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Bearing NEWS

2019
MARCH
ISSUE 11

BEARING INDUSTRY MAGAZINE

HANNOVER MESSE

Bearing EXPO & Conference

A JAPANESE SUCCESS STORY GOES EUROPE

ABB
ARTUR RDZANEK

WBJF
YU CHUANJIE

NEW WAY AIR BEARINGS
DREW DEVITT

PCOMPONENTS
DAVID HULL

INTEGRATION OF IIOT INTO THE BEARING APPLICATIONS

INDIAN BEARING PRODUCTION: AN ALTERNATIVE FOR CHINESE BEARING PRODUCTION?

HOW TO BUILD A WORLD-CLASS BEARING LUBRICATION PROGRAM


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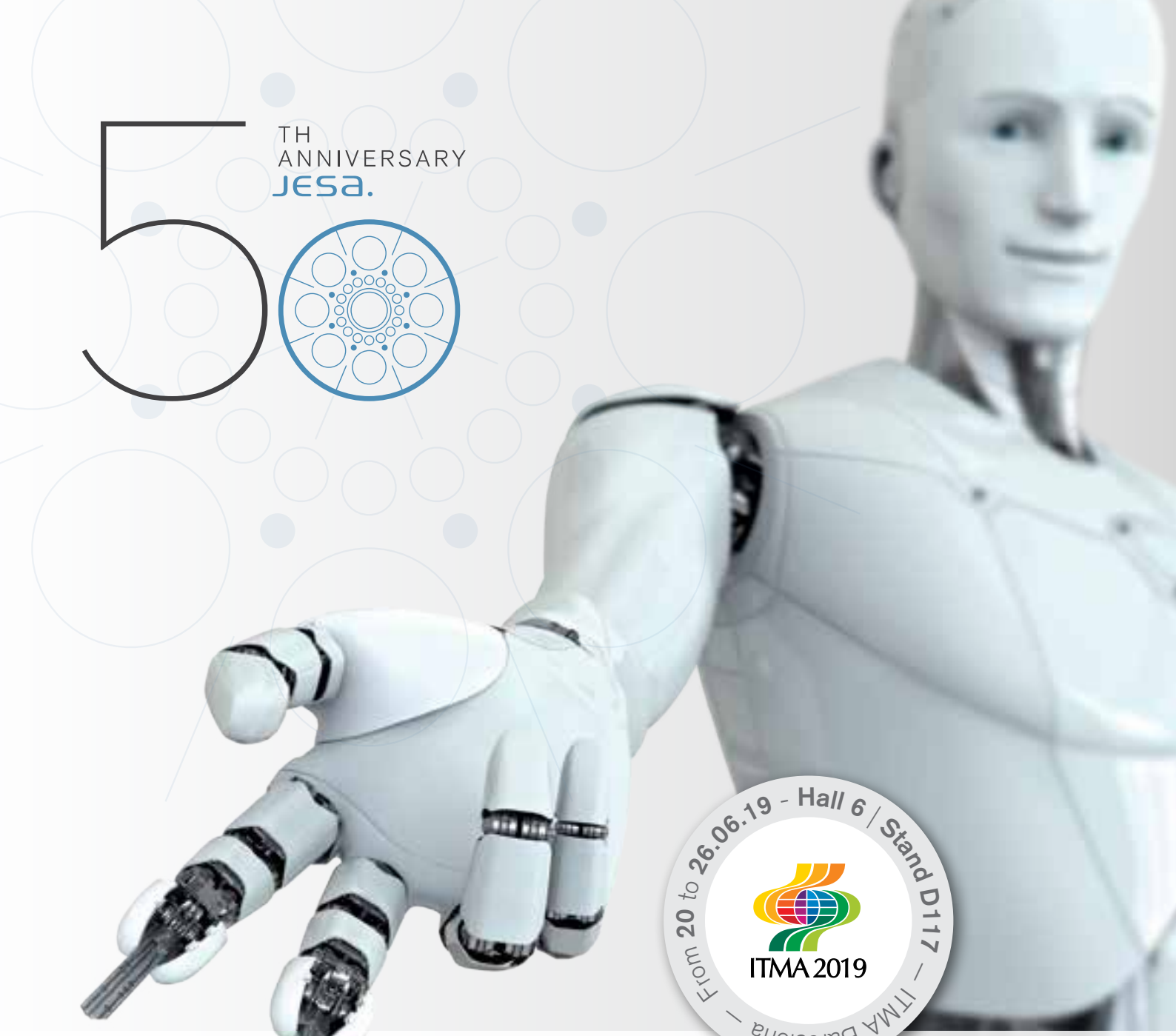

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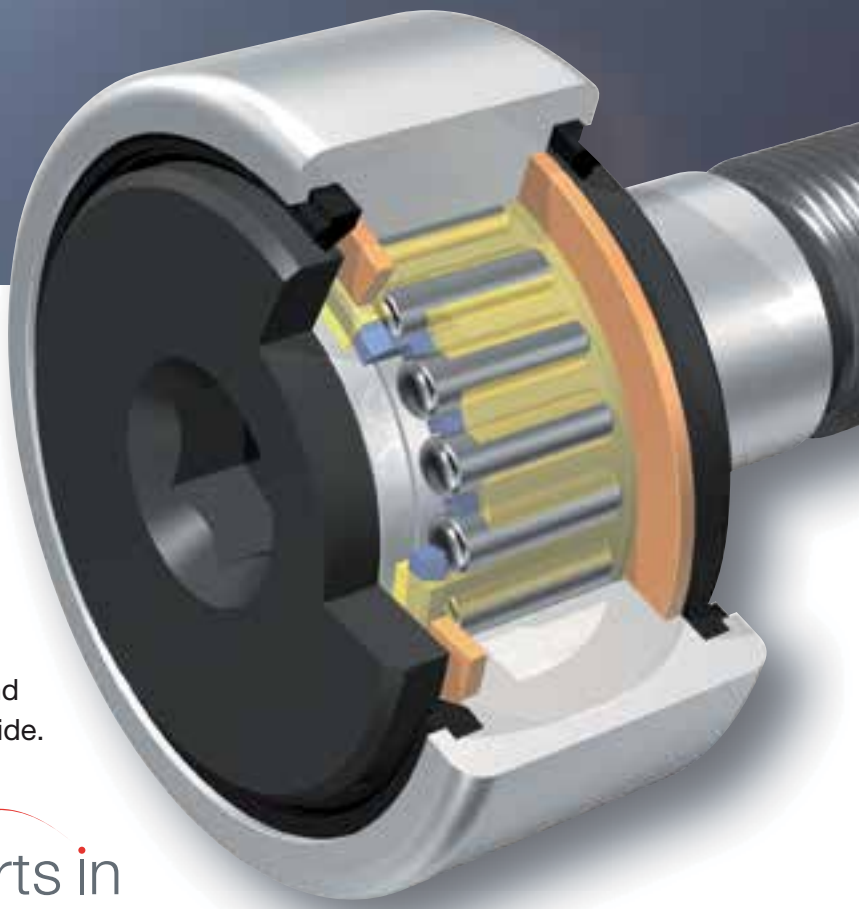

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Bearing NEWS
BEARING INDUSTRY MAGAZINE

2019, the year full of opportunities for the motion & drives industry

More than ever before is the synergy between the industrial motion, drives control and automation domains integrating and synchronizing thanks to the technological development of IIOT. The impact of the current changes and the level it has reached will be the main topic during several events in 2019, to start with the IAMD exhibitions in Hannover, Istanbul and Shanghai.

The integration, digitization and interconnection of industrial technologies is continuing to transform the world's manufacturing industries. In recognition of this, the IAMD shows will feature the full range of products and solutions for the factory of the future, including factory and process automation systems, industrial IT, robotics, smart drives, and intelligent hydraulics and pneumatics systems.

In view of these technological developments, we have integrated the BearingEXPO & Conference events into the Global IAMD shows in order to align the bearing domain with the dynamic market and product changes. Different than the IAMD shows, the first ever bearing event of India, BearingEXPO Mumbai will be added to our agenda in October this year. An overview of all the events are shared with BearingNEWS readers during our previous publication "Agenda 2019" where we have announced traditionally the 150 key industrial events which will take place in 45 different countries. In this BearingNEWS issue we will focus more on the details of the BearingEXPO & Conference events.

Further in this issue, we have 'a BearingNEWS classic': four exclusive interviews with the leaders of important production and distribution organizations in the motion and drives industry. The first interview is with Artur Rdzanek, product manager for sensor technologies, Dodge mechanical products at ABB. We discussed with him the ABB Ability™ Smart Sensor technology for mounted bearings that enables health checks for bearings. The wireless sensor technology, recently launched by ABB that provides an early indicator of potential problems by assessing the condition of bearings.

The second interview is with Yu Chuanjie, the President of Jinfeng Bearing (WBJF), one of the well-known large bearing manufacturer from Wafangdiang, China. The bearings of WBJF are currently exported to more than 30 countries worldwide, and won the title of "China Famous Trademark" issued by the State Administration for Industry and Commerce in China We tried to reveal the vision behind this success story.

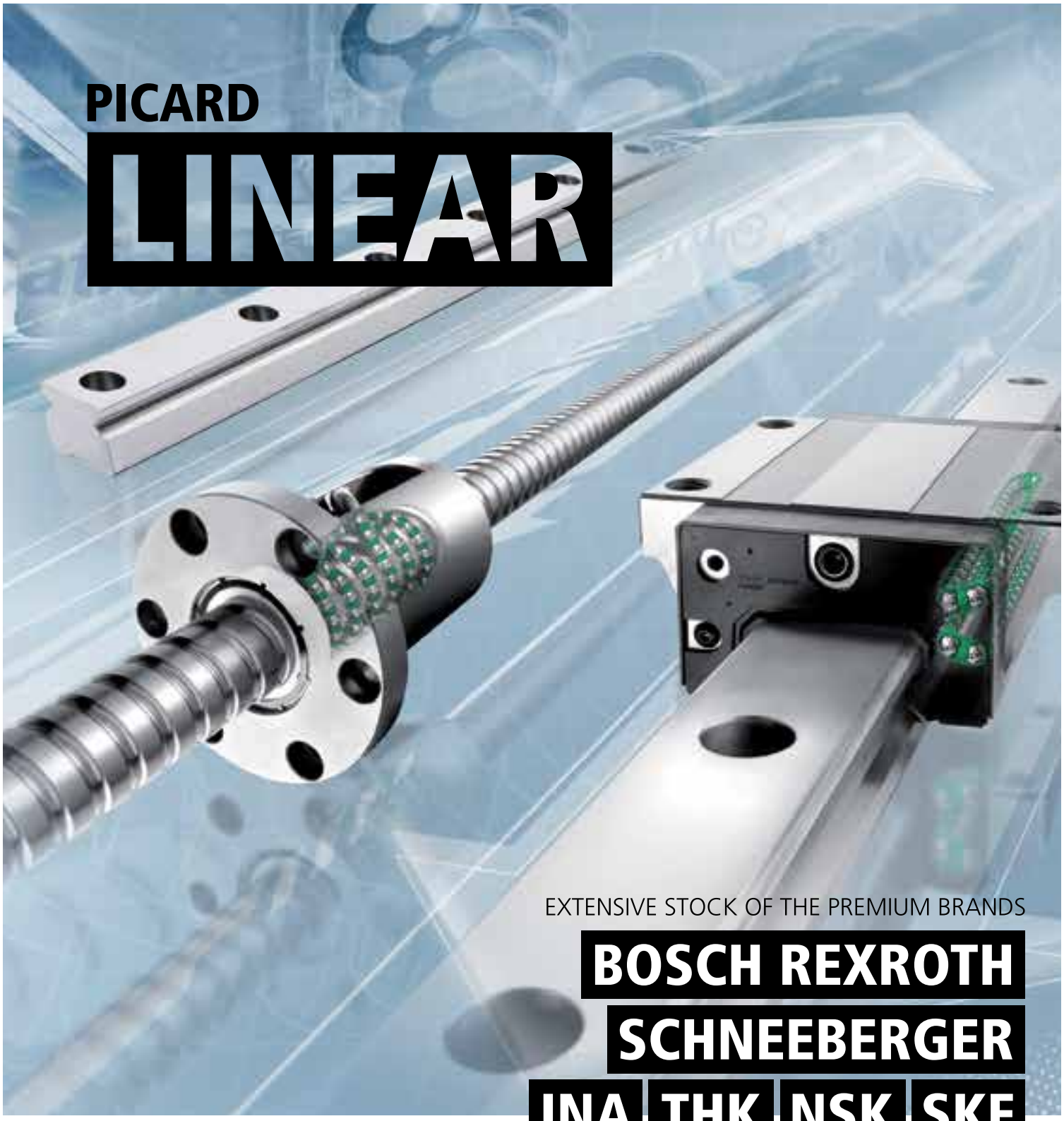
Apart from the interviews, we have four industry expert columns and case studies in this edition of BearingNEWS. David Hull, President at Pcomponents is writing about the latest updates and what you need to know about the 400 exemptions that the U.S. Trade Representative has granted to the bearing industry. A case study about precision slewing ring bearing design for large diameters and high speeds is further highlighted by Drew Devitt, the Chairman and CTO at New Way Air Bearings. With The BearingEXPO 2019 in sight, global manufacturing expert Vikas Manral is giving us the latest overview of the Indian manufacturing industry; while Shrenik Seth, general manager at Bearing Manufacturing India is answering the question if "Indian bearing manufacturing can be an alternative for the Chinese production?"

What's Rolling..

What's rolling in the bearing industry? A brief summary of what happened during the last six months in the bearing industry; special case sturdy by Drew Devitt on air bearings; several insights on bearing lubrication and assembly solution; a manual by Ian Knight on gearbox reliability; latest technologies for bearing insulation and ceramic components and a new volume of top 100 bearing reliability tips from Per Arnold Elgqvist... Together with all these interesting topics, many other bearing industry related articles, case studies, insights and developments can be discovered in this March issue of the BearingNEWS magazine.
156 pages full of BearingNEWS. We hope that you will enjoy it!

Kenan M. Özcan

Editor in Chief
BearingNEWS



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What's Rolling...

What Happened in the Bearing Industry Seconf Half of 2018 ?

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"Is your lubrication program world-class?"

How to Get Started

Success is dependent on organization and commitment. Without these two structural elements, your ultrasound lubrication program will find difficulty getting traction. A well-organized strategy and carefully planned execution will get the project started properly. Getting the commitment from all levels becomes much easier when a program can demonstrate structure and cohesion. Results will prove the program faster which will trigger easier access to funding to grow and sustain the program.

Clearly defining and communicating the objectives of your lubrication program is the best way to create a precision lubrication culture that benefits your entire organization.

Start by asking ***"Why start an ultrasound lubrication program and what improvements do we expect?"*** There is no one easy answer to the question. Saving money is an obvious benefit that gets the attention of management, but it is not specific enough. How will an ultrasound lubrication program save money?

- By reducing grease consumption
- By raising awareness of the right types of grease to use
- By making more effective use of lube tech's time
- By reducing unwanted machine breakdowns caused by lubrication failures
- By extending bearing life expectancy

A new beginning is the best opportunity to review what you have been doing previously. Identify what worked and improve or remove what did not. We will not go deeply into all aspects related to good lubrication practices. However, there are some basic and relevant points that should be noted.

Lubricant management program: Keeping your bearings healthy requires a lubricant with the right quality for the application. By quality we refer

Acoustic Lubrication is just one of the 8 application pillars adopted by world-class ultrasound programs. And what an important one it is. Poor lubrication practices account for as much as 40% of all premature bearing failures. When ultrasound is utilized to assess lubrication needs and schedule grease replenishment intervals, that number drops below 10%. What would 30% fewer bearing related failures mean for your organization? Keeping up with the changes in on-condition bearing lubrication techniques is challenging. Technology advancements from SDT's LUBExpert allows us to transform complex processes into simple, 5-step procedure.

not only to the quality of the grease manufacturer, but quality in a broader sense which involves all the processes from manufacturing to application. Some general recommendations are:

- Keeping high standards of housekeeping for storage, handling, and application to prevent contamination that degrades the quality of lubricants.
- Keep a detailed list of products to use for each lubrication point. Selecting the right lubricant requires technical knowledge in several aspects. Using the wrong product will jeopardize the useful life of the component. Don't change lubricants without solid reasons. Consider contracting a lubrication consultant to direct advice on this.
- Provide training in every aspect relevant to lubrication practices and product knowledge to those responsible for lubrication.
- Set objectives to reach so you have a clear path to follow.

Application Guidelines: Delivering the lubricant to the right point requires some type of device; usually a grease gun. There's lots of different types but they all have one thing in common; they deliver grease with high pressure; enough to overcome the backpressure in the grease fitting. Dirty grease and mixing grease types kills bearings. Therefore, it is necessary to extend the precautions for contamination and storage discussed above, to the application of lubricant through grease guns:

- Wherever possible insist on using a dedicated grease gun for each grease type to avoid the risk of applying the wrong product through cross contamination. Label the grease gun with the associated grease to be used. LUBExpert manages multiple grease guns to prevent mixing of grease types
- Standardize your grease guns so they all deliver the same quantity of grease per stroke
- The same principle must be applied for your ultrasound device. If using SDT's acoustic lubrication adaptor, assign a different lube adapter for each grease type. Grease remaining in the adaptor can mix with new grease causing a degrading chemical reaction.
- Always clean the grease fitting and grease gun before and after every application.
- Some bearings have drain plugs for purging old grease. If you open the drain, remember to clean the drain hole; it may be clogged. Use a clean brush like a bottle washing brush to clear the port.
- Apply grease slowly, one full stroke at a time (no more than 20% of the maximum designated quantity per injection) to avoid over greasing. This also avoids potential damage to the bearing as too much pressure can push the bearing cage into the roller elements.
- Always allow for churning time – the time required for freshly injected grease to work its way into the bearing.

Type of bearing inside: Don't assume that a grease fitting installed on a bearing housing means a path to grease the bearing. Sometime motors are fitted with both grease fittings AND sealed for life bearings. You must identify every grease point to be managed within the ultrasound program. Identify the bearing inside to know the size for lubrication quantity, the particulars for defect diagnosis, and the type of grease used. Here are some helpful tips regarding the use of acoustic lubrication.

- **Friction produces ultrasound.** Bearing friction is produced by the contact between race, rolling elements and seals or shields
- **Less contacts means less friction.** A ball bearing produces less friction than a same size roller bearing under the same lubrication conditions, speed and load.
- **Plain bearings produce the lowest friction levels.** Their ultrasound baseline often trends in the single digits or low teens. Typically, they remain consistent for their lifespan and only display sudden upward trend lines when the oil film becomes contaminated or the bearing is near failure.

Benefits of Ultrasound

Ultrasound performs well at sensing and measuring changing in friction levels. It's the perfect technology to guide lube technicians during the lubrication-replenishment task. Ultrasound assisted lubrication of plant assets offers significant benefits that calendar based lubrication cannot. The days of relying on calendars and calculators are over. Use our 5-Step Acoustic Lubrication Procedure and start greasing bearings the right way!

5-STEP
ACOUSTIC LUBRICATION PROCEDURE

HEAR SDT MORE Ultrasound Solutions

1 Visit Lube Room

Select grease gun designated for asset.

Safety:
Follow OEM safety protocols for grease gun.

Inspect equipment for cleanliness, especially coupler. Inspect lube delivery tube for damage.

Select the **Right Lubricant** for each asset/lube point.

Check condition of old grease in the gun, if applicable. Consider using a new grease tube.

Calibrate the grease gun's output per stroke/shot and document accordingly.

Tip: Color coding grease containers and bearing fittings is highly recommended.

2 Pre-Lubrication Checks

Safety:
Follow facility/equipment safety requirements.

Equipment Check:
1. Personal Protective Equipment (PPE)
2. Ultrasound instrument
3. Headphones
4. Contact sensor
5. Lube adapter
6. Defect log
7. Grease gun with flex hose
8. Lint free rags
9. Flashlight

Visually inspect asset and document any defects.

Identify grease fittings e.g., Zerk, button head, etc.

Confirm bearings are greasable (not sealed).

Inspect and clean grease fittings and color-coded caps with lint free rag. Confirm color codes of fittings and grease gun.

3 Initial Lubrication Check

Connect ultrasound sensor to grease fitting using lube adapter, or directly to clean bearing housing with magnetic base.

Right Location: Measure the ultrasound signal from the same spot each time.

Tip: Do not measure from the bell housing.

If measuring from grease tube extension (not recommended), inspect it for damage or obstruction.

Record initial ultrasound measurement (RMS dBµV and Crest Factor).

Right Interval: Based on data, determine if the bearing requires grease replenishment.

4 Evaluate Bearing Condition

Simple method for determining bearing failure stages using ultrasound:

Quantitative: Based on historical trend.

Qualitative: Based on lube tech's perception

+8 dBµV

Quantitative: Increase of **8 dBµV** over trend line indicates a need for lubrication.

Qualitative: Tech may note elevated whirring sound typical of increased friction from metal to metal contact.

+16 dBµV

Quantitative: Increase of **16 dBµV** over trend line indicates warning stage.

Qualitative: Tech may note louder signal and small popping signal indicative of impacting.

+24 dBµV

Quantitative: Increase of **24 dBµV** over trend line indicates severe stage.

Qualitative: Tech may note significant increase in signal, and rough, growling sound with loud popping.

5 Grease The Bearing

Right Quantity: Deliver a small amount of grease, no greater than **5%** of the total bearing volume. Depending on grease gun calibration this could be equal to one shot.

Churning Phase:
Allow ultrasound readings to stabilize based on RPM:
>1200 RPM = 5 seconds
500 - 1200 RPM = 10 seconds
300 - 500 RPM = 20 seconds.
<300 RPM = 60 seconds

Right Indicators: Take a new ultrasound measurement (RMS dBµV and Crest Factor).

Decreased Signal = Add one shot of grease; wait to stabilize; repeat if signal decreases.

Increased Signal = Stop greasing!

Caution: Do not exceed calculated grease replenishment quantity.

Document the results:
- Number of strokes
- Initial and final dBµV
- Observations

Tip: Replace the cap on the grease fitting to avoid contamination. If no cap, leave a small amount of grease on the tip.

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Engineering a Bearing Solution for the Botlek bridge

Schaeffler engineers an innovative bearing solution for vertical lift bridge

Schaeffler has engineered and supplied 67 cylindrical roller bearings for one of the busiest and geographically important bridges in The Netherlands.

The Botlek bridge opened in 2015. However, after one year of operation, noise and vibration were identified in the pulley arrangement. Investigation revealed that the bearings were damaged and needed to be re-engineered. This was when Schaeffler became involved and engineered a bearing solution to get the bridge operating again.

Bridge opens 9,000 times a year

Botlek is the petrochemical district of Rotterdam, located west of the Oude Maas river. It is connected by the A15 motorway, the gateway to the European hinterland. Construction of the bridge, which is the centrepiece of the A15, began in mid-2011 and was completed four years later in July 2015.

The vertical lift bridge comprises four lanes of traffic plus two hard shoulders and a double-track railway line. Despite its huge dimensions, the bridge can open and close in just 109 seconds, allowing both river and road traffic to pass smoothly. With two spans each measuring 87.4 metres in length and a width of 49 metres, the weight to be lifted is approximately 5,000 tonnes on each side.

In addition to the weight to be moved, the bridge also opens around once every hour – an impressive 9,000 times per year.

One of the most important factors is the speed: it takes just 109 seconds for the lifting spans to cover the entire 31 metres of travel when being raised or lowered. The maximum lift speed is 43.5 cm/s.

Expertise in coatings

Each of the bridge's cable sheaves is supported by a specially-designed, two-row cylindrical roller bearing with an outside diameter of 900mm and a weight of 800kg. The rolling elements are coated with Durotect B and separated

— Schaeffler field engineers provided assistance to mount the bearing in the cable sheave.

by a roller-guided brass cage to give the bearing optimum rolling behaviour. Durotect B is a black mixed iron oxide coating that is highly resistant to bending and stress. Durotect B also improves the bearings' run-in behaviour and energy efficiency. The bearing rings are coated with Corrotect, which protects the bearing from corrosion due to the ingress of water.

Innovative bearing design

To ensure optimum load distribution within the bearing, the two rows are matched with the highest standards of accuracy. Axial loads that occur can easily be supported by the rollers, which feature a specially profiled end face to the bearing rib, and all bearings are marked with a serial number to ensure full traceability.

The bearings are lubricated with Arcanol LOAD460 high performance grease, which has successfully proven itself in wind turbines and other large bearing applications. This grease is specially developed to withstand high loads and wide temperature ranges, as well as to provide excellent water resistance and corrosion protection.

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A beverage bottling plant was experiencing failures on the standard cam followers used in a case packer. Due to the environment, excessive corrosion was resulting in reduced bearing life, which required the cam followers to be replaced every three months.

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In addition to the standard McGill CAMROL cam follower bearing features, CRES CAMROL cam followers utilize stainless steel materials, LUBRI-DISC® + seals and H1 food grade grease. Our seal design incorporates aerospace technology to help prolong bearing life in a variety of corrosive environments.

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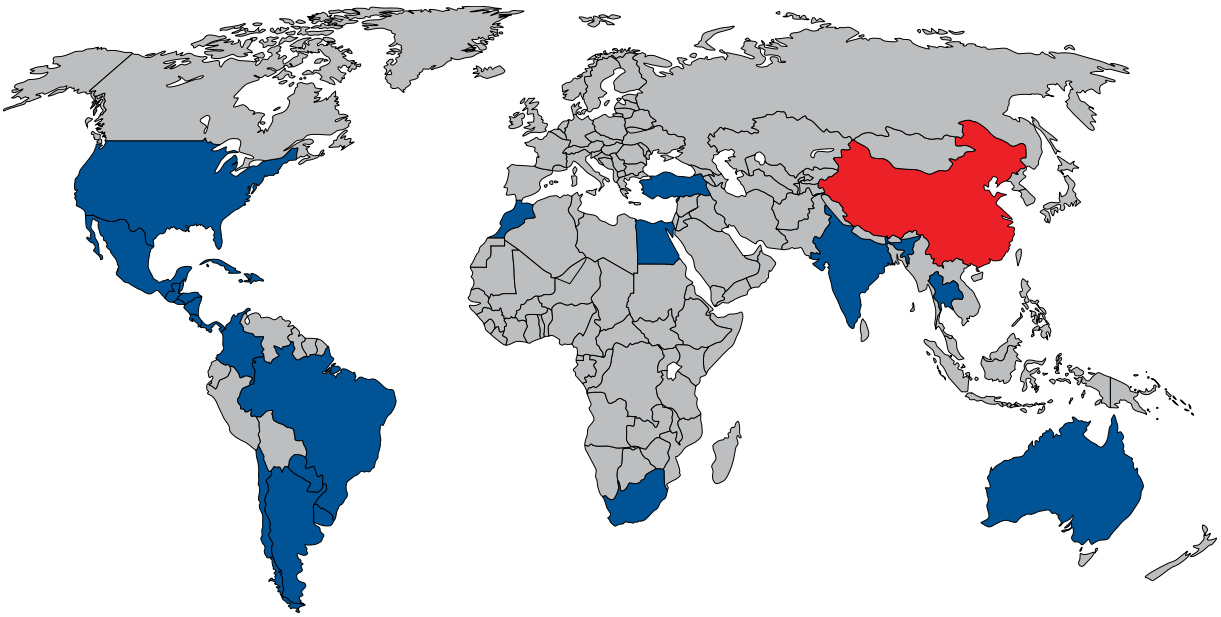


After having extended its capabilities last year with the opening of his new Shanghai's facility, bearing specialist ZEN makes a big step towards international distribution. Starting from now, customers from all over the world will benefit shorter delivery times and more competitive prices, as direct shipment from China to all countries is now possible.

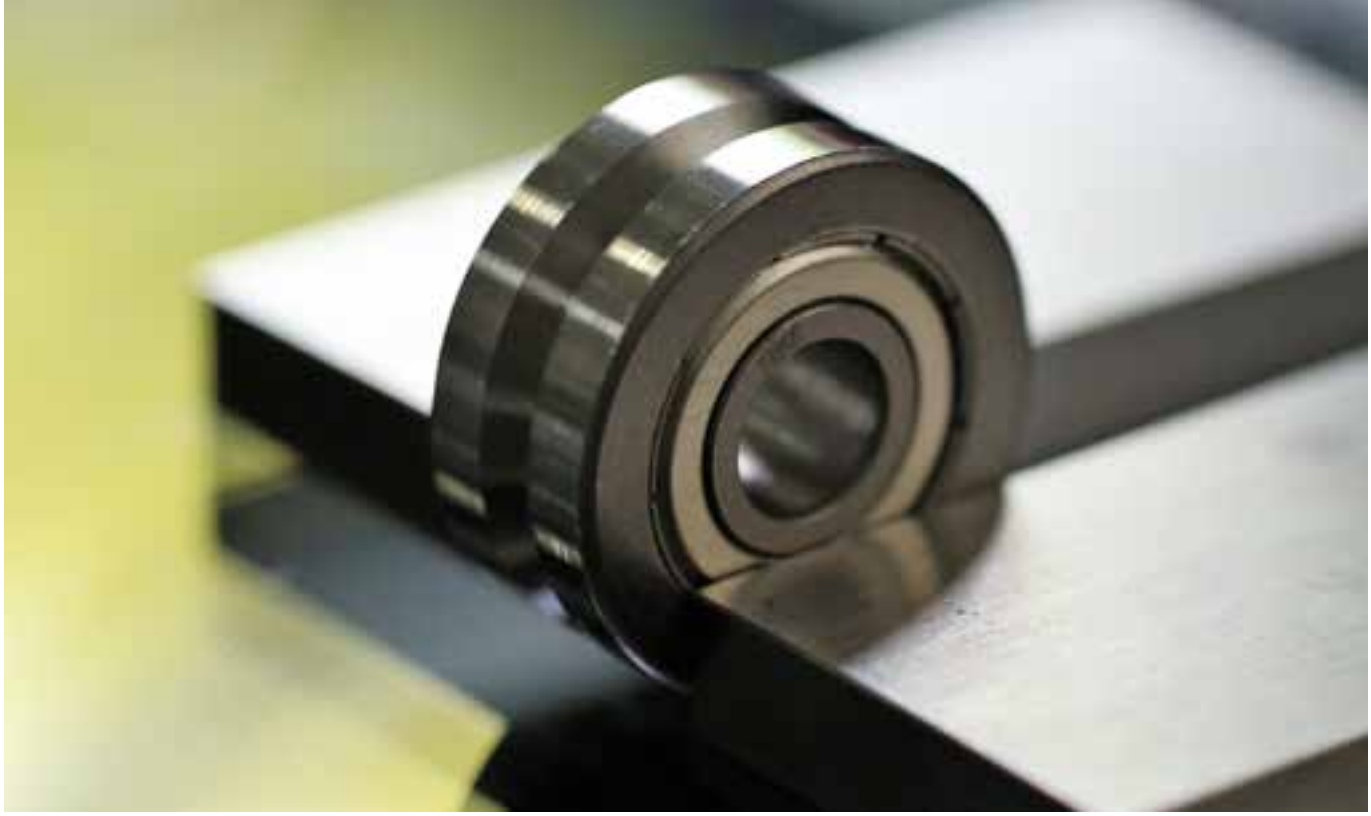
Direct shipping from China

Yago Zens, Head of ZEN explains: "Before, we would first send the goods to Europe, then from there ship it to the rest of the world. This had two major disadvantages: high import duty taxes and long delivery times. We want now to promote our products directly from China to the rest of the world, with shorter delivery times and more competitive prices. Especially in US, South-America, Russia and India, that are key markets for us. The delivery time for direct shipping from Shanghai to Los Angeles would take approx. 2 weeks, to South America from 3 to 4 weeks."

Continuous investments on product quality

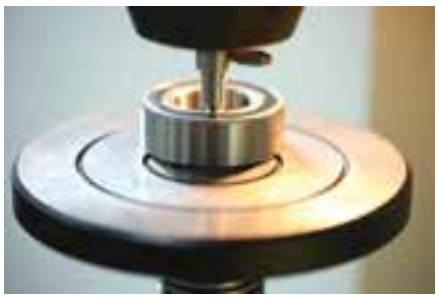
Pharmaceuticals, food & beverages or

> *ZEN plans further investments in the existing full cycle of quality control for a better and consistent quality in the stainless steel bearing range*



even aeronautics are heavy consumers of stainless steel bearings, one of the prime specialty of Zen. All of the stainless steel bearing range being supplied with FDA approved grease if required. The company, holder of the ISO 9001 certification award from TUV Rheinland, continue to invest in his core products, as Yago Zens explains : “We already cover the full cycle of quality control for a long time now, but we are aiming for even better quality in our stainless steel bearing range. Chemical compounds are key for the steel grade quality, and we’ve invested recently thousands of euros in new quality control systems. In the near future, this will help us to push a new type of bearing featuring stainless steel rings and ceramic balls. More info on this will come soon.” Interesting fact: the ZEN’s stainless steel bearing will equip all the athlete’s wheelchairs during the Dubai World Paralympics 2019.

> *“All of the ZEN stainless steel bearing range is supplied with FDA approved grease, if required”*



German know-how, global reach

Founded in 1992 in Dusseldorf, ZEN first started the production of miniature bearings in the outskirts of Shanghai, and made early investment in modern production lines and quality controls. Today the group has more than 6000 in his catalogue, relies on a powerful network of 22 distributors spread on 6 continents, and ranks number 1 as the largest manufacturer of stainless steel bearings in the world. No doubt that the new shipment possibilities should strengthen the company’s position on the international scene. On domestic market side, ZEN keeps investments going too, as another facility should be announced in 2019.

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In the grinding process, the drives of the grinding spindles and work-head dresser have to run with extreme smoothness and precision (Photo: sorapolujjin / Fotolia)

Condition Monitoring for Bearings **Improves Grinding Process**

Monitoring the condition of bearings is not only a way to detect the need for their replacement, but a way to draw conclusions about the state of the entire machine or system. To illustrate the benefits of NSK's Condition Monitoring Service (CMS), two practical examples highlight what can be offered to users of grinding machines.

As part of its AIP+ (Added Value Programme), NSK's CMS is a method to determine the health of machine components such as bearings while the machine remains operating. A measurement system, specially designed for the purpose, records the vibration, temperature and rpm of machine components, and analyses them using advanced software. The software creates the underlying data used to assess the life expectancy of bearings, and indicates whether there is insufficient lubrication, for example, or if there are dents or alignment errors. This data provides a deeper insight into the condition of the total system or process.

Data from the process can also be used to determine (or at least narrow down) the causes of form errors in the grinding process. NSK has used this method at a factory of its own in the UK. In this case, form errors were occurring on the machine responsible for grinding the bearing raceways. After several repair attempts and a fruitless search for possible faults, it was suspected that the bearings must have a defect. Looking to find a definitive resolution, NSK decided to have a status analysis carried out via the CMS.

After reading the drive data and considering important factors – such bearing and motor details – measurements were made prior to and after replacing the bearings. The analysis showed that neither the spindle nor work-head dresser were the cause of the form errors. This saved the maintenance personnel from spending many hours stripping down the spindle. Instead, the team very quickly found the true cause of the issue, after which no further problems occurred with the raceway form or surface finish.

In total, three working days were saved which would have been needed to strip down the spindle and investigate the potential bearing defects, not to mention the associated loss of production time for each of the impacted manufacturing cells. As a result, the savings in maintenance time and downtime were calculated to be €13,080.

In a second example, the user of a centerless grinding machine detected that form errors were occurring in the process. On-site maintenance technicians suspected that there were defects in some of the spindle assembly bearings. As the grinding spindle used a number of different bearing types, in eight different sizes, NSK's CMS was deployed to help the maintenance team identify the faulty bearings and find a permanent solution to the problem.

After measuring the key maintenance-related data while the machine was running, the analysis showed that the spindle bearings were in fact not the

NSK's ACBB – ROBUST series of ultra-high speed Angular Contact Ball Bearings

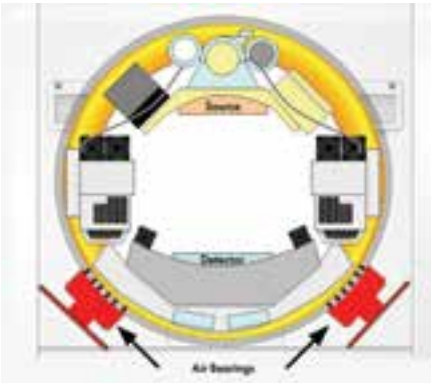
cause of the form errors. As a result, maintenance technicians were able to quickly focus on other areas and the user saved the two working days that would otherwise have been needed to strip down the spindle, along with the associated downtime. The total savings were calculated at €33,600.

The Condition Monitoring Service from helps to identify possible causes when irregularities occur in the grinding process

Slewing Ring Bearings:
A Precision Bearing Design for Large Diameters and High Speeds

Externally pressurized air bearings, commercially available from New Way Air Bearings, enable new designs that allow for higher rotation speeds, improved precision, and larger center apertures needed for advanced Computed Tomography (CT) scanner applications.

CT scanners are rotating X-ray machines. By rotating the X-ray source and detector (arranged 180 degrees across from each other) around the object of interest, it is possible to build a three-dimensional image. Medical applications are one of the early and most common applications, but baggage scanning for explosive devices in airline baggage is another big application. In both these applications, it is advantageous to have as large a center aperture as possible to fit odd shaped luggage or patients arranged in poses to keep arms from obscuring a 360-degree view of internal organs. Also, many patients have claustrophobia in small confined apertures making it difficult for them to remain still through the procedure. So, most machines require an aperture diameter of at least one meter (Figure 1). Because these machines image only a small slice each time around, they need to rotate at hundreds of rpms to have the procedure be short enough for patients to tolerate it, or to keep up with the many checked bags that need to be scanned in the airline business.



— Figure 1

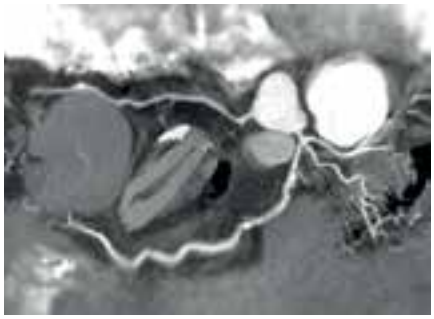
Additionally, the X-ray equipment, on the order of 1.5 metric tons, is cantilevered off the bearing by half a meter and is not symmetrically arranged. This makes for a difficult bearing specification. Rolling element slewing ring bearings have been the common choice of machine designers. In order to optimize the lifetime of the bearings they have been located at the smallest possible diameter to minimize speed of rotating elements and lifetime distance traveled. Unfortunately, this limits the size of the center aperture and puts the relatively noisy bearing near the already nervous patient.

The need for speed continued to push CT machine designers, especially in the medical area. CT scanners for imaging the heart are especially challenging, because of the natural motion of the beating heart. This procedure, known as Cardiovascular Computed Tomography Angiography (CCTA) is a growing application. In this case, the X-ray equipment needs to get around the heart between beats, while the heart is at rest, in order to image the fine blood vessels feeding blood to the heart muscle itself (Figure 2). There are only two options: slow down the heart through sedation or speed up the rotation of the machine.

Philips Healthcare, a major supplier of CT equipment began a new machine design with a fresh sheet of paper in order to find a way to speed up the rotation. According to Philips Healthcare

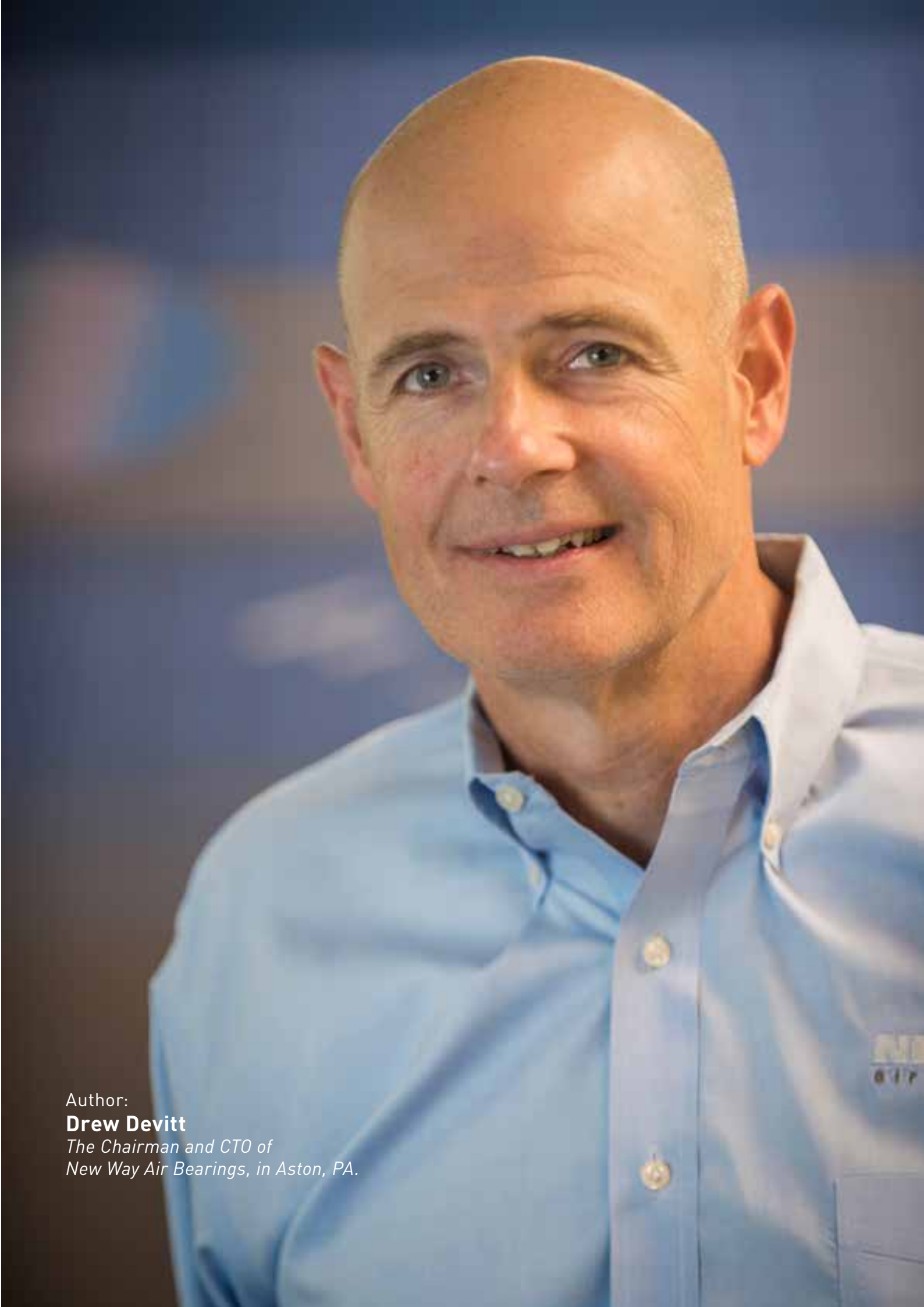
— Figure 2

CT Product Manager Robert Popilock, their clinical partners were “interested in performing CT examinations of the heart, requested a system capable of faster rotation speed to improve the likelihood of capturing a “snapshot” (Figure 3) of the vessels supplying blood to the heart wall at the most quiet state.1 ” The solution they found also solved many of the other problems of building precision CT scanning equipment.



—Figure 3

They started to evaluate air bearings for support of the rotating X-ray equipment. Air bearings have speed limitations far in excess of the speeds they needed. In fact, neither speed nor travel distance are



Author:
Drew Devitt
The Chairman and CTO of
New Way Air Bearings, in Aston, PA.

factors of wear in an air bearing system, thus improving reliability and reducing the cost of ownership for their customers. Still, there were more advantages; there was no need for periodic oil lubrication, no oil contamination of other system components, and no smell from the warm oil. The air bearing was entirely silent and could be located at the perimeter of a much larger ring. This avoids the sound and vibration of the 1-meter rolling bearing at over 200rpm carrying the 1.5 tons of equipment only inches from the patients face and increasing their heart rate. The air bearings were able to support a 1.68-meter diameter race at the perimeter, well away from the patient and at 220rpm giving 1 rotation every .27 seconds. This was fast enough to image the whole heart during a resting phase and met the requirements of the project.

During the development phase of the machine, a fully loaded 2m diameter race was spun at 500rpm successfully. This is in excess of 50m/s at the bearing and resulted in a revolution every .12 seconds. This speed though exceeded the centrifugal force that the sensitive X-ray source can withstand and was faster than needed. But the bearings were no longer limiting the machines performance.

The bearings were also crash tested during this development phase. At 300rpm the air supply was turned off intentionally, letting the fully loaded 2-meter diameter rotor land on the bearings without air supply and come to a stop from Coulomb friction. This was done not once, but 100 times. After this endurance test, the air bearings still operated as they had prior to the test. This proved out the lubricity and non-scoring nature of the porous carbon air bearing faces provided by New Way Air Bearings and was an important confidence builder for Philips Healthcare.

Still, there are more advantages to air bearing systems, one being increasing the resolution of the system over the rolling element bearings. This became apparent during the measuring of the precision of the axis of rotation. Axis of rotation metrology is defined in the standards under ASME B89.3 4-1958 (“Axes of Rotation, Methods for Specifying and Testing”) and ISO-230-7 (“Geometric Accuracy of Axes of Rotation”). These are the standards used to qualify the likes of roundness measuring machines and precision machine tool spindles. Targets are mounted on the rotating part and precision sensors (usually capacitance probes) are used to measure axial and radial displacements (Figure 4). Although both the air bearing and rolling element systems have error motion, rolling element systems have relatively high asynchronous errors. These are errors that are different every time around and result from the fact that rolling element bearings have more than one rotating component. For instance, the rotating race is not perfect, neither are all the rollers and because they precess in the outer race with different frequencies they are in a different relative position each time around. “This results in asynchronous errors that, by example in other applications, are associated with surface finish limitations in single point turning or roundness errors when grinding large gears that only rotate a few times.2” In CT scanning using rolling bearings, the issue is that at a given speed the source and detector are in a slightly different place relative to the patient in each rotation. The air bearing system though has only one rotating bearing element. So, although there are synchronous errors, these errors are the same each time around and based on the shape of the rotating race, at least the source and the detector are in the same place each time around relative to the patient. This improves the image resolution capability of the air bearing system.

—Figure 4

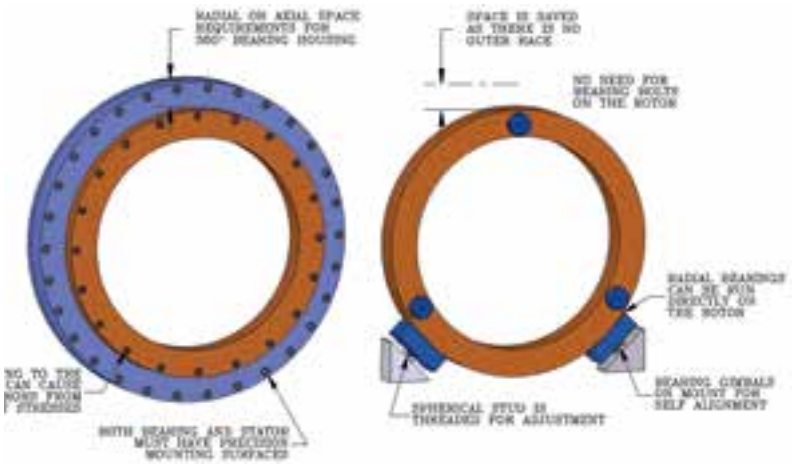
This conversation about precision leads to other cost and bearing life issues. Large roller bearings or slewing bearings require a continuous and precise mounting surface on the stator to receive (and since nothing is perfect elasticity average) the mounting of the precision machined stator side of the bearing. The same precision surface is required on the rotating component being supported that bolts to the rotating bearing race. Machining inaccuracies in any of these surfaces can cause huge increases in the Hertzian contact stress of the rolling elements and raceways.

Precision surfaces on large components are both a cost and supply chain issue, but the issue does not end there. There is a tension between the desires of light weight and high precision. A medical scanner cannot be designed with the stiffness and mass of a metal cutting machine tool, it would fall though a hospital floor, so when a medical scanner stator is machined on a vertical axis machine tool it may be near perfect, but stand it up in its horizontal axis operating condition and that precision surface may well change, mount the rotating component and 1.5 tons of asymmetric mass off that precision surface and the surface will certainly change, now spin that mass at over 200rpm and it will make the bearing races oval instead of round, splaying them open on the cantilevered mass side. This exacerbates the asynchronous precision issue discussed above and causes the bearing manufacture to build in more “safety factors” and cost to avoid premature failures. When we consider the air bearing alternative employed by Philips

Healthcare, yes, the larger rotor costs more than the inner race of a rolling bearing, needs precision machining and is subject to the same loads of as rolling bearing but there is no stationary race. The air bearings require just two relatively small and light radial air bearings supporting the rotating mass, so the stator does not require precision machining (Figure 5). These air bearings mount on self-aligning features so their faces align naturally to the rotor surface. These air bearings are also kinematically correct, so exact force paths are known through the bearings and into the stator structure simplifying FEA analysis with neat and closed equations (Figure 6).

— Figure 5 – A typical assembly consists of two radial air bearings (rear) and six axial air bearings (front).

The axial bearings mount the same way and are also kinematic with the 3 bearings establishing the vertical plane the same way a three-legged bar stool will not rock. On large rotors the length of the radial air bearings becomes very small percentage of the rotor circumference, this allows surprisingly large mismatches



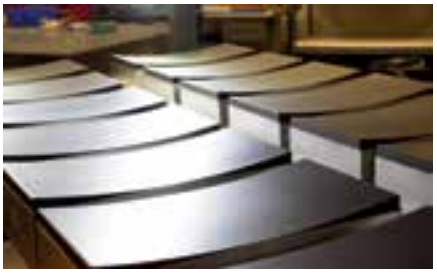
— Figure 6

—Figure 7

in the relative radius of the air bearings and rotor, so the air bearings and rotors may be sourced though different vendors since matched sets are not necessary.

Philips Healthcare started with their fresh design effort early in the 21st century knowing they needed to increase scanner speeds. Air Bearing support had the speed and other advantages they were interested in. Ultimately, they selected porous carbon air bearing technology from New Way Air Bearings, who worked with them through a six-year development. In November 2007, Philips introduced the Brilliance iCT Scanner at the Radiological Society of North America Annual Meeting using “AirGlide” technology. Today, there are over 1,000 Brilliance iCT Scanners in the field using New Way Air Bearings with an excellent reliability record.

—Figure 8



— Figure 9

— Figure 10

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References

1. Radial Air Bearings Help CT Scanners See into Your Heart
By Robert Popilock, Senior Product Manager, CT, Philips Healthcare, and Drew Devitt, Chairman and Chief Technology Officer, New Way Air Bearings
https://www.designworldonline.com/radial-air-bearings-help-ct-scanners-see-into-your-heart/
2. Axis of Rotation Metrology for Improved Gearing
By Drew Devitt, Chairman and Chief Technology Officer, New Way Air Bearings
http://gearsolutions.com/features/axis-of-rotation-metrology-for-improved-gearing/

The largest bearing warehouse *in Italy* OPENS THIS YEAR

Europe has a new world-class bearing warehouse: the **“ Green Logistic Center “** of ISB Industries. The global specialist in bearings, seals and linear systems will unveil his new warehouse the this year: the 3th largest bearing warehouse in the continent, the largest in Italy ever built.

Powerful logistics, shorter delivery times

In the heart of Italy, in the city of Rubiera (located between Parma and Bologna), ISB Industries teams are actively working to prepare one of the biggest events in the company’s history: the opening of the largest warehouse ever built in the country, the third largest in Europe. The Green Logistic Center, referring to the color and identity of the company, will feature complete modern automatic pallet robots for a total store capacity of 56.000 pallets, which will allow the customers to place orders directly from their SAP and benefit shorter delivery times. And there’s more coming.

Quality standards to the next level

Cristina Vignoli, Head of Marketing and Public relations announces: “We talk about an investment of 16 million euros for the whole infrastructure. This amount includes a third enlargement step: the new Technical Center, which will be

presented during the same occasion. This center will gather all activities; Technical Offices, Laboratories, Quality Control and a Conference Room that can host up to 200 people. This way, we'll be able to perform additional quality controls on bearings and components arriving from the factory. "

A long tradition of continuous improvement

The company was founded in 1981 by Romeo Ghirardini, still owner and President of the company. First under the name « Italcuscinetti », the group expanded internationally and changed his name into ISB, « Italy Standard Bearing », and finally to « ISB Industries ». Today, the company has branches in South America, India, Europe and Russia, giving the group an important footprint and knowledge in many different industries. Apart from the production of rod ends in Italy which is a historical specialty, the main production sites are located in China. Quality controls and procedures are at the top of ISB preoccupations, as Cristina Vignoli explains: " We are working on further investments and innovations in the coming months, including new branches abroad, the opening of new ISB Service points in Italy and possible acquisitions of new production plants."

When and where?

The inauguration of the Green Logistic Center takes place during the first part of 2019 in Rubiera, right next to the ISB Industries headquarters. It will be a great opportunity to discover all the new possibilities offered by this new logistic center, and meet the management and his staff.

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JESA builds a brand-new factory for its Chinese entity

JESA is a specialist in the development and manufacturing of high-quality bespoke bearings, as well as in combining them with machined / stamped parts and engineering polymers. After having been active in China for over 30 years, and in order to become a main player in the market of quality bearings for the automotive and high-end textile industry, JESA has transferred its production site from Shanghai to Wuxi in 2014. As it is undergoing massive growth, JESA's Chinese entity has moved last summer into its new, larger and more modern premises, thus allowing for the rapid development of its activities. JESA will be celebrating its 50th anniversary this year.

—Image 1: new factory in Wuxi (China)

— Image 2: Grinding, JESA Wuxi (China)

New factory and new production lines to increase capacity

The new factory mainly specialises in developing and producing high-quality bearings for the automotive industry and high-end industrial applications, as well as in overmoulded parts for

the industry, automotive, textile and automatic sliding doors, such as for high-speed trains and metros, segments.

Fully automated grinding and assembly lines fulfil the requirements of high-volumes and high-quality defined by the automotive standards. In addition, the new factory's organisation, processes and layout are entirely based on modern production standards and are fully in line with our customers' high requirements in terms of quality and logistics.

A new factory that is IATF 16949:2016 CERTIFIED

Having been certified for automotive since 2015, JESA has received in August 2018 the new IATF 16948:2016 certification for its new production site, in addition to the environmental certification ISO 14001:2015.

Special attention has been given to process control. All installations have been equipped with SPC systems (Statistical Process Control), to ensure high levels of reproducibility and quality.

An important step for JESA's development

Thanks to its entities in Switzerland and China, both equipped with modern and complementary production sites, JESA reinforces its global presence and its ability to develop and produce bespoke bearings, as well as innovative and flexible solutions to suit the requirement of its partners. By harnessing our engineering and manufacturing resources in China and in Switzerland, in combination with our network of trusted suppliers, JESA is able to collaborate with large international groups across the world, to locally supply high-quality products and services, as well as to react quickly to the demands of an ever-evolving market. JESA guarantees smooth co-operation, accountability and high-quality service to our customers thanks to highly skilled, multi lingual sales, engineering, and customer service teams in Switzerland and China.

— Image 3: Overmoulded bearing, textile industry

— Image 4 : Jubilee logo

50 years experience

2019 will be jubilee year for JESA. Founded in 1969 by Joseph Egger, the Swiss company is celebrating its 50th anniversary as the ball-bearing specialist; this is a perfect opportunity for JESA to show its know-how during various events, especially during ITMA, the world's largest exhibition for textile machines, which will be held in Barcelona (Spain) from June 20th to June 26th, 2019.

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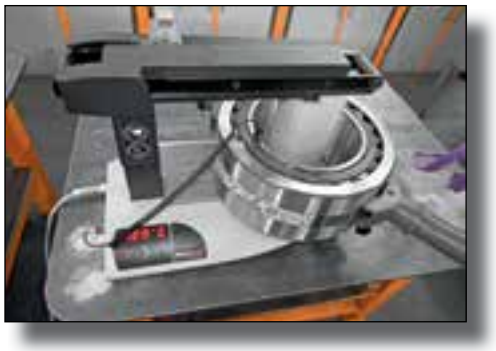
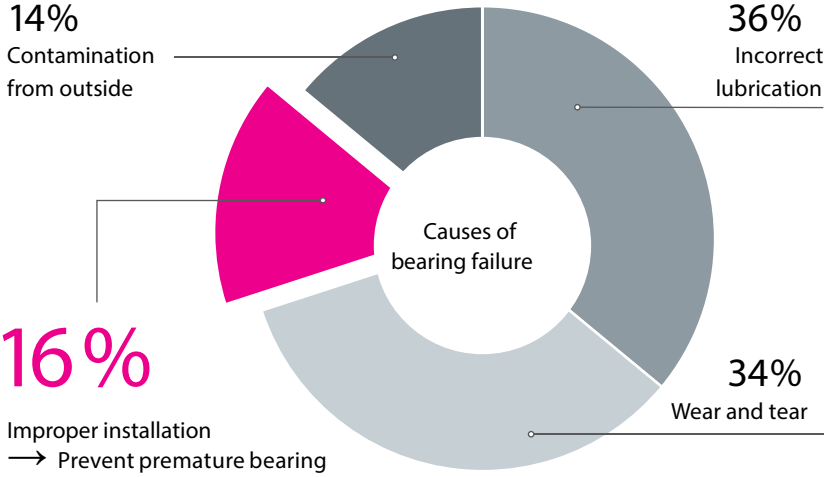
More information on p.124





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Durable Roller Bearings

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Nachi, pioneer in manufacturing of roller bearings, being recognized for its high-quality roller bearing sets for the famous Japanese high-speed train Shinkansen presents its wide range of high-quality roller bearings for use in automation and machine tools during Hannover Messe 2019.

Nachi Europe GmbH, Krefeld, subsidiary of the Japanese engineering trust Nachi-Fujikoshi Corp., shows its comprehensive range of roller bearings during hannover trade fair (Hannover Messe Industrie - HMI) 2019 from 1st to 5th of April. These bearings fulfill the highest demands concerning an efficient and long lasting support of shafts and axles under various conditions in a variety of industrial branches.

The Japanese parent company proves this while being recognized for its high-quality roller bearing sets for the famous Japanese high-speed train Shinkansen since the beginning of the first train in 1964 until today. Since then technology „Made in Japan“ is being recognized as worldwide leading.

Concerning roller bearings the range of the european subsidiary Nachi Europe GmbH includes single and double row deep groove ball bearings as standard and precision types, cylindrical roller bearings, tilted roller bearings, single and double row angular contact ball bearings. There are different types of each kind of bearings available, e. g. with or without single or double sided sealings made of metal, plastics or rubber.

Cylindrical roller bearings are available as standard or as full complement types, as single and double row types as well as with or without grooves for snap rings on the inner and the outer bearing ring.

Especially for the support of spindles in machine tool Nachi delivers angular contact ball bearings with reduced bearing clearance and as pre-loaded bearing-sets.

Due to their excedingly operation durance, their smooth and noiseless operation, their reliable life-time lubrication and their complete sealing double-sided sealed deep groove ball bearings care for a maintenance-free support of shafts in automotive air-conditioning and compressors over the life-time of the automobiles.

Nachi‘s spherical roller bearings have – compared to types of competitors – significantly higher load ratings with the dimensions being identical. Specially designed, strong types operate extended periods under severe vibration conditions. They are especially suitable for operation of cranes, construction machinery and mining plants.

High-quality due to depth of production

The depth of production of the Japanese engineering trust significantly contributes to the high quality and the long service time of Nachi‘s roller bearings. The company in Japan has all the production steps and processes from steel plant and forming the blanks across the manufacturing, the heat treatment and the coating technology to the assembly and the mounting of complete bearing sets. E. g. especially pure steel grades are melted and alloyed in Nachi‘s steel plants for use as bearing rings, balls and rollers. Moreover the japanese experts have extensively optimized the design and the surface geometry of the balls and of the bearing raceways. Therefore Nachi‘s roller bearings operate extremely smooth and precise. Since the engineering trust produces hydraulics,

— CRB

NACHI‘s precision cylindrical roller bearings can handle large radial loads and are preferred in high-speed applications, e. g. in machine tools.

— Sheave Bearing + Crane

NACHI‘s highly durable sheave bearings fulfil a variety of demands of industrial applications such as container cranes, crawler cranes, rope excavators and freight elevators in mining plants.

— Toyama Steel Mill

NACHI established Higahsi-Toyoma steel mill as an integrated manufacturing system to cover the handling of materials through to final Production.

robots, machine tool and cutting tools as well, the specialists can proove the quality of their roller bearings within the company not only metrological but also under real operation conditions.

A pioneer with comprehensive know-how

Due to various outstanding inventions the mother company in Japan is worldwide known as a pioneer in roller bearings technology. Already in the year of 1939 Nachi produced its first deep groove ball bearings. Since then until today the manufacturer has continually developed its wide range of roller bearings. As the first manufacturer worldwide, already in 1949 the japanese company presented spherical roller bearings especially designed to operate reliably on oil-platforms. Today the global acting trust has subsidiaries and distributors in 53 countries and nearly 6000 employees worldwide.

— 1939er Packshot

NACHI has been developing rolling bearings since 1939. These durable allrounders have solved many problems in a wide variety of applications all over the world.

— Shinkansen Bearings

NACHI has established a broad range of different kinds of highly durable, precise roller bearings carrying high loads while achieving a very long service life.

Bearing *Insulation* Prevents Electrical Current Damage

Insulated bearings prevent premature bearing failures eventually caused by stray electrical currents. Insulation properties must remain stable regardless of environmental conditions, in particular when bearings are stored, handled and operated in humid climates.

Author: Karl Preis, Coatings Technology Expert, Skf Österreich AG, Steyr, Austria

Why insulating bearings?
Bearing damage can occur when electrical currents use the rolling contact as a conducting path.

Today, a number of publications are available that deal with this matter, including discussions about root cause and counteractions, for example [1, 2, 3, 4].

The tribological regime of a bearing determines the electrical behaviour of the rolling contact and the possible outcome.

In the conductive state the bearing is at a standstill and shows a low ohmic resistance. Due to the relatively good metal-to-metal electrical contact, only very high amperage currents such as welding currents are able to destroy the raceway surface.

— Fig. 1: Outer ring raceway of a deep groove ball bearing showing a frosted running track (microcraters) due to passage of a damaging electrical current.

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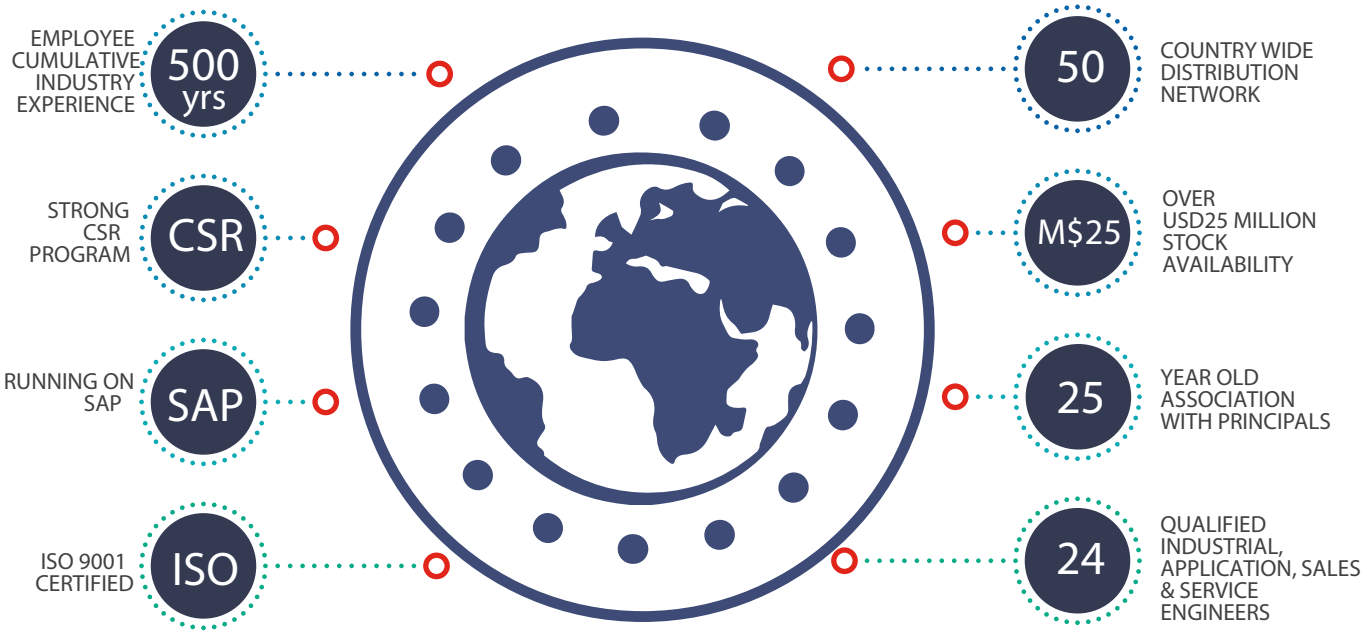

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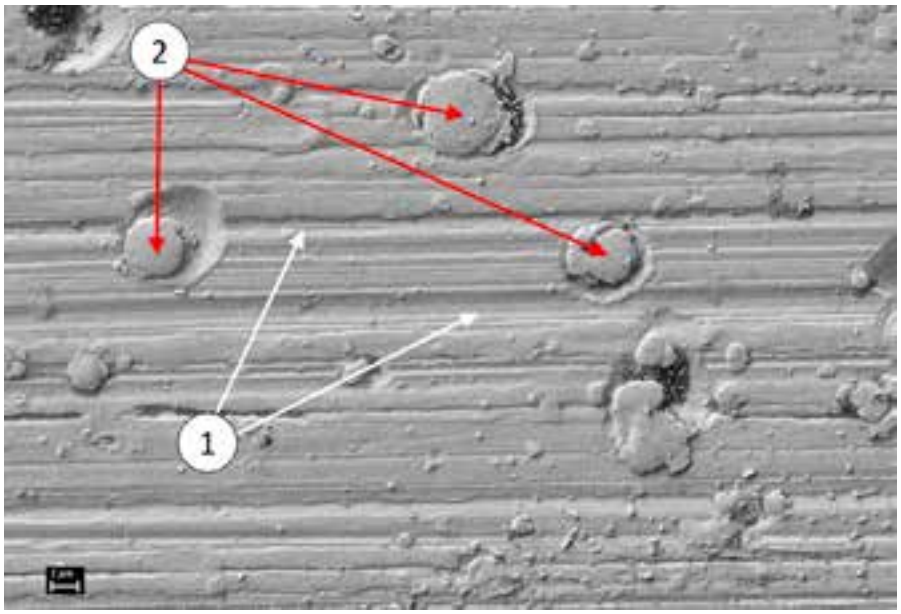

— Fig. 2: SEM image of a bearing raceway surface showing microcraters from passage of a damaging current: (1) surface finishing marks, (2) microcraters.

The resistive state is present if the bearing is in a mixed lubrication regime with increased ohmic resistance. In this regime, low electrical currents in the range of a few amperes have the potential to be dangerous.

In the capacitive state the bearing is in a full film lubrication regime, and it acts like an electric capacitor with a specific breakdown voltage. If the applied electric field strength present in the lubrication film of the contact zone is high enough (in excess of the threshold value) electric discharges, called EDM (electric discharge machining) currents, will occur.

All damage cases have one thing in common: the contact area of the raceway becomes molten locally and the material properties of the steel in that area are changed. Additionally, the properties of the lubricant might be altered. This has a negative effect on the bearing performance in the form of raceway and lubrication damage and consequently results in increasing wear and bearing vibration levels. The effect of EDM currents, visible as microcraters, is shown in figs. 1 and 2. Microcraters are a consequence of high-frequency bearing currents. Today, this kind of damage is most commonly observed in applications using frequency convertors.

One solution to counteract the possible destructive effects of damaging electrical currents is to use electrical insulation integrated into the bearing.

INSOCOAT – a bearing with an integrated thermal spray coating

INSOCOAT bearings provided by SKF are bearings equipped with an electrically insulating coating applied to the outside surfaces of the bearing outer or inner ring to integrate the insulating function into the bearing. The coating material is of oxide ceramic nature (fig. 3) and applied on the bearing by using thermal spraying . Most commonly pure Al_2O_3 is used. Sometimes oxide mixtures are applied because of different desired electrical and mechanical properties of the resulting coatings [5, 6]. During spraying, oxide particles are transported through a hot plasma stream where they become molten. This hot gas or plasma stream transports most of the molten particles to the pre-treated substrate, where they cool down and form the desired coating.

Fig. 4 shows the microstructure of the resulting coating on a bearing outer ring.

After spraying, the coating shows a certain amount of open and interconnected pores, a common property of thermal spray coatings. The amount and appearance of porosity depend strongly on the coating process parameters. It is easy to understand that porosity closing, “sealing”, is crucial in thermal spray processing. This reduces the risk of corrosion, improves the mechanical properties and keeps the insulating properties constant, which is very important in humid climates.

Fig. 4 shows the microstructure of the resulting coating on a bearing outer ring.

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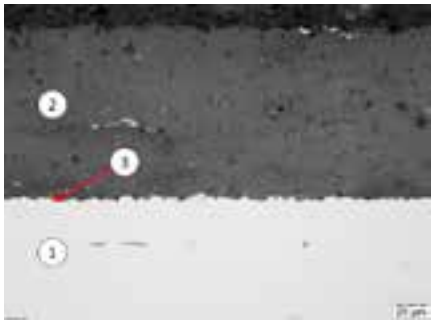
Fig. 5 shows an example of closed porosity, a typical pore that is interconnected with smaller pores in a thermal spray coating. Many different sealing strategies have already been discussed in the literature [5, 6, 7]. For electrical insulating thermal spray coatings, the most practicable is a sealing step with organic sealants. Possible sealants have different properties in terms of viscosity, curing temperature, evaporation characteristics, shrinkage, etc. The entire process, thermal spraying and sealing, needs

—Fig. 3: INSOCOAT bearings – left: previous-generation coating (light grey colour); right: new-generation coating (dark grey colour).

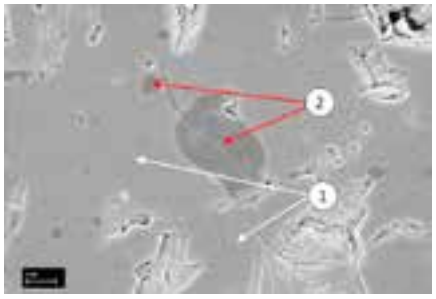


— Fig. 4: Cross section of the INSOCOAT coating on a bearing outer ring: (1) bearing steel, (2) thermal spray coating, (3) coating interface.

to be thoroughly evaluated to reach the desired coating properties.

Previous generation INSOCOAT – shortcomings and solution

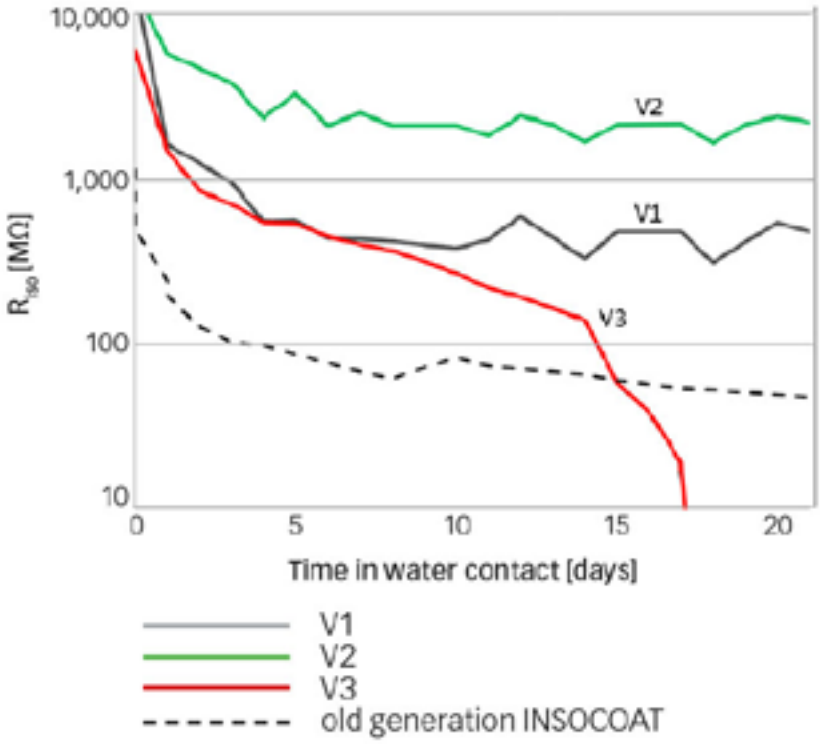
In a number of applications in very hot, humid climates, low insulation resistance values of the previous INSOCOAT bearing generation were detected. The resistance of electrical insulators is always a combination of its surface and volume resistance [8]. In addition to fundamental material properties, both parts are a function of humidity and temperature. While the surface resistance part reacts



— Fig. 5: Thermal spray microstructure in SEM – sealed pores in insulating coating: (1) oxide material, (2) sealed pores.

immediately to a change in climate, the volume resistance part changes over a longer time period. If the insulating properties are out of the desired range, the whole insulating coating system has to be improved [5, 6, 7].

Experiments on previous generation INSOCOAT bearings verified the issues claimed in the field by analysing INSOCOAT's electrical resistance in direct contact with water1. It turned out that the coating absorbs water on a long time scale and the effect was completely reversible after drying. Due to the long-time process of the resistance drop, surface currents, open porosity or cracks have been excluded as root cause. Therefore, the coating material, oxide and/or the sealant itself has to be the root cause. As a consequence, extensive research and testing activities have been started. It has been necessary to evaluate different coating and sealing strategies to find a solution. For example, different spray powder materials, sealants, curing processes and thermal spray strategies have been tested. A first evaluation was done as mentioned above, in direct contact with water. Although this test represents unrealistic conditions (in real applications the bearing or the motor is not immersed in water), it gives a very quick and sensitive feedback about possible success or failure. Some test results of good (V1 & V2) and negative examples (V3) are shown in fig. 6, always in comparison with the previous-generation INSOCOAT bearing variant. V2 was the best candidate for the new INSOCOAT generation.

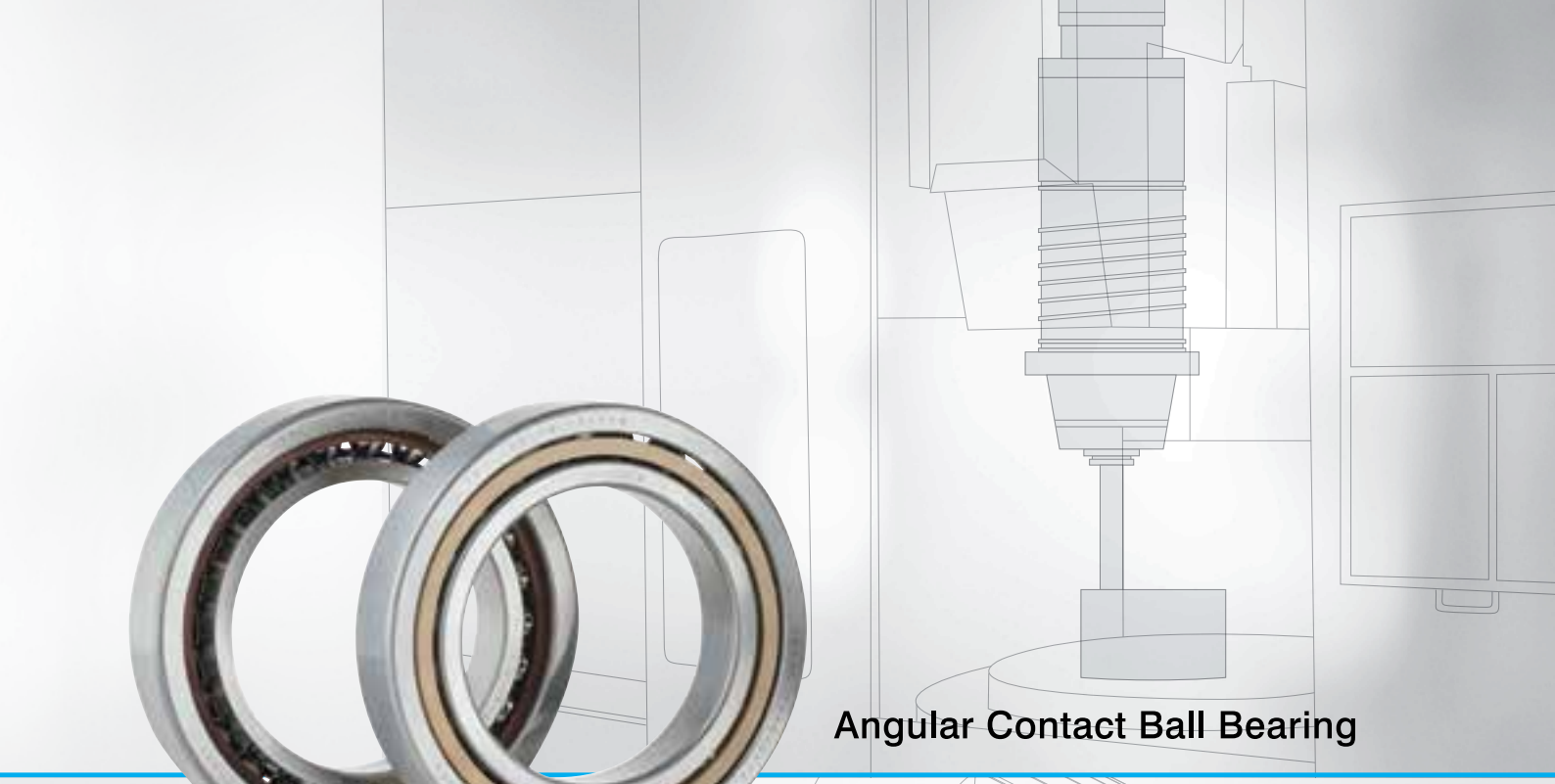


— Fig. 6: Electric insulation test results in direct water contact; mean values.

New-generation INSOCOAT bearings

Fig. 7 shows the electrical performance of the new-generation INSOCOAT bearings in comparison with the previous variant under real conditions. This means that the bearings are mounted as they are in the field and exposed to varying climatic conditions in a climate chamber. The measuring set-up is shown in fig. 8. The test results show that the new INSOCOAT variant is much less sensitive to humidity than the previous bearing generation.

Even at relative humidity levels greater than 90 %, at a temperature of 30 °C, the ohmic resistance of the tested 6316/



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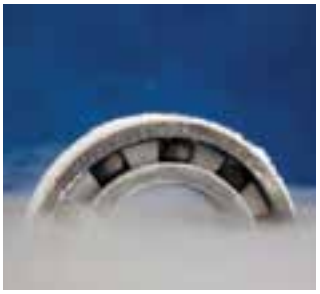

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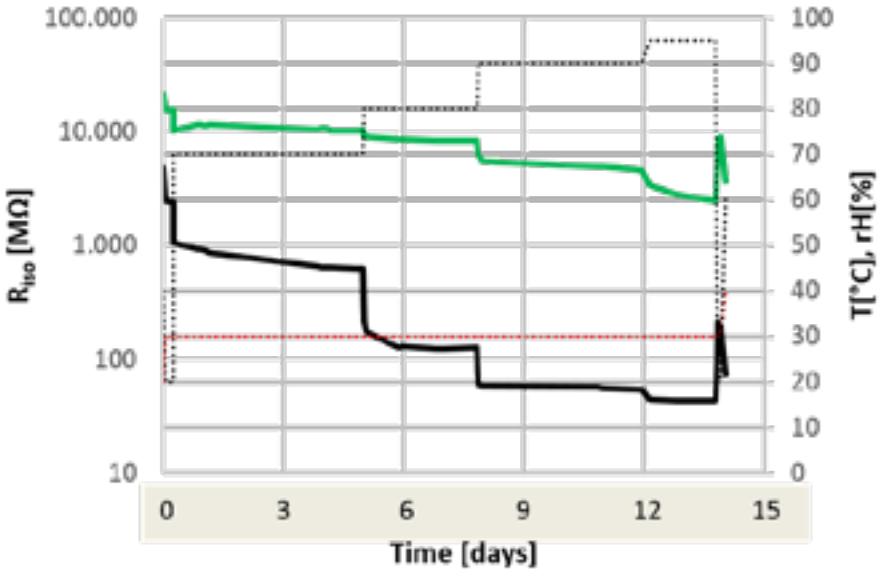


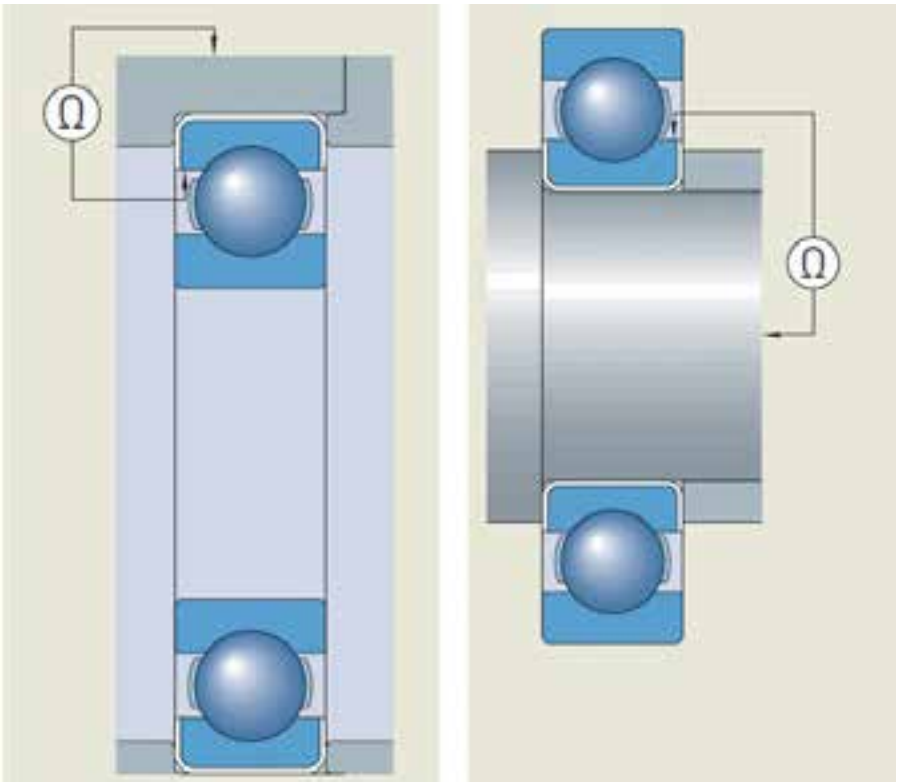
—Fig. 7: Insulation test results in mounted condition – comparison of previous generation and new INSOCOAT bearing variant; controlled climate conditions in a climate chamber.

C3VL0241 bearing stays above 2,000 MΩ, whereas the previous variant drops down just above 50 MΩ.

1 Water with a certain conductivity

References

[1] Preisinger G.: Prevention of electric erosion in bearings, SKF Evolution, #2-2001 (http://evolution.skf.com/prevention-of-electric-erosion-in-bearings/)
[2] Mütze A.: Bearing currents in inverter-fed AC-motors, TU Darmstadt, 2004
[3] SKF, Bearing damage and failure analysis, PUB BU/13 14219 EN, 2014
[4] ISO 15243, Rolling bearings – damage and failures – terms, characteristics and causes, second edition, 2017
[5] Fauchais P.L.: Thermal Spray Fundamentals, Springer, 2014
[6] Pawlowski L.: The science and engineering of thermal spray coatings, Wiley, 2008
[7] Knuuttila J.: Sealing of thermal spray coatings by impregnation, ASM, 1999
[8] IEC 62631-3-3: Dielectric and resistive properties of solid insulating materials – Part 3-3: Determination of resistive properties (DC methods) – Insulation resistance, 2015



— Fig. 8: Mounting condition and measuring principle.

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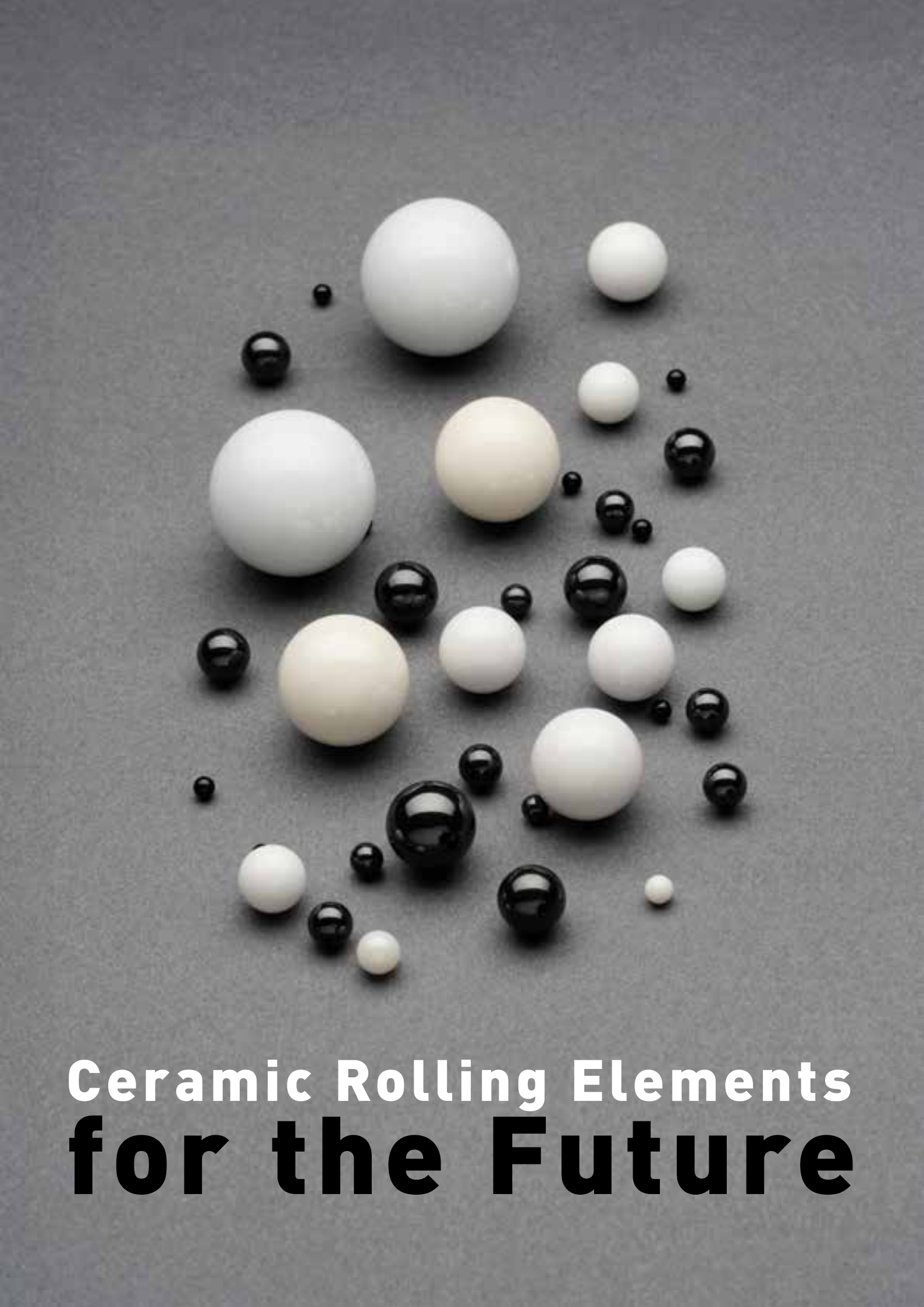

Ceramic Rolling Elements for the Future

New investments by Tsubaki Nakashima to enhance technology and expand production of ceramic material rolling elements.

Rolling elements produced from high-performance speciality ceramic materials are increasing in demand to serve the growing market needs. From the early development of bearings using ceramic rolling elements in machine tool spindles, to the adoption of ceramic materials used in electric motors and fuel injectors, the market has demanded increasingly higher bearing performance in applications where low lubrication, high speeds, high temperatures, or electrical conductance are present.

Major Automotive Tier 1 suppliers are developing, or have announced, plans for various electrification initiatives in the mobility segment. These companies are developing systems specifically designed for hybrid and electric vehicles, including powertrain products, drive products, and both high voltage and low voltage electric motors. These systems and products require an increasing need for specialty bearings using ceramic rolling elements.

The material properties of ceramics, and silicon nitride in particular, are especially suited for these applications. The combination of fracture toughness, hardness, and corrosion resistance provide the optimal combination of properties to overcome the limitations of standard steel bearings.

These mechanical properties make the rolling element manufacturing process a challenge. The high precision surface finish and diametrical tolerances can only be achieved through a process of successive fine grinding and lapping operations.

Beginning with a ceramic blank a diamond grit slurry is used in successive operations for the process of stock removal and surface finish conditioning. The grinding and lapping processes are time intensive due to the hardness of the ceramic material and the relatively low pressure that must be used in the stock removal process. It is not uncommon for the process to take months from start to finish, especially if the application demands sub-micron dimensional tolerances.

Minimal cost is achieved by efficient usage of resources and a high level of automation. Every step of the manufacturing process requires the highest precision, especially the initial blank where we partner with the blank suppliers to minimize the usage of resources including material. This has also a very positive influence on the Environmental Impact.

Tsubaki Nakashima has been producing products from ceramic material for more than twenty years and is now in the process of expanding production capability and production capacity at several make-sites worldwide. Investments are currently planned for the facilities in Japan, Thailand, and the United States. The driver for this expansion is not only the ever-increasing technical requirements, but also the increasing conversion in the market from standard bearings to speciality ceramic element bearings. Tsubaki Nakashima has seen a production output growth of more that 50% over the past three years, with continued growth projected into the mid-term.

The full production range of rolling elements and components from Tsubaki Nakashima includes balls from steel, tungsten carbide, ceramics, glass, and plastic; as well as tapered rollers, cylindrical rollers, spherical rollers, stamped and welded bearing cages, sheet metal parts, ball screw, linear motion systems, and industrial air blowers.

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The value of OEM designed and validated **automotive bearings for the aftermarket**

Traditionally the global independent aftermarket for automotive repair parts is flooded with a wide range of more or less validated parts from a vast range of suppliers.

In many cases, the parts are not more than dimensional copies made from random materials by non-certified companies. On the other side of the spectrum we see parts that are virtually the same as the original parts validated by the carmakers as OEM (Original Equipment Manufacturing) and OES (Original Equipment Service) parts, but then supplied to the independent aftermarket as well.

The unique added value of OEM validated parts for the users, compared to 're-engineered' or 'copied' parts is very often misunderstood or at least misjudged.

This paper intends to explain the background of the OEM validation process that is used by carmakers in cooperation with their selected suppliers to make sure that the parts are optimized for their specific application, from a cost, performance, quality and appearance point of view.

Designing, developing and validating a new component for a new car model

When a carmaker starts the development of a new car model it will typically ask a selected number of key suppliers to quote on the project. The project consists of the design and validation phase and, after SOP (Start of Production), the production phase.

After nomination of the supplier the development of the part is started which should finally result in the full validation, just before SOP. This trajectory is often called 'from nomination until SOP' and can take 2-4 years depending on the carmaker.

The design and development of a car component for a new application is an iterative process, where car maker and supplier engineers and manufacturing experts work closely together to improve the design in a step-by-step fashion.

If we take the example of the development of a new wheel bearing, during the process the parts are tested by the supplier in in-house bench tests, like: accelerated life tests, thermal shock tests, fatigue life tests, muddy water tests, desert sand test (the 'Arizona dust test' is notorious due to its penetrant particles, testing sealing and contamination design tolerance to the extreme), temperature cycle tests and corrosion tests.

In parallel the carmaker will test the wheel bearing in prototype cars used for in-house bench tests, test track tests and field tests like winter tests (extreme cold) and summer tests (extreme heat).

This whole validation process will lead to a fully optimized part, which will be suitable to perform its duty alongside the surrounding parts during the specified life (typically at least 240,000 km on a modern car). As all carmakers know, a careful validation is critical for the performance of the car in the field and early recalls are costly and detrimental to the image, something to be avoided at all times.

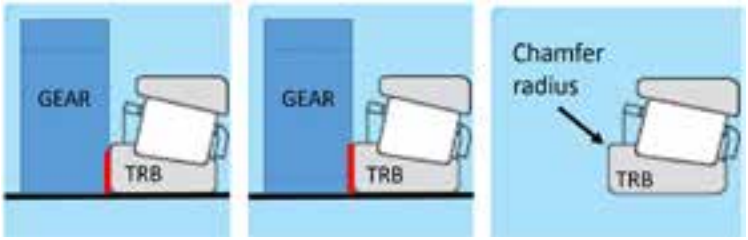
Case studies

As can be seen from these short case studies (all from the bearing industry), the interdisciplinary cooperation of engineers from both supplier as well as carmaker is essential to create optimised products for the specific application conditions that are expected in daily operation.

Clearly, from these case studies it can be understood that design 'copies' can lead to serious damage.

In the case of the tensioner pulley, the importance of proper plastic pulley design and the corresponding inertia of the system is demonstrated to avoid

Case 1: Optimised chamfer on TRB for transmission



After testing a new transmission it appeared that an adjacent gear was insufficiently supported and showed too much deflection, ultimately leading to early failure.

After analyzing together with the supplier, the solution was found in reducing the chamfer radius of the TRB cone side face, compared to the 'catalogue design' standard, resulting in sufficient contact/support area for the gear.

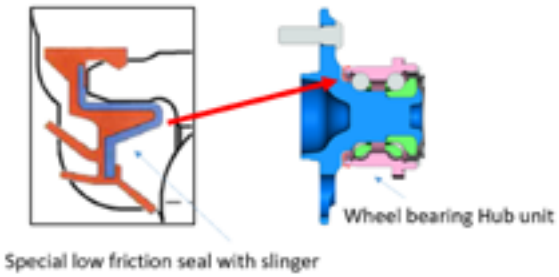
In the repair market, often standard/catalogue design products are offered for repair, leading to problems in the repaired transmission in operation and ultimately leading to early failure.

Using OEM validated parts is the only way to be assured of having the best 'custom made' and officially tested and validated parts for repair.

Case 2: Tensioner pulley with optimized mass/inertia

During the development of a new bearing pulley for an auxiliary belt tensioner it was recognized that the material and weight of the pulley is key for optimal operation of the whole belt system. To optimize the life of both the pulley as well as the whole belt system, it is essential that the components are not only optimized to attain the specified life, but are also optimized to minimize vibrations and resonance effects in the complete belt system. Typically PA66 or phenolic resin and a very specific pulley design are developed, by the engineers of both the supplier and carmaker, to reach the required specifications. What we can often see in the aftermarket are 'copied' parts that are made of different materials, even solid steel, which may result in early failure of the pulley and its surrounding parts.

Case 3: Wheel bearing with optimized sealing system



When a new wheel bearing is developed for a specific car model one of the challenges is to optimize the life of the bearing, by using an optimized sealing system to keep contamination out and the lubricating grease inside, while minimizing the friction to help improve fuel efficiency and CO_2 emission. Both engineers from the supplier and the carmaker work closely together to test the seal in house and in the field, under all possible operational conditions, to make sure that all required specifications are met. Copied wheel bearings that we find in the aftermarket often lack the design sophistication that is required for an optimal performance, leading to early failure in the field.

vibrations and resonance effects that would lead to early failure of the auxiliary or timing belt system. In the case of the taper roller bearing design for a transmission shaft, the critical chamfer of the TRB cup side face is described which should provide the optimal adjacent gear support, to avoid early failure. In the case of the seal for the wheel bearing hub unit, it is clearly explained that using wrong/imitation products can easily lead to early failure due to intrusion of contamination and/or bleeding out of lubricant.

Conclusion

Designing and developing a suitable automotive part is a meticulous multidisciplinary process involving both engineers and experts from the supplier as well as from the carmaker.

Copying the design for the aftermarket is not only about applying the same nominal dimensions, it is also about tolerances, material properties, surface treatment and proper mating parts. Therefore using OEM validated parts is the best warranty that they will perform according to the specifications required to assure the proper long lasting performance in the field.

Koyo bearings

Koyo Bearings, a division of JTEKT Corporation, is a major developer and supplier of automotive bearings to the global automotive industry OEMs and aftermarket. The large range of OEM validated parts that are offered to the aftermarket are actually the same parts, from the same production processes as the ones that are originally supplied to the carmaker (as OEM parts) or the carmaker dealer network (as OES parts). The only difference is the marking and the special individual packing for distribution to the independent aftermarket.

Should you be interested to learn more, please do not hesitate to contact: Edward Korver (Edward.korver@jtekt.com) or Jaap ten Kate (Jaap.tenkate@jtekt.com).

ABB *Integrates IIoT* into the Bearing Applications

ABB has recently introduced the ABB Ability™ Smart Sensor technology for mounted bearings that enables health checks for bearings. The wireless sensor provides an early indicator of potential problems by assessing the condition of bearings. This allows operators to schedule maintenance and prevent unexpected downtime.
The ability to monitor bearings remotely allows maintenance and other relevant personnel to safely access the health data of the bearing without touching equipment.

With this new solution, ABB Ability™ aims to connect the users to the power of the Industrial Internet of Things (IIoT).
We talked with Mr. Artur Rdzanek, product manager for sensor technologies, Dodge mechanical products at ABB, to learn more about this new technology.

What is your role in the company?

I am the Global Product Manager for Sensored Products for Dodge mechanical power transmission products. In this role, I oversee the development of sensor technology for Dodge bearings, gearing, and coupling products.

Can you explain the difference between ABB Ability™ Smart Sensor and Digital Powertrain?

The ABB Ability Digital powertrain is a suite of digital solutions including devices, software and services. It combines connectivity and data analytics with ABB expertise to make your operations efficient, predictable and safe. The ABB Ability Smart Sensor for mounted bearings is part of the ABB Ability Digital powertrain.

Which conditions of the bearings are checked with the smart sensor?

The ABB Ability™ Smart Sensor for mounted bearings measures temperature and vibration of the bearing, as these are the first indicators of a potential problem in a bearing. By understanding the health of your bearings, you know when maintenance is needed before it's too late.

How can potential customers integrate the system on their assets? Is it easy to use? Installation and portal setup

The Smart Sensor easily threads into your bearing and is activated by pressing the button until the LED is visible.

Commissioning the bearing on the portal is easy. The app will walk you through the required information and how to assign your asset to the organization and group. The web portal uses the same registration information and allows you to quickly see trends across your bearings, and alert you to potential problems.

The ABB Ability portal uses an open architecture so that is easy to integrate data into customers systems if they desire.

For which industrial applications is this solution developed?

The ABB Ability Smart Sensor for mounted bearings is suited for any application. We know that applications such as aggregate, mining and air handling require the sensor to have a rugged design that can handle handle harsh environments, yet these are also the environments where the ability to monitor bearings remotely is critical to keeping employees safe. Therefore, the ABB Ability Smart sensor for mounted bearings is heavily certified to go wherever you need it to go.

Are there similar R&D activities that you are currently working on? Which technologies may we expect in the future?

The ABB Ability Smart Sensor for mounted bearings is just the start of our journey for the digitalization of our mechanical cast iron products.

What does Industry 4.0 mean for you?

Industry 4.0 for me is the connection of the physical product with the digital data storage and analytics. This allows customers to maximize their productivity by understanding what their equipment is doing and when it needs attention, so they can better plan maintenance and scheduled downtime. The ability to see trends across equipment also allows customers to identify areas where they can optimize the performance of their equipment.

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IC	Canada

Mr. Artur Rdzanek
Product Manager for Sensor Technologies at ABB

Napoleon Conquers Commercial Space Market

The space industry thrives on the word "heritage". Relying on historical designs, equipment, processes and suppliers results in known outcomes and reduced risks in the high stakes world of rocket launches. It's hard to compete with that logic. But that hasn't stopped Napoleon Engineering Services (NES) from going all in to support the commercial space industry with custom bearings for a wide variety of mission critical applications from turbo pumps, values, actuators and hydraulic power units to docking systems.

The Olean, NY based custom bearing manufacturer has roots in the aircraft industry dating back to the 1990's. That heritage has set the stage for Napoleon Engineering Services' work in the space industry. "We started out providing bearing reverse engineering services to those looking to hold a PMA (Parts Manufacturer Approval) on type-certified aircraft and engine bearings," explains NES President and Chief Engineer, Chris Napoleon. "Over the years, in support of our PMA and OEM customer base, we have made significant investments in manufacturing equipment, allowing NES to manufacture high precision aerospace bearings. We manufacture deep groove, angular contact and thrust ball bearings along with cylindrical, needle and thrust roller bearings for commercial and military jet engine, gearbox, auxiliary power units, and a variety of aircraft and helicopter applications."

Although the space community generally sees themselves as different than the aircraft industry, there are a lot of similarities that Napoleon picked up on and promoted to the rapidly developing commercial space industry. "Let me first say that our modus operandi is picking up the phone in two rings. The new space market is moving fast and you can't begin to listen to your customer's problem, develop a solution and deliver quickly if you aren't willing to answer the call," states Napoleon. "It's an area where

global bearing manufacturing has hurt the design engineer. Today's commercial space design engineers want to talk directly with people who are designing and manufacturing their bearing so they can quickly make design changes on their end. This can often make for a challenging and stressful manufacturing process since it's common for material to be ordered, turned and heat treated ahead of final design signoff. However, the path of least resistance is not our path. We're not afraid of obstacles. We know we are defined by the results we achieve."

Napoleon also notes that many of the large players in the commercial space market are developing their design reliability through full scale testing. Therefore, it's extremely important to get to test on time. That means spacecraft companies are letting NES have a lot of control over the manufacturing quality and systems. "This is where our experience in aircraft bearing manufacturing has really helped us be successful with the space community," emphasizes Napoleon. "You've got to be solid with your ability to maintain traceability of raw materials and control of the manufacturing processes. This

includes knowing what level of inspection and non-destructive testing is required and establishing the correct standard for quality of workmanship in order to meet the rigors of launch and space travel. You need to know what is right and then do it, even when the customer is not directly requiring you to do so."

Ultimately, delivery of the product needs to be expedient to allow the industry to take advantage of the fast-paced market opportunities for commercial launch services and satellite systems. This isn't always easy when the bearing solution requires unique materials and

configurations that challenge the conventional manufacturing process. "In order for us to meet the demands of our customers we need to be willing to change from machining one material to another to yet another, all in the

same day. We aren't afraid of setup changes and we understand that high mix, low volume production is what our customers need," adds Napoleon.

"We process our bearings differently than our predecessors did. We are revolutionizing the use of hard turning and milling because we are not boxed in by old equipment process constraints. We are able to design for manufacturing very difficult bearing configurations while minimizing distortion out of heat treatment and maximizing stock removal rates. This leaves us ready to finish grind in a fraction of the time it used to take. Bearing manufacturing can be tricky and challenging every step of the way but our new processes and attention to detail result in high yield rates and delivery that is very attractive to the new space community."

NES is poised to take custom bearing manufacturing where no man has gone before with the new commercial space market. That's not too far of a stretch based on Napoleon's heritage.

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High precision custom engineered **BEARINGS** ensure reliability of satellite reaction wheels

Increasing numbers of smaller, more cost effective telecommunications satellites are being launched into the Earth's orbit, which has led to a growing need for high precision, high reliability bearings to support onboard sub-systems such as reaction wheels and other critical mechanisms, says Gary Hughes, Product Engineering Manager at Schaeffler subsidiary, The Barden Corporation (UK) Ltd.

In the past, building and launching a civil telecommunications satellite into space required a multi-million pound investment, but more recently, the size and cost of satellites have reduced. An increasing number of satellites are now being launched into space from Europe, USA, China, Turkey, India and the Far East.

For bearing suppliers such as Barden UK, high requirements are now being placed on bearings that support satellite sub-systems such as reaction wheels and other onboard precision mechanisms.

A reaction wheel is a type of flywheel used primarily by spacecraft and satellites for attitude control without using fuel for rockets or other reaction devices. A satellite typically comprises three reaction wheels (for X-, Y- and Z-axes), which are particularly useful when the spacecraft must be rotated by very small degrees. They may also reduce the mass fraction needed for fuel. This is accomplished by equipping the satellite with an electric motor attached to a flywheel which, when its rotation speed is changed, causes the satellite to begin to counter-rotate proportionately through conservation of angular momentum.

The failure of one or more reaction wheels can cause a satellite to lose its ability to maintain position and thus potentially cause a mission failure. Therefore, the reliability of reaction wheel bearings is absolutely critical. The bearings must satisfy demanding requirements, by continuing to reliably spin for long periods of 10 to 15 years while orbiting in space, using only a small amount of lubricating oils on the bearing surfaces in a vacuum environment. At the same time, the bearings must minimise any vibration, so as not to negatively affect the observational performance of the satellite. The bearings must also withstand the vibration and loads at launch, as well as endure the temperature variations while in orbit.

At Barden UK, reaction wheel bearings are typically custom engineered angular contact ball bearings that are manufactured with high surface finish requirements and visual appearance of the raceways. The bearings typically comprise 440C stainless steel rings and balls with phenolic cages. Two bearings are required per reaction wheel.

The bearings are assembled in clean room conditions (exceeding flight-critical aerospace applications) using special handling techniques. Every part of the rolling contact surface of the bearing is inspected at Barden UK. Any slight defect is captured, commented on and documented. The bearings are typically shipped as a kit ready for further examination and screening by the customer prior to assembly/fitting.

Full traceability

Barden UK specialises in the design and manufacture of high precision rolling bearings and integrated bearing assemblies for complex or critical

High requirements are now being placed on bearings that support satellite sub-systems such as reaction wheels and other onboard precision mechanisms.

applications such as aerospace, defence, medical and high performance vacuum pumps. The bearings have to withstand harsh conditions, including extreme temperatures, demanding load profiles and high speeds, which often means they are custom engineered for specific applications. By making use of advanced technologies and innovative solutions, Barden is able to enhance the performance of customers' products.

Barden's Quality Management Systems are accredited to Aerospace Standard AS9100. In addition, the company is able to satisfy specific customer requirements such as The National Aerospace and Defense Contractors Accreditation Program (NADCAP) for its heat treatment and non-destructive testing processes. These controls are coupled with a planned flexibility that enables Barden to comply with specific requirements of individual customers through a system of bespoke quality levels and formal certification of its products.

Bearings are manufactured and controlled under strict aerospace procedures, providing full traceability, controlled lubrication and complete retention of records. Full traceability is provided for satellite bearings. Torque test traces and functional tests can be performed on the bearings, as well as 100% inspection of bearing raceway surfaces. If the customer requires, documentation and measurement reports can be provided on every bearing in every batch.

Irrespective of the application, Barden UK has the knowledge, expertise and engineering capability to meet customer-specific requirements for space and satellite applications, whether these include stringent visual inspection, the highest levels of cleanliness or specific process requirements. These capabilities are backed up by skilled and trained operators who provide the high precision, high quality bearings required for sensitive, reliable space applications.

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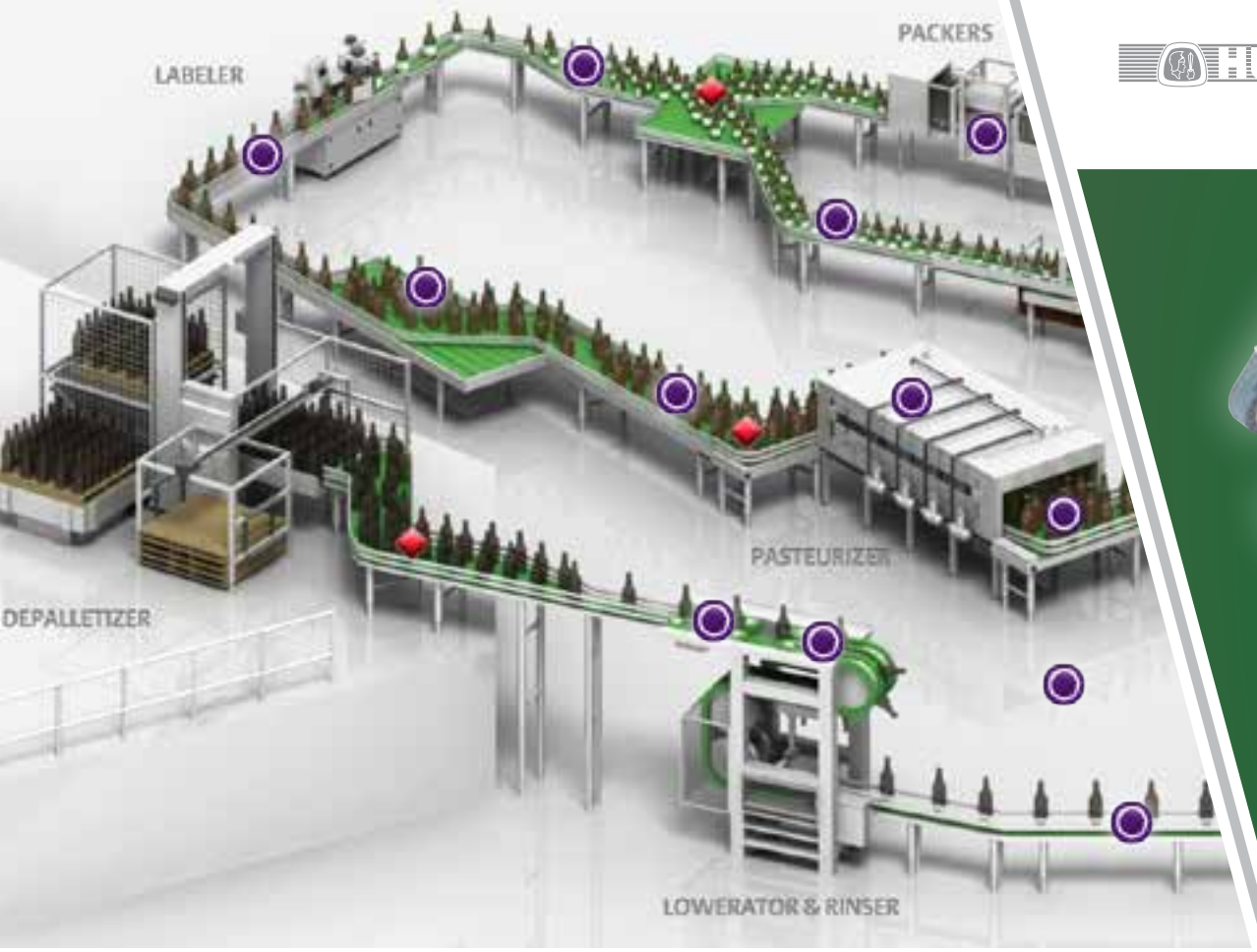

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USTR GRANTS OVER 400 EXEMPTIONS TO THE BEARING INDUSTRY

The U.S. Trade Representative has granted exemptions that will result in the reimbursement of approximately 42 million dollars: Here's what you need to know.

US customs is collecting $25 million per month in 301 tariffs from imported bearings alone, and they have been doing so since July 6th 2018. That's 150 million dollars they have collected in 6 months. Exemptions have been granted for 28% of the bearing imports and with the proper documentation, you can stop paying the tariff now if you qualify. Additionally, all exemptions are retroactive to July 6th, and all qualifying parties are entitled to refunds in the amounts paid. What portion of the $42 million is yours?

So far, in the scope of the 301 tariffs, list 1 (representing $34 billion) has a total of 10,797 overall filed requests for exemption. Of those, 1259 have been denied, 983 have been granted, and 8555 are still under review.

Bearings are a major part of list one and can be broken out in the HTS code 8482. By my calculations, within 8482 only 184 exemption requests have been denied, 408 have been granted, and 344 are still being processed.

While all ball and roller bearings fall under HTS code 8482, within this code there are 55 subcategories of bearings, and all of the granted exemptions fall within 3 (10 digit) HTS subgroups. From these 3 HTS codes we can determine that only radial deep groove ball bearings from 9mm – 100mm have been granted an exemption. You can form your own opinion as to the methodology behind the government's review process; however, the only certain aspect of this process is uncertainty. My urgent message to anyone reading this; If you are involved in supplying or importing radial deep grove ball bearings in the mentioned size range, you need to be prepared immediately to supply the correct documentation. Determine which of the 400+ exemptions best suits your situation. Show that your bearings, or the bearings you are importing, are no longer subject to the 25% tariff. Stop paying the tariff as soon as you can because it is unclear under what circumstances you may or may not be able to recover duties once they have been paid.

This poses the question, now that exemptions have been granted and reimbursements are on the table for those who qualify, how will you get your money back?

Unfortunately, for the time being, we are left in the dark. The USTR has not yet released conditions or instructions on how to recover 301 tariffs already paid. The USTR has also not released information on who is eligible for refunds. We do know that granted exemptions are not company specific. Exemptions granted for any single company will benefit anyone importing that same product. Changes are being made and it's prudent to pay attention to these changes. Whether your company is checking updates daily, or hiring a third party to do so, make sure you don't miss any reimbursement opportunities.

For an added dimension of complexity, the exemptions were granted in the last week of 2018. The U.S. government is in the midst of the longest shutdown in history. The exemptions will not take effect until 10 days after the U.S. government resumes operations. Regarding trade relations with China, It does appear that President Trump and President Xi are beginning to play nice as more high-level negotiations are scheduled for the end of January. For the time being, it's US House Speaker Nancy Pelosi and President Trump who are not playing nice, so as of this writing, the government remains shut down.

Author: David Hull

David Hull is the founder and president of Precision Components, Inc. He is a consultant to multiple hedge funds, several governments, and remains an authority on US antidumping regulations, as well as the outlook of the global bearing industry. For information on Mr. Hull, you can read his BIO on www.pcomponents.com. Facts and Figures are based on research performed by Precision Components.

The GV3 range from HepcoMotion updated with

Twin Taper Roller Bearings

for extended life

still innovating after 20 years with new components offering reduced downtime and 10x service life

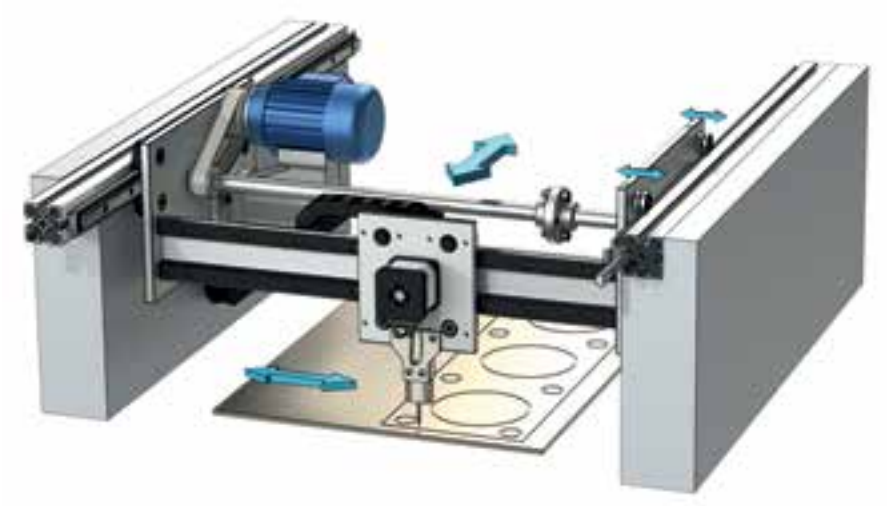
HepcoMotion is committed to providing customers with an unrivalled choice of products, sizes and options to cater for virtually any linear motion requirement. Testament to this, HepcoMotion is innovating its flagship GV3 range with the introduction of two new components that offer real benefits to design engineers. The new side-access adjustment carriage feature, and twin taper roller bearings are likely to be well received by engineers looking to reduce maintenance time and extend service life.

Side Access Adjustment Saves Valuable Maintenance Time

The addition of the new side-access adjustment (SAA) carriage to the GV3 range of products is likely to be a popular choice for applications where components are mounted to the carriage plate, or access is restricted. The SAA reduces downtime as there is no need to remove mounted fixtures from the carriage plate when adjusting the bearings. This is particularly advantageous if the customer has complex components mounted to the carriage plate that would be time-consuming to remove and then re-attach. Engineers can simply adjust the bearings with the fixtures in place to remove any wear or play, to return the system to its original running condition.

SAA carriages are highly convenient for any type of maintenance that requires the carriage to be removed as there is no need to run the carriages off the end of the slide to remove – it can be done anywhere along the slide. This saves having to dismantle part of the machine in cases where the ends of the slide are blocked for example.

Engineers will find the SAA carriages highly intuitive to set. Adjustment is made via two hexagon screws located in the side of the carriage plate. Importantly, any fixings or customer mounted mechanisms do not need to be removed from the carriage, reducing inconvenient and costly downtime.



Twin Taper Roller Bearings For Extended Life

A further addition to the GV3 range is the new twin taper roller bearings. Ideally suited to applications requiring higher load capacities, the twin taper roller bearing is physically the same size as the standard Ø 54 bearing, yet offers 10 x the life. The twin taper roller bearing also offers increased rigidity – a key requirement for many applications where precision needs to be high. Twin taper roller bearings are greased for life internally, with nitrile seals providing a high degree of sealing against ingress of water or debris. Twin taper roller bearings are available in combination with SAA carriages.

Catering for a wider portfolio of applications, the new twin taper roller bearings join Hepco's current range of bearings comprising of standard, slimline, vacuum and extreme temperature, and floating bearings. Hepco's floating bearings are proving to be a popular solution for when two systems are mounted in parallel as they 'float' by up to +/- 1.25mm in the axial direction, allowing misalignment to be overcome and avoiding binding of the linear system. Set-up times are greatly reduced as floating bearings overcome the need to accurately set opposing slides perfectly in parallel.

New Catalogue

In line with the new GV3 components, Hepco is pleased to launch a new GV3 product catalogue and an accompanying technical guide providing more in-depth, technical detail and additional components. Hepco has also produced a series of six animations, highlighting the major benefits of V Guide technology against ballrail systems. These can be found on Hepco's website as well as on Hepco's YouTube channel.

The new catalogue has been created to provide users with the information needed as quickly and efficiently as possible. When accessing online, interactive hyperlinks take users directly to the information they require – such as the product pages, technical guide, CAD files or product animations for example. Designed with engineers in mind, the new catalogue is inherently user friendly yet packed with an array of comprehensive information.

GV3 is one of over forty-two major product lines offered by Hepco, with thousands of individual components in various sizes that can be built to fit almost any requirement. HepcoMotion has been leading the development of V Guide technology since 1969, and continues to develop innovative linear products that offer new solutions to design engineers.

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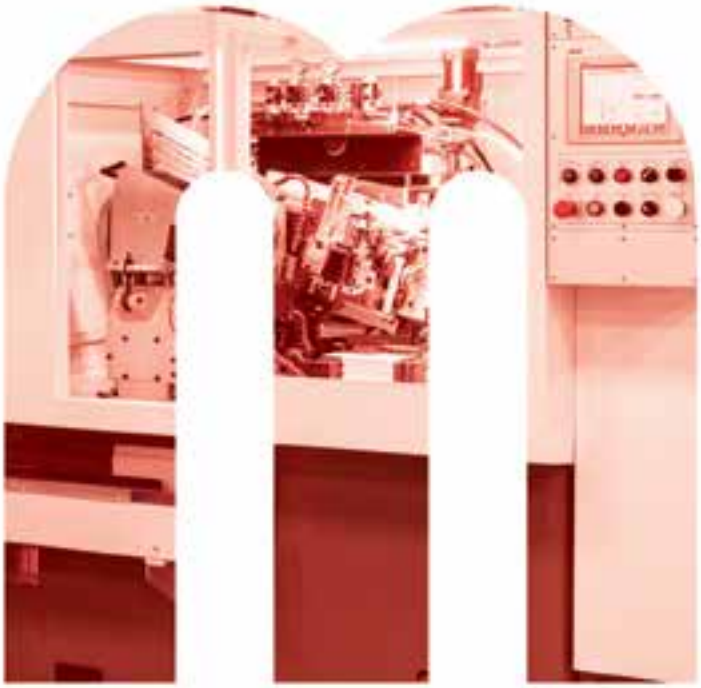

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Success of the Ukrainian bearing industry spreads around the world market

— *UPEC Industrial Group is an industrial holding which unites a number of leading design centers and engineering companies, including Kharkov Bearing Plant*

Kharkov Bearing Plant (HARP), the largest manufacturer of bearing products in Ukraine and Eastern Europe, has been producing the bearings for 70 years. Roman Girshfeld, Vice President of the UPEC IG, told about the successes of Ukrainian bearing industry leader on the world market.

HARP's main priorities are high quality and innovations. The company offers state-of-art, versatile and unique design solutions for various segments of industry such as automotive, agricultural, railway, mining and smelting and general engineering. In its proud history, HARP made its way from the pioneer of bearing manufacturing to the acknowledged leader of the industry. Today dozens of companies in more than 20 countries of the world prefer the

> *Our main aim is the export activity expansion, so HARP presents its products at the largest international industry exhibitions. For example, we traditionally present our achievements at AGRITECHNICA and InnoTrans in Germany. In 2018 HARP made its debut at such large-scale exhibitions as China International Bearing Industry Exhibition, Canada's Outdoor Farm Show and EIMA International in Italy*

products of Kharkov Bearing Plant.

As Roman Girshfeld points out, the export share was 65% in 2018. This year the company is going to hit 70-75%. HARP products are exported in EU countries (Germany, Poland, Italy etc), Russia, the Baltic states and Transcaucasia, Central Asia and North Africa. HARP also actively promotes the products to the North American market (in Canada) and going to enter the Turkish market.

"Our main aim is the export activity expansion, so HARP presents its products at the largest international industry exhibitions. For example, we traditionally present our achievements at AGRITECHNICA and InnoTrans in Germany. In 2018 HARP made its debut at such large-scale exhibitions as China International Bearing Industry Exhibition, Canada's Outdoor Farm Show and EIMA International in Italy".

HARP pursues a flexible cooperation policy and cares about customers' requirements and interests, offering traditional as well as individual design solutions. Such a business model allows the company to manufacture the original products in accordance with customer's designs, embodying technical projects of any complexity, in addition to serial products. In such a way, the company builds a successful system of fruitful and long-term cooperation with its partners. Thus, the company prolonged an annual contract for bearing products supply with MetalAgro, the largest Bulgarian agricultural machinery producer, extended an annual contract with ArcelorMittal – leading world metallurgical company, and prolonged the contract of exclusive distribution with the company IGNERA (Latvia).

"The 70-years production experience allows us to satisfy the demands of farmers and agricultural machinery producers around the world", – Roman Girshfeld tells and adds that HARP products are demanded among such large machinery manufacturers as Rostselmash

— HARP AGRO bearings with new seal systems of increased tightness X-SHIELD, providing additional protection in the harsh exploitation conditions

and Salford, Klever and MTZ.

"Kharkov Bearing Plant doesn't stay still. Annually the company adopts and produces over 100 modifications of bearings and bearing units of the top quality level. For the last several years, HARP developed the innovative solutions, implementing the patented constructions of multi-sealing and cassette seals in the bearings and bearing units. New design boosted the productivity of agricultural machinery, increased time of the fault-free operation, eliminated the necessity of regular maintenance of spare parts in the heavy field conditions. The line, which includes six different designs of X-SHIELD seals, allows each producer of agricultural machinery and farmers to choose HARP reliable solution on the basis of their needs", – Roman Girshfeld tells.

In addition, HARP cooperates with the leading metallurgical company and world producer of pipes and wheels for the railway vehicle Interpipe. The companies produce together set of wheels with increased run between repairs (up to 800 000 km or 8 years of service life), equipped with CRU Duplex bearings of HARP production.

As for interesting novelties in 2018, HARP product range was supplemented by the new development – bearings 70-80315 with high-temperature lubrication of German company KLÜBER LUBRICATION, which were developed specially for application in the heavy industrial machines, and also bearing of European type WJ/WJP 130x240 mm for freight and passenger carriages of "space 1435".

HARP is keeping its continuous and dynamic development in the field of production modernization, adopting of new product types, improving quality control system corresponding to the international standard, what allows to keep the lead on domestic and the CIS markets and to establish lasting export relationships.

The vision of China's

LARGE BEARING MANUFACTURER

Yu Chuanjie
President of Jinfeng Bearing Manufacturing Co., Ltd.

Jinfeng Bearing Manufacturing Co., Ltd. (WBJF) is one of the well-known bearing manufacturers in China. Initially, it started from a small workshop with only a dozen people while now it has become one of the largest manufacturers in China for spherical-, thrust-, cylindrical-, and tapered roller bearings.

The bearings of WBJF are currently exported to more than 30 countries worldwide, and won the title of "China Famous Trademark" issued by the State Administration for Industry and Commerce of China.

During the interview with Mr. Yu Chuanjie, President of WBJF, we had the chance to learn a lot about the development of this company, and the vision behind WBJF.

Can you tell us more about the history and evolution of Jinfeng Bearing?

There are three main stages of the development of Jinfeng Bearing. The first stage is from 2000 to 2003, the beginning stage of entrepreneurship. The company was founded in a small workshop which was less than three thousand square meters. Starting from scratch, it was mainly engaged in the processing of some parts of the bearings and parts, supporting the bearing manufacturers.

With the booming development of China's manufacturing industry at the time, and relying on the spirit of hard work and persistent pursuits, after a short period of 3 years, a small workshop with less than 3000 square meters was turned into a bearing manufacturing factory with a preliminary scale. Since then, Jinfeng Bearing has entered into a new era.

The second stage was from 2003 to 2008, the initial stage of the company. The company moved into a new plant which covered an area of 18,000 square meters, mainly engaged in the processing and sales of bearing products, and also registered its own brand "WBJF". It passed ISO9001:2000 quality management system certification. Under the economic situation at that time, the whole country was encouraging export business. With this favorable policy, Jinfeng Bearing won the first barrel of gold in the international market and took its place in the numerous bearing manufacturing enterprises in the city of Wafangdian. It is the driving force and goal of Jinfeng Bearing to be able to compete with domestic bearing brands on the same platform as well as striving for greater market share and increasing the brand recognition. Further, responsibility, value, quality, honesty and long-term business philosophy are rooted as main pillars in Jinfeng Bearing.

The third stage started from 2008 till present, the stage of development. The company moved to a new site, covering an area of 120,000 square meters. With

the introduction of advanced grinding production and salt bath isothermal quenching lines, the company also re-established their positionings of products, market, quality, management and service. After years of continuous efforts, Jinfeng Bearing has been ranked into top three privately-owned bearing enterprises in Wafangdian city, and obtained important market share and reputation in markets both at home and abroad, which makes it a classic case of high-speed development of bearing enterprise.

In 2015, I realized that the enterprises must be aligned with international first-class brands if we want to achieve better development, and in the fierce market competition in the future, since excellent quality and higher cost performance will always be the customers' preferences. From 2015 till now, after the reform of China's supply-side system and the promotion and popularization of "craftsmanship spirit", Jinfeng Bearing has comprehensively reviewed the internal and external environments, and formulated the company's strategic plan for transformation and upgrading based on relevant national policies and the company's future development. Since then, Jinfeng Bearing has entered a new period of development.

Can you introduce something about your company's transformation and development?

The transformation and development refers to six aspects. The first one is the Ideological upgrading of the whole staff; transformation and upgrading, all mobilization, unity of thoughts and creating high efficiency. The second aspect is management concept development, with focus on the world, with the people in mind. Taking advantage of production factors, capital and Internet of things worldwide, competing with global brands, cooperating with global customers and learning from global excellent enterprises.

The third aspect is the development of quality management, with better performance both internally and externally, the unity of knowledge and practices.
Also the training and improving skills is one of the drives behind our continuous transformation. Another aspect is the focus on customers groups; cooperation among competitive companies for common development and mutual benefits. Strong alliances, common development, cooperation with famous Chinese and world famous brands with focus on research and practice of imported bearings replacement.

As last, but not least the production management transformation and development, further automation with better management systems. Automation of workshop equipment to lay the foundation for digitalization and internet of things with the support of advanced management methods.

What kinds of bearings do you mainly produce?

We currently mainly focuses on four categories of products, namely, the spherical rller bearings, thrust spherical roller bearings, cylindrical roller bearings with single row, double rows and four rows, and tapered roller bearings with single row, double rows, four rows. The sizes of the bearings are mainly between ID100mm~OD2000mm.

Which industries and application fields do you serve?

Our products are widely used in fields such as: metallurgy, mining, cement, paper, mechanical transmission, chemical industry.

Which countries are WBJF exported to?

We export roughly to 30 countries worldwide, such as Japan, the United States, Germany, Italy, Belgium, the Netherlands, Turkey, Austria, Czech Republic, Poland, Sweden, France, Russia, Ukraine, Brazil, Argentina, Singapore, Malaysia, Vietnam, Indonesia, India, Dubai, etc.

What are the differences between your company and other competitors in the market?

Our differences can be generalized within a few words: high standards and strong execution. Our vision is to become “one of the World’s leading brand in the bearing industry” and we improve our products quality by carrying out strategic cooperation with many premium bearing brands in order to meet our customers “high standards and strict requirements”. By the end of 2018, our bearing product accuracy grade has reached the premium level.

Another difference of Jinfeng Bearing is that we adapts the flat management method; any order issued by the management can be effectively executed in the next second. Strong execution is one of the core competitiveness of Jinfeng Bearing.

What is the product quality/ accuracy level of WBJF?

For spherical roller bearings, thrust spherical roller bearings, cylindrical roller bearings, tapered roller bearings and other general-purpose products, our internal standards are stricter than P6. For special application and customized bearings, the standard is P5 and P4 accuracy.

What is the plan of Jinfeng Bearing for 2019 and the future?

1. Continue increasing the automation, digital transformation of existing equipment in order to create a foundation for future technological adaptations.
2. Continue to improve products quality and their stability.
3. Seek strategic cooperation with well-known brands in the bearing industry in China and abroad, create a synergy in our industry, support reform and progress and adapt to the new challenges of globalization.

What do you think of the future of bearing industry?

I think it is a big topic to discuss the future of the global bearing industry. I would like to talk about my viewpoints on the future of Chinese bearing industry.

High quality bearings have a large market space in China. Six of the world’s eight largest multinational bearing companies have set up headquarters in China, six of them have established engineering and technology centers in China, and there are 61 production plants that produce bearings and related products in China; together with 117 foreign- invested companies in the bearing industry with certain scales. These foreign-funded enterprises take a broad view of the broad prospects of the Chinese bearing market.

The market competition will be more intense. China has always been one of the largest bearing markets in the world and it is also one of the largest manufacturers of bearings. After years of development,

there are about 10,000 bearing companies in China and 1,500 companies with certain scale. The percentages of state-owned and state-owned holding, private and foreign-funded enterprises are 25%, 87.48% and 10.27% respectively. Therefore, the future market will be an era of fierce competition among state-owned enterprises, foreign-funded enterprises and private enterprises. It is also this fierce competition that has prompted the bearing enterprises to make progress and flourish.

Jinfeng Bearing has already launched a comprehensive transformation and upgrading strategy, owing to its aiming at the broad market of high-end quality bearings and preparation for more intense competition in the future. Jinfeng Bearing will provide better products and faster and more convenient service for customers all over the world. We will continue to forge ahead and improve innovation to make the world praise “China made bearings”!

Contact song@wbjf.com for more information.

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Indian manufacturing sector: **Economic growth engine on track**

Manufacturing has emerged as one of the prominent growth sectors in India and the nation is on track to become the fifth largest manufacturing country in the world by 2020. The 'Make in India' program aims to position India on the world map as a manufacturing hub and give global recognition to the economy. Various studies have estimated that every job created in manufacturing sector has a multiplier effect in creating 2–3 jobs in the services sector, this makes manufacturing critical to achieve inclusive growth in the country as India looks at transforming gradually from a service based economy to an economy with enhanced contribution from manufacturing sector.

A globally competitive Indian manufacturing sector will be a key enabler in achieving the vision of a USD 5 trillion economy by 2025, creating 100 million new jobs by 2022. Business conditions in the India continue to remain positive and Foreign Direct Investment (FDI) is on the rise as companies and economies try to capture Indian growth. Global competition and cost pressures are aiding the flow of organic investments in India. India is on the path of becoming the centre for hi-tech manufacturing as global giants such as GE, Siemens, HTC, Toshiba, and Boeing have either set up or are in process of setting up manufacturing plants in India, attracted by India's market of more than a billion consumers and increasing purchasing power, cumulative Foreign Direct Investment (FDI) in India's manufacturing sector reached USD 76 billion during April 2000-June 2018.

While global manufacturing companies look at India for investments and capturing growth emanating from India, there are peculiarities in the market that makes India different from other markets. Indian markets are price sensitive. While the volumes could be interesting for the manufacturers, obtaining high prices for premium products could be challenging.

The global manufacturers need to evaluate each product with the "sufficient for application" Vs the "best in class" design philosophy. With price sensitive markets being more susceptible to counterfeit products, brand protection becomes more important than other geographies. Strong manufacturing process development and implementation to ensure consistency of quality across the globe could ensure companies gain customer brand confidence in long term. Quality perception of products manufactured in developing countries should be countered by delivery of equivalent quality products manufactured in India. India is on the path of reforms in policy framework to accelerate process of ease of doing business.

While implementation of these reforms may bring some evident short term repercussions on the business performance, organizations tend to gain growth momentum with these policy changes in longer duration. There are more reforms in pipeline and companies need to focus on the long term gains achieved through these reforms and not be flustered with the ripples of change.

With the unprecedented growth in India, the pace of business is fast. Time to market new products requires organization agility & flexibility. New products (& designs) specific to the geography and market conditions (Made-for-India) need to be developed. Local R&D centres may help organizations to be more efficient in new product development. "Reverse Innovation" (product developed for the developing economies but marketed/ distributed globally) can be the mantra

to obtain leverage in the global market. MSMEs (Micro, Medium and Small enterprises) in India have tremendous potential to grow and contribute to the Indian economy. Long term partnerships with Indian MSMEs having good technical capabilities could not only provide a low cost advantage but also a source of "frugal innovation" for companies worldwide. An ecosystem with MSMEs could be a source of global competitive advantage for the companies investing in India.

With changing geopolitical scenario expected to play a major role in coming time, having a global manufacturing base in India, could be a good strategy for companies. India's relationship and acceptability in the world could help it in establishing itself as a hub of manufacturing for the world. Impetus on developing industrial corridors and smart cities, aims to ensure holistic development of the nation. The corridors would further assist in creation of ecosystem for co-development and growth.

Author: Mr Vikas Manral (Global manufacturing expert)

Mr Manral is a senior management professional with 18+ years of experience in global manufacturing industry. He specialises in Business strategy and International marketing for Aerospace & Defence sector. He started his career as Management Trainee 27th batch from Hindustan Aeronautics Limited (biggest aerospace company in South East Asia owned by government of India) . In his last stint with SKF Aerospace, Mr Manral was managing business in multiple geographies with multi-national teams and global reporting structure. He graduated in Mechanical Engineering from GB Pant University Pantnagar- India in 1999 and completed his Post Graduate Diploma in General Management from XLRI Jamshedpur- India. Mr Manral has also done Executive Management Program from RMIT Melbourne Australia and Accelerated Development Program from Wharton School of Management.

He is a keynote speaker and moderator in different global & domestic platforms like Knowledge@Wharton, NASSCOM, AIMA, PHD, FICCI, SIATI events. He has presented more than 15 white papers on Global Strategy, International Business, Leadership, Supply Chain Management etc.

LinkedIn: https://www.linkedin.com/in/vikas-manral-a2b47a8/

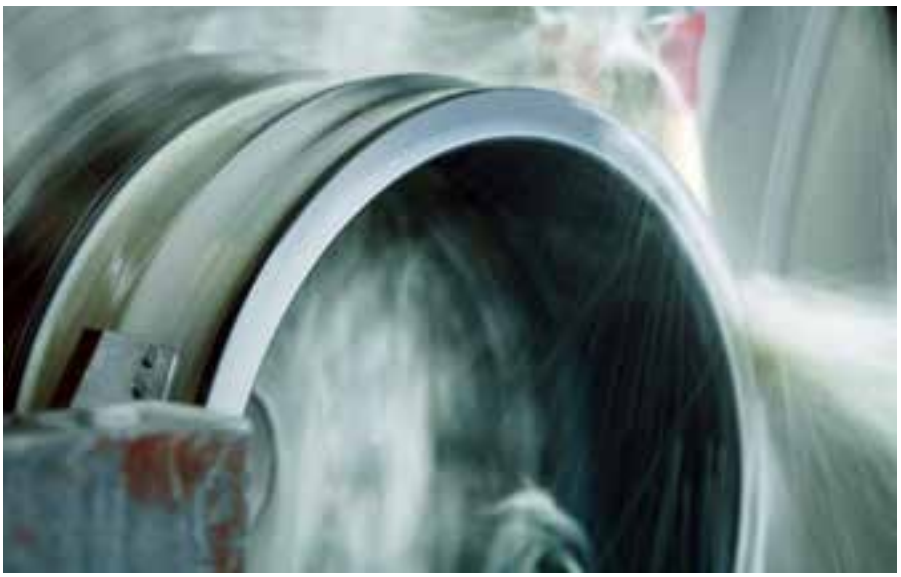
Indian bearing production

an alternative to Chinese bearing production...?

The bearing world has become quite different in 2018 with the introduction of tariffs, price increase of steel in China, closure of factories due to environment issue and also sudden demand increase. Even though the demand levels have now come back to normal with the easing of steel supply as compared to before the cost pressure still remains on importers of bearings. With more than 95% import requirements of economy quality sourced from China the sudden jolt did question the stability of business.

In this whole gamet of events - India came as a rescue for a lot of customers in western countries given the marginal price difference as compared to China and more stability of prices. With the changing dynamics of trade India has the second largest capacity of bearing production after China for economy level quality. With increasing costs from China, India will definitely gain to develop its own industry for exports. But obviously as compared to China the pricing will always be an issue for Indian manufacturers given the lesser incentives on exports from Indian government and also the higher cost of capital.

The automotive bearing industry especially for the OEM (Original Equipment Manufacturer) of Heavy Commercial Vehicles is quite actively sourcing Taper roller bearings from India. Similarly needle and ball bearings for automotive OEM applications is exported worldwide in huge quantities. However the industrial segment in which the range of part numbers is



quite long is still developing in India. But this range of bearings will continue to increase every year with time.

In the last 20 years major investments for production of bearings was done in China but we are quite confident that all future investments in bearing industry for economy cost will be in India as well.

Like all countries SKF, FAG, Timken and the Japanese control more than 80% of the market. But the only difference is that the market in India is very fragmented as compared to other countries. Industrial business is around 40-50% of the market with SKF, FAG and Timken having local production. Along with them NTN and NSK also have local production plants but mainly catering towards the automotive OE segment.

The structure of distribution is highly fragmented across the country with a local distributor playing a major role in serving the customer. Steel, Cement, Paper, sugar and other process industries are spread across the country and with local demand growing and GDP of 7-8% growth all process industries are growing with new plants coming across the country.

Given the price sensitive market there is a presence of Chinese ball bearings but mainly in the aftermarket which is very price driven market mainly dominated by HCH (mainly for fans and electric motor application at OE level) and numerous other brands at local level. Overall, the Indian bearing production will be the future for western countries driven by various reasons serving the export market.

Author: Shrenik Seth

Shrenik Seth is the key account manager at Bearing Manufacturing India. More information about the author and BMi can be checked on www.bmibearings.com

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What is BearingEXPO India 2019 ?

BearingEXPO India is the meeting point for the bearing and rolling equipment components industry during a **2 days exhibition, conference and B2B meeting sessions** – serving a wide scope of local and International audience of manufacturers, distributors, solution providers and end-users.

The bearing and power transmission industry is worldwide in a transformation and undergoes a rapid change due to various conjunctural developements, rising protectionism, environmental issues, digitalization and increasing steel prices - which creates both threads and opportunities for companies. India is the fastest rising global economy with many investments in local manufacturing, increasing demand for bearing and power transmission products and growing imports and exports at the same time.

BearingEXPO aims to create synergy between the participating sector companies by exchanging ideas for common challenges during the exhibition and B2B meeting sessions and sharing the latest available market knowledge, technologies, innovative products and services during the conference - all dedicated for the bearing, power transmission, lubrication and maintenance domains.

Facts & Figures

2500+ m2
display area

2.000+
trade visitors

30+
countries

15+
speakers

120+
exhibitors

Why Attend BearingEXPO ?

TOP 10 REASONS TO ATTEND

BearingEXPO India covers every facet for the bearing manufacturer, distributor, solution providerand end-user in one single event.

1. **Meet potential customers** - find new customers for your offered solutions and products

2. **Increase your company visibility** - promote your company, products and solutions with the exhibition and sponsorship opportunities

3. **Expand sales network** - expand your distributors network in India and abroad

4. **Meet potential suppliers** - meet new potential suppliers and diversify your product and solutions portfolio

5. **Gain insight information and generate ideas** - share ideas, knowledge and discuss industry related issues with professionals during the workshops, conference presentations in order to generate ideas to address specific needs

6. **Stay up-to-date on new technologies** - get new ideas and insight information from International key note speakers

7. **Experience all facets of your industry** - get in touch with the manufacturing, distribution, solutions and application examples of bearing and related products for 2 days

8. **Develop powerful connections** - exchange ideas with colleagues and expand professional relationships with local Indian and International bearing and PT/MC industry contacts

9. **Plan company visits** - visit potential customer and supplier companies before or after the event

10. **Enjoy India** - enjoy your time in Mumbai

WHO ATTENDS

Make your plans now to attend the BearingEXPO India exhibition, B2B meetings and conference to network with and exchange information from the following audience:

Exhibitors

- Global & Local Bearing Manufacturers
- Power Transmission Companies
- International and Local Distributor Companies
- Lubrication Companies
- Equipment Manufacturers
- Bearing Production Machinery Companies
- Solution Providers
- Engineering Companies
- Associations and Service Organizations

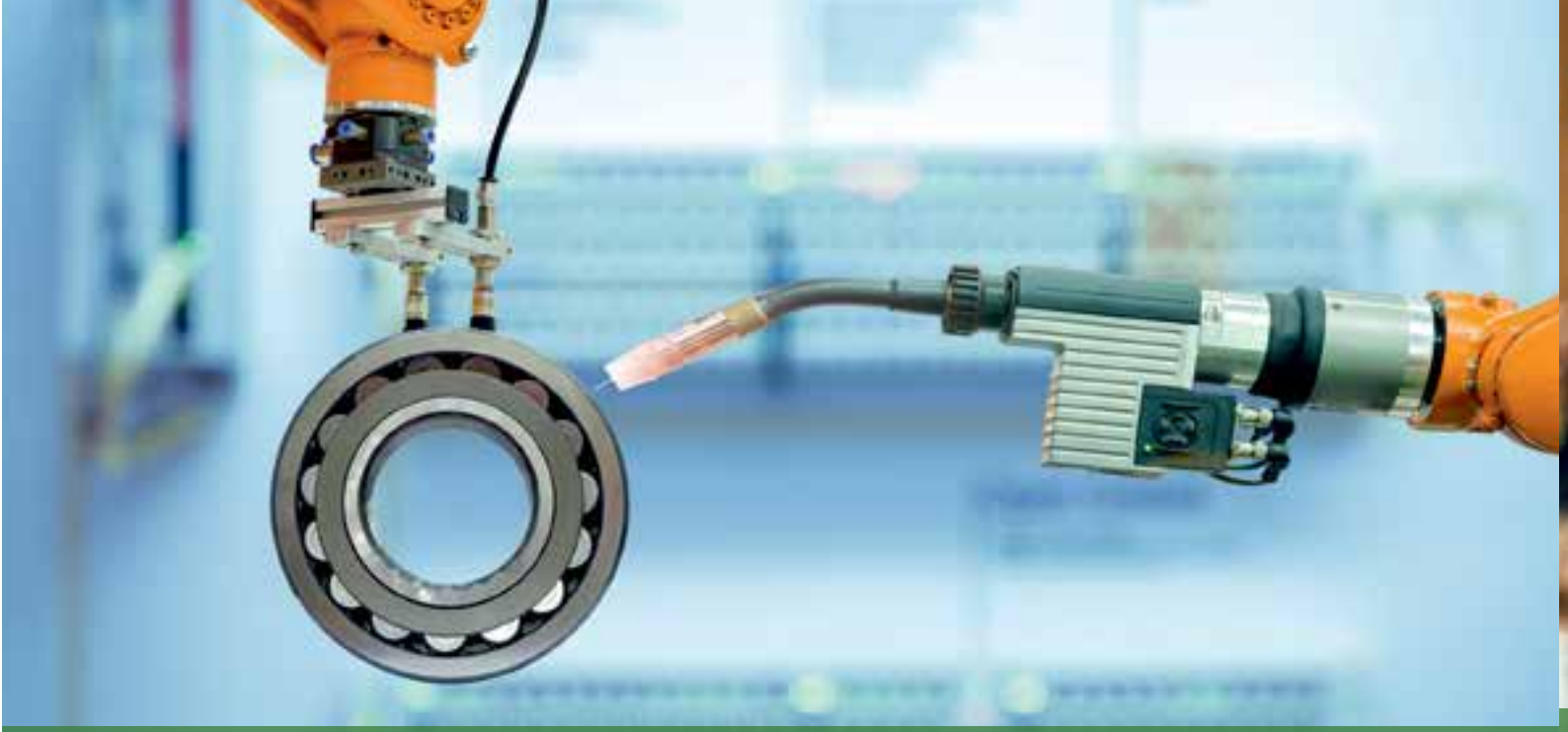
Exhibition Visitors / Conference Attendees

- Manufacturers
- Distributors
- Service Providers
- Mechanical Engineers
- Reliability Engineers
- Lubrication Engineers
- Maintenance Engineers
- Machinery Engineers

Industries

- Bearing and Power Transmission
- Motion and Drives
- Maintenance
- Energy Industry
- Automotive Components
- Steel Production
- Cement Plants
- Mining Professionals
- Food and Beverage Production
- Off-highway and Construction



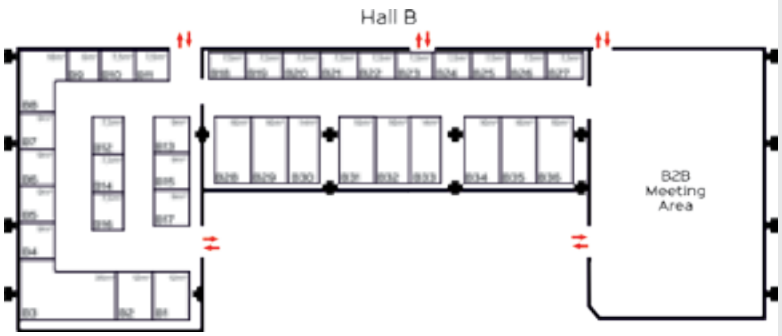


Exhibition & B2B Meetings

THE BEARING WORLD AT ONE PLACE

Visit the extended exhibition halls and discover products, tools and solutions among the comprehensive group of global and local companies representing various aspects of the bearing and power transmission industry.

With more than 2.500m² of exhibit hall space, visitors can meet more than 100 exhibitors highlighting unique solutions and services for 2 days. Network with colleagues during the exhibition, lunch breaks, coffee breaks and B2B meetings to expand professional relationships.



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PURCHASE

CW

Cement Review

INDUSTR.com

Machine Tools

Conference

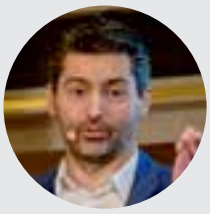
KEY NOTE SPEAKERS AND TOPICS

The bearing conference will exist out of both commercial and technical presentations focusing on the current market situation - development of bearing suppliers and quality control processes - bearing rout cause failure analysis for heavy applications - technical insights about Industrial IOT - precision engineering techniques and new technologies.

The commercial topics will cover the first half day, while the technical and engineering topics will cover 1,5 day of the 2 days conference incl. the workshops designed for engineers and end-users.

More speakers and topics will be shared closer to the event date.

Dave Hull
Pcomponents (USA)



Steve Quintijn
Regal Beloit (Belgium)

Hagen Elgeti
Elgeti Engineering (Germany)

Trinath Sahoo
India Oil

Cheng Kai
UXG Bearing factory (China)

Vikas Manral
Bearing Expert (India)

Per Arnold Elqvist
Tribologia (Sweden)

more speakers
will be announced...

Venue & Accommodation

NEHRU CENTRE

The BearingEXPO India event will be held at the Nehru Centre which has two large exhibition halls on the ground floor and three halls on the second floor of the "Discovery of India" building. The bearing conference will be held at the "Hall of Culture" on the main floor.

Several national and the international exhibitions and conferences are held in these air-conditioned facilities, which is located close to the centrum of Mumbai.

Location Map of Nehru Centre
Dr. Annie Besant Road, Worli 400018 Mumbai – India

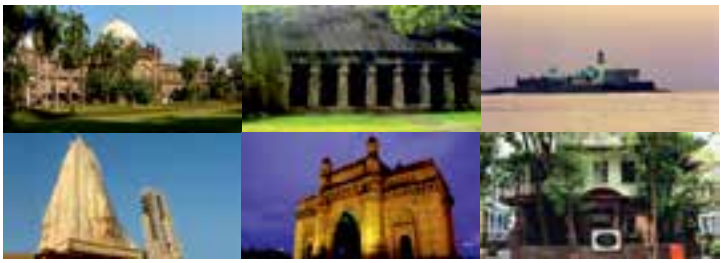
TRIDENT, NARIMAN POINT

The accommodation and daily bus transfers to the Nehru Centre will be organized for international and local participants from the Trident Hotel, Nariman Point. The hotel is nestled in the heart of vibrant and bustling Mumbai. Soaring 35 storeys high, it offers panoramic views of Marine Drive and the ocean.

With its 555 rooms and suites - Trident, Nariman Point is ranked amongst the best hotels in Mumbai. Head to one of the hotel's award winning restaurants - Frangipani or "India Jones", which offer cuisine ranging from Indian to Italian and Asian. You can relax and rejuvenate in the calm environs of the Trident Spa or recharge with an energising workout in the fitness centre.

EXPLORE MUMBAI

Mumbai or Bombay, the capital of Maharashtra, is the largest city in India. With an estimated population of 17 million, it is also one of the largest cities in the world. Mumbai is a vibrant, fast paced city, always on the move. Referred to as the 'Maximum City' , it is the business and commercial capital of India. A cosmopolitan hub home to a unique blend of cultures, it also nurtures the Hindi film industry, popularly referred to as 'Bollywood'.



Registration & Participation Options

RESERVE YOUR BOOTH

The key booth locations go fast, so reserve your exhibition space now! Spending 2 days at the BearingEXPO exhibition hall is equivalent to months of travel and hours of phone calls and meetings.

BearingEXPO India 2019 will provide the perfect setting for prospective customers to come to you.

BECOME A SPONSOR

Increase your visibility before, during and after the BearingEXPO India 2019 event. Contact us for your customized onsite, print and online marketing support.

BearingEXPO India 2019 Options

Exhibition Visitors	Conference Registration	B2B Meetings	Exhibitor Registration
FREE Registration	On Invitation	550$	Contact Us

How to register

Check the most up-to-date information and register online at www.bearing-expo.com/india2019	Send us all your questions concerning BearingEXPO India 2019 at info@bearing-expo.com	You can call us Monday - Friday 9 a.m - 6 p.m. (GMT) 0032 489 328 521

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What Happened in the Bearing Industry Second Half of 2018

September 01

Liebherr expands its portfolio with main bearings for wind Turbines

At WindEnergy 2018, one of the most important wind energy platforms, Liebherr presented its new main bearing to the public. This key component is a new development that complements the existing Liebherr portfolio of slewing bearings for electromechanical and hydraulic rotor blade and yaw adjustment of wind turbines. These slewing bearings make the rotor able to turn steadily around its axis, thus withstanding constant high loading. Liebherr main bearings are used in wind turbines with a capacity of 2 MW and upwards.

Power generation by wind turbines is playing an increasingly important role in energy policy. Therefore, increasing efficiency is an important prerequisite for further growth in the industry. The wind turbine rotor, which is supported by a main bearing, is a key factor. Liebherr offers moment bearings in two main designs: depending on the requirements, the prevailing loads and customer specification, double-row tapered roller bearings or triple-row roller bearing slewing rings are used. The optimised sealing concept for slewing bearings ensures that the inside of the bearings is protected against dirt and moisture and, above all, prevents the lubricant from escaping.

September 03

Axel Johnson International acquires Polish sealing specialist, Passerotti, from ERIKS

Axel Johnson International's Industrial Solutions business group has acquired Passerotti sp. z.o.o., a Polish niche distributor of technical seals, from the industrial service provider ERIKS. With eight locations in Poland, Passerotti is a significant player in the Polish market with about 11,000 customers present in both MRO and OEM segments.

Headquartered in Bielsko-Biala, Passerotti has an annual turnover of approximately EUR 6.6 million and 85 employees. Its offering is primarily focused on sealing technology, providing a wide range of seals for various technical applications in combination with complementary mechanical power transmission products. The company is an authorised distributor for a number of world leading brands, with a wide and diversified supplier base enabling its competitive offering.

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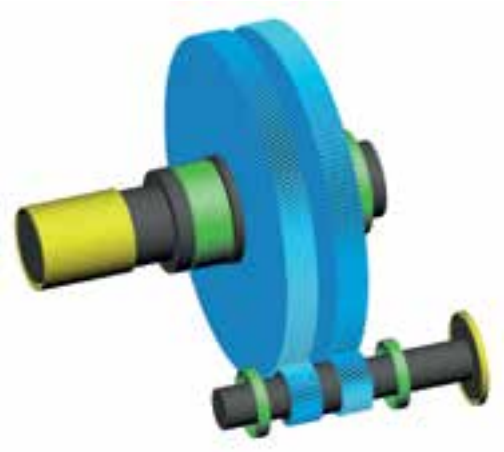
September 05

Plain Bearings in Turbo Drives updated by KISSoft

For shafts with the bearing type “Plain Bearing” can now be redefined. This is especially important for turbo drives, as it allows the shaft center dislocation during operation to be precisely taken into account (module WB3).



In KISSsoft’s plain bearing calculation, the required values – especially the displacement path, attitude angle, and stiffness – are determined and can then be entered in the elements editor of the shaft. Plain bearings can now be taken into account using a new template element provided for this purpose. This template element can be defined as both an individual element and as a connecting plain bearing.

September 06

Timken completes acquisition of ABC Bearings

The acquisition of ABC Bearings furthers Timken’s global leadership position in tapered roller bearings by expanding its presence in India and enhancing its export capabilities to serve global markets. Timken India Ltd., a subsidiary of The Timken Company, a global leader in engineered bearings and power transmission products, has completed the previously announced acquisition of ABC Bearings Ltd.

ABC Bearings, headquartered in Mumbai, India, has more than 400 employees and operates primarily out of manufacturing facilities in Bharuch, Gujarat, Dehradun, and Uttarakhand. ABC Bearings serves an established original equipment customer base, focusing on heavy truck and off-highway industries. The transaction was structured as a merger of ABC Bearings Ltd. into Timken India Ltd., whereby shareholders of ABC Bearings received shares of Timken India as consideration.

September 10

Ovako invests EUR 11 million in Smedjebacken to create new business opportunities

Ovako has decided to invest EUR 11 million in the production plant in Smedjebacken to meet the rising demand for high-quality steel. A new vacuum degassing facility will improve the properties of the steel and create new business opportunities in sectors such as the automotive industry.

With support of the new owners Nippon Steel & Sumitomo Metal Corporation, Ovako is continuing to invest in strengthening its position as a world leader in advanced steel solutions. Adding vacuum treatment to the manufacturing process will strengthen the steel and improve its properties, making it suitable for the most advanced applications on the market. The facility, which is one of the company’s largest investments in the last ten years, is planned to be operational in the second half of 2019.

October 16

IDC-USA Merges with AD

AD, the contractor and industrial products wholesale buying/marketing group, announced today the merger with IDC-USA, effective January 1st, 2019. This merger brings together the two largest independent Bearings & Power Transmission buying/marketing groups in the United States. IDC-USA adds 76 new members with 250 branch locations to the AD family, as well as redistribution centers in Indiana and Nevada and 27 employees.

Chris Hughes, Board Chairman of IDC-USA and President of Transmission & Fluid Equipment, Inc. reacts, *"Voting to join AD was an easy decision for me, as I suspect it was for the majority of my fellow IDC independents. Frankly, with AD's recent transition to a member owned organization, it made the decision that much easier. By merging IDC into AD, we get the best of both worlds; programs and services we value from IDC, expanded supplier and member relationships, and the multi-divisional scale and infrastructure of AD. It's a win–win for all independent distributors."*

October 19

Fersa Bearings acquires 100 percent of NKE Austria

Fersa Bearings S.A. made official the purchase of 100 percent of the Austrian company NKE Austria GmbH on 19 October 2018, at a ceremony held in the city of Linz, Austria. The event was attended by Carlos Oehling, Chief Executive Officer of the Fersa Group, Thomas Witzler, Managing Director of NKE Austria, and the former partners and founders of NKE, Harald Zerobin and Heimo Ebner.
Fersa Bearings has now completed the operation that began in 2016, when the Spanish company purchased 49 percent of the NKE shares. With the acquisition of the remaining 51 percent, the Austrian company is now wholly owned by Fersa and the business group is definitively consolidated, with two commercial bearing brands: Fersa for the automotive sector and NKE for the industrial sector. Fersa has not ruled out incorporating new brands into its portfolio in the near future.

The merger strengthens the group's presence in central Europe – part of the company's commitment to the internationalization that Fersa Bearings began in 2002 with the acquisition of shares by investment capital firm Going Investment. Since then, the company has evolved into a group with four cutting-edge production centers, six distribution centers and four R&D centers – two in Europe and two in Asia –, supporting Fersa's global presence in more than 95 countries on five continents with a workforce of more than 500 employees.

October 29

Jim Halverson and Sandy Sullivan to Lead PTDA in 2019

Jim Halverson, manager power products, Van Meter, Inc. (Cedar Rapids, Iowa) will become PTDA's president in 2019. Halverson has been active in PTDA since 2009 when he joined the Membership Committee and subsequently served as its chair. Jim has served on the PTDA Board of Directors since 2014.
Following his election, Halverson said, "Accepting the nomination to serve as President of PTDA was a proud and humbling experience. The focus for 2019 will not change; we will continue to work with the PTDA staff and dedicated volunteers on the execution of our strategic plan, ensuring our continued success."

PTDA

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One Drive

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Over the years we have followed one goal with a unified vision - to be the number one choice of consumers and remain committed to this mission of excellence.

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FOR THE
PT/MC INDUSTRY

November 08

AESSEAL wins prestigious regional business award

AESSEAL, the Rotherham based specialist in the design and manufacture of mechanical seals and support systems, has won regional recognition at this year's prestigious **EEF Future Manufacturing Awards**.

AESSEAL walked away with the Developing Future Talent Award, sponsored by Randstad Inhouse Services. This award recognises the manufacturer that has done the most to build skills, talent and develop their employees internally and/ or promote engineering and manufacturing careers through activities within the community

November 15

The BearingEXPO Conference at PTC Shanghai was held with high number of participants

Over 130 participants in Shanghai from the bearing manufacturing, distribution, application and power transmission industries joined the BearingEXPO Conference which was held on Thursday 8 November during the PTC-Asia exhibition at the VDMA Forum in Hall 2.

The participants enjoyed both commercial and technical presentations during the Bearing Conference at the professional Forum of the VDMA and the impressive venue of the PTC-Asia exhibition with more than 1.300 exhibitors and +100.000 visitors.

November 27

Regal Beloit wins BSA Bearing Manufacturer Design award

Regal Beloit Corporation recently announced it has been awarded a 2018 BSA Bearing Manufacturer Excellence of Innovation in Product Design Award for their innovation of the Sealmaster Time Saving Axial Groove Mounted Ball Bearing.

The award recognizes companies for innovation and excellence in product design or technology related to bearings or auxiliary items such as a mounting tool, monitoring device and more. The award provides both the manufacturer and BSA the opportunity for collaborative promotional opportunities to increase brand awareness.

November 28

Schaeffler acquires Elmotec Statomat Gm

The global automotive and industrial supplier Schaeffler today concluded a contract to acquire Elmotec Statomat Holding GmbH based in Karben near Frankfurt am Main, Germany.

Elmotec Statomat GmbH is one of the world's leading manufacturers of production machinery for the high-volume construction of electric motors and possesses unique expertise in the field of winding technology. With this acquisition, Schaeffler is expanding its expertise in the construction of electric motors and thereby driving forward the implementation of its electric mobility strategy.

Schaeffler previously acquired Compact Dynamics GmbH – a development specialist in the field of innovative electric drive concepts – at the end of 2016. By acquiring Elmotec Statomat, this expertise will be expanded by the addition of further expertise in the

high-volume production of stators for electric motors.

The acquisition is to be completed during the first quarter of 2019 once all of the closing conditions have been submitted. It has been agreed that the purchasing price will not be disclosed.

December 04

Axel Johnson International enters Czech power transmission market

Axel Johnson International's Industrial Solutions business group acquires a majority stake in Arkov, one of Czech Republic's leading distributors of mechanical power transmission- and hydraulics products. The acquisition is in line with Industrial Solutions' strategy of acquiring distributors with a strong market position and expertise in mechanical power transmissions.

Arkov is a well-recognized industrial player on the Czech market, being one of the country's largest authorized distributors of SKF and Schaeffler. Founded in 1992, Arkov has 80 employees and eight branch offices covering the central regions of the Czech Republic. With net sales close to EUR 7,8 million and most of its sales

in the MRO segment, Arkov distributes several strong international and domestic brands.

The acquisition was signed on December 4 and is expected to be completed in January 2019.

December 12

FVA Software & Service goes international!

At the FVA Information Conference in Würzburg, FVA GmbH and Elgeti Engineering GmbH announced an partnership agreement for the North American market.

Elgeti Engineering will officially promote FVA GmbH's software products, in particular the FVA Workbench, and continue to advance FVA GmbH's international expansion. Hagen Elgeti, General Manager of Elgeti Engineering GmbH, stated: "In our daily business, we are frequently confronted with unexpected damages

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wire South America

WAFIOS Umformtechnik
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from 6th – 8th October 2015

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sales@wafios-umformtechnik.de
www.wafios-umformtechnik.com

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to machinery which in many cases can only be avoided by improved design. Therefore, it is very exciting to not only identify the root causes, but also to help our customers by providing them with the proper tools for addressing these issues based on the latest research. In addition, the collaboration with a powerful partner like FVA GmbH that makes an enormous contribution of knowledge and expertise will help us take our daily work to a higher level."

Norbert Haefke, General Manager of FVA GmbH added: "With the help of our extraordinary expert-network, we are able to quickly transfer the results of the latest research into highly sophisticated software solutions that perfectly meet our customers' daily needs. As a result, we can make previously unexplained phenomena transparent and understandable, which helps professionals like Elgeti Engineering's experts with damage analysis. By combining our cutting-edge calculation methods and Elgeti Engineering's experience, we can take these examinations to the next level. This enables us to offer our highly attractive portfolio of services in the North American market."

December 18

HepcoMotion Showcasing New Demo Unit at Southern Manufacturing

At Southern Manufacturing, for the first time in the UK, HepcoMotion was pleased to be exhibiting a new joint demonstration unit showcasing a combination of technologies from Stäubli, Beckhoff and HepcoMotion. At the exhibition, Stäubli´s robotics arms (TS2-60 and TX2-60L), HepcoMotion´s GFX Guidance System and the Beckhoff eXtended Transport System (Beckhoff XTS), all cooperate in one cell demonstrating the joint potential they offer.

Hepco's GFX system has been built to perfectly merge with Beckhoffs XTS. The XTS allows movers to be individually controlled and thus frees throughput time from limitations usually caused by the slowest process: movers can dwell on a station longer or shorter if needed. The system ensures longevity and limited downtime if adjustments become necessary. In combination, the two systems enable high-speed motion profiles without compromising positional accuracy, and provides a solution for higher-duty applications.

The new Stäubli TS2-60 SCARA arm on the other hand perfectly matches the abilities that the two systems offer, in that it allows ultra-short cycle times and high repeatability. Its performance is unmatched by other like-for like robotic arms for the same application. The TS2-60 also features a unique cylindrical envelope and small footprint. Combined with the special flexibility of Hepcos GFX system and the high speeds of Beckhoff XTS (4 m/s), the combined system can achieve an impressive throughput time.

January 04

Aetna Bearing Company completed an interstate move from Illinois to Michigan

Aetna Bearing Company recently completed an interstate move from Illinois to Michigan. Started as Schulz Bearing Company in 1916 in Chicago, the fledgling company occupied 7,500 square feet of floor space. A name change to Aetna Ball Bearing Manufacturing Company the next year marked the beginning of a long and storied history for the innovative company.

Aetna Bearing Company developed a patent for a "T" type bearing for a clutch release in 1934, produced bearings for Hamilton Standard propellers, M-7 tank destroyers, Sherman tanks, Sikorsky helicopters and more during World War II and expanded multiple times to accommodate its growth and development. In 1988, the company again obtained a patent -- this time for its "Variable Contact" clutch release bearing whose creation featured key industry designs. It introduced its "alligator process" to usher in CNC hard-turning technology and achieved its QS9000/ISO9000 Certification in 1998. In order to support their enlarging customer base, Aetna Bearing Company completed a move from Illinois to Livonia, Michigan in September 2018. Focusing on the automotive, aerospace, industrial, military, mining and agricultural sectors, the company is currently leasing space in the centrally-located city of Livonia.

January 07

The Bearing Seminar Truck will start its tour through Europe dont send

Faulty installation of bearings is one of the most frequent root causes for premature failures. Therefore, Elgeti Engineering has decided to offer companies an individual training on the seminar truck at their location in Europe. Participants will learn to properly use tools like inductive heater or workshop press to safely avoid damages and to adjust axial or radial clearance.

The training begins with a theoretical part that explains what faults can happen and how those might impact bearing performance. It is important to understand how excessive mounting forces can damage raceways and what one has to do in order to avoid them. The same applies to the setting of clearance – by understanding how clearance influences operation temperature, noise and running behaviour, one develops the sensitivity which is essential for taking sufficient care and measuring precisely.

During the practical part, the following exercises will be conducted:

- Changing the ball bearings of an electric motor
- Mounting cylindrical and spherical roller bearings

- Measuring and adjusting axial clearance of an assembly
- Measuring and adjusting of radial clearance of spherical roller bearings with conical bore

This seminar takes about 4 hours and is dedicated to groups of up to four persons. Apart from this, Elgeti Engineering can refer in particular to your special applications. Please feel free to contact Elgeti directly at www.elgeti-engineering.de for coordination of details according to your requirements!


VDMA
HANNOVER MESSE
Bearing EXPO & Conference
Bearing NEWS
1 Industry
3 Continents
4 Events
20 Speakers
100 Ideas & Innovations
at Global
IAMD
Platforms

The BearingEXPO Conference at Hannover 2019

Both the market drivers and technical aspects of the bearing industry will be highlighted at the Bearing Conference which will be held at the VDMA forum on 05 Aprilduring Hannover Messe.

IAMD 2019: A world of solutions for smart factories

In 2019, the integration, digitization and interconnection of industrial technologies will transform the world's manufacturing industries more than ever before. In recognition of this, the IAMD show will feature the full range of products and solutions for the factory of the future, including factory and process automation systems, industrial IT, robotics, smart drives, and intelligent hydraulics and pneumatics systems.

All of the exhibits will share one unifying theme: "Industrial Intelligence" , which is also the official lead theme for HANNOVER MESSE 2019. Artificial intelligence and machine learning are helping to eliminate production downtime, boost efficiency and ensure the seamless integration and operation of all the different parts that make up smart factories.

The over 200,000 trade visitors attending the upcoming HANNOVER MESSE will come from a diverse range of user industries. But most will come to the fair with the same clear objective in mind: to find the right state-of-the-art smart automation solutions for their manufacturing operations. For the companies they represent, digitization is the key to keeping their competitive edge.

BearingEXPO Conference at Hannover Messe 2019

Apart from the exhibits, trade visitors can look forward to a comprehensive supporting program of forums and special presentations, including the Bearing Conference at the Motion & Drives forum of the VDMA; where various commercial and technical bearing industry related topics will be presented.

The current drivers of the global bearing industry and what to expect in the future; the influences of globalization, consolidations, trade wars, multinational politics; bearing fundamentals for energy efficiency optimization in power transmission applications;

an introduction to precision bearing engineering applied to high speed machinery and maintenance cost saving in bearing applications are some if the topics which will be highlighted during this unique event at the VDMA forum.

The BearingEXPO Conference which will take place at the VDMA forum during Hannover 2019 show is supported by the following companies:

Keynote Speakers

Date : Friday 5 April 2019, starting from 13:00
Location : VDMA forum at the IAMD Hall
Entrance : contact info@bearing-news.com for your 5 days free entrance tickets to the Hannover Mess

Thorsten Klähn - TIMKEN
Manager Application Engineering – Wind Energy and Power Transmission

Presentation:
Bearing Fundamentals for Energy Efficiency Optimization in Power Transmission Applications

Drew Devitt - New Way Air Bearings
Chairman and CTO

Presentation:
Precision Bearing Engineering Applied to High Speed Machinery

Dave Hull - Pcomponents
President

Presentation:
The Evolution of the Global Bearing Industry and What to Expect in the Future

Steve Quintijn, Regal Beloit
Marketing Manager Bearings

Presentation:
Maintenance Cost Saving in Bearing Applications

Safe bearing assembly thanks to smart technology

New generation of Betex low frequency induction heaters

HALL 25 • F23

Company Name:
Bega Special Tools

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8171 ME Vaassen, The Netherlands

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At this year's Hannover Messe, Bega Special Tools will introduce a new generation of low frequency induction heaters. These are used for controlled heating of bearings, gears and other machine parts. Using smart processor technology, they provide better control over a stress-free, controlled heating process. A log function allows the heating process to be recorded.

Correct assembly of a bearing is one of the critical processes that affect the bearing's lifespan. The requirement of correct installation is becoming ever more important, especially for very expensive bearings or for bearings in hard-to-reach locations. With the introduction of its new series, Bega meets the industry's demand for greater control over the heating and assembly process. Two series have been developed:

the Basic Series and the Smart Series.

The Basic Series replaces part of the current Betex range. These heaters are controlled using a simple keyboard and have a single temperature sensor. Heating can take place in time or temperature mode. Smart electronics ensure ideal heating and efficient use of power.

The Smart Series is used where a greater degree of control over the heating process is needed. These heaters have a modern, easy-to-use touchscreen. The heating process is visualised in the form of a clear graph. Data can be saved and externally documented via a USB connection. A double temperature (Delta T) measurement provides full control over the temperature progress. The operator can now exactly determine the rate at which a bearing is heated. The decisive factor here is not so much the speed at which the bearing reaches its target temperature as the prevention of stress that can result from rapid heating and can damage the bearing.

Induction heating is a sustainable form of heating. It replaces old methods, such as ovens, oil baths and open fires, which use much more energy as well as causing pollution and safety risks. The robust Betex heaters are designed for intensive and industrial use. They are made from recyclable materials and use induction technology, which makes them very energy efficient.

Safe bearing assembly High precision bearings for high precision applications at Hannover Messe

CPM SpA is one of the main Italian companies specialized in bearing manufacturing. The company is specialized in manufacturing tailor-made ball and roller bearings in medium to high quantity batches. CPM dimensional range goes from 10 millimeters bore up to 800 millimeters external diameter.

The complete production process takes part internally, from the design phase to the logistics of the final product. The advantage is the capability to constantly monitor the quality of the special bearings and give the required flexibility to orders management and promptness to customers needs. Produce locally and think globally is part of CPM's DNA and represents that added value which led the company, established in 1967, to a constant and significant growth through the years.

HALL 22 • D26

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CPM SPECIAL BEARINGS

Manufacturer of High Quality Bearings for tomorrow´s challenges

ZEN Bearings is a brand with a worldwide presence, with over 50 years of experience in the manufacturing of tailor-made and standard bearings for a wide spectrum of industries. More than 6.000 product lines guarantee the highest quality and the long life cycle of a premium product. All of them are manufactured according to DIN standards and are tested in our ZEN Inspection Center awarded with the ISO 9001:2008 Certification. ZEN's logistics network with 6 warehouses around the world, more than 22 official distributors and 26 official sell points, are sure to provide you with ZEN bearings wherever you are. Our technical department can modify any non-standard bearings to your requirements, even for small quantities. Also, we have at your disposition a great team of expert engineers who always will be happy to support your 3D max support, technical drawings, AutoCAD department. We look forward to your visit on our stand where we will be pleased to offer advice.

HALL 22 • D15

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ZEN™

Automatic lubrication and assembly and disassembly of bearings.

HALL 22 • A65

Company Name:
Simatec AG

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simatec ag, from Wangen an der Aare in Switzerland, designs, manufactures and sells sets of practical and easy to use tools. simatool tools are used all over the world for mechanical assembly and disassembly of roller bearings and radial shaft seals. Currently, simatec ag has extended its range of simatool products and introduces a world innovation on the market with the FT-P fitting tool. The new simatool tool offers the ideal solution for mounting and snap-in installation of bearings or other circular shaped components. The FT-P fitting tool - coupled with a mechanical press - guarantees correct mounting of components having an inside diameter up to 60 mm.

With the simalube lubricator, simatec ag has launched a successful business and is one of the main suppliers on the world marketplace. The simalube automatic lubricator allows long-lasting, clean, safe and maintenance-free lubrication of bearings. Thanks to this technology, complex processes can be simplified and significantly reduce the maintenance costs of thousands of machines worldwide. Investing in a simatherm induction heater pays off in a number of ways. Within seconds, a roller bearing is gently heated to the required mounting temperature. This results in a huge saving in time, energy and money compared with previous heating methods such as oil baths, heating plates or ovens. A component is heated to the preselected temperature, where it is maintained using the keep-warm function, which means that it is never overheated and is ready for mounting at any time.

The “Green Brand” that moves the World

HALL 22 • D65/1

Company Name:
ISB INDUSTRIES

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ISB Industries as leading manufacturer of Industrial Bearings and Components will take part, together with the partners of the Group, to MDA in Hannover.

Since 1981 the Group has founded its success on continuous investment in Italy and abroad (new partnerships, new branches and distributors), becoming more and more a reference point in the bearings market.

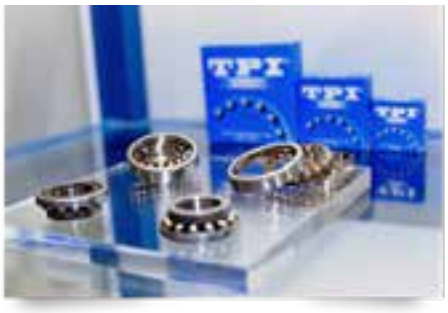
Today ISB (Italian Standard Bearing) is an ever expanding reality. In 2018 ended the works for the construction of the New Logistic Center, the largest logistic hub for bearings in Italy, with over 56,000 pallets in stock; thanks to this major investment the Group can offer a complete and reliable range of high-quality products always available in stock and a just in time delivery service.

The company’s development and culture are closely linked to the trust granted over the course of almost 40 years of commitment and passion by our customers all over the world.

TPI Bearings at Hannover Messe- Technology, Precision and Innovation

HALL 17 • E57

Since 1966 TPI has been in bearing industry providing a massive range of custom design bearings for global industry. The key to success is our ability to develop bearing designs and automated production facilities, which empower us to constantly deliver excellent product and service to all of our customers.



Quality products with over 50 years

Our three core principles of “Technology & Precision & Innovation” are central to this. these principles motivate us to achieve our goals.

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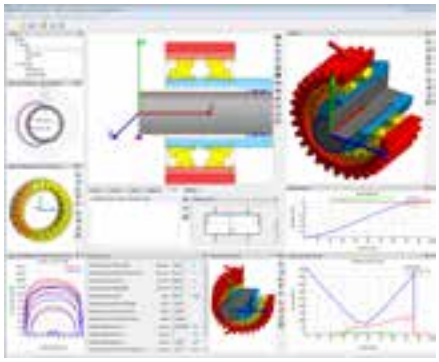
www.tpi.tw

TPI® BEARINGS

Calculation software for mechanical engineering

HALL 25 • A23

MESYS AG based in Zurich/Switzerland provides standard software for shaft and bearing analysis with customers in 25 countries on 4 continents.
The shaft analysis software allows to model shaft systems from single shafts to whole gearboxes connected by gears. Nonlinear bearing stiffness, elastic housings or elastic planet carriers can be considered either for single load cases or using load spectra. Natural frequencies or harmonic response can be calculated in addition to the static solution. A parameter variation allows a quick evaluation of the influence of selected parameters on system results. The load distribution of rolling element bearings or ball screws is calculated within the shaft system or separate programs for the calculation of bearings and ball screws are available.



The rolling bearing calculation software determines the load distribution within the bearing and calculates the reference life according ISO/TS 16281. Centrifugal forces and gyroscopic moments are considered for high speed ball bearings. Interference fits and temperature affect the operating clearance and therefore

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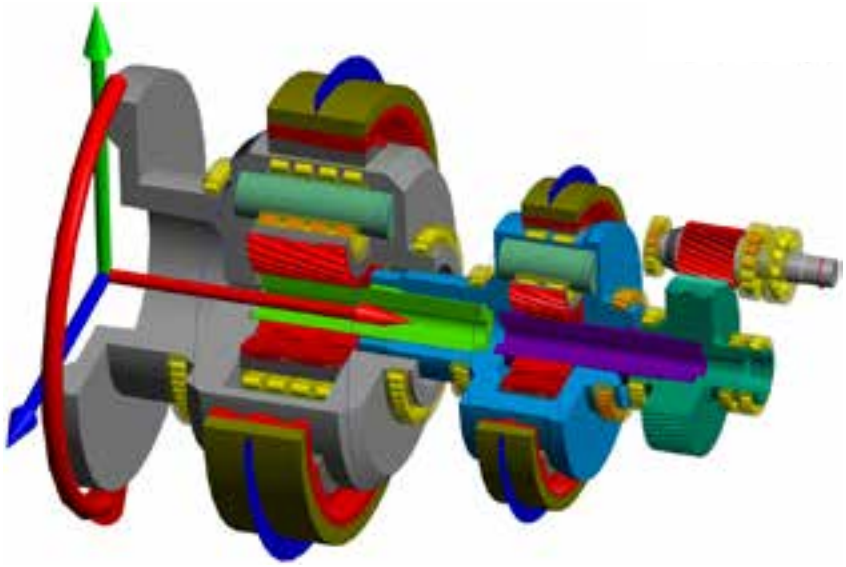
mesys AG Engineering Consulting Software

the load distribution and bearing life. The effect of tilting angles or moment load can be evaluated too.

New features presented at the fair are:

- Consideration of elastic deformations of bearing rings coupled with housing stiffness
- Nonlinear contact between elastic bearing ring and shaft or housing
- Consideration of elastic deformation of gear bodies
- Harmonic excitations using prescribed displacements of supports or in gear contacts like transmission error



Koyo displays typical examples of its various roller bearing families including some interesting new technologies, at Hannover Messe

HALL 22 • A31

Koyo Bearings, a division of JTEKT Corporation will be present at Hannover Messe 2019 with its own booth, presenting its latest bearings and technologies, alongside a general overview of its products for application in global industries like: construction & agricultural machines, steel making operations, wind mills, textile machines, medical and electronics equipment, automotive, domestic appliances and many other "mechanical" industries. Products are made for OEM application as well as for maintenance & repair and distributed via our global distributors. JTEKT is a global company with production plants, engineering centers, logistical hubs and sales offices in all major industrial regions on all continents.

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Koyo®
the bearing brand of JTEKT

Skew-controlled and vibration-resistant spherical roller bearings

HALL 24 • B35/11

NACHI Europe, subsidiary of the japanese Nachi-Fuijkoshi Corp., highlights its range of spherical roller bearings series EXQ. They convince with outstanding advantages. The curvature of their rolling contact surface has been optimized. As a result the spherical roller bearings series EXQ provide an extraordinary axial load performance. To decrease the heat generation during rotation their roller movement has been stabilized, among other techniques by using a special floating guide ring. Along the efficiency has been increased. Thus these bearings allow the highest permissible rotation speeds among the spherical roller bearings available worldwide. Moreover the spherical roller bearings series EXQ provide a longer lifetime. They are capable of continuous operating temperatures up to 200°C by standardized heat stabilization treatment.

The specific design EXQ-V is equipped with a highly strong, highly rigid steel pressed cage which encloses the entire roller. A special surface hardening treatment gives the crucial advantage of a highly increased impact resistance. This design is therefore especially suited for use in high level vibration applications.

In addition, Nachi Europe exhibits its wide range of roller bearings including ball bearings, cylindrical roller bearings, tapered roller bearings an precision bearings for use in automotive, aerospace and general machine building industry.

Nachi's roller bearings provide an outstanding quality because the company has a widely vertical integration. Every step in the production line, from the steel production and the heat treatment to the machining of the parts and the assembly of the roller bearings, is executed and controlled by the company's engineers and technicians. Thus Nachi can ensure high quality processes throughout all the production stages.

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NACHI

Double load carrying capacity with single row of rollers for spherical roller bearings

HALL 22 • B50/4

BMI is an ISO 9001 manufacturer and exporter from INDIA working with customers in more than 27 countries. With more than 2000 sizes in stock BMI is able to make quick delivery to customers for standard sizes. Apart from roller bearings BMI also does non-standard / customized bearings as per customer drawing and sample as well. You can visit our website www.bmibearings.com for more information. BMI is also awarded with STAR Performer by EEPC (Engineering Export Promotion Council of India) for exports in the bearings category.

bmi® Since 1974

Company Name:
Bearing Manufacturing India

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www.bmibearings.com

Discover the ultimate deal with KHS-LG Bearing Manufacturing at Hannover Messe

HALL 22 • D58

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KHS Innovation & Engineering LLP

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Website :
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KHS INNOVATION & ENGINEERING is a manufacturer and exporter of bearings under “KHS-LG” Brand having the wide range of Tapered Roller Bearings (MM Series) And Spherical Roller Bearings, which are produced in India. Specially in Tapered and Spherical Roller bearings the prices / quality are very reasonable. KHS-LG Bearings are manufactured from bearing Steel Grade SAE 52100 (as per international standard), with modern technologies and skilled workforce. The company has been focusing on quality & technical development since it has been established. KHS serves companies Globally, Quickly and Competently, with its progressive and innovative approach towards customers needs.

BENTLY BEARINGS™

GO OIL FREE!
BENTLY BEARINGS™
BY NEW WAY®

Offering magnetic bearing performance with the cost and simplicity of oil bearings.

EXTERNALLY PRESSURIZED POROUS (EPP)

GAS BEARINGS

THE BEARING IS THE SEAL

Enable new machine designs by combining bearing and seal function. Bearings get closer to the work, reducing impeller clearances.

DIRECTLY RETROFITTABLE

Bently Bearings™ fit in the same space as oil bearings. Retrofit your problem oil bearing machine to gas bearings in place.

HIGH LOAD CAPACITY

Load capacity is a function of input pressure. 900 PSI unit loading has been demonstrated with 1000 PSI input pressure.

HIGH STABILITY

Virtually zero friction means there is no destabilizing cross coupled stiffness. Whirl within the bearing is eliminated.

RUN ON PROCESS GAS

Bearings can run "Hot Immersed" on process gas. High temperature bearings are capable of 1000°C in continuous duty.

EFFICIENCY AND RELIABILITY

Bently Bearings™ have two orders of magnitude less shear than oil. No contact wear at startup or shutdown means better reliability.

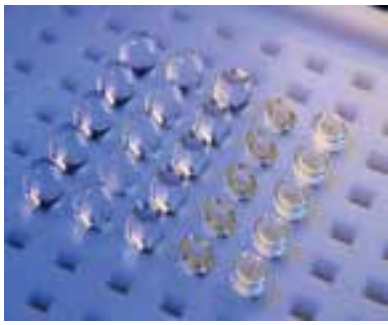
Don Bently, founder of Bently Nevada, started the Bently Pressurized Bearing Co.
See what he had to say about the topic.
bentlybearings.com/chapter23

Dr. San Andres of the Turbolab at Texas A&M is a leading expert on gas bearings.
View his paper on EPP Gas Bearings.
bentlybearings.com/sanandres

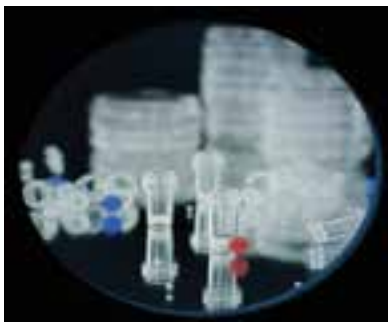
www.bentlybearings.com/BearingNews
inquiries@bentlybearings.com

Global Production, Local Service







TSUBAKI NAKASHIMA CO.,LTD.

Leading global supplier of precision balls, rollers, and components

www.tsubaki-nakashima.com

Gearbox Reliability

Core Preventive and Proactive Maintenance Requirements to achieve Gearbox Reliability

Gear reducers are an integral part of all production processes, ranging from small throwaway-units to large, both specialized and standardized units. Gearbox Reliability is a critical factor for companies tasked with reducing plant maintenance and operational costs.

Additionally, they can be very complex in design and can pose a challenge for maintenance staff, as there are many moving interfaces (gear mesh types, couplings, bearings and sealing mediums) all requiring their own and often different installations, adjustments/setups. Not to mention the very high loads that they can operate under and all of these factors require them to operate at all times with an effective and ***contamination free lubrication film thickness.***

Lubrication Film Thickness
A fundamental fact!

Particles in the oil, greater in size than the oil lubrication film thickness, is the main cause of machinery and component wear. This is supported by the fact that a leading bearing company confirms that if the particles in the oil are smaller than the lube film thickness, the bearing will have an infinite life.

...another fact!

A lubrication film thickness is only a few microns in thickness. Comparable to a strand of human hair split twenty times, this is how small the lube thickness really is.

...and another fact!

Most people think that new oil is clean. **WRONG**, unless it is ordered as a clean lubricant, it is dirty and needs to be cleaned before it is put into service.

Of course wear due to contaminates/ particles in the oil is one cause of wear. Another important point is the fact that oil in operation does not provide adequate separation of the moving metal components. I.e. ***the oil does not provide an effective lubrication film thickness.*** The causes can be any number of reasons:

- The wrong viscosity oil is being used.
- The oil levels are running low.
- The oil has water in it or other fluid contaminants.
- The oil is oxidized.
- The oil has lost its additive pack.
- And of course there can be a number of Root Causes for the lubricant to be in any of the conditions listed above.
- The lubricants were mixed.
- The oil was not topped up.
- The gearbox is operating in moist, damp or wet area.
- The gearbox experienced a running condition or high temperatures.
- The gearbox coupling was misaligned.

The table shows the Lubrication Conditions that will effect gearbox wear and reliability, along with the ways to detect the condition while in operation or at the repair stage and the rectification-actions to prevent the condition from happening again.

In order to achieve a good gearbox reliability, Maintenance Management need to address the Fault Detection Mechanisms and Rectification Needs as listed above.

Lubrication Condition	Fault Detection	Rectification Needs
Dirty oil in operation	Oil Analysis RCFA on damaged parts	Change the oil Filter the oil in operation Knowledgeable staff on Bearing RCFA
Dirty oil used in top ups	Oil Analysis	Filter the oil before use
Oils were mixed	Oil Analysis RCFA on damaged parts	Effective labelling / identification Defined details / procedures Knowledgeable staff on Bearing RCFA
Wrong oil was used	Oil Analysis RCFA on damaged parts	Replace the oil Defined details / procedures Knowledgeable staff on Bearing RCFA Consult manufacturer
Oil lost its additive pack or wrong additive pack used.	Oil Analysis RCFA on damaged parts	Replace the oil Knowledgeable staff on Bearing RCFA Consult manufacturer
Water in the oil	Oil Analysis RCFA on damaged parts	Fit desiccant breathers Knowledgeable staff on Bearing RCFA
Not enough oil	High operating temperatures Oil leakage	Fit bulls eyes or sight glasses Defined details / procedures

— Table 1: Showing the lubrication conditions that will effect gearbox wear and reliability

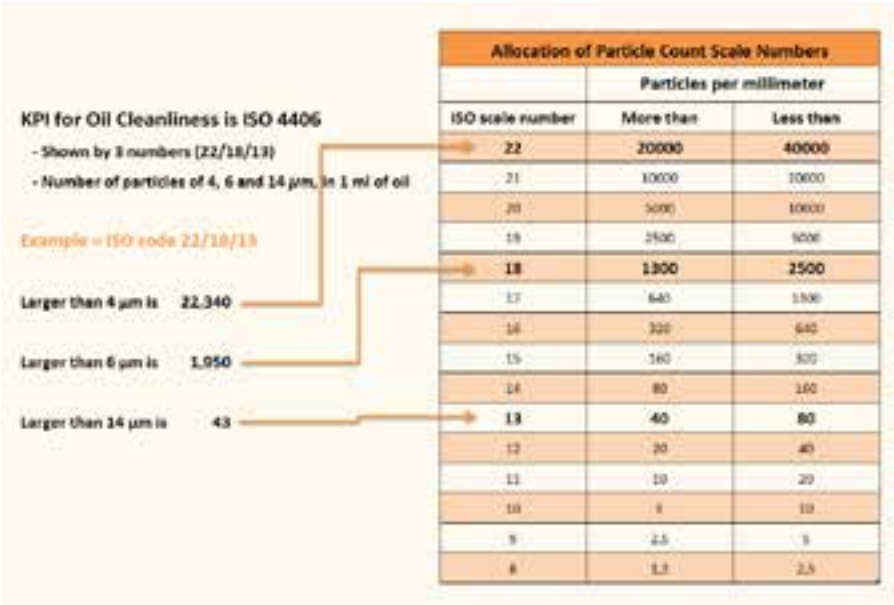
The Strategy

For any strategy to be successful over the long term two considerations are important:

1. The activity needs to be considered as a process and not a project, i.e. an ongoing process, which can be considered as being proactive in achieving the results.
2. To ensure we know **where to go** and **what to achieve.** For lubrication to work in a reliable manner (ISO 4406).

ISO 4406 is a method for coding the level of contamination by solid particles, as spelled out by the International Organization for Standardization (ISO).

Depending on the criticality of the gearbox an ISO 4406 standard needs to be



Allocation of Particle Count Scale Numbers		
	Particles per millimeter	
ISO scale number	More than	Less than
22	20000	40000
21	10000	20000
20	5000	10000
19	2500	5000
18	1300	2500
17	640	1300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5

— Table 2: Allocation of particle count scale numbers

created. For standard gearboxes a target level of 18/15/11 is generally acceptable.

ROI

Of course any strategy will cost money to implement and continue. However, this should not be considered as a cost, but more referred to as an investment to achieve greater productivity returns. By lowering a code from 22/18/13 to 16/12/8, the meantime between failures can increase by a factor 4-5 times.

Checkmark

Implementing a Lubrication Reliability Strategy has many steps and if some of the steps are missed or a wrong step is taken, achieving the desired results can become difficult. However, one Checkmark question (referring to the 6 Lubrication Rights) throughout the process will guide you in making the right decision:

Will this action ensure that we get:

- the Right Lube
- in the Right Machine
- at the Right Time
- in the Right Quantity
- in the Right Way
- in the Right Condition (and kept in the right condition ?)

If the answer is "YES". Great, the action is correct.
If "NOT", the action needs reconsideration.

Main Steps in Gearbox Lubrication Reliability Strategy:

1. Management Software.
2. Clean Storage area.
3. Identification and Labeling.
4. Clean dispensing system.
5. On-site filtering system.
6. Oil analysis program.
7. Desiccant air breathers fitted.
8. Inspection points.
9. Competent staff.

1. Management Software

An important key to all successful Lubrication Reliability programs is the process to ensure that what needs to be done actually gets done. Such a software is not only a work management program, but it is also the data base for all information about the lubrication needs for any given gearbox. CMMS system can do this work. However, most CMMS-systems do not go down to enough detail for managing the lubrication needs. Such system should also have transparent interfaces for specialized Oil Analysis Programs.

Specialized Lubrication Management software programs available today can be either stand alone or cloud based and both can be vender-specific or vender-neutral.

2. Clean Storage Area

A big source of contaminants entering the equipment is from dirty/messy lube storage areas. A well managed lube room ensures all lubes are correctly identified, filtered before use, the rooms are temperature-controlled plus

—Lustor - Lubrication Storage System

dust- and dirt-free. Generally called: Contamination Control Centres.

3. Identification and Labeling

Most plants have more than 3 different lubes in use: Hydraulic-, Gearbox-, Compressors-oils; to name just 3. Many have as many as 10 different oils in operation. The biggest dilemma for maintenance staff is to have a clear understanding of what oil goes into what application. For sure a dedicated lube man will have a better understanding of the relevant logistics. But what happens when the lube man is sick or on vacation. The last thing we want is f.e. a hydraulic oil added to a high load gearbox or a synthetic oil added to a mineral based application.

Most well managed identification systems are colour-coded throughout the plant. In the lube room, on dispensing containers, on application and on filtering systems. The labels should have details about the oil and its viscosity grade.

4. Clean Dispensing System

"Have you ever seen open dispensing cans and dirty funnels laying around in lube rooms?"

— OilSafe Dispensing System

I'm sure the answer is "yes", and these are one of the biggest sources of continents entering the oil. The "Best Practice" for oil dispensing in industry today is the OilSafe dispensing system. Colored lids with various dispensing lid types and sizes and pumping methods.

— Filtration Unit

5. On Site Filtration

Gearboxes are inherent contamination generators, particularly if they do not have desiccant air breathers fitted to them. So we need a system of cleaning up the oil when it becomes dirty.

The answer is filtration, driven by Oil Analysis results. The most effective kidney loop systems used in plants today are mobile trolleys, with quick connect couplings fitted to the gearbox. Simply attach the system and run it until the oil is cleaned. Care should also be taken that the same filtering medium is not used for different types of oils and viscosities.

6. Oil Analysis Program

No gearbox reliability or maintenance activity will work unless you can control the quality and specification of the oil in operation: oil analysis! The OA-program will tell you when the oil has a too high contamination level and it needs filtering, when the oil is oxidized, has a too high level of water or other contaminant level and needs to be replaced. A good OA-program is the gearbox blood test for health management.

7. Desiccant Air Breathers Fitted

Oil levels in gearboxes rise and fall with temperature variations and if they are not protected with air controllers, contaminants like moisture and dust are drawn into the gearbox oil. Desiccant air breathers filter out the airborne contaminants by only allowing clean and dry air to enter the gearbox.

8. Inspection Points

How do we know in a simply way when the oil levels are low? The answer is sight glasses. An innovation over the last few years have been the development of protruding type sight glasses called BullsEyes, these make it much easier to see the oil levels. A more recent development of the BullsEye are ones with variations to their construction, including Oil Analysis sampling points.

9. Competent Staff

Lubrication today is a very technical subject and staff tasked with the function of managing this activity need to be trained as analysts and service technicians. The Best Program for this is one controlled by ICML. These staff also need to understand Oil Analysis and this can be covered in the ICML programs or from oil laboratories or specialists.

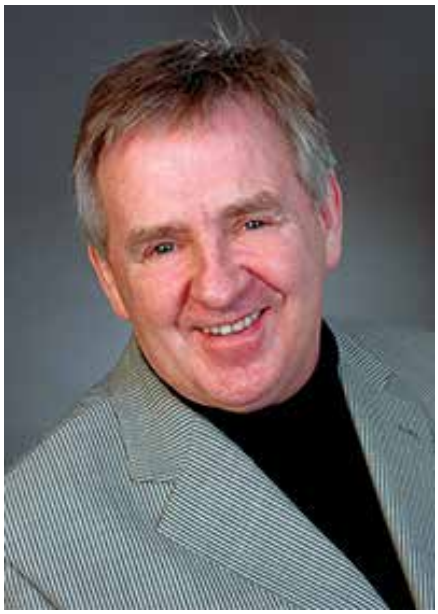
Another very important knowledge that general staff need to be competent in, is recognising . The bearing tells the story of everything that happens in its life time; how it was fitted, lubricated, the condition of the lube it ran it, how hot it became, etc. The greatest amount of knowledge of what needs to be done to prevent damages from happening again, can be gained from examining bearing wear patterns. There are more than 10 different causes for why bearings fail.

Conclusions

By effectively implementing a Lubrication Reliability strategy for operational gearboxes, unexpected failures can be avoided and application lifetimes can be dramatically improved. It is not easy, it is complex and costly, however the uptime rewards outweigh the costs many times over.

— Air Sentry Desiccant Breathers - The Guardian

Highlighted are only broad details of what is needed in most industries today. It is recommended that companies find a local and competent lubrication consultant/supplier to help them tailor and implement a Lubrication Reliability Program that suits their industry type.



Autor: Ian Knight
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Manufacturer of High Quality Rolling Bearings

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Since 1974

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BEARING MANUFACTURING INDIA

Professional installation and removal *of* **rolling bearings**

Over 16% of premature bearing failures are due to improper assembly. The lack of suitable installation tools and the necessary knowledge when replacing bearings often means that new bearings experience high forces incorrectly applied during installation and are thereby damaged. Early bearing failures are often the result. This can be prevented with the correct procedures and through the use of specialist professional tools. Only then will the new bearings reach their expected service life.

Mechanical tools

Without the right special tools, professional assembly and disassembly of rolling bearings is impossible. With its wide range of high-quality tools, simatec offers the best conditions for fast and safe working. With the proven impact tool simatool Fitting Tool FT 33, bearings can be quickly and precisely, cold-mounted onto the shaft or hammered into a housing. The design of the tool ensures that the installation forces are transmitted through the inner or outer ring and not via the rolling elements. The bearings will not be damaged during assembly.

It is also important, however, to ensure that the components are removed professionally. Thanks to the use of simatool removal tools, time is

saved while ensuring that none of the adjacent components are damaged.

Heating with induction

Another method for the professional installation of bearings is the heating of the components before assembly. The leading bearing manufacturers recommend heating bearings to a temperature of 110 °C for installation. As a result, the inner diameter grows and the bearings can be positioned without effort onto the shaft. When mounting into a housing, it is this that is heated and the cold bearing is pushed into the heated housing. With simatherm induction heaters rolling bearings and other annular metal parts can be heated efficiently. The devices allow quick and clean installation and replace conventional heating methods such as hotplates, hot oil baths, open flames or ovens. During the heating process, only the workpiece heats up and the device itself remains at room temperature. simatherm induction heaters are available for rolling bearings with a mass of up to 1200 kg.

The simatec tools and heating devices are constantly evolving to better meet changing requirements and to offer the customer the greatest possible benefits. New in the program is the simatool Fitting Tool FT-P. This tool is the ideal solution for installations with larger installation forces, since the tool can be used on presses. It thus enables mounting that would not be possible by using a hammer, making it the ideal complement to the FT 33 Fitting Tool.

simatec ag has more than 30 years of experience in the manufacture and sale of innovative products for the assembly and disassembly of rolling bearings. Using simatec products ensures that bearings are installed correctly and that they reach their full performance potential in terms of quality and service life.

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4 critical technologies *for your lubrication* ***program***

Bearings are essential to any facility's continued operation. That's why lubrication is so critical for reliability maintenance engineering and physical asset management.

Many times overlooked, lubrication is far more complex than just buying oil or grease and throwing it into your equipment. Selecting the right type or types of lubricant, storing and filtering them correctly, monitoring bearing noise, and ensuring that over-lubrication and under-lubrication don't occur all play an important role. Fortunately, there are more technologies than ever in the marketplace that allow you to manage your lubrication program effectively.

Oil Analysis

The most precise lubrication in the world won't help if the lubricants in question are poor quality, contaminated or breaking down under heat and pressure. Contracting with an oil analysis laboratory or investing in your own analytics kit will allow you to detect these kinds of issues before they result in machine failure.

Many different factors can impact the quality of your lubricant. Improper storage or a blown seal on a component could allow dirt, water, or metal fragments to corrupt your supplies. Even new oil should be tested – while your lubrication program might be top-notch, you've got little control over its handling before it's delivered to your facility.

Proper Storage Facilities

Industrial lubricants, despite their demanding conditions, can actually be some pretty sensitive materials. With the right combination of products and techniques, you can ensure that your investment isn't eroded by neglect.

There are many factors that can affect the storage of industrial lubricant, including using containers that already contain contaminants, storing them outside in harsh conditions, and not using color-coded containers to prevent accidentally mixing two different oils.

Any auxiliary equipment, lines, and

vessels should also be thoroughly cleaned and certified before being used with fresh lubricants.

High-quality Industrial Lubricants

All the maintenance, storage and analysis technology in the world won't serve you well if you're not using both high-quality and properly selected lubricants. Most, if not all technicians are comfortable with selecting the right grade of oil for a given application, but there are more complex factors than that to weigh. Considerations such as additives, duration of use and ambient conditions can all make for a significantly more complicated decision process.

Often, a multipurpose lubricant won't actually be the right selection for your applications. Multipurpose lubricants cannot provide satisfactory service in current demanding environments. Lubricant performance must be optimized to meet the increasing demands of modern industry.

The first step in selecting the best lubricant for a given application is to define the tribological system. With a fully defined tribological system in place, the next step is theoretical analysis.

Ultrasonic Inspection Instruments

An ultrasonic instrument designed specifically for lubrication, such as the UE Systems Ultraprobe 401 Grease Caddy can bring your facilities management game to the next level. The Ultraprobe 401 uses ultrasound technology to provide critical data about baseline dB levels, dB levels before and after applying grease, cost analysis of lubricants and other vital information.

Over-lubrication is often a problem as big as or bigger than under-lubrication – in fact, 70 percent of lubrication professionals believe it's a problem at their plant. When excess grease gets into a bearing, it begins to churn and heat up. This churning causes the lubricant to solidify, blocking the entry of more, fresh grease and ultimately causing a bearing to fail.

Another possible failure mode that can arise from over greasing is seal damage. Adding more than the necessary amount of lubricant to a bearing under the high psi of a grease gun can crack the seal, allowing outside pollutants to infiltrate.

This instrument uses ultrasonic technology so that lube technicians know when to stop adding grease which can prolong the life of your equipment. Its digital display allows the user to gauge friction levels through the dB levels. Even in high-noise environments, it can isolate the necessary ultrasonic waves and transmit them to the user.

Conclusion

In all, the field of precision lubrication and maintenance has grown more complex and diverse than ever before. It's easy to get lost in the minutiae of these processes and products, and sometimes the measures you think are helping may actually lead to failures down the line.

With the right techniques and technologies, however, it's possible to see real return on investment from your maintenance efforts.

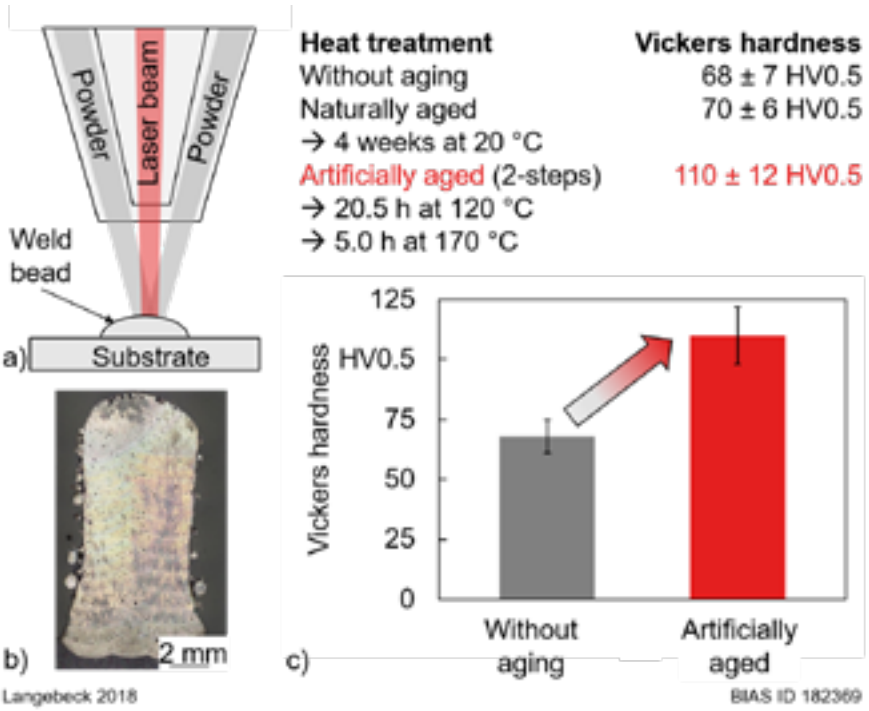
Additive manufacturing of rolling bearings **in innovative lightweight design** by laser metal deposition

In cooperation with IBO GmbH and Leibniz Institute for Material-oriented Technologies (Leibniz IWT), BIAS – Institute of Applied Beam Technology GmbH develops innovative rolling bearings in lightweight design. The IBO GmbH already uses the lightweight material aluminium instead of conventional steel for large rolling bearings. Unfavourable are the low mechanical properties even of high-strength aluminium alloys. Therefore, an additional raceway system made of bearing steel is mandatory. These rolling bearings are called wire race bearings. The additional race way unfortunately implies disadvantages like higher volume of the parts and as a result higher weight, production and assembly costs. Thus, the advantage of the low density of aluminium is diminished. Aim of the joint development work is therefore the local reinforcement of the comparably soft aluminium by hard particles and to manufacture this composite structure directly into the aluminium body as raceways of rolling bearings. In this way the additional raceway system made of steel can be omitted in lightweight rolling bearings. The approach is to use the additive manufacturing technology laser metal deposition (LMD) to produce single bearing components. During the manufacturing process hard particles will be injected simultaneously with the aluminium powder into the process zone to reinforce the highly stressed raceways of the rolling bearing.

The principle of the used LMD-technique is shown in figure 1 a). Compared to powder bed based additive manufacturing techniques, the LMD process convinces through a nearly limitless assembly space and high build-up rates. These advantages of the laser metal deposition are mandatory for an economic additive manufacturing of large-scaled rolling bearings with diameters up to 3 m.

In first tests with the high-strength aluminium powder EN AW-7075 (50 µm to 125 µm) low-defect specimens could be manufactured (see figure 1 b)). The following hardness measurements according to Vickers on a transverse section showed a low hardness value of 68 ± 7 HV0.5. After artificially aging at elevated temperatures a higher Vickers hardness of 110 ± 12 HV0.5 was measured (see figure 1 c)). This shows that already artificial aging, without a previous solution treatment after the LMD process, leads to a significant increase in hardness.

To reach higher local strength, hard spherical fused tungsten carbide particles (SFTC) (up to 3,000 HV0.1) will be injected. This shows another advantage of the LMD technique. In addition to the matrix material EN AW-7075 it is possible to bring simultaneously SFTC particles into the process zone. Via a Y-tube element, a second powder hopper with the hard particles can be connected to the powder nozzle to inject the hard particles. In one step both, the aluminium matrix material and the hard particles for the reinforcement can be brought into the process zone during



— Figure 1 a) Schematic sketch of the LMD-process; b) Etched transverse section of an additively manufactured specimen out of EN AW-7075; c) Averaged hardness values of EN AW-7075.

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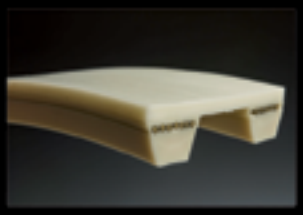
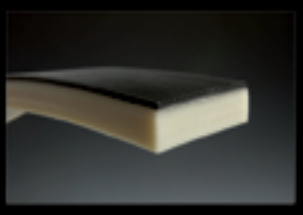
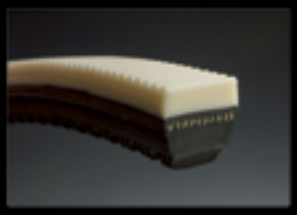


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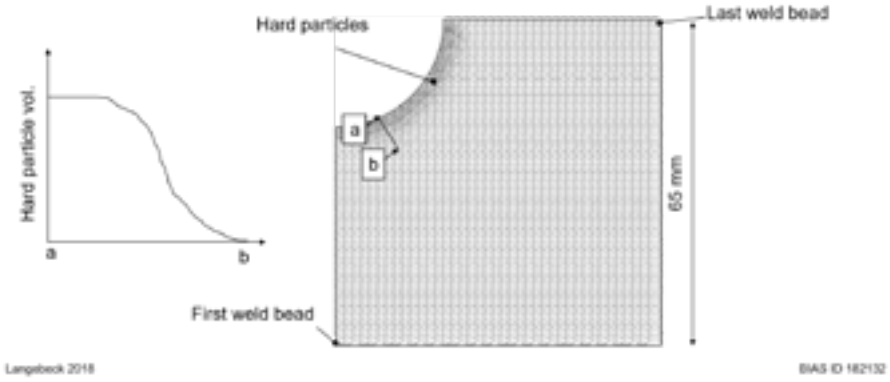
manufacturing of the rolling bearing raceways, which can be applied locally and simultaneous to the build-up process. The spherical fused tungsten carbide particles will not be melted by the laser beam and will therefore be dispersed in the aluminium matrix. Figure 2 shows the schematic transverse section of the build-up structure to generate a bearing component out of single weld beads. First circular weld beads with increasing radius



— Figure 2 Schematic transverse section of the build-up structure to generate a bearing component out of single weld beads with graded hard particle reinforcement.

are welded by LMD side by side until the required outer diameter is reached. Subsequently further layers of circular weld beads are generated on top of the first layer to reach the required height.

The research work focuses on improving the weld bead and build-up quality as well as the rather heterogenous aluminium-SFTC composite structure. Despite the near-netshape manufacturing capabilities of the LMD process, post-processing is necessary to gain the final contour and to separate the part from the build plate. To achieve the necessary roughness and fatigue properties for a rolling bearing, suitable process parameters for the machining of this extremely heterogenous composite with a soft aluminium matrix and significantly harder SFTC particles need to be determined.

The innovative combination of aluminium with local reinforcement by SFTC requires new calculation approaches to design additively manufactured lightweight rolling bearings. With the IBO GmbH this joint development work is supported by a competent industry partner with an extensive expertise in constructive design and production of rolling bearings made of various materials.

The cooperation between BIAS, IBO GmbH and Leibniz IWT focuses on enabling the development and future production of rolling bearings in innovative ightweight design.

The future innovative rolling bearings convince through low weight and high strength in the highly loaded zones of the raceways. Due to the elimination of the additional wire raceway system by embedding hard particles, the new approach for producing aluminium-based rolling bearings has also an economical benefit.

The authors acknowledge funding the project ZF4063003SU7 by the Federal Ministry for Economic Affairs and Energy (BMWi) via the German Federation of Industrial Research Associations (AiF) in accordance with the policy to support the “Zentrales Innovationsprogramm Mittelstand” (ZIM) on the basis of a decision by the German Bundestag.

Langebeck, A.1; Freiße, H.1; Stroth, M.2; Rentsch, R.3; Vollertsen, F.1,4

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vol.06

TOP100 TIPS *for* BEARING REABILITY

by Per Arnold Elgqvist

Bearing Tip No. 51: Contamination by particles reduces the service life of bearings below the required life due to abrasive wear.

It has always been known that contamination affects the service life of bearings. But until now there was no way to calculate this effect. After the new formula that was first published in ISO 281/2: 2000 we can now calculate the effects. There are still many details missing, such as the type of particles, their hardness and shape, etc., but we can still get an idea and justify the costs necessary to implement a greater cleanliness. As for example new filters of greater efficiency. How much would it increase the service life if I change the 40-micron mesh for a filter with an efficiency of β10? The difference would be 5 times, the contamination factor 0.1 compared with 0.5 for the calculation according to the ISO 281 formula. Logically this would easily justify the higher cost for the β10 filter. But why not a β5 filter that would give a factor of 0.8!

Let's see an example from the ISO 15243, Rolling Bearings – Damages and Failures – Terms, Characteristics and Causes:

This is an outer ring of a spherical roller bearing with heavy abrasive wear in the raceway. The very particular surface on the right side is caused by vibrations

in this bearing, as the abrasive wear increased the internal clearance until

this permitted vibration in the direction of the thrust load on this bearing.

Bearing Tip No. 52: Speed factors for grease lubrication

Lubricating greases that specify high speed factors often allow higher speeds for this type of lubrication than those that were earlier indicated in the bearing catalogs. Many new catalogs from bearing manufacturers have therefor left out the speed information as concerns grease, as this information was considering the greases of old traditional manufacture. Now the new concept “Reference speed is used.

Greases of modern manufacturing and especially with the greases of “High Performance” have a different physical-chemical structure and therefore their behavior as well and allows many times very high speeds. Several manufacturers of these modern greases indicate a speed factor, where the correct behavior is achieved, verified experimentally by the corresponding manufacturer of the grease.

The mentioned speed factor is the value of the mean diameter of the bearing ((inside diameter + outer diameter) / 2) multiplied by the speed of rotation in revolutions per minute.

Correction factors must be used according to the different types of bearings, which are directly related to the corresponding internal friction. This speed factor can be very useful specially to find a suitable grease in cases where it is desirable to increase the speed of the equipment in order to increase the production.

Bearing Tip No. 53: Always use grease with NLGI 3 consistency for bearings mounted on vertical shafts

Always when possible use grease with NLGI 3 consistency for the lubrication of bearings on vertical shafts. This with the objective that the grease is kept as long as possible in the bearings due to its harder consistency.
A softer grease, that is of NLGI 2 consistency or less, will quickly begin to move downwards due to the gravity, leaving the bearing without the much-needed grease.

Even when using grease with NLGI 3 consistency, the relubrication intervals obtained from diagrams published by bearing manufacturers are recommended to be reduced by half in order to ensure adequate lubrication.
In the same way, it is essential to use high quality greases that resist mechanical work without softening prematurely, that is, with good mechanical stability (Test according to ASTM D1831).

Bearing Tip No. 54: Ultrasound technology, excellent for monitoring the performance of bearings

In addition to being an excellent tool for “Precision Lubrication”, which means determining the most suitable greases, amounts of grease for relubrication and the correct intervals, ultrasound also represents an excellent opportunity for Predictive Maintenance.

Ultrasound technology should not be confused with Vibration Analysis. The two fulfill different functions and the one does not replace the other but complement each other. Ultrasound measures acoustic vibration at high frequencies (> 20,000 Hertz) and may detect symptom as a reduction of the lubricating film before any irreversible damage starts as well as lubrication problems earlier and in a timely manner, thus providing longer warning times.

The instrument to measure ultrasound is also more economic than vibration analyzers, so it can be a better start-up option for small and medium-sized companies with more limited resources, both as regards personal and financially.

Bearing Tip No. 55: Why do bearing failures become repetitive? How many times do we not ask this question?

The answer is very simple: Bearing failures will always become repetitive as long as we do not analyze the root causes of them and we do eliminate them in a definitive way with the corresponding corrective actions!

If for some reason a bearing fails prematurely it is essential to determine the cause and eliminate it immediately, otherwise the following bearings will logically fail in the same way.

To begin with, we need to know when a bearing failure is premature or natural. That is, we have to know how long all the bearings we use should last by design. By design, we refer to the design of the equipment manufacturer (not the bearing manufacturer) who has selected the bearing according to the expected service life. As an example, for industrial equipment designed to work 24 hours normally bearings are selected for a minimum L10 life of 40,000 to 50,000 hours, that is, 5 years of continuous operation. This means that all bearings that last less fail prematurely!

And do not blame the operating conditions: If the operating conditions are normal for which the equipment was designed, the bearings must last at least 5 years. For this they were

designed: bearing capacity of the bearings, types of seals, lubrication, etc.

In other words, the solution is very simple: Analyze the causes of bearing failures, determine the necessary corrective actions, implement them and do not neglect to monitor the results obtained. What is the use of changing the lubrication if we do not verify that the temperature falls as expected? Or that the new seals really prevent the entry of contamination?

Bearing Tip No. 56: Relubrication of Bearings during Operation!

The relubrication has the following objectives:

1. To replace the degraded and contaminated grease with new grease inside the bearings.

2. To replace and / or provide new grease in seals in applications where grease is used to improve sealing, cleaning and lubricating these reducing their friction and wear.

To achieve these objectives, it is essential that the relubrication is done with the equipment operating as long as the safety allows, so that the new injected grease is dynamically distributed and displaces the old grease, perfectly cleaning the bearings by the same flow of the new grease.

The best way to determine the correct amount injected is to use ultrasound technology to detect when the grease has been replaced in the bearing and it has been perfectly cleaned and lubricated.

Otherwise, in cases where the equipment is re-lubricated when it is stationary, the grease is supplied to a limited area within the bearing. When the equipment is started again, the bearings spit out most of the new grease and a limited quantity is mixed with the old grease in the rest of the bearing. This has 3 disadvantages:

1. Not all old grease is replaced.
2. The bearings are not cleaned.
3. Old grease accelerates the degradation of new grease.

Remember: ***"Bearings are as good as their lubrication!"***

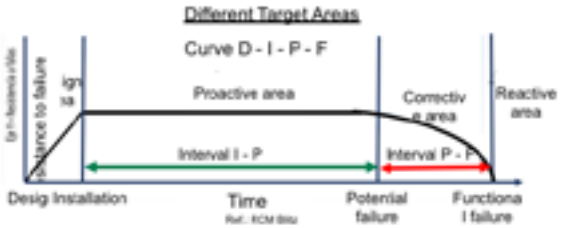
Bearing Tip No. 57: Reliability Assurance

Let's now do the same that we did some years ago in the Production: Achieve Cero Defects, applying Quality Assurance instead of Quality Control. Let's go for Cero Defects and Failures applying Reliability **Assurance**.

Let's go for **avoiding** bearing failures more than trying to **detect** them most opportunely: *Detecting faults does not improve reliability! It just reduces their consequences*.

This is the intention with my new course ***"Bearing Reliability Assurance – Cero Defects and Failures in Operation"*** with the idea of avoiding bearings failures and go for **defect elimination** and **precision maintenance.** We should start with defect elimination from the very beginning, the design and specifications, then the mounting and installation, the interval of operation, proactive maintenance and finally failure root cause analysis for the failures that may have occurred in spite of the efforts to eliminate the defects to avoid them to cause failures and stop these failures to repeat again.

Failures of assets are the consequences of unattended early defects (David Jonathan, CMRP)



Every defect is a treasure if the company can uncover its cause and work to prevent it across the corporation (Kiichiro Toyoda, Toyota).

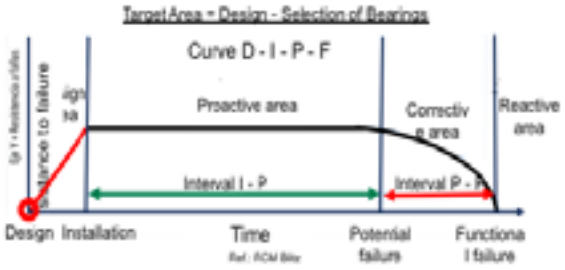
The primary focus of defect management is to eliminate the work, whereas the traditionalists try to optimize it (Per Winston Ledet). Defect elimination – How do we extend the life of the equipment – we need to understand the root causes of the failures – we can't fix it if we don't know why it fails!

Up to 84% of the failures are due to human errors according to several statistics. This is why training is a must and an enormous opportunity!

Bearing Tip No. 58: Where does the Assurance of Reliability start?

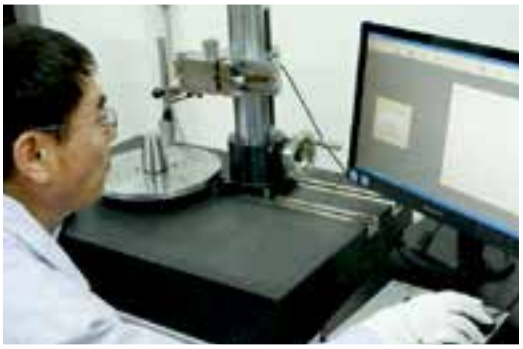
The Assurance of Reliability starts in the Design Area. The Equipment and every part of it must be the correct if the equipment will perform according to the established requirements. So, the very first step is to select the correct bearing for each and every application:

The most common errors found in the industry are:



1- Wrong bearing type:
- Insufficient load capacity (capacity, radial, thrust or combined)
- Insufficient tolerance for misalignment
- Limited speed capacity

2 - Wrong bearing variant:
- Incorrect design and/ or material of the cage





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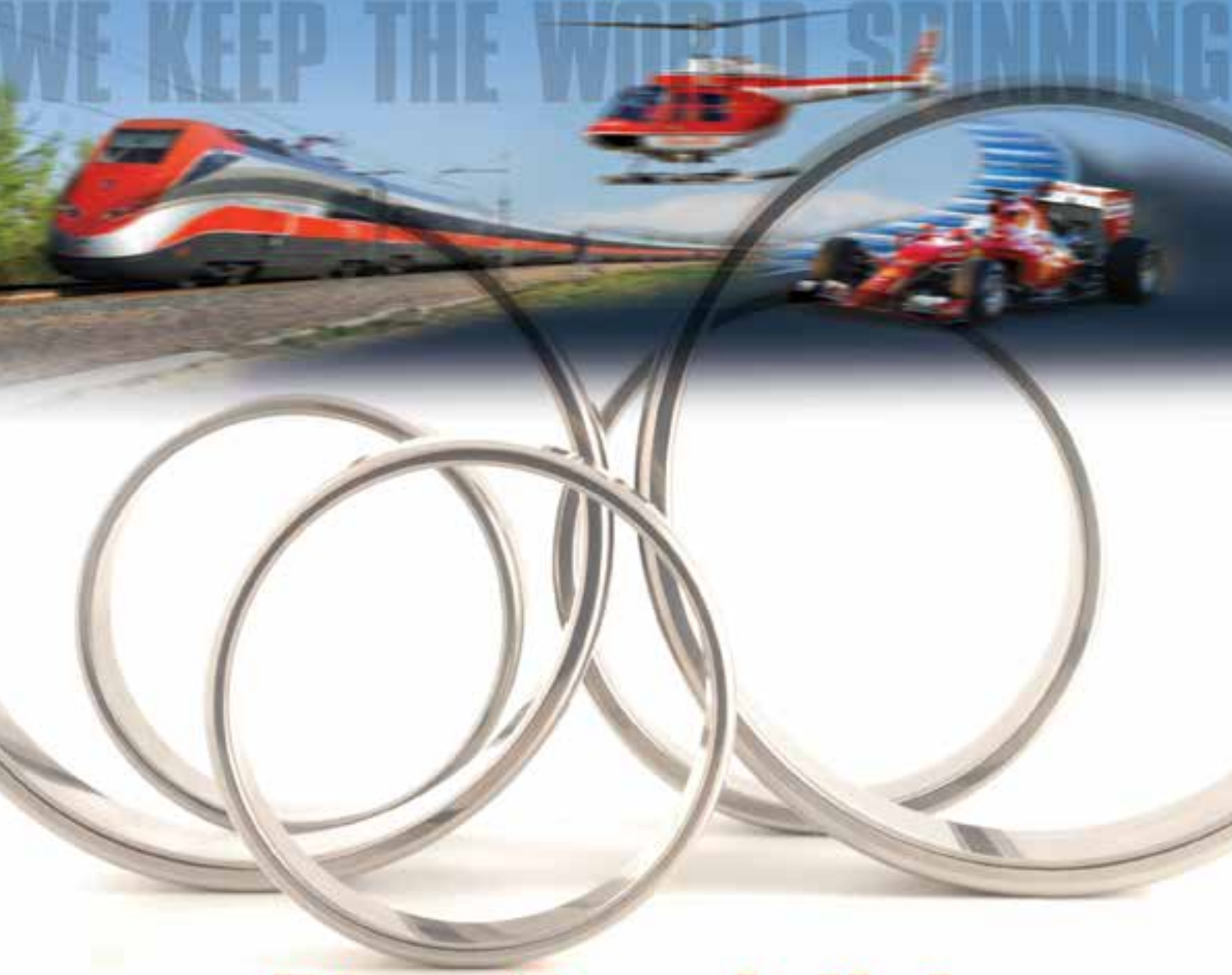

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The main reason for these errors is the lack of knowledge as regards bearing technology, and one very complex topic is the designation system for bearings. Not so much for the bearing type, as for the variants. There are only 2 variants that are regulated by international ISO Standard: The precision and the internal clearances. All the other variants are up to the corresponding manufacturer and so are also the suffixes they assign to these variants.

Bearing Tip No. 59: Incorrect replacement bearings

A most common failure cause that I have found is that the original bearings are replaced with wrong bearings. This is mostly due to the lack of knowledge of the significance of bearing designations combined with the search for more "economic" bearings. But this can turn out to be most costly. Look at the following example: A special bearing in a potato peeling machine was by mistake using a double row taper roller bearing made of normal steel and with simple steel shields as seals. Even the grease was wrong.

The original bearing had been replaced with an ""equivalent"" bearing.

The result was the following:

This means 2 things:

1. The original product must be specified correctly for the corresponding application in order to comply with the required performance and reliability.
2. This specification must be respected when the original components are replaced.

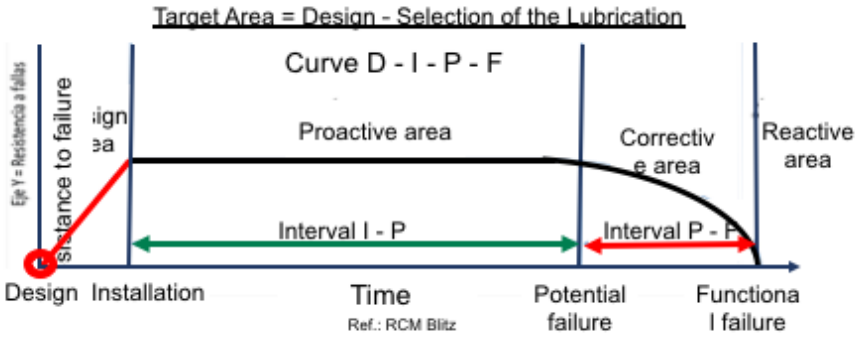
I can mention a long row of examples of mistakes like this.

Equipment: Standard medium size electrical motors mounted vertical. Standard equipment used in corrosive areas (normal steel in shaft and non-resistant paint, etc.)

Bearings: The most common: Sealed bearings are replaced by shielded bearings where hermetic seals are required. Bearings with special quality requirements, e.g. P5, C08, are replaced with normal tolerance bearings. Bearings with special internal clearance (C3, C4) are replaced with Normal clearance bearings. Bearing adjusted for mounted in pairs are replaced by standard bearings. And so on!

Bearing Tip No. 60: Reliability by Design: Selection of the Lubrication

The lubrication is the utmost important factor for bearing life. Most statistics show that incorrect lubrication causes more than 50% of bearing failures.



A correct lubrication must cover:

1. The correct lubricant. Oil or grease? Viscosity? Temperature range? Anticorrosive properties? EP properties? Consistency of the grease? Etc.

2. The correct lubrication system. Oil: Oil bath? Oil splash system? Circulating Oil? Oil mist? Air-oil? Etc. Grease: Greased for life? Manual relubrication? Automatic centralized system? Automatic lubricators? Etc.

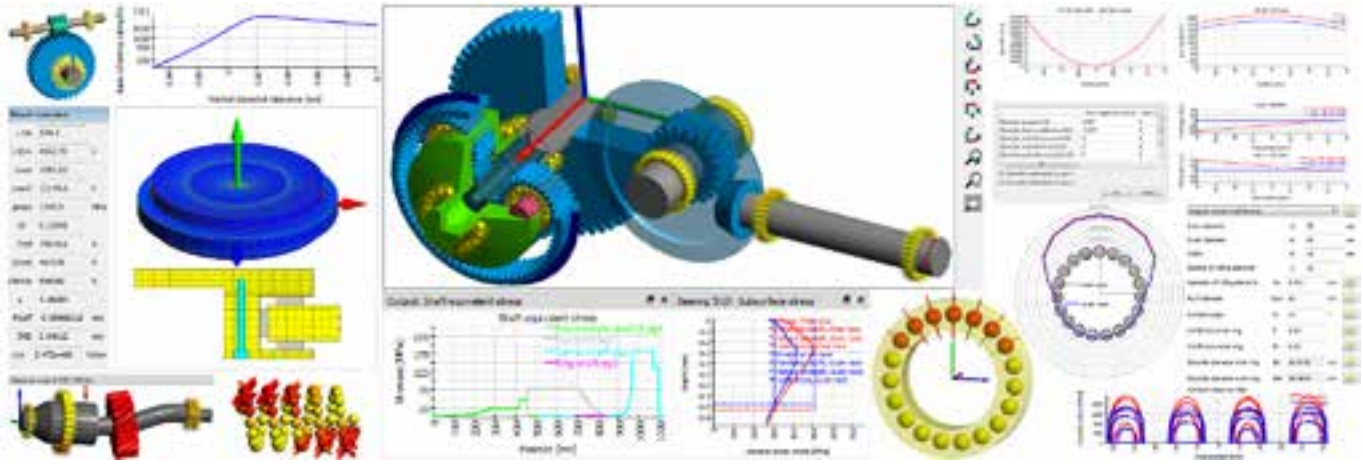
3. Place for the correct application. Oil or grease must be applied in the correct place so that the flow of the lubricant goes correctly to/through the bearings in the most efficient way. Example: The W33 groove with holes in spherical roller bearings.

4. The correct quantity of lubricant. Excess of lubricant may be as bad as to little lubricant. Excess of lubricant will increase the friction and this will increase the operating temperature which will destroy the lubricant. Lack of lubricant will logically not create the required lubricating film and metal to metal contact will take place in between the rolling elements and the raceways of the rings of the bearings.

5. The correct time. The initial lubrication must take place as soon as possible after that the new bearings have been unpacked, thus exposed to the environment.
After that, in operation, the lubricant must be renewed or changed while its properties are still acceptable. If the lubricant turns out in bad conditions, there will always be irreversible damages in the machines!

6. The correct personal. All the persons involved in the lubrication must have been well trained to avoid mistakes. A very simple mistake in the lubrication may close down several machines, or even a considerable part of a plant!

Further integration of FEA calculations with MESYS Shaft Calculation Software



The MESYS Shaft Calculation software allows the calculation of coupled shaft systems including nonlinear bearing stiffness and consideration of housing stiffness based on reduced FEA-stiffness matrices.

Housing geometry can be imported from CAD data as STEP file, meshing, static and modal reduction is then done within the software. Also FEA meshes can be imported and reduced or a stiffness matrix generated with FEA programs can be used too. Meshes can be generated as hexahedral and tetrahedral meshes with either linear or quadratic shape functions.

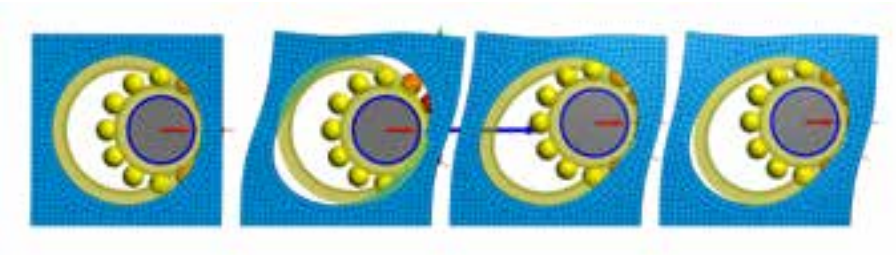
FEA based 3D-elastic parts can not only be used for housings, but also for shafts or planet carriers. Here also large rotations around the axis needs to be supported.

Since version 10/2018 reduction of 3D-elastic parts is not only done for a single node for one bearing, but elastic deformations of bearing rings and gear bodies were supported too. At the Hannover fair as further extension contact between elastic bearing rings and elastic housing can be considered.

Different models for interface between bearing and housing

The interface between bearing and shaft/housing can be modelled in different ways. The software provides five options to model this interface. Connection by a single node with rigid or elastic condensation, reduction to multiple nodes with or without adding the bearing ring stiffness and optionally contact between bearing ring and shaft/housing.

Image 1 shows a single bearing loaded horizontally and without clearance in an elastic block which is clamped rigidly at the bottom for four cases. The left two cases are using a static reduction of the housing to a single node. The reduction is done by a rigid constraint in the first case and by averaging displacements in the second case. Using a rigid constraint is stiffening the housing, leading to much smaller deformations. Using a single node for the reduction of the housing bore leads to bearing forces acting on the whole cylindrical surface of the bore, which does not correspond to reality



— Image 1: Deformations for different modelling of interface between bearing and housing

as the bearing forces are transmitted by pressure and not by tension. But this is acceptable in many cases.

The third case is using an elastic bearing ring glued to the housing, so no nonlinear contact between ring and housing is considered. Compared to the second case the horizontal deformation is quite similar, but a vertical displacement is added due to consideration of the deformations of the ring. The right case is considering contact between the bearing ring and the housing which leads to slightly increased deformations in horizontal and vertical direction. In the cases using an elastic ring forces to the housing are only applied in the load zone of the bearing.

Considering clearance between bearing ring and housing

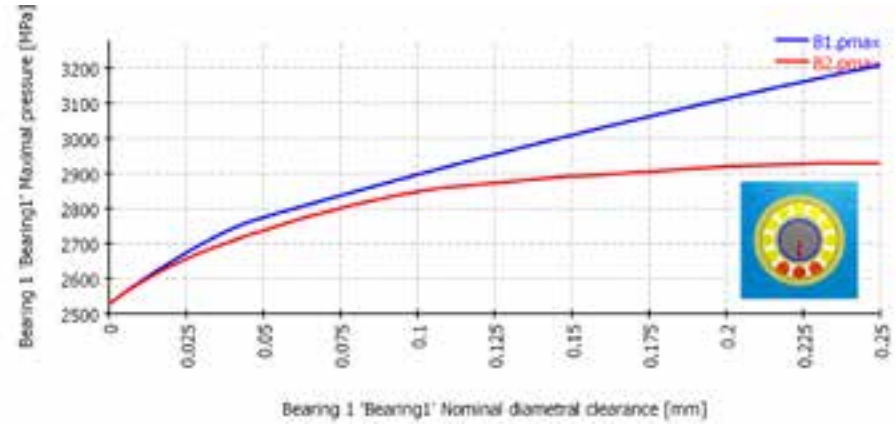
If the clearance for a radially loaded bearing is increased, the maximum contact stress is increased and bearing life is reduced as less rolling elements share the loads. This also be seen in a calculation of a single bearing. But how is the influence of clearance between bearing outer ring and housing? If the bearing ring deforms its shape will approach the radius of the housing. To answer this question a calculation with contact between bearing ring and housing can be done. Load direction is selected downwards to minimize deformations of the housing.

In image 2 the blue curve shows the contact stress of the bearing with internal clearance, while the red curve shows the contact stress with zero internal clearance but clearance between outer ring and housing. The range of the clearance can be divided into three parts. For small clearance both cases show identical results, then there is a range with a constant difference between the two curves. The reason for this is the bending stiffness of the ring. In a third range the contact stress approaches a constant value in case with clearance to the housing. The usual operating conditions of the bearing should be below 0.05mm, the diagram was only extended to give an impression what will happen for large clearance.

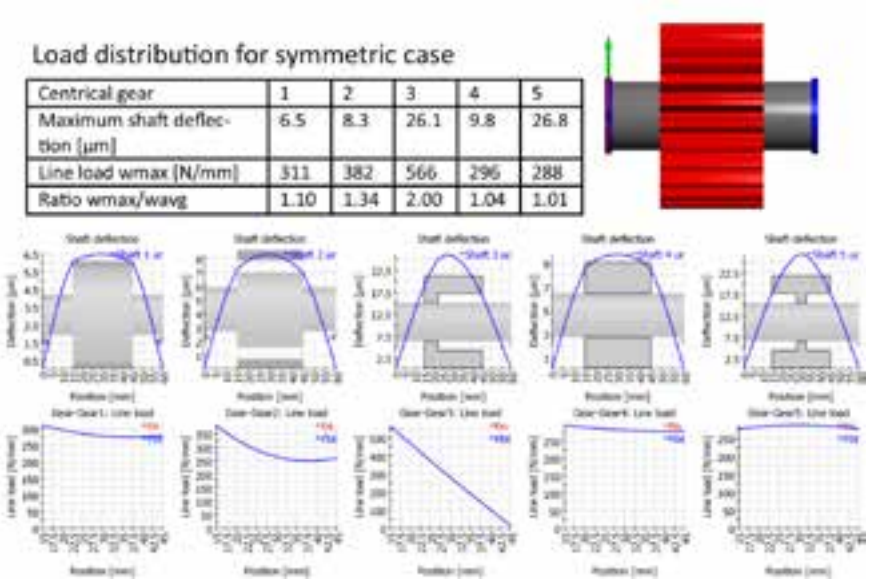
Deformations of gear bodies

Like for bearing rings also elastic gear bodies can be defined to consider elastic deformations of gears. In image 3 the first two cases are just using a beam model with full cylinder or reduced diameter, which is sometimes done to reduce stiffening of the shaft. The next three cases use 3D-elastic gear bodies of different shape. Comparing cases 1, 2 and 4 shows that the full cylinder in the beam model is too stiff regarding deflection and the reduced diameter in case 2 is closer to the 3D-model. But regarding line load of the gear, case 2 leads to much increased loads on the gear flank. So for analysis of the gear contact a full cylinder is better than a reduced diameter, if not a 3D-model can be used.

The ratio wmax/wavg is the ratio of maximum line load to average line load. It would be the load dependent part of the gear face load factor; the effect of tolerances would have to be added by varying flank line modifications.



— Image 2: Bearing contact stress over internal clearance for blue curve and over housing clearance for red curve



— Image 3: Shaft deflections and line load distributions for different shape of gear bodies

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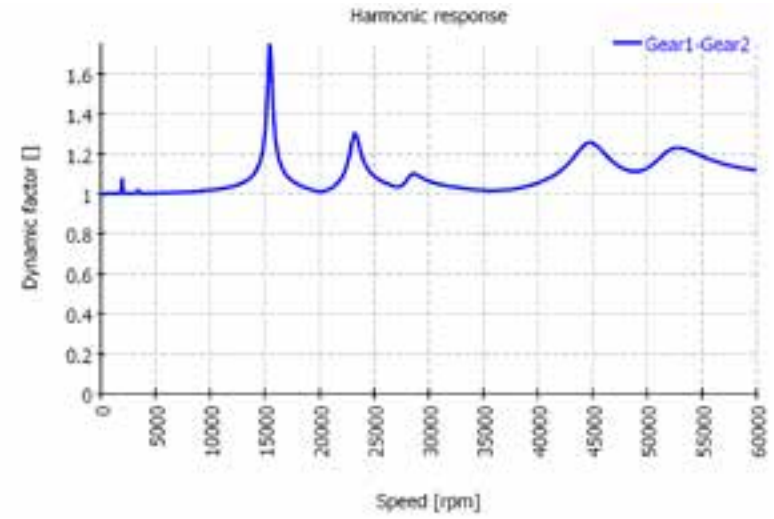
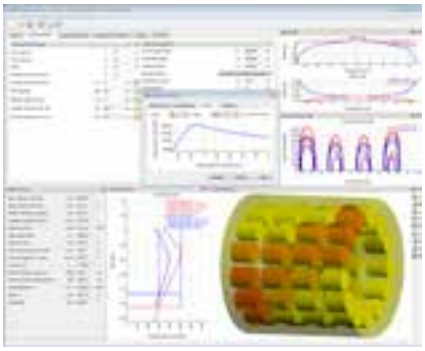
Harmonic excitations defined as displacements

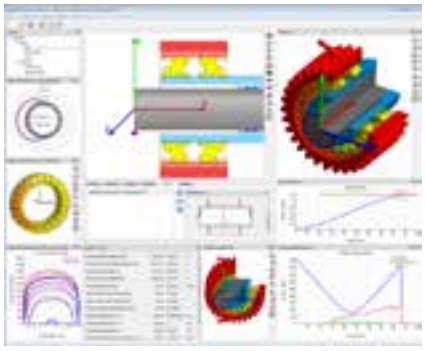
Previously harmonic excitations could be defined as forces in the shaft calculation. Now harmonic excitations can also be defined as displacements. Examples could be roundness deviations of bearings and gears or transmission errors of gears or vibrations of foundations.

Evaluation could be done as dynamic factor over speed for gear pairs for example. The peaks show possible resonances, but for the amplitude the influence of damping is a problem as there are restricted possibilities to define damping and usually there is only little knowledge about damping too. Like the variation of gear forces also amplitudes for bearing forces can be shown.

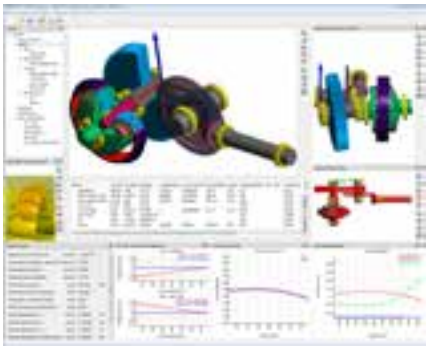




— Bearing Calculation

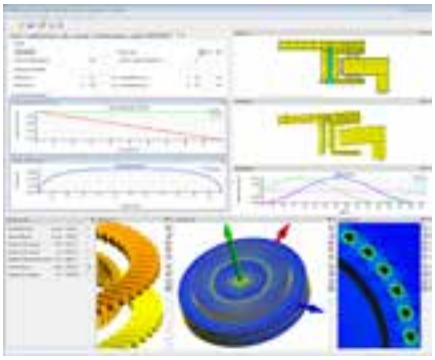


— Shaft Calculation



— Shaft System Calculation

— Ball Screw Calculation



— FEA based Bearing Calculation

FOR MORE INFORMATION
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4 Events
20 Speakers
100 Ideas & Innovations

Bearing EXPO & Conference

Agenda 2019

WIN EURASIA

ISTANBUL 2019 (Conference)
during WIN EURASIA *show*
14 – 17 March 2019

HANNOVER MESSE

HANNOVER 2019 (Conference)
during Hannover Messe *show*
01 – 05 April 2019

Bearing EXPO & Conference

MUMBAI 2019 (Exhibition, Conference & B2B Meetings)
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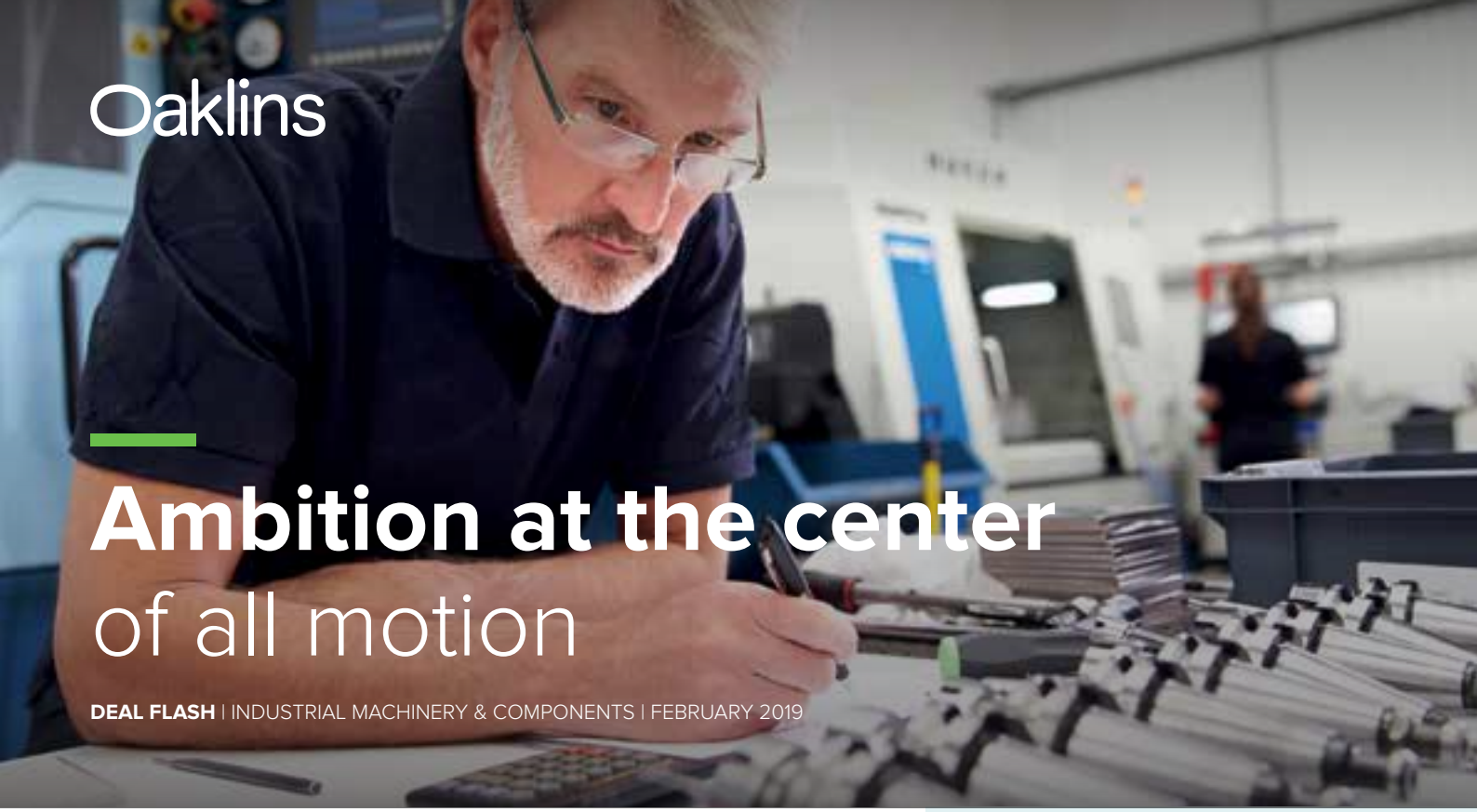


Ambition at the center of all motion

DEAL FLASH | INDUSTRIAL MACHINERY & COMPONENTS | FEBRUARY 2019

DEAL SNAPSHOT

Spindel- und Lagerungstechnik Fraureuth GmbH (SLF), a renowned German manufacturer of premium-class specialty bearings and machine spindles, has been sold to Avedon Capital Partners (Avedon). The founders will retain a significant minority stake and active management roles.

Founded in 1993, SLF has recorded profits over the last 25 years. This considerable success shows the company's clear focus on the industry and its OEM customers that are fast-growing market leaders in their respective sectors. Customers appreciate SLF's business approach, broad offering (type and outer diameter range from 32 to 1,600 mm), consistent high quality and short lead times.

Avedon is a private equity firm that brings its experience from a previous (exited) shareholding in a miniature bearings specialist, and will actively support SLF in unlocking its international potential. Currently, about 90% of SLF's revenue is generated in the German market.

"When we launched the M&A process with the Oaklins German team in the spring of 2018, it was important to us from the start to find a new majority shareholder who was familiar with our industry and who would ensure our employees would have a long-term future in Fraureuth. We are very proud of what we have achieved with our loyal and valued employees over the past 25 years. We believe we have found the ideal partner and are looking forward to working with Avedon."

DR. FRANK SCHLEGEL
FOUNDER AND MANAGING DIRECTOR
SLF, GERMANY

OAKLINS PROVIDES LONG-TERM VALUE BEYOND THE CLOSING OF THE DEAL

Oaklins' team in Germany, supported by Oaklins' industry specialists from around the world, acted as the exclusive M&A advisor to the shareholders of SLF on the sale of the business, and structured a competitive process with the participation of international trade and financial buyers. The team had built a detailed understanding of the business and a trusting relationship with the SLF founders over the two years prior to the sale in January 2019.

MARKET TRENDS & DEAL DRIVERS

The global bearings market is valued at more than US$100 billion, with the top six competitors taking a share of almost 60%.

The market can be divided into bearing type, outer diameter and application. Automotive represents the largest application, while industrial customer-specific applications are offering lucrative business opportunities for flexible competitors such as SLF.

Growth in the specialty bearings segment is driven by increasing customization and demand for higher performance.

OUR INDUSTRY SPECIALISTS

FLORIAN VON ALTEN

Managing Partner
Oaklins, Germany
T: +49 40 34914168

Florian leads the industrial machinery and components team in Germany and has closed more than 20 transactions in the sector, including the sales of USK Karl Utz to Aumann AG and of PRAE-TURBO Group to Halder, and several buy-side assignments for international corporate clients.

CHRISTIAN JELLENTRUP

Senior Associate
Oaklins, Germany
T: +49 40 34914173

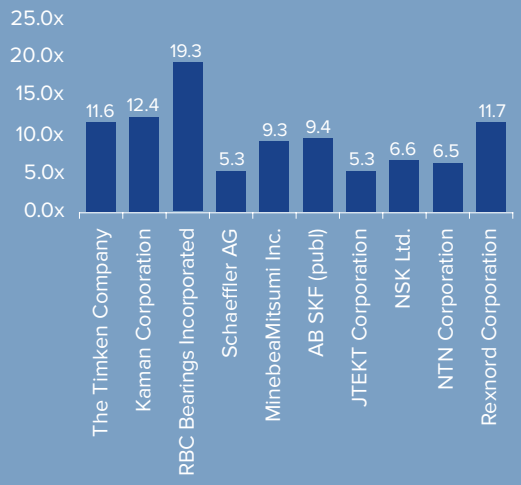
Christian is focused on advising companies in the industrial manufacturing and components industry. He continuously keeps up with developments and maintains regular contact with the key players in the sector both in Germany and abroad.

M&A VALUATION ASPECTS

Recent transaction valuations of bearings manufacturers are showing a very broad range of transaction multiples. The industry is growing at a mid single-digit rate but is very prone to economic cycles. Nevertheless, targets offering advanced bearings solutions and an attractive customer base have been valued at high single-digit to low double-digit EBITDA multiples recently.

The financial details of this transaction have not been disclosed. The accepted offer from Avedon was not the highest qualified offer in the process but was still preferred due to the attractive reinvestment opportunity, the smooth transition process and the highest safeguarding of the peripheral Fraureuth location and the jobs in the community.

EV/EBITDA multiples of listed SLF peers



Source: S&P Capital IG, 24 January 2019

OAKLINS HAS CLOSED 127 DEALS IN INDUSTRIAL MACHINERY & COMPONENTS

Oaklins is the world's most experienced mid-market M&A advisor, with 800 professionals globally and dedicated industry teams in 40 countries worldwide. We have closed over 1,500 transactions in the past five years.

"SLF has been very well managed by the founders. This sale process attracted many national and international bidders. Our client finally chose Avedon because of their sector knowledge, their proven capability to expand the business internationally and their promise to maintain the jobs in Fraureuth. We look forward to seeing SLF grow in the years to come."

FLORIAN VON ALTEN
OAKLINS, GERMANY

Oaklins

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