Durobal®

UNIQUELY EFFECTIVE BEARINGS

CASE STUDIES

Durobal® rolling element bearings are ideally suited for use in a wide variety of industries and applications. Trelleborg Sealing Solutions has already helped thousands of customers to achieve their goals through innovative thinking and in-depth knowledge.

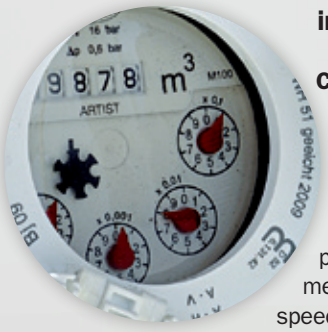
Medical – Bearings to rotate MRI machine

Challenge:
Magnetic Resonance Imaging (MRI) equipment is used to make images of soft body tissues. Included in the design of a major MRI maker's equipment was a table with a 360-degree range of motion. Because it operates in a very strong magnetic field, the table's ball bearing had to be completely non-metallic.

Solution:
Trelleborg Sealing Solutions proposed a custom Durobal®. The two bearing roller elements were mounted in a flanged housing. Unique features of this design include low friction, self-lubrication and zero maintenance.

Result:
The custom Durobal® design allows the table to move in/out and laterally on the machine's bearing surface. This smooth table movement provides added comfort and extra security to the patient during MRI procedures. In addition, since the bearing is made entirely of thermoplastics and glass, problems with magnetic interference were eliminated.

Service Conditions:
- Atmospheric pressure
- Climate controlled facility +22°C/ +72°F
- 0.008 m/s/ 1.5 fpm
- Non-metallich



industrial/chemical process – Liquid meter

Challenge:
Several challenges had to be overcome in this application. Bearings in this turbine meter were overly complex and were causing service problems. Liquid product flow had to be dependably measured, regardless of volume or speed of flow. These components operate in, and must be compatible with, diesel fuel, gasoline, kerosene, other hydrocarbons and water.

Solution:
Trelleborg Sealing Solutions proposed a custom Durobal®. The two bearing roller elements were mounted in a flanged housing. Unique features of this design include low friction, self-lubrication and zero maintenance.

Result:
Durobal® is self-lubricating, so grease was no longer required. Low frictioncharacteristics helped to increase efficiency and therefore the accuracy offluid flow readings. The new configuration was cleaner, weighed less andwas more sensitive, making it more operationally efficient.

Service Conditions:
- 1.4 MPa/ 200 psi Hydrostatic
- Light load
- +66°C/ +150°F maximum
- 180 rpm
- Various chemicals

UNIQUE SUPPORT:

With over 50 years of experience and several thousand individual customer projects completed, we at Trelleborg Sealing Solutions are experts in the specification and design of bearings and seals. Many customers approach us at concept stage with their design envelope and operational requirements, relying on us to propose the optimum bearing or sealing configuration. We can also assist with existing component designs, value engineering them to maximize operation and effectiveness. Working with us, you'll be allocated an applications engineer, and although we are global, the engineer will be local, speak your language and understand your market. Based on your application's criteria, our engineers will provide you with a number of bearing options, utilizing not only their own knowledge but also our international development network.

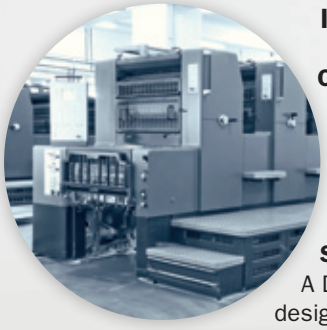
industrial/business machine – ATM

Challenge:
When a leading automated tellermachine (ATM) manufacturer was experiencing unacceptable noise levels due to the metalball bearings installed in its ATM-machines, the company turned to Trelleborg Sealing Solutions for anoise reduction solution.

Solution:
The design engineers evaluated the application, manufacturing capabilities and customer requirements resulting in a recommendation of Durobal® roller element bearings in Turcite® A, a proprietary thermoplastic material. Using Durobal® , the customer was able to substitute a light weight, non-metallic bearing component, giving the benefits of a low-friction, self-lubricating design in a fully machined ball raceway.

Result:
While the component cost of the Trelleborg Sealing Solutions Durobal® parts was comparable to the metal bearings replaced, the Durobal® polymeric bearings were maintenance-free. In addition, the noise level was drastically reduced and there was an overall benefit of longer service life.

Service Conditions:
- -17°C to +49°C/ 0 to +120°F
- Paper dust
- Rotary service
- One-time grease lubrication



Industrial/business machine – Copier & printer idler roller

Challenge:
The customer had a metal, nonlubricated bearing in its printer idler roller machine. This caused excessive noise.

Solution:
A Durobal® double row bearing was designed to replace the current bearing system. This double row design was perfect in ambient temperatures, the abrasive dust and offered anti-rotation features. In addition, the inherent properties of Durobal® provided the customer with a stable long service life.

Result:
The use of the Durobal® double row bearing in the idler roller allows the feed belt to move freely. This has ensured the customer consistent operation over extended service times.

Service Conditions:
- Ambient temperatures
- Paper dust
- Anti-rotation features built-in

PROGRESSIVE ENGINEERING:

Using the latest virtual design technology and finite element analysis techniques, Trelleborg Sealing Solutions will produce a customized Durobal® bearing design to meet or exceed your specifications. Samples from in-house prototyping facilities can be proved in your application or on specially-designed test equipment at one of our global research and development centers. From concept to delivery, we can support you all the way with customized Durobal® bearing solutions.

More than just a bearing

Trelleborg Sealing Solutions is an expert, not just in seals, but in bearings too. Its unique Durobal® rolling element bearing is ideal for high speed, low-load applications and being constructed of plastic, offers significant advantages over traditional metal components.
Most importantly, Durobal® has the added benefit that it can be designed as a single bearing and sealing element that often consolidates a number of components. This can lower total cost, improve integrity and enhance overall product performance, providing you with real competitive advantage.

Industry specific

Working with our engineering teams, Trelleborg Sealing Solutions will support you in the development of a customized Durobal® bearing solution designed to suit your individual needs. The housing could be in a variety of different plastic formulations, often proprietary, that are specially engineered to meet the demanding requirements of specific industries. This can be combined with a choice of ball bearing materials, perfectly suited to the operational criteria of your application. When developing a customized bearing solution, Trelleborg Sealing Solutions is not just interested in the function it performs. In addition, we want our component to perform that function more effectively, at a lower total-cost while enhancing your manufacturing process and providing your customer with optimized performance.

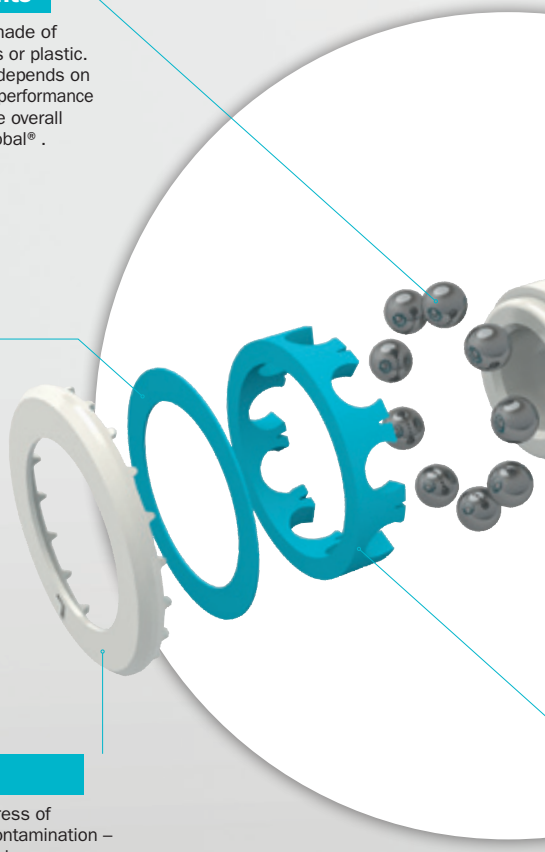
Our leading edge thermoplastic bearing solutions for the life sciences industry include a broad range of custom and standard bearing options based on various materials such as Nylon, Turcite®, HiMod®, and Orkot®. Available in both standard designs or customized to your application, bearings and bushings offer improved friction characteristics, minimized wear and longer service life.

Rolling elements

Typically these are made of stainless steel, glass or plastic. The size of element depends on the design envelope, performance requirements and the overall geometry of the Durobal® .

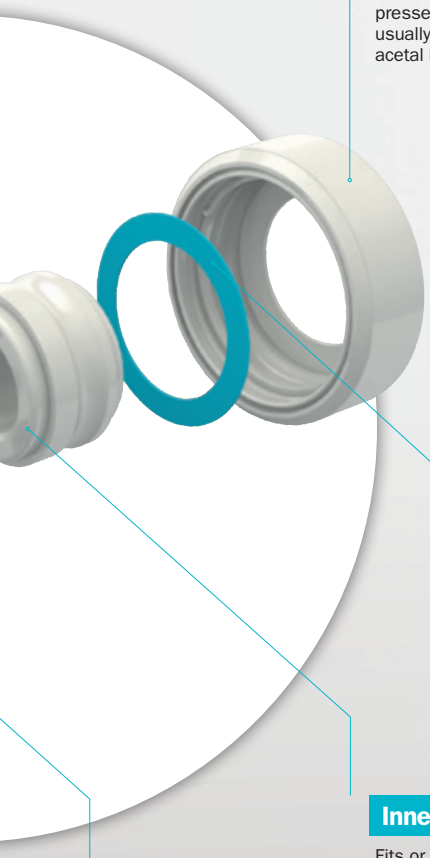
External seal

Where contaminants are very fine, an additional seal is required to avoid ingress.



Shield

Prevents the ingress of environmental contamination – snap fit or welded.



Outer Ring

The static part of the bearing pressed into the housing – usually constructed of an acetal base material.

Internal seal

Seals in grease used in some Durobal® to suppress noise and extend life.

Inner Ring

Fits or presses onto the shaft of a dynamic application – usually constructed of an acetal base material. The I.D. of the inner ring can be of any geometry.

Cage

Stops the rolling elements from contacting each other.

BENEFITS OF DUROBAL® ROLLING ELEMENT BEARING SOLUTIONS:

Polymer versus metal-ferrous Inner ring configurations

- Self-lubricating, environmentally-friendly
- Low-friction
- Molded to consolidate component parts
- Materials compatible with virtually all media, both system and cleaning
- Light-weight with good strength and stiffness
- Suitable for magnetic applications

Designed for a specific application

- Achieves bearing function that is impossible with standard products
- Fits into difficult design windows
- Improved component integrity
- Avoids incorrect assembly
- Maximize application reliability

Part consolidation

- Lowers total cost of production
- Reduction of assembly and sub-assembly
- Allows automated assembly
- Improved product integrity

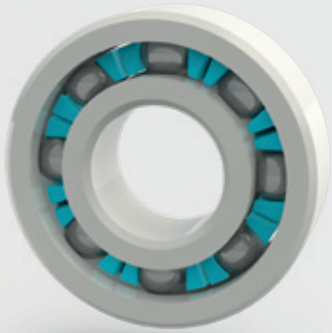
Improved performance

- Unique machined races with more land area
- Extended life
- Smoother operation
- Lower noise
- Optimum performance at high speeds with low load
- Resistance to extreme temperatures
- Compounds to meet the most stringent approvals and standards

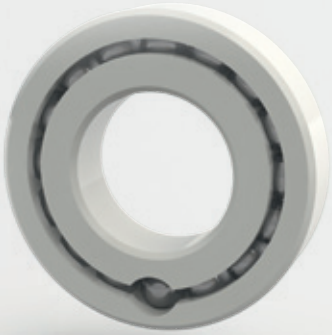
Service

- Support from beginning to end of project
- Open communication
- Flexible delivery times
- Meet special delivery requirements
- Cleanroom cleaned and packed

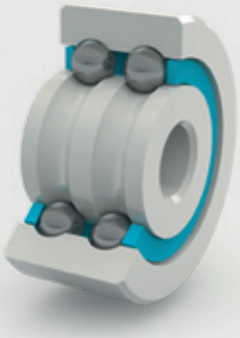
TYPES AND VARIATIONS



Conrad bearing
The most common ball bearing design. A version of the radial ball bearing, it contains a snap-in cage and deep groove races. A quieter bearing capable of handling higher speeds and lower loads.



Full Complement bearing
An extra deep bearing containing no cage but a full complement of balls. Can be used as a pure radial bearing or combined radial thrust bearing. Can carry higher loads at lower speeds.



Double/ Multiple Roll Ball
For use when radial loading is relatively high. It effectively doubles the dynamic load capacity of the bearing compared to a single row bearing. Ideal when space is at a premium.

Radial Durobal®
The most common type gives a good combination of load to speed capability. Can also be produced with angular contact to allow mild thrust loading.

Angular Contact Durobal®
This configuration allows a greater thrust load capacity but the axial load can only apply in one direction.

Thrust Durobal®
Intended for axial load with no radial load.

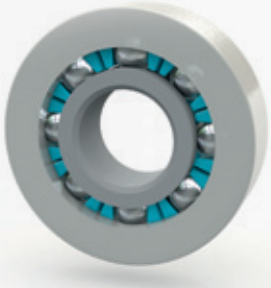
COMPLEX DESIGN FOR OUTSTANDING PERFORMANCE

The Durobal® bearing consists of an outer ring, inner ring, shield, seals and rolling elements held in a cage. The configuration of Durobal® can be varied to meet customer requirements and optimize the performance of an application.

Outer ring designs

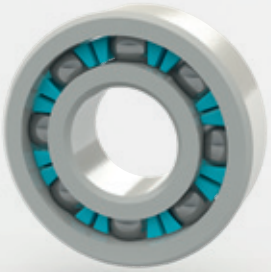
Square

Flanged

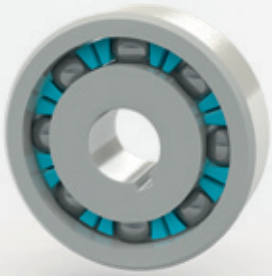


Pulley

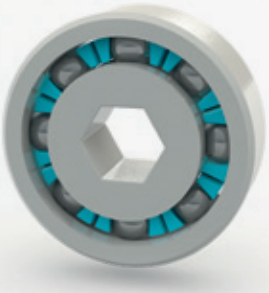
Inner ring configurations



Round

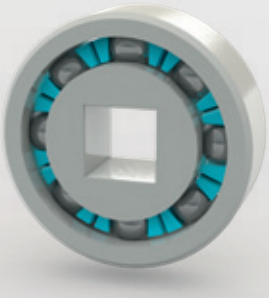


Keyway



Hex

Spline



Square

The custom Durobal® design allows the table to move in/out and laterally on the machine's bearing surface. This smooth table movement provides added comfort and extra security to the patient during MRI procedures.

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TRELLEBORG

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.

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