housing consists of a particularly impact-resistant, fiber-reinforced and durable polymer that can withstand temperatures from -40°C to 120°C (-40°F to 248°F) in the long term.

Source: igus

Spherical insert bearing material
iglide® J3

A material with excellent wear resistance at low to medium loads. It is characterized by a low coefficient of friction, good media resistance and low moisture absorption.

Source: igus

Spherical insert bearing material
iglide® H3

The material offers high wear resistance at high speeds as well as excellent temperature and media resistance. Suitable for belt speeds of up to 200rpm.

Source: igus

Learn more at www.igus.com/spherical-bearings/bolt-flange-bearings

Chemical resistance

Chemicals	Resistances	
	iglide® J3	iglide® H3
Alcohols	+	+
Greases, oils without additives	+	+
Hydrocarbons	+	+
Fuels	+	+
Strong alkalis	+ up to 0	+ to -
Strong acids	-	+ to -
Diluted alkalines	+	+
Diluted acids	0 to -	+ up to 0

+ resistant 0 conditionally resistant - non-resistant

Self-lubricating effect

igubal spherical insert bearings are equipped with embedded solid lubricants, eliminating the need for external lubrication. This results in several advantages:

Maintenance-free

Conventional metal bearings require regular lubrication, whereas igubal spherical insert bearings are maintenance-free thanks to the integrated solid lubricant.

Longer service life

Especially in heavily contaminated environments, the embedded solid lubricants significantly increase the load capacity and service life of the spherical insert bearings.

Grease-free

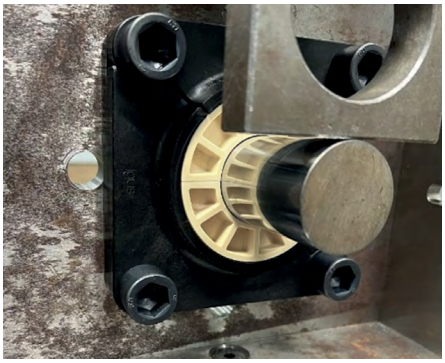
By dispensing with external lubricants, not only are costs for expensive lubricants reduced, but also maintenance time and labor costs. The risk of incorrect or insufficient lubrication is also eliminated.

Test laboratory and test methods

igus products are extensively tested and continuously optimized in the company's in-house 41,000-square-foot laboratory. Despite their lightweight design, the plastic solutions have a high load-bearing capacity.

The relevant loads for a spherical mounted bearing are radial and axial tensile or compressive forces. These are tested with a tensile testing machine, taking into account all possible installation situations.

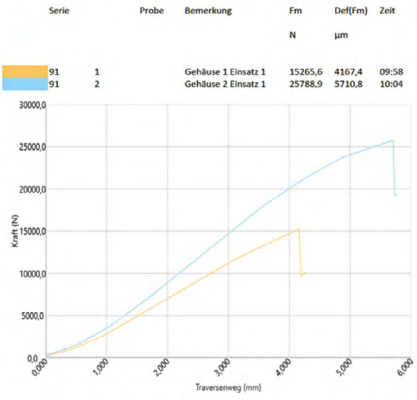
The diagram shows an example of the test setup for the radial compressive force on a split four hole flange bearing. The bearing is assembled on a holder with a suitable shaft. A fork is now used to press on this shaft from above until the bearing gives way. A force-displacement graph is recorded during the load, which records the reaction force over the traversal path of the tensile testing machine. The evaluation of this graph provides information about the strength and stiffness of the tested bearing.



Test on a 3D-printed split four hole flange bearing; source: igus

Test on a 3D-printed split two hole flange bearing; source: igus

The force-displacement graph shows the results of tests on two split four hole flange bearings with different housing orientations. The orientation in which the separation of the two housing halves runs from top left to bottom right (housing 1 in the graph) corresponds to the structure in diagram 1. For the second orientation (housing 2 in the graph), the bearing is side-mounted so that the separation of the two bearing halves runs from bottom left to top right. The results show that the strength is significantly higher in the first orientation, but this is accompanied by a lower stiffness. The load data specified in the online shop and catalog are given with an additional safety margin to rule out failure during use.



Graph of the compression tests of the four hole flange bearing; source: igus

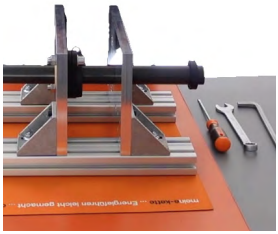
Learn more at www.igus.com/spherical-bearings/bolt-flange-bearings

Test laboratory and test methods

The housing halves are supplied with pre-assembled metal sleeves for the holes. When unassembled, the housing halves can be separated and assembled by hand.

Step-by-step installation instructions

1 Preparation



Provision of tools:
Ensure that all necessary tools and components are available. You will need the following for the installation of the flange bearing:

- Suitable tools for loosening and tightening the used screws

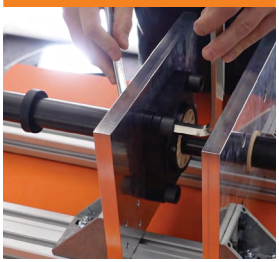
2 Installation of the housing

Positioning the housing halves:
Put the housing halves together on one side and place the housing around the shaft in the desired position.

Insert the fastening screws:
Insert the lower fastening screws into the holes provided and tighten them hand-tight.

Insert spherical insert bearing:
Place one of the spherical insert bearing halves in the lower housing half, the other over the shaft, and connect the two housing halves together.

3 Final assembly



Aligning the flange mounted bearing:
Align the flange mounted bearing with the holes and connect it to the machine component using screws.

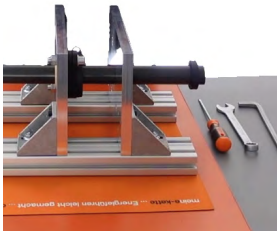
Tightening the screws:
Tighten all fastening screws to the specified torque.

Check alignment and fit:
Check that the bearing is correctly aligned and firmly seated.

tech talk

Step-by-step replacement instructions

1 Preparation



Provision of tools:
Ensure that all necessary tools and components are available. To change the bearing insert, you need:

- Suitable tools for loosening and tightening the used screws
- Slotted screwdriver

2 Installation of the housing

Loosen the screws:
First loosen all screws and then remove the two upper ones.

Open the housing:
Pry open the upper half of the housing with a slotted screwdriver and open the bearing.

3 Final assembly

Replace first half:
Remove one of the old spherical insert bearing halves and insert a new one instead.

Replace the second half:
Turn the new spherical insert bearing half downwards around the shaft. Then remove the second old spherical insert bearing half and place the second new spherical insert bearing half on the shaft.

Close the housing:
Now reconnect the two halves of the housing.

Tighten the screws:
Tighten all fastening screws to the specified torque.

Economic and ecological advantages

The introduction of igubal split flange mounted bearings offers significant economic advantages that reduce operating costs and considerably increase efficiency in maintenance and servicing:

Time-saving installation

The uncomplicated installation saves valuable working time, minimizes downtime, and increases machine availability. A practical example shows what this means for production: the increase in efficiency is clearly evident at a beverage manufacturer that produces around 55,000 bottles per hour.

Source: igus

	Conventional bearings	Split flange mounted bearings
Bottles per hour	55,000	55,000
Bearing change time (in min.)	240	48
Production loss (in bottles)	220,000	44,000
Contribution margin per bottle	$0.27	$0.27
Loss of production (in USD)	60,197.78	12,039.56
Savings through split bearing	**$48,158.22**	

Reduced spare parts costs

The longer service life of the bearings reduces the frequency of bearing changes and minimizes the need for spare parts. A good example of the savings is shown by a customer who removed machined igubal spherical insert bearings after seven years with a wear of just 0.4mm, whereas metallic bearings had to be replaced every seven months.

Dismantled JEM spherical insert bearing with a wear of **0.4mm after seven years operating at 80 hours a week** source: igus

	Conventional bearings	JEM Spherical insert bearings
Number of bearing positions	100	100
Acquisition costs of bearings	$3,283.52	$1,914.29
Number of changes in seven years	12	1
Total costs for bearings in seven years	$39,402.18	$1,914.29
Lubricant costs per year	$513.60	$0
Total costs for lubricants	$3,595.18	$0
Total costs over seven years	$42,997.36	$1,914.29
Savings over seven years	**$41,083.07**	

More efficient staff deployment

Maintenance-free solutions reduce the workload for servicing and lead to more efficient utilization of personnel.

	Conventional bearings	Split flange mounted bearings
Average time required per bearing	15 minutes	3 minutes
Time required for 600 bearing positions (in min.)	9,000	1800
Required number of persons	2	1
Time required per person (in hrs)	150	30
Annual time expenditure (in hrs)	300	30
Personnel costs per person ($49,515.41 / 2,080hrs)	$3,570.82	$714.16
Annual personnel costs	$7141.65	$714.16
Total personnel cost savings	**$6,427.48**	

These examples make it clear that the use of igus plastic solutions made of high-performance polymers offers enormous advantages, both for initial installation work and long-term maintenance costs due to extended service life.

Learn more at www.igus.com/spherical-bearings/bolt-flange-bearings

Economic and ecological effects due to grease-free and maintenance-free operation

The effects of grease-free and maintenance-free igus products on industry and the environment have been analyzed for the first time in an independent study by the Toolmaking Academy, a research company on the RWTH Aachen Campus. The calculations using the example of Heineken Brazil illustrate the benefits of injection-molded spherical insert bearings in conveyor belts.

	Conventional bearings	JEM-SP spherical insert bearings
Number of bearing positions	600	600
Maintenance requirements	Regular lubrication	Grease-free.
Lubricant requirement per bearing (in g)	4	0
Maintenance frequency (per year)	52	0
Total lubricant requirement (in kg/year)	124.8	0
Cost per kg for lubricant (in USD)	24.69	0
Annual savings through freedom from lubrication	**$3,081.57**	

Cost reduction through maintenance-free operation

	Conventional bearings	JEM-SP spherical insert bearings
Number of bearing positions	600	600
Maintenance requirements	Regular maintenance	Maintenance-free
Maintenance frequency (per year)	52	0
Maintenance time per lubrication point (in min.)	3	0
Annual savings through maintenance-free operation	**1,560 hours**	

Source: igus

If scaled to the more than 160 Heineken locations, this would result in the following annual savings:

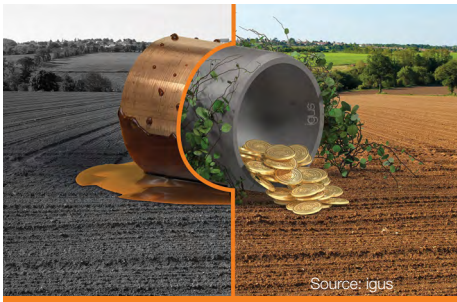
20 tons
of lubricant

$497,985
Lubricant costs

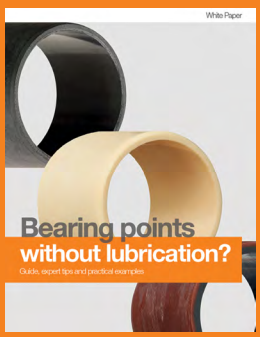
$5,975,829
Personnel costs

249,600 hours
for maintenance

28,814kg
CO2 equivalent


Source: igus

More facts, figures and data in the white paper:



Discover the split flange mounted bearings in the online shop:

- igubal flange mounted bearings

Learn more at www.igus.com/spherical-bearings/bolt-flange-bearings

Focus on core benefits

The split igubal flange mounted bearings offer a variety of advantages, which include both technical and economic aspects:

Up to 80% faster

The quick and easy installation enables a considerable reduction in installation time, even in hard-to-reach places or in confined installation spaces.

Reduced downtimes

The fast installation and longer service life of the bearing lead to increased machine availability and less downtime.

Grease-free

The integrated solid lubricants eliminate the need for external lubrication, saving time and money.

Maintenance-free

igubal bearings are maintenance-free over the entire service life, which minimizes maintenance costs.

Weight reduction

The plastic solutions are up to 40 % lighter than metal solutions. This leads to a reduction in the overall weight of the system.

Cost savings

The lower costs for maintenance, personnel and spare parts contribute to a significant reduction in costs.

No corrosion

iglide materials are resistant to corrosion, which extends the service life of the bearing.

Vibration damping

The bearings absorb vibrations and contribute to smoother running behavior and a reduction in operating noise.

Dirt repellent

Thanks to the grease-free design, no dust or dirt adheres to the bearings. This minimizes the risk of premature bearing failure.

Easy handling

Easier installation as no special tools are required.

Reduced risk of damage

Reduced risk of damage to neighboring machine components, as no dismantling of surrounding components is required.

Identical hole spacing

The hole spacing is identical to F- and FL-housings, which enables easy replacement.

Environmentally friendly

igubal bearings are recyclable and contribute to reducing the ecological footprint.

High chemical resistance

The materials are resistant to a wide range of chemicals - ideal for use in demanding environments.