2023
Special Edition
ISSUE 37

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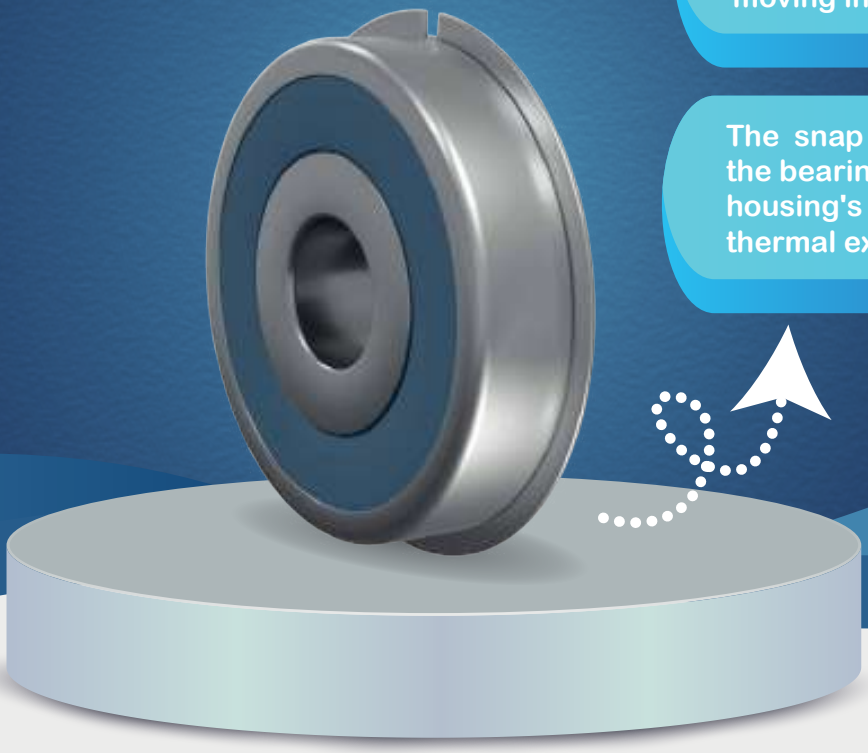

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10 Years of BEARING NEWS

It is my pleasure to begin this milestone edition of BEARING NEWS magazine with a big Thank You to all of the bearing & power transmission peers, readers, and partners who supported us for the last decade! Thanks to your tremendous dedication and loyalty, BEARING NEWS magazine has become the main publication for the global bearing & power transmission community. Our success could not be achieved without the help of our industry friends, and for that reason, we are amazingly grateful and look forward to the next 10 years with you!

To honor our global community members, this new edition contains a series of 12 interviews with prominent leaders from 8 different countries and regions. In traditional BEARING NEWS fashion, each interview offers unique and unfiltered perspectives filled with value for the readers.

Further, we are proud to announce and invite you to The Bearing & Power Transmission World Meetings in Istanbul on 04-06 June 2023. This event is the World's first dedicated meetup at the global level where 30+ countries from all continents will be represented by delegations of main players in the bearing and power transmission industries.

Finally, read important insights from our bearing market analysis and future outlook. We tried to highlight with this research how the global bearing industry is currently performing; to understand the expected growth potential, by analyzing the regional demands, production, industry trends, and impacts of current events.

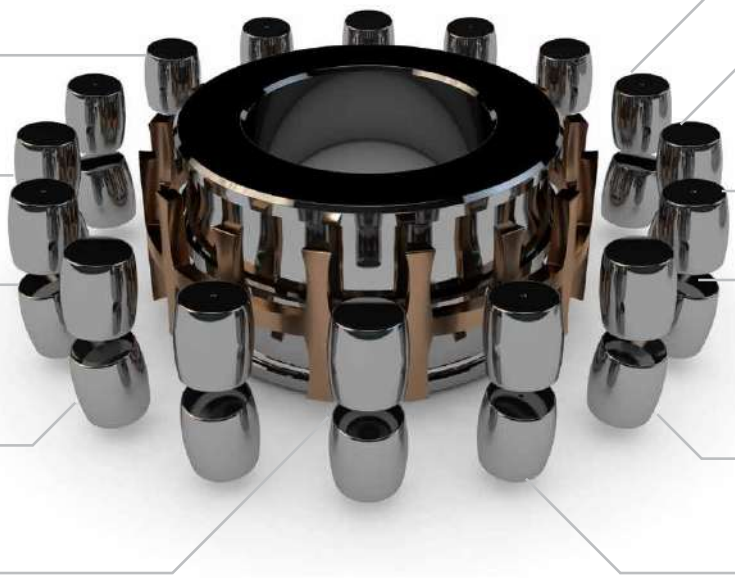
What's Rolling..

What's Rolling in the Bearing Industry. Learn details about key companies and trends, announcements, product developments, and other newsworthy advancements. All this and more can be found in this very special 10th-anniversary edition of BEARING NEWS Magazine.

I hope that you will enjoy it!

Kenan M. Özcan
Editor in Chief

The BearingNEWS magazine is published **four times a year** in **March, June, September and December.**
The online editions are published in **8 languages** and can be followed on **www.bearing-news.com**



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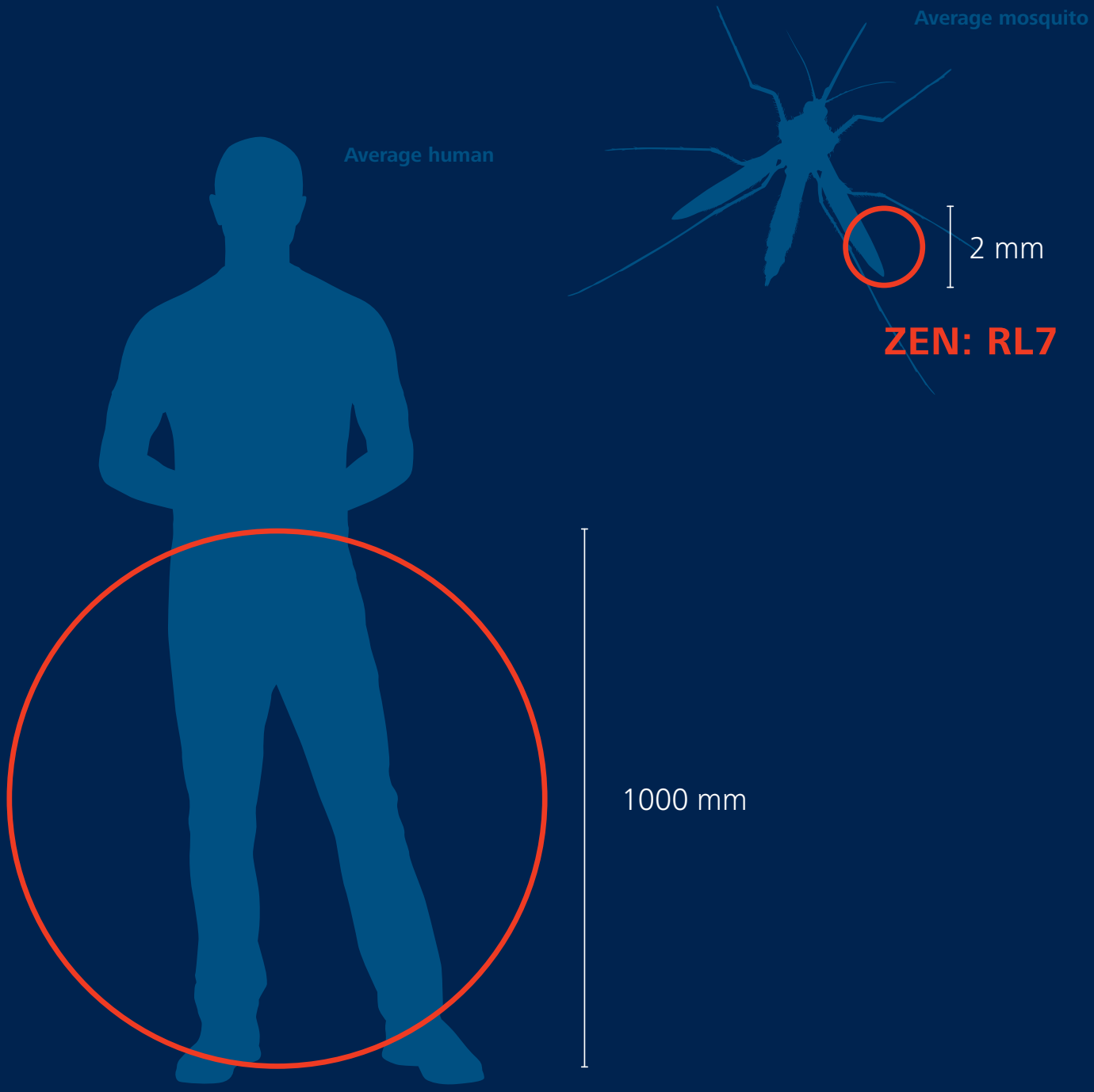

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PICARD

How a R&D minded start-up ***solved*** **a 50-year-old mechanical problem**

APO-GEE launches the BUTTERFLY cage that copes with the cage instability issue (patent pending)

The BUTTERFLY Cage developed by APO-GEE, an intense IP focused start-up based in Belgium, is a new concept that leads to an unconditionally stable behavior of the cage during the complete life of the ball bearing. No matter the working conditions encountered. Under certain constraints, the cage of a ball bearing may indeed exhibit an erratic movement or cage whirl. This is particularly the case for poorly lubricated or heavily stressed bearings. In the event of such dynamic instability (or bearing squeal), the energy exchanges involved can then lead to cage failure. This is a common problem with the reaction wheels of space probes or satellites for instance, which can result in an unwanted change or termination of the mission. Cage instability may also occur in turbo pumps of launchers that endure very hard operating conditions. Although this phenomenon has been studied for more than 50 years, it had not been fully modeled or solved until recently. By precisely identifying the deep nature of the cage instability, APO-GEE did it

with the BUTTERFLY Cage for which a patent is pending (ref. EP22191261). Now both mathematically and experimentally validated, the BUTTERFLY Cage can be integrated into the aerospace and defense mechanisms for a drastic positive impact on bearing operations and lifespan.

> “Yes, we have engineered the bearing that has the most precise functioning in the world so far.”
>
> *Sébastien Assouad - CEO of APO-GEE*

> “Everybody uses the same tool to access the kinematics of the balls, viz. the Newtonian formalism”
>
> *Christophe Servais*
> *CTO of APO-GEE*

Deep understanding leads to innovative solutions

Even though the company launched its activities at the beginning of 2022, its innovative solutions are based on more than 10 years of research in the deep understanding of the kinematics of the balls. Or to put it another way: intense research on how the balls effectively roll between the rings of a bearing.

“I started my PhD thesis with this question in mind” says Christophe Servais, CTO of APO-GEE. “I quickly realized that to understand the physics of the cage in a comprehensive way, I first had to understand how a ball bearing works without considering the cage. And as crazy as it seems, nobody knew exactly how the balls roll onto the rings!".

Progresses have been made through the years by a lot of people concerned by the cage instability issue. But the different studies often focused on the development of dedicated software, repeatedly neglecting the physical aspects behind the cage instability.

“The ball bearing is a very common mechanical component. Nevertheless, despite the swarm of technical papers dedicated to bearings, I didn’t find a clear answer to the question to know how precisely the balls roll onto the rings. How was it possible? The answer is: because everybody uses the same tool to access the kinematics of the balls, viz. the Newtonian formalism. As a result, I worked for years on establishing an efficient and robust method to determine ball bearing kinematics, no matter the working conditions it endures (loads, misalignment, speed,...) before I succeeded: I discovered a new variational criterion based on the power, especially dedicated to bearings. Using it led me to a unique description of the kinematics and the ball/race contacts of the bearing” explains Servais.

Based on this new understanding of the ball bearing behavior, and the discover of the impact of the balls on the dynamics of the cage, APO-GEE fully understands the mechanisms that govern the cage instability. Cage models have been developed and a test campaign has been performed to correlate its modeling with experimental results. It was a success. More than a correlation, APO-GEE got the confirmation that it masters the root causes that are at the origin of cage instability and also succeeded in provoking, on demand, stable or unstable behaviors. The resulting BUTTERFLY Cage is now officially a new concrete concept that leads to an unconditionally stable behavior. This definitely opens new perspectives notably for aerospace & defense projects and programs. APO-GEE has also begun to collaborate with the European Space Agency on the subject.

An innovation centric start-up

The cage instability problem solved by the start-up is just a beginning, new innovations await. The start-up has also developed a bearing that drastically improves the operation of miscellaneously loaded bearings. Those are often subjected to the Ball Speed Variation phenomenon (ball advances at non-constant speed) induced by misalignment. This phenomenon can lead to cage failure, noise, vibration and excessive heat.

“Current available bearings only provide a partial answer to this problem” says Sébastien Assouad, CEO of APO-GEE. Designers of mechanisms had to accept difficult compromises for decades, but APO-GEE can now offer them a solution which opens up new perspectives: the COBWEB Bearing. The design of this new bearing significantly decreases the bad effect of the misalignment. It is capable to support a combination of axial and radial loads, exactly as deep groove and angular bearing but with a considerably extended acceptable misalignment. “Yes, we have engineered the bearing that has the most precise functioning in the world so far” concludes Assouad.

This is undoubtedly a good omen for the young start-up.

Christophe Servais - CTO
cse@apo-gee.tech

Sébastien Assouad - CEO
sas@apo-gee.tech

More information about APO-GEE - Ball Bearing Engineering can be found at www.apo-gee.tech

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PICARD

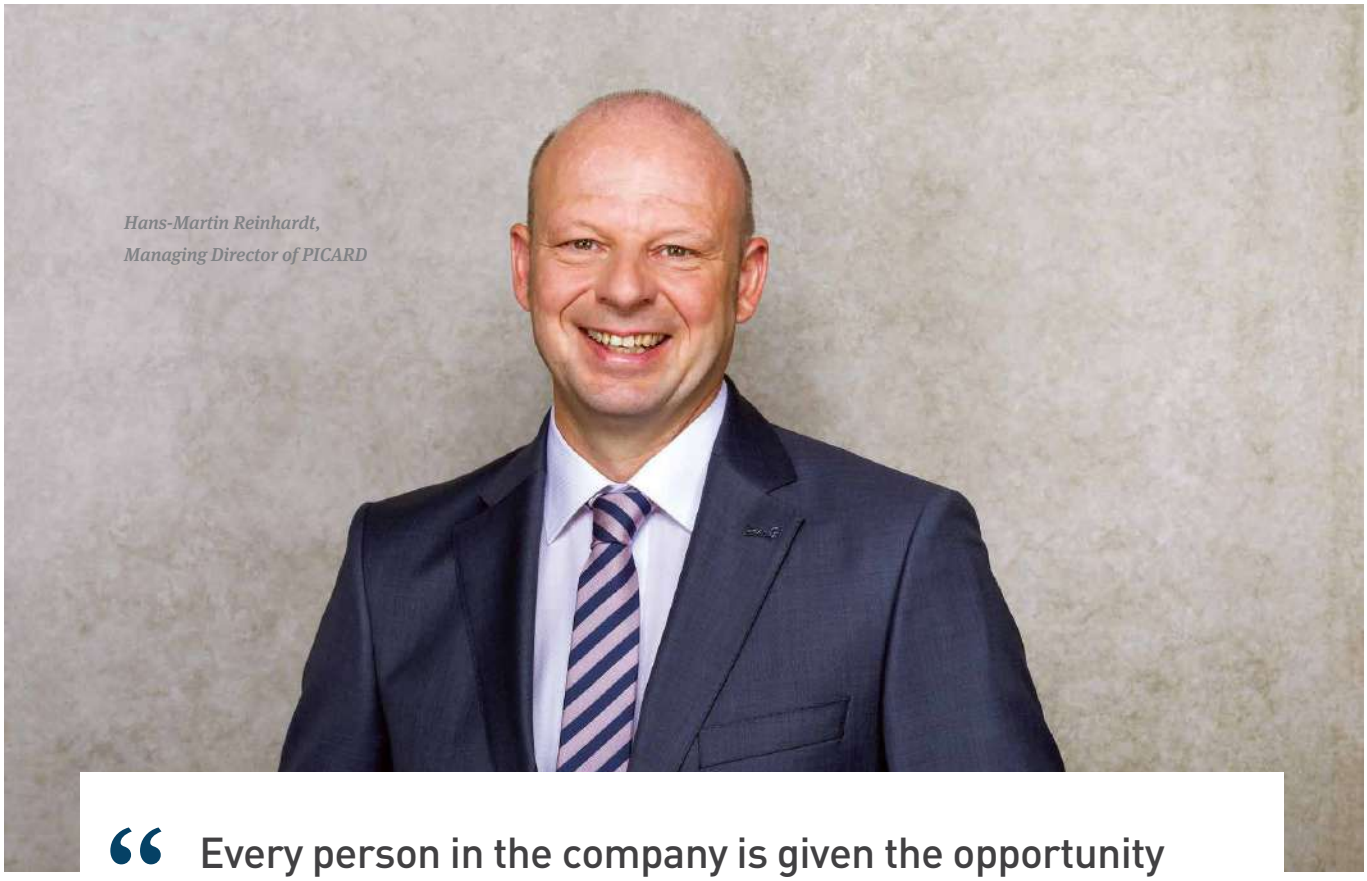
A look back at 2022, our centennial year

A spectacular anniversary year has come to a close for Friedrich PICARD GmbH & Co. KG. Over the past 100 years, the Bochum-based company has developed from a small family business into one of Europe's largest wholesale companies for roller bearings and linear motion technology. Boasting a product range of over 50,000 items from all the premium brands, reliable and flexible logistics solutions, personalized customer advice and customs clearance services, PICARD has become a true champion of the roller bearing industry.

Celebrating its 100th year has been a real milestone – but Team PICARD is hardly resting on its laurels. On the contrary, the company is fully energised, motivated and brimming with new ideas as it looks toward the future. We recently had the pleasure of speaking with Managing Director Hans-Martin Reinhardt about the challenges faced by the industry, the opportunities offered by digitalisation, and the factors behind the company's success.

Mr. Reinhardt joined PICARD in 1984. During his training, he learned, above all, the importance of efficient collaboration and goal-oriented company management. *"PICARD employees always pull together. Teamwork is paramount here. In fact, our people and their team spirit are our central priorities. Every person in the company is given the opportunity to express their talents and strengthen themselves as individuals. We work together as a team to understand the needs of customers – and employees – and to develop solutions."* So, it stands to reason that PICARD also attaches great importance to its trainees. After all, they are the future of the company. Every year, dynamic, ambitious trainees begin their professional careers at PICARD.

According to Mr. Reinhardt, this dynamism and ambition are particularly needed now because the roller bearing industry is on the threshold of change. The specialist trade has to consider that today's end customers often have great know-how and tend to expect speed, simplicity and flexibility in their purchasing processes – for example, when it comes to delivery times. This is a development that has been evident in B2C business for some time now, and is becoming increasingly important in B2B business as well. In order to manage this



Hans-Martin Reinhardt, Managing Director of PICARD

> “Every person in the company is given the opportunity to express their talents and strengthen themselves as individuals. We work together as a team to understand the needs of customers – and employees – and to develop solutions.”

change, not only the specialised trade must adapt to these challenging requirements, but also the bearing wholesalers. PICARD has recognised the importance of these measures and is actively supporting their customers in the process. *“We’re in an era of drastic change – of digital transformation and unprecedented market transparency. Those who fail to move with the times now will be left behind by the market, sooner or later,”* predicts Mr. Reinhardt.

As a pioneer in the industry, PICARD recognised early on that, despite 100 years of experience and expertise, it is only in the early stages of its corporate development. Hence, the wholesale company’s vision of its future is already clearly defined: Over the long term, PICARD aims to become an indispensable link between the manufacturers and the specialised technical trade. Two further essential goals of the company are to secure the supply of goods to its customers and to sustainably meet their roller bearing requirements.

In this respect, digitalisation is playing a central role in the industry: *“Especially in remote-transaction businesses like ours, digitalisation has been a real asset. Digital distribution channels are now very important and improve business processes enormously. Our goal is to digitally map even more of our business processes,”* explains Mr. Reinhardt.

PICARD has also strongly developed its home office and remote work capabilities in recent years. In this area, cross-industry standards are serving as a guideline for the company. *“Nevertheless, the significant thing above all at PICARD is the day-to-day contact and social bonds that exist amongst our staff,”* Mr. Reinhardt acknowledges. *“A goal for the future is to maintain that team culture, even without direct daily contact and to create a common space of action.”*

A further success factor going forward for PICARD is its international team concept. The company today is made up of nearly 300 employees from 36 nations who speak 25 different languages. Mr. Reinhardt is certain that this is a key to success for a trading company like PICARD: *“A central element of direct customer contact is the willingness to be open to all cultures and languages and to create a common denominator. It’s precisely this cultural diversity that generates a lot of potential for the future, and that can help us to become an indispensable logistics provider of roller bearings across Europe and perhaps even around the world.”*

Here’s to the next hundred years of PICARD!

Dominik Helfrich Dipl.-Ing.
Executive Director BETC
– Bearing Engineering & Testing Center GmbH

Meet **The Independent Expert** *for* **Rolling Bearing Technology**

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The Bearing News team had the chance to discuss BETC's rolling bearing analysis services during an exclusive interview with its Executive Director, Dominik Helfrich Dipl.-Ing.

Being a former laboratory engineer at the Chair for Quality Management, Production Measurement, and Rolling Bearing Technology, a certified expert and a member of the German Association of Professional Experts; Dominik Helfrich Dipl.-Ing. headed the Steinbeis Institute for Rolling Bearing Technology since 2017, and founded the BETC GmbH within the Madinger Group in 2022.

Can you explain in more detail what services BETC GmbH offers?

For rolling bearing analysis, you need an expert with the most advanced analysis equipment, testing options, and experience from steel production to bearing assembly. We offer individual analyses that are specially tailored to the respective customer application.

Our core competence, "rolling bearing analysis," is divided into two major areas, damage analysis and quality assurance. The latter specifically involves product audits, product benchmarking, incoming goods inspection, contract measurement, and testing on individually designed rolling-bearing test benches. In addition, the strong network within the Madinger Group means we can offer our customers services such as standard-compliant (according to VDA 19.1) production and inspection of technical cleanliness, non-destructive testing, or visual inspection for rolling bearings in large quantities.

Can you tell us more about BETC GmbH?

> "We look after international customers across all industries and stick to our motto: Rolling bearings should do one thing above all: work!"

How does your approach differ from other service providers in this area?

We look after international customers across all industries and stick to our motto: Rolling bearings should do one thing above all: work! Above all, our customers appreciate our independence, experience, personal and comprehensive support and advice, flexibility and reaction speed, the reliability of the data as a sound basis for decision-making processes, and cost-effectiveness in every phase of cooperation. In particular, we note that companies benefit from transfer of know-how and understand their own application even better.

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You mention the quality assurance of rolling bearings as a business area. Can you explain in more detail what this entails and how it benefits your customers?

For many of our customers, the rolling bearing is a standardized machine component that is purchased and that has to work. If there are problems or questions regarding the quality of the rolling bearing, the company's internal rolling bearing know-how is often not enough. Our services are needed especially when customers qualify and validate new rolling bearing suppliers/manufacturers. For this, we carry out product benchmarking and product audits individually tailored to the customer's requirements. The advantage for the customer is a holistic rolling bearing analysis across the various areas of investigation, such as measurement technology, metallography, and special testing techniques, which take the application's requirements into account.

For what kind of customers and industries is rolling bearing quality assurance interesting?

In principle, this service is of interest to all companies that buy, sell and manufacture rolling bearings. For rolling bearing distributors and manufacturers, we are the independent party in the customer-supplier situation, providing expertise on rolling bearing quality based on test results.

The industry itself does not initially play a role here. We can validate rolling bearings for medical devices with a bore diameter of 4.0 mm up to rolling bearings for wind turbines with a diameter of up to 1500 mm.

B© BETC – Bearing Engineering & Testing Center GmbH

The fact that you are an independent service provider also plays a decisive role in damage analysis, doesn't it? And what characterizes damage analysis at BETC GmbH?

Yes, that is correct. Independence is very important for our customers and their suppliers, as this is the only way to ensure an objective examination and assessment.

Another big advantage is that the affected rolling bearings are examined holistically in-house (in our own laboratories). To determine the cause of the damage, all relevant aspects from the measurement technology, the metallography, the lubricant analysis, and the bearing calculation are combined with the data conditions and requirements of the application to form a holistic picture. This approach and the consideration of the application or the entire system characterizes the damage analysis we carry out.

> "Independence is very important for our customers and their suppliers, as this is the only way to ensure an objective examination and assessment"

Finally, one last question, how do you see rolling bearing technology developing in the coming years? What are the most important trends and challenges at the moment?

The greatest challenge in rolling bearing technology is finding the right bearing for each application that consistently has the required quality and is available at an economical price. Because the customer only has the desired benefit if the bearing price and quality match the application. From our experience, there are often problems with "plug-and-play solutions" from different bearing manufacturers in functioning and tried and tested applications. The increased output density of previously functioning applications can lead to problems and bearing damage. Another challenge we currently have to face is the availability of rolling bearings. Whether rolling bearings in large quantities or special bearings or solutions, delivery times are sometimes not predictable.

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Dominik Helfrich Dipl.-Ing.
Executive Director BETC – Bearing Engineering & Testing Center GmbH

Dominik Helfrich received his degree from the Technical University of Schweinfurt in 2015. After completing his mechanical engineering studies in the mechanical engineering faculty, he worked as a laboratory engineer at the Chair for Quality Management, Production Measurement, and Rolling Bearing Technology, where he gained experience in rolling bearing validation and rolling bearing measurement technology. From 2017 to 2022, he successfully headed the Steinbeis Institut für Wälzlagertechnik (Steinbeis Institute for Rolling Bearing Technology) and focused on quality issues and damage analysis. Born in Schweinfurt, he founded BETC GmbH within the Madinger Group in 2022 and is responsible for the operative business as one of three executive directors. Dominik Helfrich B.Eng. is a certified expert and a member of the Deutschem Gutachter und Sachverständigen Verband (German Association of Professional Experts; "DGuSV")

BETC

Foundation: April 2022
Headquarter: Madridstraße 2, 97421 Schweinfurt, Germany
Company Structure: Part of the Madinger Company Group
Technical Capabilities: Accredited measuring laboratory, metallography laboratory and non destructive testing
Special Service: "Rolling bearing consultation hours" is a free technical customer support which is explicitly tailored to the customer's requirements
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From local specialist to global partner for industry and commerce:

Sieland GmbH
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Celebrates its 50th anniversary

— In the new warehouse, more than 20,000 power transmission items are available immediately

This year, Franz Sieland GmbH celebrates 50 years since its founding. Known as Sieland Industriebedarf, the German company headquartered in Arnsberg, near Dortmund, is a specialist distributor for tools and bearings. Its portfolio covers practically the entire range of needs for industrial and commercial customers.

Stefan Haas,
Senior Product Manager,
Managing Director of Sieland

Besides supplying a wide range of power transmission components, power tools, hand tools, cutting tools, cleaning equipment, personal protective equipment and workspace equipment, Sieland in particular offers consulting as well as repair and maintenance services. Sieland puts a high priority on extensive warehouse inventory and the personal relationship with customers. The products are delivered all over the world.

> “Over 20,000 power transmission items are available for immediate supply from the warehouse.”

The specialist dealer for industrial supplies was founded in 1973 by Franz Sieland and Rainer Haas. Rainer's son Stefan Haas has led the company as managing director since 2005. "I've been part of the company since childhood, and I practically grew up in the salesroom," says Stefan Haas. "The company originally started as a local business for industrial customers, craftsmen and municipal works. We supplied everything needed for repairing machinery."

This portfolio was extended to include power transmission as a further line of business in 2008: "We deliver power transmission components for the D2D sector, meaning from distributor to distributor, worldwide," says Stefan Haas. "This means we sell mainly FAG, INA and SKF bearings to other distributors in our network. Apart from these premium brands, we are also a niche provider for special applications with ceramic bearings and also high temperature bearings from the German manufacturer SWC." In order to expand its bearing stock capacity, since the beginning of 2023 Sieland has cooperated with a new logistics partner, A.L.S. Allgemeine Land- und Seespedition GmbH. At its 12,000 square-metre logistics centre in Arnsberg, A.L.S. is responsible for inventory management, order picking, and for shipping of Sieland's entire product range. Loading and unloading is now carried out at eleven bays and four gates in the newly constructed logistics centre. "Sieland customers now have the benefit not only of greater warehouse capacities, but also of extended shipping times and excellent transport links to the logistics centre, which is very important for our local customers," says Stefan Haas. In the new warehouse, Sieland stores goods on more than 1,800 euro pallets and 5,000 shelving racks. Over 20,000 power transmission items are available for immediate supply from the warehouse.

For orders received before 3 p.m., Sieland guarantees same-day shipment or dispatch. In the next step, it is planned to extend shipping times to 6 p.m. by the end of 2023. "Our comprehensive inventory ensures a high availability, which is complemented

—Supporting the local industry for maintenance and spare parts: Stefan Haas, managing director of Sieland in Arnsberg, Germany

> “Apart from the premium FAG, INA and SKF bearings, we are also a niche provider for special applications with ceramic bearings and SWC high temperature bearings.”

— Customer service at Sieland: as a specialist distributor for bearings, tools and personal protective equipment, Sieland also offers consulting as well as repair and maintenance services

efficiently by our worldwide delivery service," says Stefan Haas. "Because emergencies or failures of important machines happen constantly, especially in the power transmission field. To enable us to deliver the right bearing promptly in these situations, we stockpile a wide range of common bearing types. The bearings in stock can be sent flexibly via all service channels, overnight express, courier or scheduled consignments."

A further 60,000 items in the tools catalogue can be shipped within 24 hours via drop shipping. Another site has been acquired for Sieland's tools division, which specialises in personal protective equipment and tools: with the acquisition of HIW GmbH, the company now has a presence in Hamburg as well.

Besides classic delivery and customer-collection for local businesses, Sieland also runs a modern online shop. Following its introduction in 2014, the online shop for bearing distributors has now undergone complete redevelopment, functional optimisation, and re- branding. It allows simple access to inventories and individual prices. At www.d2d-bearings.com, bearing distributors can now check directly online whether the parts they need are available in the desired quantity.

"As managing director, Stefan is a true entrepreneur with integrity," says Jan Kruse, the responsible manager for organisational development and expansion of the bearings division at Sieland. "Stefan's business partners value his reliability and his rapid, dependable response. When times are tough, or if a problem arises, for example when a spare part is needed urgently, these situations often end up making new relationships. Because this is where Stefan and his excellent team work creatively with their business partners to find a workable solution. And it is from positive experiences such as these that strong relationships may be forged for both sides. This philosophy has been central to the Sieland way of doing business for five decades."

For the future, Stefan is looking to maintain the company's existing business relationships and continue developing its service portfolio. "The path he and his employees have begun together is intended to lead to further strengthening of consulting and logistics services," says Jan Kruse. "His values are reflected in every aspect of the company: his pleasant manner with employees, customers and suppliers, and innovative thinking which finds expression in his willingness to embrace new ideas!"

Company information:

Franz Sieland GmbH, known as Sieland Industriebedarf, is a specialist distributor for tools and bearings with headquarters in Arnsberg, Germany. Besides supplying bearings and power transmission components, tools, cleaning equipment, personal protective equipment and workspace equipment, Sieland offers consulting as well as repair and maintenance services. The company maintains an extensive warehouse inventory and ships the products all over the world.

More information about the company can be found at www.sieland-werkzeuge.de or can be requested from info@sieland-werkzeuge.de +49 (0)2932 97710

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An investment of 4 million euros for the leading company in the field of industrial components

ISB industries, leader in the field of industrial components, inaugurated recently its ISB Technical Solution Center. The new facility (1800 sqm) houses technical offices, laboratories, control and testing, training center and conference room holding over 200 people, and a dedicated events room.

Last 18th November ISB Technical Solution Center was officialy opened; the ceremony was attended by 130 people including many local and regional autorities. ISB Group was founded in 1981 in Rubiera (RE) and currently still retains its familiar character: today it is run by Bartolomeo Ghirardini himself as Chairman, with his daughter Chiara Ghirardini and son-in-law Giuseppe Vernetti as Managing Directors. The company has a Group turnover of 130 million euros, and 250 employees. "In the last 5 years we have invested more than

> “We have invested more than 20 million euros in the last 5 years. With a capacity of over 56,000 pallets and 235,000 boxes in stock, our Logistics Hub is the largest warehouse for bearings in Italy and the third in Europe.”

20 million euros, many projects have been carried out both internationally and in the local area: strategic branches, production companies, specializations and important investments for business development, including automatic warehouses and the ISB Technical Solution Center” -explains the owner Mr. Bartolomeo Ghirardini - “The Logistics Hub, with a capacity of over 56,000 pallets and 235,000 boxes in stock, for a total volume of 75,000 cubic meters, is the largest warehouse for bearings in Italy and the third in Europe. The new building, next to the logistic center, houses technical offices with a staff of qualified engineers and technicians who work closely with the production and other technical departments of the branches of the ISB Group- laboratories, control and testing, training center and conference room holding over 200 people, and a dedicated events room."

A key factor to the company’s success is the development of a solid reputation, also through specializations: every part of the big team has a specific role and follow ideas of development and leadership in its own sector.

The products core is represented by ISB Industries – Headquarter with industrial bearings and components, oil seals full range with OT SEALS Co., linear system solutions with TRM Co, power transmission (rigid and elastic) with EUROTRASMISSIONI Co.

ISB has five international branches in Spain, Brazil, Central America, India and China, together with a constellation of ISB dealers in more than 90 countries around the world.

Check isb-industries.com for more information.

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- a hidden champ from Germany - knows how to perform as a global player

KUKKO, synonymous with solutions for non-destructive dismantling, is considered a pioneer of pulling. As a market and innovation leader, KUKKO has a global sales network and is broadly positioned internationally. Its products are sold in over 100 countries worldwide. True to the motto ***"Think globally, act locally"***, the expansion strategy takes place in well-prepared steps and always with sophisticated logistics behind it.

— The 21-E series - highly appreciated specialists in the extraction of bearings. Available in many sizes.

The individual markets differ from one another in many respects. Therefore, it is important to have a contact person directly on site who knows the specifics of the country-specific market and can react immediately to changes and trends. For this reason, KUKKO has established various subsidiaries that offer customers and partners alike a comprehensive service. Whether it is product training, information on availability and pricing, or personal support for the dealer - the direct exchange and proximity to the potential business partner is a matter close to KUKKO's heart.

Benelux: Being close to the customer

The Dutch market focuses on the maintenance of machines and technical equipment and is primarily aimed at the technical trade. Customers demand high-quality products that are characterized by ease of use. "The demand for special product quality has gained immensely in importance in recent years," comments Timo Langenberg, KUKKO Benelux, on the current market situation.

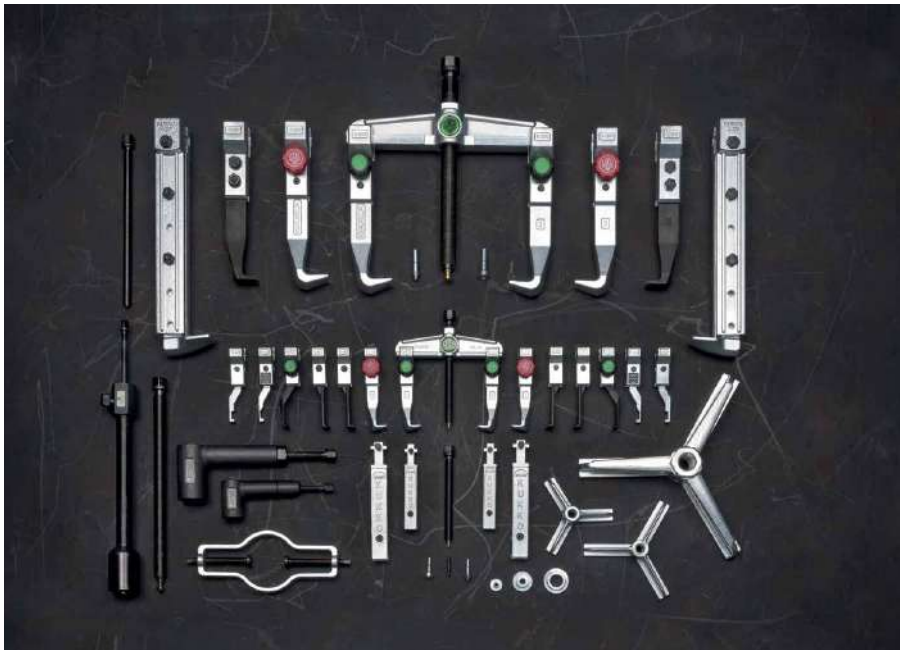
—Timo Langenberg, KUKKO Benelux

— *The black labels on all KUKKO products contain both the article and serial number, which means that each product can be clearly identified. This simplifies re-orders and traceability to a maximum. The label also contains the most important technical attributes.*

Poland: Value for money

Delivery capability and product quality are the main concerns of the Polish market. The possibility to order low-cost spare parts is very well received by customers. In addition, the competent customer service as well as the website and the catalog in the national language are highly appreciated. According to Waldemar Just, Sales Poland and Eastern Europe, price sensitivity has also changed. "It can be observed that quality is more important than price. Customers prefer to spend a few euros more if they get a premium product with a long service life in return."

— *The modular system is KUKKO's unique selling point and enjoys great popularity in all markets across all industries. The 20 and 30 series are the all-rounders among the pullers and can be used universally.*



USA: Quality is key

The U.S. market is focusing more on quality than quantity. Customers are asking for the one all-rounder that can be used for a wide variety of applications. In addition, the Made in Germany designation represents a special seal of quality for all Americans. "In the US, when someting is marked "Made in Germany," the thought is impressive engineering, great quality and outstanding performance," says Greg Genevro, KUKKO Quality Tools Inc., describing the importance of German quality tools.

— *Greg Genevro, KUKKO Quality Tools Inc.*

— Awarded with the Plus X Award - the multifunctional sets of the 20 and 30 series exist in a wide variety for all industries. The K-2030-10+S is the #1 selling set in the automotive segment in the USA.

Scandinavia: Warranty is essential

The Scandinavian market, which is dominated by the ball bearing manufacturer SFK based there, is also characterized by some special features. Among customers, KUKKO's wide range of products is highly appreciated. This is also a reason why KUKKO products are used in all industries. The longevity of the products is also expected. The 5-year warranty promise contributes to the purchase decision of many customers.

Italy: Reliabilty on after sales

A typical market requirement for Italy is the re-ordering of spare parts. In addition, the product quality as well as the local presence are valued. KUKKO products are purchased across all industries, such as the automotive industry or mechanical engineering. There is also an increasing demand in the shipping industry.

France: Passion for simplicity

On the French market there is a high demand for universal pullers. A puller must be sturdy, durable and easy to use. Both the Made in Germany labeling and the excellence to find a solution for any pulling challenge are highly appreciated in France.

— A popular product in France is the 128 series ball joint extractors, which are used, for example, on vehicles in the agricultural sector.

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FERSAGROUP

The Perfect Symbiosis:
Meister Abrasives' Ceralox & Alfons Schmeier's 410A Sulfur Free

When looked up in the Cambridge dictionary, across the word "symbiosis" one reads: "a close connection between different types of organisms in which they live together and benefit from each other". (Cambridge) Although the definition of the word has a purely biological origin, its notion has been long ago adopted into the business world.

—Illustration 1: Wheel bearing

Organizations have recognized that building strong equally-dependent relationships is mutually beneficial and creates a unique added value for the customer that would otherwise not be achieved had the companies acted individually. Funneling the concept of symbiosis from the strategic business level to that of R&D and translating it to the grinding industry, Meister Abrasives and Alfons Schmeier have proven that working together to offer a combined solution results in an unmatched benefit for the customer. Meister's Ceralox and Schmeier's 410A Sulfur Free are a true symbiotic creation for the bearing industry.

In the production of rolling bearings (Illustration 1), grinding is one of the most important process steps which affects the raceways as well as all other functional surfaces and diameters. In this context, not only shortest machining times are paramount, but also the accuracies of the components. The latter require a high degree of constant surface quality and exact compliance with the dimension-, form- and position tolerances. An improved tool life, which is achieved by a high dressing interval and low dressing amounts, is the prerequisite for an optimal machining process.

Meister Abrasives' Ceralox product solutions

Innovated by and proprietary to Meister Abrasives, the Ceralox bond has become an industry-wide standard due to its outstanding grain properties and possibility for complex wheel shapes in highly porous structures. Elaborately developed by the brand's engineers, the Ceralox bond both maintains 100% of the grain properties of the sintered aluminum oxide abrasive and achieves maximum bond strength in the ceramic bond. Drawing on its decades-long expertise in developing CBN and diamond tools in ceramic bond systems, Meister Abrasives has succeeded in introducing a unique solution to the market suited for reaching peak efficiency during high-performance processes, as is the grinding of rolling bearings. Meister Ceralox tools have been the benchmark in the high-performance grinding processes from their very first inception and it is impossible to imagine the highly competitive rolling bearing industry without them.

Alfons Schmeier's 410A Sulfur Free product solutions

Instead of being sulfurized, Alfons Schmeier's 410A Sulfur Free honing stones and cups are carefully waxed, making them entirely sulfur-free, thus, eliminating possible harms for the machine equipment, the operating staff, and the environment. Genuinely combining sintered and white corundums, 410A Sulfur Free solutions exhibit an up to three times better tool life and a significantly improved performance, leading to a better cost per part. Manufacturers can now cut on the maintenance costs for the machines, the expensive handling of health-related issues, and eliminate the complex and costly process of disposing of sulfur.

A potent symbiosis between Swiss quality and German precision

Meeting customers' requirements in terms of surface roughness, tool life, and process times and costs requires a close collaboration between the application engineer and the customer, and customization of the solution parameters – something that both Meister and Schmeier are highly adept at. Building on decades-long expertise and industry knowledge, the brands' engineers took the bold decision to combine Meister Abrasives' Ceralox grinding solution (Illustration 2) with Alfons Schmeier's 410A Sulfur Free finishing solution (Illustration 3) in the quest of finding optimal solutions for processing

wheel bearings. This integrated approach has proven to consistently achieve at least a double tool life compared to other standard solutions and surpass the challenging-to-reach surface roughness of Ra 0.06.

By coordinating the grinding and honing processes and matching the two solutions to each other, maximum performance, as well as process optimization and stability can be achieved. Additionally, being sulfur-free, 410A reduces certain accompanying costs, such as those related to oil cleaning. It is only by complementing Meister's grinding tools with Schmeier's finishing tools that the properties of each product solution can be enhanced enabling the customer to exploit the full set of benefits of that this combined application holds.

— Illustration 2: Bearing wheel with a Ceralox high-performance grinding wheel

— Illustration 3: Bearing wheel with 410A Sulfur Free cup and honing stone

The most significant intangible value-added for the customer, however, lies in having a single-source solution and a streamlined chain of responsibility, thus, assuring quick reaction times. The fusion of Swiss quality and German precision is a potent symbiosis allowing the end user to benefit from an optimal solution that goes beyond the product itself into a holistic process optimization.

About MEISTER ABRASIVES AG

Meister Abrasives is a leading and highly innovative company with extensive experience in developing and manufacturing customized cutting-edge industrial superabrasive tools for high-precision grinding applications. Founded in 1951 in Switzerland, Meister Abrasives is synonymous to exceptional quality, precision, and individualized customer solutions – values inherent not only to the brand but also to the land in which it originated – Switzerland. Being at the forefront of technological innovation, Meister Abrasives is dedicated to its quest of creating innovation with a higher meaning through processes optimization, sustainable use of resources, control of own manufacturing processes, and uncompromising attitude to quality in customer care, facilitated by the brand's international structure with family values.

Visit meister-abrasives.com or contact sales@meister-abrasives.ch for more information.

About SCHLEIFSCHEIBENFABRIK ALFONS SCHMEIER GMBH & CO. KG

Founded in 1946 in Helmbrechts, Germany, Alfons Schmeier is an innovative company, leader in application technology and production with ample experience in manufacturing internal grinding and finishing industrial tools. The Alfons Schmeier name evokes the brand's values of highest precision, utmost quality, and personalized customer solutions.

Visit a-schmeier.de or contact as@a-schmeier.de for more information.

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Specialized in Bearing Solutions

Mr. Roberto Bortolazzi,
Business Development Manager
of Techno Total Solutions (TTS)

In this exclusive Bearing News Interview, Mr. Roberto Bortolazzi, Business Development Manager of Techno Total Solutions (TTS), shares and discusses the current activities and future outlook of TTS, an Italian- based manufacturing company specializing in bearing solutions.

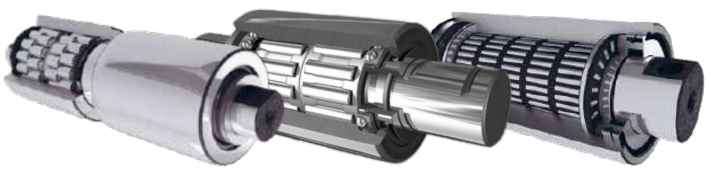
Actually, we have not heard of Techno Total Solutions, what is the story of Techno Total Solutions?

TTS was born in 2007 with a bunch of passionate and likeminded people who shared the same philosophy of increasing the level of service to the customer and providing complete technical solutions. Fast-forward to 2022, with the accrued technical acumen, TTS is serving customers worldwide in various applications by providing them with a wide gamut of products. TTS is proud to say that its products have satisfied the needs of the applications, and our technical team is adept in providing standard and tailor-made solutions for various applications.

Can you tell us more about your background and current activities at Techno Total Solutions?

As a mechanical engineer, I have about 8 years of experience in companies specializing in production of cranes and tractors for agriculture. The applications helped me realize the importance of bearings in the industry. I immediately joined a bearing distribution company wherein I learnt about the products and its applications. But after working for 20 years in the bearings industry, I still felt that I needed to learn more.

One fine day, I met and interacted with Mr. Romolo Pelizzoni, who is the CEO at TTS and Mr. Geraldo Mirafiori, who is the Technical Manager at TTS, in Milan. This short encounter led to several meetings at the TTS facility which motivated me to join the TTS team.
We have a tech savvy team dedicated to quality, who is ensuring that ISO9001:2015 and our experience in Lean Six Sigma black belt go hand in hand together. We have hundreds of measuring instruments and two CMM machines which are periodically calibrated, to ensure the continuity of the quality. Our technical team uses the latest software to give accurate technical recommendations and we strive to continuously improve the manufactured products.



> “As a short-term plan, we would like to expand further into East-European, Mexican and Indian markets.”

We at TTS maintain absolute commitment to client satisfaction, integrity and transparency. Overall TTS has shown great growth potential and it could beat any other premium manufacturer of bearings in terms of quality and performance. TTS is currently preparing for the ISO14000 certification and at the first instance, it was the vision and future goals who convinced me to join the company and become a part of TTS's journey to the next level.

Will you mainly serve OEM or distribution network?

Considering our product matrix, 85% of our revenues are from the OEM business. This has been growing at 12% on YoY basis. Despite the slowdown in FY22, our revenues have sustained the growth trend. Moreover 75% of our bearings are exported worldwide.

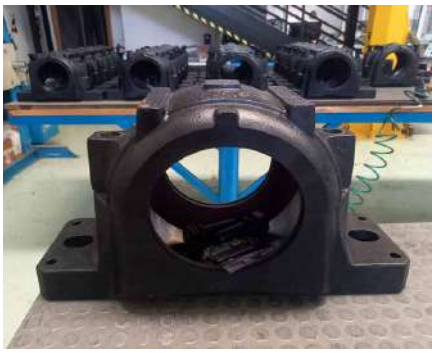
As you are the Business Development Manager, responsible for worldwide sales – In which markets/ countries is TTS is active?

As of today, TTS has a good grip in the Italian market. At the international level, its products are being used for various applications and heavy industries worldwide. We have been robust in industries as mentioned earlier but we would like to move closer to our clients' needs and provide customized solutions, with reduced delivery time, and enter new markets. As a short-term plan, we would like to expand further into East-European, Mexican and Indian markets.

> "The unique approach of the TTS's technical and the production team has reduced the onsite failures and has excelled in delivering quality products for the steel industry."

What are your main plans for 2023 – 2025?

- To see that our expansion plans in Mexico, East-Europe and India as mentioned before are successfully implemented.
- Exploring new leads to understand their current problems and help them with unique, innovative and customized solutions which our technical team has mastered since its inception.
- Lowering the overall costs by improving our efficiency and increasing our level of service to the clients.
- Continue investing in R&D activities and partnering with universities for new product development.
- Widening the technical department by strategic hiring of engineers whose vision is aligned with that of TTS.



How are changing global supply chains changing the strategies in the market?

Situations like the pandemic and the current condition in Europe have undoubtedly disrupted the supply chain for everyone. Not only the overall costs of the supply chain have increased but also the supplier and client relations have been reconstructed. During the initial days of the pandemic to recoup with the disruption, we developed a cross functional team to mitigate the risk by adopting strategies like product segmenting, developing ecosystem partnerships etc.

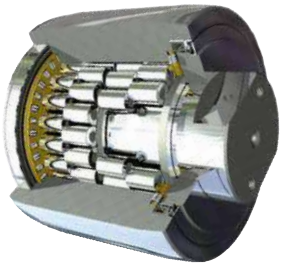
These strategies helped us to rebuild a resilient supply chain. But when the war of 2022 started, our supply chain was put into test and as of today we can say that we have been successful in handling the disruption. As we are almost at the end of the current FY, our success is clearly reflected in the steady YoY growth of 12% in revenues, growth in our PAT (Profit After Tax), reduction in CCC (Cross Conversion Cycle) and lowering of the inventories.

Mr. Roberto Bortolazzi, Business Development Manager of Techno Total Solutions (TTS)

Which products for which applications do you produce and what is TTS's target markets and industries?

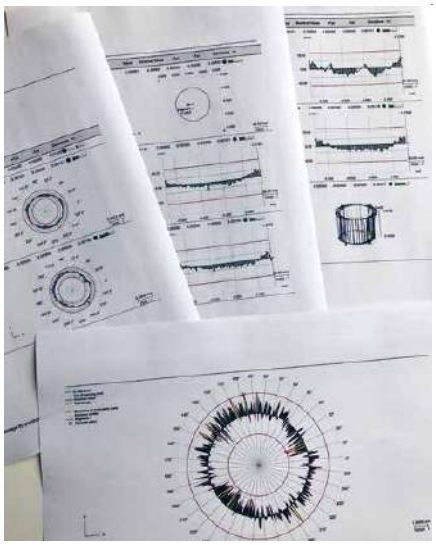
We have been instrumental in producing Combined Bearings, Backup Rolls, Ball Bearings, Tapered Roller Bearings, Cylindrical Bearings, Spherical Bearings, Split Cylindrical Bearings, Bearing Housings, Slewing Rings. Most of these bearings are used in the

materials handling, tension levelers backup rolls, steel plants, rolling mills, oil & gas, mining, and cement industries. As our target market, we would like to penetrate deeper into our existing field of expertise and applications.



Can you specify TTS's solutions for the Steel industry?

We are very well know that the steel industry applications poses serious challenges like the heavy loads, high temperatures, penetration of debris etc. It is not cake walk to deal with these challenges. The technical team of TTS has a holistic approach towards these problems, and always starts first with modelling the actual conditions using engineering simulation software. The model is validated to onsite conditions. Upon finalizing with the client, TTS undertakes sample production of the products and the feedback of the maintenance engineers at site helps us always to refine the product.

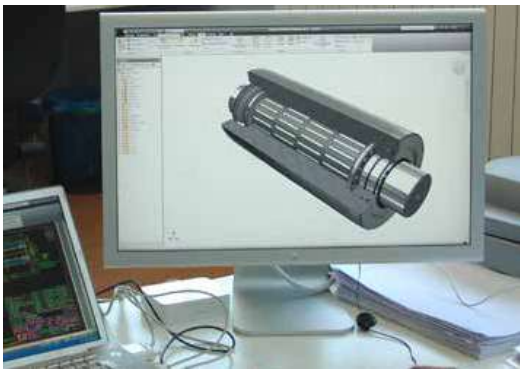


Using this approach, TTS has outshined its peers in the production of: Four Row Cylindrical Bearings, Four Row Tapered Roller Bearings, Tension Leveler Backup Roll Bearings, Spherical Bearings, Combined Bearings. We can supply bearings up to 2000mm outer Diameter. These bearings have been widely used in equipment like rolling stands, pellet cars, continuous casting machines, blast furnace, etc... The unique approach of the TTS's technical and the production team has reduced the onsite failures and has excelled in delivering quality products for the steel industry.

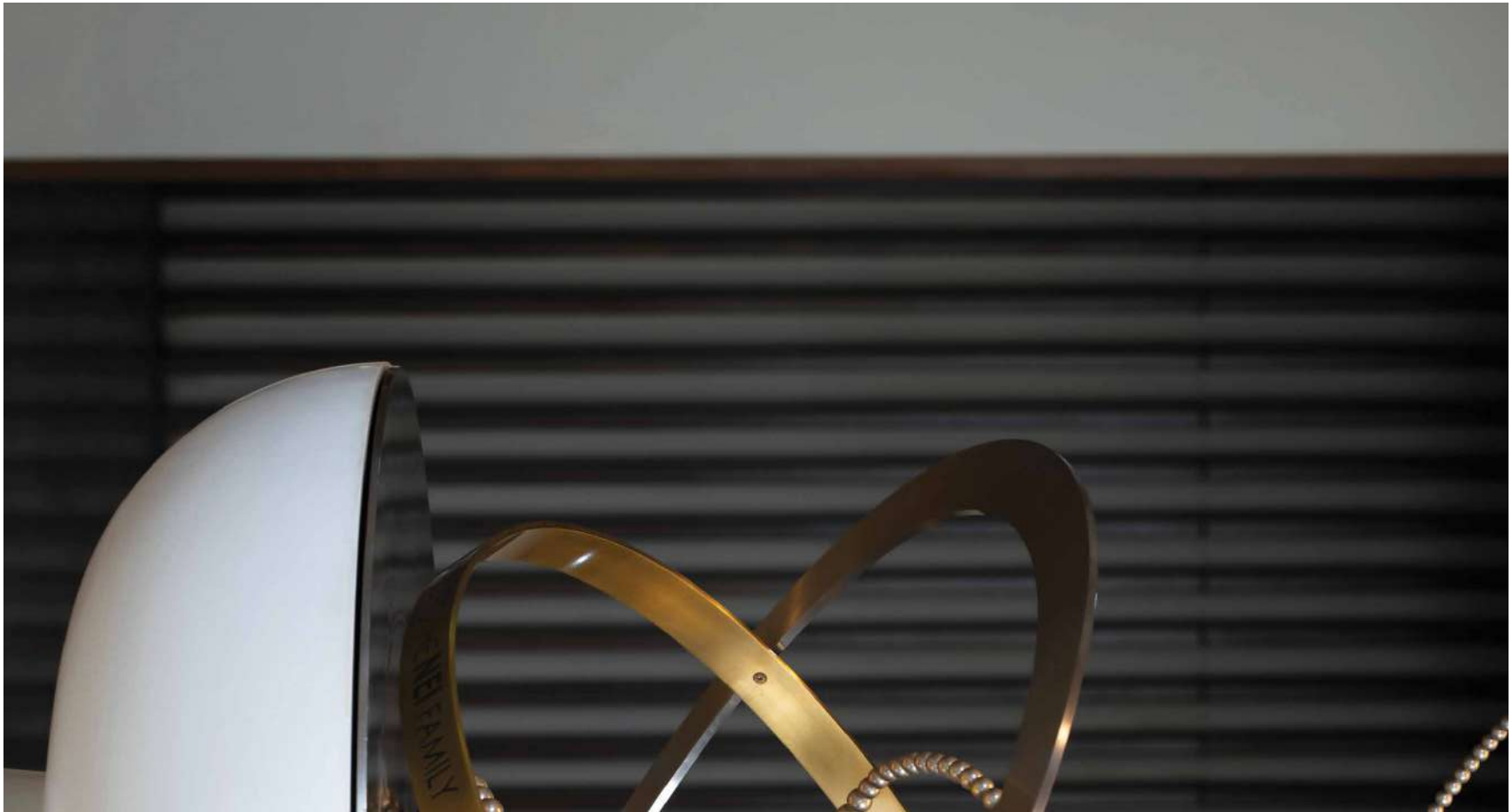
How do you see the future of the steel industry in the coming years?

Steel is the backbone of human sustenance. It's everywhere. Among all the metals, steel has seen a greater importance in industries like energy, automotive, construction, packaging, infrastructure, and machinery. Many steel plants around the world are now focusing on novel steel grades and stressing green production. The per capita steel consumption has increased by around 60% from 2001 to 2022. With the world seeing a constant increase in population, the expansion of various industries is inevitable. In the long run, the steel industry has to run to catch up the demand. We are fully confident that TTS would grab this growth opportunity.

More information about of Techno Total Solutions (TTS) can be found at www.tts-europe.com/en



India's Bearing Pioneer
Turns to Global Expansion



Mr. Rohit Saboo
President & CEO of National
Engineering Industries Ltd. (NEI)

Bearing News had the distinct pleasure of speaking with Mr. Rohit Saboo, President & CEO of National Engineering Industries Ltd. (NEI), manufacturer of NBC Bearings, India's first bearing brand. In this interview Mr. Saboo, a highly credentialed and experienced professional, provides a candid overview of NEI's history, its expansive infrastructure, versatile capabilities, and plans for future growth.

Can you tell us more about your background and the story of National Engineering Industries?

I am an Engineering graduate from Birla Institute of Technology, MBA from Rochester Institute of Technology, NY and also participated in Senior Executive Program from Columbia University, NY. My journey with CK Birla Group is more than 25 years with experience in corporate strategy, business planning, operations management, operational excellence, manufacturing and R&D. Currently I hold the position of President & CEO of National Engineering Industries Ltd. (NEI), manufacturer of NBC Bearings, India's first bearing brand.

Founded in 1946, NEI is a part of the US$ 2.4 bn CK Birla group and is India's leading bearings manufacturer and exporter, recognized for excellence in quality and delivery. With production of more than 200 Mn bearings annually in over 2300+ variants for application across automotive, railways, aerospace and industrial segments, NBC Bearings are exported to more than 30 countries. NBC Bearings has grown from a pioneer in India, to become a global supplier of bearings and flexible engineering solutions, renowned for its superior quality, precision and durability.

> "Apart from the bearings for EV, we are also focussing on expanding our portfolio into aerospace and defence industries"

Which type, and range of bearings do you mainly produce?

We produce a comprehensive range of bearings for sectors like automotive, industrial, and railway applications. Our product range includes ball bearings, taper roller bearings, cylindrical roller bearings, spherical roller bearings and needle bearings. Large size bearings and axle boxes are among other major products. Apart from this, we have developed electric vehicle (EV) bearings.

In EV industry, our current offerings include EMB series (for electric motor) and SIB series (sensor integrated). These have features like high rpm capable, reduced noise and friction, power-dense and improved life compared to traditional bearings. We are already supplying these to some of the EV OEMs in the space of 2W, 3W and passenger cars and are engaged with global OEMs in commercial vehicle space. Apart from the bearings for EV, we are also focussing on expanding our portfolio into other critical sectors like aerospace and defence industries in order to reduce import dependency for the country.

> Our customers are based in 30+ countries including Germany, Japan, China, and we have our sales offices in US, Europe and Asian countries.

Is it possible to share with us your' manufacturing infrastructure and R&D capabilities?

Headquartered in Jaipur, India - NEI is the only bearings manufacturer in the world to win the prestigious Deming Grand Prize (2015). With an employee strength of over 2,800 and five manufacturing plants in Jaipur, Newai (Rajasthan), Manesar (Haryana) and Vadodara (Gujarat), NEI is equipped with global manufacturing and process technology and one of the best R&D centres in India. Apart from being technologically advanced, we practice methods of sustainability by using alternate sources of energy and increasing the efficiency of the manufacturing process by leveraging on the power of digitisation.

We are further expanding our manufacturing footprint in Bagru, near Jaipur where we will setup new lines for manufacturing bearings over the next four years. We have also entered a JV with Amsted Seals to manufacture railway bearing seals in India. With installed capacity of two million units per year, we will be supplying products in India as well as to international markets.

Our Global Technology Centre based out of Germany is staffed with application engineers who collaborate with our global customers to better understand business needs and provide the most appropriate solutions.

To which countries is National Engineering Industries actively exporting it's products?

Over the years, NBC has become a global bearing manufacturer and exporter out of India, with 20% of our revenue coming from exports. Our customers are based in 30+ countries including Germany, Japan and China. We have partnered with prestigious brands like Brenco (US) and NTN Corporation to expand our product portfolio. In 2020, NBC also acquired Kinex bearings in Europe to enhance and diversify in order to provide best-in-class products to our existing and potential customers and to be close to the international customers. We also have our sales offices in US, Europe and Asian countries to cater to our international customers. We are building our design and

> “We are growing rapidly and will more than double our revenue by 2026.”

research capabilities in Europe to further strengthen our existing setup.

Apart from the OEMs we service in Americas and Europe, we also cater to the replacement business in SAARC and Middle East countries.

Can you share some of your main industries and applications served?

NBC Bearings are widely used by 2 and 3 Wheelers, Cars, Trucks, Tractors, Electric Motors, Railway Wagons, Coaches & Locomotives, Steel Mills, Heavy Engineering Plants, Cement, Mining and Thermal Power Plants. The automotive and railway industries form the two largest client segments for us.

Do you have any future expansion and investment plans which you would like to share with the Bearing News magazine readers?

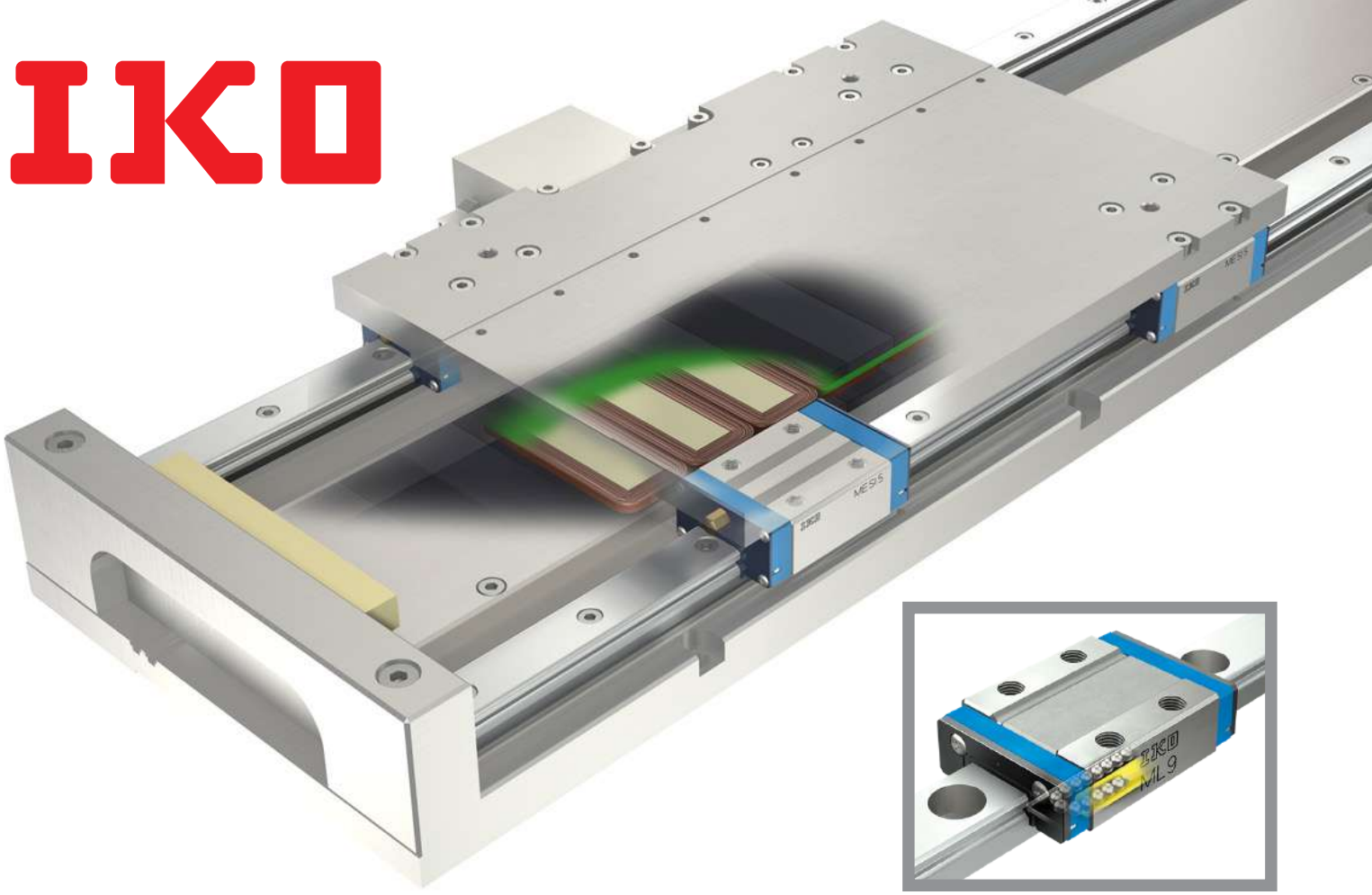
We have undergone multiple economic, social, and policy changes, with a view to enhance the quality of our products and services, thereby addressing the needs of the stakeholders, keeping pace with the changing times. We are growing rapidly and will more than double our revenue by 2026.

NBC Bearing is working with several leading research institutes and centers in India and abroad to develop the advanced design, testing, and validation capabilities, and is preparing to offer aerospace bearing solutions by establishing a world-class manufacturing facility with AS9100 certifications and the necessary NADCAP certifications. Our subsidiary, Kinex also has vast experience in aerospace bearing design and manufacturing.

How do you foresee the future of the bearing industry further developing?

Bearing industry is growing at a decent pace across the world with new automobiles being introduced and rising industrial production. There are several developments that are happening to the size, quality and speed of the bearings due to numerous new applications in different segments. The developments in the electric vehicle segment will also fuel the demand. Besides this, the new generation bearings are lighter, faster and sustainable which are the emerging requirement from the industry. The new-age bearings with sensors enable users to take data-based decisions which make the processes even more efficient. All this will propel the growth in the coming years.

More information about National Engineering Industries can be found at www.nbcbearings.com



RAPID AND STABLE LINEAR MOTION IN ANALYSING DEVICES,THANKS TO IKO LINEAR WAYS.

An increasing number of tested samples per hour and zero failures are the most important factors in bioscience analysers. Nowadays, linear motion mechanism is an indispensable part in these devices which are used widely in medical and researching facilities. Though dozens of linear bearing manufactures provides small size linear guides in the market, IKO Nippon Thompson brings unique technology and solutions to these high-end devices with our unique technology and the solution we offer:

- Excellent and accurate repeatability
- Maintenance-free
- Made from corrosion resistant stainless steel

The engineer from one of IKO's Miniature Linear Way ML users who is responsible for designing the precision scanners for their medical devices explains: "Smooth and stable linear movement without a mechanical clearance is absolutely a crucial factor for our device performance. A linear motor-driven table must have zero-compromise speed stability in order to achieve a high quality scanning of the biological membrane. IKO Linear Way brought the solution to our high demands." During the prototype designing, the engineer and IKO discussed numerous factors and finalized the specification. In addition, the end users or maintenance engineers of the devices are free from a re-lubrication thanks to IKO C-Lube technology. In addition to providing the above mentioned technical solutions, IKO worked together with the customer to plan and arrange optimized delivery control in a recently problematic supply chains system, successfully securing the customer's on-schedule production.

IKO Miniature Linear Way ML does not stop in the field of mechanical parts, but has evolved to IKO linear motor tables by incorporating their excellent performances. IKO provides the extremely thin and compact structured linear motor tables that are suitable for bio-medical, semiconductor, small automation devices. These positioning tables achieve quick positioning from A to B with more than 80% reduction of the settling time compared to the ball screw driven mechanism.

IKO provides the following size range
Miniature Linear Way ML : 1mm to 42mm in width
Linear Motor Table NT : 38mm to 88mm in width
Linear Motor Table LT : 100mm to 170mm in width

experts in MOTION

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thb NON STANDARD Bearing Solutions

flexible, fast and multi-brand

DUROCOAT - DC ELECTRICALLY INSULATED BEARINGS AND COMPONENTS

Our ceramic coatings can be applied on any brand, onto most of radial and thrust bearing types, inner or outer ring or on any other component.

The insulations are not restricted to a specific bearing brand, anyone can be coated. The ring receiving the coating will be reworked by us, the bearing performance data remain the same. Based on our cooperation with bearing manufacturer in Europe and Asia the bearing rings can be already produced with appropriate dimensions for direct coating in Austria without additional pre-processing. This way electrically insulated bearings become highly competitive.

All tolerances remain the same, the bearings and components are ready to install.

The electrical resistance and breakdown voltage are 100% process controlled, available are layers from 70 to 300µm, offering a dielectric strength from 500V to 3000V.

— 23040 / NTN / 3000V insulation

— SRB filled with Durolub DL150

DUROLUB DL - POLYMER LUBRICATION SOLUTIONS

Durolub DL is filled into the free space of the bearings and then specially heat treated. The bearing contains about 3-5 times more oil compared to bearings filled with grease. Durolub base oils are used very efficiently just at the amount needed for lubrication. At standstill the oil is soaked back into the polymer matrix.

Beside an considerable extended service life, the seals are supported and cannot be pressed inside while washing with high pressure.There will be no condensed water inside the bearings or any leakage by operating vertically.

Durolub is offered with three different synthetic base oils, two variants with a standard viscosity for ball bearings or roller bearings and one for low temperature applications.

All Durolub DL executions are NSF H1, Halal and Kosher approved, made inhouse THB and available shortterm with no minimum quantity.

DUROLUB G - SPECIAL LUBRICATION / SPECIAL BEARINGS

Specially lubricated bearings are difficult to get and even if they are available, their prices are mostly sky-high.

With Durolub G, THB relubricates existing bearings with high performance greases to your choice. There is a full assortment of greases available, made in Europe or overseas.

For most efficient and economical solutions THB offers a full range of special bearings. They can be coated - filled with special lubricants - equipped with high performance seals - made of special ring materials - be hybrid with ceramic rolling elements.

There are endless options for a higher bearing performance.

— HC224 coated Cr3+ and filled with synthetic, NSF H1 certified, low / high temp grease for a bakery combined use in the oven- and cooling zone.

THB OFFERS ALL THE OPTIONS

You can send your own bearings for any of our services, or we purchase the bearings in the brand you prefer. We can also offer complete solutions, bearings and other components, with products made in Europe or in Asia.

Furthermore we offer assistance in choosing right lubricants, technical calculations, failure analysis or any other material / process detail for rings, cages and seals.

— DGBB filled with synthetic high performance grease

— Miniature ball bearing coated with a special wear resistant TPU with a shore hardness A 92

CONTACT THB FOR FURTHER INFORMATION

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Address : Austria / 4802 Ebensee / Langwieserstraße 134

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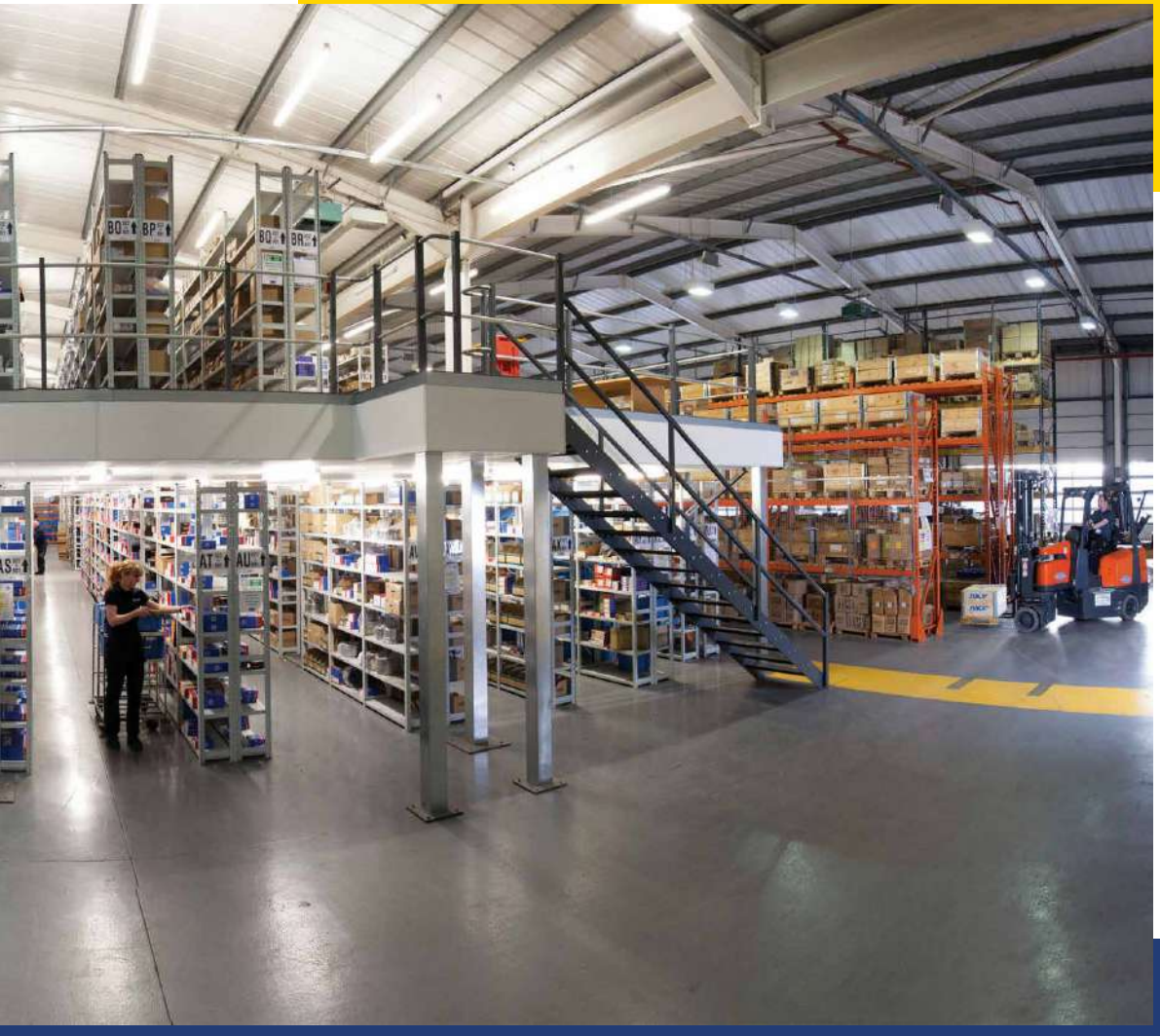
Gears Up To *Celebrate* 40 *years*



Acorn Industrial Services Ltd celebrates 40 years of service in 2023, serving customers across the globe and providing innovative solutions to every industry.

Founded in 1983, ACORN quickly expanded and relocated a number of times to cope with demand. By 1990, Acorn Industrial Services Ltd had reached £1 million turnover - a momentous milestone. The 90s saw ACORN go through a transitional phase of modernisation. This included launching its first delivery van, offering free local deliveries to businesses, as well as investing in its first computers and transitioning onto a fully computerised stock control system.

1991 was an important year for ACORN, as its first Regional Distribution Centre opened in Birmingham. This allowed the business to serve an even wider customer base across the Midlands. In the following years, ACORN continued its journey of expansion by moving into larger units and taking on more staff.

The new millennium brought with it new challenges for the company, but business continued to thrive, being awarded membership to the European Power Transmission Distributors Association (EPTDA) in 2001 and being appointed as an authorised SKF distributor in 2003. By ACORN's 20th anniversary in 2003, the company had 32 employees, as well as a dedicated Linear division.

In 2005, the company was bought by employees Des Spillings and Martin Povey, who continued to rapidly grow the business. ACORN reached £1 million turnover per month in 2009, achieving the Rotherham Business Award for Growth.

Following its trend of being an industry leader, ACORN launched its digital platform ACORN EXPRESS in 2012, enabling distribution customers to place orders online.

> “What Acorn has achieved over the past 40 years is down to the hard work of everyone in our business. I’m proud to be part of that team and look forward to seeing what else we can achieve over the coming years.”
>
> *Martin Povey, Managing Director Acorn*

The next year, in 2013, ACORN celebrated its 30th anniversary with 74 employees, as well as being appointed as an NSK-RHP official distributor and launching its dedicated couplings division.

In 2015, ACORN was taken over by Axel Johnson International, giving the company new connections and opening up new doors for opportunity.

Fast forward to the present day and ACORN is celebrating 40 years of business. This year, RW Bearings becomes ACORN Gloucestershire, bringing the total network to 13 branches of ACORN. This shows just how far the company has come since its beginnings.

One member of staff who has been with ACORN since those early days is Richard Hewitt, Marketing Manager. Recounting his experiences, he said: "When I joined Acorn in 1990, it was a family-run business with 9 full-time staff including myself. They'd recently invested in two Amstrad computers – we're talking cutting edge in those days! And I was tasked with moving the company's accounts & stock control onto computers.

Keeping up with technology has always been essential in Acorn's story. We continue to embrace the constantly evolving digital world, helping us to connect with our customers and suppliers in new and exciting ways. Whilst my role at Acorn has also evolved over the years, I am proud of the part I have played in Acorn's digital journey."

Looking to the future, Acorn is looking to consolidate its position as a leading distributor of bearings, power transmission and linear products, as well as expanding its products and services to meet the needs of its customers.

Acorn's aim is always to be at the forefront of innovation and to provide the best possible service to its customers, no matter what the challenge.

Group MD Martin Povey said: “What Acorn has achieved over the past 40 years is down to the hard work of everyone in our business. I’m proud to be part of that team and look forward to seeing what else we can achieve over the coming years.”

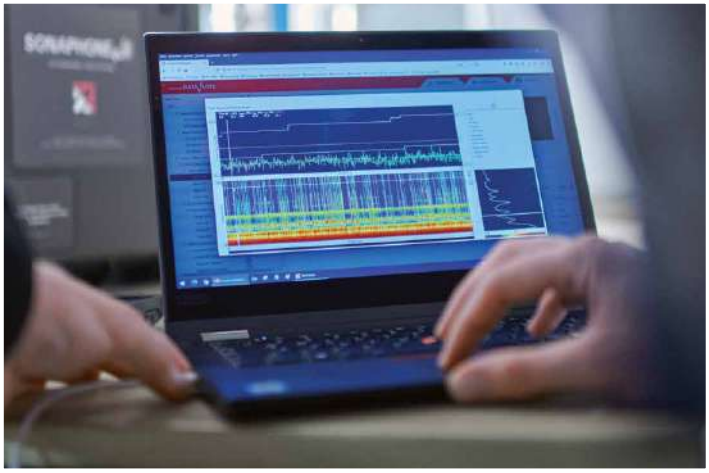
One of ACORN's main priorities is to become more sustainable, helping to build a future in which the company, its employees and its customers can all thrive. For its 40th anniversary year, the company is planning activities to increase its sustainability, whilst celebrating its achievements. These activities include the introduction of its on-site beehive at head office, planting 40 trees, and carrying out random acts of kindness throughout 2023 and beyond.

The next 40 years look set to be just as exciting as the first for ACORN. With a strong focus on its customers, staff and sustainability, there is no limit to what the company can achieve.

More information about Acorn can be found at www.acorn-ind.co.uk.

A powerful combination of broadband ultrasonic measuring device ***and*** **asset tree management software**

The new BS40 structure-borne sound sensor offers reliability and precision



Challenge

"What led to this condition?" is one the most common questions asked by clients during the inspection of failed or damaged bearings. Although rolling bearings are among the most invaluable components in most of machines, it is pretty common the case that companies are lacking of effective bearing inspection practices. Monitoring for changes (trending) is conducted to reliably detect deterioration in critical assets condition. This must be done using robust characteristic values. If the alarm threshold is exceeded, an action must follow, which then requires a detailed analysis. In order to identify a fault or damage pattern and to reveal the causes, special evaluations of raw data are made. Simple characteristic values are not sufficient for this purpose. For machinery with rotating shafts, the focus lays in monitoring the rolling bearings. As interface between shaft and foundation of the machine, they have to absorb the resulting forces. This implies that faults and damage in design and operation have a particularly strong impact on rolling bearings. This is exactly what makes them suitable measuring points.

BS40: Innovative and reliable solution

The new BS40 structure-borne sound sensor was developed and manufactured by SONOTEC to help companies worldwide to take a better care of their bearings. This handy and robust sensor is ideally suited for condition monitoring of rotating machinery parts. It convinces with a laser-welded stainless-steel housing. The ¼”-28 UNF threaded bolt allows maximum flexibility in mounting. The BS40 can be used with magnets for flat or curved surfaces or can also be screwed to adhesive pads with an internal thread. Thus, a high reproducibility can be achieved. The optimized sensor characteristic in the range from 10 to 65 kHz ensures a nearly linear frequency response. A downward extension of the ultrasonic frequency range to < 1 kHz also provides more flexibility for machine diagnostics. The sensor contains a piezocomposite material developed by SONOTEC which helps to overcome the disadvantages of many market solutions. A more reliable assessment of bearings becomes possible.

SONAPHONE & LevelMeter App: Intuitive hardware and software

With the intuitive LevelMeter App, the digital ultrasonic testing device SONAPHONE® enables broadband measurements and characteristic value determination. Due to its high sampling rate of 256 kS/s, signals up to 128 kHz can be analyzed. Up to this limit, characteristic values can be calculated and audio signals can be generated based on the filter settings. The device offers two methods for transforming the ultrasonic signals into the audible frequency range. The heterodyne method is used when a narrow-band transformation (bandwidth 4 kHz) is realized, while the vocoder method is suitable for a broadband transformation. The live signal is shown as time wave form, level graph and spectrogram.

Excellence in condition monitoring program

A great and powerful combination of the SONAPHONE®, the intuitive LevelMeter App, the broadband BS40 sensor and the software for the management of predictive maintenance tasks DataSuite helps to achieve excellence in an ultrasound condition monitoring program. This holistic ultrasonic solution helps the maintenance team to ensure that manufacturing processes in the industrial facility are running smoothly. Lubrication decisions can be made based on the acoustic feedback of bearings. Furthermore, companies are able to act in advance when bearings replacements become imminent as an early intervention can help to omit significant issues. It is now easy to recognize bearing damage early and optimize their lubrication with ultrasonic testing devices developed and manufactured in Germany.

To learn how SONOTEC can help you, please visit www.sonotec.eu

SONOTEC

BS40: ULTRASONIC BROADBAND SENSOR

For Bearing Inspection & Acoustic Lubrication

MADE IN GERMANY

Find out more

Preventive Maintenance

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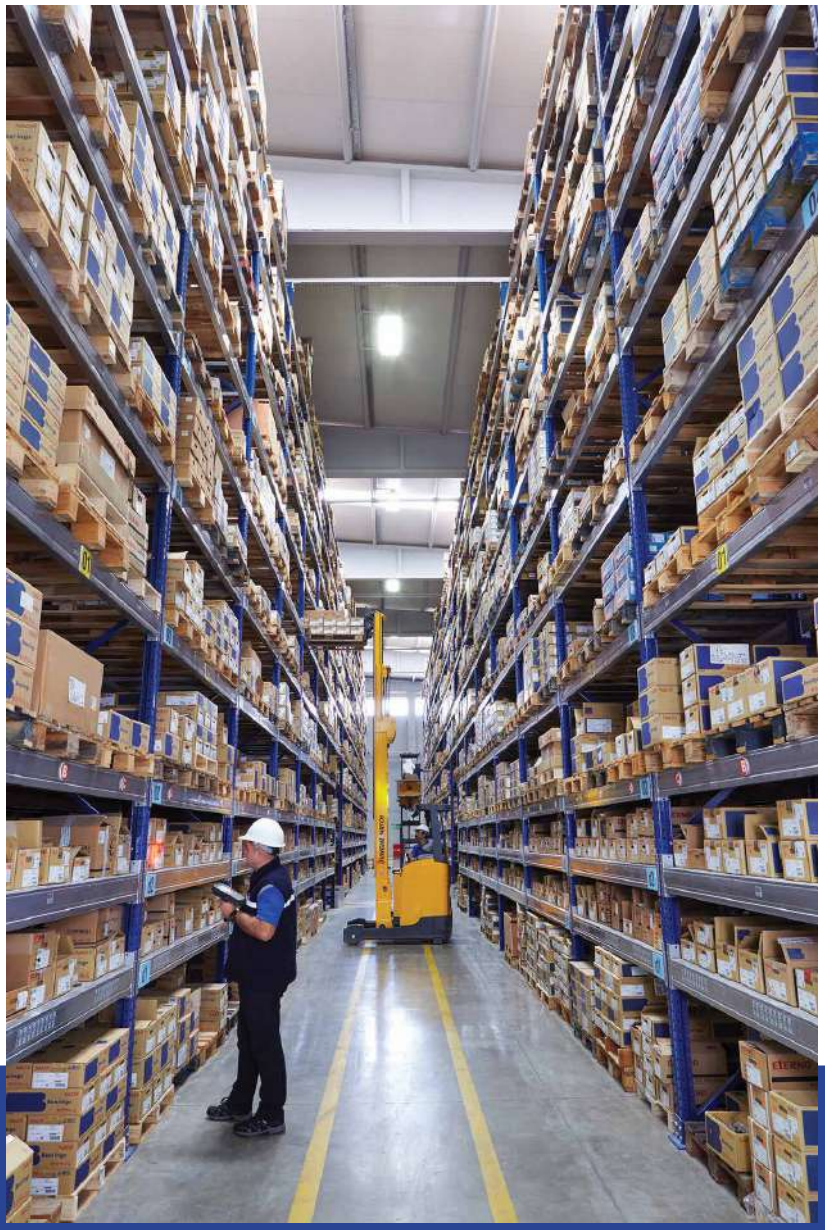


Bearing & Power Transmission

Logistics Hub

of the

NEAR-EAST & CENTRAL-ASIA

In this classic Bearing News Interview, Mr. Bilal Saygılı, Founder & CEO at Saygılı Rulman, discusses his background in the bearing industry and provides readers with a snapshot of his company's broad bearing and power transmission portfolio offerings.

In addition to serving as a distributor of many premium brands, Saygılı Rulman has developed its brand, ETERNO PLUS, and also provides after-sales support, technical support, and engineering services in Turkiye and various other countries in the region.

Bilal Saygılı,
Founder & CEO at Saygılı Rulman

What is the story of Saygılı Rulman, and can you tell us more about your background, current activities and how you did enter the bearing industry?

I can say that I fell into the charisma of bearings at a very young age. When I met such a critical product for the continuity of life, I followed it...

I got to know the bearing when I was a student at the Mechanical Engineering Department of Istanbul Technical University and even bought bearings from the bearing dealers in Izmir and sold them to companies in Istanbul industry to save my school money. After graduation, we started in a small office and with a few racks of bearings. I worked hard day and night, analyzing how this sector works in other countries, traveling abroad at every opportunity and getting a network.

Our company, which was established in 1986, today continues its business life with its young talents and dynamic staff in our facility which is located in a closed area of 10.000 m² and has a warehouse with a capacity of 13.500 pallets. In short, we can say that Saygılı Rulman's story is the story of starting from scratch, high effort, and team building.

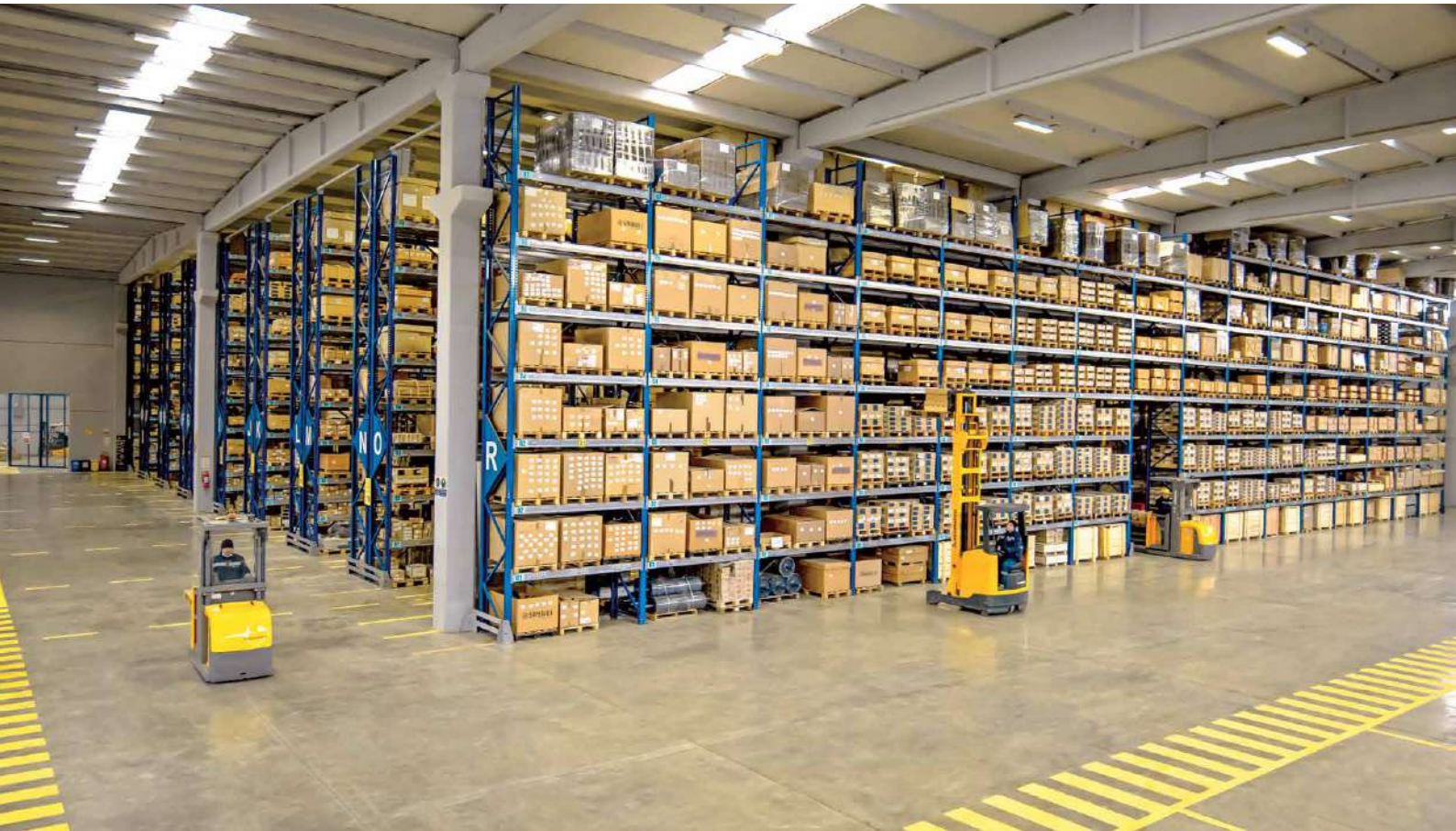
Our Company supplies bearings and power transmission products with its expert staff. In the light of more than 35 years of knowledge and experience, it carries out effective field studies in Turkiye and abroad with its distributor network.

Our facility has a modern infrastructure with social areas, a bearing technical laboratory and a seminar hall for 100 people and of course the basic working areas convenient for pandemic conditions with large spaces. With the ERP program used, all departments work in harmony and full integration is ensured in the workflows.

Which are the main products and brands in your portfolio?

Our core business is bearing and power transmission products. Our product range includes bearings, bearing units, pillow blocks and for PT products; chains, sprockets, belts, pulleys, bushings, couplings, power locks, and assembly-disassembly equipment.

We are the official distributor of NACHI, SCHAEFFLER, JTEKT and ZKL Bearings, as well as GATES brand belts, DODGE brand housings and TRELLEBORG brand sealing solution products. In addition to these premium brands, we have developed our own brand ETERNO PLUS, whose patent and engineering works belong to us, as a price/performance product that has won the satisfaction of many customers.



Beside the distribution of industrial components, are there any other services which you offer to customers?

In addition to providing the fast and accurate products supply, we also provide our customers after-sales support, technical support, and engineering services. We offer on-site or remote services with our expert engineer staff. Such as choosing the right bearing, correct use of the selected bearing, calculations of bearing life, assembly, and disassembly applications. We also organize technical training and seminars to the related sectoral teams.

Which are the key industries and markets you serve?

Our high stock volume and product range allow us to supply to many different fields. It is possible to find bearings for many industries on Saygılı Rulman shelves. We identify the needs and demands of each sector and provide sector-specific solutions. Industrial sectors such as Iron-Steel, Cement, Mining, Energy, Transportation, Food, Agriculture, Paper are examples of our key sectors. We provide 24/7 service in and outside Turkiye. The main countries where we export our products are Azerbaijan, Georgia, Bulgaria, Kazakhstan, Uzbekistan, Iraq, Kyrgyzstan, and Turkmenistan.

> “We provide 24/7 service in and outside Turkiye. The main countries where we export our products are Azerbaijan, Georgia, Bulgaria, Kazakhstan, Uzbekistan, Iraq, Kyrgyzstan, and Turkmenistan.”

What do you think about automatization of the industrial distribution?

Many sectors are at the edge of automation changes and challenges. The bearing industry is also experiencing this inevitable change.

Bearing manufacturers first analyze the production process in their facilities and in the light of these analyses, they design or buy the right machinery and production robots for automation thus trying to minimize human-based production errors.

At the point of storage and distribution of these products, automatic product placement and picking systems, which we now call dark warehouses, picking, palletizing, and packaging robots are the subjects that we get to know more every day.

As Saygılı Rulman, we achieve healthy product tracking and entry-exit processing speed with QR code application in our warehouse. We can quickly collect and place products with our latest model reach trucks from our shelf height of 12 meters. The parcels are packed by vacuum packaging method so that they are not affected by the climatic conditions when they go from our warehouse to another city or country. Thus, it is prevented from being damaged by factors such as heat, cold or humidity.

> “Our company is located in a closed area of 10.000 m² and has a warehouse capacity of 13.500 pallets.”

In addition, we provide drop shipping to our customer's customer so we can speed up the delivery time to the end customer and provide our customers with an advantage in shipping costs.

Bilal Saygılı,
Founder & CEO at Saygılı Rulman

On the other hand, with Saygılı B2B -our online ordering system- we enable our business partners to see their order stages such as product, stock, price and shipment on a single screen. This system also offers a platform that enables them to follow all the steps of the supply chain including the production times.

How do you see the future of the bearing market in your region?

Due to its geopolitical position, our region has started to turn into a region where natural gas and oil reserves are concentrated. Oil reserves in both the Black Sea and the Mediterranean Sea give hope for tomorrow. In addition, there are developments such as the discovery of new mineral reserves from all over Turkiye and our neighboring countries.

We believe that Turkiye's need for bearings and power transmission products in the production, development and service of these machinery and sectors will increase the potential as of now and in the near future, together with issues such as our country's increasing use of high technology, giving importance to automation, and the hydro mechanical systems becoming stronger.

In the future, heavy industry in Turkiye will become even stronger. The brand value of our country is increasing day by day, especially in the cement, casting, iron and steel sectors, which are among the most important sectors of Europe, in agricultural machinery, hydromechanical and automation systems as well. In parallel with this, we think that the bearing needs will increase almost 50% in the next 10 years, with the change of some bearing series in Turkiye. As for the situation of our regional countries, there is unrest and disorder in many countries. Economically, they cannot even discipline their own central bank reserves and they are struggling with inflation. The economic crises in the Middle East and the inability of the governments to come to power prevent the development of the industry in those countries. We hope that there will be peace and well-being around us in the near future and together we can produce products that can serve the whole world like Europe does, produce business and have high brand value. Turkiye continues its path of development with firm steps.

More information about Saygılı Rulman can be found at www.saygilirulman.com.tr

We Can Do So Much TOGETHER!

saygilirulman.com

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MANUFACTURED IN STEYR
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Motion Control Solutions

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Creating A Better Tomorrow

Regal Rexnord™ Corporation is a global leader in the engineering and manufacturing of industrial powertrain solutions and power transmission components, serving customers throughout the world. Our solutions are found in cement, food and beverage, intralogistics, agriculture, material handling, construction, mining, automotive, forestry, and more. Our essential products help keep systems running in mission-critical applications worldwide, while being sustainable and energy efficient.

Trusted Brands, Expert Knowledge

Our teams of expert engineers have years of industry knowledge and experience, ensuring innovative solutions that target your most specific needs. We know the ins and outs of these applications, from the smallest bearing to the largest belt. Regal Rexnord partners with our customers to carefully select the products that solve their toughest challenges.

Our flagship brands have amassed billions of hours of reliable operation and are well-known throughout the industry for their high quality.

Rex® high performance roller, leaf, and engineered chain exhibit outstanding performance in challenging conditions. Rex RN Series metric mounted spherical roller bearings with SHURLOK tapered adapter were designed shaft-ready for ease of use and durability.

CENTA® is the world's leading manufacturer of torsionally soft couplings, primarily used in marine, industrial, and wind.

Euroflex™ has a strong reputation of high-performance disc couplings, used in power generation, gas compression, and industrial process machinery.

Jaure™ family of flexible couplings and transmission elements include the LAMIDISC, MT, and BAREFLEX European brand leaders since 1958.

McGill® Metric Camrol® cam followers feature LUBRI-DISC® seals that provide positive protection against contamination and loss of lubricant.

Rollway® bearings play a significant role in the open ball and roller bearing industry, providing high quality bearings to OEM and end users for over 100 years.

Link-Belt® mounted spherical roller bearings prove their performance with outstanding misalignment capabilities, field adjustable clearance, and excellent sealing options.

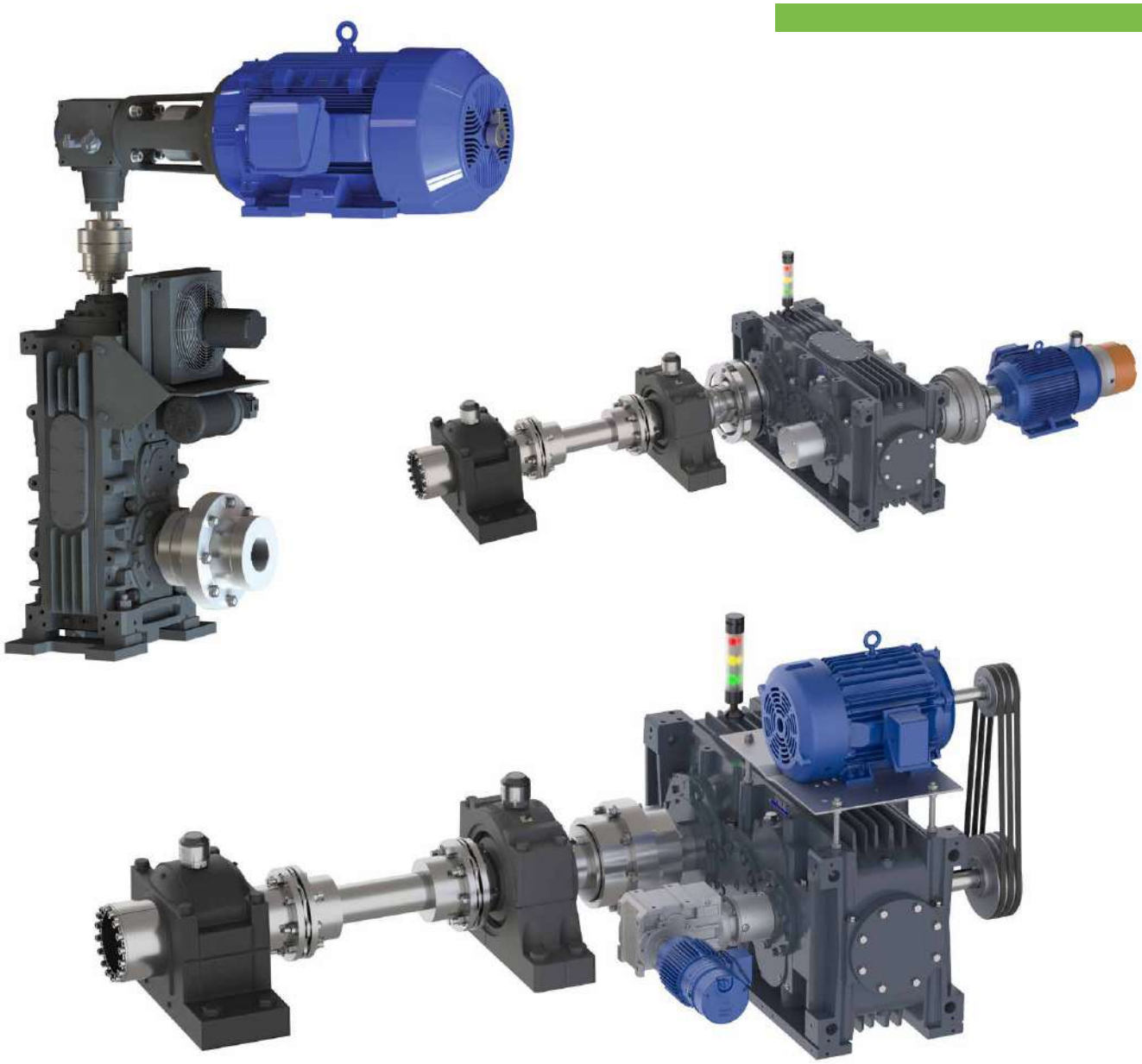
Sealmaster® mounted ball bearings are engineered to reduce downtime. The IP69K-rated PN Gold™ offers corrosion resistant solutions for washdown environments.

System Plast® is a global leader in high quality plastic conveyor chains, modular plastic belts, and industry-leading conveying components.

Rexnord® KleanTop® belts provide a plastic modular belting solution for conveyor applications requiring adherence to strict hygiene regulations.

Rexnord MatTop® & TableTop® chains are engineered to satisfy a wide range of conveyor applications, with straight running and side-flexing chain designed to convey flawlessly.

Perceptiv™ condition monitoring enables our customers to improve productivity, increase uptime, and enhance safety by monitoring equipment from a distance.



Worldwide Reliability

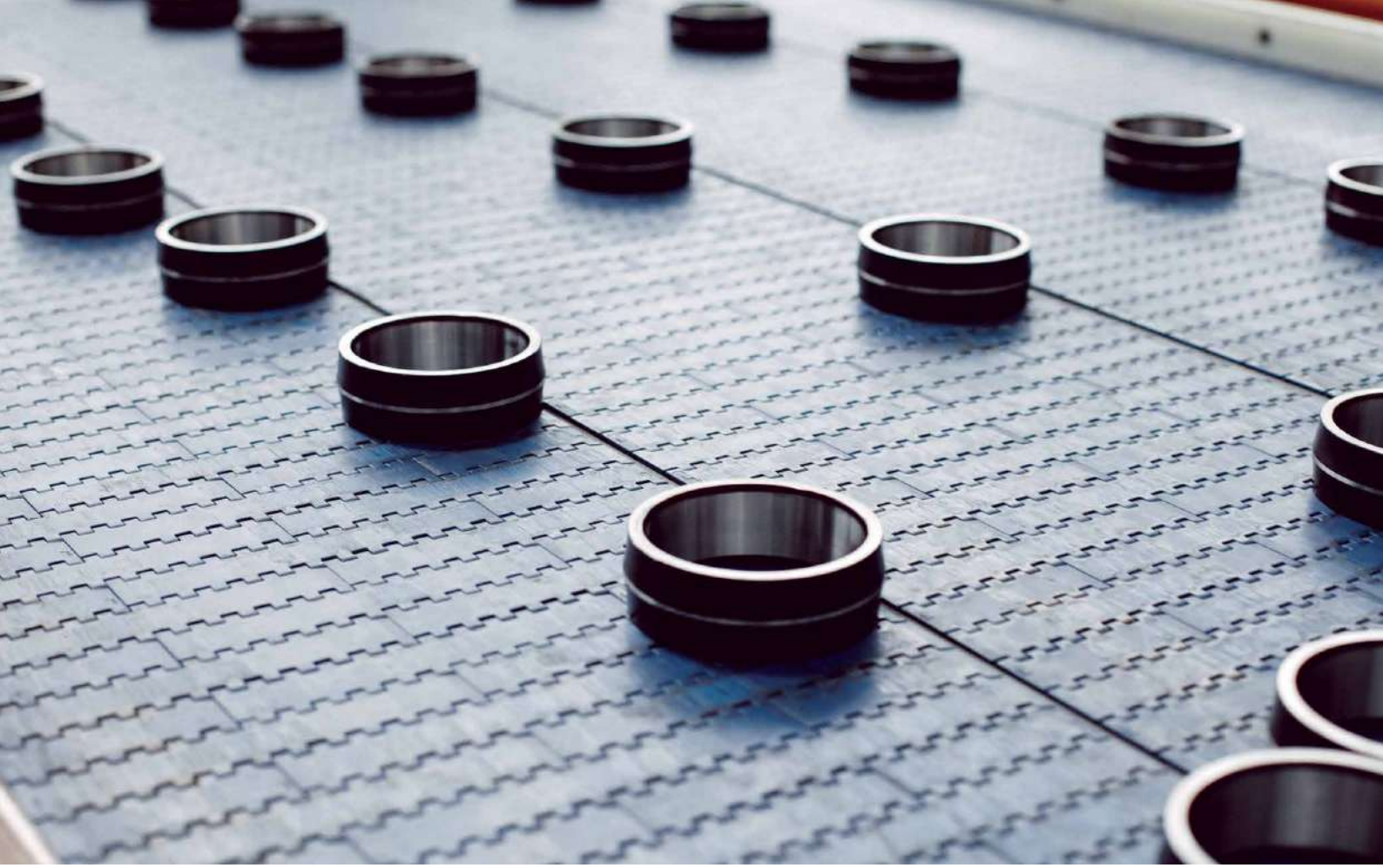
With manufacturing, service centers, and engineering support across the world, Regal Rexnord can meet you where you are. We maintain stock in Europe to ensure our customers have what they need. Our global reach ensures that wherever our customers are in the world, they receive the same expert level of service and reliability.

Regal Rexnord designs and manufactures the products that keep your applications running. Our expertise and our strong portfolio of brands make us a trusted source for sustainable, durable, problem-solving solutions. Our brands and products have the longevity needed to maintain industries around the world.

More information about Regal Rexnord™ can be found at www.regalrexnord.com

Bearing Industry Analysis

Current Situation & Future Outlook



Demand for bearings worldwide is projected to grow by nearly 5% annually, reaching 80 billion Euro within the next 5 years. This accelerated growth follows the downturn in the Covid-19 pandemic and the reversal of the post-Covid policies/limitations. Disrupting current events continue to leave elements of uncertainty; including the Russia/Ukraine War, shortage of raw materials, inflation and the current Macroeconomic policies. Still, an increase in consumer spending is leading to positive growth in the global economy. Foreign investment in heavily concentrated manufacturing sectors, such as Asia/Pacific is trending upward. And finally, new bearing technology and development are being driven forward along with growing environmental concerns and a push for more ecological and carbon-neutral products.

Global Bearing Industry is Rebounding from the Pandemic

Pandemic restrictions are easing increasing the activity of people and businesses. Consumer spending and the demand for durable goods are increasing in most countries. Supply chains are leveling out and there is a reduction in the financial limitations derived from fluctuations in the value of currencies and loan availability. These factors along with others have helped the world economy, and thus the global bearing industry recovers from a double-digit drop in demand for tangible products not intended for immediate consumption.

Since this decline, more bearings are now needed around the world in all major industries. Price sensitivity experienced by both manufacturers and consumers is becoming less impactful which reinvigorates the strategic investment and R&D spending. New product rollouts are no longer widely being delayed. Finally, with an increase in the use of machinery, including the use of automobiles, bearing replacements are once again vastly needed, driving improvement in aftermarket sales.

Regional Demand and Supply

In the next 5 years, the Asia Pacific Region will account for the largest percentage of growth with China and India leading the way. The Asia/Pacific countries are ideal for bearing growth due to the focus on exports and competitive costing.
The global marketplace is dominated by large multinational bearing corporations. Most major bearing producers will strategically concentrate manufacturing facilities in countries with large domestic markets. Today, China has one of the largest domestic markets and has become a hotspot for almost every major bearing producer. The country continues to drive the region in growth, and also continues to consolidate. The most advanced bearing manufacturing industries remain in Japan, the United States, Sweden, and Germany. These countries are home to several of the world's top bearings producers. The companies serving these large developed markets focus on highly technical, high-value bearings. While these countries maintain strong domestic bearing producers, they rely on imports from lower-cost countries to meet the basic needs of their domestic markets.

Europe

It is expected that the demand and the production for bearings will continue to increase in Europe, together with the reshoring initiatives and the general increase of manufacturing activities. The main challenge remains on the mid- and long term the supply and diversification of energy resources, which will be needed for a sustainable output. The key drivers for the coming years will be the investments in the durable products industries and the recovery of the aftermarkets.

Asia-Pacific

With over 60% of the global production and demand; the Asia / Pacific is expected to benefit the most from the economic growth in the coming period. Japan, China and India will be the driving force behind the increasing production and exports of bearings. The growing population and increase of the general income will boost the economic growth further in this region.

Middle-East

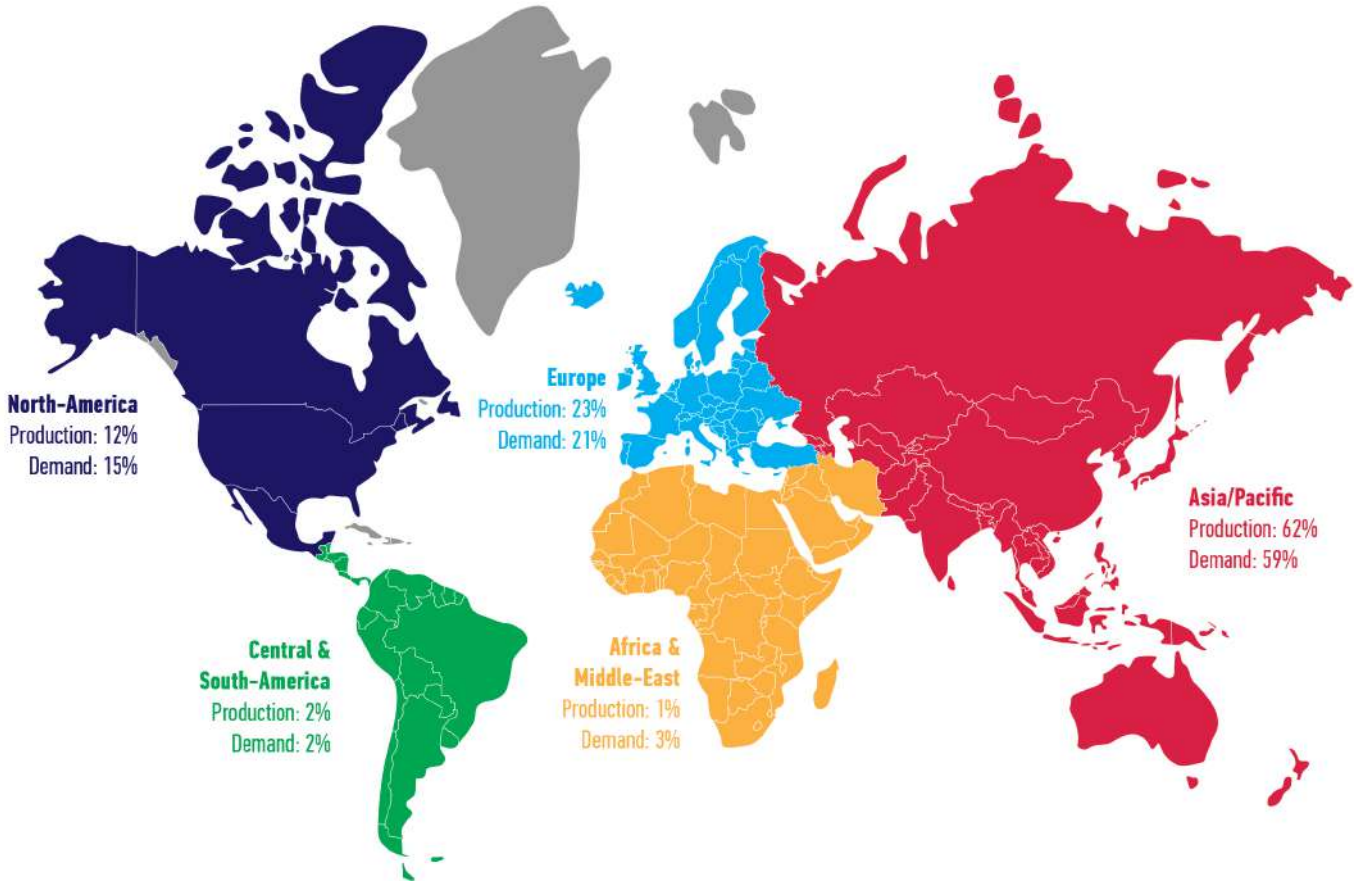
The demand is expected to be one of the fastest growing in this region till 2030, with the increase of foreign investments, manufacturing capabilities, big infrastructure projects and the demand fueled by the population boom.

North-America

The demand for bearings is expected to grow by an average of 3% a year in the coming 5 years in this region, which includes Mexico, US and Canada. Japan and China are currently the main suppliers for the North American industries and the expectation is that this trend will remain.

South-America

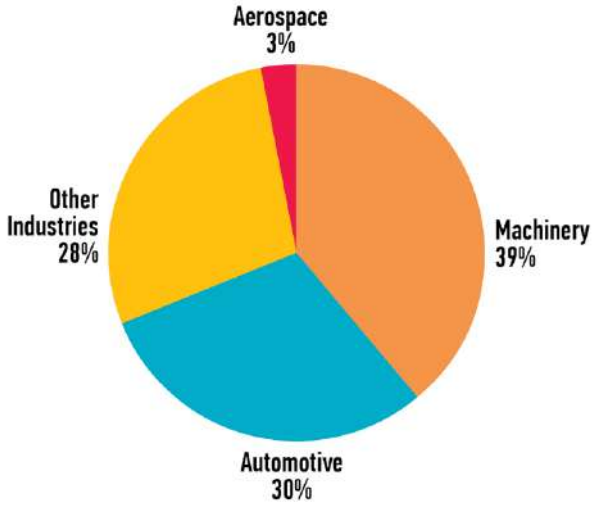
The demand in Central & South America is expected to be higher than 6% a year till 2030. The countries within the region recovered rapidly with the industrial output post-Covid-19, and the sales of bearings recovered sharply. Brazil is creating the largest demand and supply in the region.



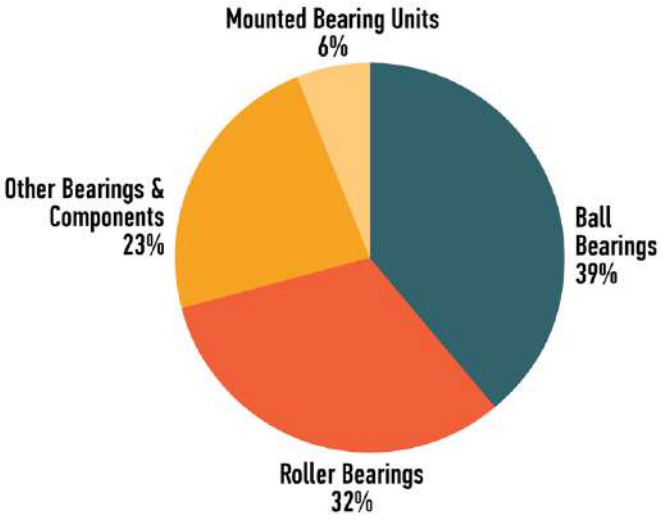
Rapid Growth for Bearings

Large manufacturing industries account for a high percentage of the bearing demand. These include but are not limited to automobiles, aerospace applications, heavy machinery, industrial equipment, engines, and other power transmission mechanisms. Each of these individual markets experiences recurrent trends. Most original equipment manufacturers maintain safety stock in anticipation of higher demand. In financially trying times, such as the one experienced during the Covid-19 pandemic, manufacturers will delimit inventory and reduce on-hand materials. When demand returns and inventories need to be replenished, manufacturers will intensify production levels and demand for bearings will increase. For the next 5 years, global bearing sales are expected to grow substantially, with motors and automotive driving well over 1/3 of new product demand.

Main Industries



Main Bearings



Russia/Ukraine War

Beyond the Covid-19 pandemic, the most impactful current event that will disrupt future economic gains is the ongoing conflict between Russia and Ukraine. Uncertainty in global markets is leading to hesitancy by investors, inflation, and further disruption of global supply chains. Energy + food production sectors are the most sensitive and of particular concern, however, redirection of resources and adjustments to supply chains are driving demand into other regions.

Most bearing producers and suppliers are insulated from downturns in specific regions and/or countries. This is because bearings are critical components heavily relied upon across the world. Demand can vary by market, being high in one region, while remaining low in others.

Environmental Concerns

Environmental concerns are likely to play a role in the future of the global bearing market, as the focus on sustainability and energy efficiency continues to grow. As consumers and governments become increasingly aware of the environmental impact of products and production processes, there will be a shift towards more energy-efficient and environmentally-friendly (carbon neutral) bearings.

Another area of focus in the bearing market is the use of renewable and recycled materials. There is growing interest in the use of recycled materials in the production of bearings, as these materials can help to reduce the environmental impact of the manufacturing process. In addition, the use of renewable energy sources in the production of bearings is likely to become more important, as companies look to reduce their carbon footprint and meet increasingly stringent environmental regulations.

Summary

Overall, following the downturn in the Covid-19 pandemic, and the still ongoing war situation, the bearing industry is still running and rolling. the future of the global bearing market full of exciting opportunities and challenges on the horizon. The increasing demand from emerging markets are likely to play a significant role, driving further growth and innovation in the industry. As many regions and countries continue to develop and industrialize, the demand for bearings and other mechanical components is likely to increase, presenting exciting opportunities for manufacturers.

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Bearing Design Activity Report 2022

Nowadays, engineers and designers scour the web in search of 3D models for the standard products that they need for their projects. Doing so increases their productivity and improves the reliability of their designs. That's why they come regularly to the TraceParts CAD-content platform (traceparts.com) looking for supplier-certified 3D product models that can be instantly downloaded in the CAD format they want.

Last year, 731,731 CAD models of Bearings were downloaded from traceparts.com and its network of partner websites, including the Bearing News portal. This Design Activity Report about Bearings was based on these 731, 731 CAD models downloaded via the TraceParts Publishing Network.

180 Million CAD files were delivered
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Bearings (ball, roller, needle, etc.)

Source: TraceParts Publishing Network

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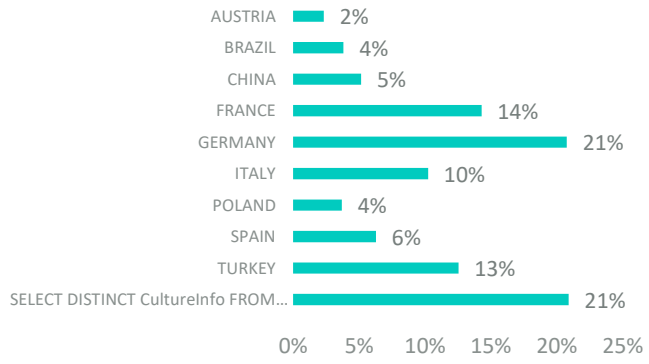

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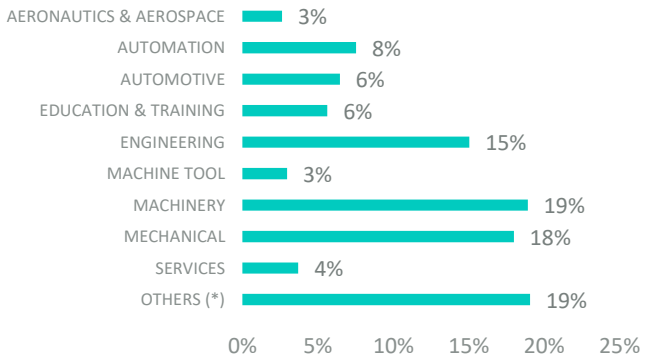

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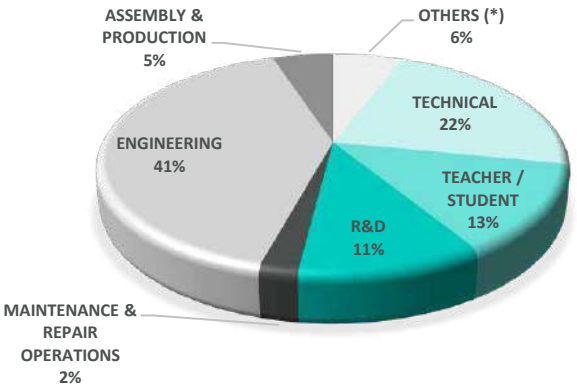

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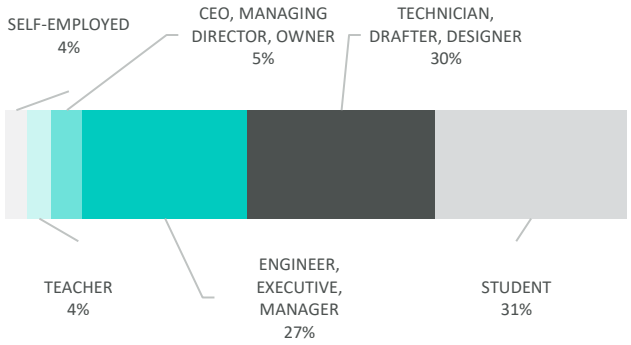

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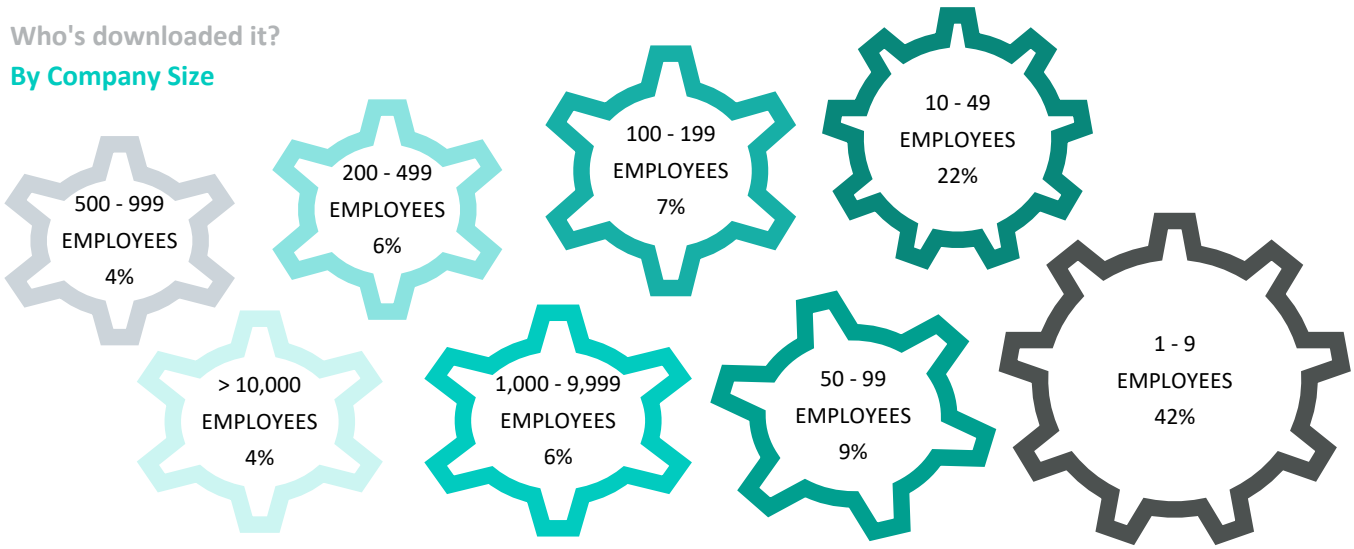

Ball bearings

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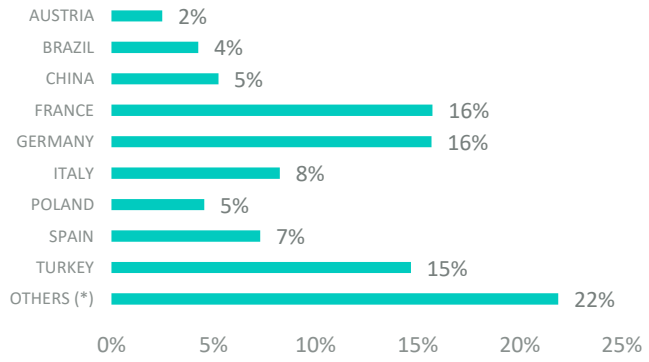

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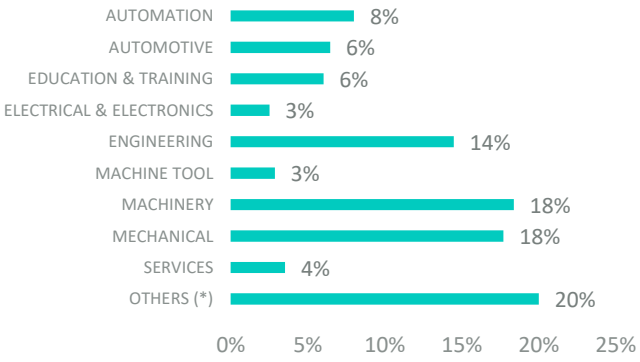

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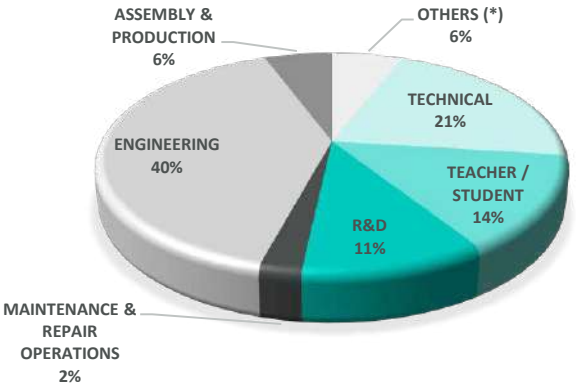

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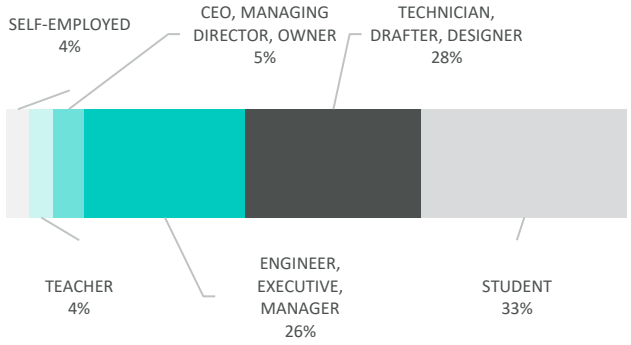

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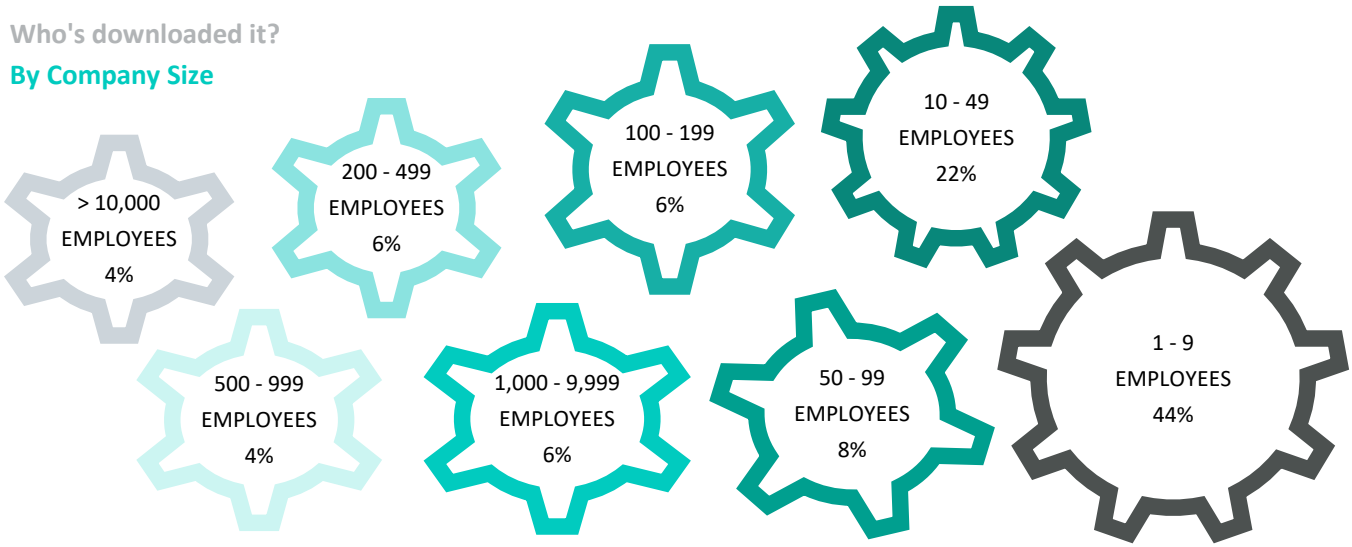

Angular contact ball bearings

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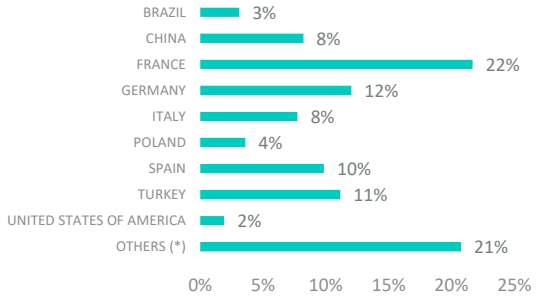

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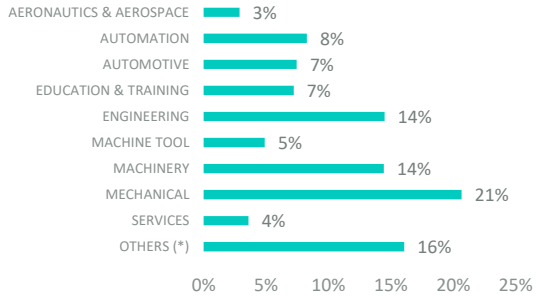

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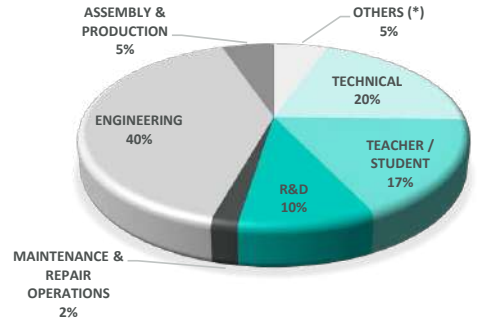

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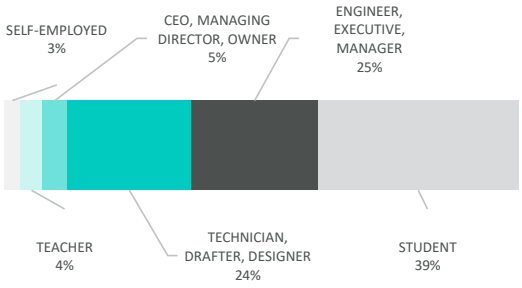

Deep groove ball bearings

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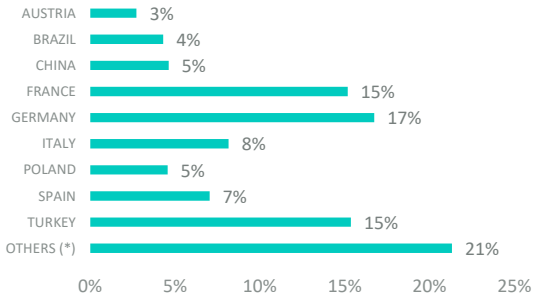

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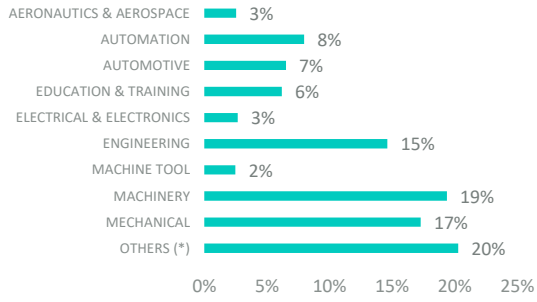

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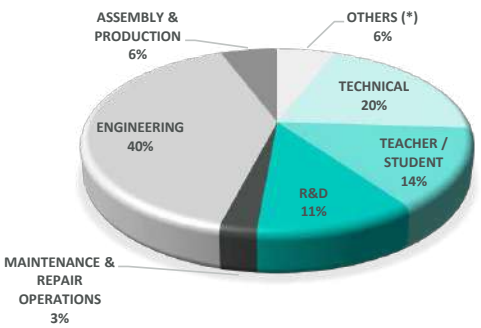

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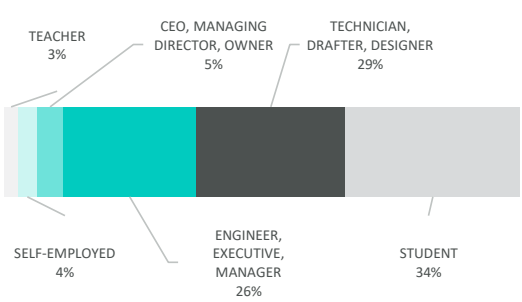

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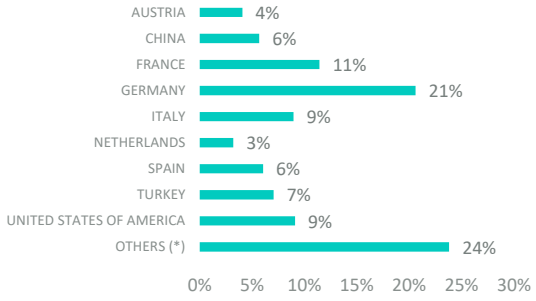

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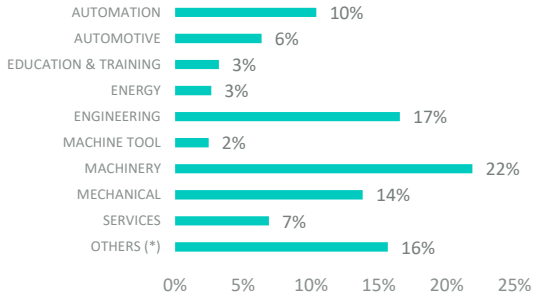

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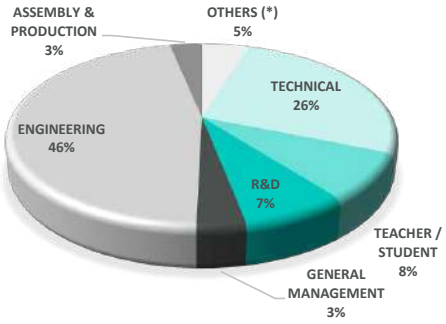

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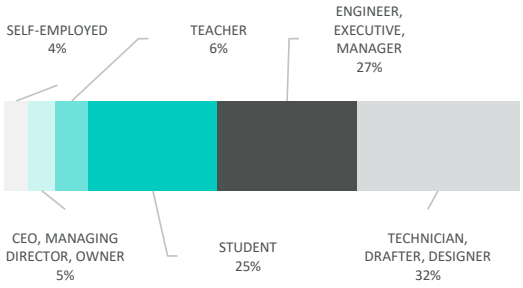

Radial insert ball bearings

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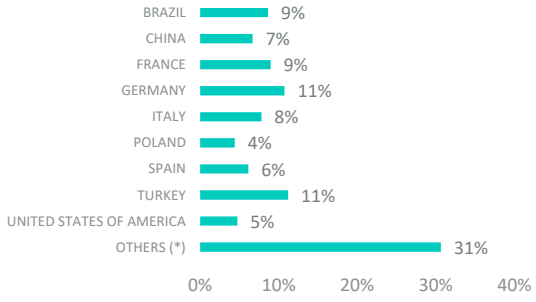

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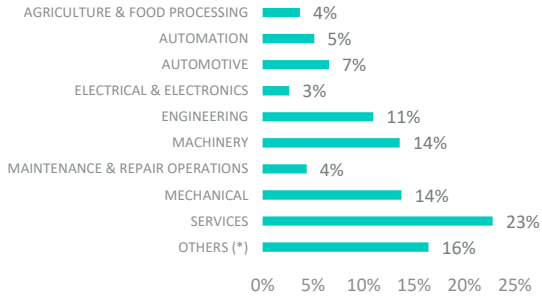

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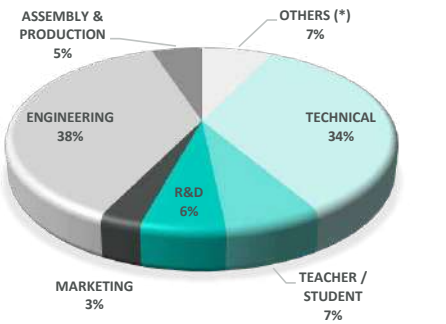

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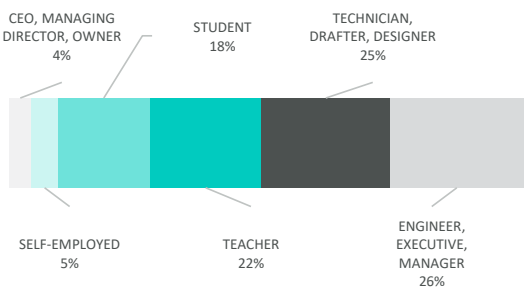

Self aligning ball bearings

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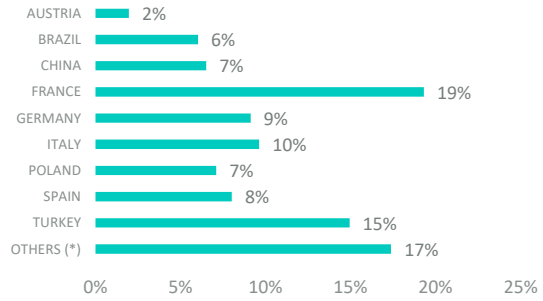

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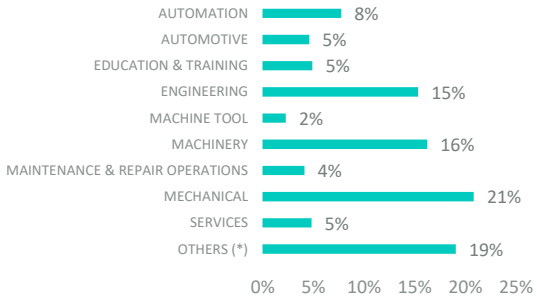

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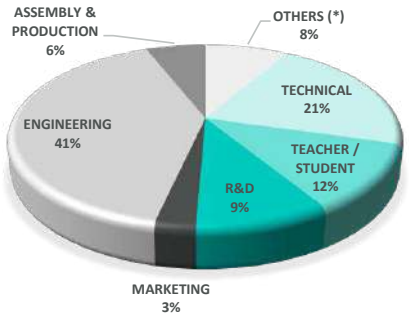

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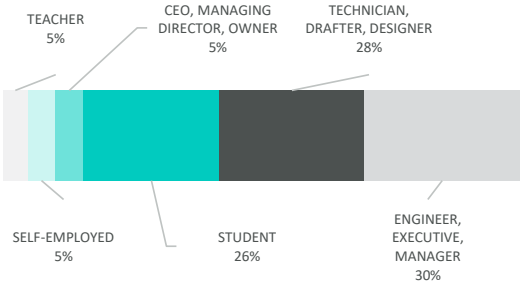

Spindle ball bearings

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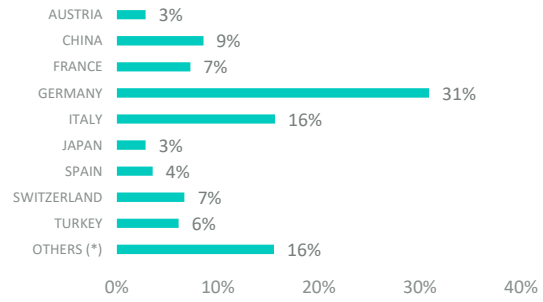

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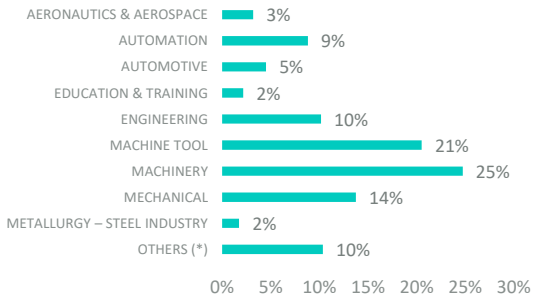

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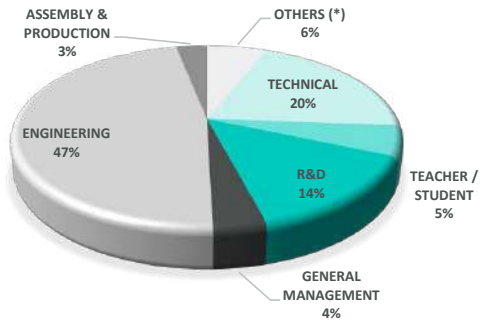

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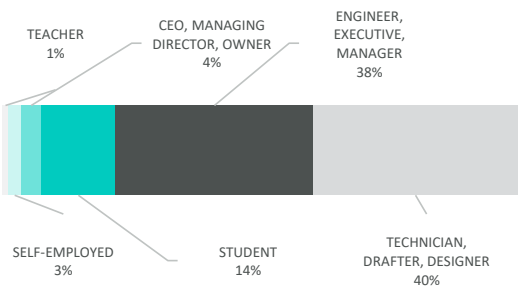

Roller bearings

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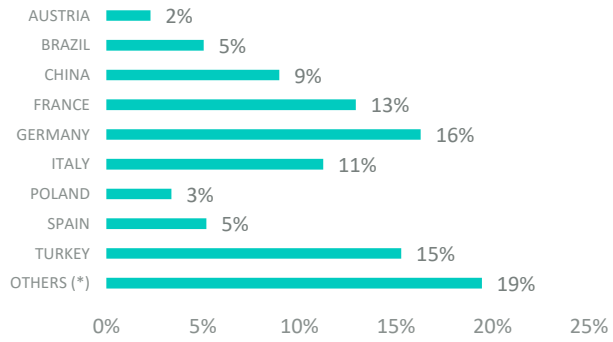

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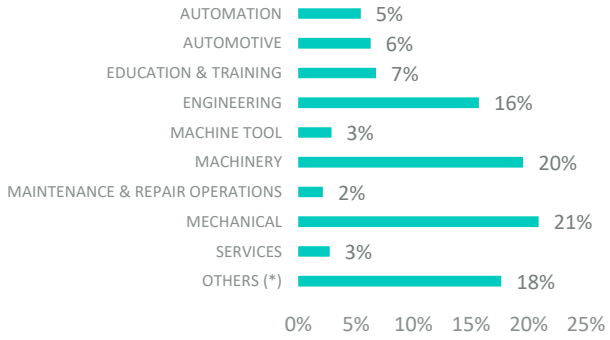

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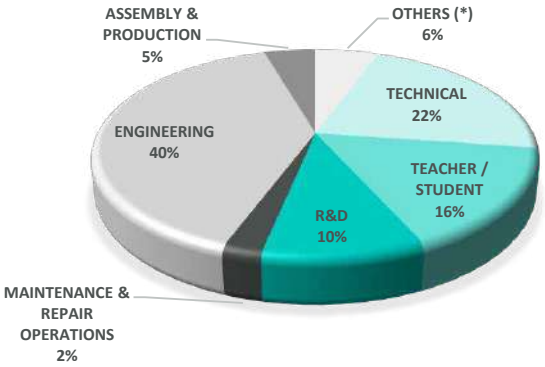

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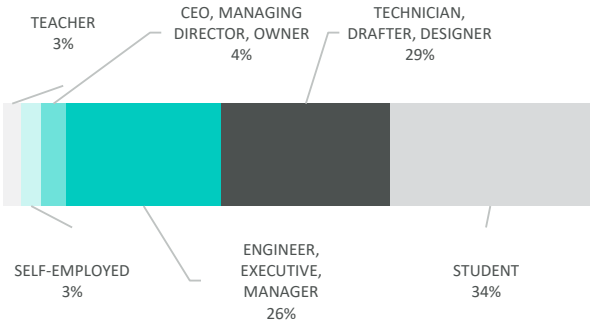

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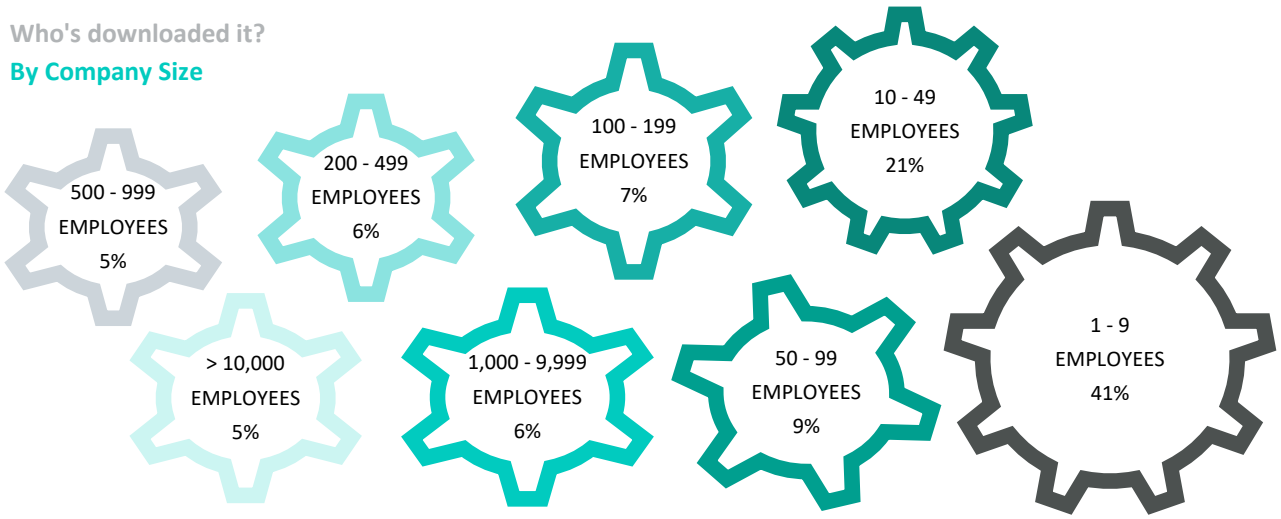

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Cylindrical roller bearings

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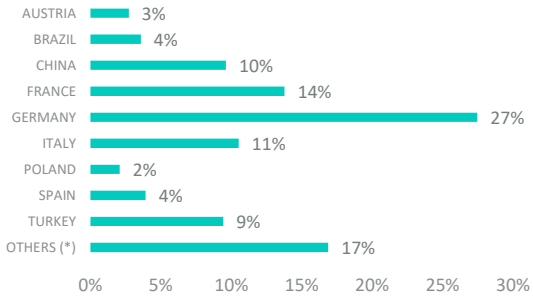

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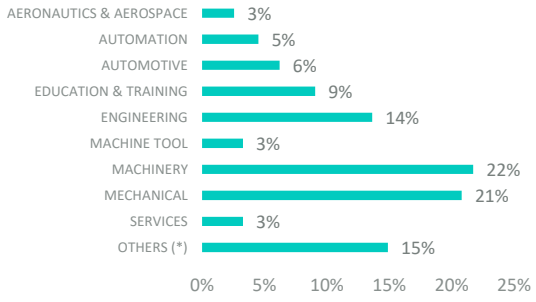

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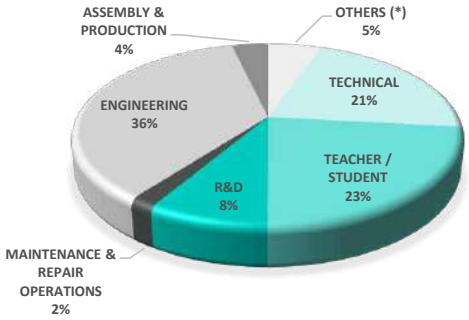

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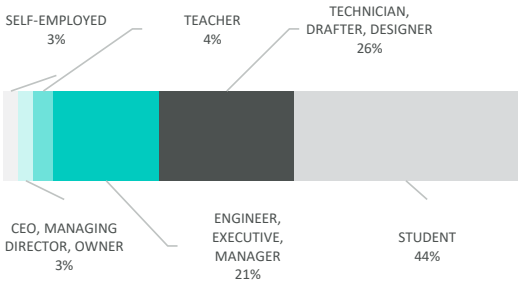

Spherical roller bearings

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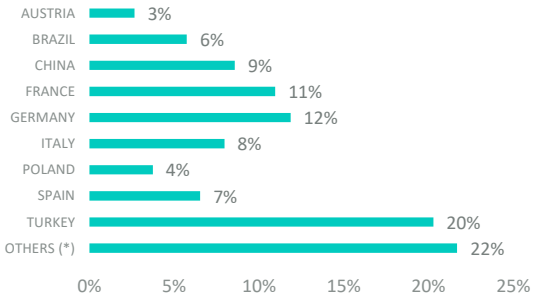

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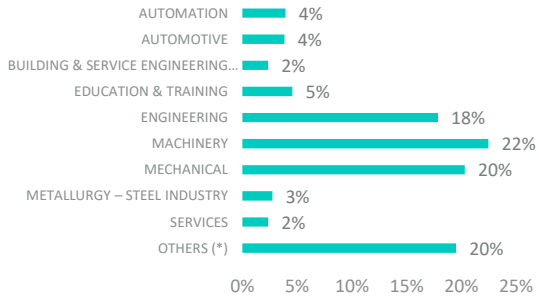

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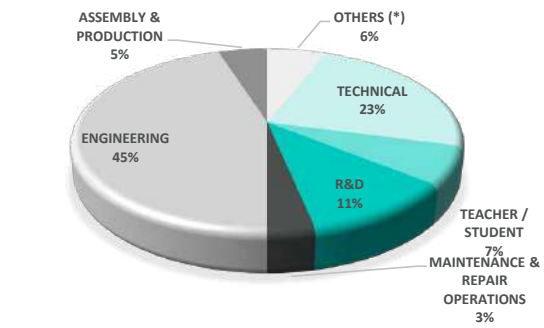

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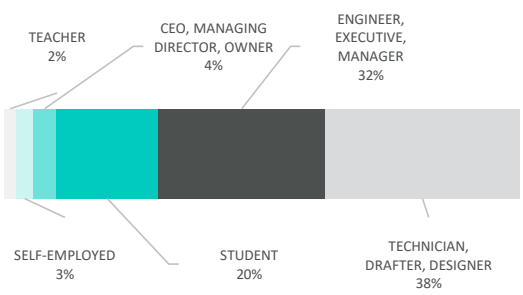

Tapered roller bearings

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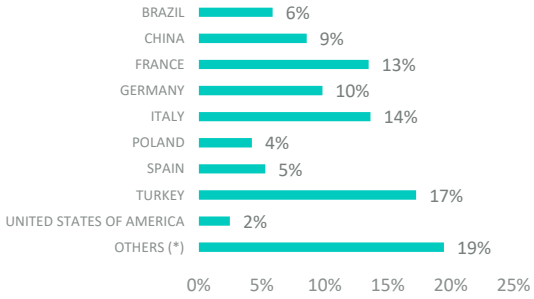

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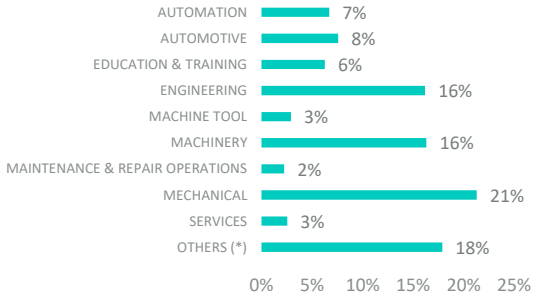

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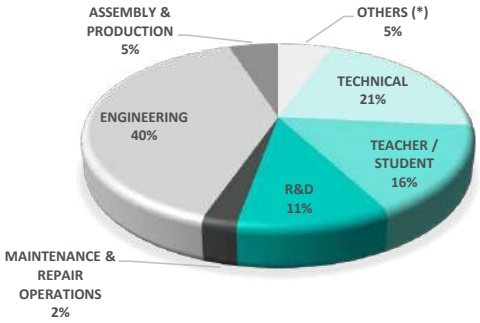

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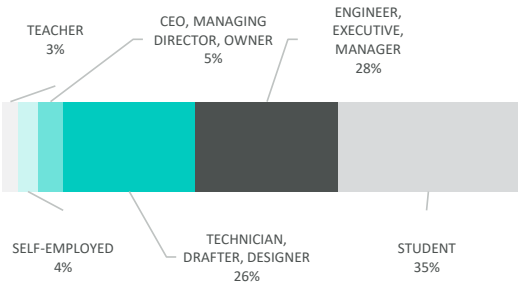

Bearings accessories

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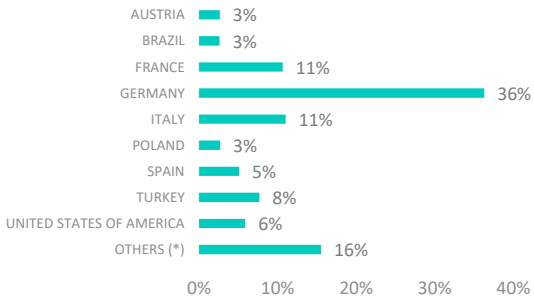

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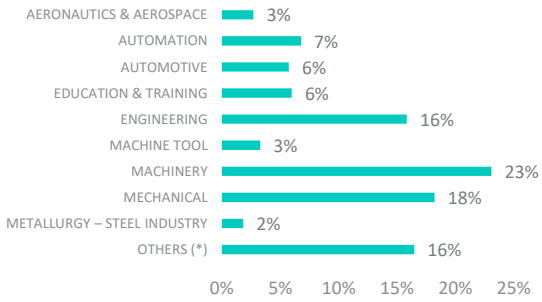

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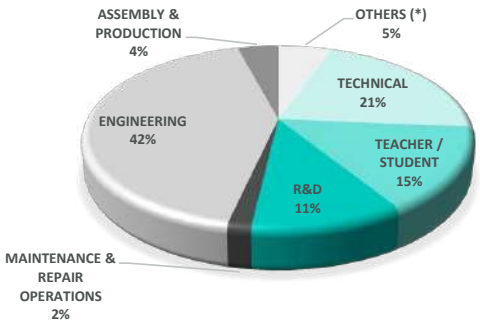

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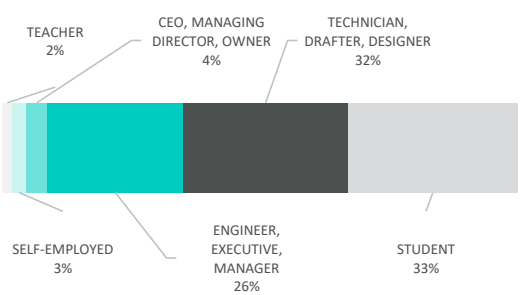

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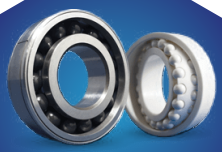

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SOLID LUBRICANT

CUSTOM LINEAR

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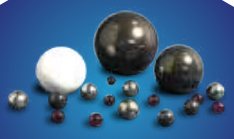

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Bearing blocks

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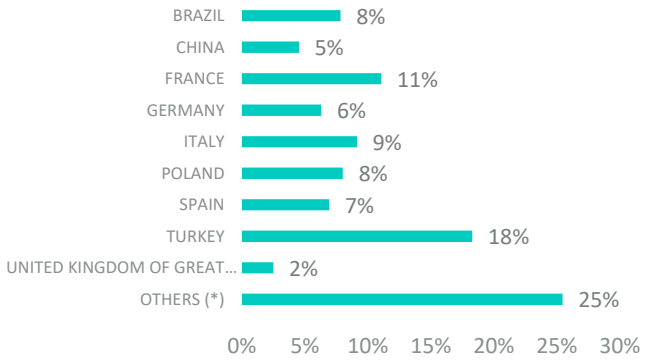

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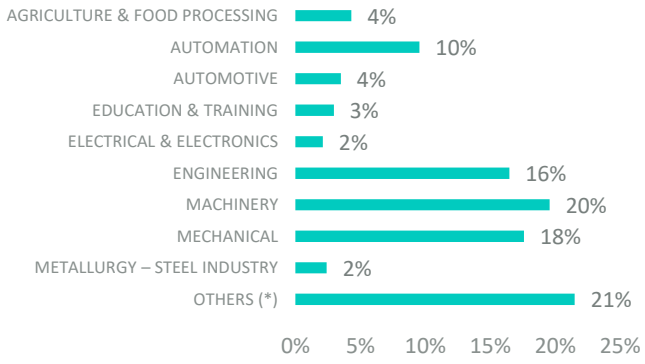

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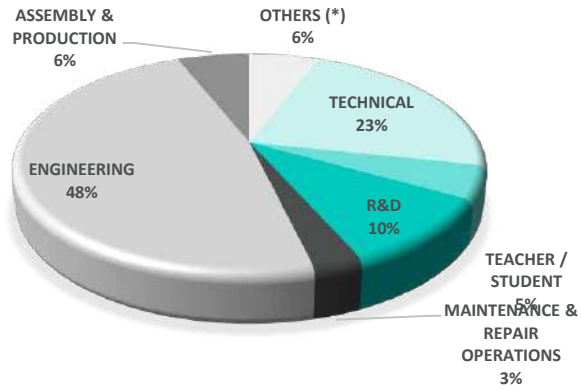

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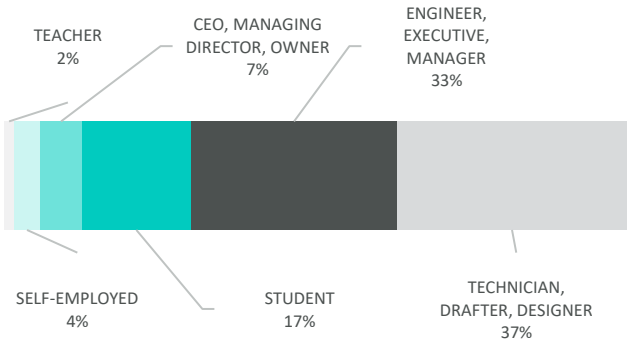

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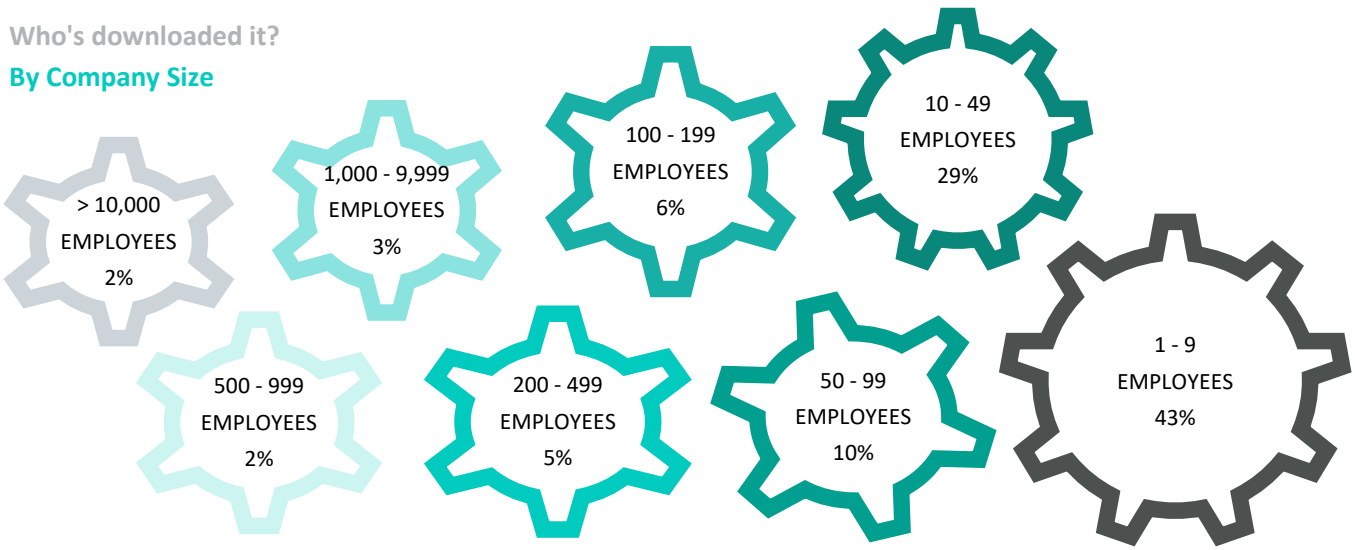
By Company Size



Flanged block bearings

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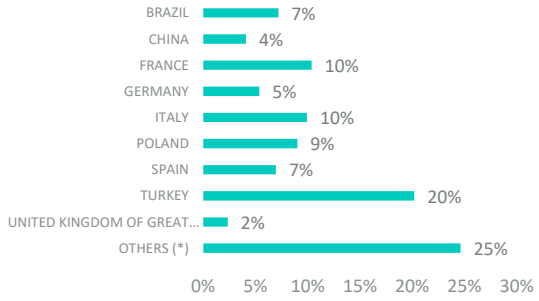

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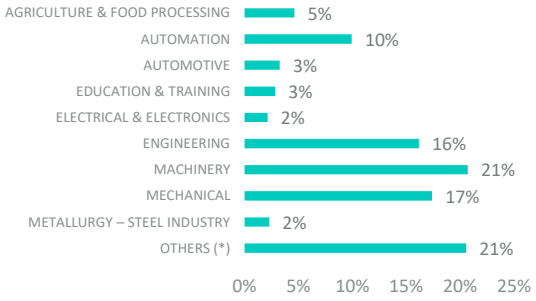

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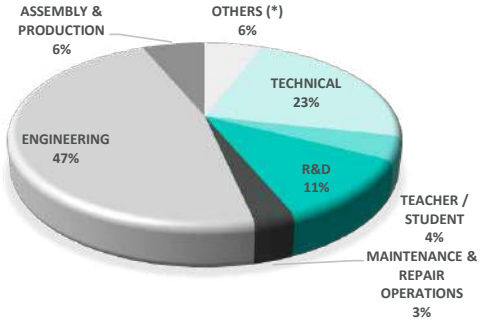

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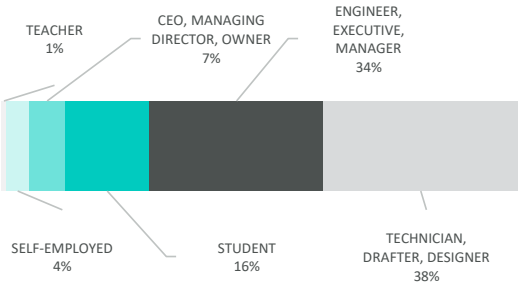

Pillow block bearings

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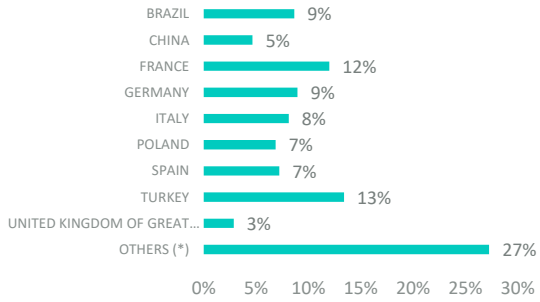

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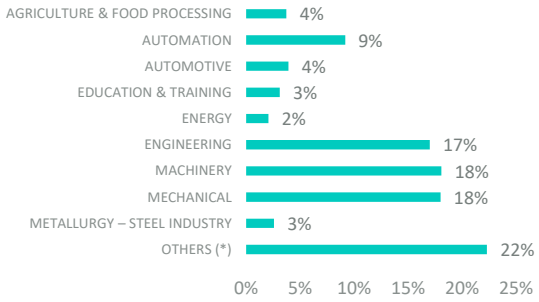

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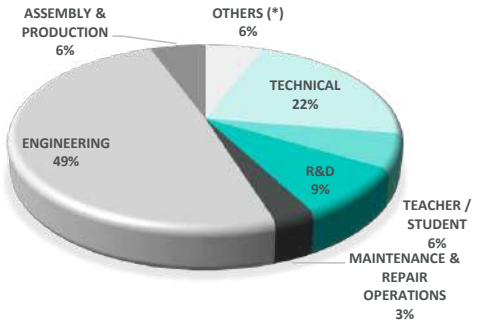

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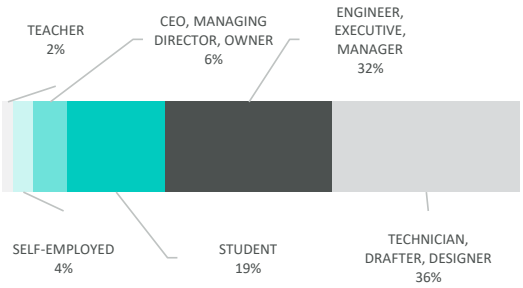

Bearings blocks accessories

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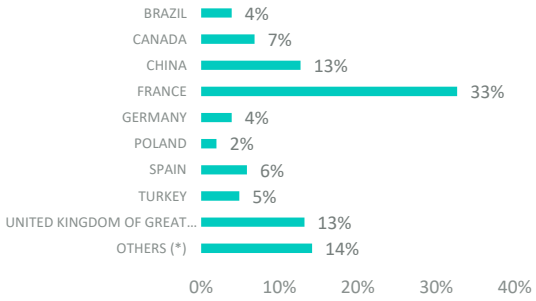

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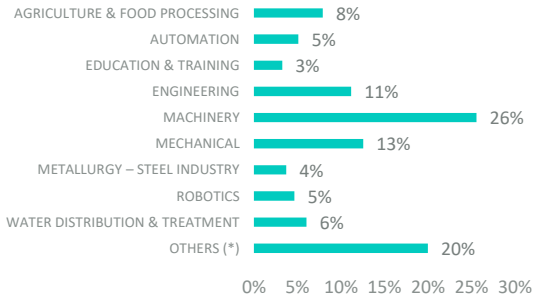

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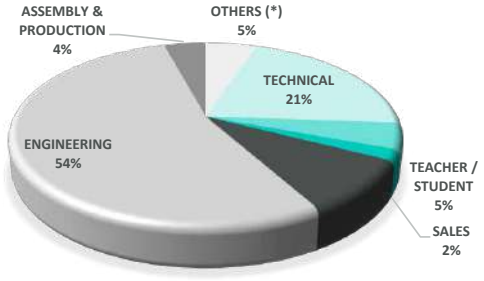

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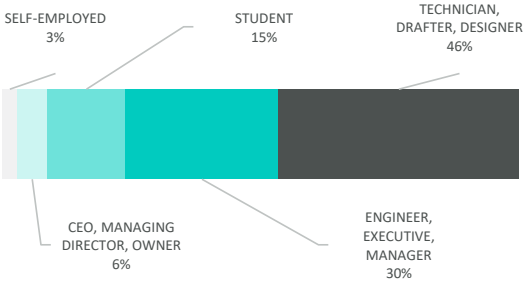

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Plain bearings

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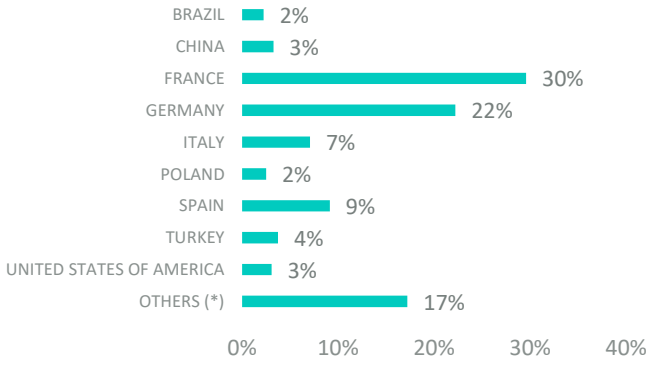

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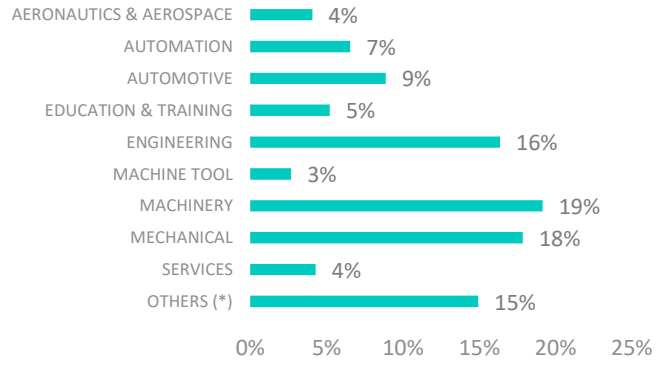

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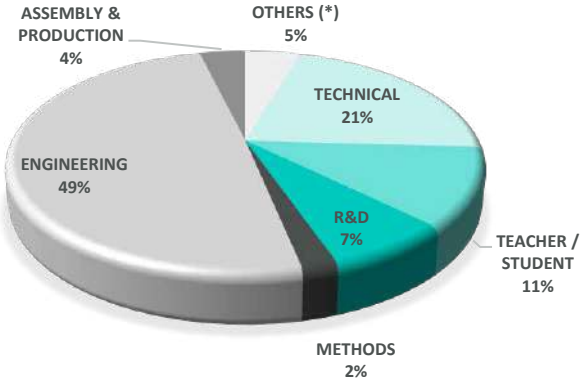

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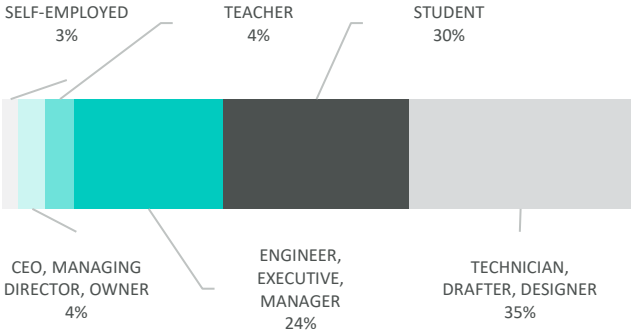

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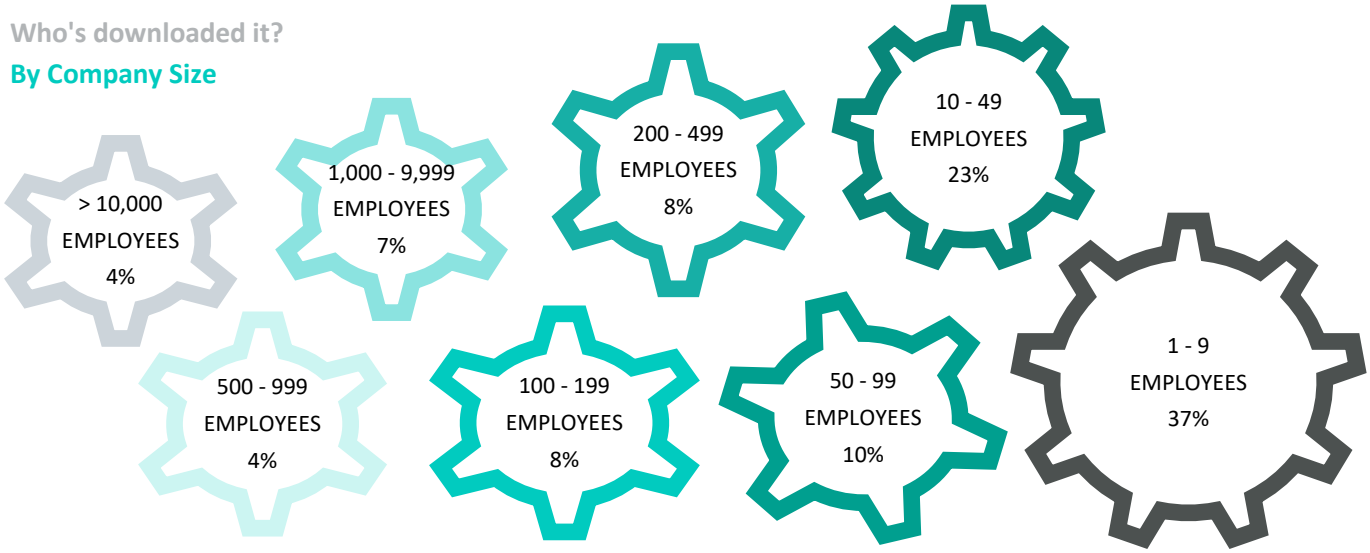

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Bearing & Power Transmission World Meetings

ISTANBUL

04-06 June 2023

Program ▶

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bearing-power.com

Welcome to Bearing & Power Transmission World Meetings 2023

Connect in-person with the global bearing and power transmission supply chain by meeting distributors, manufacturers and solution providers

Who can participate?

- Distributors
- Manufacturers
- Service & Solution providers
- OEM Companies & End-Users
- Engineering companies
- Organizations & Associations

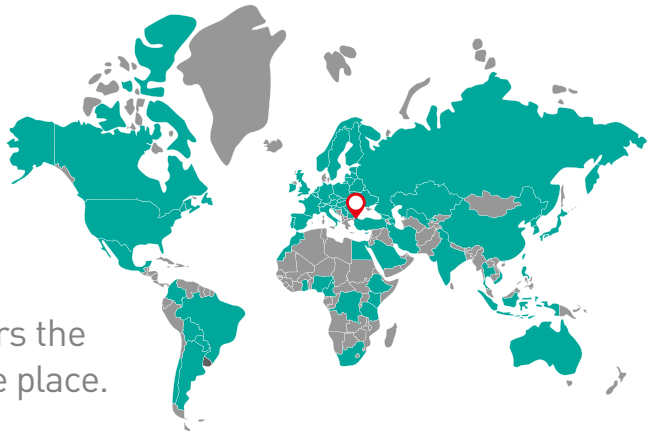
The World Bearing & Power Transmission Meetings is the World's first dedicated meetup at global level where 30+ countries from all continents will be represented by delegations and the main players of the bearing and power transmission industry. The event will run for three days, with table meetings, welcome dinner, lunches and many more networking opportunities among distributors, manufacturers, solution- and service providing companies.

The event is created out of need in the current challenging global conjuncture and is a merger of all the local events which were organized earlier under the name of Bearing Expo & B2B Meetings, Conferences since 2016 in Hannover, Mumbai, Dortmund, Istanbul and Shanghai with in total 1,200 participants worldwide. The main theme at the Bearing & Power Transmission World Meetings will be the global DISTRIBUTORSHIP, MANUFACTURING, OUTSOURCING, SOLUTIONS & SERVICES.

In addition to the Bearing & Power event, the participation can optionally be extended with visiting the WIN Eurasia exhibition (07 - 10 June), organized by Hannover Fairs Turkiye, which is the largest and most important regional industry event. A bus transfer for participants will be organized on 07 June for this purpose.

Meet The Global Players

With delegations from all continents, the Bearing & Power Transmission Meetings offers the opportunity to meet the global players at one single place.



Distributors Worldwide
Meet with key bearing and power transmission distributors and stock holding companies from all around the World

Manufacturing & Outsourcing
Discuss cooperation opportunities, develop alternative suppliers and discover outsourcing possibilities with bearing and power transmission manufacturers from different countries

Services & Solutions
Discover industrial services and solutions which can support your and your customers' activities

TOP 5 Reasons to Attend The Bearing & Power

Connect to the largest Bearing & Power Transmission network worldwide with your participation to the meetings, and via various media channels before, during and after the event.

- Expand sales and distributors network
- Match with potential suppliers
- Find industrial solutions and services
- Increase your company visibility and branding
- Meet peers from all around the World

Location
Pullman Istanbul Convention Center

Pullman Istanbul Hotel & Convention Center is 30min. from Istanbul Airport and easily accessible through highway connections. The 16.000m2 convention centre enables the event guests to enjoy a variety of lunch, dinner, meeting, seminar and exhibition facilities. The 3500 m2 spa offers relaxation areas and treatment along with a fitness centre. You will also enjoy the delicacies of Turkish and International cuisine that will rejoice your tastebuds along with special cocktails from around the world that is served in our enjoyable bar areas. With its 750 rooms, Pullman Istanbul offers its guests the luxury and comfort that they deserve. This and many more awaits you at the Pullman Istanbul Hotel.

A Trade Hub For Asia, Europe, Africa And Beyond

Istanbul is today with its 20 million large population, a critical business hub who does direct business with 200 different countries in the world. For centuries Istanbul has been a key trading point, connecting the east and west, thanks to its prime location between two continents. The market stalls of the Silk Road may have been replaced by gleaming skyscrapers and major banks, the city remains one of the world's premier business destinations. This prime location helped the city to grow rapidly into a cross-continental trading hub, paving the way for its distinction as the premier international business destination it is today. Now, still thanks in part to its thriving port, Istanbul is responsible for over a half of the regional trade, making it an important meeting point for representatives from all industries.

Bearing & Power Transmission World Meetings 2023 Program

Sunday	04 June 2023
15:30 - 19:30	Registrations & setup table / booths
19:30 - 20:00	Welcome Reception
20:00 - 23:00	Welcome Dinner
Monday	**05 June 2023**
07:30 - 10:00	Breakfast (Pullman/Mercure Hotel guests)
10:00 - 10:15	Welcome Speech
10:15 - 11:00	Opening B2B Meetings & Networking
11:00 - 11:15	Coffee Break & snacks
11:15 - 12:30	B2B Meetings & Networking
12:30 - 14:00	Buffet Lunch
14:00 - 15:30	B2B Meetings & Networking
15:30 - 15:45	Coffee Break & snacks
15:45 - 17:30	B2B Meetings & Networking
17:30 - 23:00	Free evening
Tuesday	**06 June 2023**
07:30 - 09:00	Breakfast (Pullman/Mercure Hotel guests)
09:15 - 11:00	B2B Meetings & Networking
11:00 - 11:15	Coffee Break & snacks
11:15 - 12:30	B2B Meetings & Networking
12:30 - 14:00	Buffet Lunch
14:00 - 15:30	B2B Meetings & Networking
15:30 - 15:45	Coffee Break & snacks
15:45 - 17:30	B2B Meetings & Networking
17:30 - 23:00	Closing of the Event
Wednesday	**07 June 2023**
10:30 - 17:30	Option to visit WIN Exhibition 2023 (Hannover Fairs Istanbul) with a bus transfer of 10min. from Pullman Hotel & Convention centre
17:30 - 17:40	Bus transfer from WIN Exhibition (Hannover Fairs Istanbul) to Pullman Hotel & Convention Centre
Saturday	**10 June 2023**
10:30 - 00:00	Great chance to attend the 2023 UEFA Champions League Final at the Atatürk Olympic Stadium

**This is the preliminary program. the given activity hours can be slightly updated closer to the event date.*

Curtis Harrison

EBT BEARINGS

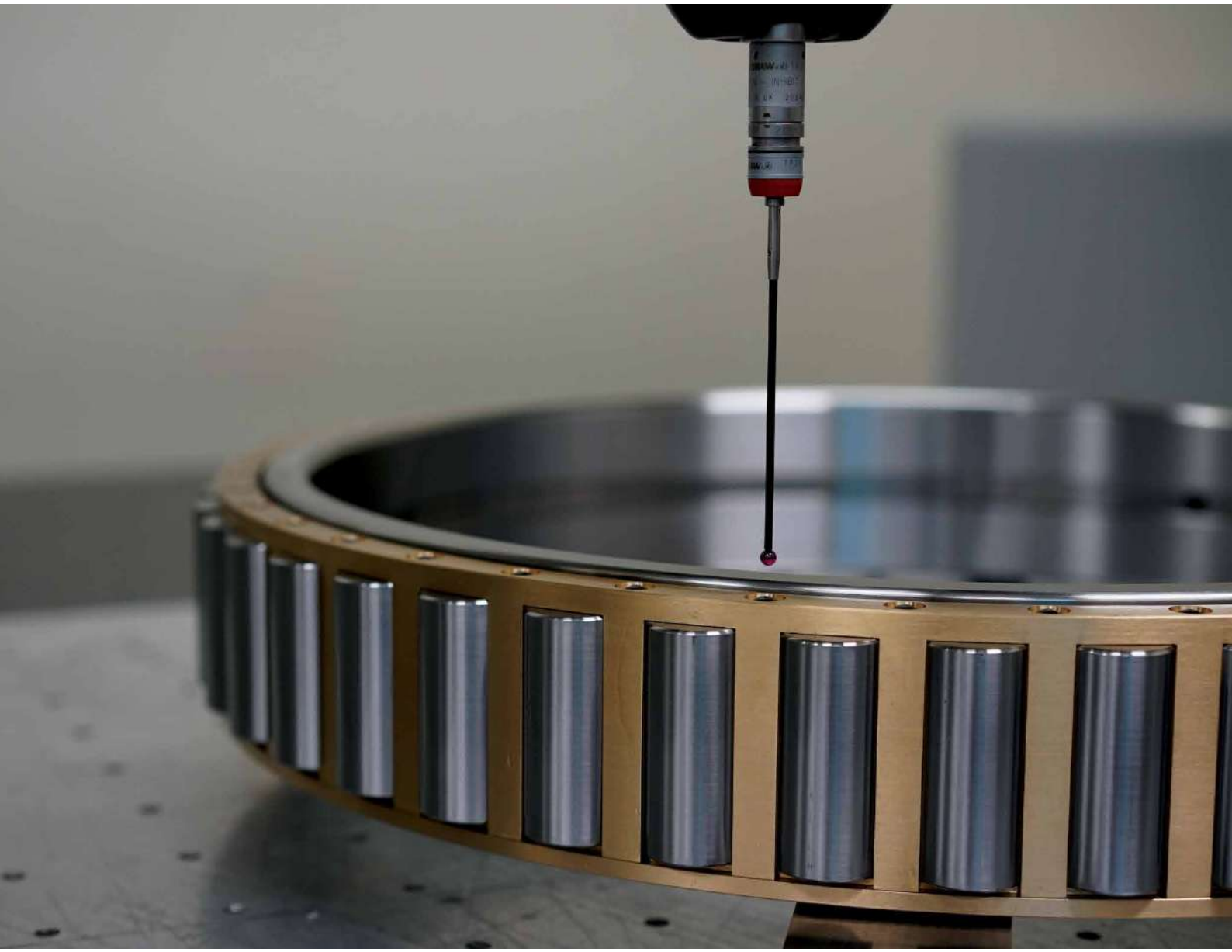
Texas based Bearing Company With a Rich History in the Hydraulic Frac Pump Industry

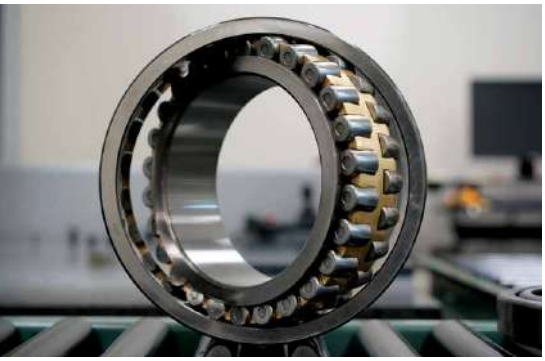
Alan Thomas

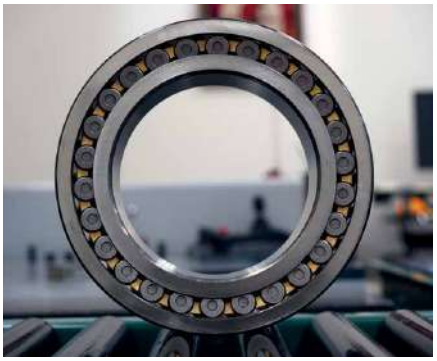
Mickey Thompson

Mickey Thompson and Curtis Harrison, founders of EBT Bearings, bring experience and expertise to the Bearing Industry. What happens when a bearing engineer supplies an expert in the Well Service Industry with the critical bearings he needs? The answer is a long-term friendship, business partnership and a company dedicated to serving their respective industries. In this candid Bearing News interview, understand how EBT's success and growth has been developed through creative problem solving.

Today, EBT offers a wide variety of products and services. Importantly, EBT has the technological know-how to quickly and reliably engineer new pumps and new bearings.







How and when did the journey start for EBT Bearings?

EBT, Inc was founded in 2010, but our journey began long before EBT's doors opened.

Can you tell us more about your background and current activities?

EBT was founded by Mickey Thompson and Curtis Harrison after a short stint of retirement. Mickey and Curtis started as young engineers in the early 1960s. Mickey worked for Rollway Bearings but founded Associated Dynamics (ADI, Inc.) soon after. Curtis began his career with an Oil and Gas Well Service Company called The Western Company. After solving some significant problems in early Frac Pumps, he became the head engineer. Curtis then started GeoQuip, Inc. to continue developing and advancing Frac Pump design and manufacturing. Curtis and Mickey became longtime friends after Mickey sold Curtis the bearings he needed for his new pumps. GeoQuip, Inc and ADI, Inc eventually sold, and they both decided to retire.

What is EBT's field of expertise? And, what makes them different from the competitors on the market?

Curtis is considered THE expert in the Well Service Industry. He has designed and engineered most (if not all) of the Frac Pumps used today, and Mickey engineered the bearings for them. As a result, EBT was founded to service that industry.

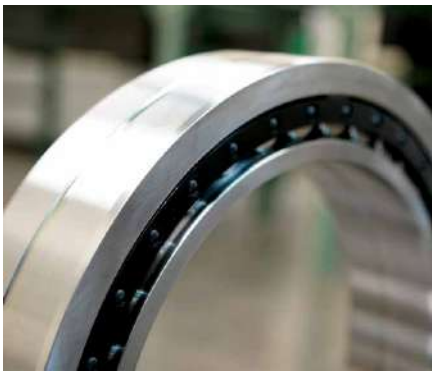
EBT offers standard bearings for existing pump designs but has the expertise to engineer new pumps and new bearings. EBT currently holds the patent on the industry's highest-rated Cylindrical Roller Frac Pump Bearing. This bearing has been installed into hundreds pumps without a single failure in the field. EBT has the expertise to quickly engineer a new bearing and bring it to market. Their staff has over 50 years of combined experience for bearings outside the Oil and Gas market.

Which other products and services do you offer?

EBT offers the following range of bearings:

- Spherical Roller Bearings / Shaker Duty Spherical Roller Bearings
- Cylindrical Roller Bearings ex: N, NU, NUP, NJ200-300-2200-2300, NU5200-series
- Needle Bearings ex MR88
- Three peace ball thrust ex: 51107
- Radial Ball Bearing 6200-6300
- Metric Tapers ex 30306
- Inch Dimension Taper roller bearings ex 48290DW/48220
- Import Mounted Units ex UCP=Pillow Block, UFC= four bolt flanges, UCFL= Two Bolt Flange
- Cylindrical Thrust Bearing ex T-735

Alan Thomas,
President at EBT Bearings



- A-Series ex A22177M
- Reconditioned Railroad Bearings for Pumping Units ex 6x11R, 6.5x12R

EBT offers the following services:

- New Frac Pump Engineering
- Existing Frac Pump Engineering and Review
- New Bearing Engineering for Frac Pump Applications
- New Bearing Engineering for Industrial Applications
- Quick turnaround on shipments
- Location Services for hard-to-find bearings.

How do you see the future of the bearing market developing? Which are the main challenges and opportunities for our industry?

EBT feels the bearing market will continue to grow while facing complicated challenges. Global conflicts and political upheaval will continue to constrain material sourcing and production output. Disruptions in distribution channels will continue across the globe in receiving products as well as getting them to their final destinations. Those who find creative solutions to problems will be successful and see growth. EBT, Inc is one of those companies.

More information about EBT Bearings can be found at www.ebtbearings.com

KUKKO // *Pull forward*

Any Bearing calls for a pulling specialist.

Made-to measure pullers and even tailor-made solutions to remove and install bearings and seals.

This picture shows removal of the impeller to get to the defective bearing. It is a custom-made solution for Ben's Ginger GmbH, a ginger juice production in Bavaria.

Original and premium pullers created by KUKKO.

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The Global Superhero & Bearing Supplier That's Exclusive To The Trade

Tom Hamlett, Managing Director at GODIVA Bearings, offers a fresh prospective on his company's strategic global position within the Bearing Industry. As one of the larger stock holding companies, GODIVA is adhering to industry trends by increasing portfolio offerings. Mr. Hamlett explains that more customers are consolidating smaller shipments into larger shipments, and further discusses why this bodes well for GODIVA's short- and long-term plans.

We had our last interview more than 7 years ago. What are the most important changes at GODIVA Bearings since then?

> "Over 47 brands all available from under one roof"

Wow, 7 years, where does the time go. Over that period we have bought in more stock, increased our storage capacity by adding a new warehouse, upgraded our Warehouse Management System, introduced a Customer Web Portal, upgraded our phone system and enhanced the quality of our packaging. We also welcomed back 7 members of staff to Godiva! So, many changes but one thing we have not changed for the last 20 years is our TRADE ONLY POLICY which means we still only sell to resellers and not the user. The orders we receive fund our next product line and not a new branch.

Tom Hamlett, Managing Director at GODIVA Bearings

Are there any new products in your portfolio? Can you refresh our mind with the main brands and products which are available at GODIVA stocks?

Ok where to begin!?!? Of course, we are known for rod ends, cam followers, needles, and linear, but over the last 10 years we have added chain, belts, sprockets and pulleys, seals, circlips, snap rings, wavey washers, taper lock bushes, timing belts, chain tensioners, high temp bearings, pneumatics, adhesives and couplings! Over 47 brands all available from under one roof – 15 of them we are official sole agents for in the UK. The superior E type rod end from NMB is only available from Godiva as we are the Worldwide Agent. We also stock other brands in depth and due to our trade policy, we win orders that we aren't distributors for. This shows that the trade does not want to line the pockets of their competition!

As one of the larger stock holding companies, how important is export currently for GODIVA Bearings?

Export is always important as it gives us the chance to promote our goods to a worldwide audience. Our systems and procedures are set up in such a way that exporting to Europe and the rest of the World is extremely simple. Our systems have been automated in such a way that the delivering of goods is seamless and very rarely do our parcels get caught up in customs as our paperwork is spot on.

Did you experience any challenges in terms of business and logistics during the Brexit process? If yes, how did you overcome these?

Yes, there were challenges at this time but with the downturn due to Covid we were able to use the time to adapt our systems so that the challenges were overcome and indeed left us in a much better place. The rules of importing/exporting from Europe once again mean that small orders/shipments are really uneconomical to ship, especially with extra charges to incur. We have found that more and more customers are consolidating smaller orders into bigger shipments and due to our £11m stock holding we are well positioned to be able to offer. I think I can safely say that although we are through this period, we really don't want another "Brexit" and of course we definitely don't want another Covid.

What are GODIVA's plans for the coming years ahead? Are there any new projects in the pipeline?

We are always looking at the next product to add to our range as our customer base pretty much remains as is so in order for us to grow, we need to sell more products to our existing customers. Over the last 6 months we have been working exclusively with Carter Americas and NMB to supply E lined NMB rod ends into the American markets of INDY 500 and the NASCAR series.

> "More and more customers are consolidating smaller orders into bigger shipments and due to our £11m stock holding we are well positioned to be able to offer."

Our portal is set to have a major makeover in the next few months with some extremely exciting and ground breaking developments that really will be a game changer – watch this space.

And of course, Godiva wouldn't be Godiva unless we did all off this with a smile on our face!

GodivaMan is also set to return in the flesh in the coming months as a large number of our colleagues offer their time to volunteer at a local food bank!

More information about GODIVA Bearings can be found at www.godiva-bearings.co.uk

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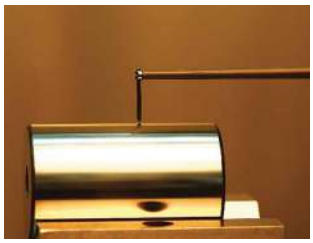

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CARTER

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Supporting your distribution and sales *strategies*

How we can help you supply the best Bearings to your OEM's and End Users?

Established for over 20 years Oxfordshire based Carter Manufacturing are acknowledged as a leading global supplier of precision bearings and tooling equipment. Being sole distribution agents for several high end specialist Bearing Manufacturers including (Carter Inc., Silverthin Bearings, KMS Bearings and UNASIS Bearings & Tools) underlines our status as being 'the go to company' for many clients across the UK, Europe, the America's and beyond.

Melvin Meader, Carter Manufacturing COO has taken time out to tell us more about the unique process that Carter follow for every sales enquiry through to delivery of the product to the customer.

Who are Carter and how do they work?

As a global supplier of precision bearings and tooling equipment to the aerospace, medical, nuclear and defense industries, Carter has significantly expanded its operation and facilities over the past 5 years. For example, setting up distribution centres in Minnesota USA and Valencia Spain as well as implementing an Engineering team dedicated to supporting customers in their selection of the correct bearing or tool for their application. This dedicated approach to every enquiry we receive starts from the basic question is our 'standard product' the best solution for the customer? If the answer is yes, we can progress by quoting a product part number supplied by the distributor / end user and supply accordingly. If the application is more complex we can deliver a more focused approach, which includes helping customers to select a more appropriate bearing to meet the demands of their application and this is where we excel. Why? Because thanks to a very experienced Technical Sales team backed up by industry specialists within our engineering resources, we can work with customers to define exactly which type of bearing or Aerospace tool they require.

What does a typical Carter enquiry look like and how do you approach it?

Francesca Kotulski (Business Development Manager) explains.

Typically we receive several sales enquiry types, some of which is where the customer knows what they want, for example a Carter Cam Follower. We keep stock of the entire imperial and metric ranges, so it's purely a case of quoting the part and (hopefully) converting the order to be shipped on the same day.

Some need further support and on most occasions our experienced Technical Sales staff can assist. However, with others (recently we've seen a high influx of enquiries for our Silverthin Thin section Bearings required for Space applications) is where we can engage our in-house Engineering team.

Ben Roberts, Senior Engineer for Carter Manufacturing explains how we respond to these more challenging sales enquiries. So, how does a 'typical' Silverthin Thin Section bearing enquiry for a space application present and how do you progress such an enquiry from infancy, through to recommending an appropriate bearing solution?

Enquires can vary significantly in how fully the specification is defined, but despite these complexities, Carter is able to work with customers that have an initial concept, right through to customers that already have a fully defined bearings specification.

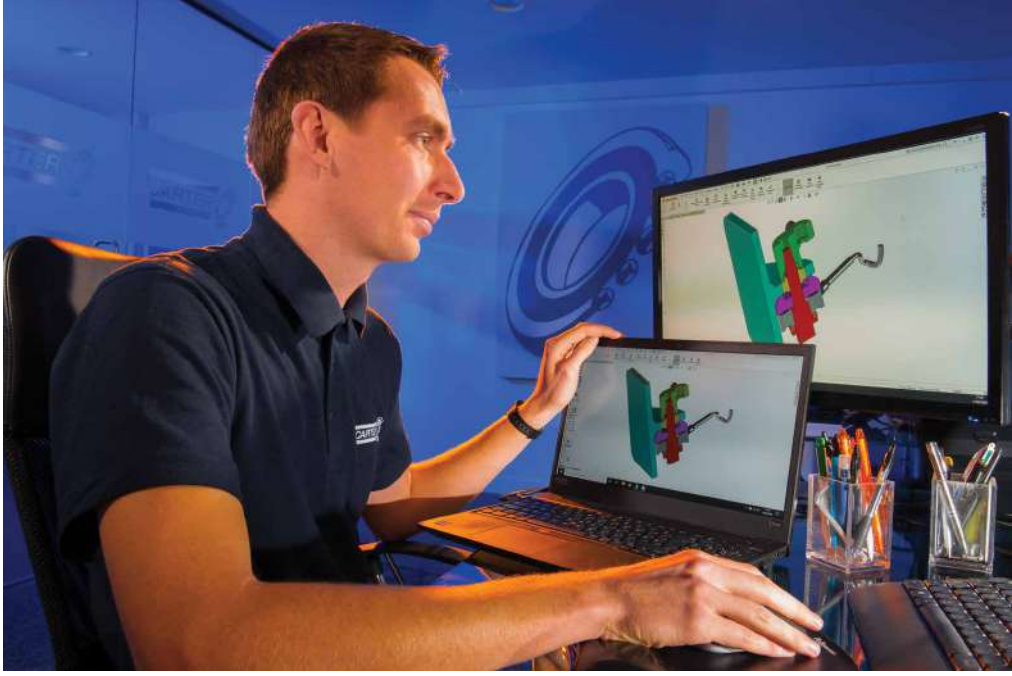
Meeting the Challenges of supplying Bearings for Space Applications

Space Applications present varying

challenges for our Silverthin Thin Section bearings. This is why Carter prefer involvement at these early stages of design as it enables us to impart our expertise and knowledge, often allowing our customers to reduce design time, risk and cost. Many of the demands we see are similar across many applications and this allows us to advise all our customers based on previous knowledge and experience.

Once our bearings have been qualified through Engineering it's time for our Quality team to get involved where **Mark Thomas** heads up **Quality and Compliance at Carter.** This is what he had to say on how we implement our ISO 9001:2015 & AS9120 accreditation and ensures full traceability for our products.

The Quality and compliance team review the customers quality management system (QMS) at pre-planned intervals to ensure that the bearings being specified continue to match the application. This includes the suitability, adequacy and effectiveness in relation to each customer's strategic direction and organization, including their individual sites. Senior Management is kept informed of all the key requirements, including all the necessary reviews which are essential in meeting ISO 9001 and AS9120 standards. The motivation and format of the management review has and always will be, to look at the strategies and business plan to ensure it adheres to the company ethos of delivering a quality product to the customer, on time and in full.



The Final Steps

The final step on the journey is getting our product from us to you. As a multi-site international organization, over the years we have honed our knowledge regarding international shipping requirements.

This is crucial as it ensures that our products are delivered to you as quickly as possible, arriving in as good a shape as they left our factory. Trevor Buckell Warehouse Controller explains the process. As Francesca explained Carter Manufacturing keep large stockholdings of Silverthin Thin Section Bearings, Carter Cam Followers and UNASIS Specialist Bearings in multiple warehouse locations, which means transactions can be shipped from stock on the same day as the order is received. We can also ship bearings between companies to be dispatched form your local office within 24 hours and most importantly, having facilities in Valencia, Spain and Minnesota USA, has increased our global supply chain capability, putting us closer to customers.

Trevor adds, with regards to handling the specialist bearings being made to order, the process in some respects is easier. Our Branded partner will send directly to the local office where we have team members who have been thoroughly trained in how to control documentation ensuring traceability is not lost. All documents are sent back to and stored at our Central Operation hub at our HQ in the UK, so if anything is needed further down the line, we don't have to go too far to reproduce it.

Focusing on our Relationships with our Customers

Mel Meader concludes, our relationships with suppliers, distribution partners and end-users are vital to us and hopefully the journey explained though these interviews explain why we are different.

There is a real culture of care here at Carter which is infectious. We will always strive to go above and beyond and really make the experience of buying bearings through Carter as simple and pleasurable as possible. As we continue to grow I can only see the relationships between the team members and of course our customers, becoming even more established and refined, which ultimately improves the sales cycle and enhances the customer experience.

More at: https://www.carterbearings.co.uk/industries/space

For enquiries

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— Jesa headquarters in switzerland

JESA SA, is a company specialized in the design, development and production of customized bearings and integrated bearing assemblies. The company was founded by Joseph Egger in 1969 and begun trading in ball bearings before starting its own bearing production factory in 1971. JESA markets its solutions worldwide in sectors as varied as the automotive, textile, linear guidance, medical technologies, and others.

Since 2003, JESA also has a subsidiary in China to develop these activities and manage its network of subcontractors. In 2008, JESA expanded its activities in China by creating its own production factory of components and bearings for the headquarters in Switzerland.

The JESA group has been part of POLYGENA AG for more than 20 years and employs today 300 people.

More than 50 years of experience have made JESA the specialist in customized solutions, containing bearings and machined parts, together with engineering polymers.

JESA does not have a fixed product range that can be consulted in a catalogue. Each customer generates a different project, which then results in a specific product.

The JESA research centre, also based in Switzerland is at the leading edge of innovation. Its huge experience in high-end materials, bearing geometries and plastic injection molding creates a unique conception focused on the design of solutions adapted to the specifications of customers.

Jesa has recently released two new innovations that are now available on the market and presented hereafter.

Scan me
Video solid oil

—Custom bearings filled with solid oil

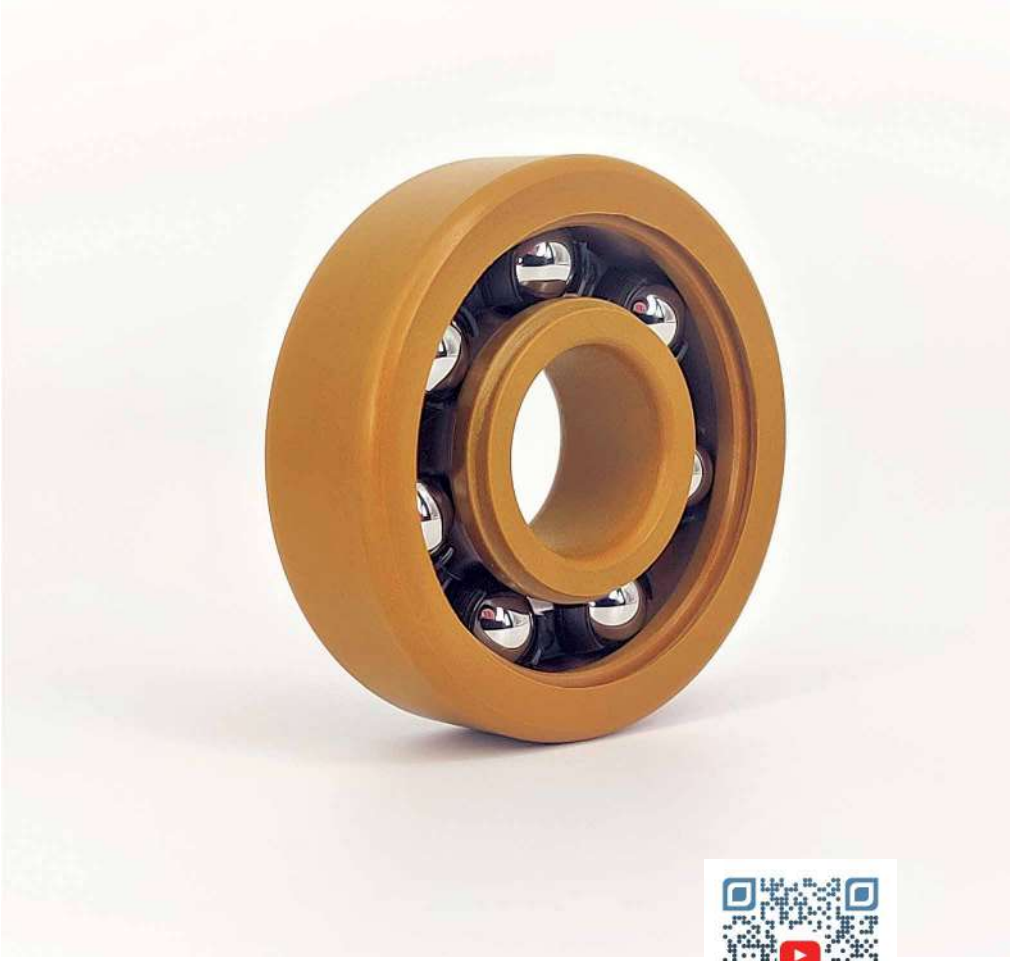
SOLID OIL: The perfect lubricant for use in aggressive environments

In certain applications, ball bearings are required to operate in aggressive environments, causing recurrent failures and therefore high operating costs. These failures can be due to corrosion or pollution by particles that penetrate the bearing.

This is the case, for example, in production facilities in the food industry, which are often cleaned with hot water under pressure or with solvents, which greatly increases corrosion and grease leaching.

Jesa has therefore undertaken, within the framework of its innovation projects and with a specialized partner, to develop and validate a solid lubricant, commonly called "solid oil", which is a polymer material saturated with synthetic oil.

This compound can easily be introduced into a ball bearing and heated so that the lubricant hardens and becomes a solid and porous matrix structure that will occupy all the available space inside the bearing around the rolling elements and the cage. This high fill rate gives JESA bearings excellent protection against moisture and dust while providing a very high level of micro-lubrication due to the amount of oil from the porous matrix.



— TORLON® PAI Bearing

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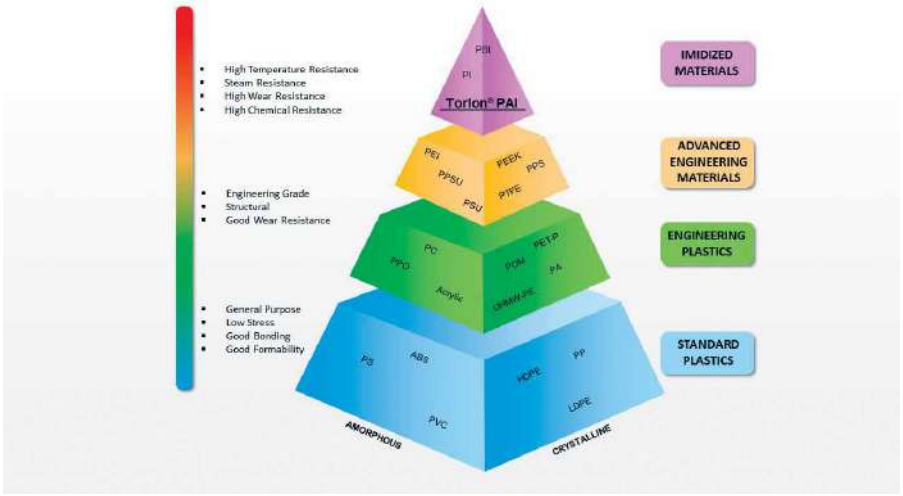
Video TORLON® PAI

This solution offers many advantages and is particularly recommended for bearings operating in an aggressive environment or where re-lubrication is difficult due to accessibility. The solid oil allows to increase drastically the lifetime of the bearings and consequently to reduce the maintenance costs. The compound is also InS-H1 certified and can therefore be used in many industries such as food, beverage, pharmaceutical, medical or textile.

TORLON® PAI: Very high-performance thermoplastic

The second innovation proposed by JESA is the injection process of high-end plastic TORLON® PAI. 3 years of development were necessary to validate this process and JESA is now part of the very closed circle of structures having this technological mastery, which naturally opens the scope of possibilities in the conception and production of customized bearing solutions.

— Bearing overmolded with TORLON® PAI



—TORLON ® PAI is at the top of the plastics performance pyramid

Torlon® PAI is known to be the best performing thermoplastic that can be processed by injection moulding under certain conditions. It has exceptional mechanical properties combining the advantages of metals (high stiffness, low creep and very high wear resistance) as well as the advantages of thermoplastics (low density and good elongation factor). Due to its composition, it is also completely non-magnetic, non-oxidizable and dielectric.

TORLON® PAI is characterised by very high thermal stability with incomparable mechanical and chemical resistance compared to other advanced engineering plastics. The intrinsic properties of this material make it an effective alternative to metal in high-temperature friction and wear applications.

This material is usually machined, but it is also possible to shape it through a complex injection molding process. Indeed, this material is not injected like a standard polymer, very specific equipment and expertise in the field of polymers is required to maximise its properties.

This process has the advantage to provide tailor-made solutions with the possibility of making very complicated shapes. Another asset of injection overmolding is obviously the cost reduction due to the wasted machining chips saving.

Thanks to this development, Jesa can now offer to its most demanding customers a state-of-the-art material and process for developing unique innovative solutions in many fields such as aeronautics, the medical technology industry and food industry.

With its extensive know-how in bearing design and plastic injection molding, JESA is the ideal partner to solve your most complex problems and develop the most suitable custom bearing solutions for your needs. Do not hesitate to contact JESA if you have any specific bearing project, technical salesmen and engineering department will be happy to assist you in your development.

Visit www.jesa.com for more information.

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INNOVATION
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Innovation is part of the DNA of simatec ag, a Swiss SME that has been launching new, high-quality products for the maintenance of rolling bearings under the brand names simalube, simatherm and simatool for almost forty years. At the headquarters in Wangen an der Aare in the middle of Switzerland, motivated employees research, develop and produce everything for the mounting, dismounting and maintenance of rolling bearings and much more.

Correct lubrication of bearings

The selection of the right lubricants and their delivery to the lubrication points in a suitable form and in the right quantity is essential and is becoming increasingly demanding. The selection of the lubrication system is therefore of crucial importance; it must be made according to the requirements. Today, expensive high-performance lubricants of the latest technologies are increasingly used for lubrication. It is all the more astonishing that relubrication is mostly done by hand and only 5 % of all lubrication points are equipped with an automatic system.

Obviously, there is a lot of catching up to do here, be it retrofitting or initial installation. In both cases, the automatic simalube lubricant dispensers from the Swiss manufacturer simatec are the ideal solution. The customer can choose the sizes, lubricants and running times of the dispensers and thus obtains the tailor-made solution for every lubrication point.

Each lubrication point is independently, reliably and continuously supplied with the amount of lubricant pre-selected by the customer. The lubricators generate exactly

— Image 1: simalube lubricant dispenser range in new design

the pressure required to deliver greases or oils to the lubrication points. Segregation of oil and thickener is avoided, the consistency remains constant and the freshly supplied lubricant unfolds its full performance at the lubrication point. Wear on components is reduced, unplanned downtime is avoided and maintenance intervals are extended. The elimination of manual lubrication also saves valuable time and thus money.

New simalube design - good things get even better

The products, which have been tried and tested millions of times on the market, have been redesigned in the spirit of innovation and the constant improvements we are striving for. The gas generator, the heart of the automatic lubricant dispensers, has been completely redesigned. The fresh, modern design offers improvements in many respects regarding function and handling. What has remained is the extremely reliable drive technology using gas producing dry cells. The generated gas builds up the overpressure in the dispenser behind the piston, which automatically, continuously and reliably presses the lubricant into the lubrication point. Compared to its modest size (comparable to a hearing aid battery), the cell produces a considerable amount of gas and delivers this on demand without an external power supply. Thanks to this innovative technology, simalube lubricators are unique in terms of function, compactness and versatility. The simalube automatic lubricant dispensers are available in five different sizes. The delivery rate can be adjusted continuously, with running times from 1 - 12 months. This makes the simalube lubricators an all-rounder when it comes to lubricating all types of bearings, chains, open gears, guide rails, spindles and much more. In addition, simalube lubricant dispensers are tested and approved according to ATEX and IECEx for all Ex-protection zones.

Mounting and dismounting of rolling bearings

Over 16 % of premature bearing failures are due to improper fitting. The lack of suitable mounting tools and the necessary knowledge when replacing bearings often leads to new bearings being subjected to high forces during mounting and thus being damaged.

— Image 2: New simalube gas producing dry cell

Premature bearing failures are often the result. This can be prevented with the correct procedure and the use of professional special tools. Only then will the new bearings achieve their expected service life.

With its wide range of high-quality tools, simatec offers the best conditions for fast and safe work. With the tried and tested simatool Fitting Tool FT 33, bearings can be fitted onto the shaft or into a housing quickly, precisely and without damage. The design of the tool ensures that the mounting forces are transmitted via the inner or outer ring and not via the rolling elements, which significantly extends the operating life of the rolling bearings.

—Image 3: simatool Fitting Tool FT 33

— Image 4: simatherm IH 025

Heating with induction

Another method for the professional installation of bearings is to heat the components before mounting. The leading bearing manufacturers recommend heating the bearings to a temperature of 110 °C for installation. This increases the inner diameter and the bearings can be positioned on the shaft without force.

When mounting in a housing, the housing is heated and the cold bearing is pushed into the heated housing. Rolling bearings and other ring-shaped metal parts can be heated efficiently with simatherm induction heaters. The devices enable fast, gentle and clean mounting and replace conventional, often time-consuming and expensive heating methods such as hot plates, hot oil baths, open flames or ovens. During the heating process, only the workpiece heats up; the device itself remains at room temperature. simatherm induction heating devices are available for rolling bearings with a mass of up to 300 kg.

simatec - your reliable partner for maintenance products

The use of simatec maintenance products significantly increases the quality of maintenance work and makes processes simpler, safer and more economical. This is how you successfully implement your maintenance processes:

Use simatherm heating devices for mounting rolling bearings: The best method for achieving/adjusting the correct heating temperature is to heat the bearing with a simatherm induction heater. The desired temperature can be set precisely, and the heating process is continuously monitored. Once the workpiece is warm enough, it can be easily mounted without any effort.
Use simatool quality tools: Correct mounting and dismounting is crucial for a long service life of your bearings. Professional tools such as bearing pullers or bearing mounting tool sets from simatec ensure safe mounting and dismounting and reduce the risk of damage. simatool tool sets are the perfect solution for professional mounting and dismounting of rolling bearings.

Lubricate your equipment with simalube: The supply of lubricants at the right time and in the right quantity is crucial and very demanding if the service life of your components is to be extended. It is important to select the right lubricants and supply them to the lubrication points in the appropriate form and in the correct quantity. The simalube automatic lubricant dispenser is the perfect solution to meet these tasks.

More information can be found at www.simatec.com

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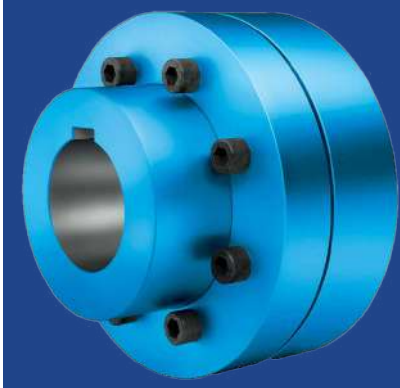

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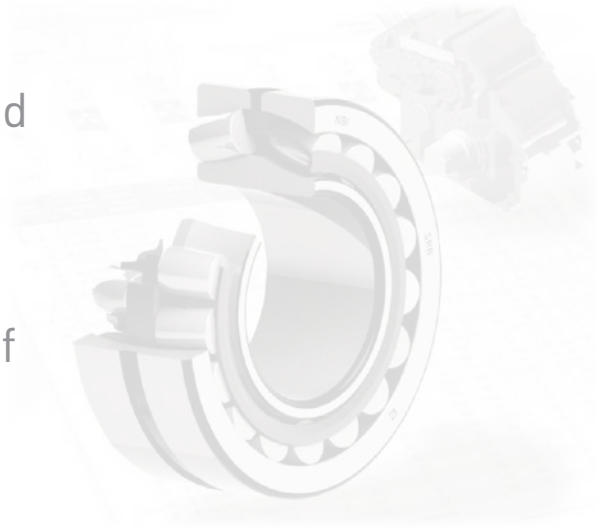
NBI

commits itself to higher efficiency on bearings for a more demanding world

The evolution of the bearings by NBI Bearings Europe responds to an increasing knowledge of the market and especially of the needs of the industry, focusing on improving the efficiency of the product. NBI carries out detailed studies, depending on the application of its bearings, allowing them to achieve a greater performance and therefore a longer service life.



NBI Bearings Europe, a company with more than 20 years of experience, designs, develops, produces and markets bearings throughout the world. It strategically invests in R&D, complementing the company's existing capabilities and, at the same time, reflecting the needs and market opportunities in the real world.

Maintaining the same manufacturing parameters of its ENHANCED+ line, with superior benefits that improve dynamic load capacity and, consequently, increase service life, reduce friction and operating temperature and also allow for downsizing and therefore save on costs, NBI has reached its most recent achievement: the creation of the premium SRB ENHANCED+ line.

High quality bearings

This series achieves high quality spherical roller bearings designed to perform in today's increasingly demanding industrial environment, thanks to its improved design.

Efficiency and high precision

The main benefits obtained in NBI's SRB ENHANCED+ bearings are based on the use of first quality steel and an optimized heat treatment. Internal manufacturing tolerances are tighter and surface finishes have also been improved.

The internal design has been optimized, increasing resistance, maximizing capacity and optimizing osculation ratios that minimize wear and improve performance for high loads. Also, NBI uses different types of brass or steel cages, guided on rollers, inner ring or outer ring, in order to meet the conditions of different applications. The sum of all these improvements allows the bearings to obtain high precision and better efficiency.

Experience in design and production with the most advanced European technology

NBI has plants in Spain, India and China but the vast majority of these spherical bearings are manufactured in the group's plant located in Oquendo (Álava - Spain), with 5,500 m2, of which 2,000 m2 are allocated to the CNC production equipment of latest technology.

Here, NBI also has 3 laboratories: metallographic, metrological and other

NBI's application engineering team develops customized solutions to specific industry applications. The SRB Enhanced ⁺ line is designed for the continuous use of bearings in the most adverse conditions and without work interruptions in order to maximize production.

A clear example is the growth of the mining industry, with a large amount of heavy equipment, such as vibrating screens, which work in extremely demanding conditions (high and unbalanced loads, accelerations, high temperatures, misalignments and contamination). For applications like these, which demand high technical requirements, NBI has developed the SRB Enhanced ⁺ bearings, whose production is based on the high-tech plant located in Spain.

life tests, equipped with state-of-the-art machinery and our own software. All the precision manufacturing and inspection processes of the bearings are carried out in these facilities, with a current capacity for bearings up to a size of 400mm outer diameter. And it is planned in the future to expand this size to up to 1 meter outer diameter.

NBI is focused on small-medium production batches with high technical requirements that meet the strictest quality standards, where experience in design and production of bearings is combined with the most advanced technology in materials research and manufacturing technologies.

The bearing division of the NBI group, together with the industrial division, are continuously committed to designing and developing products in accordance with the evolution and sustainability of new markets.

More information can be found at https://gruponbi.com

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BETC

Our task is to support our customers across all sectors on all issues relating to rolling bearings. We ensure the quality of rolling bearings, optimize rolling bearing applications and, in the event of damage, analyze the cause of the damage in order to develop suitable remedial measures. Our strength is the holistic and independent consideration of the rolling bearing. In doing so, we work in our own state-of-the-art and certified measurement laboratory with product-experienced staff. As a certified expert, we offer our customers the highest quality results, a customized service package and a short response time.

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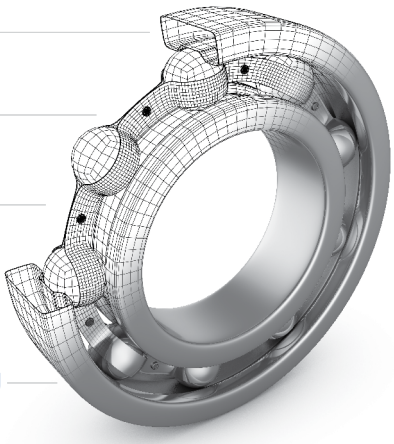

- Holistic Approach
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These four bearing failure frequencies are commonly known as:

- BPFO - Ball Pass Frequency, Outer Race;
- BPFI - Ball Pass Frequency, Inner Race;
- BSF - Ball Spin Frequency;
- FTF - Fundamental Train Frequency.

Once you have found the right bearing in our database, all you need to do is reference the speed of the machine being examined and verify that the acquired signal corresponds to one of these four bearing failure frequencies!

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Advanced Foil Bearings

Combination of Aerodynamic and Aerostatic Bearings *by OAV*

In this exclusive Bearing News Interview, Murat Erturk, Chief Executive at OAV Air Bearings, discusses his company's newly designed foil air bearings for frictionless and high-speed precision motion applications. Mr. Erturk provides a detailed overview of the higher generation products that will impact the air bearing market that is set to surpass $13Bn by 2030. Through this comprehensive interview, understand how the new aerodynamic bearings improve load-carrying capacity and dynamic stability, and why companies are replacing conventional oil-lubricated bearings with OAVs products. With a wide range of applications, OAV Foil Air Bearings are in continuous demand due to low maintenance cost and high-efficiency speed and accuracy.

Can you tell us more about your background and current activities at OAV Air Bearings?

I am Chief Executive and Leader of Innovation and Technology at OAV Air Bearings. Also the Chairman of the Board of OAVCO and an Advisory Board member in several other groups and companies. OAV

> "Higher-generation bearings have been developed, to further improve the load-carrying capacity and dynamic stability."

was originally founded to produce machine components in 1964. In 2001, the company evolved into an aerospace-oriented manufacturer of mechanical devices supporting the aerospace and defence industries – primarily but not exclusively in manufacturing precision bearings. OAV Air Bearing launched after, focusing on developing air bearings for frictionless and high-speed precision motion applications.

What are advanced foil aerodynamic bearings?

The rigid bore aerodynamic bearings primarily experience two major problems: low load-carrying capacity and instability arising from self-excited air whip and modal vibrations. To eliminate these issues, the aerodynamic bearings have compliant surfaces that have been specially designed. Bump-type foil bearings are one such compliant-bore aerodynamic bearings, known for their high load-carrying capacity and improved stability of rotors supported on them.

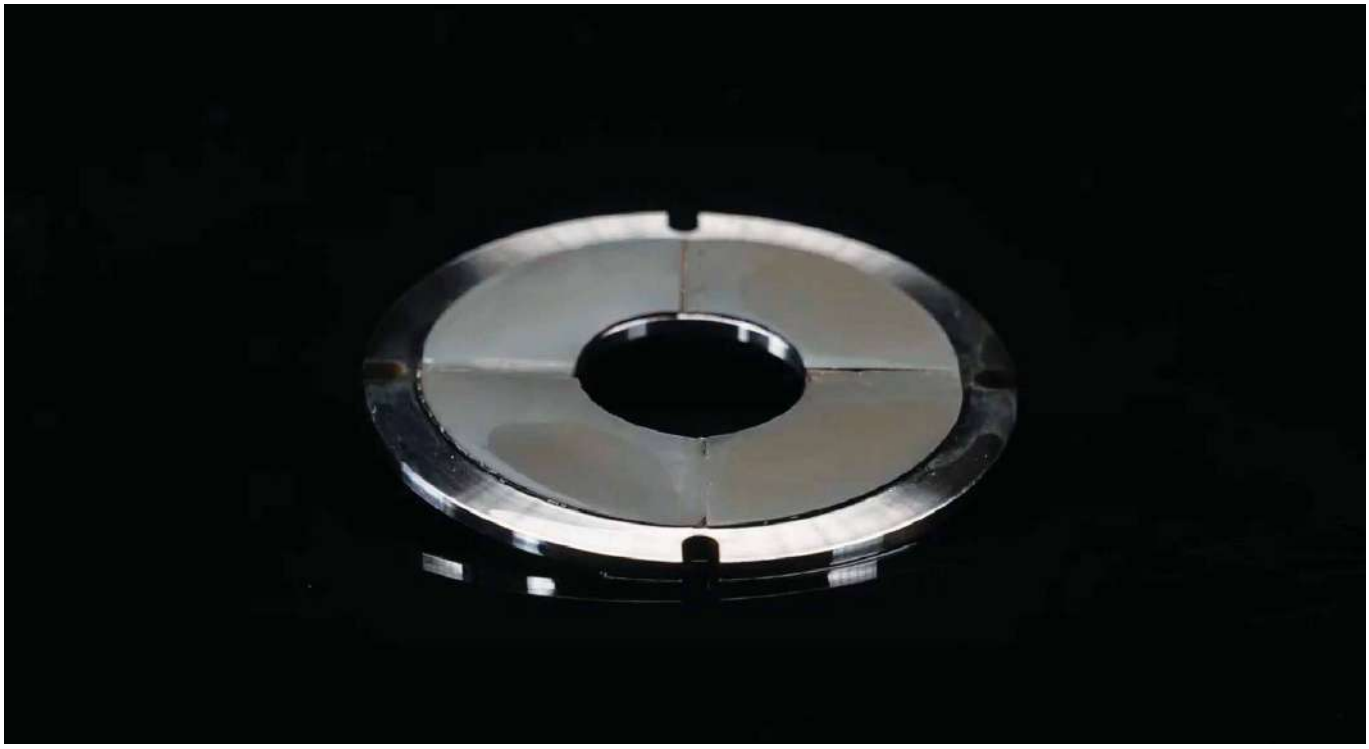
In the first-generation bump-type foil bearings, the symmetrical stiffness behaviours (in circumferential and axial directions) of the supporting compliant foils have been employed to achieve better stability. To further improve the load-carrying capacity and dynamic stability, higher-generation bearings have been developed. The foil geometry and stiffness variation in either axial or circumferential direction has been altered in the second-generation bump-type foil bearings. In contrast, in the third-generation bearings, the customizations have been made synergistically in both axial and circumferential directions.

The OAV team has gone one level higher to develop higher-generation advanced bump-type foil aerodynamic bearings to enhance their load-carrying capacity and dynamic performance several times higher than the other conventional bump-type foil bearings.

Can you tell us more about the new design?

The development of foil air bearings began in the early 1970s to provide rotational guidance for gas turbine shafts. Foil bearings, also known as foil air bearings, are a type of air bearing where the surface is supported by a compliant, spring-loaded foil journal lining. Once the surface is spinning fast enough, the air pushes the foil away from the surface so that no contact and no wear occur. The surface and foil are separated by the high pressure from the air, generated by the rotation that pulls gas into the bearing via the viscosity effects. OAV Foil Air Bearings can operate under the most demanding systems without the requirement for external supply. OAV's advanced method makes the OAV foil air bearings unmatched. OAV's novel design is for OAV to focus on eliminating the adverse effects of rotational speed, unbalanced eccentricity, and rotor mass on the non-linear response. We use a combined approach that treats air and structure as two computational areas to solve common issues, reach higher load capacities, better the damping effect and the start-up, and eliminate the concerns of foil air bearings. The OAV foil bearings are classified into two categories: OAV thrust foil bearings and OAV radial foil bearings. Based on load direction, customers can choose from thrust and radial foil bearings. The next-generation OAV foil bearings have modified

Murat Erturk
Chief Executive at OAV Air Bearings



> The air-bearing market is estimated to surpass the valuation of US$ 13 Bn by 2030.

foil characteristics (shape, number, etc.) to match the industry's current needs. With these new design changes, OAV foil bearings can accommodate a slight misalignment in the rotor without considerable changes in the bearing performance. Additionally, a special coating on the top foil surface enhances the life of OAV bearings by minimising friction and wear at the start and stop of the rotor.

Which are the main applications for these types of bearings?

With the target of achieving 'net zero,' the high-speed turbomachinery industries are replacing conventional oil-lubricated bearings with greener air bearings. Thus, OAV is committed to providing next-generation oil-free foil bearings having several orders of higher load-carrying capacity and much better dynamic stability to the industries. Typically, these bearings are widely used in air cycle machines of fighter and commercial space crafts, turbo-pumps of space launch vehicles, cryogenic turboexpanders, high-speed automobile turbochargers, medical centrifuges, miniature gas turbine engines, fuel cells, spindles of textile and food processing industries, and many more.

Are there any other benefits and innovations connected to the new design?

Since OAV has standardized the sizes of its thrust and radial foil bearings, these products are offered off-the-shelf with quick delivery time. OAV Foil Air Bearings do not require any major overhaul/maintenance since there is no contact between the rotor and the bearings during their operation. The OAV foil bearings have a distinguished advantage in their operating temperature range from cryogenic -40 ^{o}C to extremely hot 650 ^{o}C environment.

How do you predict the market and usage of this new technology in the near future?

The air-bearing market is estimated to surpass the valuation of US$ 13 Bn by 2030—advanced designs in air bearings to accommodate high loading and provide more damping are a driving factor for the market to surpass. Continuously increasing demand for air bearings because of low maintenance cost and high-efficiency speed and accuracy is a driving factor for immense boost.

More information about OAV Air Bearings can be found on the OAV website www.oavco.com.

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Deep Dive into RKB 's technological bearings

RKB has genuine knowledge of designing, manufacturing, and serving high-value technological bearings for OEM and MRO companies worldwide. We effectively combine up-to-date technological developments with experience and expertise gained over many successful years to produce quality technological bearings with outer diameters of up to 1.925 mm.

To learn more about RKB technological bearings and the challenges involved in their production, installation, and after-sales service, we spoke with Sr. Eng. Vasile Nitu from the Technical Team Unit. This new interview continues the mission begun in the previous issue of BearingNews, in which we want readers to learn more about our products while meeting various RKB specialists.

Good morning, Vasile! Thank you for agreeing to answer a few questions about RKB technological bearings. Let us start with a focused question. What is the role of technological bearings?

Let me begin by saying that technological bearings have a high level of complexity in terms of requirements to which the manufacturer must respond. They support and guide the machines with which the processed material interacts, as well as the semi-finished products during processing and the finished products at the end of the process.

The almost direct interaction with the processed material and the variety of requests they must deal with add to the technical complexity of their production. Handling heavy weighting machines while maintaining high rotation precision and combating difficult working environment conditions because of the high temperature of the processed material, as well as atmospheric contaminants like dust and water, is not a simple task. In addition, extreme reliability is required because an unexpected bearing failure can halt an entire factory's production process. These are just a few of the difficulties we must overcome to deliver a competitive product.

How does RKB respond to these demands?

In two different ways. The first method is found in RKB's manufacturing approach: no two applications in the field of technological bearings are identical. One company can manufacture many pieces of equipment of the same type, but the applications for technological bearings differ. The products are different, as are the environmental conditions, the technological materials used and, finally, the people who operate the equipment.

RKB places detailed knowledge of the applications as a core element of any collaboration in the field of technological bearings. A constant of the RKB model is the presence of its qualified teams at the partners' locations from the moment a request for an offer is received until the bearing installation is completed and the operation phase starts.

The activity of the Advanced Calculations and Technological Engineering Department of RKB Group is based on information gathering. The proposed solutions are issued, mathematically modelled, and evaluated in this department. Every time the ideas are materialized into a bearing that appears to have general parameters that are equivalent to all other bearings, RKB tests it again because there could be many differences that can only be studied with special equipment.

The second method is distinguished by the following characteristics:

- Ensuring and verifying that the raw material meets our internal standards. The accuracy of the composition and the high purity of the steel in terms of dissolved H and O2 are important components.
- Realization of primary mechanical processing on CNC equipment.

- Performing secondary heat treatments on equipment with automatic control of the main parameters - temperature, atmosphere composition, cooling speed, and so on - depending on the type of steel used - through hardening steel or case hardening steel.
- The realization of the final geometry of the bearing elements on innovative equipment ensures the special microgeometry profiles and surface quality requirements.
- We assemble the bearings under the element mating diagrams generated by dimensional measurements in the metrological laboratory.
- RKB ensures surface chemical treatments for bearings intended for applications requiring special surface conditions.
- Technological bearings are inherently more prone to non-conformities. Thus, we use a multi-level platform for quality assurance. Control of the various transformation and processing operations, as well as a final inspection of the finished bearing, are all part of this. The RKB metrology analysis laboratories conduct all the quality tests.

You mentioned the presence of RKB engineers on-site. Could you please explain what RKB's technical support involves?

During the pre-sale period, we evaluate the application together with the client. We identify its particularities, analyse the problems faced in the operation of the previously installed bearings and proceed to identify the bearing variant according to the application.

However, there are times when a bearing with new characteristics is required due to changes made to the equipment structure or the work process. In this case, the application engineer collaborates with people from the RKB Research and Development Department to design a bearing specifically for that application. We provide our clients with technical support for bearing installation, maintenance, staff training, and the participation of an application engineer at the bearing installation, either on-site or via video conference.

Following installation, the bearings are jointly monitored by the client and RKB; data on their performance is collected by RKB via the "RKB Follow-Up Form" system.

The collected data is analysed regularly, and if necessary, the client is informed of the corrective actions he must take.

A fact-based conclusion is that RKB offers inclusive solutions, not just bearings!

Are there numerous applications for technological bearings?

My knowledge of RKB's technological bearings allows me to give examples of a wide variety of applications.

For instance, I recall installing technological bearings at a 4HI Cold Rolling Mill almost two years ago. The application to which I am referring is not noteworthy for its novelty. RKB provides technological bearings for a wide range of other applications.

High maintenance costs prompted the respective customer to seek advice from RKB. Following collaboration with the client for the application evaluation, RKB proposed a solution that addressed a number of issues.

RKB's solution aimed at reconditioning some of the parts matched with bearings, changing the bearing installation procedure, training maintenance personnel, establishing the bearing maintenance procedure, and determining the best bearing that met the application requirements.

As a result, the RKB bearings have outlasted the previously installed bearings and are still in operation.

What else does RKB provide besides technological bearings?

Aside from technological bearings, RKB provides a diverse range of industrial rolling bearings and accessories to meet the performance requirements of its customers. Over 12,000 parts numbers are available in our catalogue.

Thank you, Vasile!

Thank you!

Learn more about our bearings at www.rkbbearings.com

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Hard rolling for increasing the strength of functional surfaces subjected to rolling loads

As part of a funded project, HEGENSCHEIDT-MFD GmbH has developed a hard rolling process in close cooperation with research institutes, rolling bearing manufacturers and metallography companies. Through the use of the associated machin-ing concepts and tool variants, residual compressive stresses are induced in the running surfaces of the bearing rings, which results not only in hardening and smoothing, but also in a demonstrable increase in the service life of rolling bearing raceways in particular. HE-GENSCHEIDT-MFD GmbH, a medium-sized mechanical engineering company within the NILES-SIMMONS-HE-GENSCHEIDT Group (NSH) with an international focus, has been engaged for many decades in the smooth and deep rolling and roll straightening of rotationally sym-metrical components.

1. Introduction

HEGENSCHEIDT-MFD GmbH demonstrated in the three-year research project “Hard rolling of bearing rings” (funding code EFRE-0800344) in close cooperation with other project partners that the bearing rings of anti-friction bearings achieve a significantly longer service life as a result of the process sequence of hard turning and hard rolling with a hard rolling process that had been specially adapted for this purpose.

Compared with the conventional process chain for hard machining, hard rolling therefore offers a resource-saving and cost-effective alternative. The longer service life of the bearings contrib-utes to a further increase in efficiency and therefore reduces the costs not only for the manu-facturer, but also for the user. This may be the avoidance of early breakdowns of production machines or the extension of maintenance intervals, for example in the energy supply field.

From tool and process development to the finished anti-friction bearing, all of the necessary skills were available within the project consortium.

Determination of the process requirements was followed by the iterative development of the rolling tools and process parameters, with this being followed in turn by trials on analogue and real components.

Hard rolling is a forming production process in which hardened areas of components are plas-ticised and shaped by means of a rolling element in the contact area. The aim is both work hardening and the introduction of residual compressive stresses into the border zone, as well as the smoothing of the surface, which results in an increase in the service life of functional surfaces that are subjected to rolling loads.

The advantages of the hard rolling process lie in its cost-effectiveness and resource efficiency, as it can be easily integrated into existing production lines with a short machining time and low energy requirements.

The high variance in the specially adapted rolling tools and process parameters also enable the machining of a large number of different anti-friction bearing variants. There are currently only isolated approaches to using the process for anti-friction bearings, although the anti-friction bearing industry offers a high application potential for the use of hard rolling. Anti-friction bearings are among the most frequently used machine elements and often have a significant influence on the operating behaviour and service life of production machines and systems.

2. Motivation

The process is shown schematically in the image below. The rolling element generates a contact pressure due to the normal force, which leads to plastic forming of the workpiece surface and levels the roughness profile, as well as inducing additional residual compressive stresses in the border zone.

It has been demonstrated in several different studies that such residual compressive stresses increase the service life of anti-friction bearings. The residual compressive stresses counteract the progress of cracks in the rolling contact and therefore contribute to an increase in the re-sistance to surface disintegration and an improvement in rolling-contact stability. The smooth-ing of the surface counteracts any insufficient lubrication. The induction of residual compressive stresses in bearing rings requires the development of a new tool concept, as none of the existing ones offers accessibility of the tool.

3. Rolling Process and Tool Development

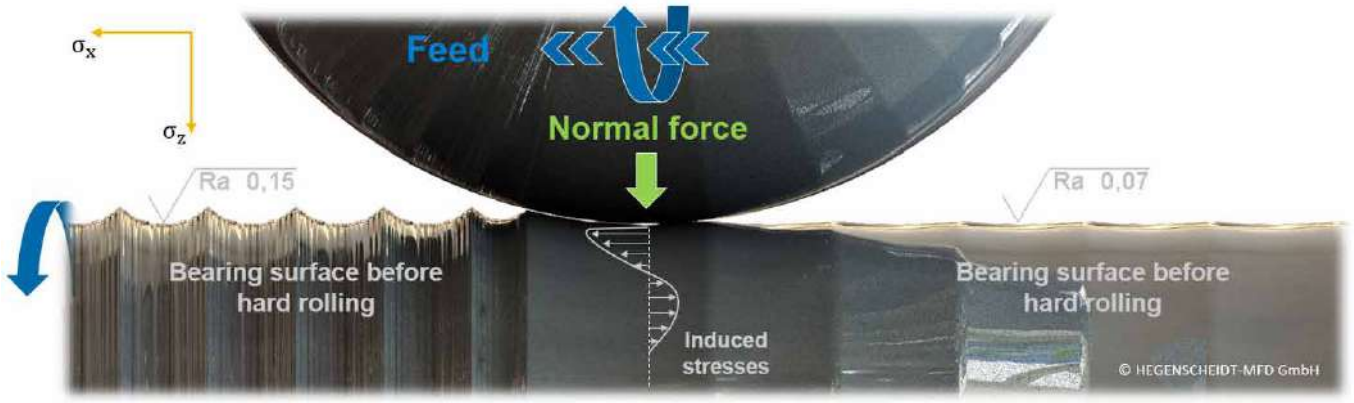
For the hard rolling process, HEGENSCHEIDT-MFD has developed a suitable variable tool that is used in the feed rolling process. Relatively small rolling elements are used for this. The contour of the bearing ring is traced with the rolling element using a defined feed rate. In this way, the usual raceway contours can be machined very flexibly.

The force-based support in several spatial axes, as well as the variable tool design, enable the machining of a wide range of designs of inner and outer rings. The robust and durable mechanical design of the rolling element bearing does not require any additional media. Furthermore, it is possible to monitor the process by means of interfaces and thereby carry out a resource-saving adaptation of the machining task.

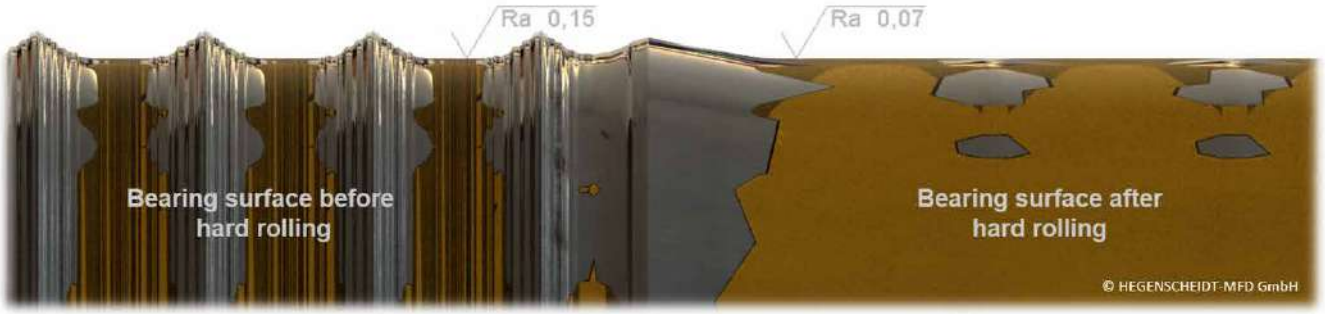
4. Experimental Investigation

The first investigations were carried out on axial washers as simple test specimens, which ena-bled a high level of reproducibility and therefore comparability of the machining.

The characterisation process comprised features such as the geometry, surface quality and shape and position tolerances on the one hand, and boundary zone properties such as residual stresses and a hardness profile on the other. On the basis of the analogue components it was shown that induced residual compressive stresses lead to a significant increase in the service life.



— Schematic representation of the hard rolling process

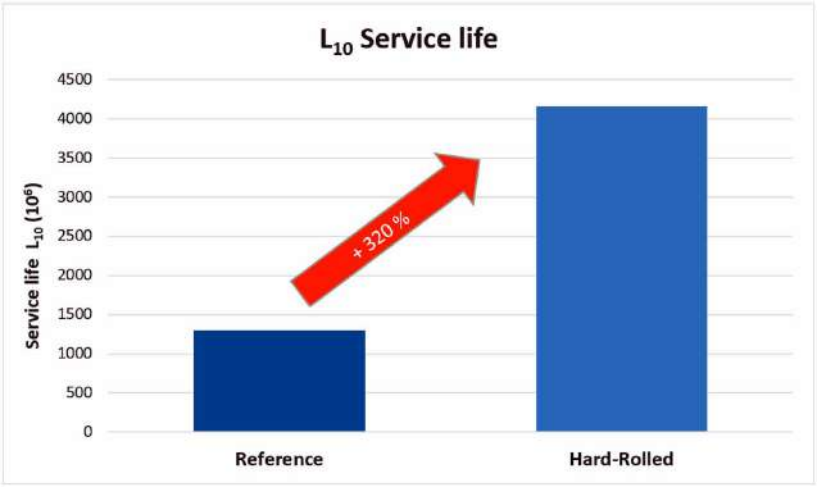


— Distribution of the lubricating film with different surface characteristics

5. Service Life Investigations

The results of trials with real anti-friction bearings are shown in the following image.

If the results of standard hard-turned samples are taken as a reference to 1, the hard rolling process results in an increase in the service life by a factor of 3.2 according to the current status.



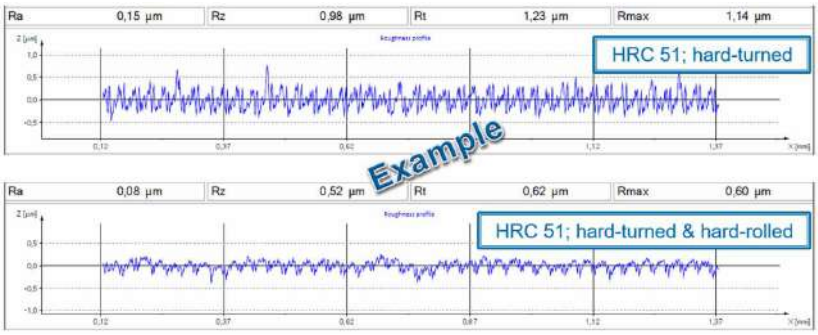
— Increase in the service life of hard-rolled anti-friction bearing rings

6. Rolling Results

Example of a clearly identifiable improvement in the surface roughness levels:

The measurement report shows that the bearing raceways are uniformly well smoothed, which also includes the uniform generation of the residual compressive stresses.

The generated contour accuracy corresponds to the common requirements of the anti-friction bearing industry.



7. Potential Workpieces

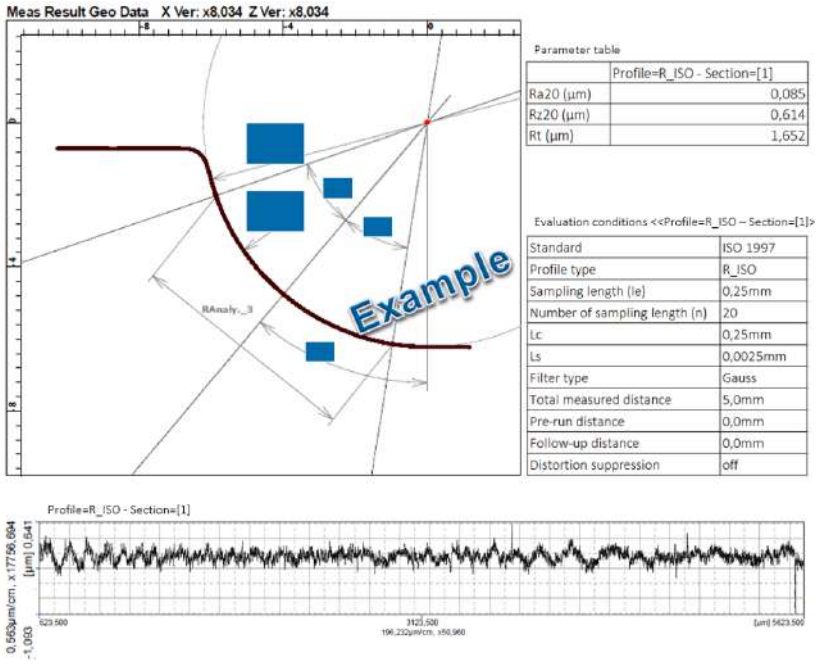
In principle, hard rolling with the newly developed tool base and the tool variants derived from it can be used for all rolling bearing raceways. Also for linear bearings and guides, as well as ball caster units and the like.

Furthermore, it can provide significant performance improvements for more complex struc-tural units with integrated rolling element raceways and for the components which are treated accordingly.

8. Summary

Although the benefits of the surface rolling of bearing raceways have been demonstrated sev-eral times in various studies, they have not yet been implemented as standard because suitable process and tool concepts for the machining of typical bearing geometries have been lacking up to now. The hard rolling process developed by HEGENSCHEIDT-MFD for rolling bearing race-ways closes this gap. The variable design options enable its application in a large number of different types of anti-friction bearing units.

The integrated interfaces for process monitoring, as well as the robust and durable design of the rolling element bearing, ensure the precise positioning of the required rolling forces.



The trials carried out so far have shown both high machining qualities and very good values for the increase in the service life.

Several projects are currently underway with different partners to prove the suitability of the process for series production.

For more information about HEGENSCHEIDT-MFD GmbH visit www.nshgroup.com

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Haffar Salim Reelected as President of the EUROTRANS

Salim Haffar
newly re-elected President at EUROTRANS

The EUROTRANS announced the reelection of Mr. Haffar Salim as president of their organization during the International Drive Conference that took place online the 17th November. In front of a panel of professionals and associations members from more than 30 countries, Mr. Haffar presented the work achieved in the last two years and the strategy for future.

Mr. Andre Thuswaldner (President of SWISSMEM) also got reelected as vice-president of the EUROTRANS.

The organization announced the dates for the next International Drive Conference, that will take place in Germany during Hannover Messe. The conference will be held on the 19th April 2023.

Celebrating it's 50 years In 2019, the COMITÉ EUROPÉEN DES ASSOCIATIONS DE CONSTRUCTEURS D'ENGRENAGES ET D'ÉLÉMENTS DE TRANSMISSION (EUROTRANS) is an organization that represents the interests of the European power transmission industry. It informs and supports more than 600 enterprises within Europe, which accounts for an annual production of more than 40 billion Euro.

Europe remain the leading region worldwide in terms of innovation and experience in the power Transmission sector. Companies in this industry employ no less than 160,000 people. Consequently, EUROTRANS takes its task of representing these people and enterprises, in line with national needs, very seriously. The European platform for the Gears and Transmissions sector, has also developed an extensive and all-encompassing modular Gear Training Program. This program has been running since 2010 and is organized in three European countries: Belgium, Germany and the UK. Meanwhile 19 trainings were organized with over 300 participants. Provided by top gear trainers, the training covers every possible aspect in their domain - from geometry and design, through production, to quality control and failure analysis. As a member of the EUROTRANS, the MIB is currently working on adding Turkiye to the list of hosting countries for this high-level training sessions.

More information about the organization can be found at www.euro-trans.org.

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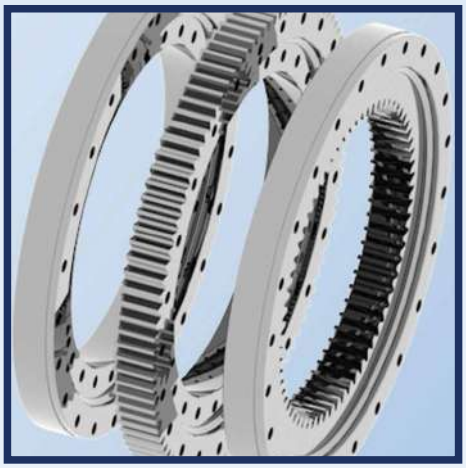


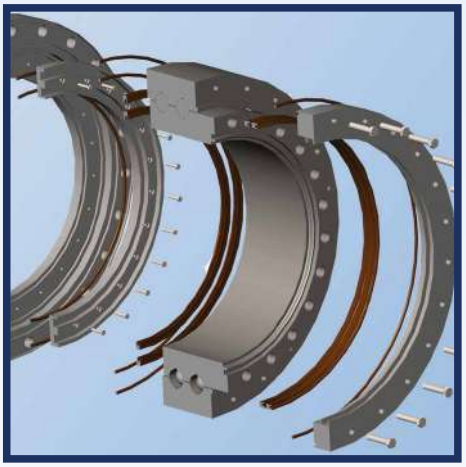
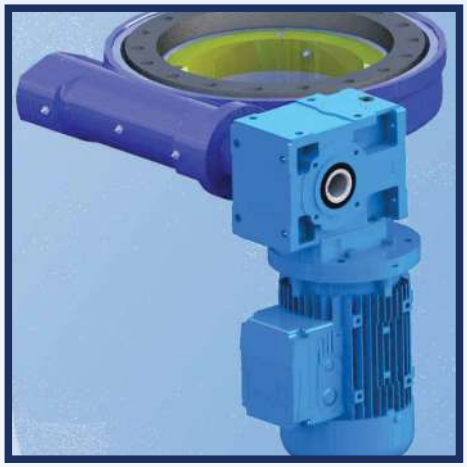

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In Memory of

Aram Markaroğlu

The Bearing Industry Mogul who built his 25 sqm shop into a 12,000 sqm company

Mr. Aram Markaroğlu, founder of Özevren Rulman, was born in Istanbul. He spent his entire childhood in Şişli district, which was very close to the heart of the bearing trade in Istanbul. Therefore, he naturally was familiar with the industry from his very early years. Actually, if you asked me to summarize him, I'd say he was "born into it" and grow up at the roots of the Turkish bearing industry.

He was involved in the trade first at "Karakoy Thursday Bazaar" (Karaköy Perşembe Pazarı) which many called a "Trade University" back then. Until his military service, Mr. Markaroğlu absorbed the notion of his artisanship which was shaped by the trade culture of "Karaköy Bazaar". After completion of his military service, he started to work as chief of the bearing segment at Viktor Bali, which was one of the fastest growing companies

Mr. Aram Markaroğlu,
Founder of Özevren Rulman

in the area at that time and decided to start his own business in 1982. He successfully founded his own company thanks to his entrepreneurial spirit and interpersonal skills. A decision that was taken after working ten years in the bearing industry.

His company Özevren Rulman, is today still actively serving the bearing industry for more than 40 years now.

TIMELINE *of Özveren Rulman*

Started its activities in Istanbul, Karaköy Misirlioglu Bazaar. (25m2)

1982

1985

Continues activities in Istanbul Karaköy Tunel location (35m2)

1991

First import of bearings from Far-East

1995

Moved to a new 600m2 building in Istanbul Karaköy Kemeralti area

1998-2001

Authorized distributorship of TR brand (1998), of CTK brand (1999), SBC brand (2001) and registration of MRS trademark

Opening of Izmir branch

2004

Opening of Ankara branch

Authorized distributorship of Bega Special Tools fro Turkiye

2006

Construction of Tuzla headquarters

Opening of Bursa branch.

2007

Autorized distributorship of Renold

Autorized distributorship of IKO

Opening of Tuzla headquarters

Distributorship of ZWA bearings

Distributorship of Toyopower

Schaeffler (FAG/INA) distributorship for the Turkihs market

Opening of Iskenderun branch.

Opening of Trakya branch.

Distributorship of ZKL bearings

2008

2009

2010

2011

2012

2014

2015-2017

NSK distributrship for the Turkish market

Distributorship of ZNL bearings

Opening of Konya branch.

Opening of Karabuk branch.

Distributorship of ZR

Opening of Esenyurt branch.

Sole exclusive distributorship of Sinoma

Özevren Rulman was founded as a 25sqm bearing shop. The company's first import experience was in 1991. Throughout the 90s, Özevren Rulman grew even more by introducing its own MRS bearing brand and signing a deal of distributorship with HCH, which was at the time, one of the biggest factories for deep groove ball bearings.

From 2000 on, Özevren Rulman started to grow even more rapidly, with the help of its wide marketing activities, experience and network all over the country, the company helped NSK brand to enter the Turkish market. In the 2010s, Özevren started to work with the Schaeffler group and gained a remarkable momentum with brands such as FAG / INA and became a market leader. From then on, Özevren Rulman was recognized as a front-runner in the Turkish bearing trade and became a well-known company with its large and ready-to-ship stock.

From 1982, the year the company was founded, until today, Mr. Aram's company has been growing and adding new local branches throughout Turkiye. The company has reached a 100+ large team, along with a fleet of over 40 vehicles, serving all the regions and 81 provinces within Turkiye.

The company is active at all the key segments of the Turkish manufacturing industry, on a 24/7 basis, with the motto: "Two Partners, One Aim".

Özevren's main strategy has always been supplying manufacturers and end-users directly. A strategy that resulted in setting up the branches at key and crucial industry locations with a high level of industrial activity.

The company has currently in total 9 branches with a cumulated storage capacity of 12.000 square meters. Which makes Özevren Rulman the regional leader in terms of local network, logistics and capacity. While bearings are at

> "I still remember the first meeting we had with Mr. Aram in our office. What was supposed to be an introduction meeting prolonged in a four hours friends chat and discussion. I will never forget our first pleasant conversations about the bearing market and on life matters in general. May he rest in peace!"
>
> *Mehmet Safaltın, General Manager at Schaeffler Turkiye*

> "A respectable father who is always considerate and trustful.
> I will always regard him as
> Papa since he cared for everyone."
>
> *Celine Fu, Export Manager at ZWA International*

> "Mr. Aram Markaroğlu, who was a big fan of the Fenerbahçe club, is one of the best examples and proof that it's really possible to reach the top from zero, with hard work and real efforts."
>
> *Gültekin Çevik, General Manager at NTN-SNR Turkiye*

"Working with Mr. Aram Markaroğlu; a veteran, whose name is associated with the bearing industry means for me:

- Winning tenders and projects together, shoulder on shoulder, after hours of tense work and bargaining.
- Phone calls which sometimes lasted for hours but always ended with a smile on the face.
- Listening to life lessons and experience stories.
- Competition on gentlemanly manner and chats with friendship. It was like when you expect a friendly match, you find yourself competing against a professional player with championship rings.

This is how I would like to express my memories in short, on how it was to work with Mr. Aram for the last seven years. May his place be the heaven."

Burak Günsür, Sales Manager at Schaeffler Turkiye

the center of its product portfolio, Özevren supplies also products related to engines, reductors, linear products, chains, belts and other power transmission products.

The main industries served are the iron & steel, chipboard, woodworking manufacturing, heavy industries, railway and mining facilities. In terms of OEMs, the company focusses on machine producers, engine and reductor producers, compressor, pump producers and agriculture machine producers.

Main brands in Özevren's portfolio are SCHAEFFLER (FAG/INA), NTN-SNR, IKO, ZWA, MRS, BEGA, MARSTON DOMSEL, ZIMAS, OMEGA, VOLT, SUPTEX, LIMON, SINOMA and many other.

"Mr. Aram Markaroğlu is an approachable, hospitable, helpful, respectable, and a gentleman of truth and justice. He will live in my heart forever."

Yupeng Guo, Export Manager at HCH International

Contribution to further downsizing of EV e-axles

Introduction

JTEKT Bearings (formerly Koyo Bearings) continues its relentless efforts to optimize its products for a multitude of applications inside demanding industries, including the design and manufacturing of drive trains for Electric Vehicles (EV's). Recently a new ultra compact bearing was developed for application in Automotive e-axles, contributing to improved power density of the e-drive system.

JTEKT Ultra Compact Bearings (JUVB's) for e-axle application

E-axles (that integrate the electric motor, inverter, reducer and differential into one unit) used for EV's must be as compact and light weighted as possible, to contribute to energy efficiency and increased driving range. Additionally this creates more space in the front of the car which can be used for other purposes (better car streamlining or increasing luggage space). To meet such targets JTEKT developed a ball bearing with reduced width (-30%) and weight (-26%) compared to conventional types (Fig. 1).

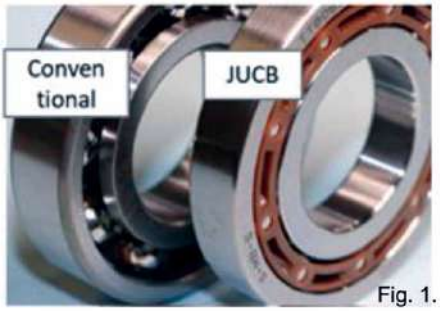


Fig. 1.

How did JTEKT realize such compactness

The main challenge was to redesign the resin cage in such a way that the critical properties (high speed resistance, high rigidity) would not be lost. In addition, the strength of the cage was ensured by establishing a unique mold design and molding method. The bearing performance such as strength and durability (load ratings) are the same as that of conventional products and the bearing width has been narrowed to the limit (Fig 2).

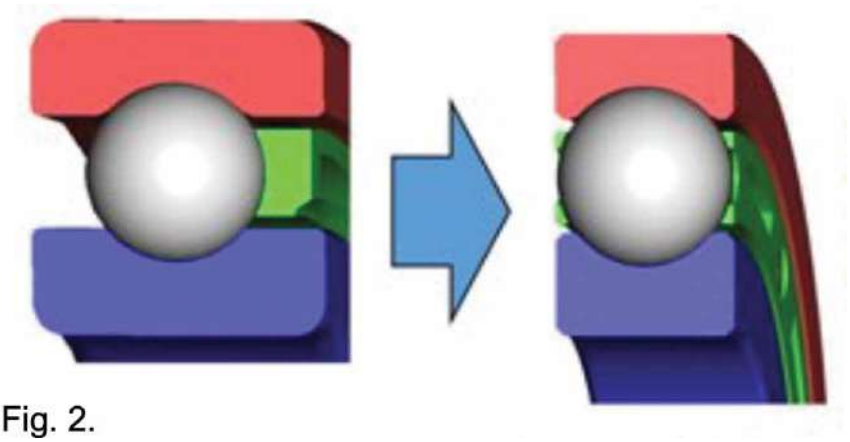
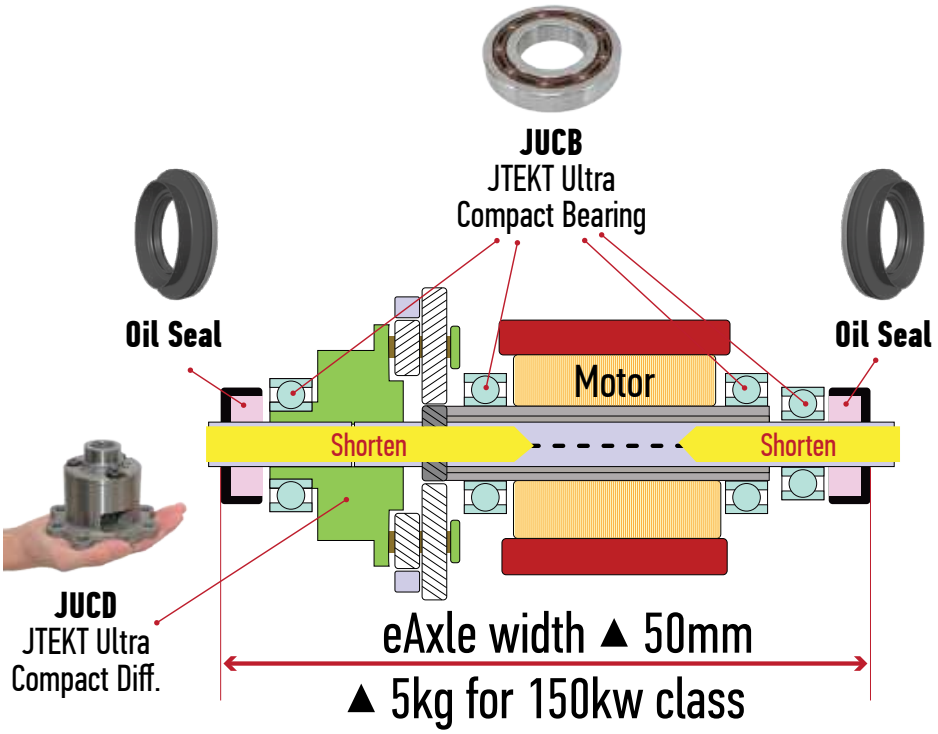


Fig. 2.

The effect on e-axles

In combination with other new JTEKT technologies, including an ultra-compact differential (JUCD) and a special seal, the weight of a so called coaxial type 150 KW e-axle, could be reduced by 5 kg, with a total unit length reduction of 50 mm. (Fig. 3).



Additional prospects

The JUCB is expected to be beneficial in other applications outside the Automotive industries as well, including construction & agricultural machines, robots and drones. Where required, we will meet the needs for miniaturization of all types of drive systems.

Global sustainability

JTEKT will continue to overcome business barriers and work together as a group to further strengthen technologies that contribute to electrification. We will contribute to the realization of a low-carbon society through activities that are "for the earth, for society, and for customers"

General notification

Koyo Bearings has been officially rebranded to **JTEKT Bearings** as of April 1, 2022. Please appreciate that this is only a change of brand. The company, its general structure, the products and services will remain the same. Our customers can rely on the continued good service and quality of our products in the future and our commitment to keep the same excellent business relationship with our valued partners, as in the past.

Please do not hesitate to contact us or your distributor in case you would like to have more information about our company, products and services.

More information can be found at www.koyo.eu.

SKF® Enters a New Era *with* **Rickard Gustafson**

Rickard Gustafson,
CEO and President at SKF

Rickard Gustafson,
CEO and President at SKF

Rickard Gustafson,
CEO and President at SKF

Bearing industry leader, SKF, recently welcomed Mr. Rickard Gustafson to the position of CEO and President. The BearingNews editorial team had the distinct pleasure of sitting down with Mr. Gustafson to candidly discuss his new role. In this exclusive interview, readers are provided a unique opportunity to hear directly from one of the industry's most prominent new leaders.

Mr. Gustafson brings a breadth of professional experience to SKF. Having held previous leadership roles within several well-known organizations, he is most notably recognized for his decade long tenure as CEO of SAS. Now, with a keen understanding of the bearing industry, Rickard Gustafson weighs in on current trends, objectives, and future insights, with particular attention dedicated to the utilization of technology, the importance of sustainability, and finally, the capacity to navigate today's rapidly evolving world.

Q: First of all, we would like to congratulate you on your new position at SKF. Can you tell us more about your background? Who is Rickard Gustafson?

It's my pleasure to be a part of this very iconic company, SKF, a company with such a global footprint. I have an engineering background, (a long time ago) I graduated in 1989 from the University of Technology in Linköping Sweden. I joined what is now known as Accenture for 7 years, back then it was Anderson Consulting. Following this role, I spent 10 years with GE and GE capital in various positions, and eventually I became the CEO of a property and casualty insurance business here in Scandinavia called Codan/Trygg Hansa where I spent 7 years running that company. I was recruited to lead the flag carrier here, Scandinavian Airlines, SAS, and I did that for 10 years. And since June 1st I'm here at SKF, so I'm delighted. It's a new industry for me and a new company.

things we are already doing. We have set very ambitious targets for ourselves. For scope 1 and 2, we will be net zero by 2030, and as of today, some of our facilities are already net zero. Such as the one here in Gothenburg for example. For Scope 3 are aiming for net zero by 2050 and the reason why we need a longer time is because we need to transform the steel industry so that we can source green steel and that is going to take a bit longer. So those are things that we do. But our products, they also serve our customers well in order to help them to transform their businesses towards a more sustainable future.

Because the whole idea of the bearing is to increase energy efficiency and reduce friction, it's a natural thing for us to support our customers. And we do that through innovation. I'm excited about the activities we have now for remanufacturing of bearings to create a circle, rather than a constantly re-buy and re-make. You can actually re-manufacture the bearings, I think that's exciting. I also think it's exciting

Q: What will be your strategy for a profitable growth and sustainable development for SKF in the coming years?

We have initiated a rather comprehensive strategic review process that is not yet completed. We aim to announce in the beginning of 2022. Basically, what we have done is that we are taking a very holistic view on our business, looking into the big mega transport, how they will impact our customers and thereby us longer term. We are scrutinizing our portfolio looking into the profitability and potential in all parts of our portfolio, and based on this, we will articulate a strategy going forward. Even though I can't go into many details, I think some key components that will be part of that. We do see some industry segments that are likely to grow very rapidly in the years to come. And of course, we want to be there. And most of them are linked in some shape or form to the ongoing transformation to a more sustainable future. Wind, rail, electric vehicles and so forth. So, we are going to play there.

> "For scope 1 and 2, we will be net zero by 2030, and as of today, some of our facilities are already net zero. For Scope 3 are aiming for net zero by 2050."

Q: You are remembered for your sustainability initiatives at SAS, which became the starting point for a new era in the entire aviation industry. May we expect a similar trend and change within the bearing and power transmission industries?

I do hope so, I think within any industry we all need to do everything we can to transform our businesses towards a more sustainable future, and I will be keen to do whatever I can to ensure that SKF is perceived as a leader within our industry and think there are number of

to see our leading technologies in some industries such as magnetic bearings, which will be vital for hydrogen conversion. Hydrogen will require a lot of compression, and magnetic bearings fit very well into high-speed rotation which will be required in compression. So, there are a number of things we do both internally and then of course to help our customers by using our products to become even more sustainable. So long answer to your question, but the short answer is yes, you should expect the same.

I think it's also going to be a lot about ensuring that we connect digitally, the entire supply chain. I think that is going to be key to come close to our customers and even closer to the customer needs, and we understand that. And the journey that we started a few years ago and the trends that we see that would, what we call **"region for region"**. You need to have a manufacturing footprint so that you're fairly close to your customers in different regions, and that will be part of our journey going forward. So again, I need to ask for your patience, you will get a more comprehensive

Rickard Gustafson,
CEO and President at SKF

story from us in early February next year, but we do see a number of exciting opportunities for SKF going forward.

Q: What are currently the biggest challenges for manufacturing industries?

Short term is obvious, the challenge we foresee related to logistics, related to cost inflation, we have experience in raw materials, now its energy costs that are going up. Costs for logistics are extremely challenging and now we are starting to see the cost for labor is increasing across different regions. So, those tactical things, and our ability to actually deliver to our customers, it's something that we are wrestling with every day, but hopefully those are short term issues. Longer term, there are a few key things that we need to get right, one that I mentioned is to transform the footprint, so we have the right footprint in each region. And it's not just to build the manufacturing capacity in the different regions, but we need to build very robust supply chains in all regions, so you can source your entire supply chain in a robust and effective way in those regions that you plan to operate. This is a massive work that will be undertaken in the years to come from most industrial companies to rebuild some of those capacities.

Europe that also supports other regions, so for us, our European challenge will be rather how do we automate, and how do we consolidate our capacity in Europe. In other regions, such as Asia or North America, we focus partly on consolidation, but it's more about building new capacity to replace some of the capacity that is being sourced from Europe to be sourced more locally. The journey will look bit different depending on your starting point.

Q: New technological innovations are creating, more than ever before, fully integrated systems, with various benefits such as production automation, energy saving, and machine learning. How do you see this trend evolving in the coming years? How will this shape the future of manufacturing?

I do see that this will significantly change a traditional manufacturing company. Today, when you walk into a facility that has been upgraded to the latest technology it's a completely automated environment, highly robotized, it's hard to distinguish a traditional blue-collar job from a white-collar job. They blur because those colleagues of ours that man those production lines, are primarily monitoring the whole digital flow and also making adjustments, digital adjustment to the equipment, rather than working at the machines themselves.

> "The buzz word digitization will become a reality"

Q: Do you foresee that the reshoring of manufacturing will speed up back in Europe, the US, or other regions?

Broadly across the board, but depending on your starting point, it might look a bit different. For us, we have a long history and a rather large footprint in

That's the starting point. Going forward, I think we are going to see much more sensors coming into this, we capture a lot of data, in the whole manufacturing footprint. How we leverage that data is going to be important for predictive maintenance, for quality enhancement, and so forth, that's going to be key.

Related to sustainability, traceability is going to be key over time. The end product needs to be marked so that you can fully understand and have an audit tract on the footprint (CO_2) of that component all the way from the steel that went into it how it was manufactured when it was manufactured, in what batch and so forth.

Again, that is going to be one thing. And that whole thing I mentioned about remanufacturing is going to be bigger, how we are going to integrate some of those loops. Again, when we have sensors out with our customers, we should be able to, in a much smarter way, provide predictive maintenance, so we can do the re-manufacturing when they have their planned stops in their own production lines for their maintenance, so we can avoid un-planned stops or breaks in our customers production environment.

So again, the buzz word digitization will become a reality, not just a buzz word. But truly how we use data, and integrate that through our value chains and in our production lines going forward will be important.

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Managing contamination risks in pharma settings

The importance of correct lubrication in pharmaceutical manufacturing

There's more pressure than ever on pharmaceutical companies to meet production demand. Consequently, the global pharmaceutical market size is expected to reach USD 2,067.36 million by 2028, growing at a compound annual growth rate (CAGR) of 5.7 per cent during the period from 2022 to 2028. Here Chris Johnson, managing director at **bearing lubrication** specialist SMB Bearings, explains the importance of careful lubricant selection to manage contamination risks and boost drug output.

Drug shortages pose a significant threat to public health. As the global population ages and access to drugs increases, pharmaceutical companies face growing pressure to meet the production demands needed to provide critical care to patients. While it may seem like the obvious solution is to simply ramp up production, the manufacturing realities are more complex.

According to an FDA report, product or facility concerns are the leading cause of pharmaceutical manufacturing disruption, being responsible for 66 per cent of all production disruptions. Due to these disruptions, producing more drugs would be challenging for facilities and could be an inefficient and wasteful approach to increasing output. The alternative lies with increasing the quality of each batch.

To address this growing challenge, manufacturers are turning toward more flexible factory operations to support the manufacture of a wide variety of specialised drugs. To achieve this, drug manufacturers should accelerate the adoption of digitalization and address infrastructure upgrades to bring transformation to the entire manufacturing process. This will increase the overall quality in any given batch, thus minimising shortages. Here are three key considerations for pharmaceutical plant managers to minimise contamination risks and increase output while maintaining compliance.

Pharmaceutical quality assurance

Pharmaceutical quality assurance is one of the most fundamental aspects of the whole drug manufacturing process. This regulation is designed to ensure medicines conform to industry standards and there are no contaminants present at any stage of development.

If environmental conditions are poorly

managed, this can lead to poor quality standards, regulatory violations and delayed drug approvals. This can also result in deteriorating equipment, which creates more variable product quality. In such instances, it's not simply a compliance issue, but can lead to additional financial and environmental costs, ultimately impairing productivity.

Managing contamination

Despite evolving manufacturing techniques, safety and the control of contaminants remains of the utmost importance. One such area that introduces potential contamination risk if not managed effectively, is the use of bearing lubrication in equipment.

Effective bearing lubricant selection in pharmaceutical settings starts by considering the application of the machine. Equipment used in the production of pharmaceuticals, such as tablet packaging machines or peeler centrifuges, generally use very little lubrication or no lubrication at all. This is because contact between active pharmaceutical ingredients and products such as lubricants cannot take place.

Food grade lubricants are used for the lubrication of machinery in the pharmaceutical industry and are purpose-designed to help minimise risks. Lubricants are classified by NSF into several food-grade categories H1 and H2. H1 lubricants are food-grade lubricants used in food-processing environments where there is the possibility of incidental food contact. However, for equipment that is not situated in the production zone and does not have any direct contact with production machinery, the product or packaging — H2 lubricants will suffice.

Cleanroom applications may demand the sterilisation of tools and machine components. If lubrication is needed in these environments, extreme low volatility (low outgassing) cleanroom lubricants must be used to avoid contamination of the environment. Typically, these lubricants will not contain lithium, molybdenum, calcium, aluminium, barium, zinc or sodium.

Another consideration is whether a bearing can be used without lubricant at all. Ceramic is non-porous and as a result, it

is practically frictionless. Unlike stainless steel bearings, full ceramic bearings do not suffer heat build-up within the bearing and therefore do not need lubrication to help dissipate the heat. Therefore, unlubricated full ceramic bearings do not run the risk of contaminating the product due to lubricant leakage.

Other contamination risks such as using the correct personal protective equipment, storage conditions and handling procedures should also be considered. A dedicated system to control and monitor environmental conditions, real-time energy monitoring and production correlation can be installed.

Real-time data

Human error is one of the biggest risk factors in quality control. By effectively digitalising their operations, plant managers can better adhere to regulatory requirements, promote data integrity and ensure traceability throughout the product lifecycle.

Introducing a digital dashboard showing real-time data from across the manufacturing plant makes data easily accessible to operators. Through simulation, data modelling and analytics software, plant managers can make data-backed decisions relating to individual machinery or entire production lines.

For example, by installing sensors on bearings used in pharmaceutical manufacturing, operators would be able to clearly see if a bearing needed to be regreased and could prevent equipment failure in the long run.

Data is also used to fact check and make informed decisions. Missing or inaccurate data can lead to non-conformance, which will ultimately result in delays and could even cease production. As plants consider revamping their physical infrastructures, simulation can allow businesses to conduct real time testing to gain insight without production disruption.

It's clear that the pharmaceutical facilities of the future will need to be agile and flexible to face the risks that can impact production capabilities. By choosing the correct bearing lubricant for the desired pharmaceutical operating environment, plant managers can dramatically reduce contamination risks in this area.

For more information about SMB Bearings product range or relubrication services visit www.smbbearings.com

The Superior Quality Bearing Manufacturer of China is Looking for New Distributors Worldwide

China's well-known and largest bearing manufacturing company ZWZ Group is expanding its global distributors network by announcing new distributors cooperation plan. The company is currently present in more than 100 countries and aims to increase this number in the coming period by appointing new distributors.

Steel | Cement | Mining | Engineering Machinery | Wind Mill | Railway

Contact export@zwz-bearing.com to become a ZWZ distributor

www.zwz-bearing.com

NSK bearings save costs *when maintaining ship loading conveyor*

When the need arose to replace the bearings supporting a bend pulley on a ship loading conveyor at an iron ore port in Australia, NSK designed a solution using spherical roller bearings that were not only made from its proprietary HTF tough steel, but also featured a detachable nitrile seal. The result was an extension in service life leading to significant savings in downtime costs.

Due to the operating environment, the mining and quarrying industry requires highly reliable equipment that can withstand harsh conditions. So when the bearings on a bend pulley serving a ship loading conveyor had only six months of operating life remaining, the iron ore port called upon the expertise of NSK to devise a better solution.

NSK's team of experts investigated the bearing failure, discovering that heavy iron ore particle ingress and water contamination in the failed bearing's lubricant had compromised the service life of the bend pulley. Any conveyor components exhibiting curtailed operating life will incur costs for maintenance hours and lost production.

To address the issue, NSK's engineering specialists set about designing a new solution based on the company's proven line of spherical roller bearings. In the first instance, NSK decided to manufacture the bearings from its unique HTF tough steel. Tough Steel is an effective countermeasure to the wear commonly found on the outer ring raceway, where the fixed load zone material is prone to wear when experiencing fine particle ingress.

NSK's long-life HTF series bearings utilise advanced material engineering and heat treatment technology, thus facilitating superior resistance to wear, seizure and elevated temperatures. The outcome is dramatically longer service life and reduced costs for maintenance and unplanned downtime. Indeed, HTF series bearings can offer as much as 10 times the service life in contaminated lubrication conditions, such as those experienced at the iron ore port facility.

Another key design feature of the NSK proposal was removable nitrile seal (HNBR) garter sprung seals, which compensate for seal wear to further extend operating life. The lip contact maintains pressure even under misalignment.

As well as the extension to service life – the NSK sealed spherical roller bearings achieved 12 months of trouble-free operation – the detachable seal provided the iron ore port facility with the ability to check radial internal clearances using feeler gauges during the fitting process.

In short, this notable design feature enables accurate management of the proper clearance as part of bearing assembly procedures. The concept centres on a seal mounted to a ring/holder that is fully detachable (via bolts), providing sufficient access for feeler gauges to perform clearance measurements.

Furthermore, this unique design offers complete interchangeability with existing solutions. At the iron ore port facility, a reduction in lost production downtime was the major contributor to cost savings totalling €77,376 per annum.

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Wind main bearing: **new single-row tapered roller bearing**

— Liebherr expands its portfolio with single-row tapered roller bearings as main bearings for wind turbines.

- Liebherr expands its portfolio with single-row tapered roller bearings as main bearings for wind turbines
- The induction-hardened and superfinished raceway surface increases the service life
- Liebherr is a development partner with many years of experience in the manufacturing of slip-free hardened main bearings for various on- and offshore turbines

Turning one into two: The new single-row tapered roller bearings for the main bearing arrangement in wind turbines expand Liebherr's product range. Two single-row tapered roller bearings find their use in yet another type of wind turbines. Mounted with some distance from each other on the shaft, the single-row tapered roller bearings have a lower moment effect. They are also significantly smaller in design. With these newly developed main bearings, Liebherr is specifically responding to the customer demand.

— Two single row tapered roller bearings find their application in another type of wind turbine.

Nussbaumen (Switzerland), September 13, 2022 –With the new type of main bearing for wind turbines a fresh wind is literally blowing in Liebherr's components product segment. For the first time, Liebherr develops and produces a main bearing arrangement, consisting of two single-row tapered roller bearings. Optimum rolling characteristics and ideal force distribution are ensured by the layout and design of the bearing. In addition, the precise rolling elements combined with the narrow manufacturing tolerances of the two single-row tapered roller bearings provide for an exact preloading in the installed condition. Liebherr ensures that the preload is determined during development by finite element calculations, as well as by the dimensional accuracy of the machines in production. The two single-row tapered roller bearings thus enable ideal load distribution.

High complexity in production: inductive hardening process and superfinishing

"Setting the filigree rings in the slip-free hardening process was a challenge," explains Stefan Milotzke, head of technical sales of the business unit slewing bearings at Liebherr in Biberach (Germany). "Our several years of experience enable us to make a perfectly coordinated adjustment of the four inductors. This is particularly important, because it enables us to meet the high requirements put on the hardening depth and surface hardness," says Milotzke. Superfinishing further refines the raceway surface: In this process, the surface of the raceway is processed in such a way, that wear, friction and lubrication are optimised. This ensures extremely high surface quality and a longer component service life.

About Liebherr-Components AG

In this segment, the Liebherr Group specialises in the development, design, manufacturing of high-performance components in the field of mechanical, hydraulic and electric drive and control technology. Liebherr-Component Technologies AG, based in Bulle (Switzerland), coordinates all activities in the Components product segment. The extensive product range includes combustion engines, injection systems, engine control units, axial piston pumps and motors, hydraulic cylinders, slewing bearings, gearboxes and winches, switchgear, electronic and power electronics components, and software. The high-quality components are used in cranes and earthmoving machinery, in the mining industry, maritime applications, wind turbines, automotive engineering or in aviation and transport technology. Synergy effects in s other product segments of the Liebherr Group are used to drive continuous technological development.

About the Liebherr Group

The Liebherr Group is a family-run technology company with a highly diversified product portfolio. The company is one of the largest construction equipment manufacturers in the world. It also provides high-quality and user-oriented products and services in a wide range of other areas. The Liebherr Group includes over 140 companies across all continents. In 2021, it employed more than 49,000 staff and achieved combined revenues of over 11.6 billion euros. Liebherr was founded in Kirchdorf an der Iller in Southern Germany in 1949. Since then, the employees have been pursuing the goal of achieving continuous technological innovation, and bringing industry-leading solutions to its customers.

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Green Manufacturing & Manufacturing Green the Path of CITIC Pacific Special Steel's Sustainability Development

Upon arrival to the main steel mill campus of CITIC Steel, visitors are immediately impressed by how clean the environmental is when they see red crowned cranes, a level-1 national protected bird, and black and white swans living and raising families. Such birds can only live with very good air and clean water. CITIC Pacific Special Steel Group (CITIC Steel) is a global player in the high-end special steel market. On their journey to become the most competitive special steel group in the world, they always adhere to the strategy of low-carbon sustainable development and are committed to taking required actions and approaches towards long term Carbon Neutral. Such actions and approaches can be summarized as *"Green Manufacturing and Manufacturing Green"*, as the company puts it.

Green Manufacturing

For many years, CITIC Steel has been implementing technologies and lean manufacturing to conserve energy and reduce emissions in all their internal processes, from coking, sintering, ironmaking, to steelmaking, rolling and further processing. Started in 2021, under a program named “Digital & Intelligence Manufacturing”, 500 million RMB is budgeted annually to further improve green manufacturing. Such investment covers technologies for extreme electric furnace and extreme combustion that can realize extreme energy efficiency. CITIC Steel is also conducting research on new and disruptive CCUS technologies and plan to use them for carbon dioxide recycling in operations. Another technology the company has been committing itself to research and apply is using hydrogen in their existing smart blast furnace, re-heating furnace, and air shaft furnace for DRI. In the heat treatment process, green electricity is also expected to be used to replace natural gas as a heat source to realize zero emission of CO_2. On the other side, CITIC Steel has recognized that achieving carbon neutral requires close operations and synergies at all levels of the society. They have put great emphasize on strengthening cooperation with all value chain partners including suppliers, customers, local organizations, and government. Such cooperation includes using electricity, hydrogen, raw and auxiliary materials that are green, working with customers to approve new steel making processes that have smaller carbon footprint, and providing steel with high precision near-final-shape that requires less machining.

Manufacturing Green

Besides making sure its own operation is on the right track to be green, CITIC Steel also produces excellent cost-efficient products to support the green industries (wind, solar, hydro, EV, etc..) and help customers and the society to become green – manufacturing green.

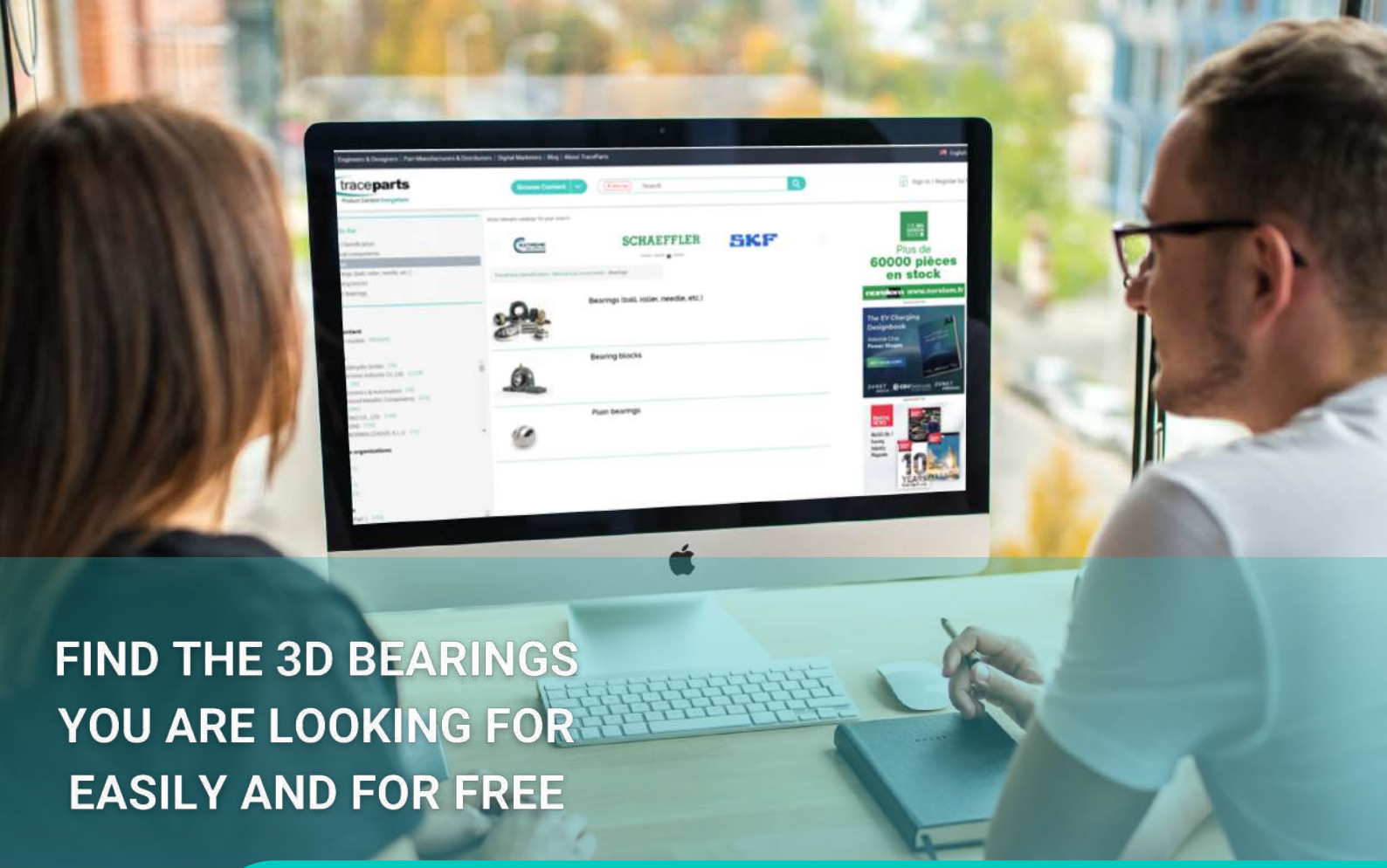
In China market, CITIC Steel opened the door to innovative development of "Low-carbon Con-casting Bearing Steel" since May 1998, when the first production line “DC EAF - Refining - Vacuum Degassing - Con-casting - Tandem Rolling” was put into production locally. With the implementation of this line, the production lead time of bearing steel had been shortened from one month to eight hours and the yield ratio had been increased

from 80% to 94%. Nowadays, our CC-routed bearing steels are widely used in the market at home and aboard. Its characteristics of super high cleanliness, long fatigue life, high strength and lightweight, are enabling global customers to optimize their production efficiency and energy consumption.
In addition to the high-quality CC-routed bearing stee bars, we are also the pioneer of Con-casting large size round blooms, widely used for high end wind-power related bearing applications. CITIC Steel initiated the hot commissioning of the largest round bloom con-caster in Oct. 2021 and casted successfully the first batch of Ø1200mm bloom on Dec. 13, 2021. It means CITIC Steel set another worldwide record ever since its last breakthrough of Ø1000mm achieved in 2011. The newly launched super-large con-casting machinery is co-designed by Jiangyin Xing Cheng Special Steel (a subsidiary of CITIC Pacific Special Steel Group) and SMS Concast. It's innovative to apply con-casting large-size bloom for wind-power bearings by replacing die-casting ingot, driven by cost reduction and quality improvement. The successful application breaks people's conventional thinking and proves the limits of bloom size and quality control in con-casting large section blooms can be broken through. With the development of wind-mill generator towards larger-size and offshore, there is no doubt that CITIC Steel's super large C-C blooms will contribute further to the sustainable development of clean energy industry.
Above are just some examples of manufacturing green by CITIC Steel. The company welcomes industry peers and special steel users to contact them directly to learn more of their successful cases and discuss potential collaborations to jointly drive a green future for the industry and society.

Conclusion

CITIC Steel aims to achieve carbon peak in 2030 and carbon neutral by 2060. The company is very confident about achieving these goals. It is their firm believe that improving on green is just like improving on quality, it requires long-term effort, sustained focus, and disciplined execution, all of which are what CITIC team is good at. After witnessed CITIC Steel's amazing growth to become one of the world's largest special steel producers, the world will witness another big achievement by the company – most competitive producers of green steel.

For further information on CITIC Steel's green initiatives and successful value chain collaboration cases, please contact Tracy Wang at tracy.wang@citicsteel.com or Leo Luo at luokun@citicsteel.com



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Key technology control of bearing materials and Heat treatment processing for new energy passenger car transmissions

by Mr. Wang Mingzhou - Zhejiang XCC Group Co.

The new energy passenger car transmission bearings include tapered roller bearings, cylindrical roller bearings, deep groove ball bearings, angular contact bearings and four point contact bearings, as shown in Figure 1.

— Figure 1 Transmission bearings for new energy passenger cars

New energy vehicle bearings working characteristics are high speed, high load, low friction, low noise and long life, in order to adapt to the new energy vehicle bearings working characteristics, the corresponding bearing materials, heat treatment processing characteristics are shown in Table 1.

In order to improve the bearing life of new energy vehicle gearboxes, in addition to using computer simulation software to simulate the design of the bearing structure, the bearing raceways are optimized for low friction design and microscopic shaping to reduce early failure due to stress concentration. In addition to simulating the internal stress graph of the bearing, calculating the maximum contact stress, friction torque and technical parameters such as stiffness, efficiency and preload, it is necessary to control the key factors that determine the life of the bearing such as materials and heat treatment processing technology.

New energy vehicle performance	Corresponding bearing performance	Corresponding bearing materials, thermal processing properties		
		Materials	Forging	Heat treatment
Fast response time	High speed	High tensile strength High yield strength High fatigue strength High wear resistance	No overheating No overburning No forging cracks No carbide reticulation The streamline distribution is reasonable Control of shape and properties	High surface hardness High surface wear resistance High and stable residual austenite on the surface Less working face, no troostite Low surface and no heat treatment defects Homogeneous and fine structure
Powerful and increased output torque	Increased contact stress, load on bearings			
Maintenance free	Long life, 500,000 km or more			
Long range	low friction, light weight			
Comfort	low noise levels			

—Table 1: Correspondence table between bearing characteristics and bearing materials and thermal processing characteristics for new energy vehicles

Material quality control

The new energy vehicle transmission bearings are small to medium sized bearings, using bar stock generally less than 80 mm in diameter. As can be seen from Table 1, as the bearing performance increases, higher material properties are required, and therefore higher demands are placed on the metallurgical quality of the material (Table 2).

The bearings commonly used materials named GCr15 in China, according to the metallurgical quality is divided into high-quality bearing steel, high-grade quality bearing steel, extra high quality bearing steel, super clean bearing steel, see Table 3.

For high carbon rolling bearing steel bars, the three key technical indicators are as following:

1. Oxygen, titanium content and trace element content.
2. Inclusion levels.
3. Carbide homogeneity levels include reticulation, banding and liquid precipitation levels.

High-carbon chromium GCr15 bearing steel, according to GB/T 18254-2016 and GB/T 38885-2020 standards, with different metallurgical qualities, different oxygen and titanium contents and trace elements, see Table 4, inclusions level, carbide uniformity see Table 5 and Table 6.

As can be seen from the above table, the metallurgical quality is different and the key material indicators are very different. When designing products, different levels of bearing materials need to be selected according to the bearing working conditions. New energy vehicle bearings should choose extra high quality bearing steel or super high clean bearing steel.

High standard bearing steel requires ultrasonic and eddy current or leakage magnetic flaw detection of steel rods to remove cracks in the heart and surface of the rods as required to improve the reliability of the bearings.

Material failure mode analysis, due to material causes bearing failure mode is shown in Table 7.

Bearing performance requirements	Material properties	Material metallurgical quality requirements	Key control items
High speed, high load bearing, long life, light weight, precision	High tensile strength High yield strength High fatigue strength High wear resistance	Extremely high purity	Oxygen, titanium and trace elements
		Homogeneous organization	Banding, reticulation
		Fine grain size	Inclusions, carbide particles
		Consistent quality	Process stability

— *Table 2: Metallurgical quality requirements for materials*

Metallurgical quality classification	Standard
High-quality steel	GB/T 18254-2016
High-grade Quality Steel	
Extra high quality steel	
Clean high carbon chromium bearing steel	GB/T 38885-2020

— *Table 3: Bearing steel metallurgical quality classification*

Metallurgical Quality	Chemical composition /Wt% Not more than												
	Ni	Cu	P	S	Ca	O	Ti	Al	As	As+SN+Sb	Pb	H	Mo
High-quality steel	0.25	0.25	0.025	0.020	-	0.0012	0.0050	0.050	0.04	0.075	0.002	-	0.01
High-grade Quality Steel	0.25	0.25	0.020	0.020	0.0010	0.0009	0.0030	0.050	0.04	0.075	0.002	-	0.01
Extra high quality steel	0.25	0.25	0.015	0.015	0.0010	0.0006	0.0015	0.050	0.04	0.075	0.002	-	0.01
Super Clean Steel	0.25	0.25	0.015	0.006	0.0005	0.0005	0.0010	0.050	0.04	0.03 0.005	0.002	-	0.01

— *Table 4: Oxygen and titanium content and trace elements at different metallurgical qualities*

Metallurgical Quality	A		B		C		D		DS
	Department of fine	Department of coarse	Department of fine	Department of coarse	Department of fine	Department of coarse	Department of fine	Department of coarse	
	Conformity grade/level, no greater than								
High-quality steel	2.5	1.5	2.0	1.0	0.5	0.5	1.0	1.0	2.0 (38μm)
High-grade Quality Steel	2.5	1.5	2.0	1.0	0	0	1.0	0.5	1.5 (27μm)
Extra high quality steel	2.0	1.5	1.5	0.5	0	0	1.0	0.5	1.0 (19μm)
Super Clean Steel	1.5	1.0	1.0	0.5	0	0	1.0	0.5	0.5 (13μm)

— *Table 5: Inclusion levels of different metallurgical qualities*

Metallurgical Quality	Nominal diameter /mm	Reticulation		Banding		Liquid precipitation	
		Magnification	Grade	Magnification	Grade	Magnification	Grade
High-quality steel, high-grade Quality Steel	≤60	200	≤ Appendix A Level 7th diagram	100	3.0	100	2.0
	< 60-80			500	3.0		2.5
Extra high quality steel	≤60		≤ Appendix A Level 7th diagram	100	2.5		1.5
	< 60-80			500	2.5		2.0
Super Clean Steel	≤30	200	≤ Appendix A Level 7th diagram	100	2.0		0
				500	1.0		
	< 30-60			100	2.5		0
				500	1.5		
	< 60-80			100	3.0		0.5
				500	2.0		

— *Table 6: Homogeneity of carbides of different metallurgical qualities* ***Note:*** *Magnification 100 times to assess the width of the banded carbide and 500 times to assess the density of the banded carbide.*

Heat treatment processing quality control

Heat treatment processing of new energy vehicle bearings includes two processes: bearing forging and heat treatment.

(1) Quality control of new energy vehicle bearing forging

The three main quality problems of forging are overheating, over burning, folding, cracking and mixing.

The forging of new energy vehicle gearbox bearings mostly adopts medium frequency induction heating method, in order to avoid overheating and over-burning phenomenon, the standard configuration of medium frequency induction heating equipment: heating over-temperature alarm; three-way automatic sorting; medium frequency cooling water temperature, water pressure alarm; temperature to achieve closed-loop control; temperature measurement using infrared high temperature measuring instrument. Folding and cracking involve more factors; folding is often caused by burr press-in, cracking is related to process temperature control; mixing includes material mixing, furnace batch number mixing and model mixing, which is related to process management. The quality problems caused by forging are shown in Table 8.

Advanced processes for forging new energy vehicles

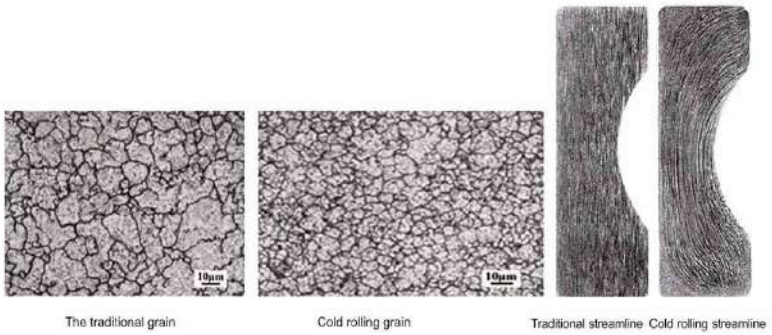
Near net forming technology is a combination of forging and cold rolling technology for the production of high-end metal ring parts, is an advanced blank manufacturing technology, rolling expansion at room temperature, not only high dimensional accuracy, saving raw materials, material saving rate can reach 15% ~ 30%, and the product quality intrinsic quality, raceway streamline distribution is reasonable, grain refinement as shown in Figure 2, bearing fatigue life increase in Table 9, the world's leading bearing manufacturers have adopted this technology, while cold rolling technology has also been the focus of domestic bearing enterprises.

Failure mode	Lead to consequences	Prevention measures
Excess of inclusion	Bearing fatigue failure	Control oxygen and titanium content; Vacuum degassing; Quality of smelting raw material
Net carbide exceeds the standard	Bearing impact performance decreases and brittleness increases, resulting in intergranular cracking; Reduce wear resistance; Early fatigue flaking	During rolling, controlled rolling and cooling process was adopted to inhibit the precipitation of reticular carbide
Ribbon carbides exceed the standard	Chemical composition segregation, resulting in uneven distribution of carbides in bearings; Quenched structure exceeds the standard, the hardness is uneven, so that the mechanical properties are not consistent; Increase the overheating sensitivity, increase the risk of quenching crack; Increase the deformation of ring during heat treatment; Strip carbides are easy to peel off and reduce the fatigue life of bearings	Control the undercooling degree and the fluctuation of liquid steel during pouring; High temperature diffusion annealing; Control rolling ratio;
Liquid evolution carbides exceed the standard	Heat treatment is prone to crack; In the process of use, the surface liquid evolution carbides are easy to peel off, which significantly reduces the wear resistance of the bearing. Liquidated carbides are prone to fatigue failure	Improve the crystallization cooling process of molten steel; the high temperature diffusion annealing temperature and heating and holding time should be increased appropriately

— Table 7: Material failure modes

Forging quality problems	The reasons causing	Preventive measures
Overheating, overheating	Mechanical wear causes stalling	Periodic maintenance, temperature alarm configuration, three way sorting.
	The transmission mode is unreliable	Clamp-roll transmission, temperature alarm configuration, three way sorting.
	The reworked products have different shapes, and the intermediate frequency heating temperature is difficult to control	Electric furnace heating rework
	The hot shear temperature is high, the gap between sleeve and cutter plate is too large; The cutting tool plate is worn	Temperature shear technology is adopted to manage
Burrs produce folds	Horseshoe shape of header cake	Upgrading of work skills or introduction of robotic work
	Wear of punching dies and punches; excessive clearance creates burrs	Improve die life; Manage the mold life
	High temperature shear weight error is large	Adopt warm shearing process to improve the cutting precision
	Blank width or parallel difference is too large	Upsetting mold life management; ensure vertical placement of the stock section
	Eccentricity leads to burrs	Adjust the mold center
	Low rolling temperature	Monitor forming temperature and adjust cooling water flow
	Rolling operation is too fast	Using manipulator, numerical control rolling machine, reduce human error
The crack	Forming temperature is too low or too hot	Control heating and forming temperature
Wet crack	The cooling water flow is too large, the cooling temperature exceeds the phase transformation temperature to form bainite or martensite	Control cooling water flow
	Falling products crack when they hit water	Dropped products are scrapped
Mesh overweight	High stop forging temperature and slow cooling	When the stop forging temperature exceeds 800°C, air or fog cooling is adopted, and heap cooling below 700°C is adopted
Mixing	Mixing of dissimilar materials	Bar stacking area is divided, marked clearly, spark inspection
	Material furnace No. Mix	Mixing by size and furnace number, first in, first out
	Type mixing	Clearance around equipment; control of charge height; checking of charge frames

— Table 8: Analysis of the causes of forging quality problems



— Picture 2: Cold rolling grain size and metal flow lines

Performance	High speed forging + cold rolling	Hot rolled and expanded	Bar material is processed directly by car
Grain size after heat treatment /um	10.5	9.5	8-8.5
Fatigue life /h	2125	1578	635
Metal flow line	With dense layer, flow lines, continuous	Form streamline, but not obvious	No streamline is formed

—Table 9: Effect of high speed forging + cold rolling on product properties

(2) Control technology of shape and properties.

Automation of forging to reduce human error and ensure consistency and stability of forging quality.

High-speed forging including automatic heating, automatic shearing, automatic transfer by robot, automatic forming, automatic punching and separation, realizing fast forging at speeds of up to 120 times/minute, suitable for forging of small and medium-sized bearings and automotive parts in large quantities.

Multi-station stepper beam: using hot-die forging equipment, in the same machine to complete the cake pressing, forming, separation, punching and other processes, between the process transfer using stepper beam, suitable for medium-sized bearing forging, production rate 10 ~ 15 times / min.

Robot instead of human: according to the forging process, multiple presses are connected and the product transfer between presses is carried out by robot, suitable for medium and large bearing or gear blank forging, with a production rate: 4-8 times/min.

Manipulator instead of man: the transformation of the existing forging line, using simple manipulators instead of man, simple operation, low investment, suitable for small enterprises automation transformation.

Applied undergraduate colleges and universities are not research-based colleges and universities, but focus on the word "application", which requires them to cultivate applied talents with high social adaptability and social competitiveness. The development of science and technology and the ever-changing needs of society require teachers to be able to update their knowledge base in their field of expertise and to have a certain level of applied research skills. Applied research skills are generally developed after teachers have joined the profession. Some younger teachers with less teaching experience have significantly less applied research skills. The survey shows that most young teachers write research and teaching research papers for the purpose of evaluating their titles, and some young teachers do not fully recognize the importance of applied research and teaching research, so it is difficult to improve their applied research skills.

(3) Controlled forging and controlled cooling technology.

Double "refinement": precise temperature control to prevent overheating and over burning of the forging; refinement of the grain. Control the cooling rate after forging to prevent webbing (Figure 3), refine the organization and improve the fatigue life of the bearing.

— Fig. 3: Bearing steel after controlled forging and cooling, without reticulated carbides

(4) Protected atmosphere, waste heat utilization technology.

The work-blank size of the near net forming process is precise and the amount of processing is small. After high-speed forging, forgings must be spheroidized and annealed in a protective atmosphere to reduce the depleted carbon layer, high-speed forging forgings, the product depleted carbon in a protective atmosphere see Figure 4, Figure 5.

— Fig. 4: Surface depletion of carbon layer on high-speed forgings

— Fig. 5: Depleted carbon layer under protective atmosphere

(5) Spheroidal annealing waste heat utilization technology.

Bearing steel 650 °C spheroid annealing is completed, from 650 °C cooling to 200 °C out of the furnace, the process curve, see Figure 6, usually this part of the heat is wasted, this part of the released heat will be used to heat just into the chamber of the room temperature cold material, so as to achieve energy saving purposes (Figure 7), energy consumption reached 150 ~ 160kW-h / t, than the traditional annealing energy saving up to 40% or more.

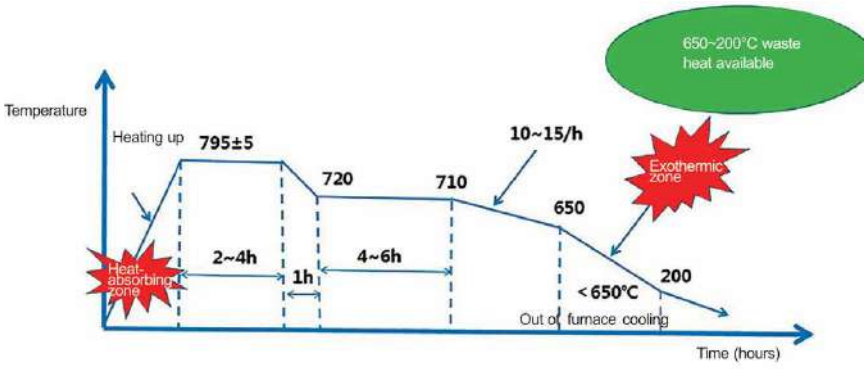
Advanced heat treatment process for new energy vehicle bearings

According to the new energy vehicle working conditions, the gearbox bearing needs to work under high speed, high load bearing, long life, low friction and low noise, at the same time the working environment of the bearing is relatively harsh, the bearing in the process of operation, there are a lot of metal debris in the gearbox, will form indentation in the bearing working surface, causing stress concentration and become a fatigue source. Therefore, the requirement of heat treatment after the product to get high hardness, high wear resistance, high toughness with the unique performance, especially the working surface. The hardness and toughness is a contradiction, high hardness is often accompanied by high brittleness, bearing design hope bearing working surface has a layer of hard, wear-resistant organization, improve the threshold value of crack sprouting, but also have high toughness, improve the crack expansion work, to prevent crack expansion.

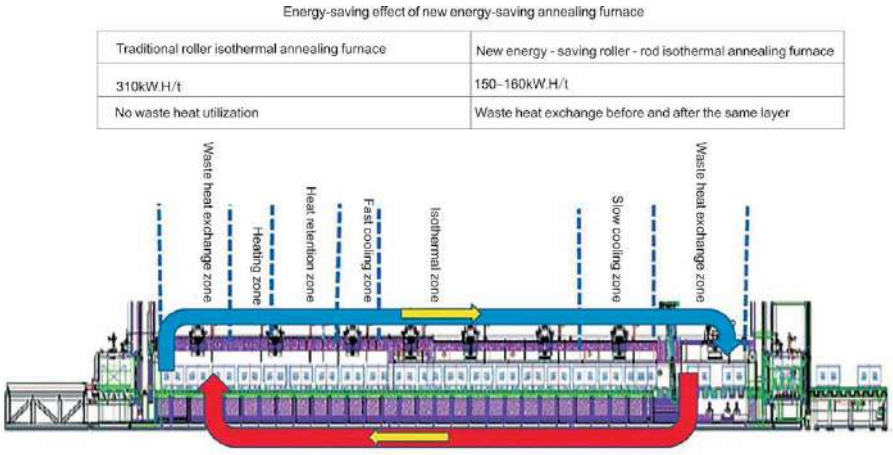
Austenite is face-centered cubic structure, low hardness, high toughness, is the ideal organization to prevent the expansion of cracks, which can improve the fatigue life of the bearing, so in the surface to obtain high hardness, high wear resistance at the same time, hope to get high residual austenite organization, but the surface residual austenite content and will affect the surface hardness, and austenite is unstable phase, bearing work in the external force, a certain temperature, residual Austenite will decompose and transform into martensite. Because the transformation of martensite is not tempered, so there will be a risk of micro-cracking, while the transformation of residual

austenite will cause changes in bearing dimensions, eventually leading to bearing failure, so too high residual austenite is also unfavorable, for this reason GB/T 34891-2016 standard stipulates that conventional tempering residual austenite is not more than 15%. But 15% residual austenite is not enough to improve the fatigue life of new energy gearbox bearings, the surface needs to get more than 20% residual austenite, in order to play a beneficial role in residual austenite, the requirements of residual austenite must be stable, and cannot affect the hardness, still need to ensure high wear resistance, which requires a special heat treatment process for the bearing surface - - Composite heat treatment surface modification technology.

1. *Bearing surface modification technology: in order to obtain long life, high reliability, maintenance-free high-performance bearings, in line with the working conditions of new energy transmission bearings, the need for full hardenability of high-carbon chromium bearing steel bearing ring surface for special heat treatment, that is, high-carbon chromium bearing steel carbon nitriding compound heat treatment.*
2. *The influence of nitrogen on the expansion of the infiltration layer: carbon and nitrogen seepage, solid solution in austenite nitrogen will significantly reduce the Ac 1 temperature, (austenitic phase began to form), and make the co-precipitation point downward movement, expand the austenite area range, carbon, nitrogen into the matrix, both in the austenite solubility of each other, can be obtained in the bearing infiltration layer nitrogen-rich martensite, and the formation of nitride, carbon and nitrogen compounds new phase, greatly increasing wear resistance,. At the same time residual austenite increased significantly, due to the dissolution of nitrogen into the residual austenite stability also increased significantly.*
3. *The effect of carbon and nitrogen seeping layer on bearing performance: (1) improve the hardening of the common seeping layer, obtain nitrogen-rich (carbon) martensite, with better wear resistance; (2) surface seeping layer to obtain a very high content of nitrogen-containing residual austenite, improve the ability to resist crack eruption and expansion, improve fatigue life; (3) nitrogen containing residual austenite improves stability; (4) obtain new phase organization, nitride, carbon and nitrogen compounds, further improve wear resistance; (5) Obtain a very high residual compressive stress, which can obtain a stable residual stress at higher temperatures.*
4. *Main control technical indicators for high-carbon bearing steel carbonitriding: (1) depth of co-diffusion layer; (2) surface hardness, matrix hardness; (3) surface defects of the seep layer, voids, grain boundary oxidation, depleted carbon, flexural network; (4) surface free ferrite; (5) depth of carbide-free layer on the surface; (6) uniformity of the co-diffusion layer; (7) nitrogen content and carbon content of the seep layer; (8) size and shape of the carbide/carbon/nitrogen compound in the co-diffusion layer; (9) flexural level of the co-diffusion layer and core matrix; (10) martensite level of the co-diffusion layer and core matrix; (11) residual austenite content of the co-diffusion layer and core matrix. Levels; residual austenite content of the coextruded layer and the core matrix.*



— Figure 6: Typical isothermal spheroidal annealing process curve for high-carbon chromium bearing steel



— Figure 7: Principle of isothermal spheroidal annealing of high-carbon chromium bearing steel using waste heat

Conclusion

High-carbon chromium rolling bearing steel bearing rings for surface carbonitriding compound heat treatment is an advanced heat treatment technology for bearings working under harsh working conditions, and also for bearings working under the trend of energy saving and miniaturization, which can significantly improve the fatigue life of bearings.

Author: by Mr. Wang Mingzhou - Zhejiang XCC Group Co., article from Forging & Stamping, No. 15, 2022

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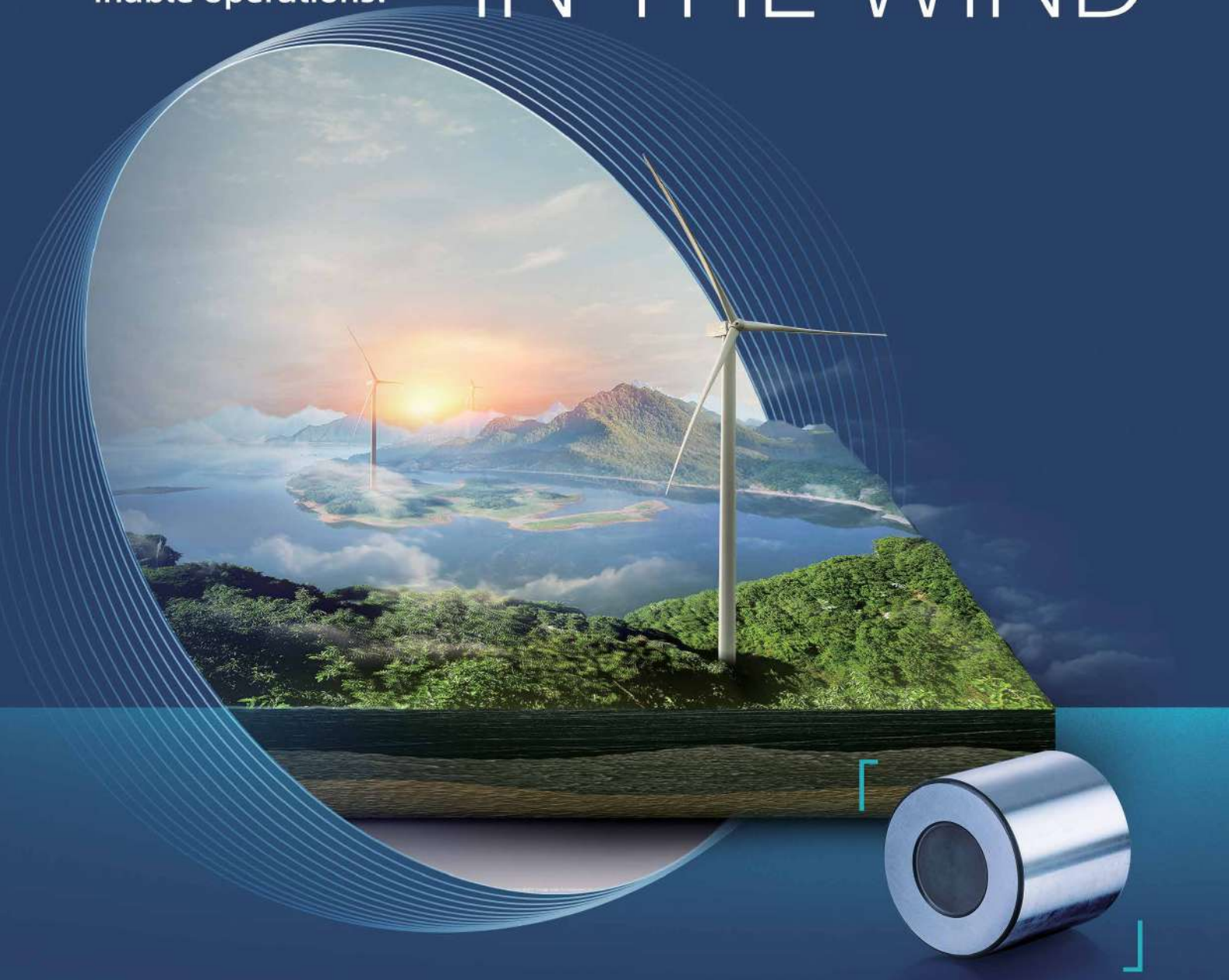

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ZHEJIANG XCC GROUP CO.,LTD

The Art of Monitoring
Low-Speed Bearings

Low-speed machinery is classified as machines with operating speeds less than 600 rpm. These are known to be the most critical items in the production line and are generally large with high rotating inertias. In the past, there was little interest in condition monitoring of these machines as they have less tendency to break down. However, if a failure does occur, the downtime and replacement costs can be huge, which can lead to massive production loss.

The moving components of these machines that require condition monitoring are mainly bearings and gears. In this article, we'll discuss the new and advanced tools to facilitate condition monitoring of low-speed machinery, with the main focus on rolling element bearing condition monitoring.

Challenges of Low-Speed Bearing Monitoring

For high-speed bearings, different technologies are commonly a part of a PdM program: vibration, thermography, and wear debris analysis. Low-speed bearing monitoring is a different story. These common technologies are ineffective until it is too late regarding speeds less than 250 rpm. In slow-speed applications, early bearing failure remains a notorious problem – unless ultrasound is used.

Why Ultrasound?

Slow speed bearing monitoring with ultrasound isn't as difficult as you might think. Because most high-end ultrasound instruments have a wide sensitivity range and frequency tuning, you can listen to the acoustic quality of the bearing, especially at slower speeds.

In extreme slow-speed bearing applications (usually less than 25rpm), the bearing will produce little to no ultrasonic noise. In that case, it is important to not only listen to the sound of the bearing but more importantly to analyse the recorded ultrasound sound file in a spectrum analysis software, focusing on the time waveform to see if there are any anomalies present. If "crackling" or "popping" sounds are present, then there is some indication of a deformity occurring. In bearing speeds above 25rpm, it is possible to set a baseline decibel level and trend the associated decibel level readings over time.

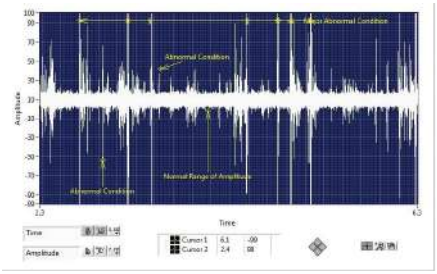
How Does It Work?

The primary function of an ultrasound device is to turn high frequency into audible

sound. This is called heterodyning. An operator who knows the basics of bearing friction can distinguish a healthy bearing, producing a quiet steady signal from a defective bearing, causing an intermittent or specific repetitive ringing or crackling sound. However, listening is not enough. Reliable measurements are required to

build a solid PdM program. Otherwise, your instrument is no more than a stethoscope.

The UE Systems Ultraprobe 15000, for example, allows you to listen to sound quality and compare baseline information before it saves the recording to be uploaded to DMS software. From there, you can set alarm levels and analyze data to determine a bearing's condition.



Bottom Line

For slow-speed bearings, it's crucial to rely on sound quality and pattern. To facilitate data analysis, it's recommended to use an ultrasonic instrument with sound recording capabilities, like the Ultraprobe 15000 or the OnTrak SmartLube system, which can manage the life of your bearings and significantly reduce the number of bearing failures caused by improper lubrication. After the sound has been recorded, it is then analysed on sound spectrum analysis software. Then, maintenance professionals can record the sound produced by a slow-speed bearing, load the file in the software, and analyze it. This software provides valuable insights into when a bearing needs to be lubricated or replaced if failure is imminent.

Check-out the video on: Using Ultrasound to Inspect and Monitor Slow Speed Bearings www.youtube.com/watch?v=TAW1UhxosH8

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— ***Example of heating:*** *Dismounting a bushing from a pump used in the dredging industry. After 3.26 minutes the bushing had reached a temperature of 143.5°C and could be pushed off the shaft.*

New portable multi-purpose induction heater from Bega Special Tools

Bega Special Tools introduces the MF Quick-Heater 3.0 – 3.5 kW, a new, portable, multi-purpose induction heater with maximum power output of 3.5 kW. This brand-new model is part of the MF Quick-Heater 3.0 series, used for industrial heating of all kinds of ferromagnetic parts. The heater can be deployed for mounting, dismounting and preheating purposes. Weighing only 7.85 kg and with dimensions that allow it to fit in a small carrying case, this powerful tool offers solutions for difficult circumstances where other systems are impossible to use.

Induction heating is a highly efficient and eco-friendly method for industrial heating applications. Examples of applications are bearings, sleeves, gears, inner rings etc. The generator is combined with a flexible inductor which can be wrapped in or around a workpiece. It heats parts very fast or under precise control, depending on the application: dismounting, mounting, or preheating. The flexible inductors are available in optional lengths of 5 m, 7.5 m and 10 m, for a maximum temperature of 180°C. The heater is easy to use – just plug into the 230 V mains – with four different heating modes. Two magnetic temperature sensors make it possible to measure the internal and external temperature of a workpiece. When this Delta-T function is enabled, the maximum preset temperature difference between two points can never be exceeded. Smart electronics ensure optimal operation frequency. The heating process is displayed in a 4.3-inch touchscreen. A log function is provided for saving data or exporting it via the USB port.

There are many other reasons to consider induction heating in comparison with conventional methods. Heating is controlled, fast and energy efficient. The quality of work is better, it enhances machine up-time. Since there is no open fire, there is no polluting smoke or noise. Personal safety is also a point to take into serious consideration. Headquartered in Vaassen in the Netherlands, Bega Special Tools manufactures and distributes special tools for safe, cost-effective mounting and dismounting of

bearings and transmission parts. These tools substantially improve the quality and ease of maintenance and installation of rotating parts in machines, resulting in longer lifespan. They are used in production and maintenance departments of MRO and OEM companies within various types of industries and include special solutions for the wind energy, railway, mining and steel industries.

Company information

Founded in 1978 and headquartered in Vaassen in The Netherlands, Bega Special Tools manufactures and distributes special tools for safe, cost-effective mounting and dismounting of bearings and transmission parts. These tools substantially improve the quality and ease of maintenance and installation of rotating parts in machines, resulting in longer lifespan. Exported to over 60 countries worldwide, Bega products are used in production and maintenance departments of MRO and OEM companies, providing custom solutions to a wide range of industries including wind, rail, mining and steel. Bega is part of the Schaeffler Group since August 2022.

—The MF Quick-Heater kit consists of one generator MF 3.0 – 3.5 kW, two magnetic temperature sensors, one pair of heat resistant gloves, flexible inductors in optional lengths of 5 m, 7.5 m and 10 m.

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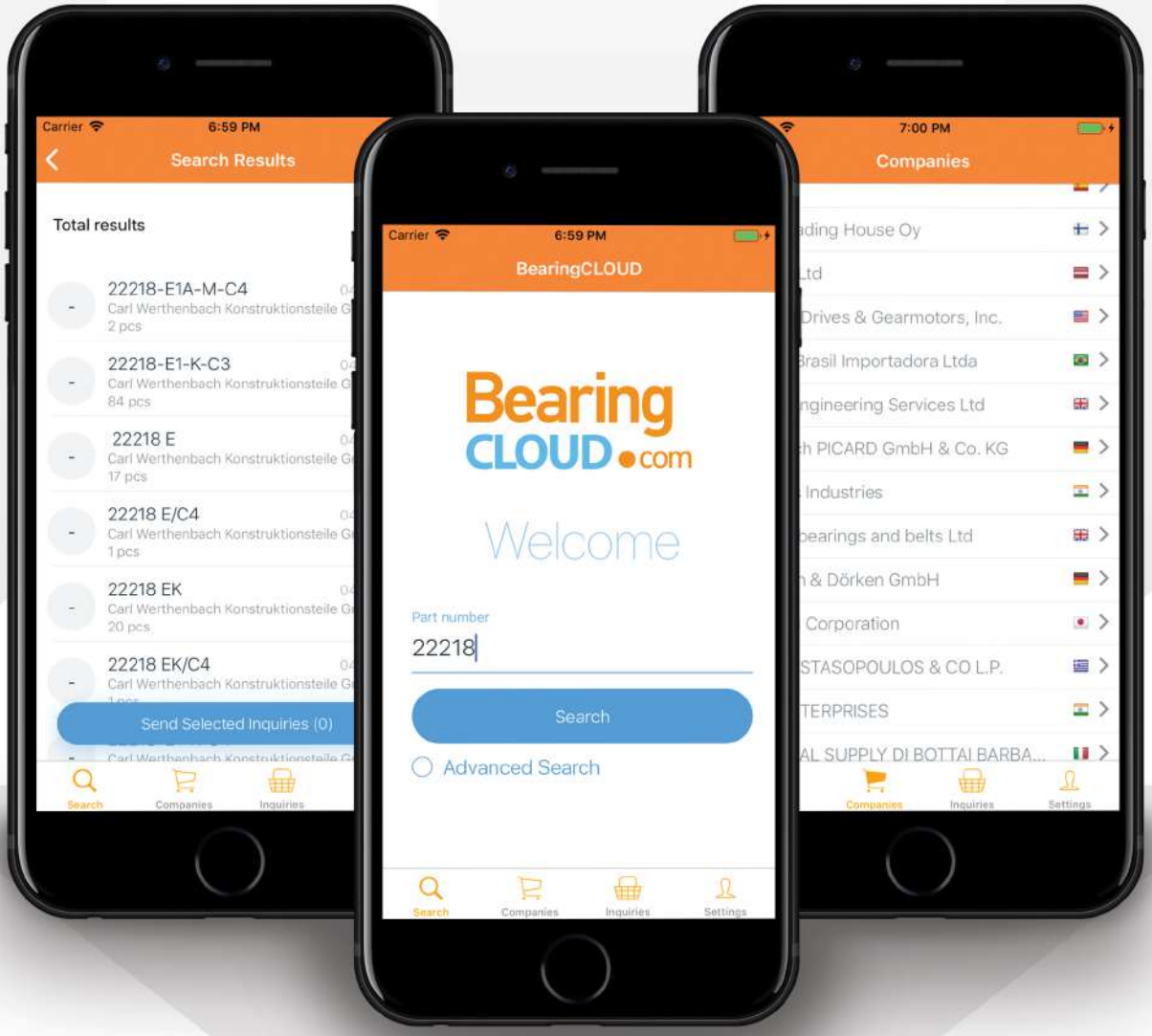

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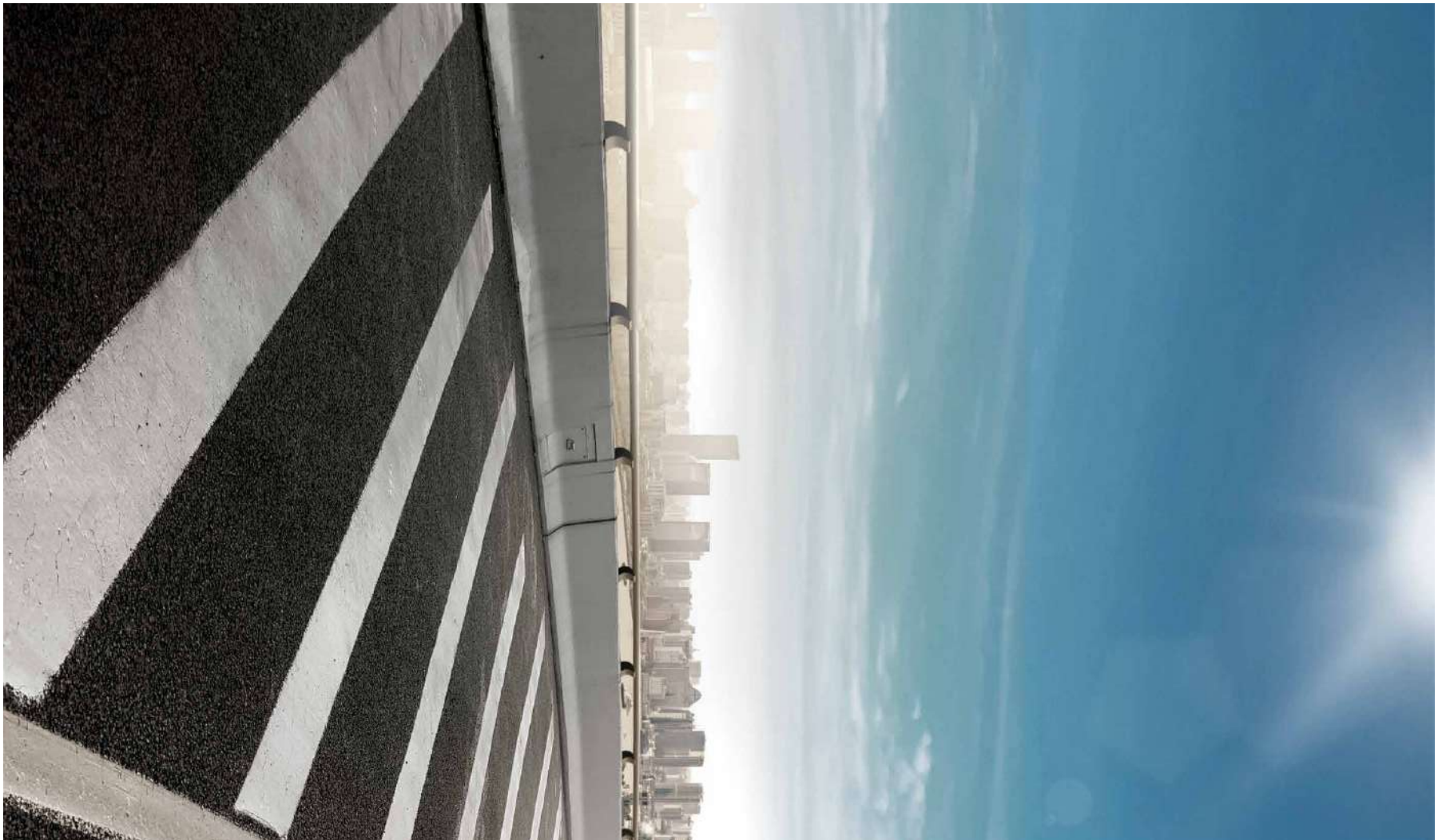
Effects of Efficient Greases
on the Operating Range of BEVs

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The use of lubricating greases in hybrid (HEV) or fully electrified passenger cars (BEV) may have a positive impact on their operating range. Here, Fuchs Schmierstoffe explains the prioritization of individual vehicle components for the topic friction minimization, the advantages of efficient greases as well as the special demands electrified vehicles impose on these automotive fluid class.

In order to be able to classify individual greased components in Battery Electric Vehicles (BEVs) or Hybrid Electric Vehicles (HEVs), Fuchs Schmierstoffe carried out an analysis and assigned priorities based on degrees of efficacy relevance. They are defined by the duration of the power supply to the individual components from the vehicle's battery. The longer a component taps into the battery energy, the higher the electricity consumption.

An efficient or in other words low friction lubrication can improve the degree of effectiveness, thus reduce the energy demand and therefore make an important contribution to the extension of the vehicle's operating range. Consequently, components that consume more electricity also have a greater operating range boosting potential as a result of increased efficiency. Three efficiency degree relevant priorities generated by optimized grease lubrication were defined which are presented in the next paragraphs.

First Priority: Drive Train

Components that are either parts of the drive trains or directly connected to it are allocated to drive train priorities. While the vehicle is in operation, they take on the role of constant direct or indirect automotive battery electricity consumers. Among the first priorities considered are for instance the greased bearings in the traction electric motor, the wheel bearings or the joint shafts. The potential energy savings of these components as a result of the increased degree of effectiveness are high, since their operation utilizes the largest share of the battery supplied energy. Consequently, a boost of these component efficiencies has the potential of delivering the largest operating range extension. Currently, the focus in the development of low friction greases is on first priority components.

Second Priority: Permanently Servo-Actuation Supporting Components

The second priority comprises components that also continuously embedded into the operation of the vehicle, while assuming supporting roles only. Among these are, for example, the steering system, the brake booster, or the cooler fan. The optimized degree of effectiveness of these components, which can be achieved if low friction greases are utilized, does not have as strong of an impact on the vehicle's operating range as a first priority improvement of the drive train. However, these components most certainly offer potentials for energy savings, too.

Third Priority: Temporarily Servo-Actuation Supporting Components

Components that are only used for a limited period of time and thus tap into the vehicle battery's energy supply merely temporarily, are categorized as third priority components. This category includes, for instance, the parking brake or the seat adjustment. Given that these parts are only temporary electricity consumers, their operating range extension potential is much smaller than that of the other two priorities. Nonetheless, even third priority components do have the capability to have a positive impact on the passenger car's operating range if efficient greases are used. This objective is primarily attained through synthetic greases, which deliver reduced breakaway and driving torques even in low temperature conditions (up to -40°C) and thus demand a lower electrical deployment output.

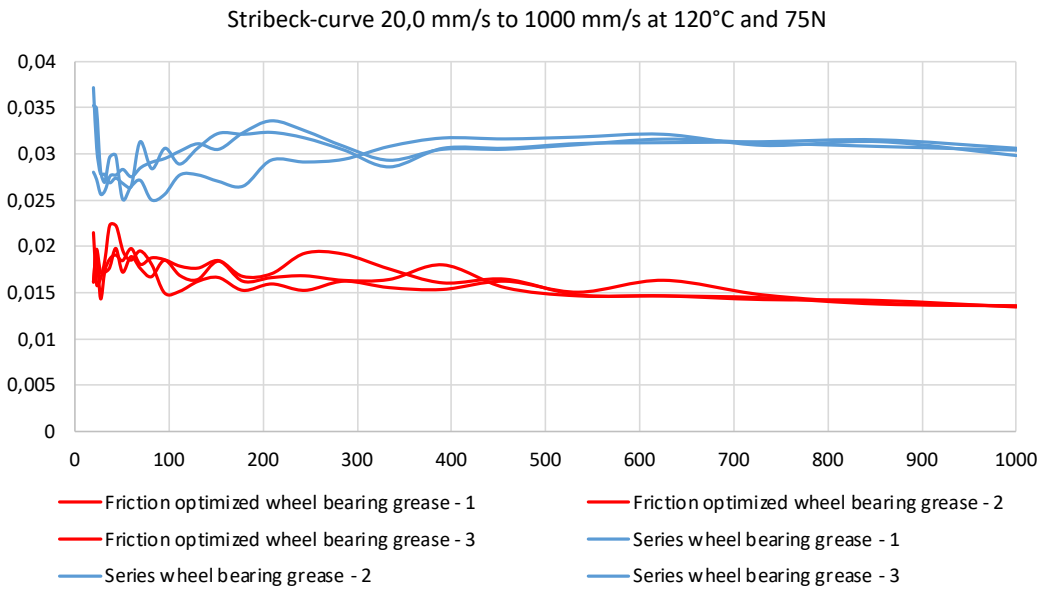
Evaluation And Advantages Of Degree Of Effectiveness Relevant Priorities

The described categorization into the three designated priorities translates into a focused evaluation of the lubricant applications in HEVs and BEVs. TABLE 1 allocates the greased automotive components to these three priorities.

The friction minimization of grease lubrications can be achieved through a low base oil viscosity as well as special, optimized thickeners and additive technologies. The reducing friction is of particular importance primarily for the degree-of-effectiveness-relevant first priority components. The vehicle's electricity consumption can be reduced thanks to the decreased power losses in the drive train, which can also be attributed to the lower friction in these components. Among other things, the coefficient of friction μ describes the interior friction of the lubricant that has a significant impact on the degree of effectiveness of the components in the

First priority	Second priority	Third priority
Traction electric motor	Steering system	Parking brake
Wheel bearing	Brake booster	Seat adjustment
Joint shaft	Cooler fan	Steering column height adjustment
Propel shaft	Brake caliper	Mirror adjustment
Wheel hub motor	Electric-mechanical brake	Door lock
Dual mass flywheel*	Synthetic gearbox	Window lever
–	Wiper blades motor	Sunroof
–	Air conditioner	–

*—TABLE 1 Grease applications based on priorities and components (*only relevant for HEVs) (© Fuchs Schmierstoffe)*



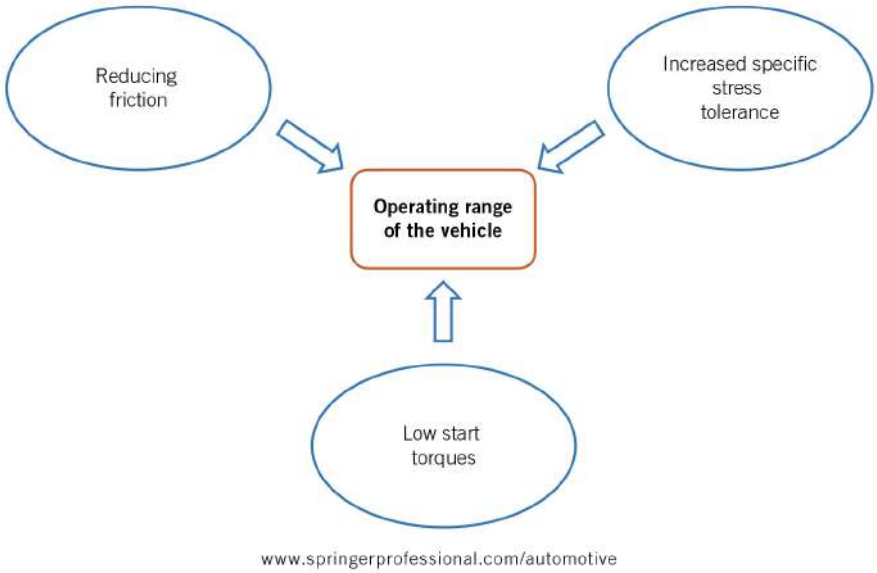
— FIGURE 1 Comparison of the Stribeck curves of a friction optimized (red) and a standard wheel bearing grease (blue) – a friction minimization of 50 % becomes possible (© Fuchs Schmierstoffe)

hydrodynamic lubrication area.

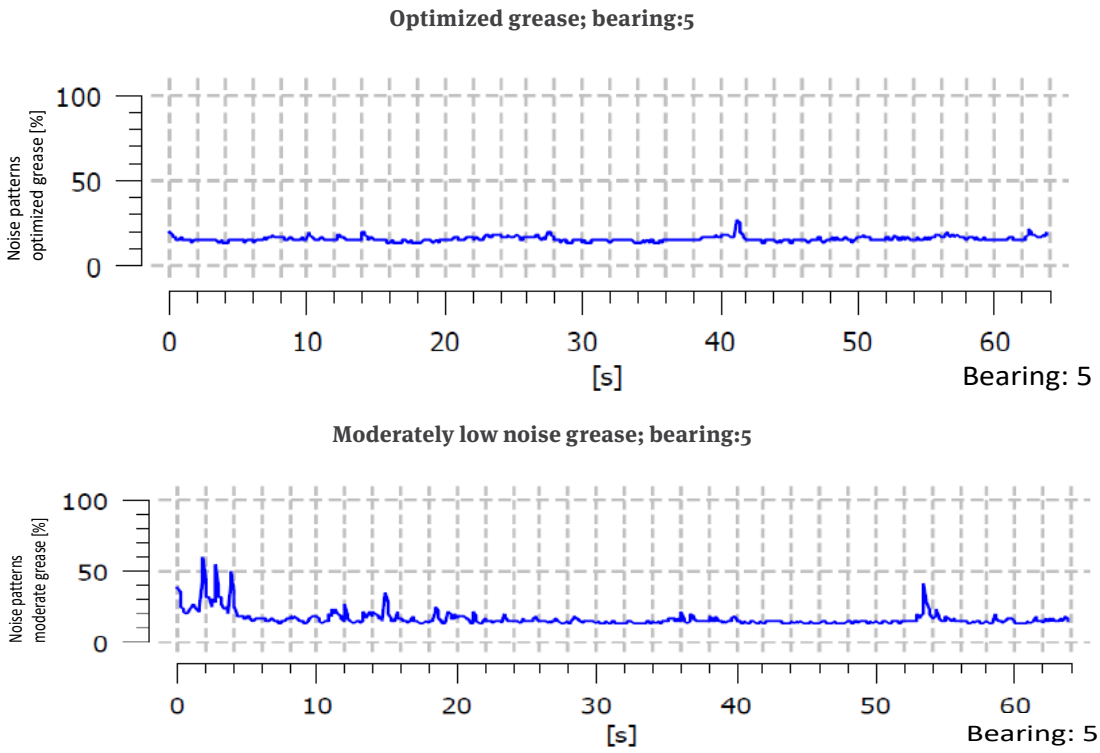
The development of efficient greases mandates the precise measurement of the grease dependent friction in model and component test stands under load conditions that are as actual application proximate as possible. One available option is the so-called Mini Traction Machine (MTM) from PCS Instruments. FIGURE 1 includes the measuring results of an MTM test run and clearly identifies the difference in the friction patterns of a standard and a friction-optimized wheel bearing grease. It is clear that the coefficient of friction of the optimized grease has been reduced by 50 % compared with the standard wheel bearing grease (μ = 0.015 instead of 0.030) and thus a positive influence can be exerted on the efficiency of the component.

In most cases, low friction greases are formulated with thin base oil viscosities. However, this may result in the premature failure of rolling bearings due to wear and fatigue. To counter act this effect, it is essential to make sophisticated choices as far as the base oil types and lubricant additives are concerned. Fuchs Schmierstoffe has at its disposal a modified FE8 test bench (basis according to DIN 51819) that enables the company to test the fatigue-related lifetime of rolling bearings under critical load and rotational speed conditions. The bearing is vibration monitored during this process and the test is aborted if the defined limits are surpassed. Consequently, it is possible to assess whether the grease has the potential of reducing the likelihood of a premature bearing failure due to wear and fatigue.

Besides the capability to reduce friction, efficient greases have additional properties that have a potentially positive impact on the operating range of a BEV or HEV. For instance, the specific stress tolerance of a component can be substantially increased. If this factor is already considered during the design phase of the vehicle, it is possible to develop a smaller and lighter component while retaining the same performance levels. The thus achieved weight reduction has the potential of improving the range.
The effect of increased specific stress tolerance applies primarily to first and second priority components. One typical example is the propel shaft. This principle, which is commonly referred to as downsizing, is already in use in innumerable combustion engine models. As described earlier, optimized synthetic greases have the capability of reducing the required electrical current supply. Under the most optimal conditions, this means that electrical lines with smaller diameters can be used, which in turn reduces the vehicle's weight. FIGURE 2 sums up the



— FIGURE 2 Positive effects of efficient greases on the operating range of the vehicle (© Fuchs Schmierstoffe)



— FIGURE 3 Comparison of a noise-optimized (top) and a moderately low noise (bottom) grease (© Fuchs Schmierstoffe)

described advantages of optimized greases.

A Further Requirement On Greases: Particle Purity

In addition to the previously described optimization of friction, Fuchs Schmierstoffe imposes three other major requirements on its greases regarding electric mobility. These are low noise, long lifetime of the grease and high rotational speed limits as well as compatibility with electrical current transporting rolling bearings. All of the aforementioned properties can be monitored and evaluated thanks to modern testing procedures. As a result, it is possible to make qualified statements with regard to the suitability of a grease.

The low noise requirement does not simply aim at the reduction of the noise generated by the vehicle component as such, since the noise of the tires in motion and the airstream already eliminate the benefits of "less noisy lubrication" at accelerated velocities [1]. It is far more important that the noise behaviors of greases are primarily impacted by their cleanliness (chemical purity). The mere use of low noise or mechanically highly pure greases translates into a mathematically increased lifetime of rolling bearings [2].

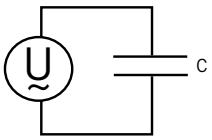
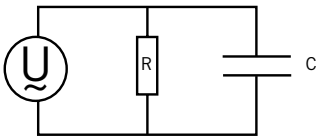
Since low noise greases are free of particles, it is possible to utilize thinner base oils with lower friction rates to improve the degree of effectiveness of the rolling bearings and the tribological pairings without reducing their respective lifetime.

Consequently, Fuchs Schmierstoffe tests the noise behaviors of rolling bearing greases with the BeQuiet+ and MoreQuiet methods. FIGURE 3 shows excerpts of a MoreQuiet noise test conducted on two greases. Compared with a moderately low-noise grease, the optimized rolling bearing grease exhibits significantly quieter noise behavior, resulting in a better noise class (II/1 instead of II/2).

High rotational speed and temperature compatibility paired with the longest possible lifetime are the key requirements for the grease lubrication of rolling bearings in traction electric motors. Fuchs Schmierstoffe conducts tests for continuous grease utilization on its test benches SKF ROF+ and FAG FE9 at temperatures of up to +180 °C. The rotational speed compatibility and/or the maximum rotational speed limit is determined on the test machine FAG WS 22.

Current-Conducting Bearings And Their Greases

One of the characteristics that has not been examined for greases as thoroughly to date is the suitability for current-conducting rolling bearings. Given the comparatively highly dynamic operation of frequency controlled traction electric motors, it is, however, becoming increasingly important since in these scenarios, rolling bearings are frequently exposed to damaging currency throughputs and thus are more prone to accelerated wear. Final research into the properties a grease must have to provide sufficient lubrication even under these conditions must yet be conducted. One frequently discussed characteristic in this context is the specific electrical conductivity of the grease, which can for example be influenced through the addition of conductive additives or base oils. The purpose of increasing the electric conductivity of the grease as much as possible is to minimize the electrical throughput energy on the grease and the bearing as effectively as possible. The aim is to prevent damages to lubricant and bearing. Further interdisciplinary research will have to be conducted and time will tell whether this is the proper approach.
Fuchs Schmierstoffe has at its disposal the Dielectro-Rheological Device (DRD) from Anton Paar – a modern testing device

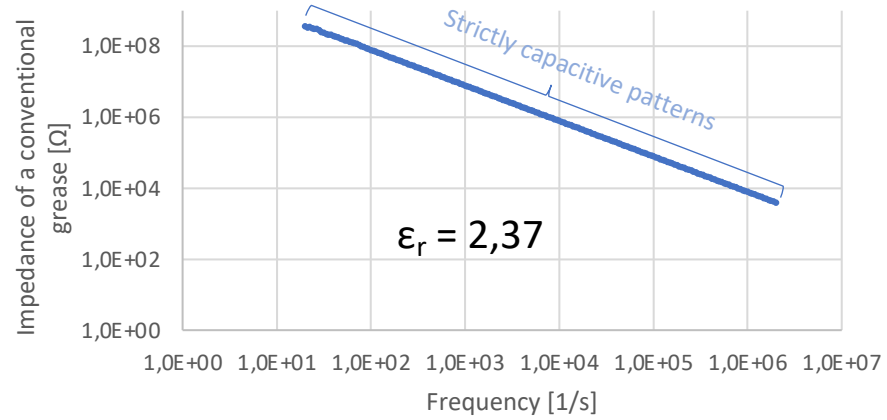
Feature/grease	Conventional grease	Conductive grease
Characteristics	Shows strictly capacitive patterns	Ohm patterns at low frequencies Capacitive patterns at higher frequencies Additional electrical conductivity through charge transport
Comparable substitute diagram		
Formula for impedance	$\lvert Z\rvert = \frac{1}{\omega C} = \frac{1}{2\Pi f \varepsilon_r C_0}$ $\varphi = -90°$	$\frac{1}{\lvert Z\rvert^2} = \frac{1}{(\frac{1}{\omega C})^2} + \frac{1}{R^2} = (2\Pi f \varepsilon_r C_0)^2 + \frac{1}{R^2}$ $\varphi = 0°$

—TABLE 2 Comparison of a conventional grease with an electrically conductive grease regarding their impedance Z (© Fuchs Schmierstoffe)

that characterizes these electrical properties of fresh and previously used greases. The combination of a rotation rheometer with the measuring set-up of a plate-plate condenser, paired with an impedance spectrometer makes it possible to measure the specific resistance, conductivity and permittivity. The test conditions can be selected randomly across a vast temperature range of -40 to 150 °C and for a frequency range of 20 Hz to 20 MHz. Moreover, the test set-up makes it possible to evaluate greases under shear stress. TABLE 2 compares the electrical characteristics of a conventional grease and an electrically conductive grease, while FIGURE 4 shows the impedance curves of them.

Conclusions

The electric mobility requirements imposed upon the utilized greases are not new. However, their prioritization has changed. The focus has further shifted in favor of the reducing friction and the related increase of the degree of effectiveness. The importance of low-noise performance as well as compatibility with current-conducting rolling bearings continues to grow as well. If companies take these requirements into account when they develop efficient greases, they can have a notable positive impact on the operating range of electric vehicles.



— FIGURE 4 Impedance curve and permittivity value εr of a conventional (top) and a conductive (bottom) grease at a rotation frequency of 20 Hz to 2 MHz (© Fuchs Schmierstoffe)

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To ensure that **BearingNews** and **Motion+Drives** magazines are doing their part to protect the environment, the parent company, **iMotion Media**, has developed a strategy to offset the carbon footprint of its printed magazines. The twofold approach includes a fully supported tree planting campaign in conjunction with each newly released edition, and the use of recycled paper in the printing process.

Sustainability is no longer just a buzzword. Members of the global community have become increasingly aware of human impact on the environment. As a result, a massive movement is driving private sector companies to responsibly manage their environmental, economic, and social resources to safeguard the well-being of future generations.

The term 'sustainability' encompasses a large swath of efficiency objectives that aim to go beyond the thresholds of carbon neutrality. Companies must fulfill further economic and social obligations by devising less wasteful practices. When discussing the printing of magazines, there is long-term value achieved by responsibly implementing environmentally friendly solutions associated with the use of paper.

The paper industry has focused its efforts on the sustainability of raw materials, processes, and products. Highlighted within the industry's strategy is the promotion of sustainable forestry practices and responsibly harvesting renewable raw materials. Tree planting is considered one of the most effective ways to combat global warming, as forests naturally reduce atmospheric carbon dioxide (CO_2) by removing it from the air through photosynthesis. In line with this strategy, iMotion Media has adopted 'tree planting for

reforestation' as the most effective method to reduce the carbon footprint associated with the printing and distribution of Bearing News and Motion+Drives magazines. In careful coordination with the release of each printed edition, a tree planting campaign will be launched to help restore forests and offset the use of natural wood materials used in paper production. In addition, iMotion Media is supporting the use of recycled paper in the printing process to reduce dependence on new materials. It will also continue to promote the currently available digital magazine options.

Thanks to the use of recycled paper and certified companies dedicated to carefully managing wood harvesting, there has been a decline in global deforestation. And while there are positives to both recycled paper and the responsible production of new paper, recycled material contributes significantly more to global social and economic sustainability goals.

iMotion Media is happy to be a part of a forward-thinking movement with ambitions for a greener future. Through its broad reach within the Bearing, Power Transmission, and Motion Control Industries, iMotion Media intends to create an infectious optimism that will compound progress towards greater sustainability.

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