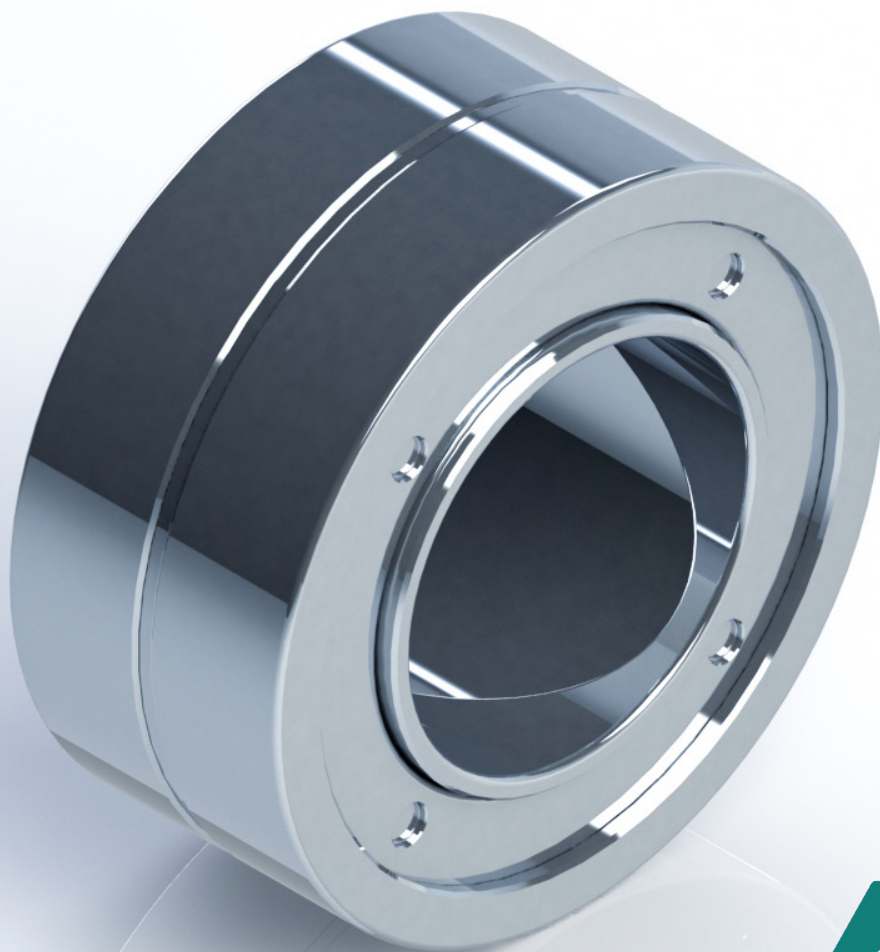


HERRINGBONE ROLLER BEARINGS®

ALT BEARINGS®



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ALT BEARINGS® - Global presence with local teams



ALT BEARINGS®

About us !

ALT BEARINGS® is specialized in High Performance Mechanical Components for Linear and Rotary Motion. Founded in France, the company gathers the most experienced knowledge in Mechanical Engineering.

A highly qualified and skilled team specialised in mechanics and tribology have challenged the traditional bearing designs and have developed a breakthrough innovative product that improves performance and reliability of existing solutions.

Our R&D department is at the leading edge of many technologies and innovative solutions. As a result of many years of research, development of testing and validation, ALT BEARINGS is pleased and excited to introduce the range of highest load capacity bearings ever made: the **Herringbone Roller Bearings® (HRB)**.

This patented technology can easily replace existing bearing solutions which enables optimisation in many applications. Our technology is available for you to take advantage wherever you are. You can now easily gain advantage of this technology and equip your system with the most effective and reliable bearings ever produced. ALT BEARINGS is globally available in every world region.

New



The ALT BEARINGS idea started from seeing that customer needs could not be met with available products and issues that remained open.

ALT BEARINGS developed a solution that combines simplicity, reliability, safety, performance and greater flexibility. We put our customers first at the heart of our company. Our internal processes are defined so that specifications are met without compromise, solutions are offered quickly and products are delivered on time.

ALT BEARINGS is a global company with offices in 4 continents (Africa, America, Asia, Europe) so that support can be given close to where you are. We are a young and dynamic company which strives to develop breakthrough technologies and go beyond current limitations.

Diversity is a key factor in supporting our customers. We know that we need to react quickly, understand your needs and provide the best support.

Our strength relies on the melting pot team which empowers us every day as human beings with different and complementary skills, knowledges, genius and cultures. We deeply entrust each other, strongly believe in connections between people. Our teammates fully aim at creating the best professional environment at work and more than the best commercial relations with our customers.

We understand that we have a responsibility on the environment. While developing solutions that meet our customers expectations we also optimise our solutions so that they have a positive impact on the environment.

*bearing solutions
business approach
international team
for a revolution in the Mechanical World!*



The Herringbone Roller Bearing® (HRB) is the unique alternative to traditional bearings. HRBs are recognized as the best bearings ever when it comes to high-capacities, longer life, reliability, performance, safety and energy saving.

You can reach us here



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Headquarters in France

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The ALT
BEARINGS®
patented
Herringbone
Roller Bearing®
improves
durability, load
capacities and
performance
unlike no other
bearing.

HRB BASICS



1.1 The patented Herringbone Roller Bearing® (HRB) technology

The **Herringbone Roller Bearing® (HRB)** is a patented anti-friction and heavy-duty bearing assembled with threaded rollers that have unique opposite helical geometry specifically designed for heavy load and long service applications (Fig. 1).

developed to fix issues that exist with current, conventional bearings. The HRB offers greater reliability, especially in heavy duty applications and due to its compact design the uses for our unique design are endless.

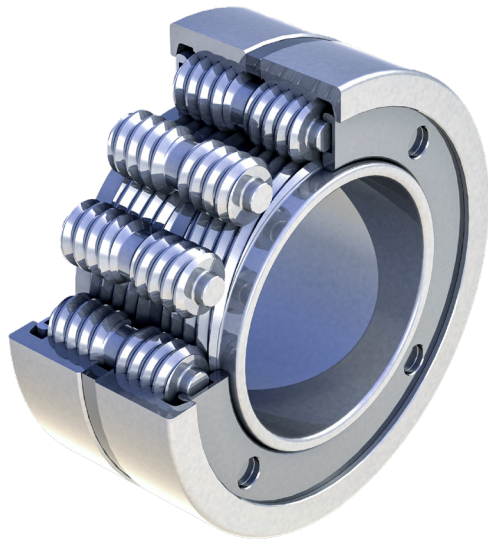


Fig.1-a: partial cut of a type of HRB

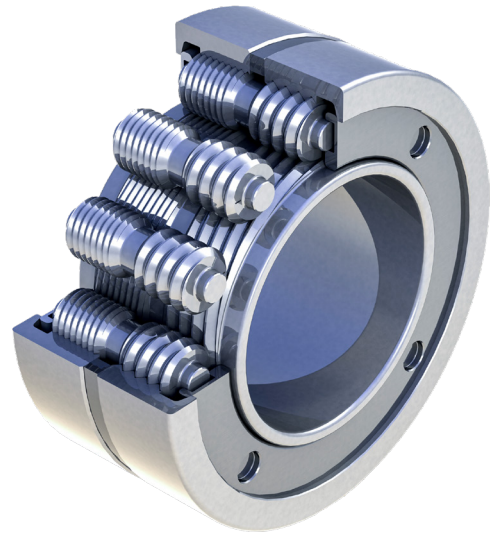


Fig.1-b: partial cut of another type of HRB

The backlash of the HRB is internally and automatically eliminated by its herringbone threads or by a spring ring. The bearing is designed to achieve pure rolling which results in minimum friction. Any sliding is eliminated.

The threaded rollers provide multiple contacts of large geometry which provide an extremely high capacity while keeping assembly very simple at the same time. This unique and innovative concept will open new horizons in mechanical design.

The HRB have rolling elements which can be set to take any combination of radial or thrust loads. It is a result of more than 30 years of research in the field of rolling bearings and linear technologies. This design was

The core design of the HRB is an assembly (Fig. 1) of:

- one double-helical threaded or herringbone inner ring,
- double-helical threaded rolling elements called 'herringbone rollers',
- two outer half-rings with opposite threads,
- zero, one or two carriers or spacer rings,
- one central spacer or spring ring.

The inner ring can be directly mounted on to a shaft and the outer double-rings in a housing. These are aligned to ensure perfect guidance of the HRB mechanism.



The two outer half-rings allow the HRB to be easily installed into a housing. This allows for potential retrofitting as well as new applications. However, these outer half-rings can be flanged or customized to fit application needs. Rollers are bearing elements that carry the load. They are set in such a way that their herringbone threads match perfectly with the herringbone threads of the inner ring, and with threads of the outer half-rings. The number of rollers is defined according to load capacity.

The spacer, or the spring ring is set between both outer rings. It can be positioned in the middle or can be shifted. Its dimensions can be adjusted accurately to eliminate backlash or set the required preload level.

The carriers, or spacer rings are designed to avoid external contamination, to maintain rollers at equal distance from each other and to keep reliability as well as service ability. In the HRB, it is not necessary to fix axially the carriers with elastic rings. Each carrier is directly fixed by each corresponding outer half-ring, thus avoiding the use of additional parts.

From thread perspective, the threaded components can have two opposite portions bearing threads with different axial pitches and number of starts (Figs. 2-3). Such a type of HRB is also available and is developed in order to fit better even load distribution and high stiffness issues. The HRB design gives a unique ability to support both radial and thrust loads. Some advantages of the HRB provided by the threaded definition are dimensional and weight optimization as there is no need in fact to include carriers or spacer rings. Some customized designs are available without these parts for even higher optimization.

ALT BEARINGS manufacturing facility is located in Europe and is certified to ISO 9001 and has decades of experience in precision manufacturing. Besides, the company has developed new patented tools and equipment to manufacture and assemble the HRB mechanism. All these efforts help produce high quality products.

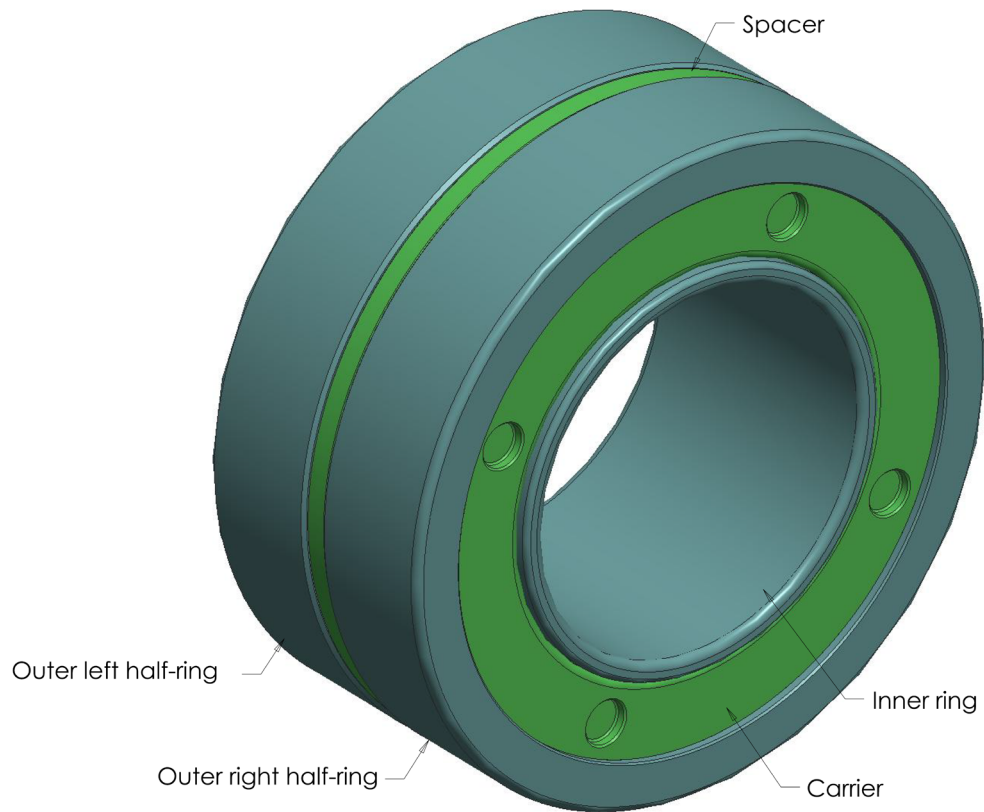


Fig. 2-a: Single versions of HRB, HIS, or HHS

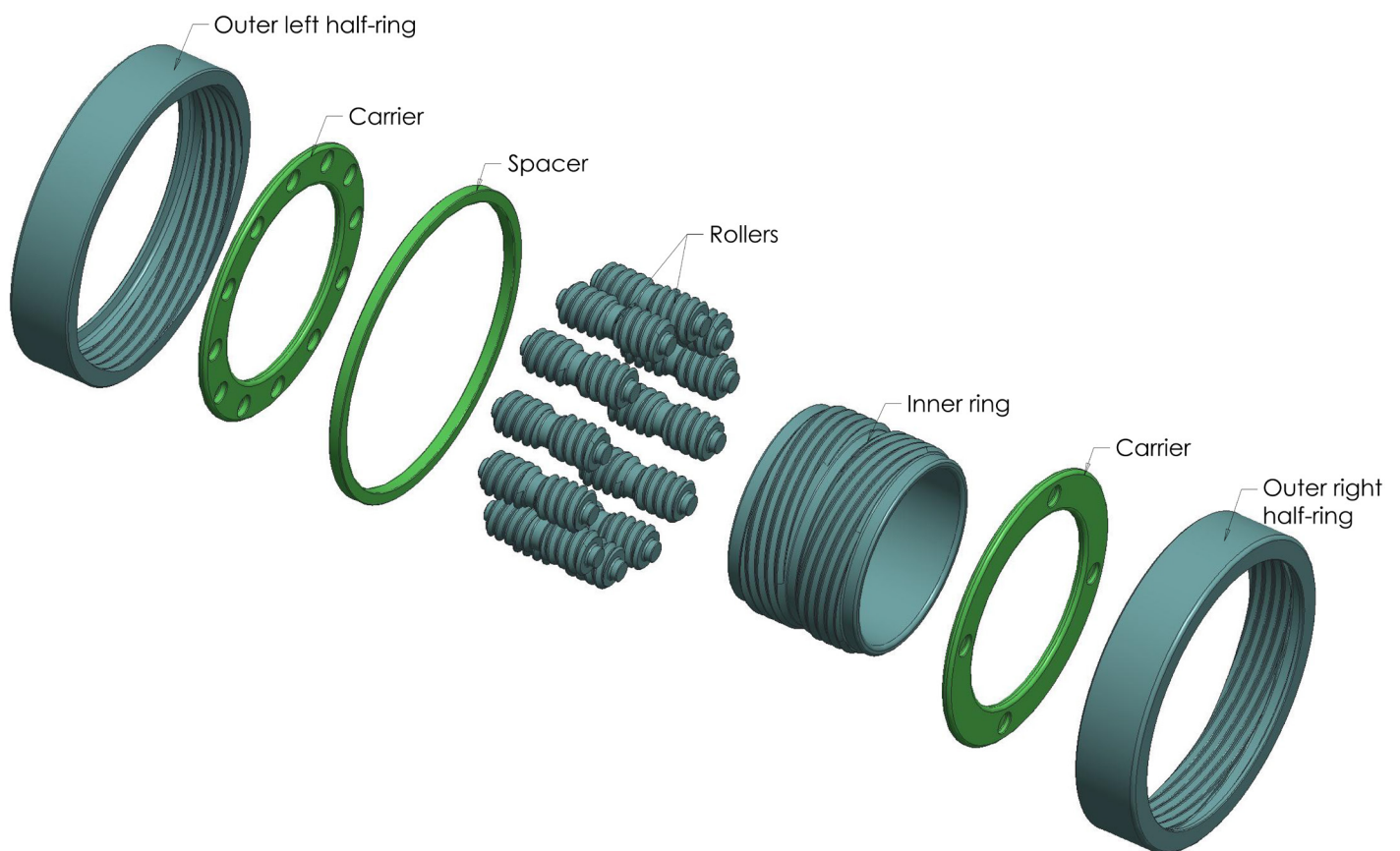


Fig. 2-b: a split of the HIS or HHS bearing with its different components

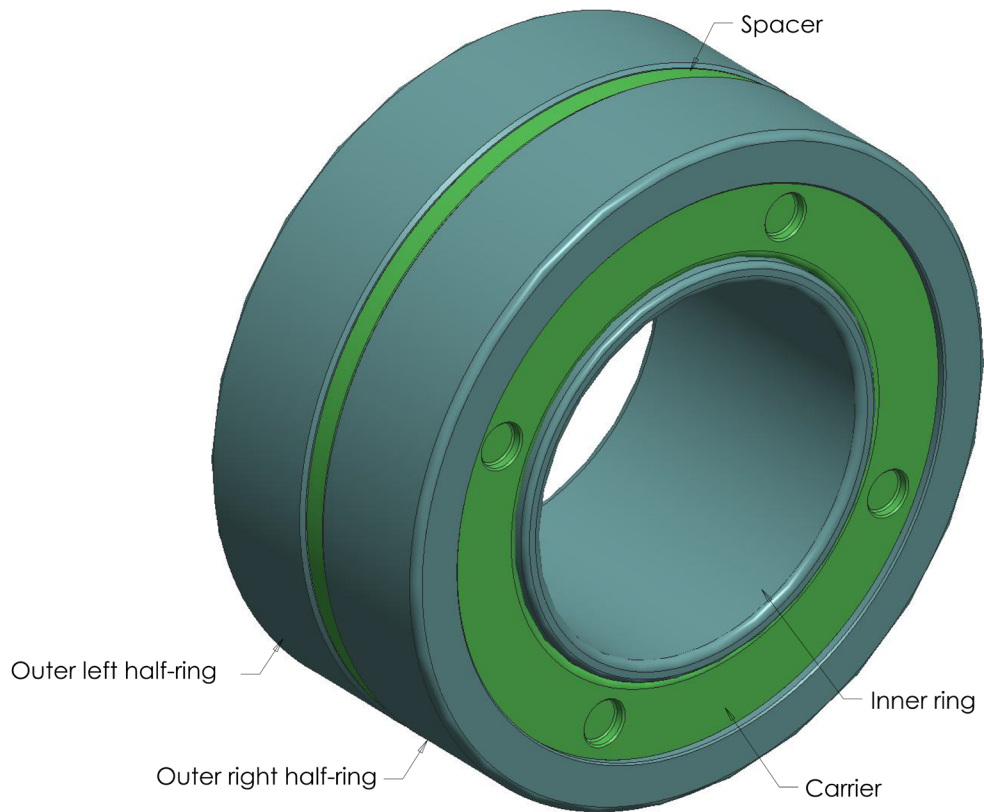


Fig. 3-a: another Single version of HRB, HDS

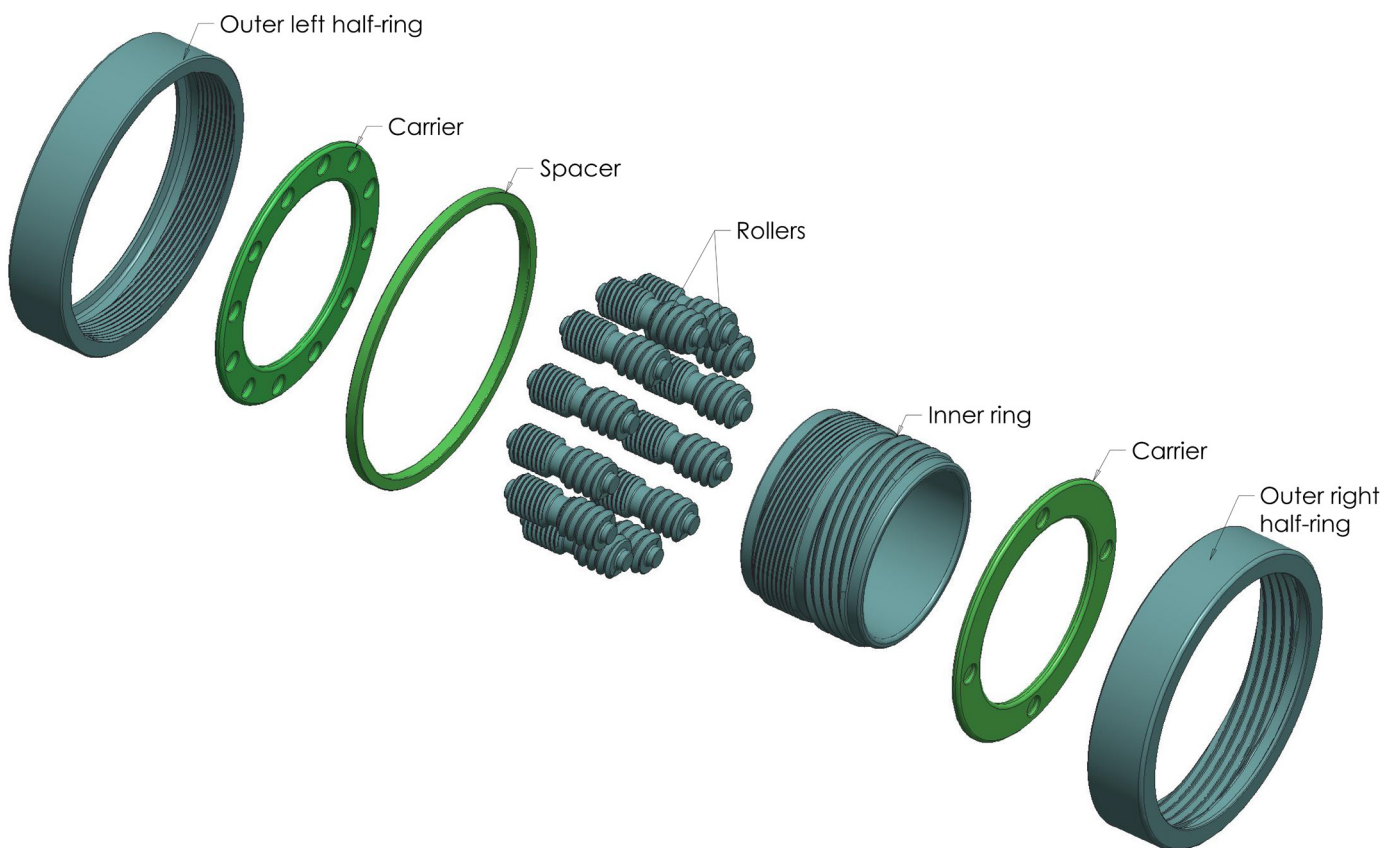


Fig. 3-b: a split of the HDS bearing with its different components

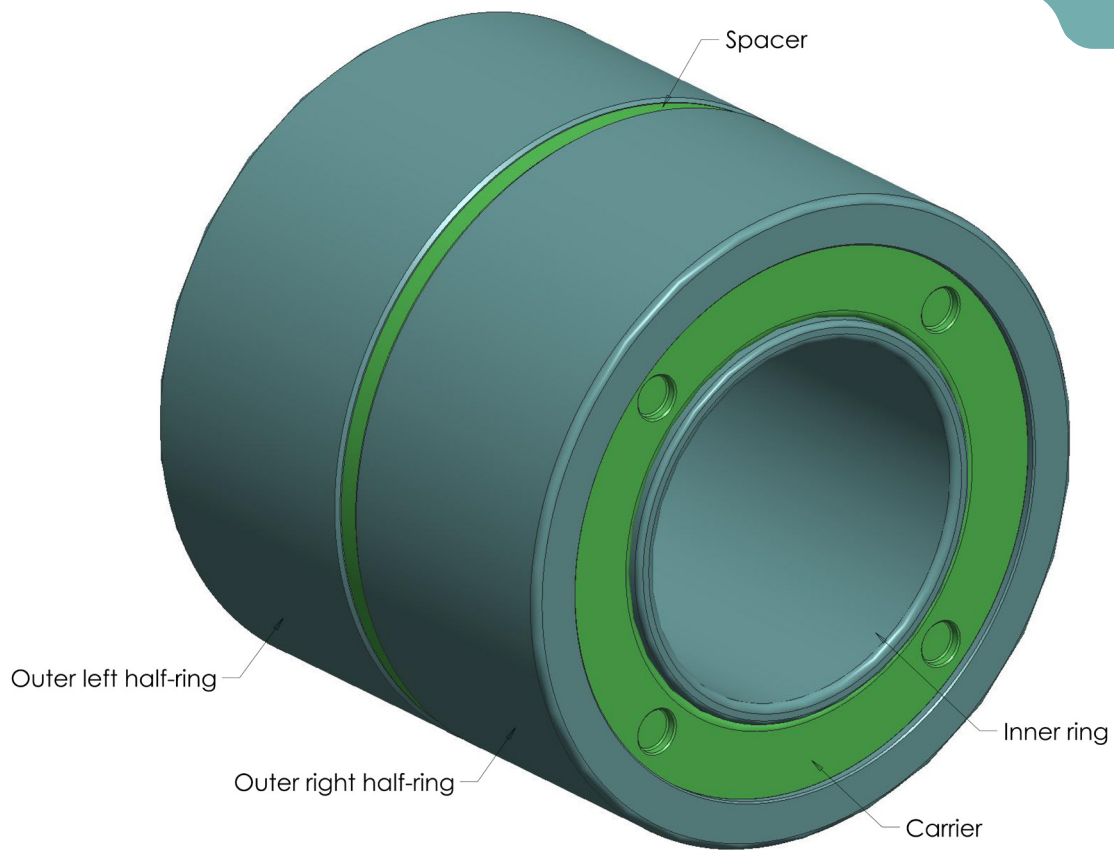


Fig. 4-a: Twin versions of HRB, HIT, or HHT

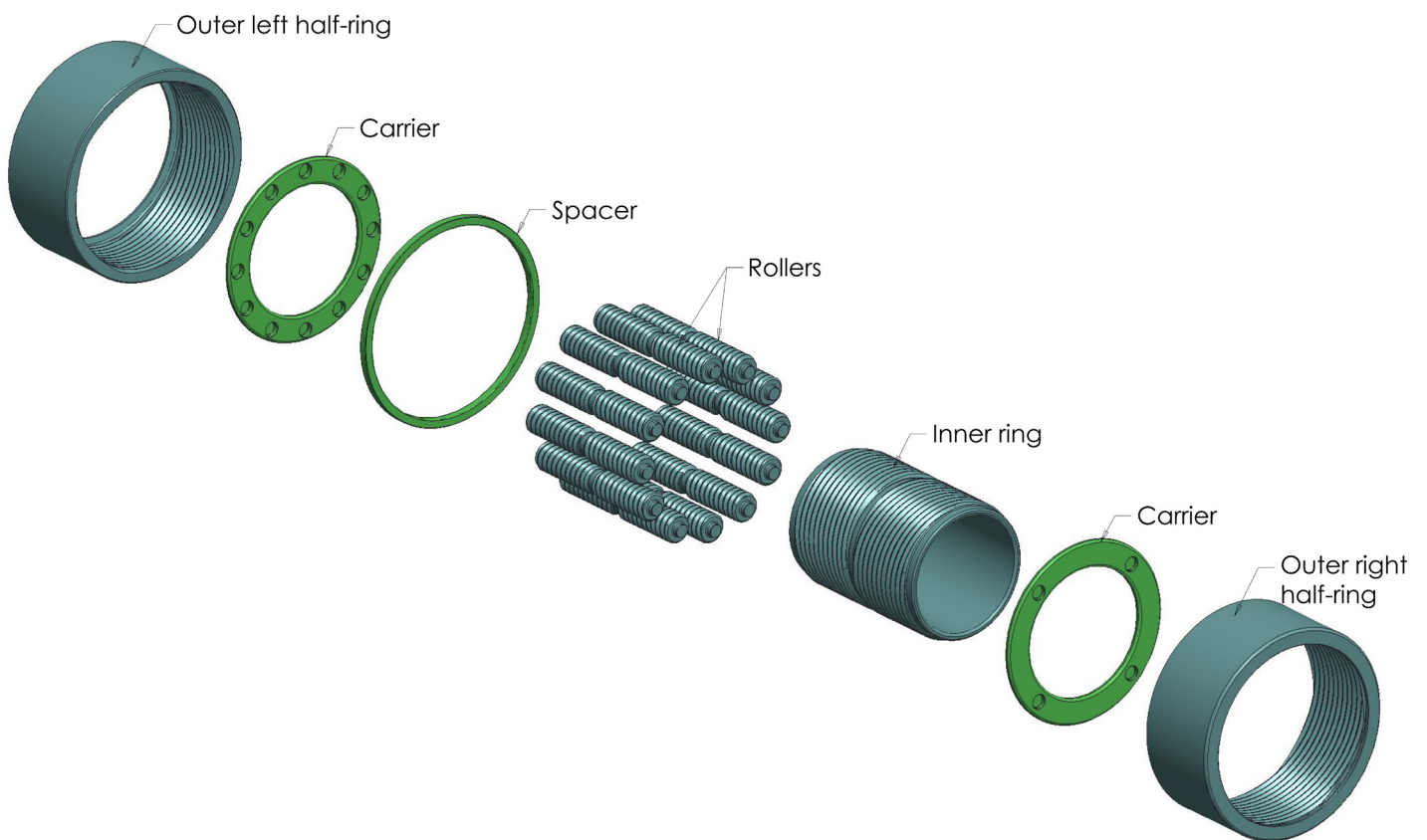


Fig. 4-b: a split of the HIT or HHT bearing with its different components

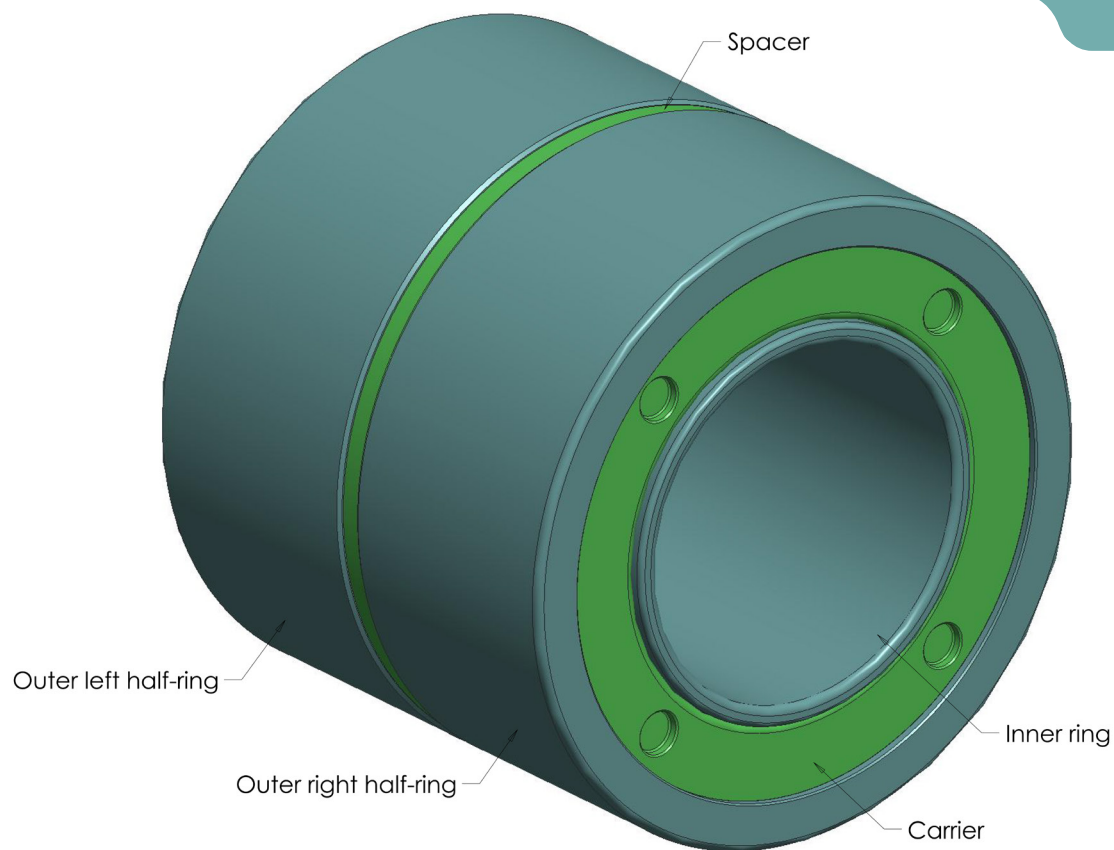


Fig. 5-a: another Twin version of HRB, HDT

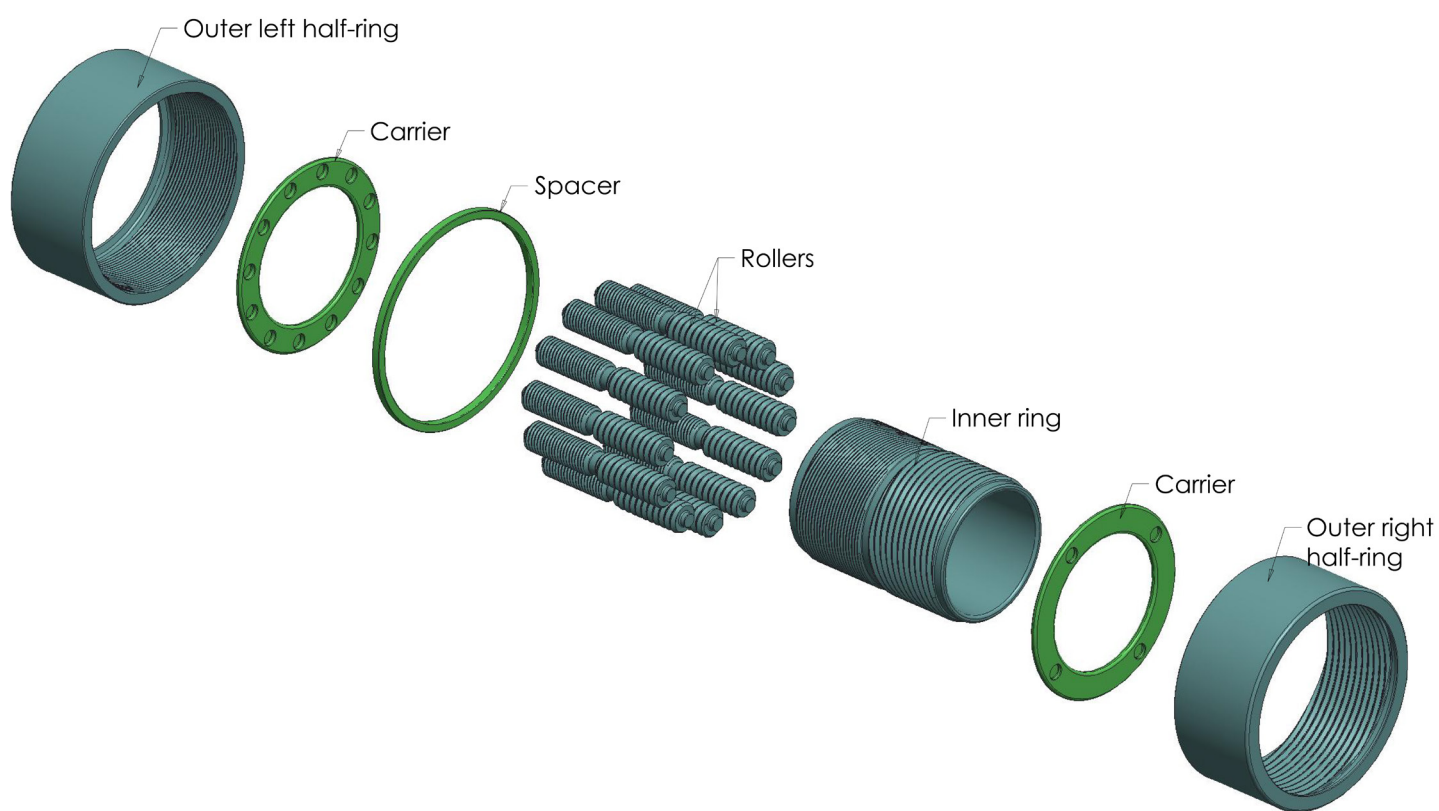


Fig. 5-b: a split of the HDT bearing with its different components

1.2 Designs and variants

Designed to meet the customer's needs in terms of performance and reliability, the HRB is available in 2 main types or designs (Figs. 2-5):

- the classic version with similar pitches herringbone threads;
- the smart version with differentiated pitches herringbone threads.

The HRB classic version is the standard design that can be used in most applications. Each component of this version has opposite threads with the same number of starts and the same axial pitches. The HRB smart version

is a special design that has been developed to support applications requiring greater rigidity and higher loads. This unique design has threaded components with different number of starts and axial pitches. This can be customized to meet precise application requirements.

Both versions are available in short and long models (Figs. 2-5). The "Single" HRB or the shortest variant is identified as **HIS**, **HDS** and **HHS** whereas the "Twin" HRBs or the longest variant is identified as **HIT**, **HDT** and **HHT** according to their sizes.

The Single-length HRBs are mainly designed to any type

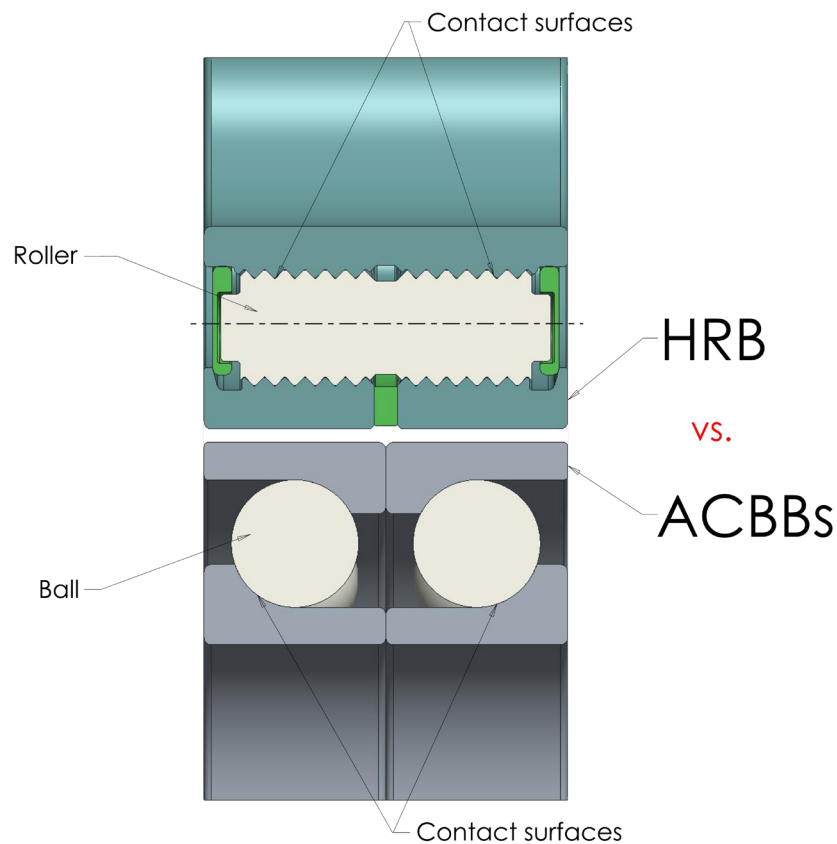


Fig. 6-a: comparison of a stack of 2 ACBBs and a HRB

of load regardless of its direction. Though they can support radial and combined loads. The Twin HRBs are mainly designed to support thrust loads.

To compare with conventional Angular Contact Ball Bearings (ACBBs), in terms of length and diameter, the size of the single HRB is equivalent to 2 ACBBs (Fig.6-a) whereas the size of a twin HRB is equivalent to 4 ACBBs (Fig.6-b). However, single HRB product can be reduced to the size of 1 ACBB, on request.

When the HHS or the HHT is inserted in a bearing flanged housing, the HHF (Fig. 7) version is obtained. This product is developed as a more robust alternative to conventional bearings. For instance, you can upgrade your existing (FLR)BU by replacing current bearing type with the corresponding HHT as its dimensions fit those

of the existing bearing flanged housing.

ALT BEARINGS offers a range of 9 dimensions of HHF. These solutions have 2-9 times greater capacity than existing solutions. The HHF solution incorporates at its core, a HIS or a HIT bearing, depending on size, with various other components including seals as shown on Fig. 7. The HHF is suitable for high load or high stiffness applications involving for instance ball or roller screws.

The HRB can be customised according to specific customer requirements. Based on capacity ratings etc. thread profiles, materials and precision can be adapted to achieve high levels of performance and reliability. The Ultra-High capacity can be further optimised by reducing mass by up to 30% and more efficient heat dissipation.

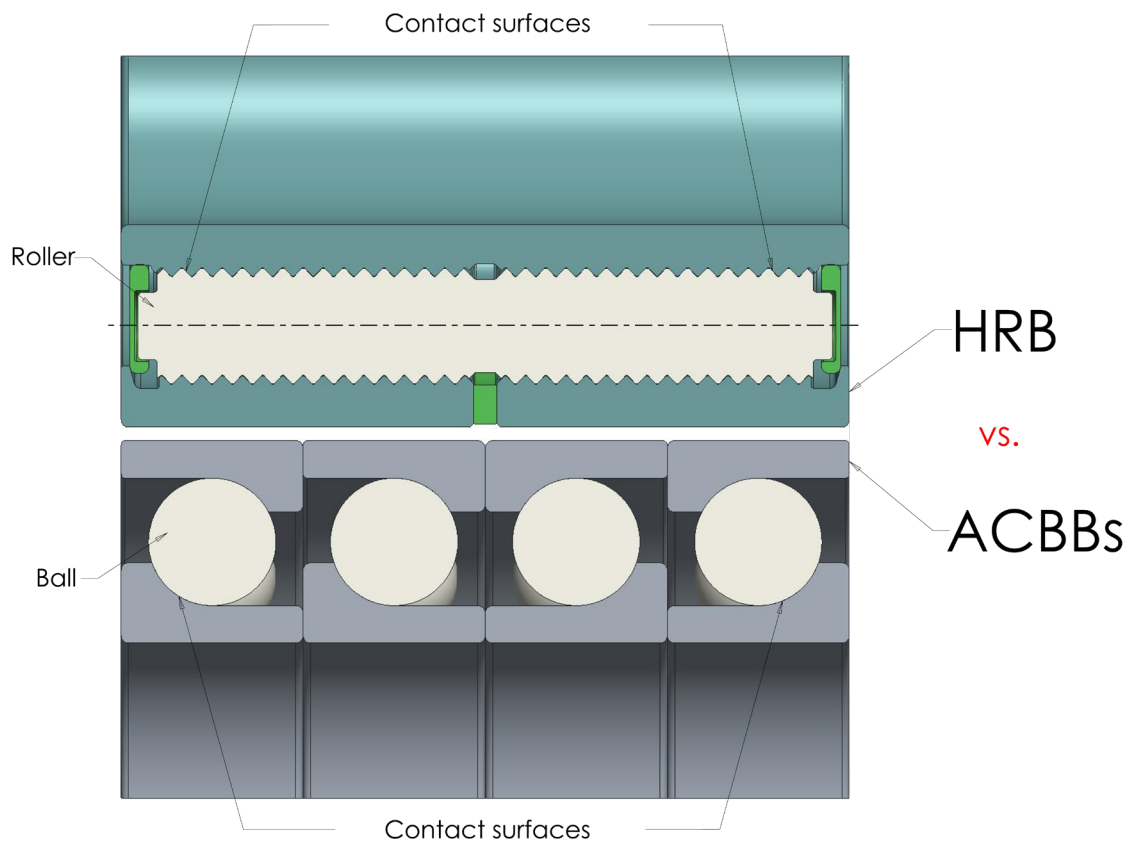


Fig. 6-b: comparison of a stack of 4 ACBBs and a HRB

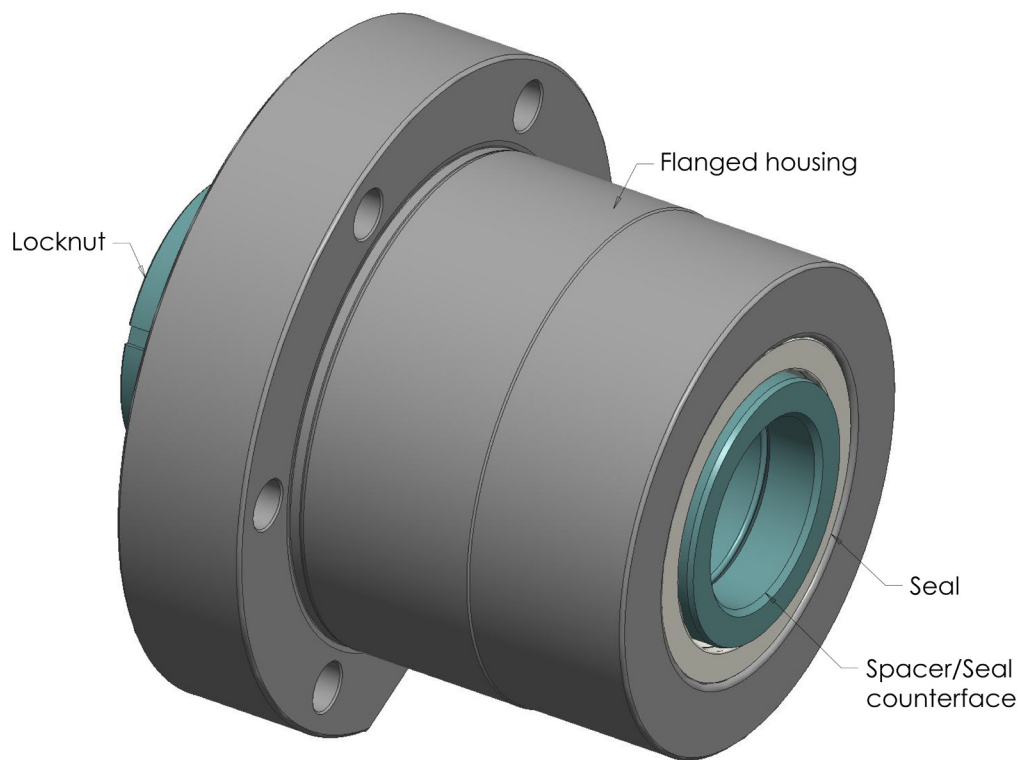


Fig. 7-a: HHF product including a HHT

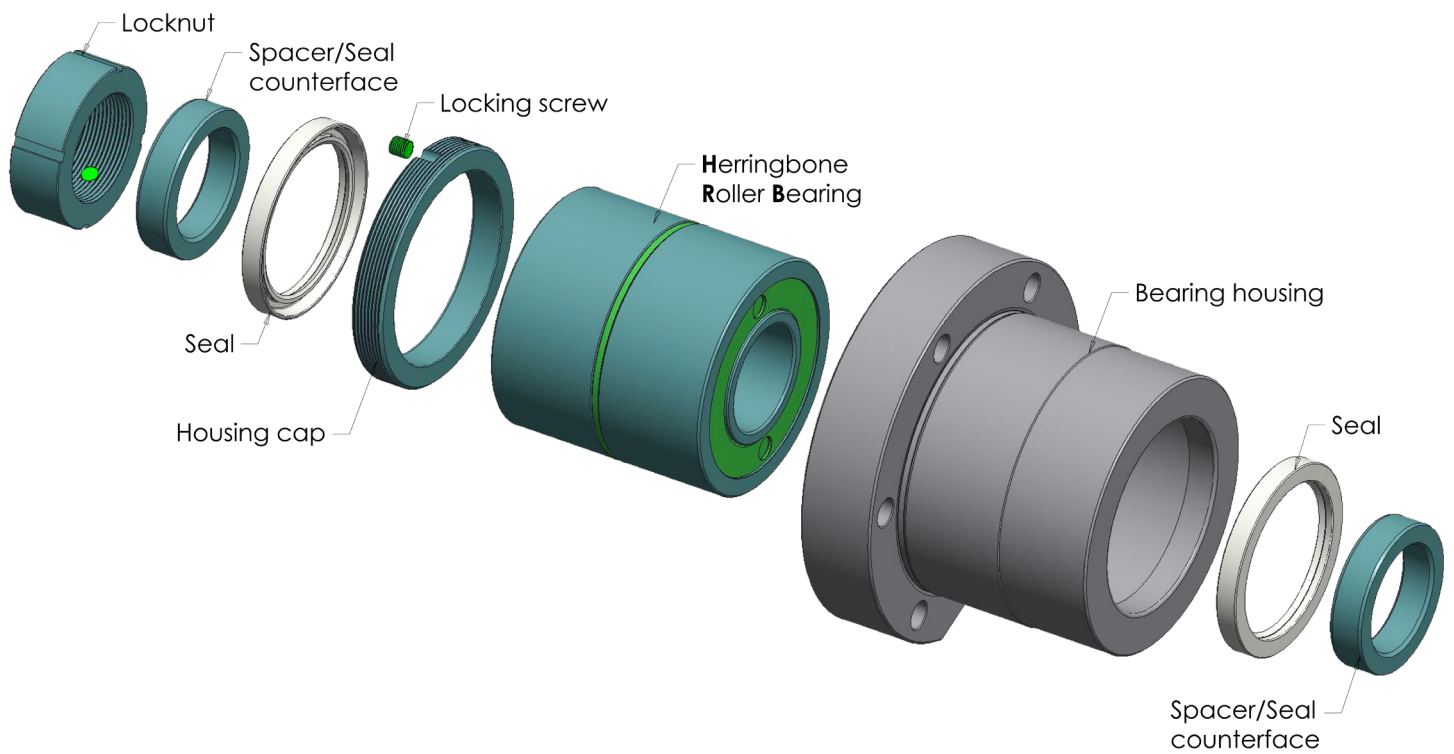


Fig. 7-b: a split HHF product including a HHT bearing

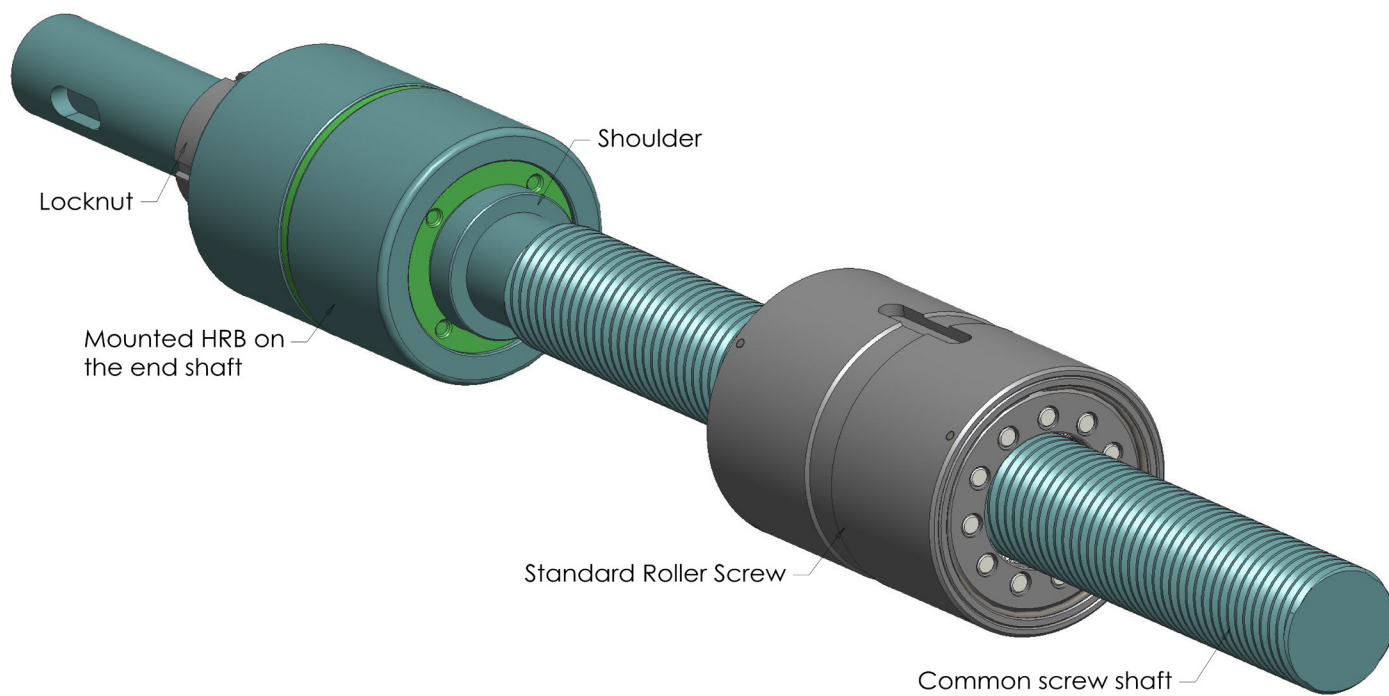


Fig. 8-a: mounted HIT 017 on the shaft of a planetary roller screw

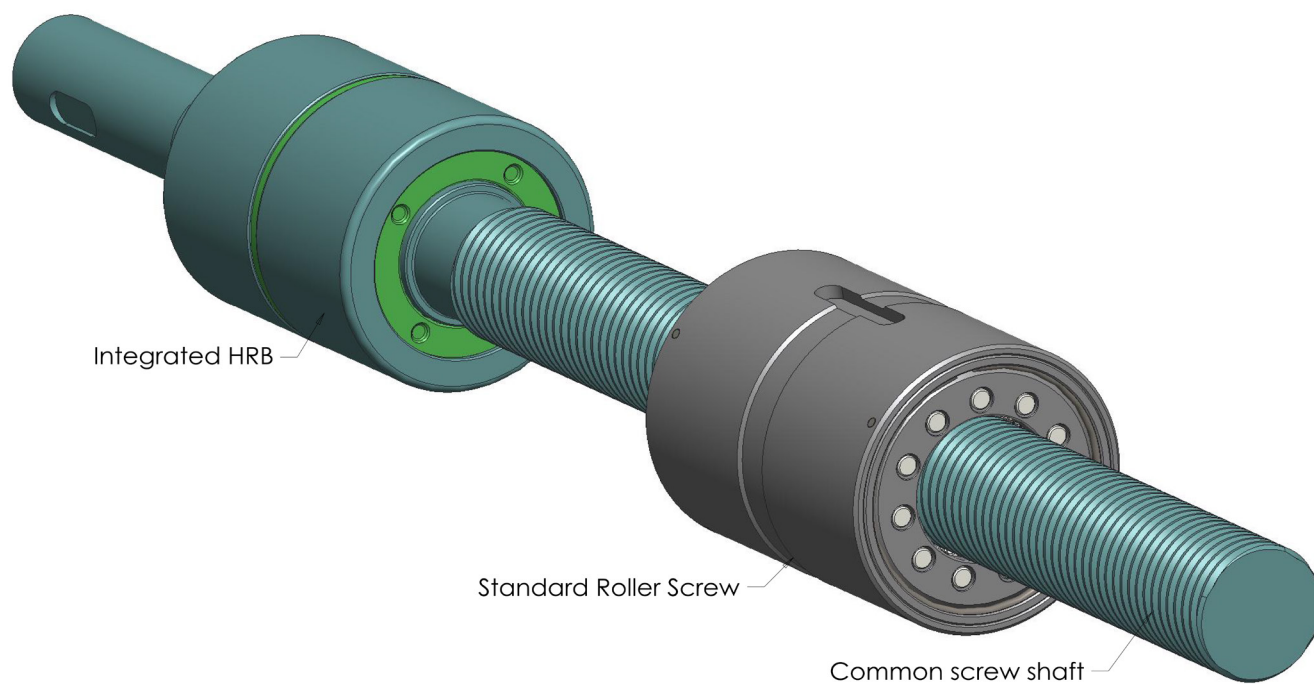


Fig. 8-b: HRA 017 or an integrated HIT 017 on the shaft of a planetary roller screw

The HRB offers outstanding performances compared to existing bearings in the same space envelope.

- Reduced or no backlash at all
- Ability to preload by use of a spring ring
- Silent operation
- High load density
- Larger capacities compared to the GRB and the (FLR)BU
- Very low mass
- Extended lifetime
- High speeds and accelerations
- High axial, radial and bending stiffnesses
- Options for sealing
- Excellent stability
- No skidding, no smearing
- Elimination of sliding
- Reduced friction and heat generation
- Reduced TCM (Total Cost and Maintenance)
- Flexible design or availability of standard and customized sizes, materials and features.

The HRB can be delivered with zero backlash, with preload or with backlash according to customer specifications. The HRB is optimised for size without compromise on performance.

The HRB is a truly innovative design that will enable greater flexibility in applications than ever before. It will also help our customers innovate and be more successful.

The HRB is perfectly suited for applications with high axial or/and thrust loads, high radial loads, moment loads and/or long-life requirements.

ALT BEARINGS solutions can, for example, be applied in:

- roller screw support bearings;
- ball screw support bearings;
- custom bearings;
- thrust bearings;
- large size bearings;
- compact bearings.

Fig. 8-a shows an example of HRB product mounted at the end of shaft or a planetary roller screw.

ALT BEARINGS can design and supply customized HRB solutions according to customer requirements. The HRB can also be directly integrated on any high efficiency screw: the shaft or the nut of a planetary roller screw (Fig. 8-b), or a ball screw. Referred to as the HRA, it is an ideal solution for these applications.

Some of the HRB benefits with respect to existing bearings are shown in Tab.1.

	HRB	GRB	Stack of ACBBs
Compactness	+++	++	-
Capacity ratings	+++	++	+
Lifetime	++++	++	+
Flexibility on design	++	+	-
Standard or stainless	++	-	-
Noise	+	+	+
Stiffness	+++	++	+
Friction	++	-	+
No skidding	++++	-	-
Preload	+++	+	++
Reliability	++	-	+

Tab.1: performance comparison

Fig. 9 depicts the differences between a HRB and current bearing designs. Similar comparisons can be made to other types of existing bearings such as roller bearings, tapered bearings, ball bearings, thrust bearings, spherical roller thrust bearings, etc.

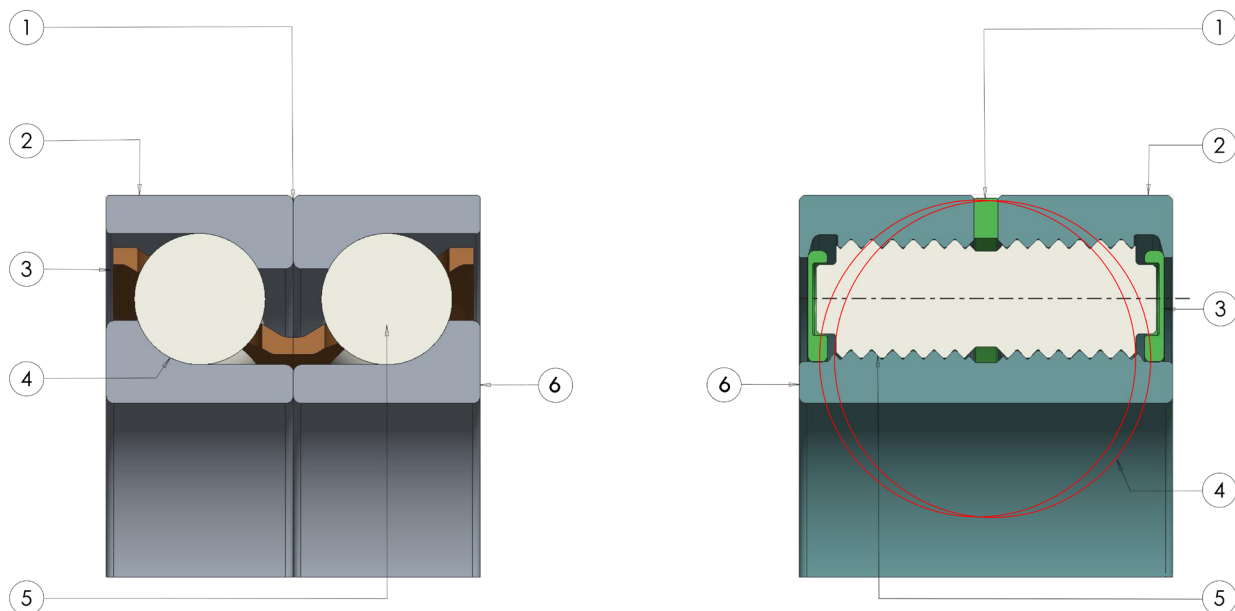


Fig. 9: benefits of HRB against ACBBs

- | | | |
|---|---|---|
| Preload difficult to adjust from external tightening | ① | Standard preload set in factory to make your assembly easy |
| Outer diameter cannot be customized on ACBBs | ② | Outer diameter can be fully customized on the HRB |
| Cage generates friction at contact with balls
No seal available on ACBBs | ③ | No cage in the HRB
Optional ends covers
Could be used with shields or seals |
| Ball diameter is limited to fit in bearing track | ④ | Higher equivalent ball diameter on the roller profile
Gives much higher load capacity |
| One set of balls in one bearing width
Limited load capacities
Skidding | ⑤ | Multiple contacts on the same width of one ACBB
Much higher capacity and higher stiffnesses
No skidding thanks to herringbone threads arrangement |
| Limited material options (100C6, AISI 52100) | ⑥ | Many material options (conventional and advances bearing steels, carburizing steels, stainless steels, etc.) as function of the application and operating conditions |

The Artificial Intelligence (AI) market is predicted to grow in 2016, attaining Compound Annual Growth Rate (CAGR),

barriers manufacturers face in evaluating and adopting technologies, and explores how global manufacturing companies can best capitalise on emerging technologies. The study defines exponential technologies as enabling change at a rapidly accelerating, nonlinear pace facilitated by substantial progress and cost reduction in the areas of computing power, bandwidth, and data storage.

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HRB APPLICATIONS

2



2.1 Applications for the HRB

The HRB is recommended for all applications where space, lifetime, and maintenance are important issues and when failure is not an option. It has been designed and manufactured to be used in many sectors:

Aerospace, Oil & Gas, Injection and Moulding, Presses, Pumps and Compressors, Industry, Marine, EMAs, etc.

2.2 Typical industries for the HRB solution

The characteristics of a bearing depends on the application in which it is installed. For instance, the specifications needed for aerospace bearings differ from those in the marine industry. Consequently, all design parameters and performance results must be

specifically assessed. ALT BEARINGS has experience in many industries and high-tech segments to review specific requirements and offer the right Herringbone Roller Bearing that will be a perfect fit and perform unprecedentedly, even in the most extreme conditions.



Conditions in **Aerospace** are very extreme and increasingly demanding. ALT BEARINGS provides the perfect solution that will help optimize the space envelope and weight without compromise on performance and safety. Products are available in stainless steel and with coatings. The customization and design of the interfaces will help reach the best integration and compactness. Excellent reliability is also achieved through the reduced number of parts.



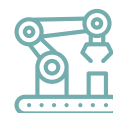
Fig. 10-a: aerospace factory



Ball and Roller screw mechanisms are at the core of **Linear and Actuation Technologies** in mechatronics. These mechanical assemblies combine linear and rotary motions. Many traditional bearing solutions have failed to offer solutions with enough capacities, lifetime, stiffness, or compactness. Complex assembly procedures, bulky housings, specific tools, issues to manage preload have often led to costly downtime and maintenance. Herringbone Roller Bearings, as threaded-based technology, are designed and manufactured to meet load capacities of ball and roller screws capacities.



Fig. 10-b: electromechanical actuators



In advanced manufacturing industries, the need for **automation and robotics** is continuously growing. This technology increases productivity while reducing costs which contributes to a better efficiency and competitiveness. Specifications in this sector include more demanding requirements for example endurance, speed, precision and protection from contamination. ALT BEARINGS supplies high precision Herringbone Roller Bearings with excellent rotational accuracy, reliability, stiffness and extended lifetime. They are ideal for automated systems.

Fig. 10-c: automation and robotics in automotive



Harsh environments and the need to lengthen service life. The **Construction Machinery** segment operates under extreme conditions such as dust, soil, high loads, tough weather and extreme temperatures. ALT BEARINGS offers special Herringbone Roller Bearings that provide superior performance for these applications and reduce the total cost of ownership to the minimum. In addition, the use of HRB technology gives the advantage of a more environmentally friendly operation.

Fig. 10-d: a construction machinery



O&G exploration and extraction and more generally upstream operations become more challenging as the demand for energy grows around the world and new technologies onshore and offshore develop quickly with higher depth, Higher Pressure Higher Temperature (HPHT). Performance of drilling equipment, top drives, pumps, valves, Blow-out Preventer, artificial lift, racking is constantly threatened by unforgiving conditions like stress, shocks, heat and contamination for instance. In this critical environment, where safety is paramount and downtime is not an option, the Herringbone Roller Bearings provide higher level of reliability, performance and durability to keep operations running smoothly no matter what.



Fig. 10-e: O&G (Oil and Gas) platform



Pumps and Compressors are widely used in process industries. The challenge in this segment is to maintain long life and reliability and prevent any downtime and disruptions in production. In addition, one of the challenges machinery and equipment manufacturers are facing is how to downsize and make their solutions even more compact. Both needs of increased lifetime and downsizing make the HRB the perfect, optimising size and lifetime choice. The HRB has been engineered to withstand the most difficult operating conditions: high operating temperatures and vibrations, combined axial and radial loads.

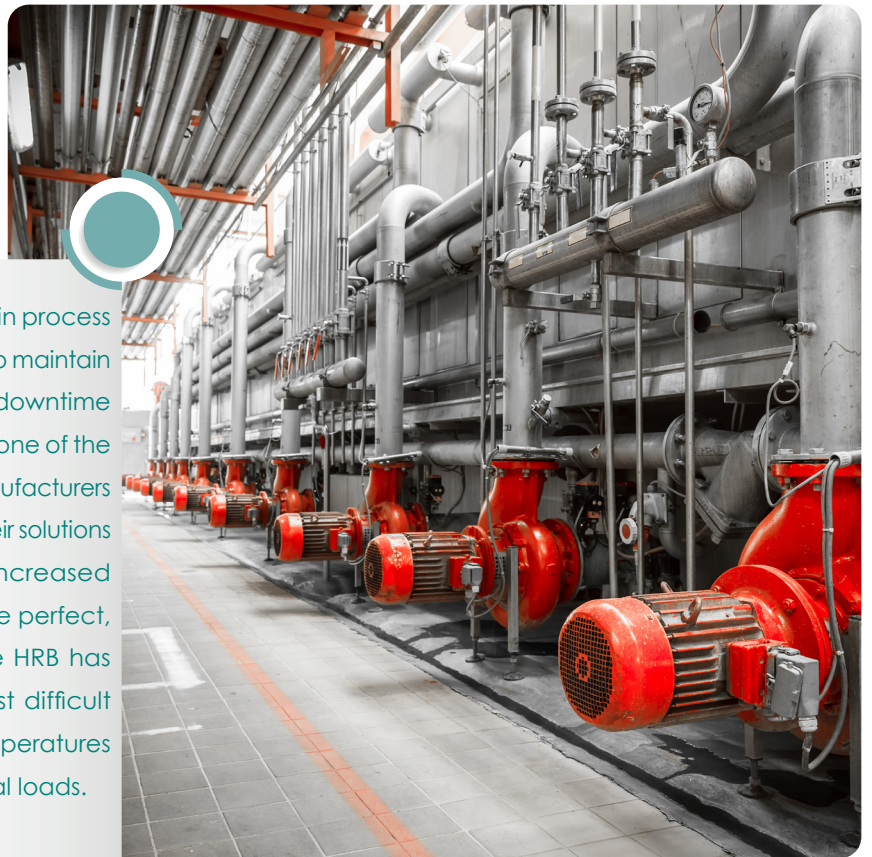


Fig. 10-f: pumps and compressors industry

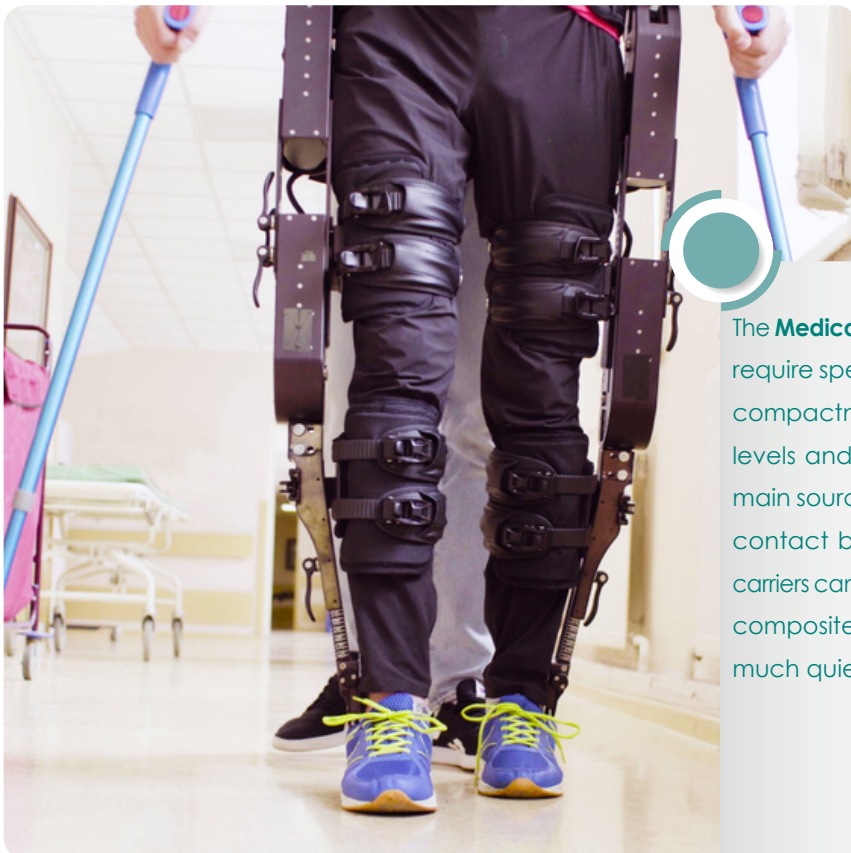


Fig. 10-g: exoskeleton in medical field



The **Medical sector** faces challenging applications that require special bearings that can not only combine compactness and reliability but also minimize noise levels and drive torque. In the standard HRB, the main source of negligible noise only originates from contact between rollers ends and carriers. Since carriers can be made of non-metallic materials (plastic, composite) or simply removed, HRB rolls with very much quieter conditions than traditional bearings.



In the **Marine Industry**, bearing manufacturers have to respond to new challenging requirements, with increasing environmental and safety regulations and permanent risk of corrosion caused by salt water. Since standard steel bearings will not easily survive in such critical conditions there can be excessive operational and maintenance costs. Marine HRBs on the other hand are specifically made of specific stainless steel and follow a dedicated process that is designed to provide with the best performance in a harsh environment.

Fig. 10-h: marine industry



In **Toolings**, new machine tools require higher speed and stiffness to combine precision and productivity. HRB bearings will easily replace standard bearings solutions with a much higher rigidity and offer options such as seals or wipers. Commonly installed on ball or roller screws, any HRB will give a compact and reliable solution to meet new hard machining or high-speed machining challenges.

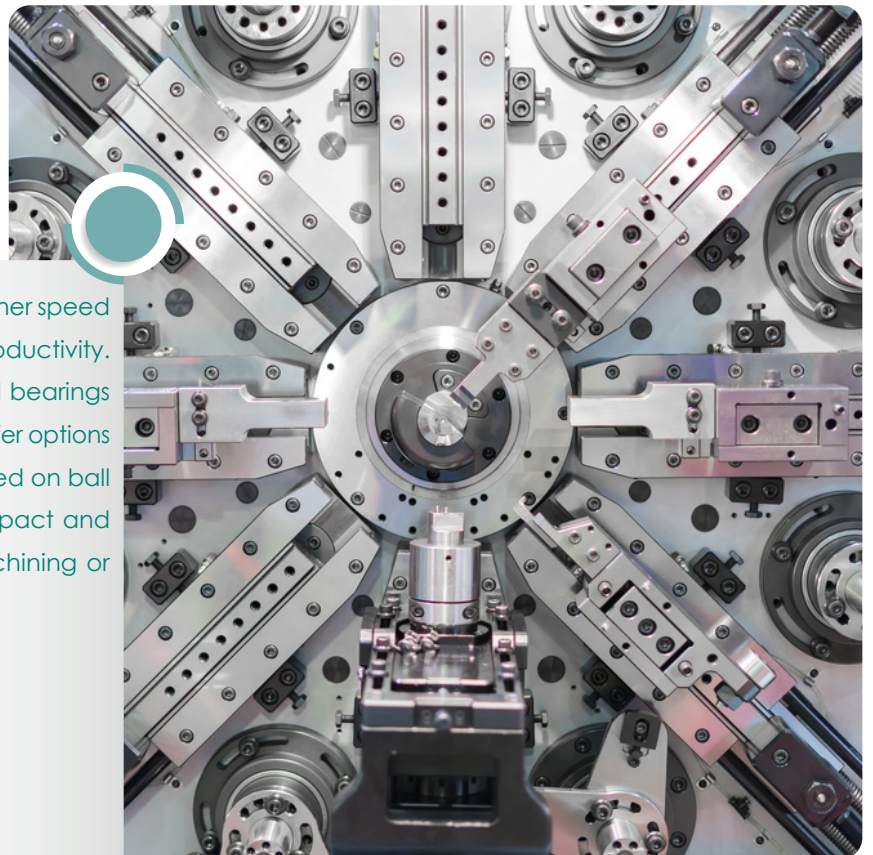


Fig. 10-i: wire bending machine



HRB is the key bearing to success when failure is not an option. In **Military and Defense**, ALT BEARINGS provides its expertise, high quality products and services to meet demanding requirements for ground, air and marine equipment.

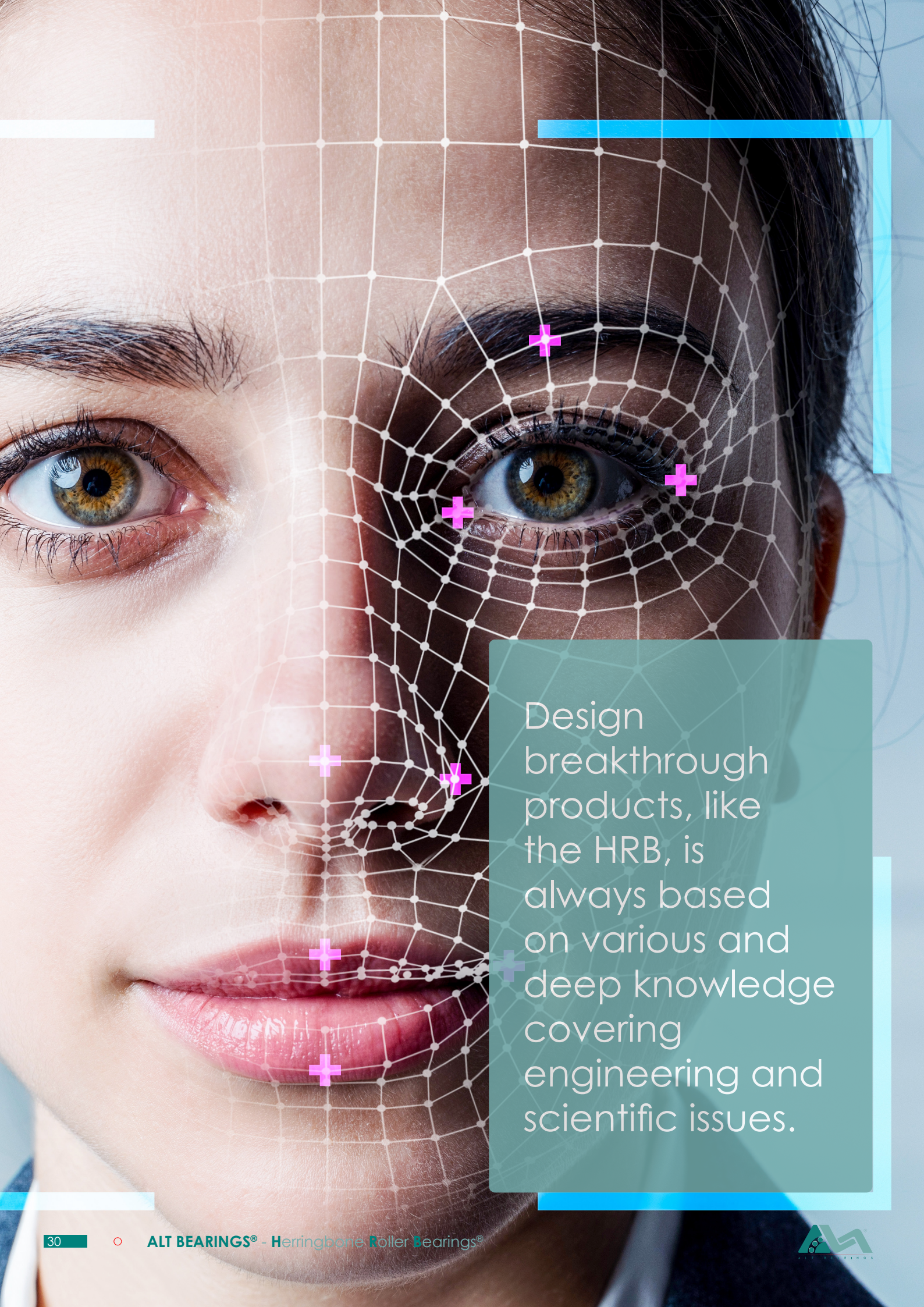


Fig. 10-j: military drone



All over the world, **Renewable Energy** is being developed as a new resource. HRB is designed and manufactured to fulfil the needs of our customers for the clean energy industry. ALT BEARINGS offers solutions for rotating mechanisms suited to the issues imposed by solar panel and wind power generation or powerstation. Our different bearings solutions are particularly adapted to photovoltaic power generation to save weight, create space, reduce friction, increase design flexibility, and provide excellent running accuracy for water powerstation, heavy duty and reliability.

Fig. 10-k: renewable energy equipment



Design breakthrough products, like the HRB, is always based on various and deep knowledge covering engineering and scientific issues.

HRB TECHNICAL ASPECTS

3



3.1 Backlash and preload

It is well known that backlash could reduce lifetime of bearings as rolling elements can slide and have random or hazardous trajectory. The HRB has been designed to keep reliability and lifetime in mind and is then delivered with zero backlash as the standard version. The backlash elimination is achieved with a spring ring and an accurate manufacturing of all

components. The preloaded version of HRB is also carefully adjusted with a spring ring to get stiffness increase without compromising the lifetime and is only available on request. The preload is then provided in tension or compression mode depending on the width of the spring ring.

3.2 Speed and noise

In classic bearings, skidding often occurs when the rolling elements become large and heavy. In the HRB, the double-helical threads prevent the skidding no matter the type of the rollers. This enables reaching higher speeds and accelerations than any other existing bearing.

The opposite action of the herringbone threads eliminates internal backlash and ensures orbital equidistance position of rollers which eliminates the need of spacer rings or carriers, such as in the herringbone planetary gear.

Seals or wipers can be added according to application. In addition, the absence of gears like in traditional designs enables the HRB to reach extremely high speeds and accelerations while keeping the noise at a very low level.

In the HRB, the only source of a barely perceptible noise originates from contact between roller ends and carriers. Since, carriers can be made in non-metallic materials (composite, plastic, etc.) or simply removed, HRBs are significantly quieter than traditional bearings. For further noise reduction, our engineering team can offer special coatings and lubrication.

3.3 Lubrication and sealing

Lubrication is of high importance in mechanical assemblies and bearings. This enables good performance. Lubricant helps to reduce friction between the surfaces in contact and to ensure heat dissipation. It is also important:

- to protect against corrosion;
- to prevent metal-to-metal contact;
- to minimize wear.

Herringbone Roller Bearings are available with a selection of greases or oils that can be perfectly matched to the application.

Carriers and wipers help to avoid the contamination or pollution of the lubricant from outside (neighbour components, environment, etc.).

But for sealing purposes, seals remain the best solution and the HRB can be customized correspondingly.



3.4 Materials for the HRB components

The materials of components determine, to a large extent, the performance and reliability of the HRB.

The selection of materials for the rings, herringbone rollers, carriers and spring ring, is based on the hardness for load carrying capacity, fatigue resistance of threads (rolling contact paths) under clean or contaminated lubrication conditions, and the dimensional stability of the HRB components and herringbone threads.

ALT BEARINGS offers customized solutions. Our team can support your needs to propose specific materials and coatings as required.

Materials for rings and rollers: the main HRB components are available in different grades of high-quality hardened steels. The standard HRB version is built with AISI 52100 bearing steel or 100C6 to achieve high-performance, wear and fatigue resistance. Hardness is typically in the [59-63] HRC range to accept very high loads and achieve wear resistance and extended service life. Besides, stainless steel can be used when facing corrosion treats. Many high-performance stainless steels are available,

for low or high temperature, nonmagnetic, different grades or corrosion resistance. Titanium grades can also be used, for instance in aeronautic applications, helping to reduce the weight. ALT BEARINGS engineering team provides the ideal solutions based on the application.

Materials for the carrier(s): each spacer is made in steel or stainless steel. The grades used are similar as for the rings and the rolling elements. Polymers are also available when noise reduction is an issue. In addition, other materials such as bronze or aluminum can be used. Coating options are also available.

Materials for seals and wipers: these materials are chosen in order to withstand oxidation or ageing, wear and chemical aggression over a wide temperature range. In general, seals are made of sheet steel reinforced elastomers and wipers are made in polymers. The type of material depends on the type and size of the HRB as well as the application requirements. For additional information about seals and wipers materials, please contact our application engineering service.

3.5 Contacts in the mechanism

The HRB is a high-performance mechanism resulting from the combination of many factors. Among these are high contact density and the elimination of skidding.

The contact density is the number of contact points per length per rolling element considering all contact surfaces. In traditional bearings, the contact density decreases with the length of the bearing as there is always 1 or 4 rolling elements set axially per line to support the load in one direction (Fig. 6). However, the contact density in the HRB increases with the length of the bearing as there are multiple contact surfaces along the roller at contact interfaces. Also, the contact density can be easily modulated thanks to the pitch

of the threads. This is like having many rolling parts in a tiny space. For instance, for a given external load on the bearing, the load acting on a contact point in the HRB is much lower than the one on a traditional bearing ACBB.

The contact surface radii in the HRB are greater when compared to those of an equivalent traditional bearing in the same envelope (Fig. 9). Then, for a unit load acting on a single contact, the maximum pressure is lower in the HRB contact interfaces thanks to the contact surface radii. The induced stresses beneath the contact surface are lower than the material tensile strength and fatigue limit. So, the HRB can exhibit longer lifetime.

High contact density and contact surface radii enable the HRB to withstand high loads or contact pressure. That is why the lifetime is extremely high. Also, in the same envelope, all contact points are involved in the loading direction whereas for traditional bearing only

half of contact points are involved. The HRB can be used in both directions with the same load capacities whereas ACBBs for instance cannot because they must be used in a back to back or face to face arrangement.

3.6 Stiffnesses of the HRB

Stiffness should actually be called “stiffnesses” as it refers to a matrix with values quantifying deflection as a function of the directions. However, in the initial review, one may be concerned more directly with composite stiffnesses in the main directions such as axial, radial and bending stiffnesses.

Axial stiffness - The axial stiffness is the ability of a mechanism to withstand a purely axial load with more or less axial deflection. In the HRB, it greatly depends on the number of contact points and the geometry of contacting surfaces. The more the number of contacts, the higher the axial stiffness.

Radial stiffness - Similarly, the radial stiffness is the ability of a mechanism to withstand a purely radial load with more or less radial deflection. In the HRB, it greatly

depends on the number of rollers, the number contact points per roller length and the geometry of contacting surfaces. The more the number of contacts, the higher the radial stiffness.

Bending stiffness - The bending stiffness is the resistance of a mechanism while undergoing bending. In other words, it is the ratio obtained from the bending torque against the angular bending deformation in the normal direction. It can be challenging to determine bending stiffness. It depends on the number of rollers, the number of contacts per roller's length and the geometry of the contacting surfaces.

ALT BEARINGS has developed an advanced simulation or calculation model to assess stiffnesses. Our team will advise values for any loading cycle.

3.7 Power loss and efficiency

The HRB is dominated only by rolling friction thanks to its unique thread arrangement. Sliding is rare and only occurs at contact interfaces due to manufacturing defects. However, the power loss related to it remains

negligible. The power loss mainly originates from spin caused by the load and the relative velocity field over contact areas. This helps the HRB to achieve a very high efficiency.



3.8 Operating temperature

The normal operating temperature with standard materials is between -30°C and 180°C. When the HRB operates beyond the upper temperature level, the hardness of the herringbone threads may be reduced. This can also increase the oxidation of the components materials and cause the lubricant

properties to change. At extreme temperatures, the HRB can be provided with cooling chambers or grooves to suppress excessive heat. Special steels (standard or stainless) can be used to enable operation from -250°C up to +500°C.

3.9 Basic load ratings

Equivalent load - The equivalent load F_Q is the load axially or radially acting on the HRB. This load depends on the amount of radial load and axial load applied on the HRB. The calculation of the equivalent load is very complex as it takes into account the radial and axial load distribution. The equivalent load F_Q is given by the relation (1) :

$$F_Q = X \cdot F_R + Y \cdot F_A \tag{1}$$

where:

- F_R is the actual radial component of the bearing load [kN];
- F_A is the actual axial component of the bearing load [kN];
- X is the radial load factor for the bearing;
- Y is the axial load factor for the bearing.

	X	Y
$F_R / F_A \leq 0.8$	0.65	1.00
$F_R / F_A > 0.8$	1.05	0.70

Tab.2: load factors for the HRB

X and Y are constant parameters that are depending on the load distribution, thus of the number of contacts per roller, the number of rollers, the radial and the axial load values. Tab. 2 gives X and Y data that can be used to calculate both dynamic and static equivalent loads for HRB. Please contact ALT BEARINGS for customized applications or detailed calculations.

Fluctuating bearing load - In many cases the magnitude of load varies. In some applications, the operating conditions, such as the magnitude and direction of loads, speeds, temperatures and lubrication conditions are continually changing. In these types of applications, to calculate the HRB life it is essential to first reduce the load spectrum or duty cycle of the application to a limited number of simplified load cases F_j ($1 \leq j \leq n$) (Fig. 11).

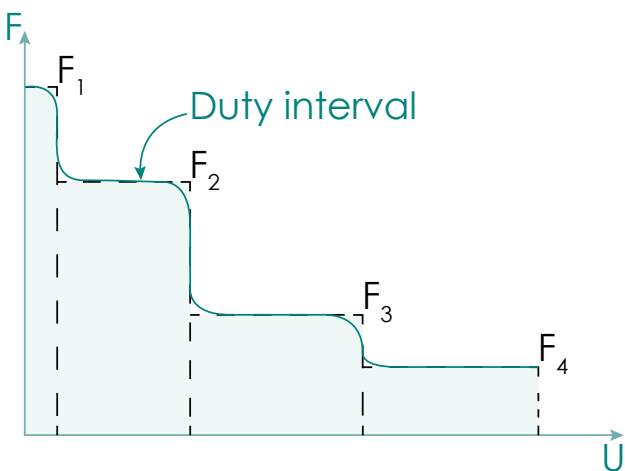


Fig. 11: duty intervals

In cases of continuously changing loads, each different load level can be accumulated and the load spectrum reduced to a histogram of constant load blocks. Each block should characterize a given percentage or time-fraction U_j ($1 \leq j \leq n$) during operation. Then, the cubic equivalent mean load F_m corresponding to this spectrum is given by the relation (1):

$$F_m = \frac{(F_1^3 U_1 + F_2^3 U_2 + F_3^3 U_3 + \dots + F_n^3 U_n)^{1/3}}{(U_1 + U_2 + U_3 + \dots + U_n)^{1/3}} \quad (2)$$

where:

- $F_1, F_2, F_3, \dots, F_n$ are the load related to phases 1, 2, 3, ..., n
- $U_1, U_2, U_3, \dots, U_n$ are the percentage of duration of phases 1, 2, 3, ..., n

Mean load within a duty cycle - Within each loading interval the operating conditions can slightly vary from the nominal value (Fig.12). Assuming that the operating conditions like speed and load direction are fairly constant and the magnitude of the load constantly varies between a minimum value $F_{\min}$ and a maximum value $F_{\max}$, the mean load F_m is given by the relation (3):

$$F_m = \frac{F_{\min} + 2 F_{\max}}{3} \quad (3)$$

Rotating load - If the load on a HRB consists of a load F_1 , which is constant in magnitude and direction (Fig. 13), such as the weight of a rotor, and a rotating constant load F_2 , such as an unbalance load, the mean load F_m can be obtained from the relation (4):

$$F_m = f_m (F_1 + F_2) \quad (4)$$

where values for the factor f_m are provided (Fig. 14) by the relation (5):

$$f_m = \left(\frac{F_1}{F_1 + F_2} - \frac{1}{2} \right)^2 + \frac{3}{4} \quad (5)$$

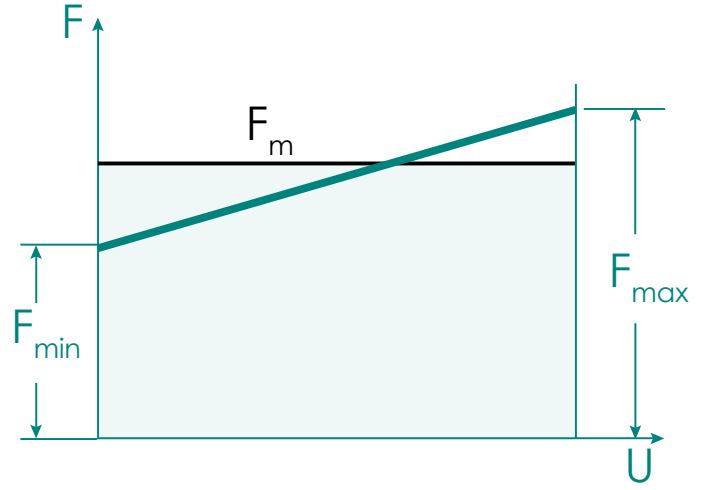


Fig. 12: load averaging

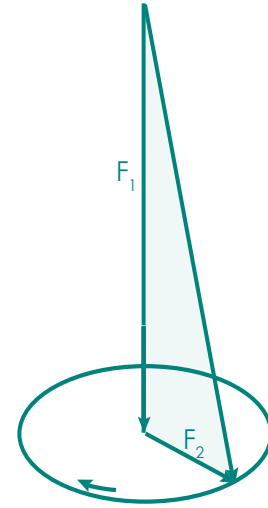


Fig. 13: rotating constant load F_2

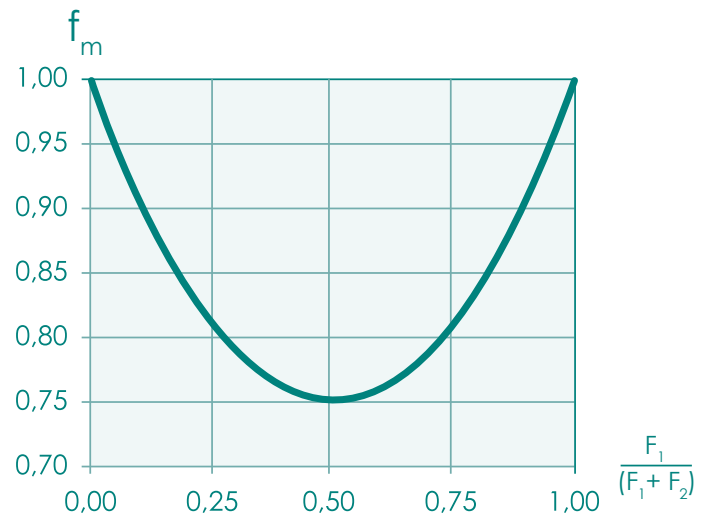


Fig. 14: rotating load factor

Load ratings - The load rating of a HRB is captured through the static load capacity C_0 and the dynamic load capacity C . The static load capacity C_0 is the maximum load that generates a permanent deformation of 0.0001 times the diameter of the rolling element. A permanent deformation is typically caused by:

- heavy loads acting on the HRB while it is stationary or oscillating slowly;
- heavy shock loads acting on the HRB while it is rotating.

Due to the numerous contact points of the HRB, permanent deformations on threads do not necessarily result in higher vibration or noise levels unless the basic life rating is exceeded to a large extent and the mechanism close to failure. Also, the internal clearance does not increase and remains constant.

The dynamic load capacity C is defined as the load that gives a lifetime of one million revolutions of the inner race. The dynamic load rating hence plays a vital role for the bearing life. In whatever operating condition, the HRB size is selected on the basis of the dynamic load capacity C in respect of the basic rating life.

Both C and C_0 factors are commonly defined for all types of bearings mainly to compare solutions. It does not represent necessarily the magnitude of force that can be applied dynamically or statically. Often traditional solutions have limitations for the maximum external force that cannot exceed a small percentage of the calculated load ratings.

The comparison of the HRB with other existing bearings shows that the Herringbone Roller Bearing is the best solution ever designed in terms of load capacities.

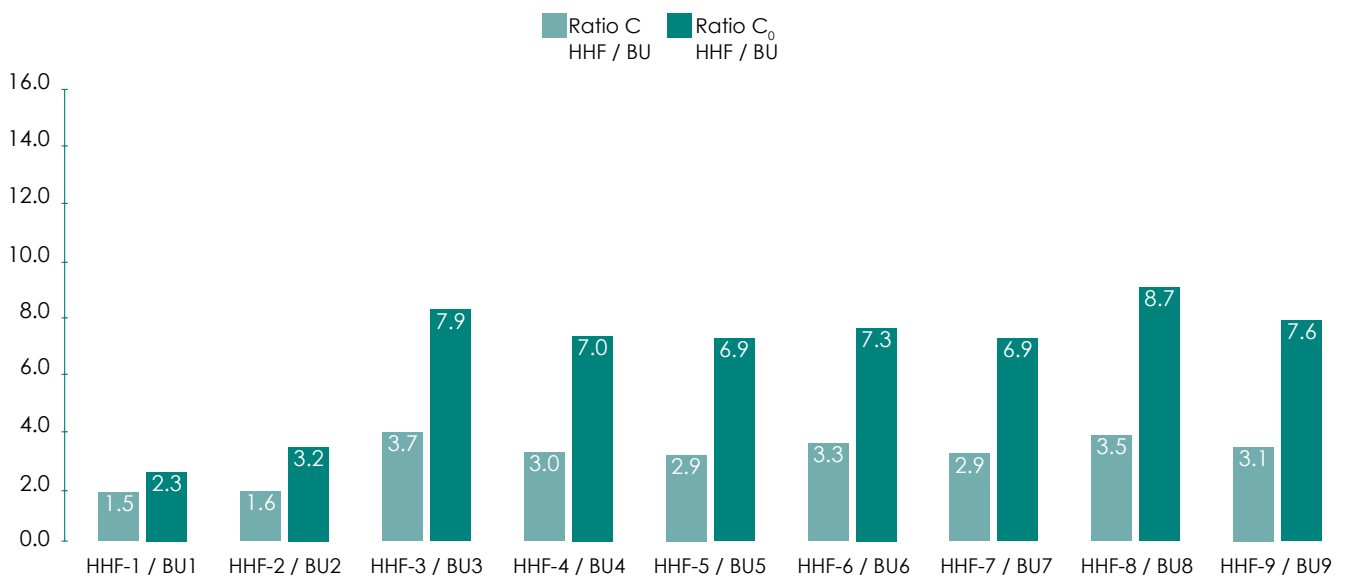


Fig. 15: ratios of static and dynamic load capacities of HHF vs. BU

Fig.15 illustrates the ratios of the capacities of HHF against those of the Bearing Units (BUs) from published data. The static load capacities of the HHF are 2.3 to 8.7 times those of the BUs and the dynamic load capacities of the HHF are 1.5 to 3.7 times those of the BUs. From our reference tables (see pages 68-69), the gap in dynamic capacities correspond to theoretical lifetimes

4 to 50 times those reached by BUs set in symmetrical arrangements. Briefly, the HHF has a dynamic capacity on average 2.8 times higher than the BU, i.e. a service life 27 times greater, and has a static capacity on average 6.4 times larger, which allows for instance to downsize of 1 to 2 sizes.

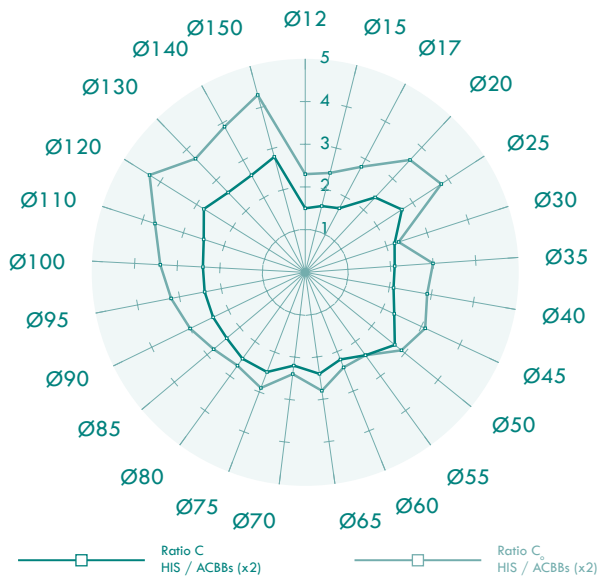


Fig. 16-a: load capacities # HIS vs. ACBBs (x2)

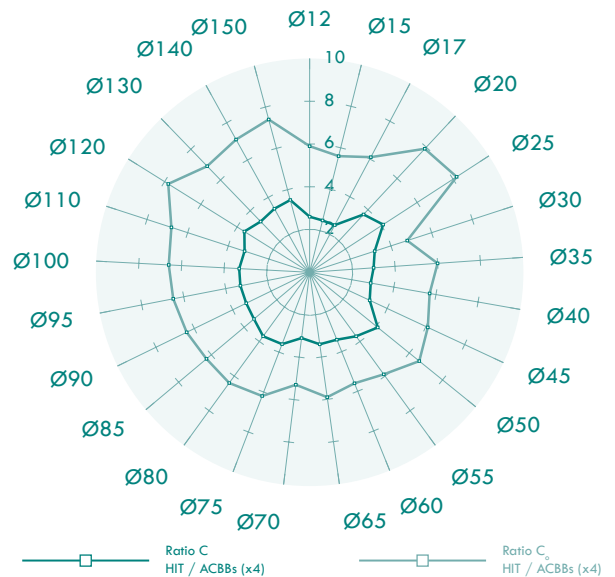


Fig. 16-b: load capacities # HIT vs. ACBBs (x4)

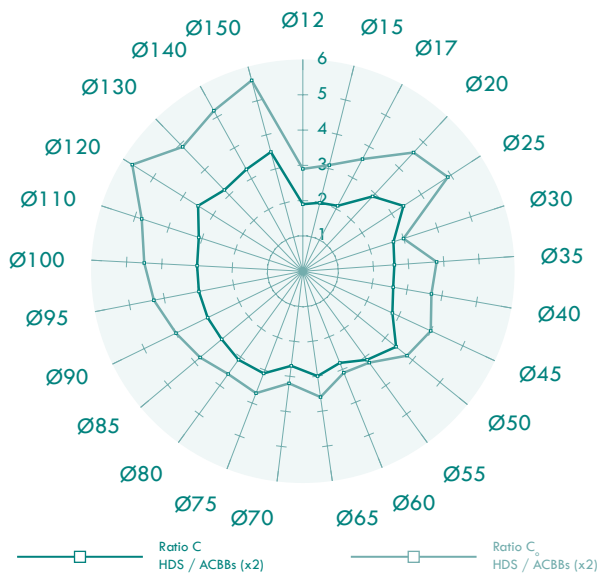


Fig. 16-c: load capacities # HDS vs. ACBBs (x2)

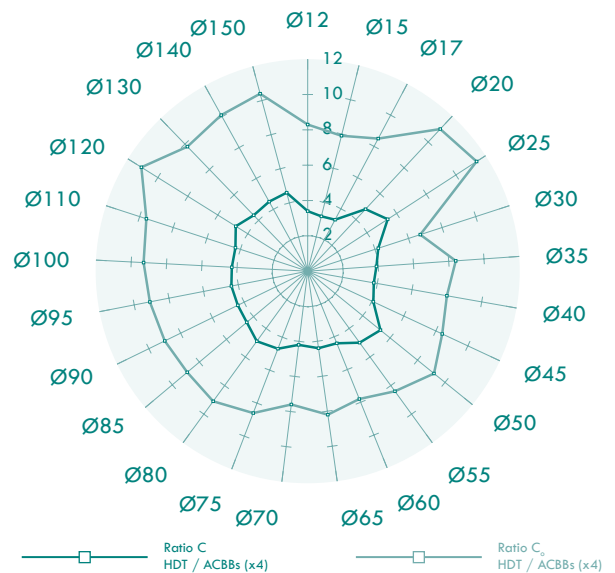


Fig. 16-d: load capacities # HDT vs. ACBBs (x4)

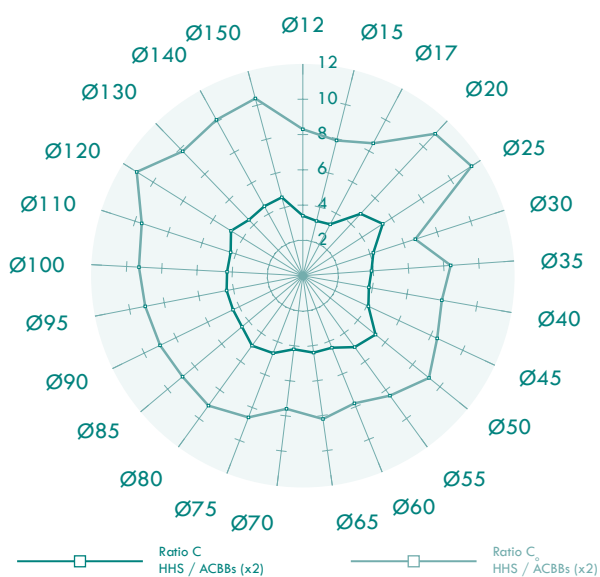


Fig. 16-e: load capacities # HHS vs. ACBBs (x2)

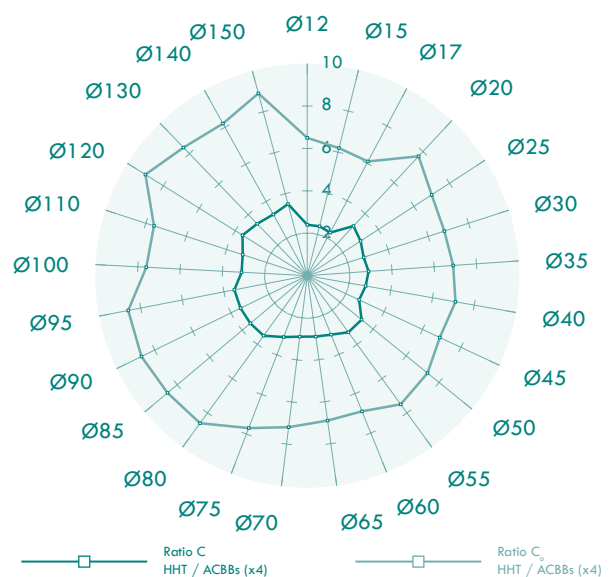


Fig. 16-f: load capacities # HHT vs. ACBBs (x4)

Fig.16 depicts the ratios of the load capacities of the other HRBs against those of stacks of ACBBs from published data. It can be seen that the dynamic load capacities ratios fluctuate in the range of 1.5 to 5.4 which corresponds to a lifetime benefit of 3.7 to 157 times. The static load capacity ratios are in the range of 2.3 to 11.4 which helps to safely endure heavy loads or impacts.

Effect of surface hardness on HRB load ratings -

According to the ISO reference calculations, the load ratings provided in the catalogue are given for surface hardness above 654 HV (58 HRC). For materials or treatments giving a lower hardness, some correction factors have to be applied to the dynamic and static load carrying capacities:

$$C_{\text{corrected}} = C \times \left(\frac{HV_{\text{actual}}}{654} \right)^2 \quad (6)$$

$$C_{0 \text{ corrected}} = C_0 \times \left(\frac{HV_{\text{actual}}}{654} \right)^2 \quad (7)$$

3.10 Basic rating life

The life prediction of a HRB is very complex, even more than that for a standard ball or roller bearing. The lifetime of the HRB not only depends on the lubrication and cleanliness conditions, on the actual loads and the geometry which determine the contact pressures and the in-depth and beneath stresses, but also the surface finish, the material properties, metallurgical structure and hardness profile and the surrounding conditions like environment or mounting. Some of these factors are independent from the design which make a full-service life calculation complex without assessment of full application conditions. Then, only the basic rating life of the HRB can be considered. This one refers on the material fatigue of the rolling surfaces in contact.

In accordance with ISO 281, the basic rating life of the HRB is predicted using the Lundberg and Palmgren theory as follows.

$$L_{10} = \left(\frac{C}{F_Q} \right)^3 \quad (8)$$

where:

- L_{10} is the lifetime expressed in millions of revolutions (with 90 percent probability of survival);
- C is the dynamic load capacity;
- F_Q is the equivalent normal load.

Advanced models presented in bearing catalogs with more factors combined with the equation (8) can be applied as well.

If the speed is constant, it can be also interesting to calculate the life expressed in operating hours using the relation (9)

$$L_{10h} = \left(\frac{10^6}{60N} \right) L_{10} \quad (9)$$

where:

- L_{10h} is the basic rating life or operating hours (with 90 percent probability of survival);
- N is the rotational speed [r/min].

Probability of Survival	Failure Probability	ALT BEARINGS Rating Life	Factor
	m	L_m	a_1
%	%	10^6 revs.	-
90	10	L_{10}	1.00
95	5	L_5	0.62
96	4	L_4	0.53
97	3	L_3	0.44
98	2	L_2	0.33
99	1	L_1	0.21

Tab.3: values for life adjustment factor

The lifetime for a certain probability of survival is given by the following relation:

$$L_m = a_1 \cdot L_{10} \quad (10)$$

where:

- L_m is the basic rating life at 100-m percent of probability of survival;
- a_1 is the life adjustment factor of reliability whose values are given in Tab. 3.

CONNECTION
ANALYSIS
DATA
SEARCHING
VERIFICATION
CODING
SENDING

ALT BEARINGS®
constantly
develops
advanced
tools to analyse
in details the
behaviour of
the HRBs in your
applications with
high security
factors.

HRB CALCULATION EXAMPLES

4



This section presents some calculation examples that can be done easily. More advanced calculations can be performed with ALT BEARINGS proprietary software to consider complex loading and speeds cycles or mounting conditions for the HRB. Please contact ALT BEARINGS engineering department for any specific calculations.

4.1 Example 1:

HRB subjected to a pure axial load

A HIS-030 is to operate under a constant axial load $F_A = 10$ kN. The desired reliability is 90% and it is assumed that the operating conditions are very clean. What is the basic rating life?

According to the product guide, the dynamic load capacity C of such HRB is 84 kN. The equivalent load is $F_Q = 1 \times 10 = 10$ kN. Then, the basic rating life is given by the relation:

$$L_{10} = \left(\frac{84}{10} \right)^3 = 592.70 \times 10^6 \text{ revs.} \quad (11)$$

4.2 Example 2:

HRB under to a pure radial load

A HIS-030 is to operate under a constant radial load $F_R = 10$ kN. The desired reliability is 90% and it is assumed that the operating conditions are very clean. What is the basic rating life?

From to the product guide, the dynamic load capacity C of such HRB is 84 kN. The equivalent load is $F_Q = 1.05 \times 10 = 10.5$ kN. Then, the basic rating life is given by the relation:

$$L_{10} = \left(\frac{84}{10.5} \right)^3 = 512.00 \times 10^6 \text{ revs.} \quad (12)$$

4.3

Example 3:

HRB subjected to a combination of a radial and a dominant axial loads

Consider again the same HIS-030 to operate under a constant an axial load $F_A = 10$ kN and a radial load F_R whose value is 4 kN. The desired reliability is 95% and it is assumed that the operating conditions are very clean. Let us determine the lifetime of this HRB?

Let's calculate $F_R/F_A = 0.4$. As $F_R/F_A \leq 0.8$, according to Tab.2, the load factors are respectively $X=0.65$ and $Y=1$. Then, the equivalent load yields into:

$$F_Q = 0.65 \times 4 + 1 \times 10 = 12.6 \text{ kN} \quad (13)$$

The basic load rating life L_5 which corresponds to a reliability of 95% is given by the relation:

$$L_5 = 0.62 \times \left(\frac{84}{12.6} \right)^3 = 183.70 \times 10^6 \text{ revs.} \quad (14)$$

Fig.17 shows the trend of the lifetime against the radial load for a given axial load. It can be seen, in this case where the axial load is comparatively bigger, that the radial load reduces the basic rating life. This is because the radial load increases the intensity of distributed loads on the contact points and over the rolling elements.

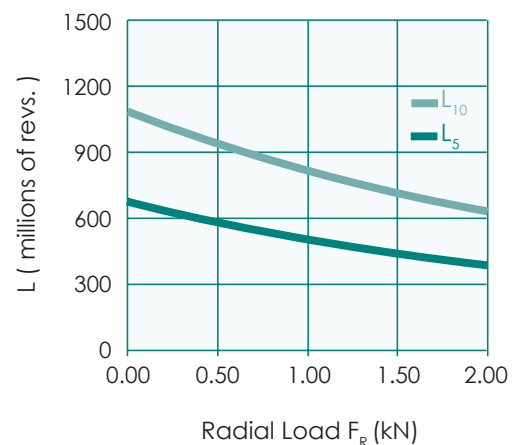


Fig.17: influence of the radial load on the basic rating life

4.4

Example 4:

HRB subjected to a combination of an axial and a dominant radial loads

Consider again the same H15-030 to operate under a constant an axial load $F_R = 10 \text{ kN}$ and a radial load F_A whose value is 4 kN . The desired reliability is 95% and it is assumed that the operating conditions are very clean. Let us determine the lifetime of this HRB?

$F_R/F_A = 2.5$. As $F_R/F_A \geq 0,8$ according to Tab.2, the load factors are respectively $X=1.05$ and $Y=0.70$. Then, the equivalent load yields into:

$$F_Q = 0.70 \times 10 + 1.05 \times 4 = 13.30 \text{ kN} \quad (15)$$

The basic load rating life L_5 which corresponds to a reliability of 95% is given by the relation:

$$L_5 = 0.62 * \left(\frac{84}{13,3}\right)^3 = 156.20 \times 10^6 \text{ revs.} \quad (16)$$

Fig.18 shows the trend of the lifetime against the radial load for a given axial load. It can be seen, in this case where the axial load is comparatively bigger, that the axial load reduces the basic rating life. This is because the axial load modifies increases the intensity of distributed loads on the contact points and over the rolling elements.

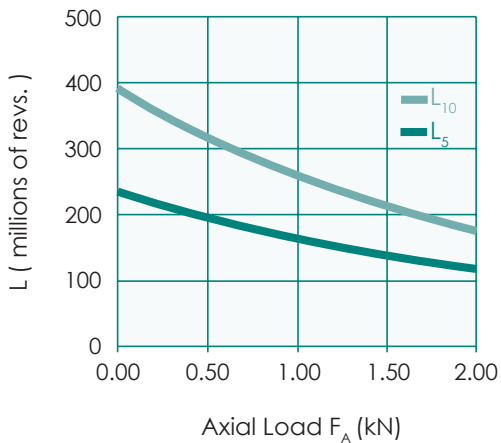
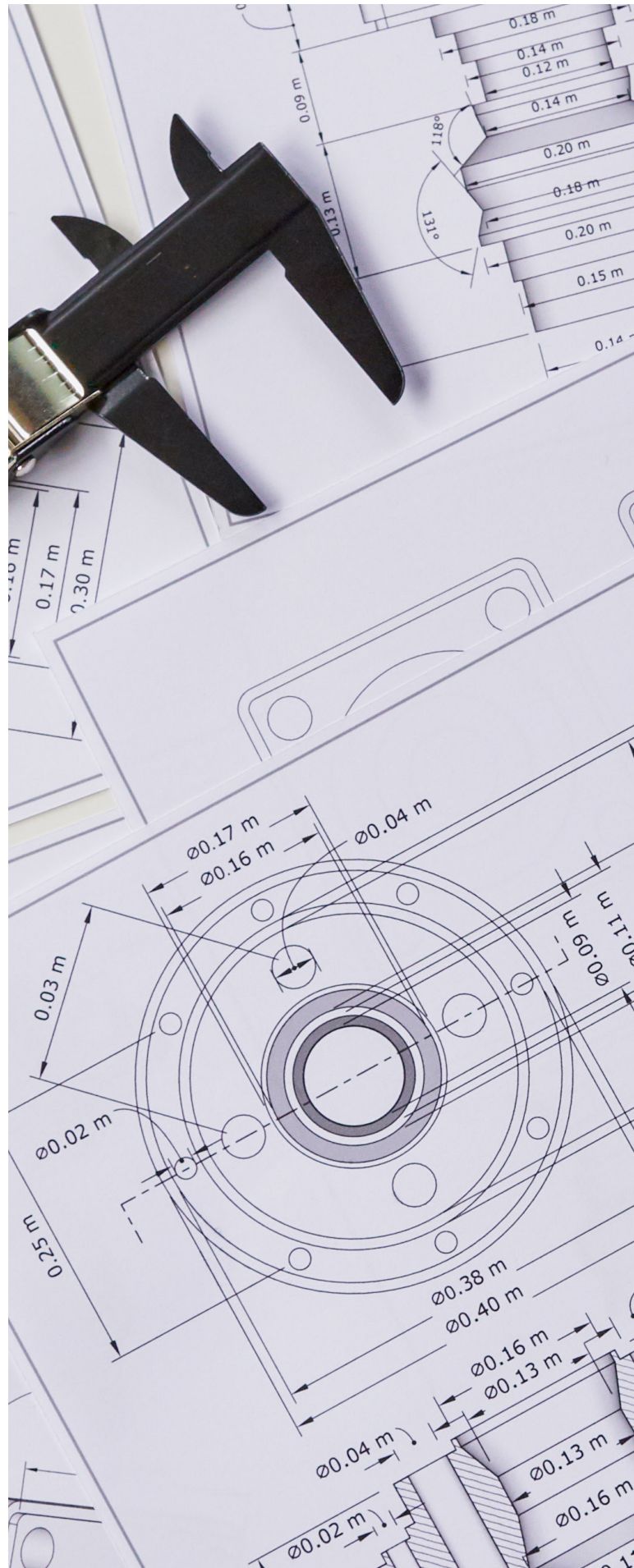


Fig.18: influence of the axial load on the basic rating life





HRB products are suited to critical space constraints and can replace conveniently existing, traditional bearings or solutions.

HRB FEATURED PRODUCTS

5



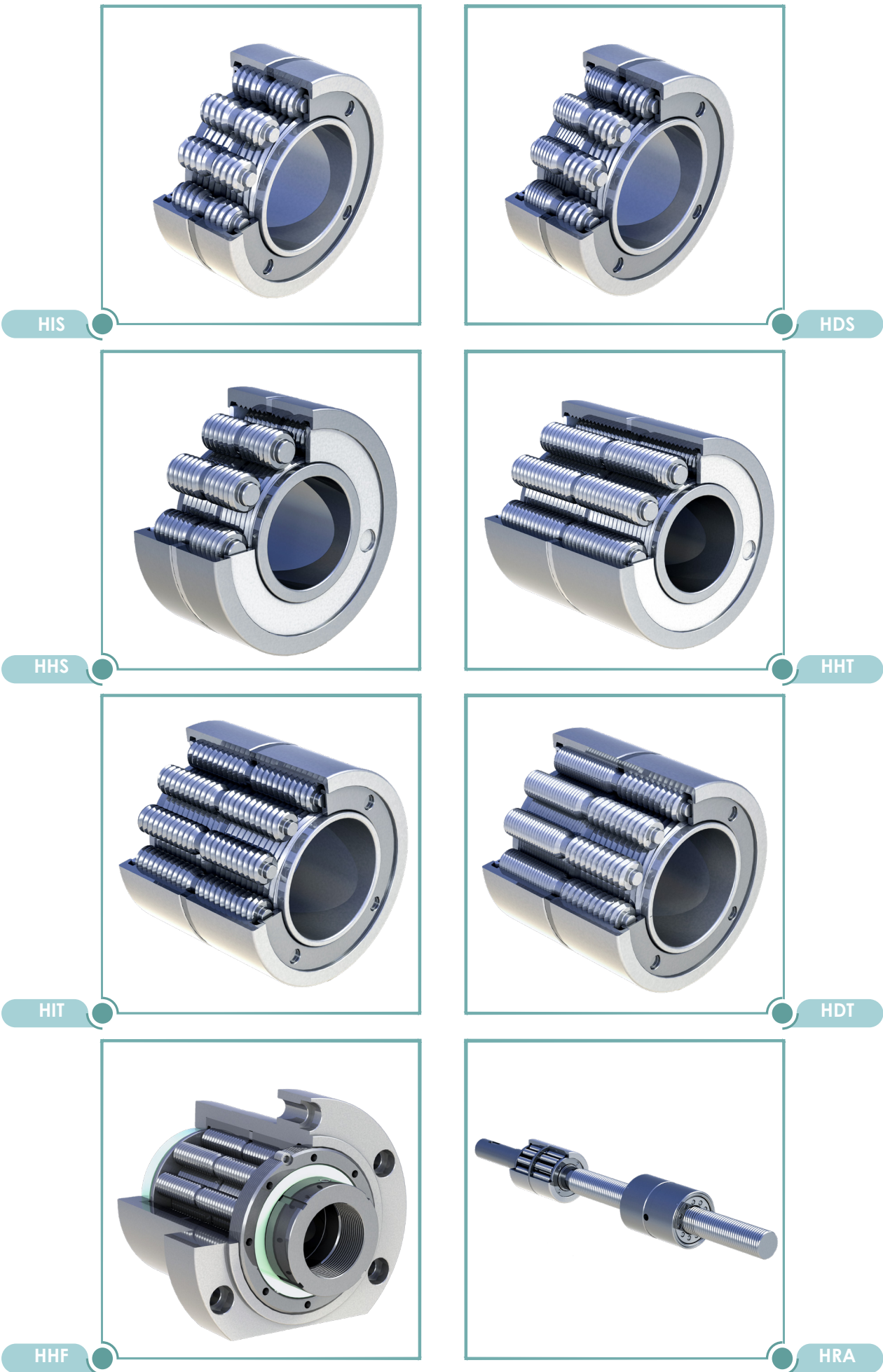


Fig. 19: standard products

5.1 Standard products

ALT BEARINGS guide incorporates eight products with many available references as shown on Fig.19.

- HIS: Single Identical HRB
- HIT: Twin Identical HRB
- HDS: Single Differentiated HRB
- HDT: Twin Differentiated HRB
- HHS: Single High-Capacitive HRB
- HHT: Twin High-Capacitive HRB
- HHF: Support Bearing
- HRA: Assembled Roller Screw with integrated HRB

With the same arrangement in terms of herringbone threads pitches, HHS and HHT differ respectively from HIS and HIT due to their length and external diameters.

HDS and HDT are relevant when it comes to higher capacities and higher stiffnesses in the same space as HIS and HIT and when the peak loads are not the same in both directions.

HHF products are designed and manufactured to offer an alternative to customers using already bearing units with ACBBs and needing higher capacities to achieve longer lifespan to address higher capacities and lifespan issues.

The HRA solutions are available upon request. These can advantageously equip ball or roller screws. The length of the bearing portion can be adapted to the application needs or requirements. Please contact us for more information.

The load capacities given in the Product Tables (see pages 56 to 71) are calculated considering standard steel and a hardness of 58 HRC for standard steels. Calculated masses inside those Tables do not include any lubricant.

Our models are highly engineered and have been qualified. They can be relied upon as being proven capacities.

5.2 Selection of HRB solutions

The selection process of an HRB is very close to the one used for existing bearings. However, the HRB is not a traditional bearing designed with simple balls, cylindric or taper rollers. The HRB has unique, threaded rollers. The internal behaviour is therefore different from standard bearing solutions.

Although it might be possible, ALT BEARINGS does not recommend to combine products together to obtain equivalent 'T-' (Tandem), 'O-' (back to back), or 'X-' (face to face) configurations like a stack of ACBBs. For instance, it is recommended to use one HIT instead of combining 2 HIS. Moreover, we do not recommend either to combine a HIT and a HIS.

Charts are provided on following pages (50-53) to help you find the best product by underlining the main features of each type of HRB. Gains in terms of load capacities are highlighted and basic rating life compared to 2 or 4 rows of ACBBs in virtual equivalent 'T-' configuration. But in reality, these bearings are mounted in 'O-' or 'X-' configurations in a symmetrical arrangement, which means twice as many capacity ratings and consequently 8 times the lifespan.

Also, the Single HRB can be customized to any size you might need, even in the envelope of a single angular contact ball bearing (ACBB). For more information please contact our application engineering service.

5.3 Designation of HRB products

The HRB can be designated with seven (07) main parameters defining:

- the Herringbone Roller Bearing's type
- the internal diameter of the inner ring
- outer rings type
- the preload
- the material
- the type of lubrication
- the type of customization

The last five (05) parameters are optional and the

designation can then be contracted for the default HRB. For example:

- HIS-030 is equivalent to HIS-030 S-P0-M0-L0-C0;
- HIS-040 S-P1 equals HIS-040 S-P1-M0-L0-C0.

Customization includes for instance wipers, seals, absence of carriers, non cylindrical shape of the nut, or any specific constraints of the customer.

Please use our request form on pages 70-71 or on line if you need to request a HRB product.

5.4 Additional products

HRB products described in this catalogue include a herringbone inner ring combined with two outer half-rings which are separated by a spacer. Sometimes, other designs upon request may alternatively include two inner half-rings separated by a spacer combined with a herringbone outer ring.

In particular, HHF products can be even more compact with less components. In standard designs, the housing and the outer half-rings are modular components. In another designs, the housing can be directly turned into a herringbone outer ring for compactness.

In standard version, herringbone components are symmetrically designed meaning that each thread portion has the same length. In other solutions, herringbone components may not be symmetrically designed depending on the application needs in order to increase performance.

All those specific designs among others are only suitable in few cases of extremely high demanding applications. Please contact our application engineering service if you need more information.

5.5 Handling and installation recommendations

Packaging: HRBs are delivered with packaging that protect them again shocks during transportation.

Disassembly of external rings: the HRB is assembled with a special tooling. ALT BEARINGS strongly recommends that you do not attempt to disassemble any component. Please follow instructions in the delivery box.

Storage: it is important to store HRBs without exposure to contaminants, vibrations, shocks, humidity or other detrimental conditions.

Handling: HRBs are precision components and should be manipulated with care to prevent damaging shocks, contamination or corrosion.

Standard designation
Complete designation

HIS-030

HIS-030 N-P0-M0-L0-C0

HRB Type

HIS	Single Identical HRB
HIT	Twin Identical HRB
HDS	Single Differentiated HRB
HDT	Twin Differentiated HRB
HHS	Single High-Capacitive HRB
HHT	Twin High-Capacitive HRB
HHF	Housing with ultra-capacitive HRB

Bore Diameter or Reference**Outer Rings Type**

S	Standard
N	Nonstandard

Preload

P0	Zero preload
P1	Light preload

Material

M0	Steel
M1	Stainless Steel
M2	Titanium
M3	Aluminum
M4	Plastic
M5	Other

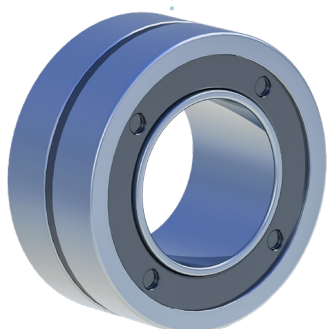
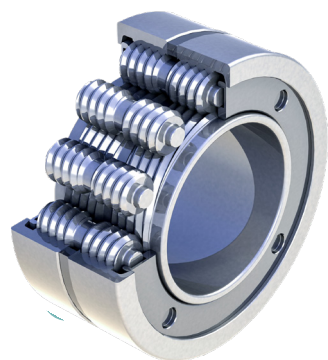
Type of lubrication

L0	Grease
L1	Oil
L2	Dry
L3	None

Customization

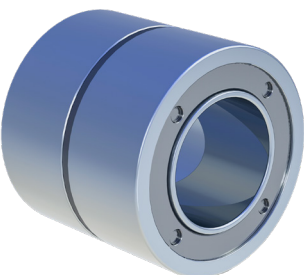
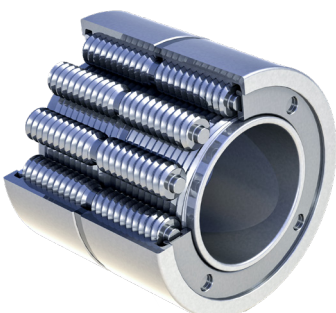
C0	None
C1	With

Example : HIS-030 S-P1-M0-L0-C0



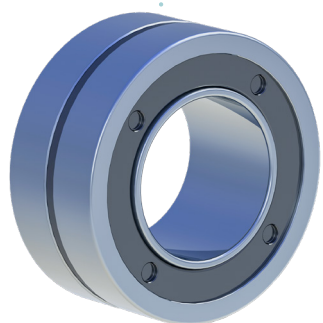
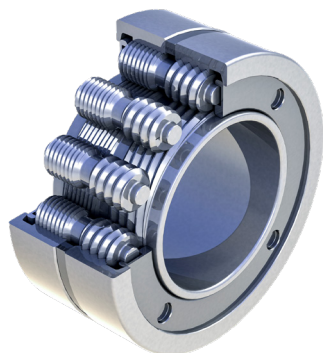
Synoptic - HIS

Designation:	Single Identical Herringbone Roller Bearing
Internal Diameter:	range from Ø12 to Ø150 for standard bearings
External Diameter:	range from Ø32 to Ø270 for standard bearings
Length:	range from 17 to 90 for standard bearings
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 2.8 times compared to equivalent 2xACBBs in T configuration
Static capacity:	up to 4.3 times compared to equivalent 2xACBBs in T configuration
Stiffnesses:	extremely high
Lifetime:	tremendous (up to 22 times the one of equivalent 2xACBBs in Tandem)
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request



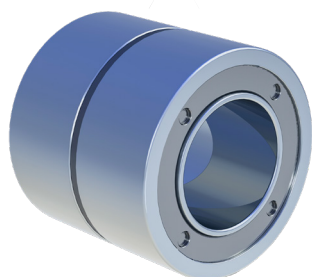
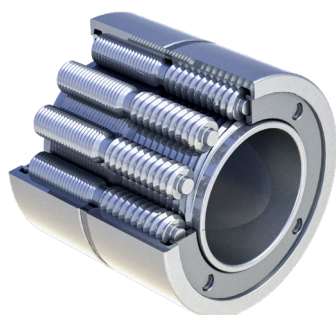
Synoptic - HIT

Designation:	Twin Identical Herringbone Roller Bearing
Internal Diameter:	range from Ø12 to Ø150 for standard bearings
External Diameter:	range from Ø32 to Ø270 for standard bearings
Length:	range from 34 to 180 for standard bearings
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 4.1 times compared to equivalent 4xACBBs in T configuration
Static capacity:	up to 7.4 times compared to equivalent 4xACBBs in T configuration
Stiffnesses:	extremely high (more than 2 times HIS one)
Lifetime:	tremendous (up to 69 times the one of equivalent 4xACBBs in Tandem)
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request



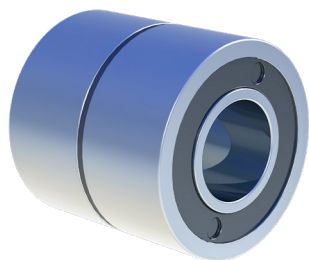
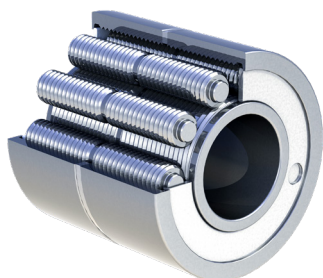
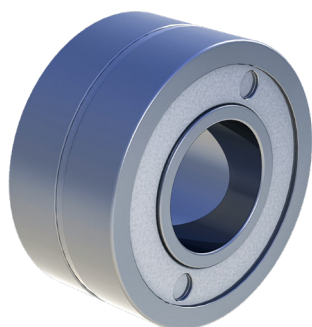
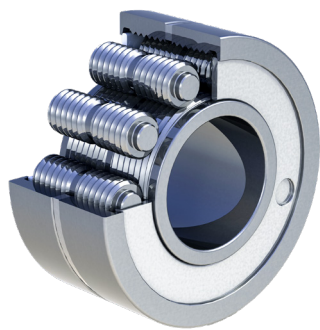
Synoptic - HDS

Designation:	Single Differentiated Herringbone Roller Bearing
Internal Diameter:	range from Ø12 to Ø150 for standard bearings
External Diameter:	range from Ø32 to Ø270 for standard bearings
Length:	range from 17 to 90 for standard bearings
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 3.5 times compared to equivalent 2xACBBs in T configuration
Static capacity:	up to 5.7 times compared to equivalent 2xACBBs in T configuration
Stiffnesses:	extremely high (more than HIS one)
Lifetime:	tremendous (up to 43 times the one of equivalent 2xACBBs in Tandem)
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request



Synoptic - HDT

Designation:	Twin Differentiated Herringbone Roller Bearing
Internal Diameter:	range from Ø12 to Ø150 for standard bearings
External Diameter:	range from Ø32 to Ø270 for standard bearings
Length:	range from 34 to 180 for standard bearings
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 5.4 times compared to equivalent 4xACBBs in T configuration
Static capacity:	up to 11.4 times compared to equivalent 4xACBBs in T configuration
Stiffnesses:	extremely high (more than 2 times HDS one)
Lifetime:	tremendous (up to 157 times the one of equivalent 4xACBBs in Tandem)
Resistance to shock:	good
Coatings:	under request
Sealing:	under request
Carriers:	can be removed under request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request

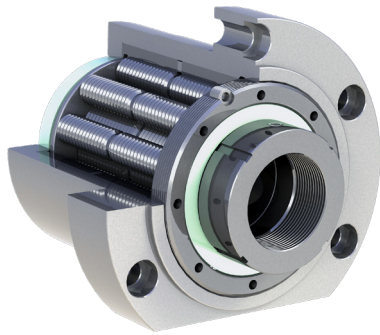


Synoptic - HHS

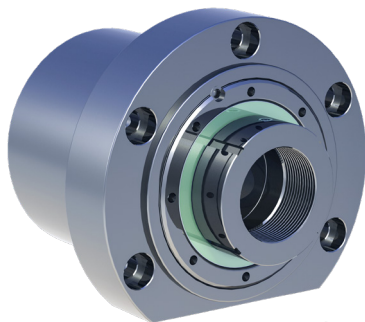
Designation:	Single H igh-Capacitive H erringbone R oller B earing
Internal Diameter:	range from Ø12 to Ø150 for standard bearings
External Diameter:	range from Ø37 to Ø320 for standard bearings
Length:	range from 24 to 134 for standard bearings
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 3.0 times compared to equivalent 2xACBBs in T configuration
Static capacity:	up to 6.0 times compared to equivalent 2xACBBs in T configuration
Stiffnesses:	extremely high
Lifetime:	tremendous (up to 27 times the one of equivalent 2xACBBs in Tandem)
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request

Synoptic - HHT

Designation:	Twin H igh-Capacitive H erringbone R oller B earing
Internal Diameter:	range from Ø12 to Ø150 for standard bearings
External Diameter:	range from Ø37 to Ø320 for standard bearings
Length:	range from 48 to 268
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 3.6 times compared to equivalent 4xACBBs in T configuration
Static capacity:	up to 8.9 times compared to equivalent 4xACBBs in T configuration
Stiffnesses:	extremely high
Lifetime:	tremendous (up to 48 times the one of equivalent 4xACBBs in Tandem)
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request

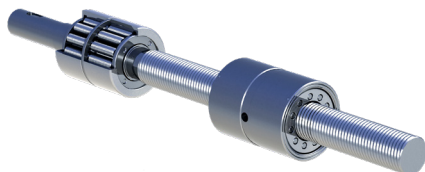


HHF

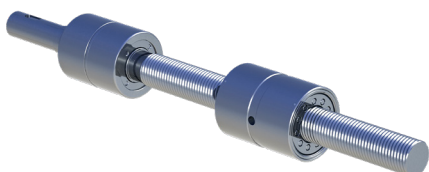


Synoptic - HHF

Designation:	Flanged Housing with High-capacitive Herringbone Roller Bearing
Internal Diameter:	Ø12, Ø17, Ø20, Ø25, Ø35, Ø50, Ø65, Ø90, Ø100 for standard products
External Diameter:	Ø47, Ø57, Ø58, Ø74, Ø94, Ø128, Ø164, Ø215, Ø240 for standard products
Flanged diameter	Ø77, Ø92, Ø122, Ø144, Ø177, Ø230, Ø292 for standard products
Length	40, 44, 74, 86, 106, 136, 163, 175, 208, 229, 272
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Loads:	uni-directional (radial, axial, moment), multi-directional
Dynamic capacity:	up to 3.7 times compared to equivalent competitor solutions
Static capacity:	up to 8.7 times compared to equivalent competitor solutions
Stiffnesses:	extremely high
Lifetime:	tremendous (up to 50 times the one of equivalent competitor solutions)
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request



HRA



Synoptic - HRA

Designation:	Assembled Roller Screw with integrated Herringbone Roller Bearing
Range:	from Ø12 to Ø150 corresponding to all dimensions of roller screws
Materials:	hardened steel, stainless steel, titanium, aluminium, plastics, etc.
Hardness:	58-62 HRC (650- 750HV) for standard and some stainless steels only
Lubrication:	grease, oil.
Dynamic capacity:	high regardless the loading direction
Static capacity:	high regardless the loading direction
Loads:	uni-directional (axial)
Stiffnesses:	extremely high
Lifetime:	tremendous
Resistance to shock:	good
Coatings:	upon request
Sealing:	upon request
Carriers:	can be removed upon request
Herringbone threads:	symmetric (standard) or asymmetric (specific application)
Maintenance:	low or free
Vibrations:	negligible
Heat:	minimised
Noise level:	extremely low (negligible)
Speed limit:	higher
Acceleration:	higher
Skidding:	none, or negligible
Parts:	customised on request



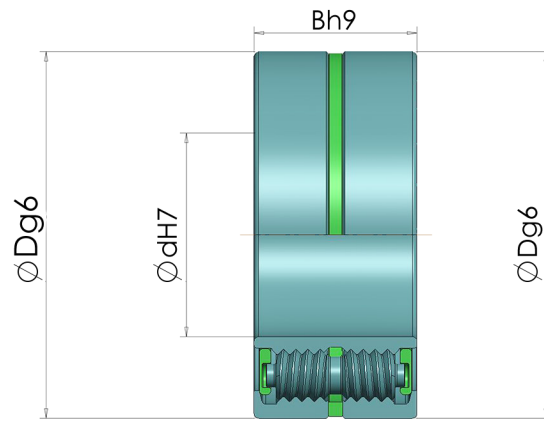
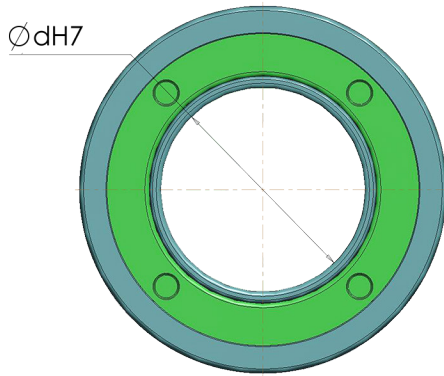
ALT BEARINGS®
manufacturing
facility is located
in Europe and
is certified to
ISO 9001 and
has decades
of experience
in precision
manufacturing.

HRB PRODUCT GUIDE

6



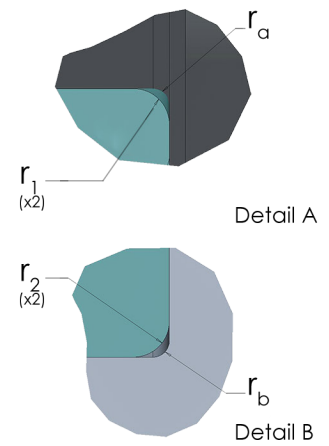
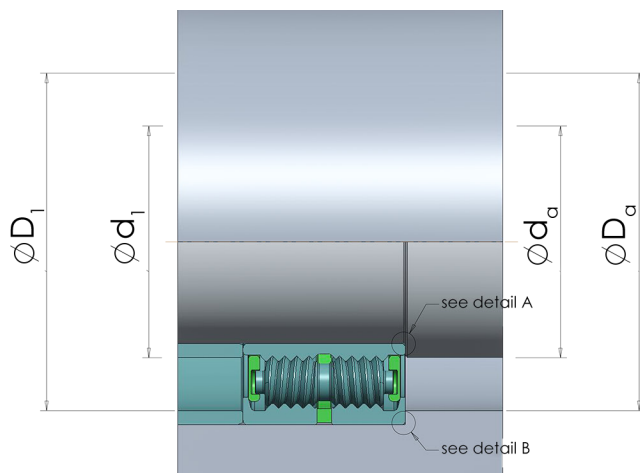
HIS – Single Identical HRB
d 12 – 150 mm



Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm			kN		–	r/min		kg
12	32	20	19	17	4x	25000	29100	0.09
15	35	22	24	24	4x	20000	23300	0.11
17	40	24	30	33	5x	17600	20500	0.16
20	47	28	55	58	13x	15000	17500	0.27
25	52	30	69	77	20x	12000	14000	0.32
30	62	32	84	97	10x	10000	11600	0.48
35	72	34	105	124	9x	8500	10000	0.68
40	80	36	122	150	9x	7500	8700	0.86
45	85	38	141	178	12x	6600	7700	0.96
50	90	40	176	182	20x	6000	7000	1.09
55	100	42	191	191	14x	5400	6300	1.41
60	110	44	222	242	11x	5000	5800	1.82
65	120	46	258	302	14x	4600	5300	2.26
70	125	48	262	306	10x	4200	5000	2.47
75	130	50	295	369	16x	4000	4600	2.64
80	140	52	339	407	15x	3700	4300	3.24
85	150	56	390	510	13x	3500	4100	4.06
90	160	60	447	630	13x	3300	3800	4.94
95	170	64	499	756	14x	3100	3600	6.02
100	180	68	559	899	14x	3000	3500	7.15
110	200	76	677	1213	15x	2700	3100	9.94
120	215	80	747	1403	22x	2500	2900	11.83
130	230	80	773	1443	17x	2300	2600	13.31
140	250	84	853	1659	19x	2100	2500	16.70
150	270	90	983	2079	22x	2000	2300	21.03

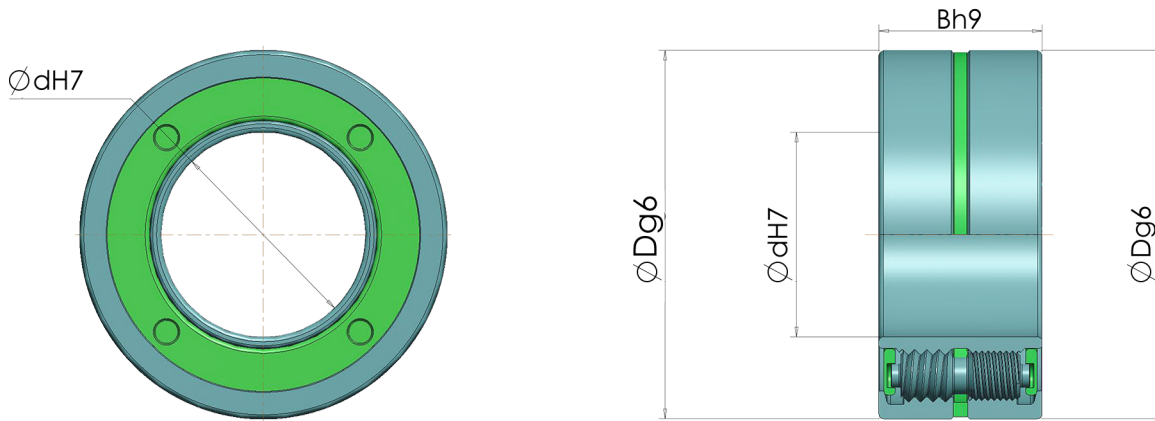
(¹) : It compares the bearing with a set of 2xACBBs of the same dimensions

HIS – Mounting on an end shaft



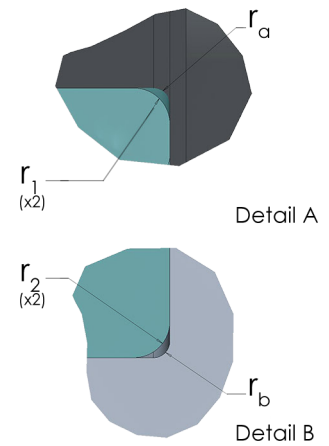
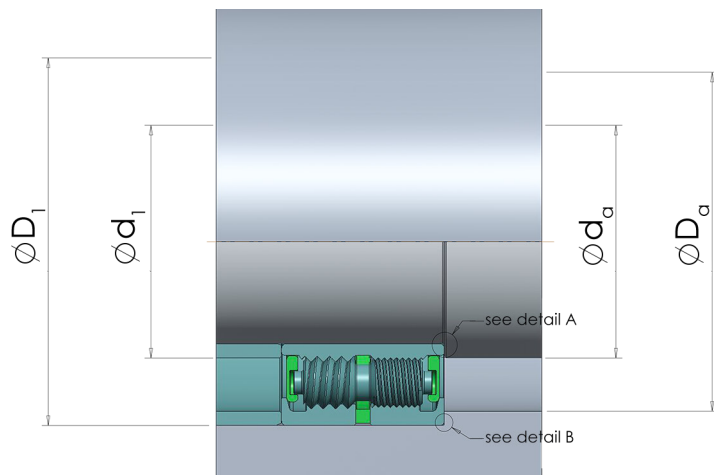
Designations Herringbone Roller Bearing	Dimensions			Abutment and fillet				
	d	d ₁	D ₁	r _{1,2} max	d _a max	D _a min	r _a max	r _b max
–	mm							
HIS - 012	12	17	27	0.6	17	27	0.6	0.3
HIS - 015	15	20	30	0.6	20	30	0.6	0.3
HIS - 017	17	22	35	0.6	22	35	0.6	0.6
HIS - 020	20	26	41	1	26	41	1	0.6
HIS - 025	25	31	46	1	31	46	1	0.6
HIS - 030	30	36	56	1	36	56	1	0.6
HIS - 035	35	42	65	1.1	42	65	1	0.6
HIS - 040	40	47	73	1.1	47	73	1	0.6
HIS - 045	45	52	78	1.1	52	78	1	0.6
HIS - 050	50	57	83	1.1	57	83	1	0.6
HIS - 055	55	64	91	1.5	64	91	1.5	1
HIS - 060	60	69	101	1.5	69	101	1.5	1
HIS - 065	65	74	111	1.5	74	111	1.5	1
HIS - 070	70	79	116	1.5	79	116	1.5	1
HIS - 075	75	84	121	1.5	84	121	1.5	1
HIS - 080	80	91	129	2	91	129	2	1
HIS - 085	85	96	139	2	96	139	2	1
HIS - 090	90	101	149	2	101	149	2	1
HIS - 095	95	107	158	2.1	107	158	2	1
HIS - 100	100	112	168	2.1	112	168	2	1
HIS - 110	110	122	188	2.1	122	188	2	1
HIS - 120	120	132	203	2.1	132	203	2	1
HIS - 130	130	144	216	3	144	216	2.5	1
HIS - 140	140	154	236	3	154	236	2.5	1
HIS - 150	150	164	256	3	164	256	2.5	1

HDS – Single Differentiated HRB
d 12 – 150 mm



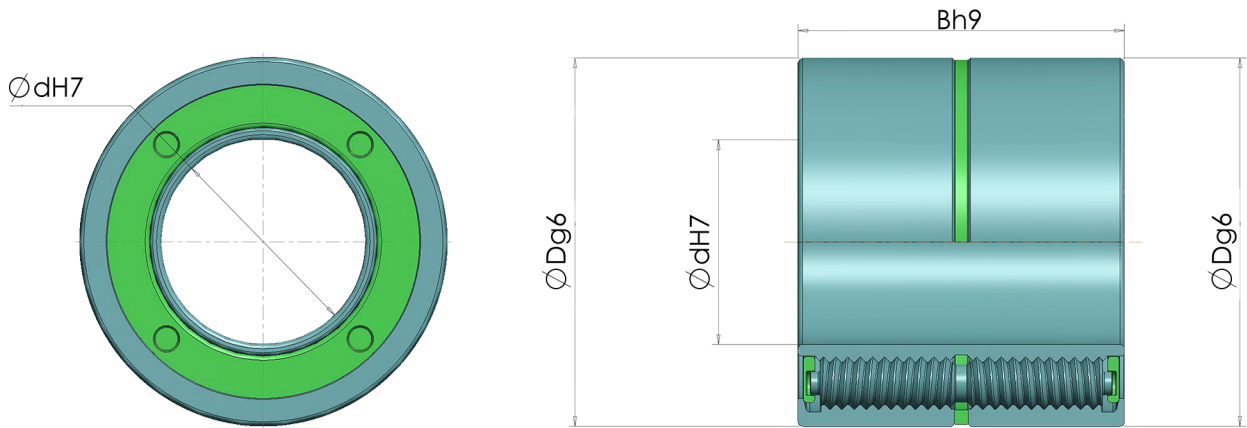
Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm			kN		–	r/min		kg
12	32	20	24	22	7x	25000	29100	0.09
15	35	22	30	31	7x	20000	23300	0.11
17	40	24	37	42	9x	17600	20500	0.16
20	47	28	68	74	25x	15000	17500	0.27
25	52	30	85	98	39x	12000	14000	0.32
30	62	32	104	125	19x	10000	11600	0.48
35	72	34	130	159	17x	8500	10000	0.68
40	80	36	151	193	17x	7500	8700	0.86
45	85	38	174	230	23x	6600	7700	0.96
50	90	40	218	233	38x	6000	7000	1.09
55	100	42	242	257	28x	5400	6300	1.41
60	110	44	274	310	21x	5000	5800	1.82
65	120	46	319	387	26x	4600	5300	2.26
70	125	48	330	408	20x	4200	5000	2.47
75	130	50	365	473	30x	4000	4600	2.64
80	140	52	431	546	31x	3700	4300	3.24
85	150	56	493	683	27x	3500	4100	4.06
90	160	60	564	840	27x	3300	3800	4.94
95	170	64	629	1005	27x	3100	3600	6.02
100	180	68	703	1194	28x	3000	3500	7.15
110	200	76	849	1605	29x	2700	3100	9.94
120	215	80	936	1854	43x	2500	2900	11.83
130	230	80	969	1907	33x	2300	2600	13.31
140	250	84	1068	2190	36x	2100	2500	16.70
150	270	90	1216	2681	42x	2000	2300	21.03

(¹) : It compares the bearing with a set of 2xACBBs of the same dimensions



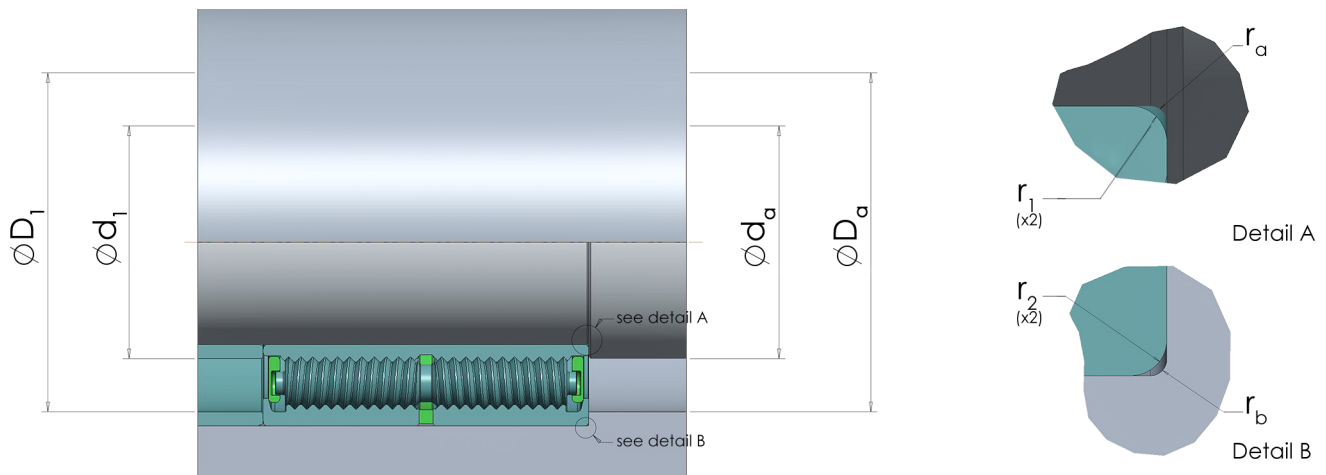
Designations Herringbone Roller Bearing	Dimensions			Abutment and fillet				
	d	d ₁	D ₁	r _{1,2} max	d _a max	D _a min	r _a max	r _b max
–	mm							
HDS - 012	12	17	27	0.6	17	27	0.6	0.3
HDS - 015	15	20	30	0.6	20	30	0.6	0.3
HDS - 017	17	22	35	0.6	22	35	0.6	0.6
HDS - 020	20	26	41	1	26	41	1	0.6
HDS - 025	25	31	46	1	31	46	1	0.6
HDS - 030	30	36	56	1	36	56	1	0.6
HDS - 035	35	42	65	1.1	42	65	1	0.6
HDS - 040	40	47	73	1.1	47	73	1	0.6
HDS - 045	45	52	78	1.1	52	78	1	0.6
HDS - 050	50	57	83	1.1	57	83	1	0.6
HDS - 055	55	64	91	1.5	64	91	1.5	1
HDS - 060	60	69	101	1.5	69	101	1.5	1
HDS - 065	65	74	111	1.5	74	111	1.5	1
HDS - 070	70	79	116	1.5	79	116	1.5	1
HDS - 075	75	84	121	1.5	84	121	1.5	1
HDS - 080	80	91	129	2	91	129	2	1
HDS - 085	85	96	139	2	96	139	2	1
HDS - 090	90	101	149	2	101	149	2	1
HDS - 095	95	107	158	2.1	107	158	2	1
HDS - 100	100	112	168	2.1	112	168	2	1
HDS - 110	110	122	188	2.1	122	188	2	1
HDS - 120	120	132	203	2.1	132	203	2	1
HDS - 130	130	144	216	3	144	216	2.5	1
HDS - 140	140	154	236	3	154	236	2.5	1
HDS - 150	150	164	256	3	164	256	2.5	1

HIT – Twin Identical HRB
d 12 – 150 mm



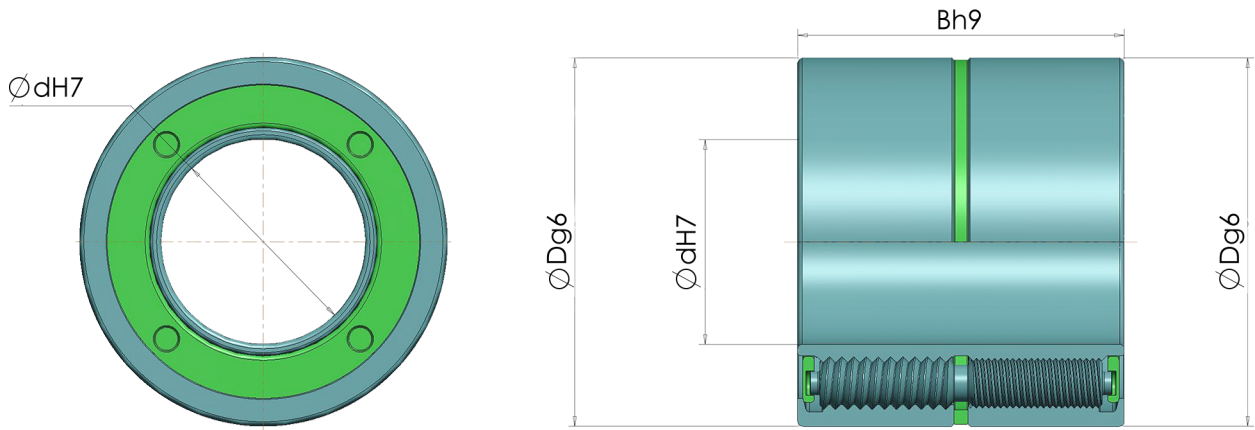
Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm			kN		–	r/min		kg
12	32	40	51	90	17x	25000	29100	0.18
15	35	44	61	115	15x	20000	23300	0.21
17	40	48	72	142	16x	17600	20500	0.31
20	47	56	138	258	50x	15000	17500	0.52
25	52	60	168	326	69x	12000	14000	0.61
30	62	64	199	401	32x	10000	11600	0.93
35	72	68	241	503	26x	8500	10000	1.31
40	80	72	276	593	24x	7500	8700	1.67
45	85	76	312	690	31x	6600	7700	1.84
50	90	80	425	821	67x	6000	7000	2.09
55	100	84	481	947	52x	5400	6300	2.70
60	110	88	538	1123	38x	5000	5800	3.50
65	120	92	587	1268	38x	4600	5300	4.34
70	125	96	617	1367	31x	4200	5000	4.75
75	130	100	679	1577	45x	4000	4600	5.06
80	140	104	820	1913	50x	3700	4300	6.17
85	150	112	912	2252	40x	3500	4100	7.78
90	160	120	1018	2656	37x	3300	3800	9.48
95	170	128	1115	3049	36x	3100	3600	11.60
100	180	136	1226	3515	35x	3000	3500	13.80
110	200	152	1442	4491	34x	2700	3100	19.27
120	215	160	1575	5110	48x	2500	2900	22.95
130	230	160	1630	5332	37x	2300	2600	25.82
140	250	168	1779	6058	40x	2100	2500	32.45
150	270	180	1974	7078	42x	2000	2300	40.97

(¹) : It compares the bearing with a set of 4xACBBs of the same dimensions



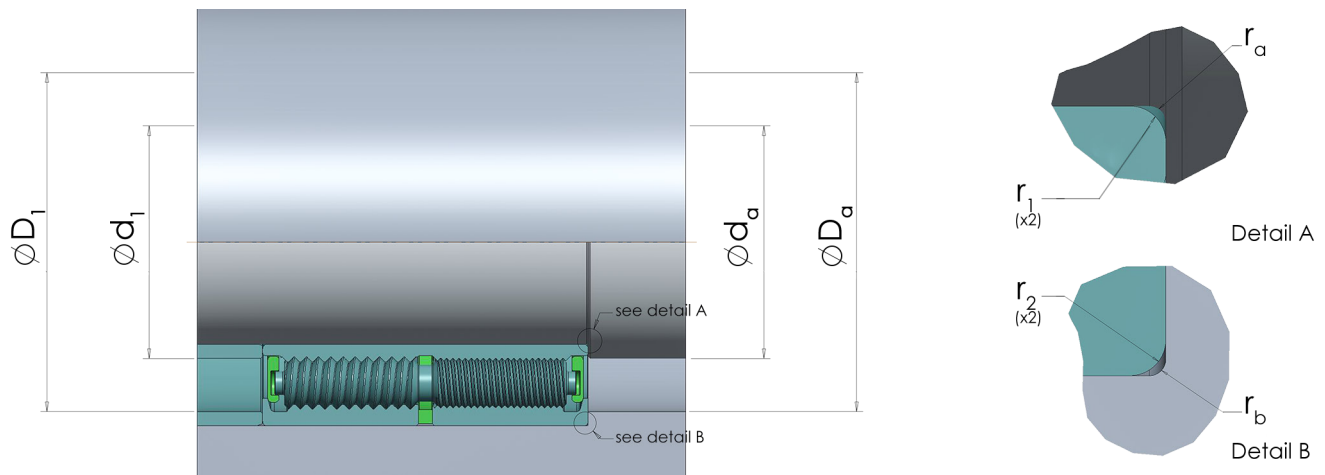
Designations Herringbone Roller Bearing	Dimensions			Abutment and fillet				
	d	d ₁	D ₁	r _{1,2} max	d _a max	D _a min	r _a max	r _b max
–	mm							
HIT - 012	12	17	27	0.6	17	27	0.6	0.3
HIT - 015	15	20	30	0.6	20	30	0.6	0.3
HIT - 017	17	22	35	0.6	22	35	0.6	0.6
HIT - 020	20	26	41	1	26	41	1	0.6
HIT - 025	25	31	46	1	31	46	1	0.6
HIT - 030	30	36	56	1	36	56	1	0.6
HIT - 035	35	42	65	1.1	42	65	1	0.6
HIT - 040	40	47	73	1.1	47	73	1	0.6
HIT - 045	45	52	78	1.1	52	78	1	0.6
HIT - 050	50	57	83	1.1	57	83	1	0.6
HIT - 055	55	64	91	1.5	64	91	1.5	1
HIT - 060	60	69	101	1.5	69	101	1.5	1
HIT - 065	65	74	111	1.5	74	111	1.5	1
HIT - 070	70	79	116	1.5	79	116	1.5	1
HIT - 075	75	84	121	1.5	84	121	1.5	1
HIT - 080	80	91	129	2	91	129	2	1
HIT - 085	85	96	139	2	96	139	2	1
HIT - 090	90	101	149	2	101	149	2	1
HIT - 095	95	107	158	2.1	107	158	2	1
HIT - 100	100	112	168	2.1	112	168	2	1
HIT - 110	110	122	188	2.1	122	188	2	1
HIT - 120	120	132	203	2.1	132	203	2	1
HIT - 130	130	144	216	3	144	216	2.5	1
HIT - 140	140	154	236	3	154	236	2.5	1
HIT - 150	150	164	256	3	164	256	2.5	1

HDT – Twin Differentiated HRB
d 12 – 150 mm



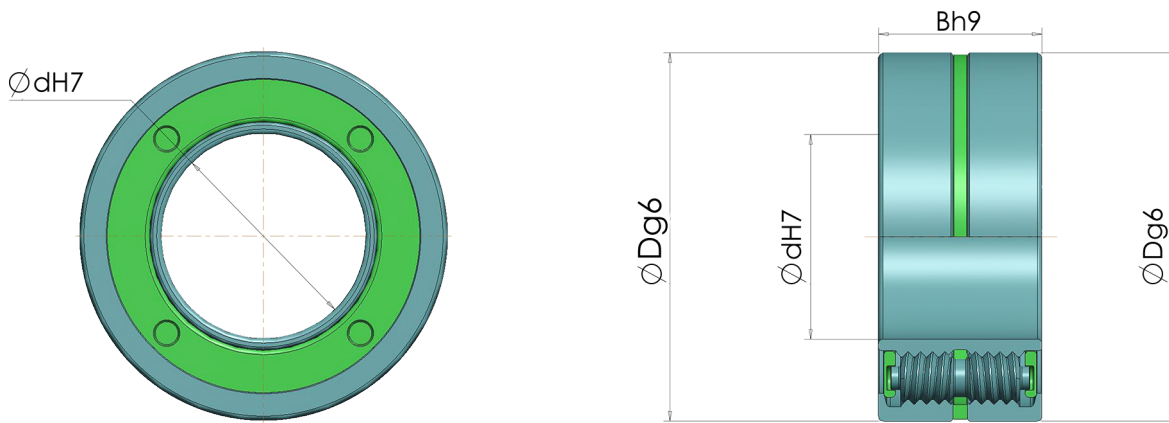
Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm				kN	–	r/min		kg
12	32	40	67	126	38x	25000	29100	0.18
15	35	44	81	160	34x	20000	23300	0.21
17	40	48	95	199	35x	17600	20500	0.31
20	47	56	182	359	113x	15000	17500	0.52
25	52	60	221	455	157x	12000	14000	0.61
30	62	64	262	560	72x	10000	11600	0.93
35	72	68	318	702	60x	8500	10000	1.31
40	80	72	363	828	55x	7500	8700	1.67
45	85	76	411	963	70x	6600	7700	1.84
50	90	80	560	1143	152x	6000	7000	2.09
55	100	84	639	1344	123x	5400	6300	2.70
60	110	88	709	1565	87x	5000	5800	3.50
65	120	92	773	1767	88x	4600	5300	4.34
70	125	96	820	1936	72x	4200	5000	4.75
75	130	100	894	2199	102x	4000	4600	5.06
80	140	104	1091	2717	117x	3700	4300	6.17
85	150	112	1213	3194	93x	3500	4100	7.78
90	160	120	1353	3762	88x	3300	3800	9.48
95	170	128	1480	4316	83x	3100	3600	11.60
100	180	136	1626	4971	81x	3000	3500	13.80
110	200	152	1912	6344	79x	2700	3100	19.27
120	215	160	2086	7214	112x	2500	2900	22.95
130	230	160	2159	7528	87x	2300	2600	25.82
140	250	168	2356	8548	92x	2100	2500	32.45
150	270	180	2613	9982	98x	2000	2300	40.97

(¹) : It compares the bearing with a set of 4xACBBs of the same dimensions



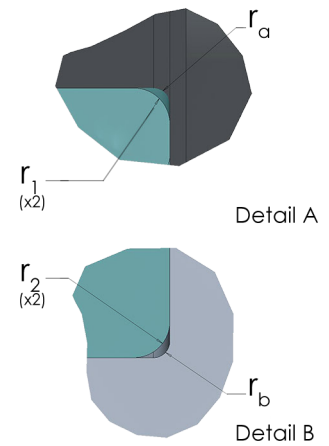
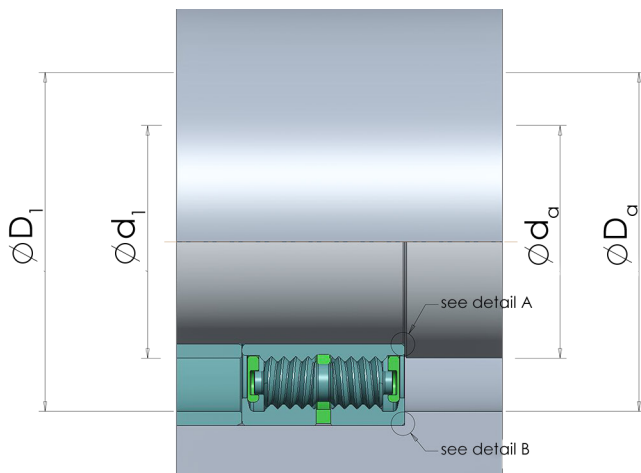
Designations Herringbone Roller Bearing	Dimensions			Abutment and fillet				
	d	d ₁	D ₁	r _{1,2} max	d _a max	D _a min	r _a max	r _b max
–	mm							
HDT - 012	12	17	27	0.6	17	27	0.6	0.3
HDT - 015	15	20	30	0.6	20	30	0.6	0.3
HDT - 017	17	22	35	0.6	22	35	0.6	0.6
HDT - 020	20	26	41	1	26	41	1	0.6
HDT - 025	25	31	46	1	31	46	1	0.6
HDT - 030	30	36	56	1	36	56	1	0.6
HDT - 035	35	42	65	1.1	42	65	1	0.6
HDT - 040	40	47	73	1.1	47	73	1	0.6
HDT - 045	45	52	78	1.1	52	78	1	0.6
HDT - 050	50	57	83	1.1	57	83	1	0.6
HDT - 055	55	64	91	1.5	64	91	1.5	1
HDT - 060	60	69	101	1.5	69	101	1.5	1
HDT - 065	65	74	111	1.5	74	111	1.5	1
HDT - 070	70	79	116	1.5	79	116	1.5	1
HDT - 075	75	84	121	1.5	84	121	1.5	1
HDT - 080	80	91	129	2	91	129	2	1
HDT - 085	85	96	139	2	96	139	2	1
HDT - 090	90	101	149	2	101	149	2	1
HDT - 095	95	107	158	2.1	107	158	2	1
HDT - 100	100	112	168	2.1	112	168	2	1
HDT - 110	110	122	188	2.1	122	188	2	1
HDT - 120	120	132	203	2.1	132	203	2	1
HDT - 130	130	144	216	3	144	216	2.5	1
HDT - 140	140	154	236	3	154	236	2.5	1
HDT - 150	150	164	256	3	164	256	2.5	1

HHS – Single High-Capacitive HRB
d 12 – 150 mm



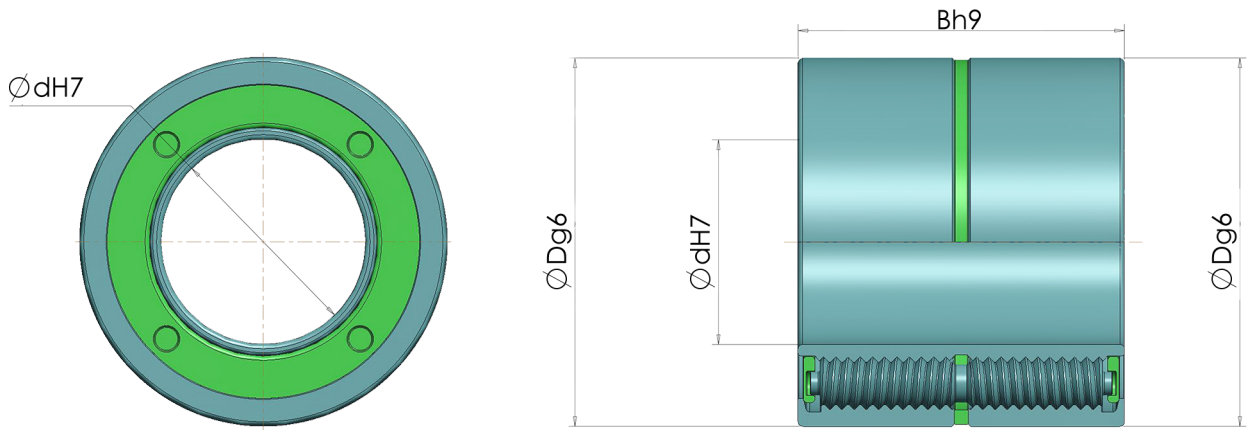
Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm			kN		–	r/min		kg
12	37	24	28	31	4x	25000	29100	0.16
15	42	26	35	41	4x	20000	23300	0.21
17	47	28	42	53	4x	17600	20500	0.28
20	52	30	65	74	10x	15000	17500	0.37
25	62	34	90	111	9x	12000	14000	0.58
30	72	38	117	158	8x	10000	11600	0.85
35	80	42	145	210	10x	8500	10000	1.12
40	90	46	177	271	10x	7500	8700	1.53
45	100	50	210	340	10x	6600	7700	2.02
50	110	54	284	384	13x	6000	7000	2.63
55	120	58	341	513	15x	5400	6300	3.33
60	130	62	377	595	11x	5000	5800	4.15
65	140	66	414	683	11x	4600	5300	5.09
70	150	70	479	854	13x	4200	5000	6.13
75	160	74	518	959	14x	4000	4600	7.34
80	170	78	644	1226	22x	3700	4300	8.76
85	180	82	702	1395	21x	3500	4100	10.29
90	190	86	764	1582	23x	3300	3800	11.92
95	200	90	825	1774	23x	3100	3600	13.78
100	215	94	893	1991	17x	3000	3500	16.94
110	240	100	986	2274	16x	2700	3100	22.64
120	260	110	1160	2941	27x	2500	2900	29.02
130	280	116	1253	3266	22x	2300	2600	35.21
140	300	120	1343	3596	21x	2100	2500	41.65
150	320	134	1581	4681	25x	2000	2300	52.47

(¹) : It compares the bearing with a set of 2xACBBs of the same dimensions



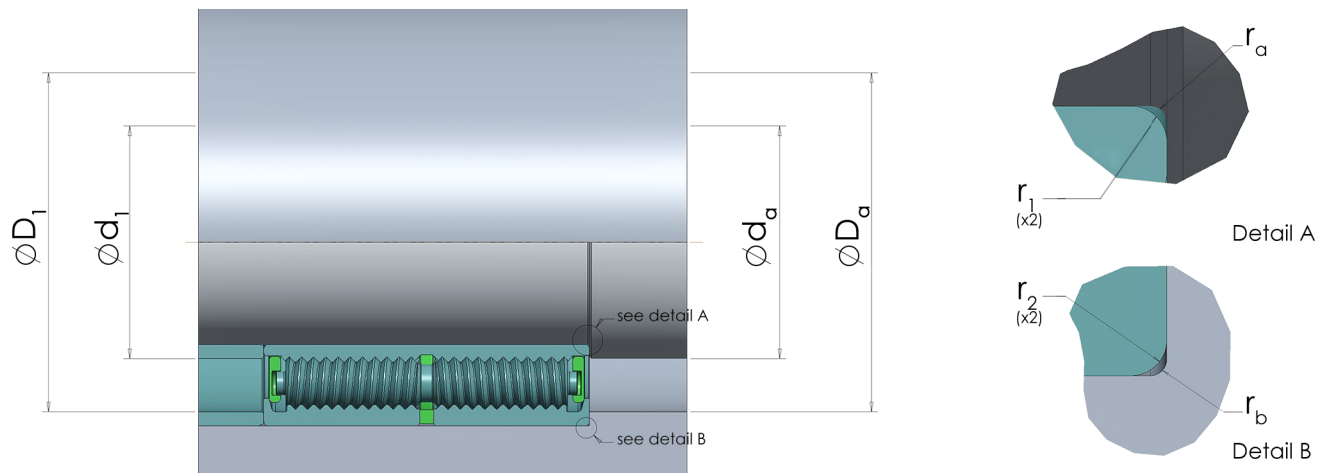
Designations Herringbone Roller Bearing	Dimensions			Abutment and fillet				
	d	d ₁	D ₁	r _{1,2} max	d _a max	D _a min	r _a max	r _b max
–	mm							
HHS - 012	12	18	31	1	18	31	1	0.6
HHS - 015	15	21	36	1	21	36	1	0.6
HHS - 017	17	23	41	1	23	41	1	0.6
HHS - 020	20	27	45	1.1	27	45	1	0.6
HHS - 025	25	32	55	1.1	32	55	1	0.6
HHS - 030	30	37	65	1.1	37	65	1	0.6
HHS - 035	35	44	71	1.5	44	71	1.5	0.6
HHS - 040	40	49	81	1.5	49	81	1.5	0.6
HHS - 045	45	54	91	1.5	54	91	1.5	0.6
HHS - 050	50	61	99	2	61	99	2	0.6
HHS - 055	55	66	109	2	66	109	2	1
HHS - 060	60	72	118	2.1	72	118	2	1
HHS - 065	65	77	128	2.1	77	128	2	1
HHS - 070	70	82	138	2.1	82	138	2	1
HHS - 075	75	87	148	2.1	87	148	2	1
HHS - 080	80	92	158	2.1	92	158	2	1
HHS - 085	85	99	166	3	99	166	2.5	1
HHS - 090	90	104	176	3	104	176	2.5	1
HHS - 095	95	109	186	3	109	186	2.5	1
HHS - 100	100	114	201	3	114	201	2.5	1
HHS - 110	110	124	226	3	124	226	2.5	1
HHS - 120	120	134	246	3	134	246	2.5	1
HHS - 130	130	147	263	4	147	263	3	1.5
HHS - 140	140	157	283	4	157	283	3	1.5
HHS - 150	150	167	303	4	167	303	3	1.5

HHT – Twin High-Capacitive HRB
d 12 – 150 mm



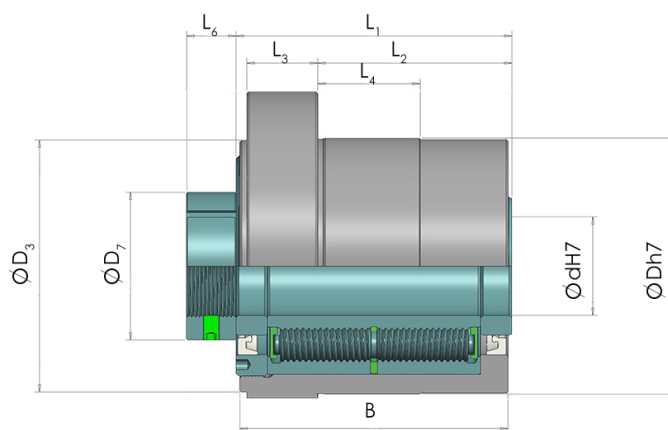
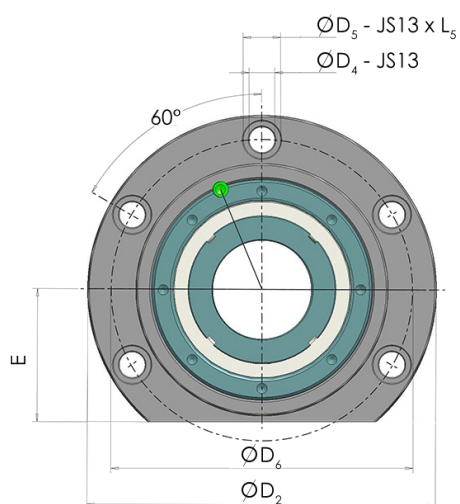
Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm			kN		–	r/min		kg
12	37	48	66	131	14x	25000	29100	0.30
15	42	52	81	166	13x	20000	23300	0.40
17	47	56	94	204	12x	17600	20500	0.54
20	52	60	159	308	32x	15000	17500	0.72
25	62	68	206	430	26x	12000	14000	1.13
30	72	76	260	578	22x	10000	11600	1.65
35	80	84	314	736	24x	8500	10000	2.18
40	90	92	374	920	23x	7500	8700	2.98
45	100	100	437	1123	20x	6600	7700	3.96
50	110	108	640	1483	34x	6000	7000	5.12
55	120	116	726	1788	34x	5400	6300	6.50
60	130	124	814	2122	27x	5000	5800	8.11
65	140	132	885	2399	25x	4600	5300	9.97
70	150	140	983	2805	26x	4200	5000	12.01
75	160	148	1078	3219	30x	4000	4600	14.40
80	170	156	1324	4041	44x	3700	4300	17.14
85	180	164	1431	4535	43x	3500	4100	20.14
90	190	172	1546	5087	45x	3300	3800	23.36
95	200	180	1657	5639	43x	3100	3600	27.02
100	215	188	1783	6285	31x	3000	3500	33.26
110	240	200	1997	7422	32x	2700	3100	44.53
120	260	220	2273	9022	48x	2500	2900	57.15
130	280	232	2485	10292	40x	2300	2600	69.37
140	300	240	2653	11323	38x	2100	2500	82.09
150	320	268	3041	13931	43x	2000	2300	103.57

(¹) : It compares the bearing with a set of 4xACBBs of the same dimensions



Designations Herringbone Roller Bearing	Dimensions				Abutment and fillet			
	d	d ₁	D ₁	r _{1,2} max	d _a max	D _a min	r _a max	r _b max
–	mm							
HHT - 012	12	18	31	1	18	31	1	0.6
HHT - 015	15	21	36	1	21	36	1	0.6
HHT - 017	17	23	41	1	23	41	1	0.6
HHT - 020	20	27	45	1.1	27	45	1	0.6
HHT - 025	25	32	55	1.1	32	55	1	0.6
HHT - 030	30	37	65	1.1	37	65	1	0.6
HHT - 035	35	44	71	1.5	44	71	1.5	0.6
HHT - 040	40	49	81	1.5	49	81	1.5	0.6
HHT - 045	45	54	91	1.5	54	91	1.5	0.6
HHT - 050	50	61	99	2	61	99	2	0.6
HHT - 055	55	66	109	2	66	109	2	1
HHT - 060	60	72	118	2.1	72	118	2	1
HHT - 065	65	77	128	2.1	77	128	2	1
HHT - 070	70	82	138	2.1	82	138	2	1
HHT - 075	75	87	148	2.1	87	148	2	1
HHT - 080	80	92	158	2.1	92	158	2	1
HHT - 085	85	99	166	3	99	166	2.5	1
HHT - 090	90	104	176	3	104	176	2.5	1
HHT - 095	95	109	186	3	109	186	2.5	1
HHT - 100	100	114	201	3	114	201	2.5	1
HHT - 110	110	124	226	3	124	226	2.5	1
HHT - 120	120	134	246	3	134	246	2.5	1
HHT - 130	130	147	263	4	147	263	3	1.5
HHT - 140	140	157	283	4	157	283	3	1.5
HHT - 150	150	167	303	4	167	303	3	1.5

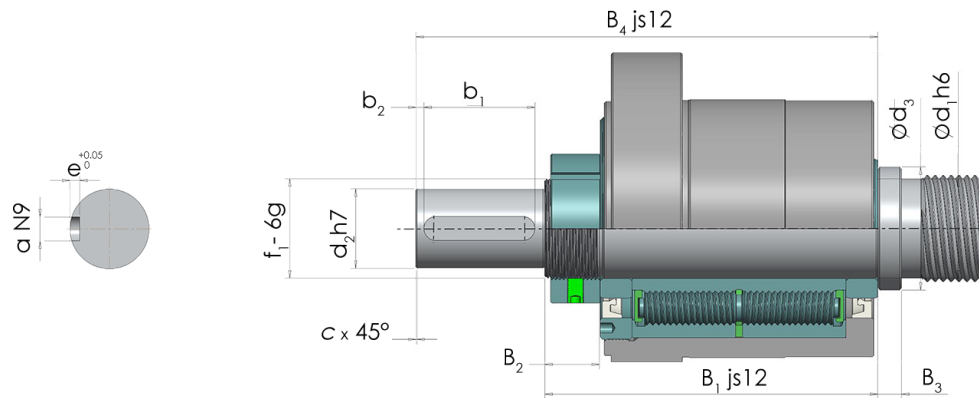
HHF – Flanged Housing with High-Capacitive HRB
d 12 – 100 mm



Principal dimensions			Basic load ratings		Lifetime benefit ⁽¹⁾	Speed ratings		Mass
d	D	B	C	C ₀		Reference speed	Limiting speed	
mm			kN		–	r/min		kg
12	47	40	19	17	4x	25000	29100	0.72
17	60	44	42	53	4x	17600	20500	1.16
20	60	74	138	258	50x	15000	17500	1.73
25	80	86	206	430	26x	12000	14000	3.71
35	100	106	314	736	24x	8500	10000	6.72
50	130	136	640	1483	34x	6000	7000	13.62
65	170	175	885	2399	25x	4600	5300	29.51
90	220	229	1546	5087	45x	3300	3800	60.47
100	250	245	1783	6285	31x	3000	3500	84.21

(¹) : It compares the bearing unit with the best competitor solution of the same dimensions

HHF – Mounting on an end shaft



Designations Dimensions

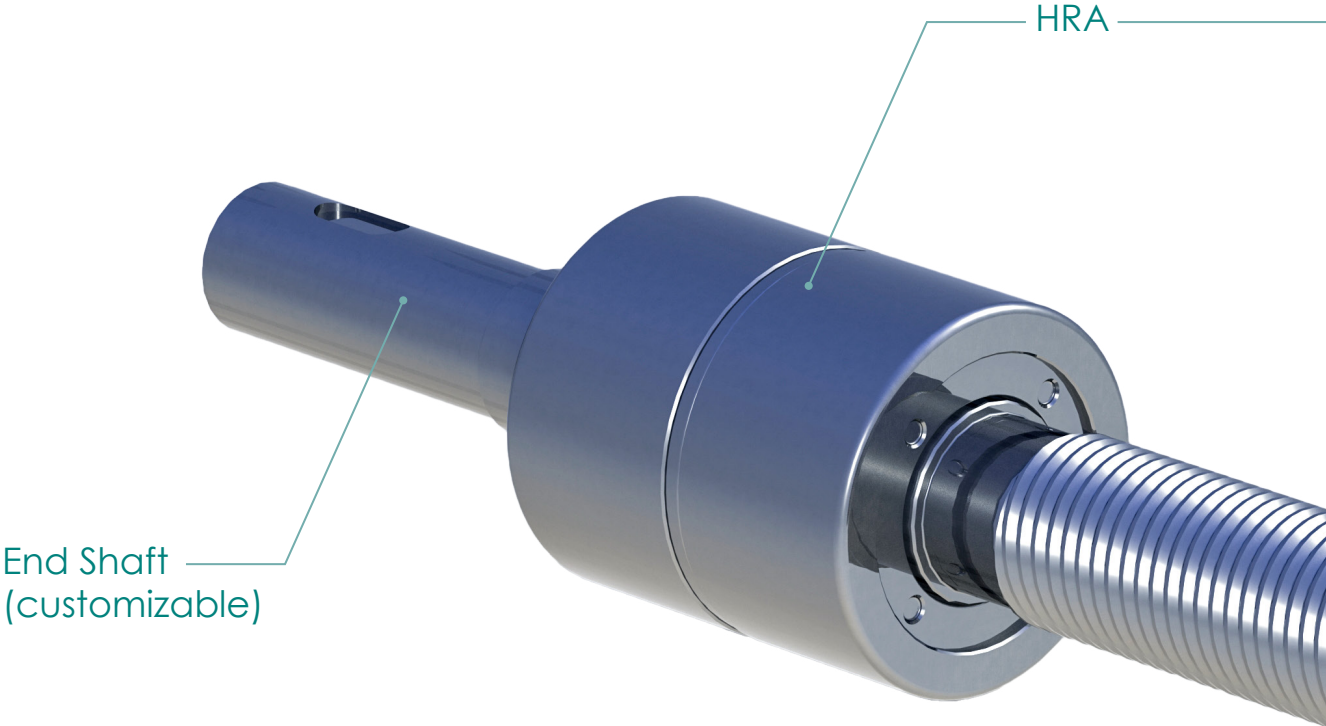
Herringbone
Roller
Bearing

	d	D	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	E
–	mm														
HHF - 1	12	47	77	47	6.6	11	63	22	42	25	12	10	2	8	27
HHF - 2	17	60	92	57	6.6	11	76	28	46	32	12	15	2	10	32
HHF - 3	20	60	92	58	9	14	74	38	77	60	15	27	2	10	32
HHF - 4	25	80	122	74	11	17	100	45	89	68	19	33	3	20	44
HHF - 5	35	100	144	94	13	19	120	58	110	82	25	42	5	22	54
HHF - 6	50	130	177	128	13	19	152	75	140	98.5	36	52	11	25	67
HHF - 7	65	170	230	164	17	25	198	105	180	133.5	41	50	11	32	87
HHF - 8	90	220	292	215	22	32	252	130	235	179	48	94	13	38	115
HHF - 9	100	250	330	240	25	38	285	140	253	195	50	109	14	38	130

Designations End Shaft Dimensions

Herringbone
Roller
Bearing

	d ₁	d ₂	d ₃	B ₁	B ₂	B ₃	B ₄	f ₁	c	b ₁	b ₂	a	e
–	mm												
HHF - 1	12	10	17	51	10	5	71	M12 x 1.0	0.5	16	1.5	3	1.8
HHF - 2	17	15	23	66	21	5	96	M17 x 1.0	0.5	25	2.0	5	3.0
HHF - 3	20	17	27	98	22	7	138	M20 x 1.0	0.5	32	3.0	5	3.0
HHF - 4	25	20	34	111	24	7	156	M25 x 1.5	1.0	40	2.5	6	3.5
HHF - 5	35	30	45	134	26	10	189	M35 x 1.5	1.0	45	2.5	8	4.0
HHF - 6	50	40	62	168	30	12	233	M50 x 1.5	1.0	56	4.0	12	5.0
HHF - 7	65	60	78	215	37	18	315	M65 x 2.0	1.0	90	3.0	18	7.0
HHF - 8	90	85	108	275	43	25	395	M90 x 2.0	1.0	100	8.0	25	9.0
HHF - 9	100	95	120	293	43	25	433	M100 x 2.0	1.0	125	7.0	25	9.0



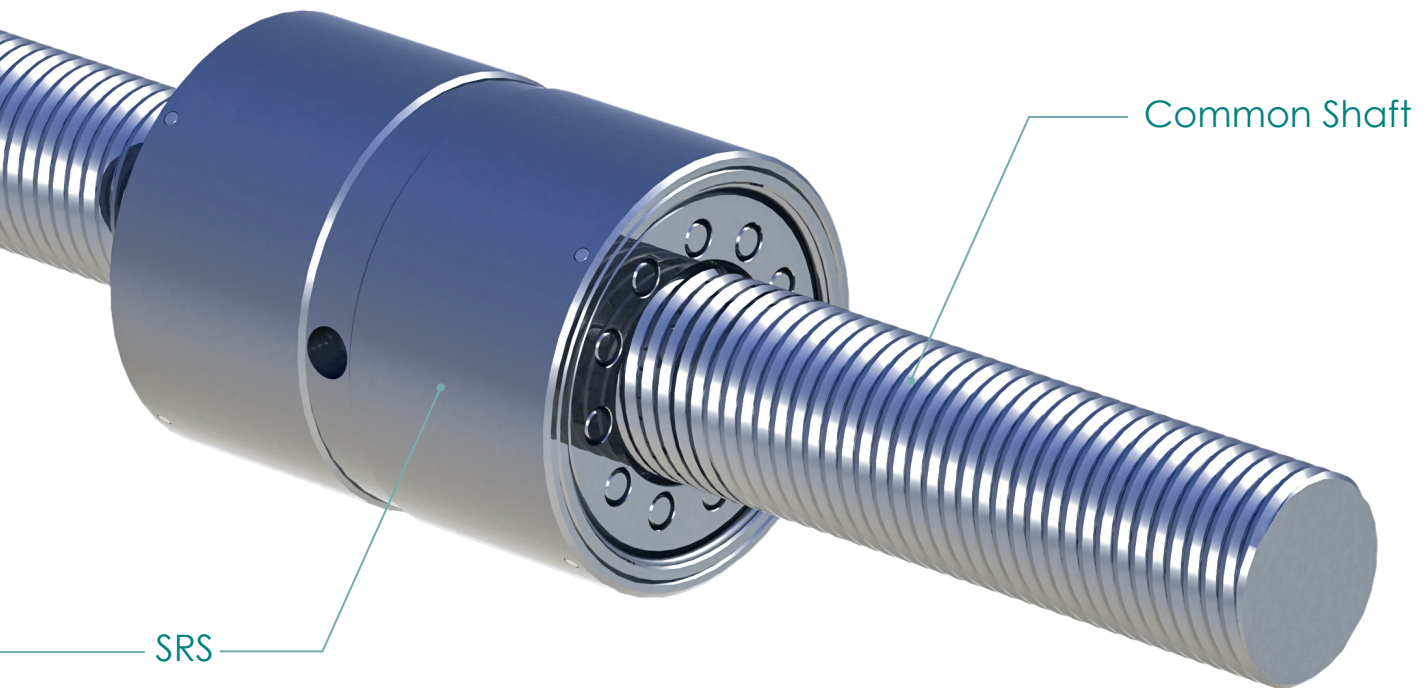
d ₀ Pitch Diameter (mm)	Lead Min - Max (mm)	Nut Type	Backlash (μm)
15	2 – 8	C – C ylindrical F – F langed	0 – 20
21	2 – 10		
25			
30	5 – 15		0 – 40
39			0 – 70
48	5 – 20		
60	10 – 20		

Standard
Roller
Screw

Tab.4: summary of ALT Roller Screws preferred range

Integrated HRB	D Outer Diameter (mm)	B Length (mm)	Type	Equivalents (C, C ₀)
	Ø32 – Ø320	20 – 134	S – Single	HIS, HHS
		40 – 268	T – Twin	HIT, HHT

Tab.5: summary of integrated HRB



Date:

CUSTOMER INFORMATION

Company name:

Contact name:

Address:

Phone:

Email:

APPLICATION / INDUSTRY

New application: ☐ Yes ☐ No

☐ New bearing

☐ Replacement of existing bearing
(Please specify size/ Ref.)

OPERATING CONDITIONS

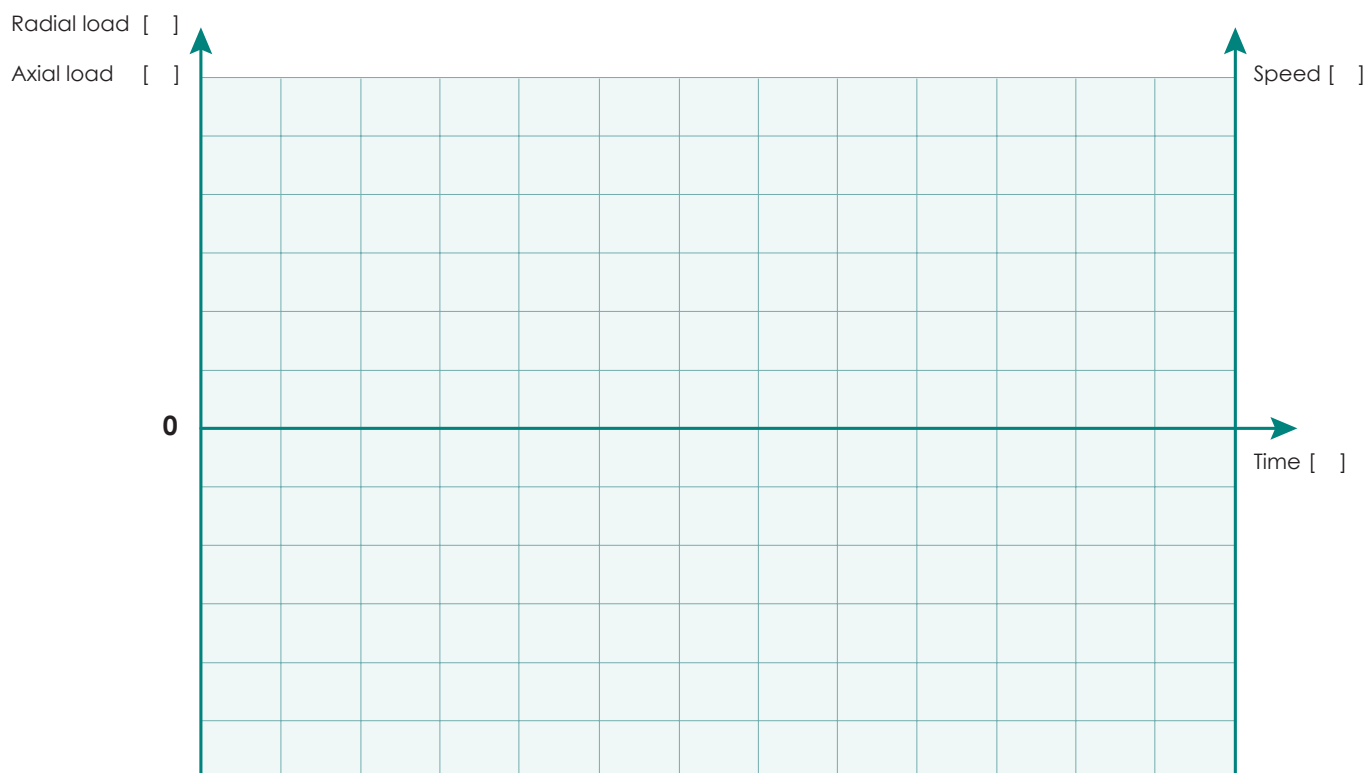
Axial force ☐

Radial force ☐

Combined load ☐

Maximum load: Static: Dynamic:

Load and speed chart



Alternatively, please fill-in the chart below and specify units:

	Axial load []	Radial load []	Speed []	Time []	Remarks
n° 1					
n° 2					
n° 3					
n° 4					
...					

Main load: ☐ Compression ☐ Tension
 Rotation: ☐ Rotating inner ring ☐ Rotating outer ring
 HRB's axis: ☐ Vertical ☐ Horizontal
 Miscellaneous: ☐ Shocks ☐ Vibration

Total number of revolutions required:

Total time required (years or hours):

ENVIRONMENT

☐ Indoor ☐ Outdoor
 Exposure to Water / Fluid / Dust:
 Temperature range [°C]:
 Humidity [%]:

SPECIFIC LIMITATIONS OR REQUIREMENTS

Dimensions: max outer diameter (D):
 max inner diameter (d):
 max width (B):
 Lubrication (Grease / Oil / Dry / None – *please specify*):

CLEARANCE – PRELOAD - STIFFNESS

Preload state: ☐ Standard (backlash elimination) ☐ Preload/Stiffness
 Type of HRB: ☐ HIS ☐ HDS ☐ HHS ☐ HHF
☐ HIT ☐ HDT ☐ HHT ☐ HRA

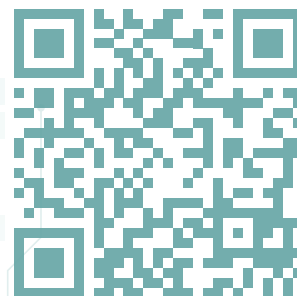
QUANTITIES FOR REQUEST

Notes / Remarks / Sketch:

a_1	[-]	life adjustment factor of reliability
C	[kN]	dynamic load capacity
C_0	[kN]	static load capacity
F_A	[kN]	actual axial component of the bearing load
F_j	[kN]	spectrum load related to a phase j
F_m	[kN]	minimum load
F_{max}	[kN]	mean load
F_{min}	[kN]	maximum load
F_Q	[kN]	equivalent normal load
F_R	[kN]	actual radial component of the bearing load
L_{10h}	[hrs]	basic rating life or operating hours with 90 percent probability of survival
L_{10}	[10^6 revs.]	lifetime expressed in millions of revolutions (with 90 percent probability of survival)
L_m	[10^6 revs.]	basic rating life at 100-m percent of probability of survival
N	[r/min]	rotational speed
U_j	[-]	percentage of duration of a phase j
X	[-]	radial load factor for the bearing
Y	[-]	axial load factor for the bearing



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