www.bearing-news.com

P918438 - 2019/01

Bearing NEWS

2019
SEPTEMBER
ISSUE 13

BEARING INDUSTRY MAGAZINE

FLUID FILMS IN BEARINGS AND ROTORDYNAMIC PREDICTIONS

THE TRIBOLOGY OF ELECTRIC VEHICLES

IMPLEMENTING A PREVENTIVE MAINTENANCE PROGRAM & FAILURE DETECTION USING ULTRASOUND

THIS MAN LOVES CHALLENGES

KUKKO // *Pull forward*

YOUR 24/7 PULLER PROVIDER.

Anytime, anywhere on KUKKO.COM

Original and premium pullers created by KUKKO.

KUKKO.COM

ZEN™

sales.uk@zen.biz or +44 (0) 1227 793 334

EDELSTAHL Rostfrei®
INOX
STAINLESS STEEL

ZEN AISI 304 Stainless Steel Bearings

Like all the ZEN products, the AISI 304 Stainless Steel Bearings, offer the best quality and the long life cycle of a premium product.

Worldwide shipping

Non-magnetic and low load rating

Suitable for highly corrosive enviroments and high temperatures

Suitable for the food & beverage industry, chemical industry, pharmaceutical industry and nuclear plant equipment

Visit us at www.zen.biz

ZEN™

BEARINGS FOR YOUR FUTURE

TÜVRheinland® CERT

In our industry, the highest standard we can achieve for our Quality Management System is the ISO 9001 certification - awarded by TUV Rheinland. It is the global benchmark that guarantees a total focus on customer service and continual improvement.

www.zen.biz

UNITS

CUSTOM

OVERMOLDED

TRACK ROLLER

ISO RANGE

TOUGH CHALLENGES REQUIRE CUSTOMISED SOLUTIONS

A standard solution won't always be the perfect one. Which is why JESA develops tailor-made systems that fully respond to all customers' requirements. Specifications on the form, load, materials or sealing are responded to, resulting in a product that is ready to integrate. Maximum precision and an innovative approach are used in the process. You benefit from a one-stop solution which saves you time, capital and fixed costs.

JESA.
bearing solutions

Linked in

twitter

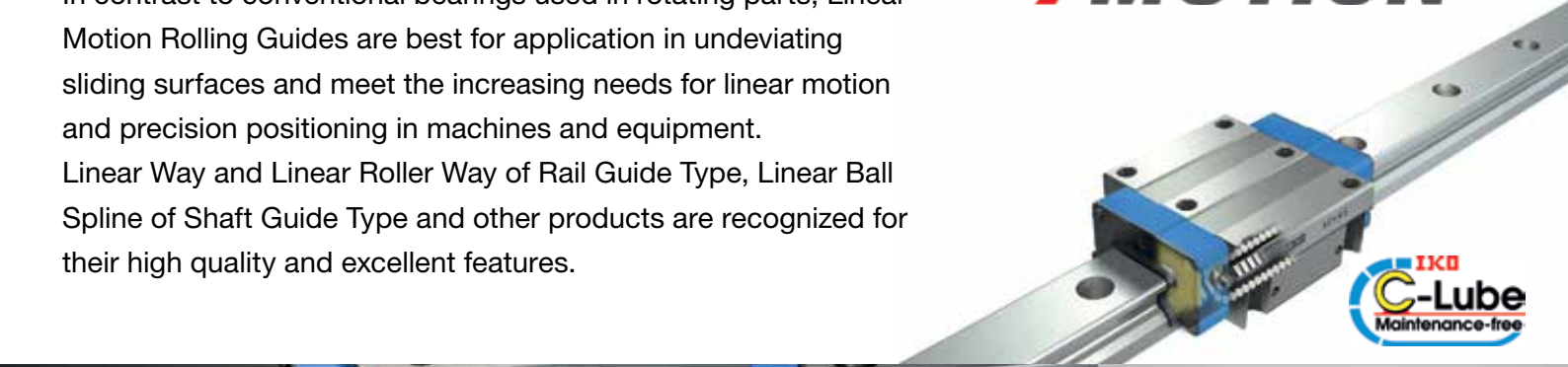
Rte du Petit-Moncor 9 I 1752 Villars-sur-Glâne - Switzerland I +41 26 408 47 00 I www.jesa.com

Linear Motion Rolling Guide Series

IKO is one of the most experienced Japanese Linear Motion Rolling Guides manufacturers, producing the highest quality Linear Guides for decades. Linear Motion Rolling Guides are used for various applications requiring precision positioning, with great results; such as semi-conductor manufacturing, large sized machines, industrial robots, precision and medical equipment.
In contrast to conventional bearings used in rotating parts, Linear Motion Rolling Guides are best for application in undeviating sliding surfaces and meet the increasing needs for linear motion and precision positioning in machines and equipment.
Linear Way and Linear Roller Way of Rail Guide Type, Linear Ball Spline of Shaft Guide Type and other products are recognized for their high quality and excellent features.

www.ikont.co.jp/eg/

experts in MOTION



IKO

Maintenance Free Linear Roller Guides

www.bearing-news.com
Bearing NEWS
BEARING INDUSTRY MAGAZINE

The BearingEXPO events are expanding over five countries

The BearingEXPO & Conference events are continuing to reshape the future of the bearing industry worldwide. The event which is initially developed by BearingNEWS magazine and launched in 2016 is extended from a small 200 persons conference into an exhibition with 100 booths and 1200+ visitors from 18+ countries. For the coming period the BearingEXPO events will be held in Mumbai between 15 - 16 October, in Shanghai on 25 October 2019, again in Shanghai on 13 – 16 May 2020 and in Chicago during IMTS / Hannover show in 2020.

BearingEXPO series are unique events serving a wide scope of bearing industry professionals, original equipment manufacturers and reliability engineers. Each show is designed according to the demand and needs of the local players in the country where the event takes place. The main aim is to create synergy between the companies by networking and sharing the latest available knowledge, innovative products and services within the bearing, power transmission, OEM, lubrication, equipment, industrial services, organizations and maintenance industries.

The upcoming event in Mumbai will be the meeting point for the bearing and rolling equipment components industry during a 2 days exhibition, conference, networking lunches and B2B meeting sessions – serving a wide scope of local and International companies.

The bearing and power transmission industry is worldwide in a transformation and undergoes a rapid change due to various conjunctural developments, rising protectionism, environmental issues, digitalization and increasing steel prices - which creates both threats 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. It is therefore the right time to join this event and get connected with the industry professionals.

Furthermore, the physical BearingEXPO events are supported by www.bearing-expo.com, -the online exhibition and network portal for the bearing & rolling equipment components industry. The portal is serving an unique network of more than 900 companies from different segments of the bearing and motion industries. You can read all upcoming BearingEXPO event details and the features of the online portal in this new issue of BearingNEWS.

Further in this issue, we have as always 'a BearingNEWS classic': exclusive interview with key persons at important production and distribution organizations in the motion and drives industry. The main interview in this September issue of BearingNEWS is with Christian Schuster, Industrial Mechanic at Schaeffler. Christian Schuster is one of seven members of Schaeffler's field service crew. They're the men for special challenges. Be it maintenance, repair or replacement, be it in a steel mill, on trains or in a mine, out in the middle of the North Sea or in the "ice house" at Pori – whenever precision work needs to be done on huge high-tech components, Schuster and his colleagues are called.

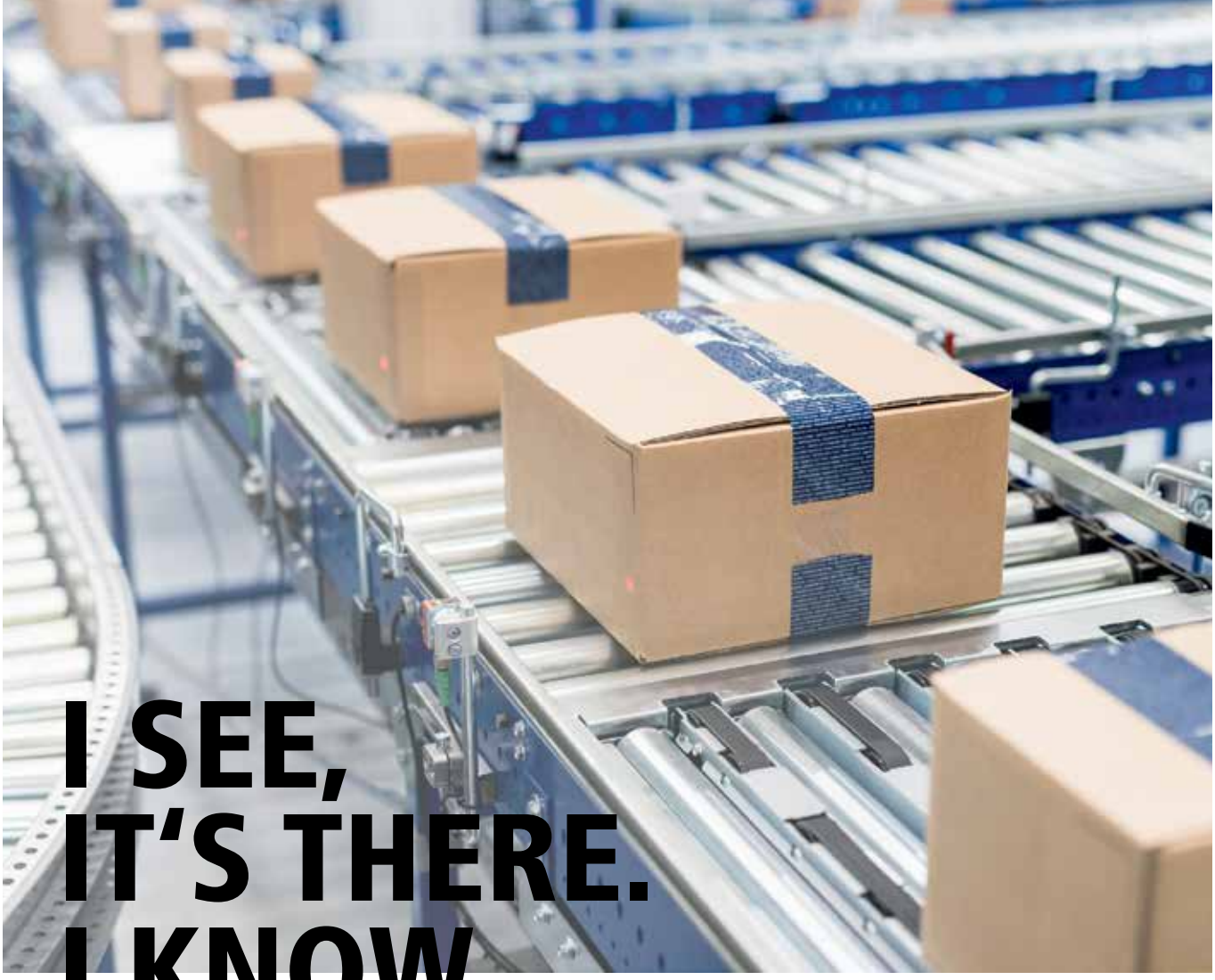
What's Rolling..

What's rolling in the bearing industry? A brief summary of what happened during the last six months in the bearing industry; more details about company acquisitions; and transformations into industry 4.0 entities; case studies about Implementing a successful preventive maintenance program and the use of ultrasound technology to detect bearing failures; a research on a research on fluid films in bearings and rotordynamic predictions and the tribology of electric vehicles; the new technologies that will shape the future of the motion industry... and many more motion and bearing industry related articles, case studies, insights and developments can be discovered in this September issue of the BearingNEWS magazine.

152 pages full of BearingNEWS. hope that you will enjoy it!

Kenan M. Özcan

Editor in Chief
BearingNEWS



I SEE, IT'S THERE. I KNOW, IT WORKS.

Explore the new PICARD onlineshop

– Direct access to more than 40,000 articles ready for same-day despatch
– Convenient navigation and search features
– Quick and easy configuration of linear guide rails

SHOP.PICARD.DE

19:00 20:00 CET

PICARD®
WÄLZLAGER • ROULEMENTS • BEARINGS

What's Rolling...

MORE INFORMATION ON PAGE 111

Connect to the worldwide bearing industry network

The BearingNEWS magazine
is published four times a year in

March, June, September and December

The online version of BearingNEWS is published in 8 languages and can be followed weekly on the links bellow.

SUBSCRIBE ON:
www.bearing-news.com/magazine-subscription-form

English	www.bearing-news.com
German	de.bearing-news.com
Russian	ru.bearing-news.com
English	in.bearing-news.com
Turkish	tr.bearing-news.com
English	sw.bearing-news.com
English	us.bearing-news.com
Dutch	nl.bearing-news.com
English	ph.bearing-news.com
Dutch	be.bearing-news.com
English	au.bearing-news.com
Portuguese	br.bearing-news.com
Spanish	sp.bearing-news.com
English / Chinese	cn.bearing-news.com
Korean	kr.bearing-news.com

FOLLOW US SOCIAL MEDIA:

www.linkedin.com/groups?gid=4713215&trk=hb_side_g
www.facebook.com/BearingNewscom
www.twitter.com/Bearing_News
www.youtube.com/channel/UCqr0oE70JeqRyhxUwQNP8NQ
plus.google.com/u/0/117109538045880726702/posts
www.bearing-news.com/rss-feeds/

PARTNERS:

FVA sharing drive innovation
CBIA
RELIABILITY LINK.COM
Bearing CLOUD.com
BEARING-EXPO.com

Bearing-NEWS.com & Bearing NEWS

PUBLISHER
BEARINGNEWS COMMV
Camille Huysmanslaan 27/15
2020 Antwerpen – BELGIUM
Phone: +32(0)489 32 85 21
Fax: +32 (0)3 303 52 82
Email: info@bearing-news.com
Web: www.bearing-news.com

EDITORIAL
Editor-in-Chief
Kenan M. Özcan

Managing Editor
Meruyert Zhunuskanova

Art Director
Diydem Deniz Koç

Photography/Illustrations
Ksenia Shamanaeva

Marketing & Advertising
Roxana Vasilescu

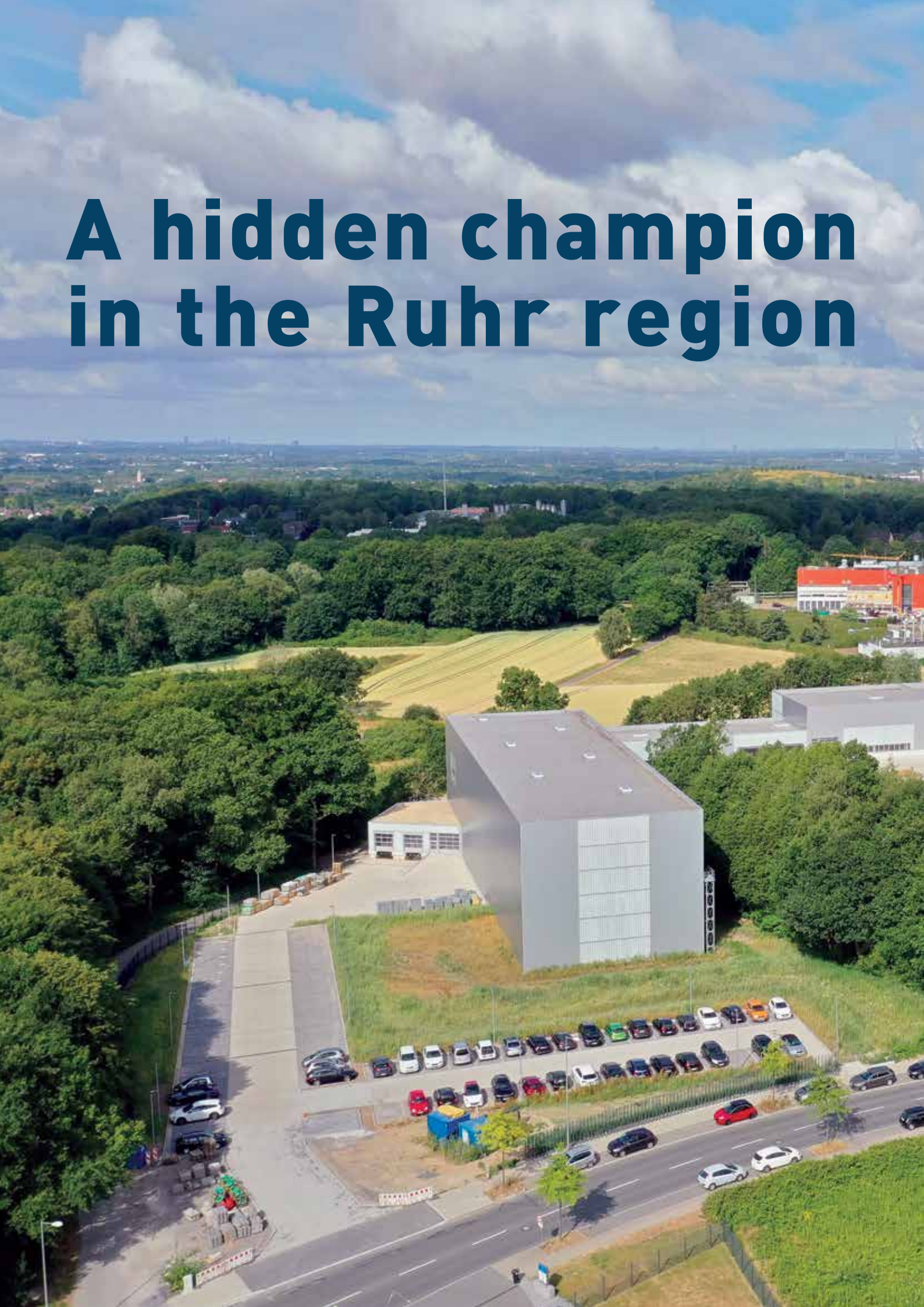
Web & IT
Canbey Bilgili
Birsen Aydın

Subscriptions
info@bearing-news.com

EPTDA Member

BearingNEWS is a member of the EPTDA

A hidden champion in the Ruhr region



Roller bearings, linear motion technology, and an unrivalled product range.

Friedrich PICARD GmbH & Co. KG *just keeps on growing.*

Founded in Bochum, Germany, in 1922, Friedrich PICARD GmbH & Co. KG is a specialised wholesaler of roller bearings and linear motion technology products. In recent years, the Company has further expanded its headquarters by investing over 17.5 million euros to increase its warehouse floor space and modern office complex, thus more than doubling its capacity.

An impressive 11,289 square metres (121,500 sq ft) of the site is now occupied by buildings, or slightly more than a third of its 32,761 square metres (352,600 sq ft) of land. “We are growing steadily. It was also clear fairly quickly that the area we occupied in 2012 would need to continue to expand,” remarks Managing Director Hans-Martin Reinhardt, confidently. “This is an investment in a successful future that we will shape together with our team.”

In addition to the state-of-the-art office building, considerable added value has been achieved, particularly in terms of the site’s warehousing capacity. In fact, the site’s storage area and number of pallet spaces have been doubled to 10,357 square metres (111,482 sq ft) and 12,000 places, respectively. Meanwhile, the large, three-level shelving rack facility boasts some 200,000 storage spaces.

Linear motion technology from the market leaders

Special attention was also paid to the site’s new linear motion technology centre. The spacious, 571-square-metre (6,141-sq-ft) facility houses two fully automatic cutting machines, which ensure that rails can be cut, deburred and shipped on the same day, provided orders are placed by 7 p.m. CET, so that customers receive their consignments as rapidly as possible. PICARD distinguishes itself in yet another way from many of its competitors: The Company carries linear motion technology products from all six market leaders – BOSCH Rexroth, INA, THK, NSK, Schneeberger and SKF – and stocks all common standard sizes, from miniature to size 65.

Roller bearings from the premium brands

As a medium-sized business, PICARD stands out, above all, due to its extensive product range. In fact, the third-generation, family-run company now owned by Marc Picard permanently stocks over 40,000 items with a net value of 42 million euros. The wholesaler is particularly well positioned in the premium roller bearing segment, as it carries brands such as SKF, FAG, INA-SCHAEFFLER, ELGES, NSK, NTN/SNR, NKE, ZEN, TIMKEN and KS PERMAGLIDE. And despite its already large selection, PICARD is constantly expanding its range. Indeed, new brands – the most recent being DURBAL and NADELLA – and production series are being steadily added to enlarge the overall PICARD assortment.

Innovative logistics services

In addition to stocking a vast range of products, the ‘hidden champion’ is also impressive both as an employer and in terms of its outstanding logistical performance from its location in Germany’s Ruhr region. Customers who place their orders by 7 p.m. CET on Mondays to Thursdays, and by 5 p.m. CET on Fridays, are guaranteed same-day dispatch by the Company. For very urgent cases, PICARD offers a special EXPRESS COURIER service at fixed terms and conditions, whereby the required goods leave the PICARD logistics centre no later than 30 minutes after the order has been received.

The specialists at the Bochum-based company also handle organisational matters in an uncomplicated manner.

For shipments outside the EU, the PICARD team prepares all necessary customs documents at no extra charge. And time-saving electronic customs clearance procedures have been standard practice for years.
For customers who wish to save time and lower their logistics overhead, PICARD also offers a discreet direct-shipment service, whereby it ships goods directly to the customer's individual customers – in a neutral manner, in the customer's name, and accompanied by their delivery note. "This eliminates unnecessary waiting times and double shipping," explains Reinhardt, who himself began his career at PICARD by apprenticing to become a wholesale and export sales agent. "End customers thereby receive their products quickly and without any unexpected complications."

The PICARD onlineshop, meanwhile, provides customers with a quick and easy overview of the product range, delivery options, and associated shipping costs. A special feature of the Web-based shop are the three discrete shopping baskets that can be concurrently filled by the customer. This may seem complicated at first glance, but it makes it easier to distinguish between stock orders and current requirements, for example. Meanwhile, the shop's flexible linear motion configurator makes it possible to immediately obtain the price and availability of a product by entering the required quantity, rail length and bore spacing. PICARD also offers this configurator to its customers as a plugin for their own websites to make it easier for their customers to inquire about and order linear motion technology products. As part of its ongoing digitalisation measures, PICARD is offering its customers a variety of versatile models.

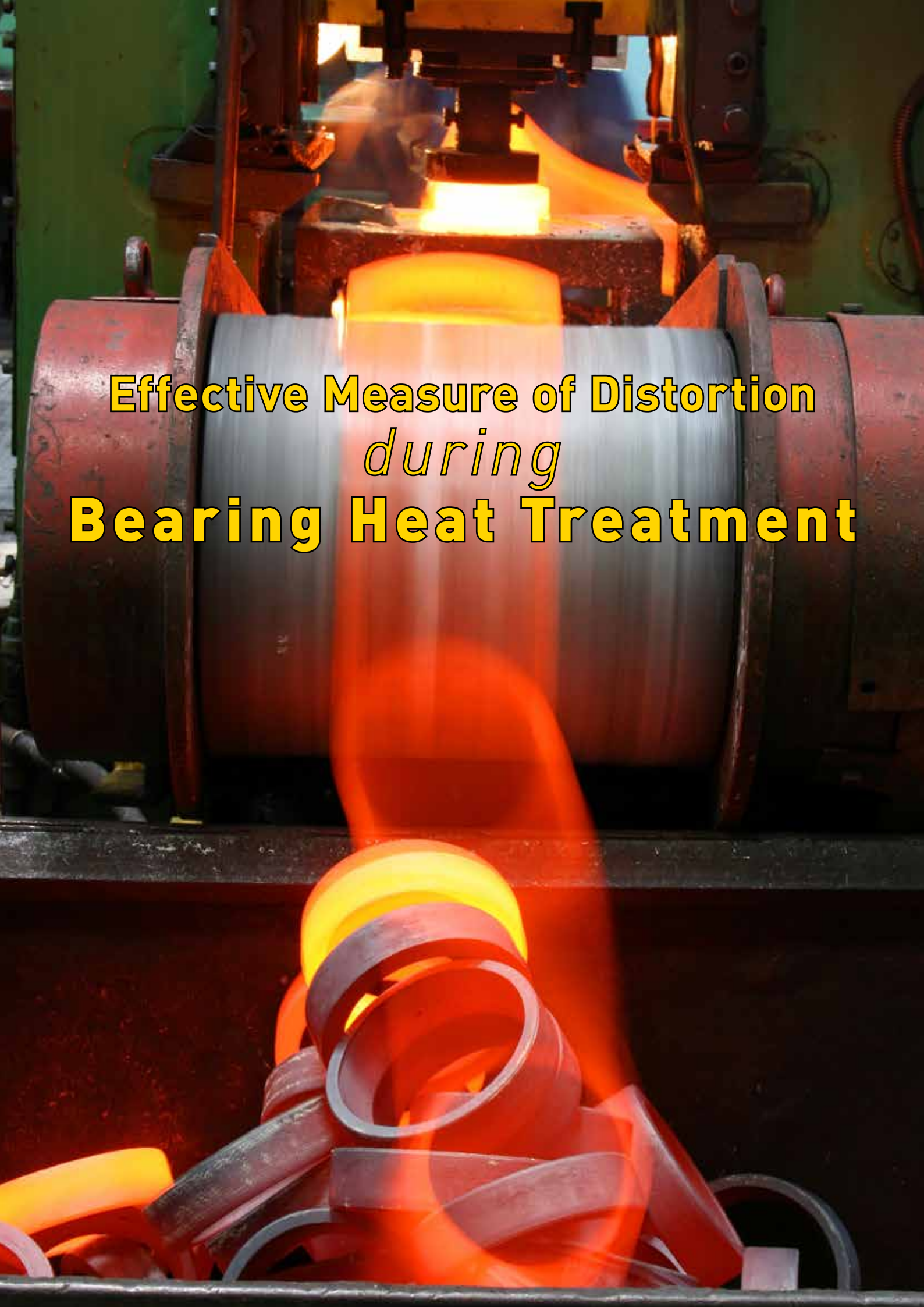
Customized digitalisation models on demand

At PICARD DIGITAL, simplification is a major priority. The Bochum-based company offers its customers the opportunity to take a further step toward digitalisation by simply and practically integrating inventories and item master data into their own merchandise management system and online shop. Using a digital catalogue, they can import the complete PICARD product range of around 40,000 items into their online shops and thus offer it directly to their own customers. For live data sharing, there are a number of interfaces available that enable deeper integration. For PICARD customers, this makes having to manually update master data, such as manufacturer list prices, a thing of the past. And PICARD DIGITAL can offer them even more. For example, documents transmitted by Electronic Data Interchange (EDI) can be further processed automatically, thereby making daily procedures much more efficient for both parties. Furthermore, PICARD offers its EDI customers a best-price guarantee, whereby all ordered items are consistently charged at the lowest applicable price. PICARD customers benefit from easy process handling, access to an exceptionally large selection of products – and thereby added sales opportunities with their customers.

A further advantage of being a PICARD customer is the Company's in-house quality management. PICARD is constantly working on further developing its intelligent warehousing processes in order to guarantee customers consistent top quality. PICARD employs ID-Check, a system specially developed for verifying deliveries of drivetrain systems. ID-Check verifies the authenticity of the delivered goods by mass-scanning data matrix codes.

Co-developed with oneIDentity+, the ID-Check process relies on a variety of state-of-the-art high-performance scanners (selected according to the type of goods being processed) and a software application, combined with asynchronous data queries. By using ID-Check, PICARD has achieved transparency across all in-house goods flows. As for goods purchased from retailers, ID-Check ensures that customers only receive genuine, trademark-compliant merchandise.

Sounds digital? It certainly is. But without being impersonal. There are currently 180 employees from 32 different nations at PICARD in the Ruhr region, all working to ensure that day-to-day business runs smoothly. The Company's international sales team is composed of native-speakers from 19 countries advising customers from around the world in 17 different languages with the aim of always finding the best logistics solution. This team is certainly one of the cornerstones of the Bochum-based company's success. In 2018, PICARD supplied 3,364 customers in 79 countries, generating around 95 million euros in total sales revenue. Suffice it to say that the family-owned company's move back to Bochum about seven years ago has been worth it. After all, sales in 2018 totalled more than twice the 46 million euros it collected in 2012. Fresh thinking pays. And so does envisioning a digital future. PICARD GmbH & Co. KG is the best proof of this.



Effective Measure of Distortion *during* Bearing Heat Treatment

"Reference QuenchProbe" is a-breakthrough technology for obtaining Cooling characteristics for HEAT-TREATMENT Quenching process.

The cooling curve from surface to core can be calculated with this new technology from single thermocouple measurement (for the first time ever) hardness and microstructure can be predicted (for the first time ever) surface heat flux and heat transfer coefficient.

Bearing Heat Treatment

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

When bearing steels are in their soft (unhardened) state, metallurgists refer to their structure as being in the pearlite state. In order to harden the steel it must be heated to a very high temperature and then cooled very rapidly. When heated in the heat treat furnace to 900°C, the structure transforms from pearlite to what is known as austenite. After quenching (very rapid cooling), the structure then transforms from austenite to martensite.

Once transformed to martensite, the steel becomes very hard. However, at this point it is not considered "thermally stabilized". This is because not all of the austenite transforms into martensite during the quenching process. This phenomenon is called "retained austenite". If the steel is not thermally stabilized, the retained austenite will over an extended period of time (possibly years) transform into martensite. This transformation is accompanied by an increase in volume that is called metallurgical growth. Metallurgical Growth will cause a change in dimension and form of any steel parts such as bearings' even at room temperature.

While not a problem with low precision commodity type bearings, in high precision (ABEC 5P, 7P, 9P) miniature bearings this lack of dimensional stability can cause problems. In order to eliminate this unwanted metallurgical growth, the steel must be subjected to thermal stabilization. This is accomplished by repeated cycles of chilling at 50°C and tempering to transform a large percentage of the retained austenite to martensite.

Area of failure in bearing heat treatment

Distortion is very important to bearing races. Not only do we want to preserve the case, or surface, properties given during surface treatments like carburizing and nitriding, but grinding or hard turning is a relatively expensive process. Final dimensional results are critical to bearing performance. Many manufacturers have elaborate schemes to try to control or minimize distortion, which is the holy grail of bearing heat treatment.

Factors include quench media, uniform media flow through the load, stacking, fixture quenching, and the number of times the part was cooled and how it was cooled. Other, less thought-of items include the temperature achieved, how long at temperature, furnace fixture maintenance, rate of heating/uneven heating of the parts, and cooling orientation.

Quenching phenomenon and method to avoid distortion

The heat transfer during immersion quenching is very complex and it is not very well understood by scientists even to date. Quenching results in boiling of the quenchant and during boiling, the quenchant vaporizes carrying away the heat from the surface of the component.

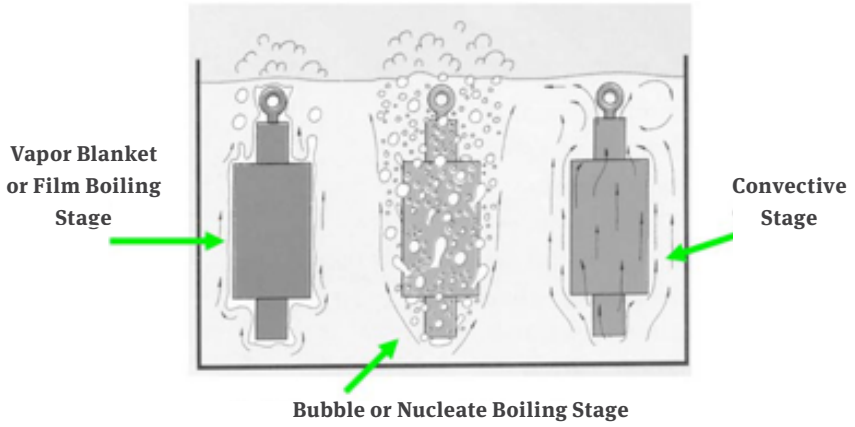
Thermal conductivity of the steel component, viscosity of the quenchant, chemical nature of the quenchant, temperature of the bath, agitation levels of the bath and a host of other factors affect the overall heat transfer rate. Of significant importance is the fact that the heat transfer mechanism in the quenchant can be distinctly different at different temperatures, giving rise to three important phenomena called (a) the vapor blanket (b) nucleate boiling and (c) convective phases.

Distortion or cracks are formed due to high temperature difference between surface and core of a component. Distortion and cracks can be minimized in a heat treated component by choosing the right quenchant for the component. One of the most important things is that the cooling rate must be just adequate; neither too high nor too low. The correct cooling rate is decided by the steel composition, the section thickness, and the hardness required. Once the cooling rate is decided the proper quenchant is selected which gives the required cooling rate. The cooling rates of quenchants, in turn depend upon the type of quenchant (brine, water, oils, polymer solutions etc), whether they are new or old, clean or contaminated, level of agitation etc.

Is there a way of calculating the required cooling rate for a given component?

Yes, **ProQuench software developed by ProVaC Manufacturing Technologies Pvt. Ltd.** can calculate surface heat flux and also predicts cooling rate from surface to core. This gives complete

— Picture industrialheating.com



— Picture Hardcastle Petrofer

insight to the bearing heat treatment. In addition the software is coupled with metallurgical transformation which predicts microstructure and hardness from surface to core. It comes with a probe which uses same bearing steel as specimen and test conducted in the actual quench tank. This is the breakthrough technology every bearing manufacturer can depend upon to decrease the quench failures in the bearing heat treatment.

Some of the key features are:

- In-situ measurement of quenching capacity of different quenching mediums
- Check the 'health' of quenchants with continued use
- Select suitable quenchant for specific material to achieve required properties
- Inspection of quenchants in as received condition
- Check the effect of agitation/flow rate/quenching position in the tank
- Check the effect of contamination in quenchants (water in oil; polymer in oil etc.)
- Estimate the heat transfer coefficient during quenching
- Reduce rework, rejection rate and improve quality
- Eliminate destructive testing by conducting cost effective virtual experiments
- As the software runs with standard mathematical models, accuracy of the results are high

More information about this technology can be found at www.provactech.com

MOTION & CONTROL™
NSK

EMO
Hannover
16-21·9·2019
Hall 7, Booth B34

PRECISELY FORWARD
NSK MOTION SOLUTIONS

From Machine Tool, Injection Molding, Medical & Measuring to General Machinery applications, NSK offers the best technical solutions and a full range of engineering services. Every NSK Linear Guide, Ball Screw, Support Bearing and Super Precision Bearing is tailored to your specific needs. NSK, the only comprehensive engineering service supplier on the market, will take your business a step ahead. Find out more at www.nskeurope-motionsolutions.com.

LINEAR GUIDES | BALL SCREWS | SUPPORT BEARINGS
SUPER PRECISION BEARINGS | ENGINEERING | SERVICES

CASE STUDY

Implementing a successful **preventive maintenance program**

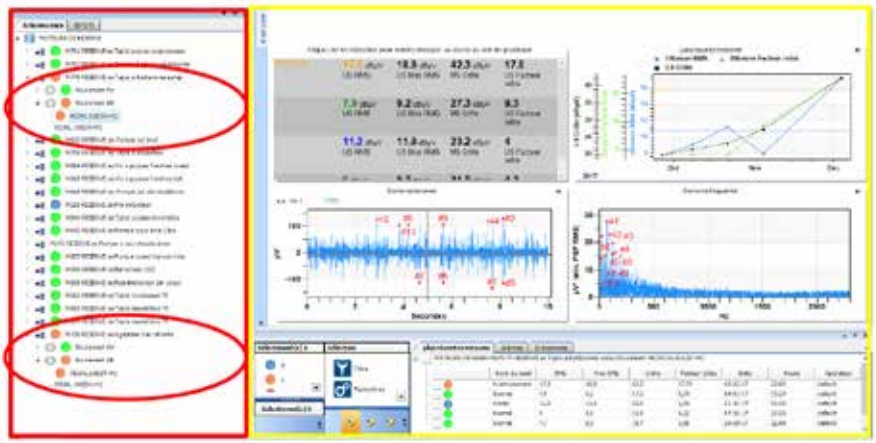
Introduction

CRISTAL UNION (CU) is an agroprocessing cooperative company ranking among the top European sugar and alcohol producers. Most of its facilities are established in France (18 sites).
The BOURDON site in AULNAT (in the Puy-de-Dôme département) has a production capacity of 4,500 tons of beets per day. They contacted SDT Ultrasound Solutions regarding the implementation of a preventive maintenance program based on the collection and analysis of ultrasonic signals. This project dealt with about 400 rotating machines.

Background

After purchasing an ultrasonic data collector and its analysis software tool, SDT and CU have defined the outline of a training program suited to the monitoring of rotating machines. The first step consisted in creating a database containing all 300 machines and then, performing the first data collection in order to determine the initial mechanical condition of each bearing. After simple on-site analysis (ultrasonic listening) and more detailed analysis (overall or static measurements and spectral or dynamic measurements), 1 800 thresholds were defined (pre-alarm, alarm and danger). Using these background data, technicians were then able to identify, at a glance, the machines having an alarm condition.

Viewing the database



Display of the asset hierarchy (or machine tree structure) for the machines under monitoring. In the above example, 19 rotating machines are monitored, 2 of which have exceeded the danger threshold.

Display of the analysis tools (matrix, trend curves, time signal, FFT spectrum, measurement time history).

Issue

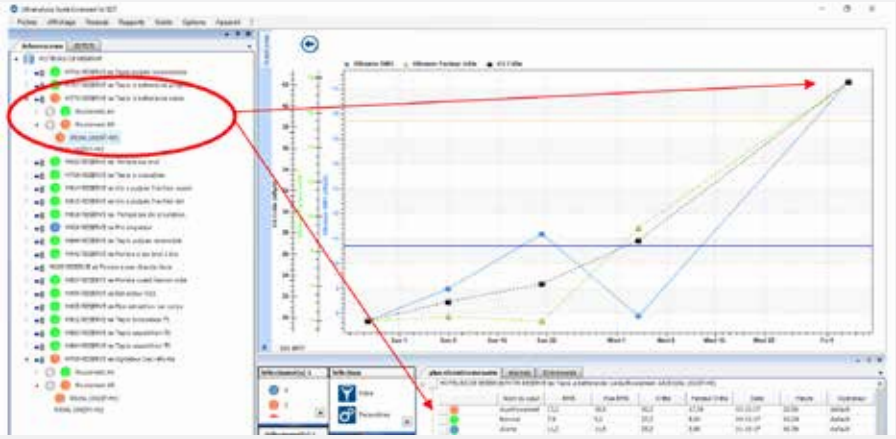
This preventive maintenance program had 3 objectives:

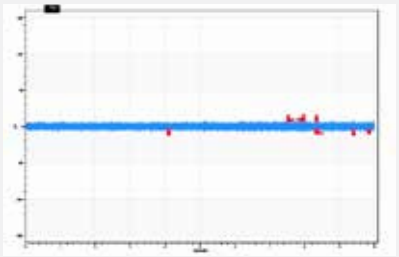
- Assess a simple and quick data collection technique
- Control the reliability and relevance of ultrasonic measurements
- Calculate the return on investment

Feedback from the September 2017-January 2018 production campaign

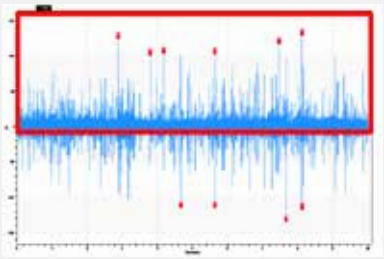
Monitoring of a damaged motor bearing

- Machine: **M779 Dirty beet conveyor line – Asynchronous electric motor**





— Measurement carried out on 26/09/2017



— Measurement carried out on 03/12/2017

Significant increase of +10 dBµV (RMS): the RMS value on the rear bearing of this motor increases from 7.7 dBµV to 17.3 dBµV.

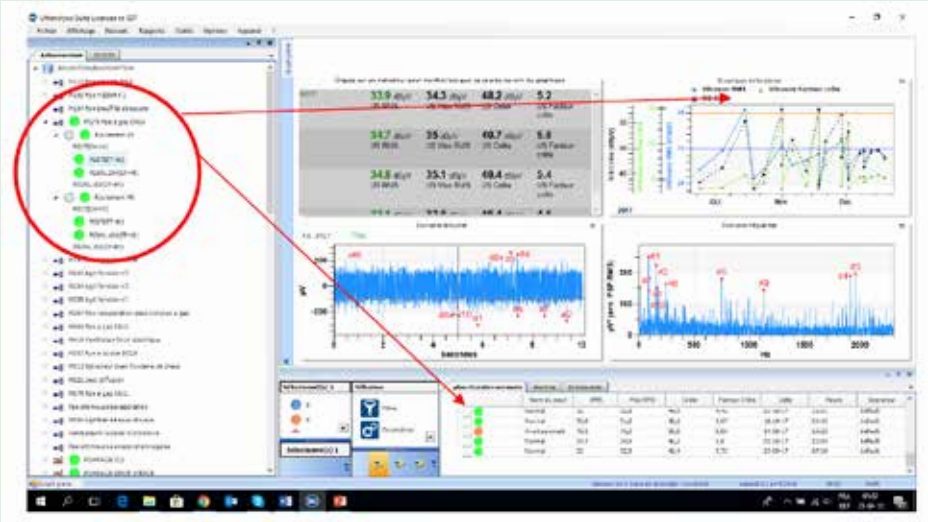
According to SDT criteria, this increase corresponds to the early failure of the bearing.

Listening to the bearing and analysing the time spectra (see chart below) has allowed confirming this diagnosis by observing the emergence of significant peaks relative to this damage.

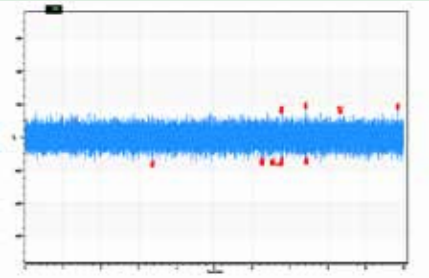
Obviously, the financial impact of a production shutdown right in the middle of the beet campaign is significant. It was then decided to closely monitor this bearing, so as to control the evolution of its condition. Monitoring helped schedule an operation on this machine at the end of the seasonal production, thus preventing a costly shutdown.

Detection of a mechanical problem at the beginning of the campaign:

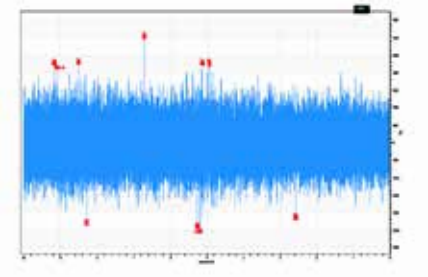
- Machine: **M170 Gas pump CN16 – Asynchronous electrical motor (P=160 kW)**



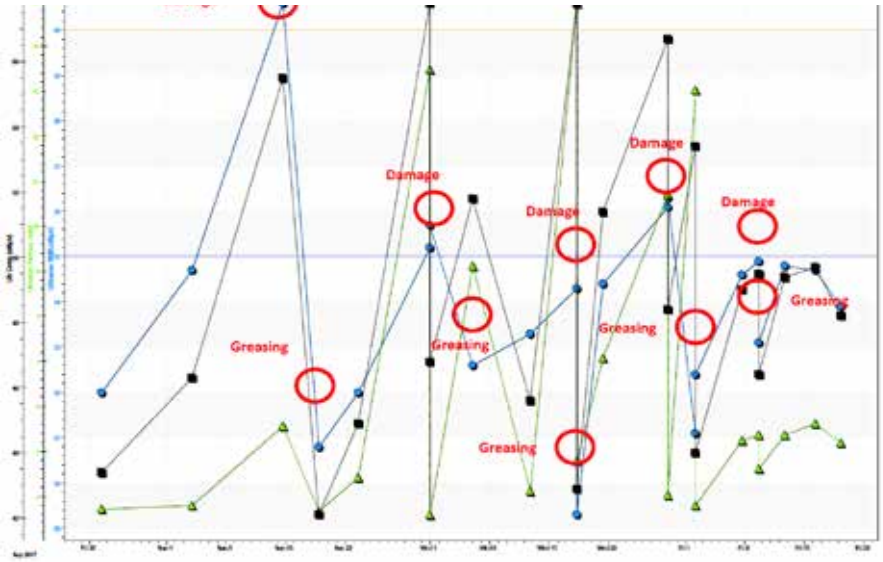
After a few weeks of production and the third measurement on this motor, the technician in charge of the ultrasonic measurement campaigns noticed that the bearing was extremely noisy. After comparison, the measured value showed a significant increase of the signal, which was confirmed by the time spectra (see below).



— Measurement carried out on 11/12/2016



— Measurement carried out on 14/10/2017



The original RMS value was 32 dBµV (RMS) on 16/12/2016. On the route of 14/10/2017, static measurements (overall levels) showed a significant increase of +8 dBµV (RMS), i.e., 40 dBµV (see curves below).

According to SDT International criteria, this increase corresponds to a poorly greased bearing and/or an early failure.

After greasing of the bearing, the measured signal reverted back below its original value, i.e., 30 dBµV (disappearance of bearing friction).

The customer then meticulously monitored this motor throughout the entire campaign. They could observe that the noise reappeared on a regular

basis, which required repeated greasing (see graphs below). Monitoring the ultrasonic data and controlling the quantity of grease injected, the customer was able to maintain the bearing in operating condition over the entire production period.

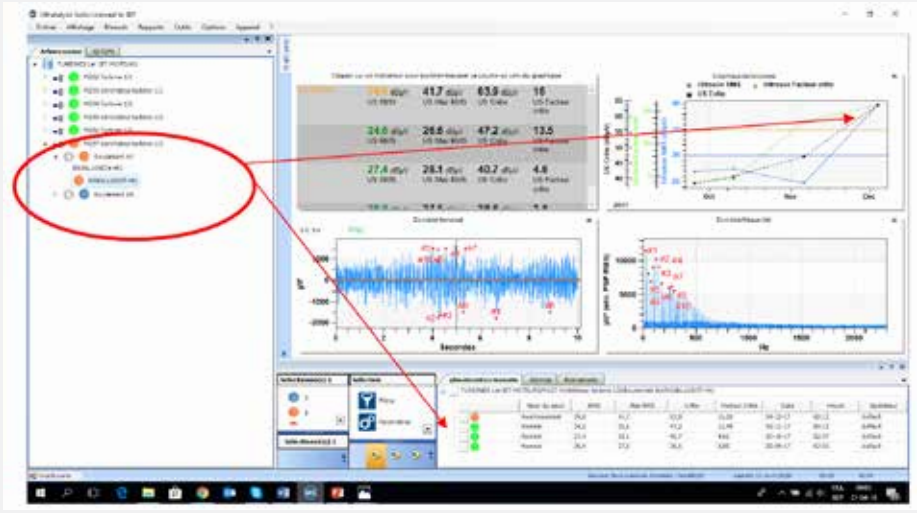
After completion of the campaign and dismantling of the motor, the damage survey showed that the sealing ring of the front bearing was cracked. Despite the damaged sealing ring, injecting of a regular and appropriate quantity of grease prevented accelerated damage and untimely breaking of the bearing.

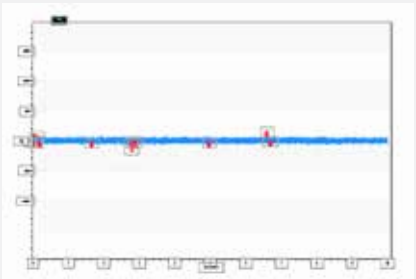
Monitoring of a damaged motor bearing:

- Machine: **TURBINE 1st JET M257 Forced ventilation – Asynchronous electric motor**

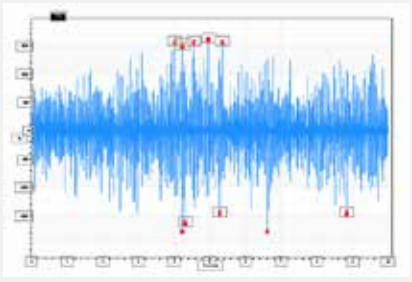
After 3 months of monitoring of this electric motor, the RMS ultrasonic value of the rear bearing had significantly increased. The static measurements (overall levels) showed a significant increase of +12.9 dBµV, with the RMS value going from 26.9 dBµV (25/09/2017) to 39.8 dBµV (04/12/2017).

According to SDT criteria, this increase corresponds to an advanced failure of the bearing. Listening to the bearing and analysing the time spectra (see chart below) have allowed confirming this diagnosis by observing the emergence of significant peaks relative to this bearing damage.





— -1500Measurement carried out on 25/09/2017



— Measurement carried out on 04/12/2017

Based on the ultrasonic levels reached by both the rear and front motor bearings, the customer decided to replace this motor during a scheduled shutdown to avoid a sudden breaking and a detrimental production shutdown.

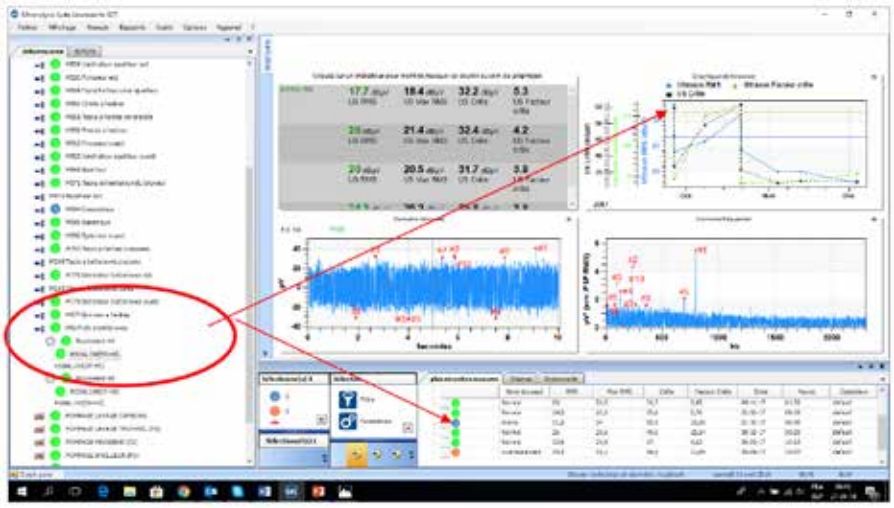
This forced ventilation system is designed to cool down a 160 kW motor that runs from 50 rpm up to 1,200 rpm and down again to 50 rpm in 3 minutes.

This damage originated from excessive unbalance due to the built-up of sugar dust on the blades of the forced ventilation fan.

Lubrication of a bearing

- Machine: **WASHERY – M014 Beet screw – Asynchronous electric motor**

When performing the first measurement on this motor on 26/09/2017, the attention of the technician in charge of the ultrasonic measurement campaign was drawn by the noise when listening to the front bearing of the motor. He decided to grease it at once, which had an immediate effect: the original measurement of 33.9 dBµV dropped to 23.9 dBµV (see trend curves below).

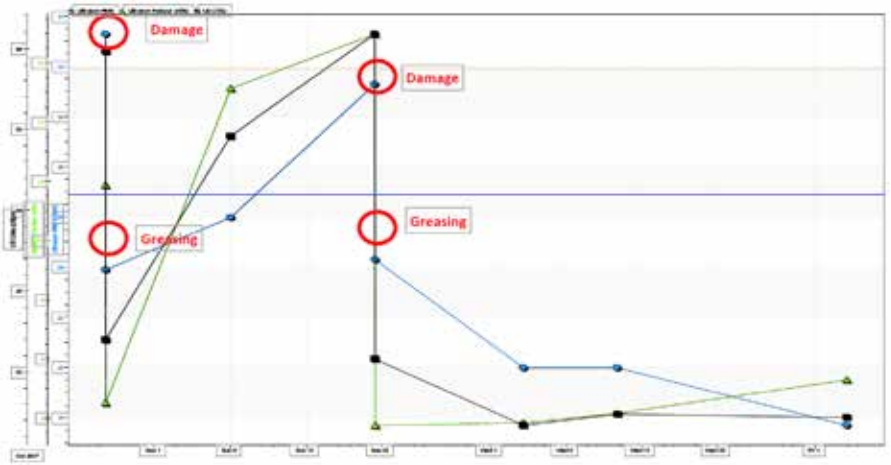


This bearing, which had been replaced between campaigns, was lacking grease.

The customer decided to implement regular monitoring of this electric motor and, on 21/10/2017, they observed a new increase of the ultrasonic measurements, from 23.9 dBµV (RMS) to 31.3 dBµV (RMS).

After adding grease on that same day, the value dropped to 24.3 dBµV. The ultrasonic value remained stable until the end of the production campaign.

The customer was able to fully control the quantity and periodicity of greasing.



observing a significant decrease of consumed quantities. For the 2018-2019 campaign, SDT and CU shall implement a bearing lubrication-specific ultrasonic program ensuring full traceability. It shall guarantee perfect greasing by indicating:

- the proper grease,
- the proper greasing location,
- the proper greasing interval,
- the proper quantity of grease to add,
- the proper indicators for the lubrication condition.

6. Based on this first successful experience, CU is considering extending controls to other rotating machines (reduction gears, bearings, pumps, etc.), but also, taking advantage of the versatility of ultrasounds, to search for compressed air leaks and to control steam traps and electrical systems (corona, tracking, arcing).

Conclusion

Mr. HERCEGFI, who is the Methods Manager and one of the instigators of the implementation of the ultrasonic methodology, told us why he favoured this technology over any other one: “Our goal was to implement a simple, fast and effective method to monitor a maximum number of machines. The ultrasonic data collector, along with its software tool, provided by SDT fully met our expectations. Reliable, simple and effective diagnoses could be issued. The onsite training was perfectly suited to our requirements and rapidly provided us with the autonomy we needed.”

Key figures:

1. CU was able to avoid 5 to 7 unscheduled shutdowns, which always occurred in the past.
2. CU used to systematically overhaul 80 to 100 electric motors each year. This year, overhaul will be performed on 27 machines only, i.e., a 60% decrease.
3. The in-depth monitoring allowed preventing sudden shutdowns, but also setting priorities for off-campaign maintenance operations.
4. The maintenance department was able to arrange for the provisioning of spare parts and/or the set-up of electric motors in stock, thus limiting the maintenance time.
5. CU was able to better schedule their greasing campaigns by

Koyo

JTEKT
Koyo TOYODA

Koyo's OEM designed & validated automotive bearings for the aftermarket

Koyo Tough on Friction, Kind to Earth

www.koyo.eu << visit us at

A brand new design.
Performance for a longer life.

crossocean.com

New Spherical Roller Bearing Units
with innovative new designs
from JAPAN

Please visit us at
BOOTH #A39

Bearing EXPO & Conference
INDIA
2019

Christian Schuster is one of seven specialist mechanics of Schaeffler's field service that performs worldwide maintenance and repair work

THIS MAN LOVES **CHALLENGES**

London, Paris, Madrid – what sounds like the stops on a tour of a TV commercial for hairspray in the late 1980s may also at times be hairy routine for Christian Schuster – this story, though, is not about the hairstyle of Schaeffler's field mechanic but about tricky maintenance jobs around the globe.

by Carsten Paulun

Be sure not to turn around, don't look up, and definitely don't take off your goggles: The bright sunshine feigns warm temperatures that Christian Schuster can only dream of at the moment. At 20 degrees centigrade below zero (–4 degrees Fahrenheit) and a biting coastal wind, the 33-year-old mechanic is perched on a scaffold at a height of a one-family house in the Finnish port city of Pori, about a three hours' drive northwest of Helsinki. His mission: replacing the main bearings of the two reels of a pipe-laying vessel. Exposed to exceptional forces, each bearing has an outer diameter of 1.75 meters (5.74 feet) and weighs six metric tons (6.6 short tons) because several kilometers of pipe previously welded onshore is wound on the reels. Replacing the bearings is no mean feat and requires Schuster and his crew to insert the spherical roller bearings with millimeter precision into the housing that also weighs several tons.

A great team that Schaeffler is proud of

Christian Schuster is one of seven members of Schaeffler's field service crew. They're the men for special challenges. Be it maintenance, repair or replacement, be it in a steel mill, on trains or in a mine, out in the middle of the North Sea or in the "ice house" at Pori – whenever precision work needs to be done on huge high-tech components, Schuster and his colleagues are called. "A great team that Schaeffler is proud of," says Andreas Krieg, who is in charge of the field service crew.

» *I turned my dream into my job*

Christian Schuster, industrial mechanic

Besides the work itself, the conditions at the site pose a challenge because in spite of all advance coordination, the local situation often differs. There's just one constant: the required completion date. Schaeffler's mechanics must adhere to the defined time window under all circumstances. "In spite of tight schedules, we have to work with millimeter precision," Schuster explains.

PORI (FIN)

Each of the two reels of the "Deep Energy" pipelayer has a diameter of 25 meters (82 feet) and is able to take up 2,800 tons (3,086 short tons) of welded, ready-to-lay pipe for pipelines. With a 200-millimeter (7.9-inch) pipe this is enough for a total of more than 90 kilometers (56 miles) of pipeline.

MAINTENANCE & SUPPORT **WORLDWIDE**

Specialty bearings from Schaeffler are used around the globe. Mechanics from Schaeffler's customer support team handle all the necessary maintenance and repair work. Here are a few examples.

OPEN-CAST MINING GARZWEILER (D)

The bucket wheel of the **coal excavator** has a diameter of 21.60 meters (71 feet). The massive bearings have to be inspected regularly.

MOJAVE DESERT (USA)

To repair a **wind turbine** in the Mojave Desert, the mechanics have to work at a height of 80 meters (262 feet). Constant wind force 4 puts axial and radial loads on the specialty bearings.

LONDON (GB)

Work at dizzying heights: The **wheel** of the 135 meter (443 feet) high "London Eye" weighs 2,100 metric tons (2,315 short tons) and is supported by two Schaeffler spherical roller bearings.

SINGAPORE (SGP)

Due to their Azipod propulsion systems that can rotate by 360 degrees, **cruise ships** and other huge vessels are extremely agile. The bearings are replaced when a ship like this is in a dock.

NORTH SEA (GB)

During the extension of an **offshore gas platform** in the middle of the North Sea, new joints for the pile foundations had to be installed.

"You can't cut corners with our precision components. The next failure would be pre-programmed."

Completing one of these specialized on-site jobs takes an average of one week, plus all the preparatory work such as selecting the required external staff, specifying the component, arranging for equipment and tools. Naturally, working in foreign countries with their unique cultures and the diversity of people holds a special attraction as well. "Yes, it's exciting every time, even though in many of our projects we work to a schedule that hardly leaves any time for the country and its people," says Schuster. But at least working with local colleagues at the site provides some small insights. "And sometimes the job involves a weekend on which we may not be working quite as long as usual," says the family man and father of two, who "by all means wanted to work with the final product of rolling bearings" even when he was still an apprentice at Schaeffler being trained as an industrial mechanic.

Installation of a large housing with assembled spherical plain bearing for an offshore platform

Specialty bearings with a diameter of 2.62 meters

Christian Schuster has been a field service mechanic for special missions since 2007. The lead picture and the one at the bottom of this article show him after just having replaced the spherical roller bearings of the lock and dam complex in Hagestein, the Netherlands. They sit on the cable winches that pull up the two lock gates, each weighing 270 metric tons (298 short tons). Since 1958, the lock and dam complex has been controlling the water level of the Lek river to keep the waterways navigable at all times.

The two spherical roller bearings in London's rotating landmark, the "London Eye," have to bear even greater weight. The Ferris wheel that with a height of 135 meters (443 feet) is Europe's biggest weighs 2,100 metric tons (2,315 short tons). Its hub sits in specialty bearings with an outer diameter of 2.62 meters

(8.59 feet). Both bearings have a design life of more than 50 years. An inspection is necessary every year. Large bearings expert Christian Schuster has just performed the most recent one.

Having no fear of heights is one of the prerequisites that Schuster has to meet in addition to his qualification as an industrial mechanic. “Plus, we’re trained in fitness for heights, rope rescue, and helicopter underwater escape for missions at offshore wind farms or oil and gas platforms,” the Schaeffler employee explains.

How do you get a job like this?

Sounds tough, so it’s not really a dream job? “Yes it is! Fortunately, my family accepts that I’m away all the time,” says Christian Schuster, who initially came into contact with the technical field service during his apprenticeship at Schaeffler and was ultimately approached by one of his colleagues back then: “You love challenges, so that’s right up your alley.”

THE AUTHOR

Carsten Paulun *was already fascinated with technology as a young child. He’d dismantle and examine anything he could get his hands on – and still does today. In the members of Schaeffler’s field service crew, especially Christian Schuster, he instantly found the right people to talk shop with.*

At the lock and dam complex in Hagestein, the Netherlands, Christian Schuster just finished replacing the bearings on the cable winch drive of the gates each of which weighs 270 metric tons (298 short tons)

Fluid Films in Bearings and **Rotordynamic Predictions**

What is rotordynamics?

Most simply, it is the study of the vibration characteristics of a rotating shaft supported on bearings. In almost all cases, the object of rotordynamic analysis is to predict and then reduce or eliminate actual rotor vibrations. A rotor spinning frictionlessly on a perfect axis of rotation with zero lateral and axial vibrations would be the geometric ideal. This condition is also preferred for reducing tip clearances and increasing efficiencies.

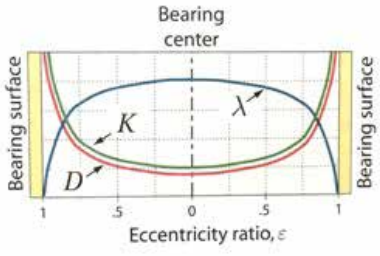
More philosophically, rotordynamics can also be considered an effort in determinism. Determinism is the idea that everything happens for reason, and that these reasons can be understood. It is recognized that rotor bearing systems can be very complicated, to the point where their response appears random. But nothing is random and rotordynamics is our tool to simplify the complexity and deepen our understanding.

The question explored in this work is how fluid film lubrication in bearings affects our ability to make rotordynamic predictions.

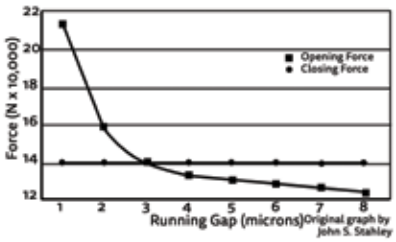
Let's start with the property of stiffness, sometimes referred to as a spring rate. It is the force required to compress a spring though a unit of distance (force/distance) here in pounds per inch.

The stiffness of the rotor supports is very important, as is the stiffness of the rotor itself. It is recognized that taken together with the base, they comprise a structural loop that needs to be considered as a system. In this case though, we will focus on the bearing film properties, considering both oil and gases as fluids used in both dynamic and static bearing technologies.

The spring rate of a fluid film is primarily dependent on its film thickness- the thinner the gap the higher the stiffness. This is well known and documented in eccentricity ratios of hydrodynamic oil journal bearings (Figure 1), stiffness curves of dry gas seals (Figure 2), and commercially available externally pressurized gas bearings (Figure 3). Notice in every case that the stiffness is increasing exponentially at the smaller gaps.



— Figure 1 Qualitative plots of fluid-film bearing parameters versus journal eccentricity ratio. Stiffness, K, and damping, D, are minimum when the journal is at the center of the bearing, and they are approximately constant for low eccentricity ratios. As the journal nears the bearing surface, stiffness and damping increase dramatically. λ behaves the opposite way. When the journal is at the center of the bearing, λ is maximum. As the journal nears the wall, the fluid flow is increasingly restricted, until λ nears zero at the wall. Source: Don Bently's Fundamentals of Rotating Machinery Diagnostics



— Figure 2 The aerodynamic bearing opening force of a dry gas seal face. The slope of the line is representative of the stiffness at a gap. Note that the gap is in microns.

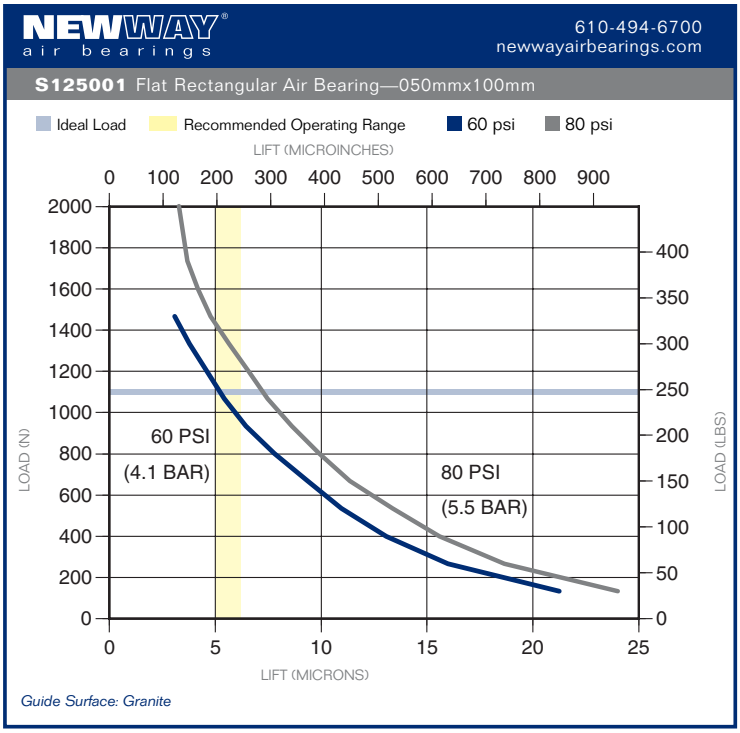
Hydrodynamic oil bearings common in large turbines and aerodynamic bearings used as sealing elements in dry gas seals have no static stiffness, as dynamic bearings require motion to generate the lubricating film. Once spinning, the speed of rotation will be the primary determinant of film thickness. Temperature change will affect the viscosity of the oil and so the stiffness of the film significantly. Shear heating of the film is based on a cube of the film thickness, so heat generation can increase rapidly, again having an unstable feedback effect on viscosity.

When we look to the eccentricity ratio of oil hydrodynamic bearings, Figure 1, it can be seen that both the stiffness and the damping of the film increase exponentially as the rotor approaches the bearing surface. The viscosity of oil also changes in a non-linear away with the temperature increase from the shearing oil. One of the main challenges in rotordynamics is that the conventionally used bearings (hydrodynamic oil bearings) have multiple properties changing in non-linear fashion with respect to the speed and temperature.

This can make them a challenge to model.

Hydrostatic oil bearings common in large machine tools and aerostatic air bearings in measuring machines, have an external supply of pressurized fluid and so can support a load statically, that is without relative motion of the bearing faces.

Oil hydrostatic bearings will suffer from heat generated by shear in the film at higher speed as was case with the oil hydrodynamic bearing, but because of the external pressure, the film thickness may be made to remain the same, essentially an eccentricity of zero and a low enough



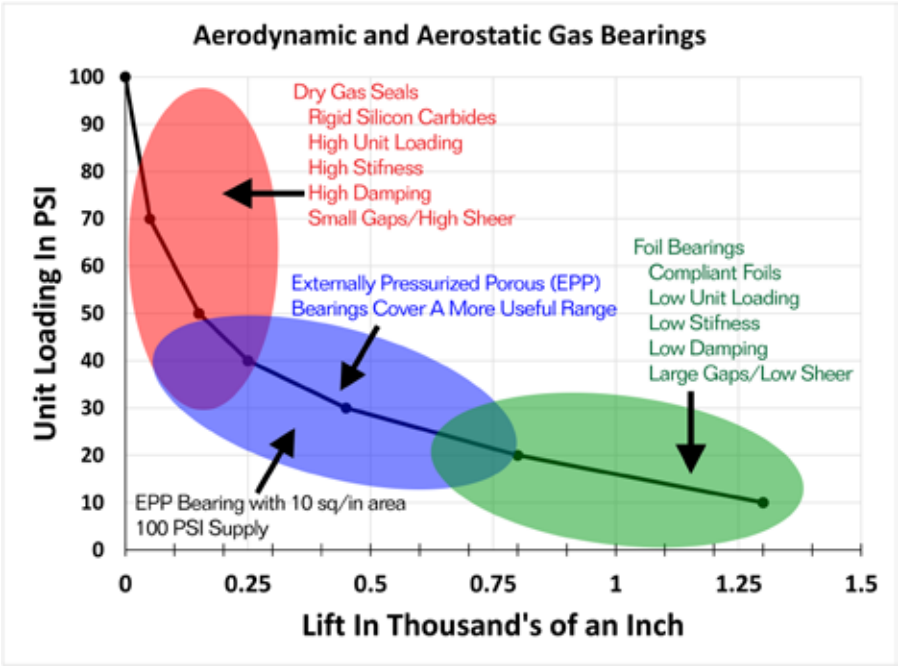
— Figure 3 Lift-Load Chart for commercially available Externally Pressurized Porous (EPP) gas bearing.

case. Stiffness of externally pressurized gas bearings, as we have seen, is a function of film thickness, which is a result of the input pressure and load conditions. A gas bearing with 0.5 square foot (6 x 12 inches of face area), fed 60psi compressed air and loaded with 2,500lbs will have a film thickness of .0002 inches and almost 10 million lb./in stiffness with flow less than 1 SCFM. The same bearing with the same input pressure but with just 10% the load (250lbs), would have higher flow and stiffness less than 1000 lb./in. This is a change of four orders of magnitude in the stiffness for a one order change in the load. This effect can also be seen in the lift load plot in Figure 4. At large gaps, above 0.0005in, the curve is near horizontal, which would be zero stiffness; at small gaps the curve is near vertical, which would be infinite stiffness.

Don Bently focused on this adjustable stiffness property as a panacea for the stiffness to have motion for damping. As compared to the oil hydrodynamic bearing where lower viscosity oil will result in lower film thickness. The lower film thickness results in higher stiffness and damping as shown in the eccentricity ratio plots, but the increases may not be useful.

Aerostatic bearings have very low shear relative to oil, so they will not generate significant heat, and most gases do not change their properties much with a change in temperature. So, externally pressurized gas bearings have similar stiffness properties regardless of the rotation speed or temperature. It should be pointed out that this makes them easier to model and predict then oil hydrodynamic bearings. Because the stiffness may be adjusted by input pressure, they have flexibility and adjustability that can be used as feedback to check the model. And because they have an easily measurable static stiffness, functional quality rather than just dimensional checks may be performed before assembly.

It is hard for some to imagine how an air film could be too stiff in a structural loop made of metal but this can easily be the



—Figure 4 This is a "big picture" chart to conceptualize gas-bearing technology in turbo equipment. It is a lift vs. load chart for an externally pressurized porous (EPP) gas bearing that has 10 square inches of bearing face; 100 psi is fed to the bearing as the load on the bearing is increased. Resulting air gaps are shown on the bottom axis. The slope of the curve is representative of the film stiffness. The typical operating regions of dry gas seals and foil bearings are super imposed, as is the operating area for EPP Bearings. It can be seen that the EPP Bearings operate with a larger gap than dry gas seals, reducing heating and contact issues but still having good stiffness, damping and speed capabilities.

many rotordynamic problems he had spent his life identifying. After selling Bently Nevada to GE in 2002, he established the Bently Pressurized Bearing Company to commercialize externally pressurized bearings. More about this later.

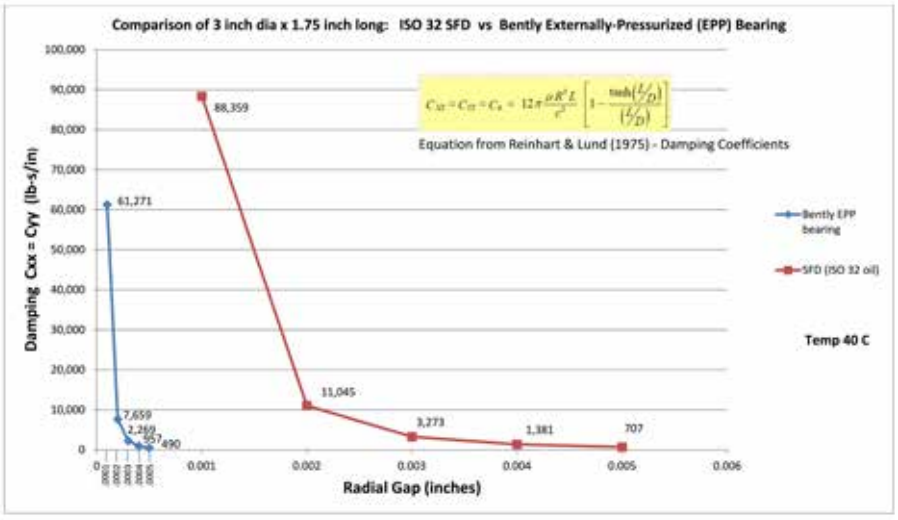
Our next topic, damping is certainly affected by stiffness. Damping, the property of dissipating energy is force/velocity, here in units of lb-s/in. We see in the eccentricity ratios that stiffness and damping are both increasing together as the rotor moves towards the bearing wall. As a way of conceptualizing this, it can help to think of damping in extremes of stiffness as noted above; if there is zero stiffness, there can be no damping because the rotor has nothing to exert force on. A large film thickness is like ringing a rotor hanging on surgical tubing to get its undamped natural frequency. If the stiffness is infinite, then there is no motion, and again zero damping (damping being force over velocity). So, for a given system and frequency, somewhere in between zero and infinite stiffness, an optimum point will be reached to maximize the damping, after which point further increases in stiffness will begin to lock up the motion, reducing effective damping.

can see in the eccentricity plot that damping increases with the stiffness but please remember that damping will be variable in a non-linear way, based on speed and temperature for the same reasons that the stiffness was.

Hydrostatic oil bearings offer a method to adjust the damping of oil bearings, again by having control over the film thickness via the external pressure.

Regarding aerodynamic bearings, it is frequently noted in turbo-related articles and papers that foil type gas bearings have little stiffness and damping. This is in large part due to the low stiffness of the bumps, leaves and foils supporting the gas films and or the relatively large clearance left for the films to develop and so typically do not have enough stiffness to give much damping.

Yet there seems to be universal acknowledgement that aerodynamic bearings in dry gas seal applications have very small gaps < 0.0002in. and very high stiffness, as seen in figure 2. Considering that DGS are “balanced”, that is sealed pressure is allowed behind the stationary face, forcing it against



— Figure 5 Comparison of oil and air-based squeeze film dampers. Air damping is similar to oil at 10 times smaller gaps.

Hydrodynamic oil bearings are considered to have good damping properties. We

the rotating face with unit loading of the pressure being sealed, often that may be thousands of psi. This is much higher than oil bearings are capable of, but only because the DGS dynamic bearing is charged by the sealed pressure trying to escape though the gap. The dynamic pumping of the groves only provides the small pressure differential that keeps the gap. So, if there is 20,000 lbs of closing force, (excluding spring bias for now), say 2000psi across 10 square inches and the pumping groves generate 4psi there will be 20,040lbs of force separating the faces. Again though, there is no ability to adjust the film thickness; you just take what you get for a film in dynamic bearings.

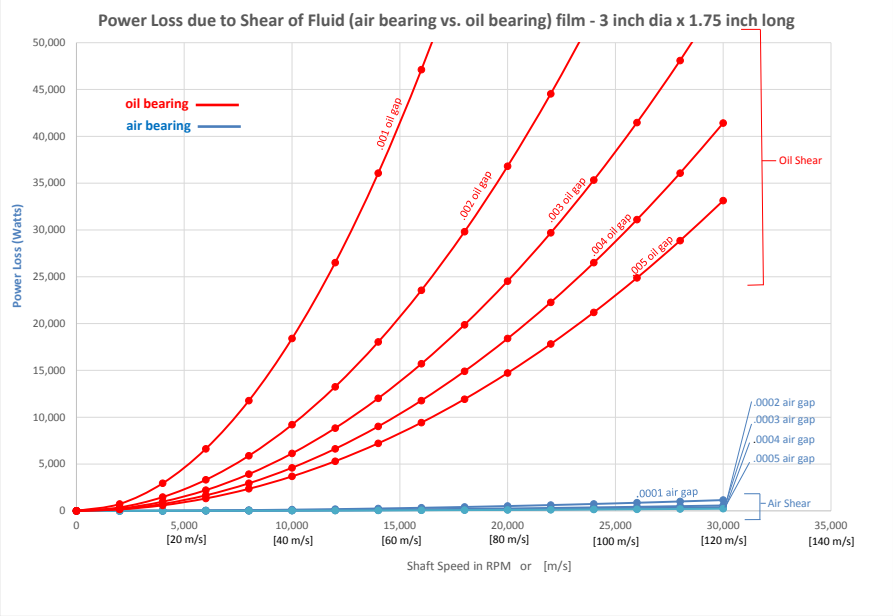
Aerostatic bearings do allow for the adjustability of stiffness in order to maximize the damping is noted above. There are equations for calculating the damping in fluid films. Using one that is often cited in the industry, we calculated the damping from an oil squeeze film damper at 5 different film thicknesses from 0.001 to 0.005in. Again, we see the same effect where damping increases exponentially at the smaller film thicknesses. Using the same equation, changing only the oil viscosity for that of air, and calculating the damping at 5 film thickness exactly 10 times smaller than with the oil (0.0001 to 0.0005in.) we notice that the damping values are only marginal less than the oil, Figure 5.

Cross coupled stiffness coefficients in rotordynamic calculations are a way to account for the destabilizing effects of friction in the fluid film. With oil hydrodynamic journal bearings, and to a lesser degree in oil hydrodynamic tilt pads, as the rotation of the rotor drags oil underneath it, there is an equal force on the rotor causing it to climb up the side of the bearing wall. At first thought it may be hard to see how this could have much effect, but consider it this way, a gas turbine with 6-inch diameter journals may consume some 1000hp for cooling the heat added to the oil from shear. This shear heating is the measure of the “traction” the rotor gets in the bearing. Imagine a 1000hp dragster burning rubber and accelerating down the track. When considering that this is the same power and traction the

rotor has in the journal bearings, it is easier to conceptualize the destabilizing effects of friction. This friction may be seen graphically in Figure 6.

of air is so low though, that it is difficult for the rotor to create a destabilizing cross coupled stiffness. This is also the fundamental reason the unit load capability of aerodynamic bearings is low.

stiffness and damping, Don was going to revolutionize bearings in rotating equipment. He wanted to simplify rotordynamic analysis by making the bearing properties more deterministic. If he could not control it, he did not want it.



— Figure 6 Comparison of shear power losses between oil and air within their operating range. These losses are from the traction the rotor gets in the oil and responsible for the destabilizing cross-coupled stiffness terms.

References

Andres, L. S. (2015). Experimental Assessment of Drag and Rotordynamic Response For A Porous Type Gas Bearing. STLE.
Bently, D. E. (2002). Fundamentals of rotating machinery diagnostics. Minden, Nv: Bently pressurized bearing Press.
Delgado, A. (2014). Experimental Identification Of Dynamic Force Coefficients For A 110MM Compliantly Damped Hybrid Gas Bearing. ASME Technical Conference GT2014-2240.
Kuzdal, M. J. (2013). Rotordynamics 101 Turbomachinery & Pump Symposium 2013
Nicholas, J. C. (2005, May). Tilting Pad Bearing Design. Retrieved from http://turbolab.tamu.edu/proc/turboproc/T23/T23179-194.pdf
Stahley, J. S. (2005). Dry gas seals handbook. Tulsa, OK: PennWell Corp.

Considering a journal bearing of the same dimensions used in the damping example figure 5 (3-inch dia. 1.75 inch long), but in Figure 6, we solve for shear (power loss) at speed. It is a representation of the "traction" we were referring to previously, and it becomes clear again that the thickness of the film is key. We have seen that stiffness, damping and now the destabilizing effects of shear are a cubed function of the film thickness. At smaller gaps where dynamic bearings operate, multiple rotordynamic properties are near asymptotic, with both heat generation and the destabilizing cross coupling changing dramatically with small changes in other properties. Oil hydrostatic bearings would be more deterministic, again in that it is possible to control the film thickness and so the other rotordynamic properties.

Aerodynamic journal bearings like leaf, bump or metal mesh type generate lift from the same principle as the oil hydrodynamic bearings. The viscosity

Externally pressurized gas bearings, or aerostatic bearings, are also represented in figure 6. It is evident from the nearly zero power loss that there must be near zero cross couple stiffness. Dr. San Andres from Texas A&M Turbo Lab investigated this in a 2015 STLE (Society of Tribology Lubrication Engineers) paper on aerostatic bearings. He noted "External gas pressure has a large effect on the system damping ratio, increasing as supply pressure decreases, yet there is near zero cross couple stiffness".

Notice that Dr. San Andres's findings regarding the damping increasing with decreasing supply pressure seems counterintuitive. The key is, by reducing the supply pressure the fluid film thickness is reduced and so its stiffness increases to allow more damping, yet still there was not 100 W of shear. This was Don Bently's dream after selling Bently Nevada to GE; by avoiding the destabilizing effects of oil lubrication and providing adjustable

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

ISB Industries towards Industry 4.0: The New Logistics Hub

With a total capacity of over 56,000 pallets in stock, ISB industries has officially opened a new logistics hub, which will allow the company based in Emilia region to rise to all the challenges posed by the market.

Founded in 1981, ISB Industries Group has become one of the major international players in the field of industrial components.
ISB is today able to produce and offer a complete range of quality articles to meet the needs of customers operating in a wide variety of manufacturing sectors.

Since 1981, the success of ISB Industries has been founded on continual investment in Italy and abroad (new partnerships, new branches, new products), always playing an active role on the market for bearings and components for industrial automation.

For ISB Industries, the three-year period 2016 - 2019 has been characterised by numerous major investments, most notably the construction of the new Logistics Hub, an automatic bearings warehouse – the largest in Italy and the third-largest in Europe – with a total capacity of over 56,000 pallets in stock, officially opened in May in Rubiera (Reggio Emilia) by the President of ISB, Romeo Ghirardini, along with Riccardo Ferretto, CEO of Ferretto Group, who took care of the project for the integrated logistics system.

Ghirardini explained that “although it remains a family business, headed by me, my daughter Chiara and my son-in-law Giuseppe Vernetti, ISB Green Brand is now a familiar name worldwide, thanks to the focus on internationalisation that has always been our hallmark. To achieve this result, we have implemented an internationalisation programme that in our almost 40 years in businesses has led us to open branches in Spain, Brazil, Central America, China and India, as well as five production facilities, to ensure we’re never far from our customers”.

“The inauguration of this new logistics hub is a matter of pride for

us", continued the President of ISB, "because it is further confirmation of our desire to open out to international markets and to be increasingly at our customers' service, offering a complete, reliable range of products".

Thanks to its widespread distribution network and new ISB automated Logistics System, ISB is a reliable partner, able to offer a timely service and customised logistics solutions, such as just-in-time and KanBan, with a view to the Industry 4.0 approach. To create this new automatic stocking system, ISB chose the skills and technology of Ferretto Group Spa. The work required 15 months of planning and design, and a year of work for installation, adding up to a total of 24 months. The warehouse is equipped with seven carriers that move latest-generation shuttles able to guarantee 135 combined cycles per hour, which means that 135 incoming and outgoing pallets can be handled per hour. This will rise to 235 when the system is complete.

The new ISB automated warehouse, equipped with an anthropomorphic Cartesian robot, performs the four basic functions of entry of single units, exit of single units, picking/refilling and depalletizing as well as film-coating and selection. All operations are automatic, except for film removal, which remains manual.

Production and internationalisation

ISB's consolidated international reputation and presence in over 90 countries worldwide starts out from the Headquarters of ISB Industries. The size of this logistics hub is indicative of the vocation of the Group based in Emilia region to increasingly open out towards markets all over the globe. "ISB's international vocation is evident in the widespread network of distributors, branches and production facilities located abroad", explained Giuseppe Vernetti. "In order to effectively provide our customers with products and services, we don't just use sales offices; we have a structured network of branches. To mention just a few, there's ISB Spain, the first branch established in Barcelona; or ISB Shanghai, where we opened a new facility in autumn 2015, although we've actually been present in Shanghai since way back in 1995. In 1995, selling quality bearings in Shanghai was a

visionary concept, which immediately set us apart from the other players present at the time on the international market. Today in Shanghai we have a warehouse that's very similar to the one we've just opened, in terms of everything except size", continued Vernetti.

"Also worth mentioning is the Brazilian branch, which is growing all the time; ISB India, a huge market, where we receive orders for bearings with diameters that are unusual compared with the European market; or ISB Central America, a branch established just last year, but which is growing at an impressive rate, because here we offer a bearing in inches, with improved geometries, quality and production range", concluded Giuseppe Vernetti. In addition, ISB Industries has five factories for producing bearings, rod ends and linear systems:

- The ISB factory for the production of ball bearings is located in China, and was inaugurated in 2014;
- Located in Fiorano Modenese is Mac Power, a leading 100% Italian company that recently joined ISB Group and produces rod ends;
- The facility for the production of linear systems was inaugurated in Taiwan in 2004;
- ISB tapered roller bearings are produced in the Chinese factory inaugurated in 2008 and currently undergoing renovation work to take product from 4 to 7 million units. The work is close to being completed.
- In 1990, in India, ISB opened the factory that manufactures tapered and cylindrical roller bearings, with P6 standard precision.

Other new developments are also on their way in the coming months: new branches abroad in strategic countries, the opening of further INS Service facilities in Italy and the acquisition of new factories.

You can visit www.isb-industries.com for more information about ISB Industries.

100th ANNIVERSARY

THE RANGE MADE IN JAPAN
PREMIUM QUALITY AT YOUR DOOR

NTN NEEDLE ROLLER BEARINGS

NTN SNR

NTN-SNR provides the widest range of solutions to meet your requirements for needle roller bearings. Premium steel, sturdy design and Japanese manufacturing guarantee optimum reliability and service life. Because our European logistic and technical support teams are close to you, they can provide you with enhanced reactivity.

With its available and competitive wide range, NTN-SNR concentrates all its energy on its key concern: you!

www.ntn-snr.com

With You

Prime Roll International Pvt. Ltd

Introducing ROLLWAY® Bearings

a century old brand

to Indian Industries

Rollway® bearing products are not strangers to India. Almost all segments of Indian Industries – especially Oil and Gas, Power Generation, and Mining and Construction industries are regular users of this bearing brand.

However, in order to reach the vast distribution market of India, Regal® has now appointed Primeroll International Private Limited, Kolkata, as the Authorized Exclusive Distributor of Rollway Products and an Authorized Distributor of McGill® and Sealmaster® range of products for the territory of Republic of India. Primeroll's founding directors have been involved in the bearing distribution business in India since 1975 and are the top bearing distributors in India. This unique association between Regal and Primeroll brings Indian customers field expertise, market knowledge, quality products and technical services that are used by industries all over the world. Primeroll International Private Limited has its headquarters and central warehouse in Kolkata. The Corporate office of Primeroll International was inaugurated by dignitaries from Regal Beloit USA and Belgium on 4th March, 2019. With representative offices in Kolkata, Gurgaon, Mumbai and Chennai and a network of dealers strategically situated all over India, Primeroll International has now donned the mantle of provider of a unique service to the Engineering Industry – **"The Complete Shaft Solution".**

A good quality bearing alone cannot ensure trouble-free operation of the machine, unless several other factors associated with its functioning are taken care of. These factors include :

1. Careful handling and storage
2. Quality sleeves and housings in which the bearings are fitted
3. Proper removal of the used bearings and careful installation of the replacement bearing.
4. Correct lubrication
5. Protection from Contamination

In other words, the users will have to ensure that the bearing does not fail on account of any factor, other than metal fatigue. According to a study conducted sometime back, incidences of premature failure of a rolling bearing, due to load related metal fatigue, are absolutely insignificant. The majority of the premature failures occur on account of issues related to the above factors – in other words, due to lapses during use.

Primeroll International's concept of **"Complete Shaft Solution"** offers to its customers products and / or advice regarding all the above ingredients that are needed for trouble-free

operation of a rotary machine.

That is not all. To ensure that the bearing users get only genuine Rollway bearings, each Rollway bearing of bore diameter of 40mm or more, supplied by Primeroll International either directly, or through its network of Authorized Dealers, carries a pair of **"Pilfer-proof Holograms"** as a mark of genuinity. Each pair of these Holograms carries unique numbers that are serially controlled. Records of these Holograms are maintained by Primeroll International for tracking.

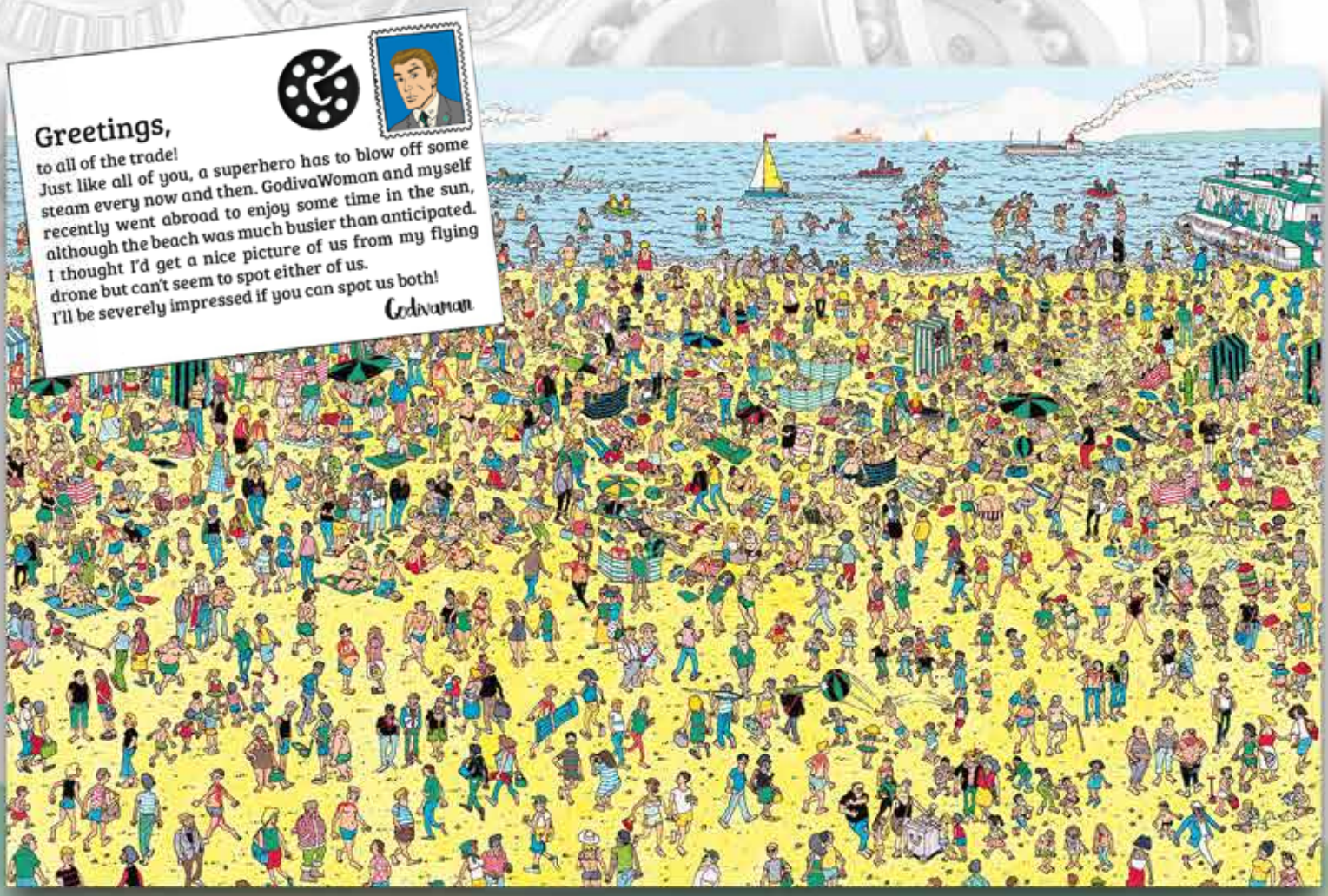
Smooth-running rotary machines minimize downtime-costs and contribute to the profitability of the end user industry immensely. Not only that, defect-free running of the machines also results in less power consumption and help in keeping our planet green in a substantial way.

Primeroll International views its task of providing the customers "Complete Shaft Solution" as a humble contribution towards achievement of these goals. With its experienced marketing force already in the saddle, different segments of industries in India have already started to switch over to the Rollway brand from other bearing brands. While sample bearings are undergoing user trials with a number of large OEMs in the Metal Working, Power Transmission and Material Handling segments, end users from Textile, Agro Industries and General Engineering sectors have started to place orders for Rollway bearings.

Customer interaction is another area of priority selected by Primeroll International in their bid to promote the Rollway brand. They have started to host in house customer seminars at large Integrated Steel Plants, where Rollway bearings have very strong international standings. Product specialists from Regal Beloit's Global Product Development Centre, Pune, address the users and present the salient features of the Rollway products – highlighting customer benefits. More similar seminars are being organized for other segments of Industries in different locations in the days to come. In the last three months from the date of inauguration of its Corporate Office, Primeroll International has got Rollway, SealMaster and McGill brands registered with a number of major PSUs – paving the way for participating in their tender enquiries hereafter.

Primeroll International may be a new company, but the expertise behind it is awesome. The founding directors are heading the largest bearing distribution conglomerate in India, with more than 40 years of experience in Bearing distribution and supply chain Management. The Chief Executive Officer is one of the very few specialized Bearing Technologist in this country with almost 50 years of experience in the field of Marketing of Prime Brand of bearings, with specialist experience in Application Engineering and Root Cause Failure Analysis.

GODIVA BEARINGS



KEY BRANDS

AURORA BEARING COMPANY · ConeMount Bearing Heaters · Continental CONTITECH · DURBAL Vision Technology 1938 · ELGES · FAG · FLURO · HMEC · IKO · INA · JNS · KBS · KUKKO · LDK Bearings · LOCTITE · LS · MinebeaMitsumi Aerospace · NACHI · Nippon Bearing · NMB Minebea · PBC Linear · perma · RENOLD · RHP · Rose Bearings · SCHAEFFLER · SFERAX · SMC · SMITH · STC Steyr

Official IKO agents for over 35 years!

Largest stocks of INA & FAG in the UK.

THE GREATEST TRADE-ONLY SUPPLIER

PRIVATE TOURS AVAILABLE ALL YEAR ROUND!

OUR NEW PREMISES ARE NOW IN FULL OPERATION, INCREASING OUR STOCK HOLDING TO 45,000 SQ FT IN THE MIDLANDS. COME AND SEE OUR UNBELIEVABLE STOCK DEPTH FOR YOURSELVES.

CONTACT US TODAY AND HEAD DOWN TO DUDLEY FOR A FREE TOUR OF OUR INCREDIBLE UNITS AT A TIME THAT SUITS YOU!

YOUR GODIVA TEAM

Dudley: +44 (0) 1384 240 005
dudley@godiva-bearings.co.uk

Newcastle: +44 (0) 191 272 5225
newcastle@godiva-bearings.co.uk

WWW.GODIVA-BEARINGS.CO.UK

Koyo

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

part 2

Introduction

Recently Koyo published a paper that focused on the OEM design and validation of new automotive parts as a concerted effort among carmaker and supplier and the resulting added value of offering such parts also to the aftermarket (see Bearing News – March 2019 edition). The focus in that document was on designing and developing the right prototype part to meet the required functional behavior and performance of the part on the new car.

A next important aspect of the homologation is the validation of the manufacturing process that needs to be put in place by the supplier to make sure that the fully optimized (prototype) design can also be replicated millions of times in a serial manufacturing process at a consistent high quality level. The OEM serial manufacturing validation process according to the well-established PPAP procedure is the focus of this paper.

From part design validation to manufacturing process validation

Once the optimal part design (prototype) is validated by the car maker, the next challenge for the supplier is to reproduce the parts in a validated serial production process, before the official SOP (Start of Production) milestone is reached.

The PPAP (Product Parts Approval Process) procedure which originates from early QS9000 quality standards (introduced into the global automotive industry in the 1990s – today superseded by ISO/TS 16949) is a procedure in which the supplier proves to the carmaker that proper production (and supporting) processes are in place that are "capable" of producing the part in serial production with a stable and high quality output (in terms of consistently staying within agreed specification limits).

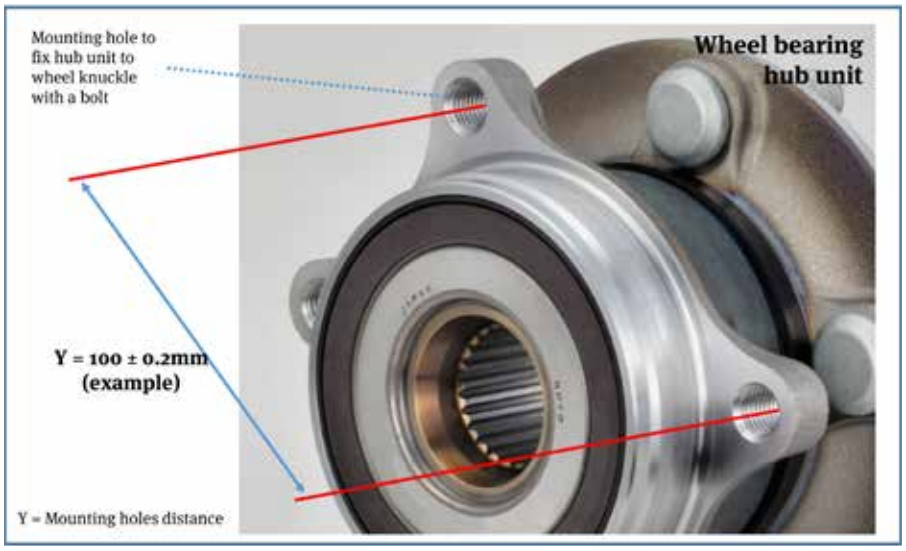
Typically the PPAP process validation procedure ends with the submission to – and approval by the carmaker of the following PPAP documents:

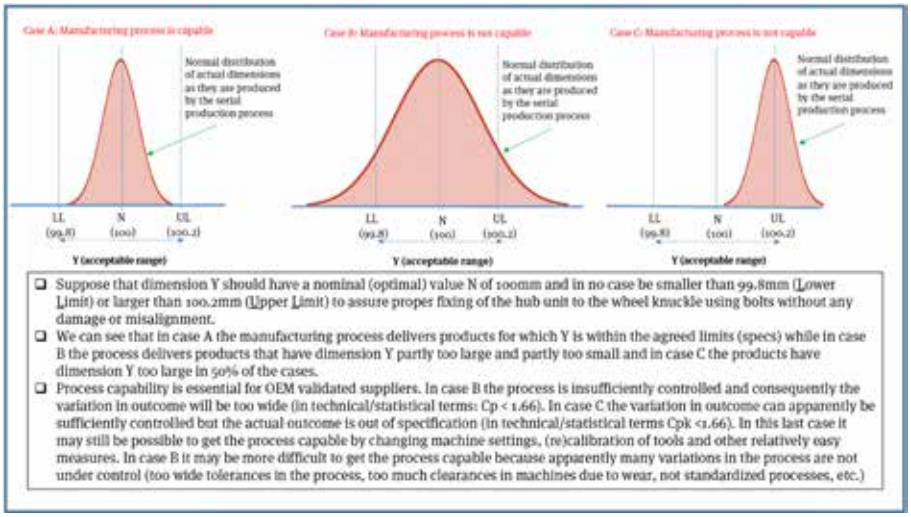
1. A customer drawing showing all main dimensions and features of the parts.
2. A Dimensional Report – proving that measured critical dimensions for randomly taken parts from the new serial production process, are actually within specification limits.
3. A Materials Report – proving that the chosen material/chemical critical properties are actually within agreed specifications.
4. A Process Flow Chart – showing the actual process steps that will be consistently followed during serial production.
5. A Control Plan – showing the quality controls, starting from incoming material inspection, on to in-process checks and up until final product inspection, to assure that all dimensions and properties are within agreed specifications.
6. A PFMEA (Production Failure Mode and Effects Analysis) study – demonstrating that the production organization understands possible process failure modes, their relative impact and countermeasures that can be taken beforehand to eliminate such risks.
7. A Process Capability Report – demonstrating that the manufacturing process is capable of keeping any critical dimension consistently within specification limits (represented by the so called "Cp value") and that machine settings are such that the normal distribution mean value of such critical dimensions are actually close enough to the nominal specification value (represented by the so called "Cpk value") – See the case study for an example from the auto bearing industry.
8. A Calibration Report – demonstrating that all measuring tools are sufficiently calibrated to be able to measure all critical dimensions and machine settings properly.

The final validation of the supplier manufacturing process by the carmaker before SOP is established by the signing of the so called PPAP Part Submission Warrant (PSW). Only at this stage is the supplier allowed to start mass production of the part for the carmaker. As can be understood from the above

Case study

Critical dimensions of a wheel bearing hub unit - the importance of stable supplier manufacturing process capabilities for OEM validated products.





discussion the main characteristic to prove the suitability of the serial manufacturing process is the process capability. All critical dimensions and properties of the product design will have to be produced within well-defined limits (specifications) to make sure that the serial mass production parts have the same quality and performance as the final prototype part that was approved on the prototype car after surviving all types of bench and field tests during the development phase of the new car model.

In the attached case study we can see the importance of the capability of the manufacturing process that assures the proper dimensions between fixing holes on a wheel bearing hub unit. For automotive OEMs part mounting dimensions are very critical. In this case the position of the holes should be exactly the same as the position of the holes on the wheel knuckle to which the wheel bearing unit needs to be fixed. If the dimensions are out of specification there will be a serious risk of misalignment during the mounting of the bolts or damage to the thread (resulting in poor fixing of the wheel hub to the wheel knuckle) leading to an unacceptable risk of failure.

Conclusion

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

Even if a new AM parts supplier makes a perfect copy of the original OEM design, there is absolutely no guarantee that the same supplier is capable of reproducing the same part in large volumes in a capable serial process. Following JTEKT's Monozukuri philosophy, Koyo manufactures the highest standard OEM validated parts and supplies exactly the same parts, from the same manufacturing processes also to the AM.

Therefore using OEM validated parts is the best warranty that they will perform according to the specifications and are actually produced with capable manufacturing processes, required to assure the proper long lasting performance in the field.

Koyo bearings

JTEKT corporation has a high reputation for excellent quality mass manufacturing of systems and products for diverse industries, including automotive, aerospace, agricon, windmill and others.

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).

Bearing Mounting with **Induction Heating 4.0 Technology**

We all know that bearing failure occurs for different reasons. One of these reasons is improper mounting. If you do not use the right techniques and tools, bearing life is jeopardized. It is estimated that approximately 30% of bearing failure is caused by poor fitting. A serious percentage to consider. Why does this happen? Lack of knowledge, lack of correct fitting tools.

There are many types of bearings which require different techniques of fitting. For instance, hydraulic mounting, cold-mounting or hot-mounting (interference fitting using heat).

In this article we are discussing "hot-mounting". A bearing (or other part) is heated prior to mounting, allowing the inner ring to expand. Then, you can mount the bearing on the shaft. When it cools down it shrinks and tightens around the shaft.

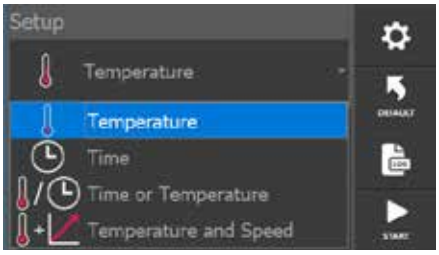
Methods used for heating can be ovens, oil baths, hot plates, or even open flames with blow torches. The risks are many: local overheating causes material stress, loss of original lubrication, dirt contamination, not to mention the risk of personal injury due to slippery bearings (oil) or open flames. Oil baths and open flames also cause air pollution in the workspace.

Bearing manufacturers recommend induction heating as the superior heating method. The reasons why are obvious. Modern heaters offer many advantages like time or temperature control, energy & time efficiency, safety for part and person.

— Bearings should never be heated over 120°C (248°F), unless specified otherwise. Extreme heat can affect metallurgical structure and lubrication. Betex® Induction heaters offer full control including Delta T. When using this option, the temperature between inner- and outer ring can never exceed the maximum pre-set temperature difference.

But now the new generation Induction Heaters by BETEX® have even more to offer!

Bega Special Tools have launched a new generation of SMART BETEX® low & middle frequency induction heaters, where full control over the heating process can be exercised. These heaters are suitable for middle sized



— Touchscreen with easy selection of various heating modes.

— BETEX® MF Quick-Heater Dismounting bearing rings within minutes.

and large bearings (or other parts).

Specially designed for industrial use, the heaters have an easy to use touchscreen with many heating options. More important: these heaters are fitted with a **Delta T** control system. Two temperature sensors measure the inside and the outside temperature of the bearing (part) and adjust the heating according to the selected variable settings. In this way the maximum permitted temperature difference between 2 points can never be exceeded. An even and uniform heating is achieved, and material stress is avoided. Heaters have a USB port for logging purposes. Nowadays it is becoming more and more important to be able to store heating data or to create a proof of work report.

Middle frequency induction heaters are used for both **Mounting and Dismounting.** Thanks to the flexible inductors, very large parts or oddly shaped parts can be heated, with all the above-mentioned advantages. These heaters are fast and economic in use compared to traditional methods. Another big advantage is that damage is avoided, reuse of parts is possible.

Reducing maintenance costs is a hot topic!

Induction heater technology no doubt saves time and energy. Sometimes savings can be enormous. Think about the time savings; and reuse of parts that would otherwise be scrapped; or the case where a factory overhaul time was reduced from 10 to 8 days!

But perhaps the most important advantage of using induction heating technology, is the improved quality of the assembly process, thanks to the perfect control over the heating process.

Visit www.begaspecialtools.com for more information about this new technology or email sales@bega.nl for all your questions.

EVOLUTION *Bega Special Tools has been selling induction heaters for over 40 years. The evolution the company experienced over the years are many: the change from analogue heaters to digital heaters; the introduction of the ergonomic swivel arm; the continued development of the microprocessor for maximum control; automatic demagnetization; the first to produce according to CE directives and the first to obtain CSA/ UL certification for the Canadian and USA market; design of induction heaters for both dismounting and mounting.*

HOW TO CHOOSE THE RIGHT INDUCTION HEATER?

Requirements customers can have, are a cylindrical and even expansion, automatic demagnetization, microprocessor-controlled heating, automatic power adjusting, logging of the heating process.

Used for bearings, couplings, flanges, gears, bushings etc, in every type of industry.

1. What is the size and type of bearing/part? Knowing what the smallest inner diameter and largest outer diameter is, determines the size of the heater.
2. How often is the heating requirement?
3. Do you need speed, or do you need a controlled heating process using Delta T?
4. Do you have both mounting and dismounting requirements?

CASE STUDY

A PERFECT CONNECTION: Revolutionary technology meets robust engineering

In early 2015 an East German StartUp, AIM3D set out to revolutionise the 3D printing world by creating a 3D printing machine that would offer the potential to eventually become a standard tool on every workbench. One unexpected challenge in this quest to develop a flexible and economically efficient 3D printing machine was finding a suitable provider of a high quality linear guidance system that would fit their needs.

The founders of AIM3D GmbH, all from the University of Rostock in Germany´s East Coast aimed to drastically reduce the cost of the additive manufacturing of metal parts. In their experience, the widespread use of additive manufacturing had so far failed because of high material and machine costs. Still today, many 3D printers only accommodate a single material and often rely on expensive materials for printing. "It was our ambition to create ´the´ machine tool of the 21st century that has a place in any company, much like a lathe or milling centre in the 19th century," says Robert Radon, Head of Development Mechatronics.

When the team around AIM3D started building the first prototypes of its 3D printer, the ExAM 255, they were convinced that finding suitable linear guides for their requirements would be straightforward – it did not seem an extraordinarily complex task. However, it soon became apparent that this was not the case "To make the printing process as accurate as possible, it is crucial that the two print heads are perfectly aligned, even at fast speeds. In order to avoid shock during printing, the support of the print bed must also be constructed so that it is completely stable", explains Rene Zielke, who is Head of plant development.

"In addition, since the mechanism for raising and lowering the print heads is such a visible interface between the user and machine, it was important to us that the linear guide looked and felt high-quality," adds Zielke who was involved in the printer´s development right from the start. While the AIM3D engineers aimed at drastically reducing the cost of additive manufacturing, they did not want to do so by compromising on quality. However, finding this combination of features at an acceptable price proved more challenging than expected. They looked at a number of providers for linear solution guidance systems but nothing quite satisfied their high demands until they came across HepcoMotion. HepcoMotion specialises in high quality linear solutions and automation components and, celebrating its fifty-year anniversary this year, has gained a reputation for its high-end products, which require little maintenance and guarantee absolute precision.

High-end engineering

Mark Völkers, Sales Representative from HepcoMotion, advised the AIM3D team on the most appropriate products for their application: "There was not much space in the printer and the guides are subjected to considerable loads under high acceleration whilst still needing to work reliably and accurately. Here, Hepco's slimline bearings and the NV20 slide from our GV3 linear guide system was the best solution," explains Völkers.

HepcoMotion's slimline bearings are directly mounted to the two changeable printer heads, and along with HepcoMotion's NV20 slides, they

ensure that the printer head is moved up and down at a speed of 2.5 m/s with absolute precision. The x-y movement is achieved by three ball screws; two on the x-axis and one on the y-axis. The Z movement for the print happens via two ball screws. The ExAm 255 uses two print heads in order to easily deal with possible material changes. During the printing process, the second print head that is not being used, is constantly being lifted by 10mm so it does not collide with the object to be printed.

One important benefit of the GV3 range of linear expert HepcoMotion is the ability to readjust the bearings and therefore to remove play that develops from wear over the life of the product. “So instead of having to dismantle and change the linear guide and the bearing you can simply readjust our bearing which is obviously much more time efficient and low cost,” adds Völkers. “The ability to adjust and readjust was extremely important for us since even the smallest deviations in the range of microns are unacceptable in the end product,” adds Zielke.

The GV3’s self-cleaning action, was also an important feature in this environment where dirt and debris are a constant presence. Thanks to the specific shape of the V guides, dirt particles are constantly being pushed away through the movement of the bearings during the print process. This self-cleaning feature ensures a long system life even in dirty environments like the printing process. “Ultimately, we were quite simply convinced by Hepco’s products; both the quality and product features were right. We also found it very helpful to be provided with a sample we could experiment with, something we did not expect as we are not yet a bulk buyer,” says Zielke, explaining the decision to use Hepco’s GV3 system.

Set to go

It took two years of development work to complete the ExAM255 but now AIM3D GmbH are ready to move into serial production and are awaiting the patent for their CEM E-1 Extruder print heads. The printer can process almost any injection-moulded granulate up to a diameter of 3mm. “The really special thing about the E-1 Extruder is that the customer does not have to purchase expensive polymer

— The ExAM255 is the first industrial 3D printer worldwide producing metal pieces using injection moulding granules.

— HepcoMotion's reliable slimline bearings move the extruder of the ExAM255 inside the installation space with absolute precision.

filaments or metal powders," explains Mr Radon, who worked as a research assistant at the University before founding the company. The ability to use standard injection granules makes the process a lot less expensive. Additionally, the same material can be used for prototypes and final manufacture, making the transition from prototype to finished product more economical and faster for the end user. "In my opinion, we are the only company so far to have developed such a universally employable 3D printer. Although there are a few that work with polymer granules, they do not offer choice in the range of materials and this is a unique feature of our system," explains Zielke.

— AIM3D use HepcoMotion's slimline bearings with short axles to deal with the very tight space. The competitively priced bearings are part of HepcoMotion's high quality GV3 range of products.

A notable feature of AIM3D's printer is the separation of shape and fusion during the printing process. During printing, only the thermoplastic carrier material is fused to give a component its shape. Following this, the component may be reworked before the actual sintering process. This in turn reduces tooling and machining costs during post-processing. The binding material is then removed from the thermoplastic carrier (in a two-stage process) and finally sintered in an oven thus creating the final product.

The prototypes have been well received, particularly from the automotive industry where glass-fibre filled plastics are commonly used. In this industry, margins are low and there is a constant need to adapt. Here we have a 3D printer that no longer relies on its own ecosystem, but works with readily available, standardised materials and tools, bringing the potential to significantly reduce the costs of additive manufacturing. A central part of the system, Hepco's GV3 has been working well for over a year in the prototypes and Hepco will remain AIM3D´s supplier of choice when it comes to linear guide systems.

About HepcoMotion

With global recognition for innovation, HepcoMotion focuses on manufacturing linear solutions that deliver quality and precision. With branches and distributors in 41 countries, we provide extensive application support through a global network of qualified, experienced and factory trained engineers backed up by a substantial and experienced manufacturing capability.
For press enquiries and additional images please email Tanya Frost at tanya.frost@hepcomotion.com

Napoleon Engineering Services

nesbearings.com • sales@nesbearings.com • (877) 870-3200

ENGINEERING TABLE	
	ABEC 5
dness	Cronidur 30 per AMS-5898
nt	Rc 58 - 62
eter	16 - 7/16" (.4375)
s. load	(2.7559)
	.0037-.0041
outer)	27.5° Ref.
e	.0012 Ref.
	3%
	.017 Max.

Made-to-print **CUSTOM** Bearings

- Unique Materials
- Shorter Lead Times
- Application Engineering Support
- Small and Large Quantities





✓ ISO9001 CERTIFIED

✓ AS9100 CERTIFIED

✓ NADCAP CHEMICAL PROCESSING

How one of Japan's leading bearing manufacturers champions the wind and solar energy race

Sub-Saharan Africa on Renewable Energy

Imagine yourself feeling safe while playing tennis or doing other outdoor activities at night. Imagine having emergency light and power supply even when disaster strikes.

— An NTN Green Power Station near NTN Japan's offices./Photograph © 2019 NTN Corporation

"Isn't it amazing?"

According to a research by General Electric (GE) published in May 2019 entitled Re-imagining the future of power in Sub-Saharan Africa, Africa's population by 2040 will balloon to 1.7 billion. Stepping up then on giving sustainable, dependable, and not to mention affordable energy source must start immediately- and it needs to start NOW!

For a continent rich in solar, wind, geothermal, and other natural energy resources, how difficult can this be?

"Certainly, it won't be as easy."

With economic challenges, bureaucracy, political unrest, and recurring power outages (also known as load shedding) experienced in a couple of African countries, businesses and infrastructure development are undeniably affected.

How about citizens' safety from twilight to daybreak? *That's another story.*

To further see the magnitude of the need for electrical power, do you know that Sub-Saharan Africa only has about half of Japan's entire power capacity in spite and despite it having eight times more population? Yes, this is a fact stated from a publication by Africa Oil&Power (AOP), a trusted energy investment and policy platform patronized by the bigwigs of African government and private sector corporations.

"Any solution in mind?
Take it from Japan"

NTN Green Power Station

At the aftermath of the Fukushima Daiichi disaster of 2011 caused by a 15 meter tsunami slamming into nuclear reactors, life in Fukushima Prefecture has never been the same. Radioactive scare was at its highest level, leaving the area much like a ghost town.

—NTN Green Power Station automatically lights up at sunset./Photograph © 2019 NTN Corporation

"Fast forward to 2018"

Most residents returned to get their lives back as government sanctions were lifted.

Renowned Japanese companies like NTN Corporation, one of the world's leading bearing manufacturers, stood up and shared one of its cutting edge renewable technologies under its wing- the NTN Green Power Station or previously known as the NTN Hybrid Street Light.

As part of its corporate social responsibility (CSR) efforts in its centenary year, NTN Corporation, announced in its 2018 press release, donations of NTN Green Power Stations to over five regions in Japan with the following goals:

1. Express its readiness to collaborate with local communities
2. Help illuminate streets to curb crimes
3. Enable faster coordination when disaster strikes
4. Harness renewable energy for local consumption

Interested to see one? Just take a quick stroll along Fukushima Airport Park, about an hour and 36 minutes' drive from the nuclear disaster zone, and you'll see not just one unit but three!

Why NTN Green Power Station Stands Out

"This is a question from most of us out there. "

Launched in 2016, it's an independent renewable technology with power source harnessed through solar energy during daytime and wind energy at nighttime- thus making it hybrid- and after which charges the battery that automatically illuminates the Light Emitting Diodes (LEDs) after sunset.

Any other surprise benefits and features in store? Let's count the ways!

1. It's the winglet. Specially designed by NTN, the winglet is engineered with a bendable tip to harness wind effectively without causing noise so you can enjoy a good night's sleep.
2. Its vertical type blades are designed for increased torque for efficient harnessing of wind energy even when subjected to heavy loads caused by unforeseen wind gusts.
3. Five (5) days of LED lighting when fully charged brought about by consistent power generation through 360 degree blade rotation even under tough wind conditions
4. Solar power generation of up to

— Requiring no electrical connection, NTN Green Power Station is safe to be installed in public areas. /Photograph © 2019 NTN Corporation.

220Wh except during cloudy weather

5. Safe to be placed in sidewalks, parks, schools, and residential areas as it does not require any electrical power supply to install and operate
6. Has a color tone that blends to any environment with the capability of adding WiFi, USB port, bench, security cameras, and even a customized logo or paint for brand marketing purposes
7. It's low maintenance. Once a year maintenance only with recommended battery replacement every five years depending on the use
8. Technical support available from an NTN engineer in case of downtime
9. NTN high precision bearings inside for optimum performance

Meguru Fujii, NTN Corporation Middle East's General Manager, said that NTN has started promoting the Green Power Station in Africa whose superior characteristics are incomparable to the competitor products in the market. What's more, the Japanese manufacturer's wide network of trusted distributors throughout the MEA region, most notably Mineral Circles Bearings (MCB), provides technical services apart from premium bearing sales for both industrial and automotive applications.

In a nutshell, help will be on the way in case of mechanical malfunction! Seeing NTN Green Power Station as a solution to make Africa literally light up even for some periods of time? Undeniably so!

The Role High Precision Bearings Play

"In the bearing world, if it's from NTN, it must be good!"

A popular brand in Middle East and Africa, NTN bearings are known to possess both Japanese ingenuity and craftsmanship. No wonder, its industrial bearings are at the forefront of the OEM wind industry from the world over.

For the NTN Green Power Station, high precision bearings play a significant role in the effectiveness of its components.

For those non-techie ones out there, here are top five characteristics of this bearing range for you to know.

1. Adaptability to varying degrees of loads and speeds
2. Low vibration or noise
3. Lesser in weight
4. Energy efficient
5. Extended service life

No need to say more! Renewable energy with NTN is the way to go for Sub-Saharan Africa.

For more details on NTN's Green Power Station, contact MCB's in-house engineer through the following email industrial@mcb.ae or visit www.mcb.ae for more information.

References

-NTN Global, -NTN-SNR documentation, -Mc. Kinsey reports, -VOANews, -The Economist, -GE publications, -Africa Oil & Power magazine

ROLLWAY®

High quality engineered roller bearing solutions

Since the introduction of Anti-Friction bearings into rolling mills in the 1920's Regal Beloit has been providing high quality engineered Rollway® roller bearing products to keep the mills producing efficiently. Roller bearing technology has changed dramatically, but the Rollway bearings have been there leading the way. Rollway was the first bearing brand to offer vacuum degassed steel and crowned rollers on all standard products.

Today, Regal is still manufacturing some of the highest quality bearings attainable. Our components are made from the finest bearing grade steel available, manufactured in the most efficient manner in a modern facility by some of the highest skilled workers in the industry. Whether you are looking for a cylindrical mill support bearing or a bearing for use on your rolling mill, the Rollway bearings product range is able to offer an interchange product or a complete new design to keep the mill running.

"Rollway" is a brand of Regal Beloit Corporation, a leading manufacturer of electric motors, electrical motion controls, power generation and power transmission products serving markets throughout the world.

Experience us at **europe@regalbeloit.com**

www.RegalBeloit.com
Creating a better tomorrow™...

REGAL®

NSK to unveil ball screws bearings and linear guides at

Among the exhibits from NSK's comprehensive portfolio at this year's EMO Hannover 2019 exhibition will be a number of notable products for machine tools, including the recently introduced range of DIN-standard ball screws and a new series of high-durability precision ball screws.

Also being presented is a range of optimised spindle bearings for ever-higher precision and speed, while a further product set to be unveiled is a series of linear roller guides equipped with highly dustproof seals. Visitors to EMO Hannover, which takes place on 16-21 September, will find NSK at booth B34 in hall 7.

High-speed DIN-standard ball screws for machine tool applications

The NSK showcase at EMO Hannover will be headlined by the recently introduced DIN-standard ball screws, which are designed to offer high-speed and high-load capacity, as well as low noise. In fact, 1.4 times dynamic load rating can be achieved thanks to the use of NSK's proprietary TF bearing steel.

Also in the spotlight will be NSK's new range of high-durability precision ball screws, which make use of newly developed surface processing technology to reduce wear and realise maintenancefree operation for longer intervals. A special surface texture is applied to the raceways to greatly enhance oil film formation. It is typically difficult for a satisfactory oil film to form during low-speed, short-stroke, oscillating type operations. However, even under such conditions, high-durability precision ball screws are three times more resistant to wear than standard NSK products. The ball screws are ideal for machining centres that perform high-accuracy operations, such as mould and die machining, as well as EDM (electrical

— NSK's DIN-standard ball screws for machine tools are designed to offer high-speed and highload capacity

—High-durability precision ball screws from NSK feature newly developed surface processing technology

discharge machining) machines.

The NSK interchangeable ball screw for automated transfer (pick and place) systems will be another highlight at the show. Here, the shaft and nut are prepared individually, so that NSK can guarantee the specification for random matching, hence making them interchangeable. NSK interchangeable ball screws, which offer C7 accuracy grade, will be available in shaft diameters of 15-32 mm, and with leads of 5-20 mm. An NSK K1 lubrication unit can also be offered.

— The special cage of Robustride bearings helps to minimise wear, even under high loads

A further innovation on display will be the S-HTF ball screw series for injection moulding machines, which offers more than double the service life and 1.3 times greater dynamic load capacity than the company's previous generation product.

Optimised spindle bearings for ever-higher precision and speed

NSK is set to showcase its recently introduced single-row cylindrical roller bearings with the designation 'Robustride'. The main feature of Robustride series bearings is the cage, where geometry and guidance have been improved specifically for use on the spindle drive of machine tools. The results of this optimisation work include better distribution of the lubricant and, in turn, reduced and more uniform heat generation within the rolling bearing, thus minimising wear, even under high loads.

A further bearing solution will be in evidence with the Robust series of ultra-high-speed angular contact ball bearings featuring the Sursave cage, which will be displayed running on a machine spindle. The cage facilitates 20% less heat generation in comparison with conventional bearings operating under high-speed conditions.

High-performance linear motion

NSK will present its new RA series of linear roller guides with highly dustproof V1 seals and V1 bottom seals to help improve the operating life and reliability of machine tools. Dustproof performance and low frictional resistance has been achieved by optimising the seal lip shape and contact, and using a seal material with high abrasion resistance. The RA series will be displayed in a water box at EMO Hannover.

Also worthy of mention is a series of linear guide rails that offer the option of coating with a ceramic layer. Designed for machine tools that operate in harsh environments, the black, ultra-thin (~1 µm) coating provides high rust-inhibiting properties.

— RA series linear roller guides are fitted with a highly dustproof V1 bottom seal

NSK at EMO 2019: hall 7, booth B34.

About NSK Europe

NSK Europe Ltd. is the European organisation of the Tokyo-based bearing manufacturer NSK, which was founded in Japan in 1916 and today employs around 31,000 people in its worldwide operations. The products and solutions provided by the industrial and automotive supplier can be found wherever things move. In addition to nearly all types of rolling bearings, the company's portfolio includes housed bearings, linear technology, wheel bearing units, transmission and engine bearings and steering systems. The company is oriented to perfection in all of its business activities. Its aim is quality leadership in its industry, which it strives for through a continuous process of improvement, excellent product development, optimised production processes and customer-oriented service processes.

www.nskeurope.com

ABB's New Dodge® Food Safe bearings *designed for aggressive cleaning*

ABB's Dodge® Food Safe ball bearings, the first to achieve IP69 and be warranted against failure due to water ingress, help maintain hygiene standards and extend equipment life.

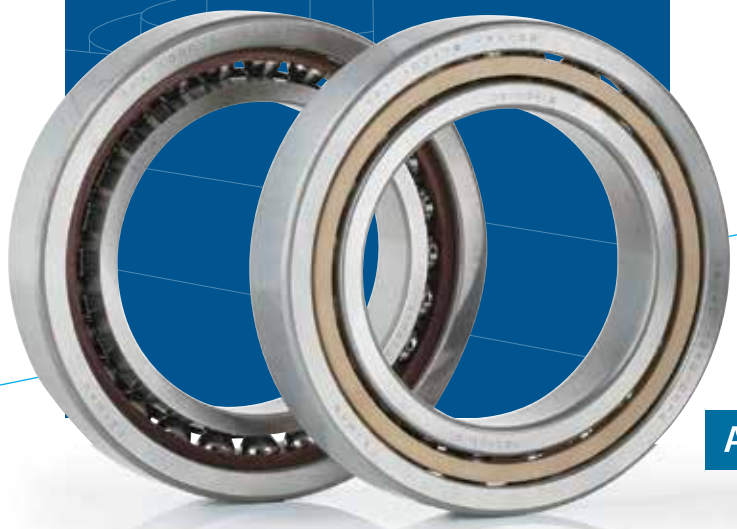
ABB has launched Dodge® Food Safe mounted ball bearings, which are designed to withstand caustic, high-pressure cleaning and sanitation processes. The new bearings are the first industrial bearings to achieve the IP69 water protection rating without the use of an end cover, making them ideal for use in the food and beverage industry, where equipment must be aggressively cleaned. They are the only bearings to carry a warranty against failure due to water ingress. Consumers and stringent health regulations increasingly challenge food manufacturers to guarantee higher food safety and hygiene standards. However, harsh chemicals and high-pressure sprays

TPI®
BEARINGS

www.tpi.tw

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.



Angular Contact Ball Bearing

Radial Bearing

TPI Bearings - Visit us: Hall 6, H77
16 - 21 . 9 . 2019 . Hannover . Germany

EMO Hannover

Technology ▪ Precision ▪ Innovation

SDT340

Data Collector

Detect, Measure, Analyze

Ultrasound and **Vibration**

HEAR SDT MORE Ultrasound Solutions

sdtultrasound.com

Scalable
Multi-technology
Multi-platform

UAS4.0

Analysis Software

APPLICATIONS

MECHANICAL
Detect defects in any mechanical system.

LEAKS
Find pressure and vacuum leaks in noisy conditions.

LUBRICATION
Avoid over/under lubrication. Grease bearings right.

ELECTRICAL
Inspect medium and high voltage systems for arcing, tracking and corona.

VALVES
Asses valve tightness

STEAM
Find faulty steam traps and leaking components

HYDRAULICS
Troubleshoot any hydraulic system for passing and blockages.

TIGHTNESS
Determine the tightness of any enclosed volume

— Food Safe bearings are available in a variety of housing styles, including pillow block, tapped base, flange and take-ups ranging in sizes from ½ inch (20mm) up to 1-15/16 inch (50 mm)

used in clean-in-place (CIP) procedures can quickly deteriorate product reliability. ABB's Food Safe bearings are resilient against these cleaning agents. The bearings' 100% stainless steel insert design combined with a revolutionary top coat, KleenTec, offers superior protection against corrosion. The smooth housing without a grease fitting minimizes contamination harbour points and is easy to clean. The bearing is sealed and lubricated for life to minimize maintenance costs.

To prevent grease wash-out, the leading cause for bearing failure in washdown environments, the Food Safe bearing is equipped with industry-leading lubrication protection. The Hydro armor sealing system, with a stainless steel flinger and four contact lip seals, prevent water and contamination from entering the bearing. ABB's patented ball retainer, the Maxlife cage, retains a large volume of grease in compartments around the rolling elements to prevent wash-out during high pressure cleaning. "Food Safe bearings solve the two most common reliability problems in the food industry – grease washout and corrosion," says David Kaunitz, Dodge Mounted Ball Bearing Product Manager for ABB. "We are so confident in our design that if a customer registers their Food Safe bearings, they will receive a one-year warranty against failure due to water ingress."

Food Safe bearings are available in a variety of housing styles, including pillow block, tapped base, flange and take-ups ranging in sizes from ½ inch (20mm) up to 1-15/16 inch (50 mm).

ABB is a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally. Continuing a history of innovation spanning more than 130 years, ABB today is writing the future of industrial digitalization with two clear value propositions: bringing electricity from any power plant to any plug and automating industries from natural resources to finished products. As title partner in ABB Formula E, the fully electric international FIA motorsport class, ABB is pushing the boundaries of e-mobility to contribute to a sustainable future. ABB operates in more than 100 countries with about 147,000 employees.

Grease Filled Labyrinth Seals in Conveyor Applications

“ Why such poor reliability? ”

There are many different seal designs on the market for countless bearing applications. For those with misalignment you will most likely find a seal that incorporates a grease filled labyrinth. Conveyor pulleys are one of these applications where a ‘Taconite’ type seal is the most common seal arrangement. Pulleys are exposed to arduous environments and installation requires the bearings and seals to facilitate misalignment due to the inaccuracy of the housing mounting position and operational movement.

There are various designs of labyrinth currently available however, the fundamental difference for the labyrinth is either vertical or horizontal. These seals are designed to use grease as a sealing medium and the purported benefit is that they can be 'purged' regularly using clean grease. In some applications these labyrinths are purged manually on a regular basis with a set grease quantity, some purged to 'witness' replenished grease exiting the labyrinth and others are supplied with a continuous flow of new grease.

The labyrinth seals in conveyor pulleys have proven to be unsuccessful for many years resulting in contamination through ingress of dust and water. In order to mitigate this, a common practice encouraged by major bearing manufacturers is to employ a system of contamination 'barriers' that are a combination of:

1. a greased labyrinth;
2. excessive grease filling within the housing cavity;
3. the contact seal on the bearing.

If this style of seal was successful, there would not be the need for this industry standard '3 Barrier Solution'. The end result is that these methods do not work. *Grease filled labyrinths do not work!*

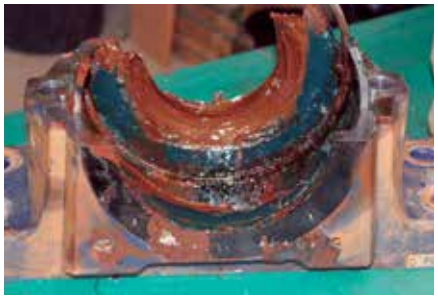
The issue is not seal misalignment or insufficient / excessive grease. It is the fundamental design and the characteristics that grease presents in the rotating environment. DASH Engineering have completed extensive studies on this phenomenon both in workshop testing and practical bearing investigations of over 400 pulley bearings.

The grease is not actually the 'barrier' it is perceived to be – it is in fact the carrier. The grease entraps contamination, altering its consistency. The shaft rotation encourages mixing and the natural progression of the grease from the outer extremities towards the 'imaginary' centre. The excess grease in housing cavity creates an easier pathway to the bearing.

The internal contact seals installed on the bearing offer little, if any, benefit to reduce the progress of the contamination and the bearing interstices become contaminated. This contamination usually results in rolling surface degradation in the form of material adhesion causing spalling. Additionally, the cage pocket/rolling interface has accelerated wear that can result in cage failure and ultimate catastrophic bearing failure.

Want to know more or have us determine your failure mode? Please contact us on +61 8 6162 0990 or via email at info@dashengineering.com.au

Author:
David Beattie
DASH Engineering (Australia)



The tribology of electric vehicles

Photo courtesy of www.chevrolet.com

"Four technical issues are determining the growth of this market. How our science is helping to solve them."

By Jeanna Van Rensselar
Senior Feature Writer

Electric vehicles (EVs) are not new. They are as old as automobiles. According to STLE Fellow and Past President Dr. Edward Becker, P.E., president of Friction & Wear Solutions, LLC, in Brighton, Mich., electric vehicles outnumbered gasoline-powered vehicles in the U.S. before 1900. However, development of the modern electric vehicle began in earnest around 1990 as rising petroleum prices, stricter environmental regulations and increasing fuel economy standards put pressure on automakers to investigate other forms of propulsion, including alternative fuels and EVs.

STLE-member Arup Gangopadhyay, technical leader, Powertrain Research and Advanced Engineering, for Ford Motor Co. in Dearborn, Mich., defines terms upfront. "I would like to clarify an important distinction between electric vehicles and vehicles with electrified powertrains," he says. "A purely electric vehicle has no ICE (1). The power is supplied by the battery. There is no transmission either. There is usually a simpler eAxle (2) or differential to help divert power to individual axles and wheels. An electrified powertrain will have an engine and a transmission as we see them today, but they will be assisted by electric motors. These are basically hybrid electric vehicles."

STLE-member Dr. Farrukh Qureshi, technical fellow for The Lubrizol Corp. in Wickliffe, Ohio, cautions that the term electric vehicle itself is open to interpretation. "EV is a general term that may mean different things to different people rather than a specific form of vehicle," he explains. "EV architecture is still evolving and depends on the choice of the specific OEM. Additionally, the degree of electrification would vary and may range from a mild

60,000
SKF PRODUCTS
ONLINE

www.
acornexpress
.co.uk

SKF

Authorized
Distributor

acorn®
industrial services limited

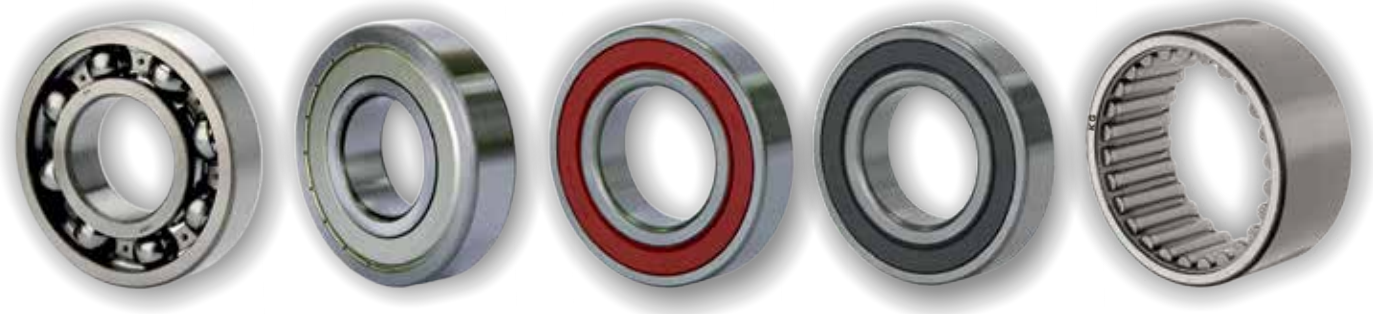
KG International

MOVING THE WORLD

MOVING TO THE NEXT 50 YEARS 1968-2018

KG® BEARINGS

SOLUTIONS FOR HOME APPLIANCES



Quiet I Sustainable I Economical

KG bearings for home appliances have been developed to meet the specific requirements of household appliances like ceiling fans, exhaust fans, washing machines, water purifiers, water pumps, AC fan motors, vacuum cleaner motors, dishwashers, food processors and other kitchen appliances.

We offer a wide range of Miniature Ball Bearings, Deep Groove Ball Bearings and Needle Roller Bearings for home appliances.

KG Product Benefits

- Quiet running
- Superior quality
- Robust sealing to prevent ingress of foreign materials
- Operational reliability
- Cost-effective solution and sustainable performance

KG International FZCO

An ISO Certified Company

P.O. Box 17122, Jebel Ali Free Zone, Dubai, United Arab Emirates

T: +971 4 8815547 F: +971 4 8816423/8818509

www.kginternational.com | info@kginternational.com

EUROPE | DUBAI | INDIA

hybrid vehicle to a vehicle in which all systems will be electrical."

In this article, only purely electric vehicles are referred to as electric vehicles or EVs unless otherwise noted. Vehicles equipped with a driveline containing both battery and ICE power sources will be referred to as hybrids.

Concerns and challenges

Gangopadhyay sees four key consumer concerns regarding EVs:

1. Driving range between charges. Today's consumers are accustomed to driving 300-400 miles between fill ups, and they expect the same from EVs.
2. Charging time. It takes minutes to fill a gas tank but hours to charge a battery.
3. Difficulty accessing charging while traveling. Not knowing if there are enough charging stations in the area so that the vehicle can get charged within a reasonable driving distance.
4. Cost of the vehicle.

Fanghui Shi, GM technical fellow, Global Propulsion Systems, Engine Hardware General Motors in Pontiac, Mich., believes that consumer education is key for adoption. "We know that, at the start, there is a lot of education needed about the experience of an EV, including how to charge and what to expect," he says. "Cost also is an important consideration, and General Motors is working hard to build EVs that meet the functionality and affordability our customers are looking for, as shown with the Chevrolet Bolt EV."

Current technological challenges are many, but bringing down certain costs is paramount. Gangopadhyay says, "The cost of the battery is still relatively high and needs to come down to a more affordable level. The second cost concern is the cost of rare Earth materials used in electric motors."

Shi says that General Motors is working to address key technological challenges of battery energy density, costs and charging to accelerate the adoption of EVs. "Current lithium-ion battery energy density is about one eightieth of that for fossil fuel," he explains. "Even after considering the high efficiency of the electric motor (in the 90% range) versus the lower efficiency in the ICE (in the 30% range), and the mechanical system in the EV being simpler, EVs still have weight and range disadvantages. Although charging at home offers the advantage of waking up to a 'full tank' via a charged battery, high-voltage DC fast charging does not yet match the speed of refueling at the gas station. Thermal management and battery life balance are among the challenges."

Specific tribological issues

There is no question that tribological considerations still will be key performance factors in both hybrid and completely electric vehicles. STLE Past President Dr. Ali Erdemir, Argonne Distinguished Fellow, Argonne National Laboratory, Applied Materials Division in Argonne, Ill., explains, "In hybrid EVs, tribology will still play an important role in the efficiency, emissions and durability of such vehicles, but in pure EVs the concerns over emissions will diminish and nearly all remaining efficiency and durability issues will be burdened on remaining moving parts and, hence, their tribology."

Before starting his own consultancy, Becker spent 30 years as a GM engineer working mainly on a variety of engines and transmissions. He says that by reducing friction in components such as wheel bearings and gears, tribology can contribute to extending the range of EVs. However, EV accessories (power steering, AC) use greased, sealed for life electric motors rather than motors driven off the crankshaft of an ICE. "Lubricants for EVs will need to be compatible with new materials such as copper wires and windings, and advanced polymers, as well as compatibility with electric currents and magnetic fields," he says.

Shi explains the basic differences between lubricating ICE-equipped and EV vehicles: "In an ICE vehicle, the primary function of the lubrication, in addition to cooling, is to provide hydrodynamic load-carrying capacity to separate metal surfaces in load-carrying devices such as rings, pistons and all kinds of bearings. However, the normal loads or radial loads that are intrinsic to the crank-slider mechanism no longer exist in electric motor supporting structures. The function of such devices changes from load-carrying to torque-transferring. NVH (3) (noise, vibration, harshness) concerns or NVH-induced durability concerns will rise as the primary challenges as compared to the durability concerns in ICEs. Control and rotor dynamics for high-speed rotor and air lubrication in the high-speed compressor will become popular research topics."

Unlike an ICE, an electric motor typically generates maximum torque at zero speed and maximum efficiency at around 90% speed. Given this, Becker explains that to provide good launch characteristics and allow the motor to operate near peak efficiency more often, all current production EVs use a reduction gear (typically around 8-1) to achieve higher efficiency over their speed range. "These gears are subjected to very high torque at low speed," he says.

Shi says that due to the simpler mechanical interactions in the EV powertrain and drivetrain, the absolute friction loss is reduced. The percentage of power to wheel is significantly increased from 20% for ICE-based vehicles to 80% for EVs. Therefore, the drive to reduce friction for fuel economy gain is less substantial.

Becker concludes that tribological advances can realistically only assist with range.

Fluids for EVs

Qureshi explains that the choice and type of fluid would depend on the degree of electrification, the configuration and design of the vehicle and location of the electric motor/components. "Fluid properties will be dictated by the potential operating environment of the fluid and whether the electric motor or other electrical components are to be wetted by the fluid," he says. "Some of the hybrid/EV

— Bearings for electric vehicles. Figure courtesy of Schaeffler

architectures would use existing engines, transmissions and axles. As a result, conventional lubricants may suffice."

He adds that if an electric motor is used for propulsion in addition to an ICE, which is a common configuration for prevalent hybrid vehicles, an existing engine oil could be used for lubricating engine components.

"Care would be needed to make sure that the lubricant can provide protection to engine components for more frequent stop/start events compared to a conventional ICE," Qureshi says. "Depending on drive cycle, the ICE may operate at a lower temperature for a short time duration. This may result in water condensation leading to emulsion formation in the fluid. Further studies would be needed to understand the impact of emulsion on fluid performance."

Regarding required fluid properties for EVs, Qureshi says that, in general, performance criteria of electrical conductivity, thermal transfer properties, copper corrosion protection (4) and elastomer compatibility would be of most importance.

"In some cases, new base fluid as well as additives might be needed to provide the desired combination of performance attributes for hybrid/EV vehicles," Qureshi explains. "Some of these performance levels may be determined by conventional test methods; others would require development of new test methods to meet the criteria needed to provide long service life of EV systems for mobility. Whether a new additive chemistry would be needed would depend on whether the required criteria can be met with current base fluids and additive chemistries or not.

"Several drivetrain configurations would exist depending on vehicle configuration and design. If the motors are embedded in the transmission or axle where they are immersed in oil, the fluid's electric and thermal conductivity will be of importance. However, there is lack of consensus among OEMs on targets for electric or thermal conductivity. Friction and wear protection of gears, bearings and seals also will be important. Motor output speeds may exceed 25,000 rpm, which would require that associated bearings, seals and other components are properly lubricated."

There are other engine oil considerations. Gangopadhyay says, "Hybrid engines tend to operate at load/speed conditions related to high efficiency points to maximize fuel efficiency. Also, the engine does not operate all the time due to the introduction of start/stop technology, fuel shut off during deceleration, etc. Thus, engine oil tends to run cooler than a normal engine. This offers the opportunity to use lower viscosity grade engine oil, which can further improve fuel economy while maintaining comparable minimum oil film thickness. Many high-volume engines today use SAE 0W-20 oils, but one can now go to SAE 0W-16 or even lower provided durability, oil consumption, etc., are not compromised."

Qureshi indicates that The Lubrizol Corp. scientists are working hard to solve potential issues for fluids and EVs and also cautions that developing, registering and manufacturing new chemical components is an arduous, time-consuming and expensive process.

Bearings for EVs

Chris Marks, senior engineering specialist for The Timken Co. in North Canton, Ohio, says that the usual number of bearings depends on whether the vehicle is mild hybrid, full hybrid (5) or pure EV. "With a mild hybrid, these vehicles typically contain the same number of bearings as today's designs," he says. "However, a full hybrid that uses an electric motor to propel the vehicle may have more bearings in the powertrain, depending on the integration architecture.

"For pure EVs, where an electric motor is the only vehicle propulsion source, the overall number of bearings in the powertrain probably will be reduced compared to a conventional powertrain. Typical powertrain architectures use about eight bearings between the electric motor and the gearbox. The number of wheel bearings in the vehicle stays the same."

Early hybrid gearboxes were often designed around existing production bearings to bring an EV powertrain solution to the market faster. However, this may not offer the best long-term solution in terms of vehicle power density and overall efficiency.

"Timken offers power-dense, fuel-efficient bearing solutions that allow for more compact powertrain designs, providing an overall vehicle weight reduction, lower bearing operating temperatures and improved powertrain efficiency," Marks says. "Additionally, these bearing solutions can help reduce NVH by eliminating the clearance

CPM
SPECIAL BEARINGS

www.cpmbearings.com

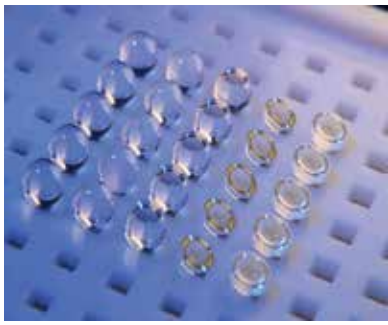
Italy
20834 Nova Milanese (MB)
Via Brodolini, 26
Tel. +39 0362 363411
info@cpmbearings.com

made in Italy
since 1967

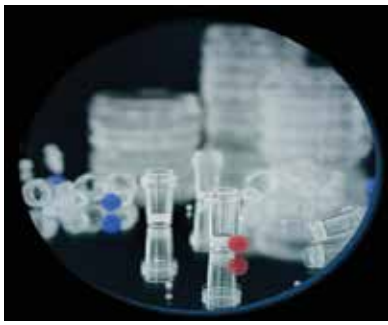
QUALITÁ
SERVIZIO
FLESSIBILITÁ
competitività

Global Production, Local Service







TSUBAKI NAKASHIMA CO.,LTD.

Leading global supplier of precision balls, rollers, and components

www.tsubaki-nakashima.com

in the bearings and preventing the backlash motion when going from drive to coast conditions encountered during regeneration. New lubricant formulations also are likely to arise in the market to meet the EV application requirements, including lubricant characteristics such as foam control, low conductivity, cooper corrosion and thermal stability."

Chris Shamie, director of Advanced Automotive Development, Americas-Schaeffler Group USA Inc. in Livonia, Mich., is convinced that bearings are key to the success of EV vehicles in the future, especially with respect to one of the biggest hurdles faced by EVs in the race to gain widespread acceptance, what he calls "consumer range anxiety." He says, "While improvements in battery energy density are, of course, needed, driving range also can be improved through reduced parasitic losses—which Schaeffler innovations, such as high-speed motor bearings and ultra-low friction bearings, can help overcome."

Shamie continues, "Today's ICE vehicles utilize as many as 11 gear states to maximize powerpack efficiency. As we move to pure electric vehicles, one or two speeds will likely be sufficient in the near term, based on the larger efficiency island of an electric motor as compared to an ICE. With a reduction in the number of gear states comes a reduced demand for bearings. This is actually good news for Schaeffler, as this transition allows us to focus our resources on delivering E-mobility solutions such as complete electric axles, P2 (6) modules, actuators and fully dedicated hybrid transmissions products for which there is strong market demand."

Shamie explains that bearings used with brushless eMotors and IGBT (7)-type power electronics present a special challenge. As electricity flows through the eMotor's rotating shaft to the machine frame, the current fluctuates at a high frequency. This can result in electrical discharge machining, which, in turn, can lead to premature bearing failure.

"Schaeffler is developing a shunt bearing that bypasses this current via a secondary conductor, thereby eliminating electrical discharge machining," he says. "In addition, new lubricants that can lower the power of these electrical discharges are being developed for EVs. Schaeffler also is collaborating with the manufacturers of these lubricants to optimize the system's robustness."

Schaeffler's bearings also must operate without making much noise under high speed (see Figures 1 and 2). While EV motors can spin at speeds of up to 20,000 rpm, they will no longer have an ICE to mask background NVH. To address this potential issue, Schaeffler has developed special high-precision bearings. It also is working on a new bearing coating that can reduce bearing NVH at high speeds (see Advanced Coatings/Materials for EVs).

ADVANCED COATINGS/ MATERIALS FOR EVs

New driving regimes combined with new oil/grease formulations with much reduced viscosity will call for the use of more advanced surface technologies, coatings and materials. STLE Past President Dr. Ali Erdemir, Argonne Distinguished Fellow, Argonne National Laboratory, Applied Materials Division in Argonne, Ill., says, "In the long run, the goal will be fill-for-life lubrication in most if not all EVs, and this can only be achieved by the use of more advanced materials and coatings."

Regarding the potential for adding coatings to EV bearings, Chris Marks, senior engineering specialist for The Timken Co. in North Canton, Ohio, says, "Typically surface coatings are not used on bearings in automotive applications today. It is possible that some bearing manufacturers may use surface coatings to enhance the performance (e.g., fatigue life, electrical resistance). Long term this is probably not a viable high-volume manufacturing process, especially if EV production volumes increase. Usually coatings are applied in a batch-type process. If coatings are applied through a continuous process, it can lower the cost, making this option more attractive. A coating could be used to offset thin film bearing conditions that occur as a result of using lighter weight oils. In addition, coatings can help prevent surface adhesion."

Marks continues, "There are several applications where bearing coatings can be beneficial to our customers. With the high speeds and loads that accompany eMachines, the bearings sometimes move slightly inside their housings (also known as bearing creep). This can cause damage to the bearing or the housing itself. To that end, Schaeffler has developed a special coating to prevent creeping inside the bearing housing.

"Also, as mentioned earlier, we need to be mindful of the potential for electrical discharge machining that can sometimes occur in high-speed eMachine bearings. In addition to the shunt bearing concept, which moves the current flow path away from the rolling element raceways, Schaeffler has developed a specialized coating to prevent electrical discharge thorough the bearing. Used on electric train bearings for years, this coating can be applied to the bearing's inner race, outer race or to the rolling elements themselves.

— Needle bearing for electric vehicles. Figure courtesy of Schaeffler

"In addition, EVs will no longer have an ICE to help mask the bearing noise," he says. "Consequently, the bearings themselves will have to run more quietly,

— eAxle. Figure courtesy of Schaeffler

which is achievable with a special bearing coating. Schaeffler has invested heavily in coating technologies for many years to ensure that the above-mentioned problems can be solved.

Lube challenges for bearings

The automotive industry is moving toward lighter weight oils for overall efficiency improvements, regardless of the vehicle propulsion type. "These lighter weight oils must provide adequate lubrication to the bearings under a range of application conditions to meet bearing performance expectations (e.g., fatigue life) and to aid in the removal of heat from the drivetrain (e.g., gearbox)," Marks says. "Lubrication requirements in an EV may have a different set of challenges compared to a conventional axle depending on its interaction with the electric motor and surrounding components (e.g., is it cooling the motor and the gearbox?)."

Qureshi indicates that The Lubrizol Corp. is currently working on fluids with desirable attributes of thermal management, efficiency and durability in high-speed driveline systems.

Shamie believes that lubrication and tribology challenges for bearings inside EVs will depend on the region where the vehicles are sold.

He explains that in the U.S., electric vehicles will sell when they are marketed on the basis of their improved function and performance attributes regarding comparable vehicles with ICEs. Many of these high-performance EVs will use direct-spray cooling for the eMachine, and the runoff from this process can then be used to cool and lubricate the attendant bearings.

In Europe and Asia, the need for CO_2 reduction will be the driving force behind the growth of E-mobility. One of the easiest ways to lower CO_2 emissions is to reduce the mass of the vehicle. "Products like eAxles and the P2 module clutch could push optimization targets for lubrication and heat extraction around bearings to the edge of robustness (see Figures 3 and 4)," Shamie says. "Many of these designs could use water-jacket cooling for the eMachine, which would require the use of sealed, greased bearings.

"Schaeffler is in the unique position of being a full-service supplier of both the eAxle as well as the P2 system. This allows us to look at the overall heat transfer and lubrication delivery so we optimize not only the bearings but the complete modules, too. The eAxles will contain high-speed motors with large reduction ratios that will present challenges to bearing design. Since these electric motors will be turning at speeds in excess of 20,000 rpm, robust bearings are needed here."

Another factor that must be considered is the need to control oil aeration at these high speeds," Shamie says. "The overall system must be carefully designed to ensure that splash lube features do not cause excessive aeration at high speeds.

Shamie explains, "Because EVs use many parts made from copper, the biggest challenge for lubricant manufacturers is to ensure that the EV lubricant does not corrode copper components. Such a corrosive lubricant could dissolve the copper and deposit it on areas that need to be electrically insulated. Because certain existing powertrain lubricants are corrosive on copper, they will need to be reformulated."

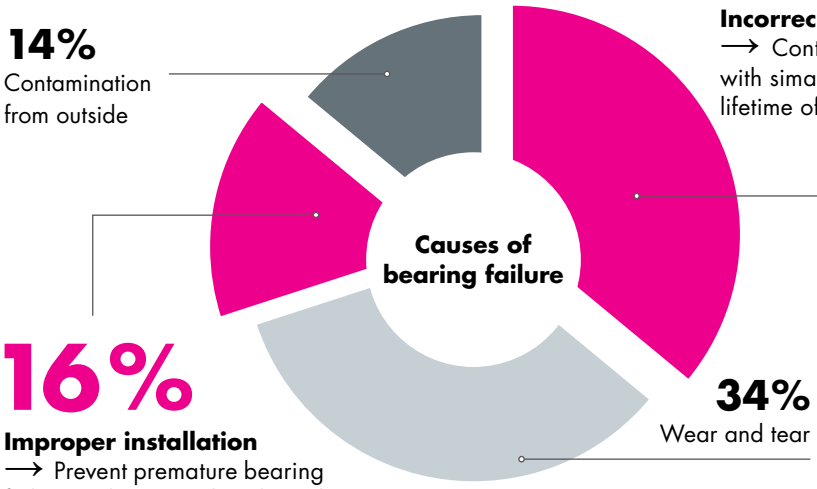
Bearing fatigue

When selecting and analyzing bearing solutions for an EV, The Timken Co. leverages its vast application knowledge across multiple industries whether that is a high-speed machine tool spindle or a rotor craft gearbox application to provide bearing solutions that meet customer requirements for EV applications.

"The operating conditions and environment of an EV gearbox application are vastly different from a conventional axle and offer many new bearing and lubrication challenges along the way," Marks says. "Bearing fatigue performance is subject to impact from the harsher thermal environment along with the lighter weight lubricants. OEMs must work to validate the EV system solution and balance all of their 'e-requirements'. Extensive testing must drive the development of EV powertrains to establish acceptable component performance such as bearing fatigue life."

As vehicles become more and more sophisticated, parts, including bearings, will have to work harder. "When we get to 'robo-taxi'-type conveyances (an example of which is Schaeffler's recently introduced 'Mover' concept car), the vehicle's duty cycle will be greatly increased. This means that bearings, gears and lubrication systems will need to be more robust as well," Shamie says. "It is realistically conceivable that these components would need to last 10 times

Prevent premature bearing failure with simatec maintenance products



14%
Contamination from outside

36%
Incorrect lubrication
→ Continuous lubrication with simalube ensure a longer lifetime of the bearing

16%
Improper installation
→ Prevent premature bearing failure with simatool tools and simatherm induction heaters

34%
Wear and tear

More information on p. 133

SWISS MADE

simatec ag Switzerland www.simatec.com

simatec smart technologies

OPTIMIZE LUBRICATION & EXTEND BEARINGS LIFETIME

An Ultrasound instrument is the perfect tool for lubrication management

60-80% of premature bearing failures are lubrication related

Avoid downtime and premature bearing failures with Ultrasound Assisted Lubrication

ULTRAPROBE 401 DIGITAL GREASE CADDY

- Can be attached to a grease gun for ease of use
- Know when to stop adding lubrication and record the amount used
- Set up and store routes for easy condition based lubrication
- Trend and report your lubrication data with UE Systems free DMS Software

The Path to **LUBRICATION** EXCELLENCE

DOWNLOAD NOW FOR FREE AND START IMPROVING YOUR LUBRICATION PRACTICES
www.uesystems.eu/ebook-lubrication

UE Systems Europe - Windmolen 20, 7609 NN Almelo, The Netherlands
T: +31 546 725 125 | **E:** info@uesystems.eu | **W:** www.uesystems.eu

ue SYSTEMS INC
The ultrasound approach

longer than what today's mechanical systems are engineered for. We will likely see the advent of cloud-based condition monitoring to make sure these vehicles stay on the road instead of inside the repair shop, which is why Schaeffler has invested heavily in digitalization."

Bearing grease lubrication

Currently there is a limited amount of grease used in EV gearboxes. Grease is typically found in sealed ball bearings, which have been used in some EV gearboxes or in electric motors. "Bearing positions using sealed solutions in high-speed and high-temperature applications bring challenges for long-term performance," Marks says. "The reason is that the grease cannot be serviced over the life of the vehicle; as a result it has a finite working life under these conditions. In addition, there might be challenges with the interaction of the gearbox lubricant. At The Timken Co. we draw on our machine tool industry experience to help determine if it is appropriate to apply greased, sealed bearing solutions for these types of demanding applications."

Shamie says, "Depending upon the customer's architecture preferences, grease-filled bearings are often favored for eMotor bearings in eAxle applications that use a water jacket

— Integrated hybrid module P2. Figure courtesy of Schaeffler

(as opposed to splash lube)," he says. "Working with our partners, Schaeffler has developed a special grease for these high-speed motor bearings."

Transmissions and fluids

A power split transmission, with increased torque transfer capability, is currently used for hybrid vehicles, which is simpler than a conventional step transmission (6-speed/8-speed/10-speed).

Gangopadhyay explains, "In this transmission, the power from the engine passes through a set of planetary gears set to the ring gear through a final drive gear. The ring gear feeds power to the wheels through the transmission output shaft. There are two electric motors inside the transmission housing: the integrated motor generator and the traction motor. The traction motor can directly supply power to the wheel when the engine is not running. The motors get very hot, and they are cooled by the transmission fluid dripping on them.

"The electric machines are more efficient if they can be kept cool. That is where the opportunity lies. There is a need to develop a transmission fluid with improved heat transfer capability to take heat away faster to keep the motors from getting hot. This can allow more current to pass through the motor offering more torque, which customers desire. There are no friction clutches in this transmission, therefore, some of the additives used in today's ATF (8) may not be necessary and this may offer more degrees of freedom for formulation. However, durability of planetary gears, bearings, etc., must be maintained.

"Since the transmission fluid comes in contact with copper windings, insulations, laminates and rare Earth materials in motors, adequate corrosion protection becomes highly important. In addition, it is desirable to increase operating temperature of the fluid to enable passing even more current through the copper windings. Therefore, higher oxidative stability would be very much desired.

He adds that while the above requirements are more like additional requirements for a traditional ATF used today, other ATF requirements such as antiwear protection, contamination control, even fill-for-life, etc., continue to apply.

Full hybrid vehicles will still rely on an ICE and transmission in addition to the electric motor in its integrated drivetrain. Currently in the light vehicle market, EVs typically employ architectures with a single-speed gearbox. Two-speed gearbox designs are more attractive to the commercial vehicle market to accommodate city versus highway driving conditions.

"The two-speed designs may offer a solution for the larger vehicles in the light vehicle market, such as the light truck and large SUV market, if those vehicle types adopt EV powertrains," Marks says. "In EV gearboxes there is a trend toward using ATF as the gearbox lubricant versus the traditional lubricant packages used in conventional axle center applications. One driver for the usage of this lubricant type is EV gearboxes generally use helical gearing instead of hypoid pinion and ring gears, which have significantly more sliding."

Shamie agrees that for pure electric vehicles one- or two-speed gearboxes will likely be sufficient for the immediate future. "Hybrid/electric vehicles will either use dedicated hybrid transmissions or P2 systems that utilize the OEM's existing planetary automatic investments by locating an eMachine between the ICE and gearbox," he says. "In each of these cases, reducing parasitic loss is crucial to extending EV driving range, so low-viscosity oils such as automatic transmission fluid will be utilized. Most of the building blocks for these transmission types will be the same as those used for conventional planetary automatics. However, just as with eMotor bearings, they will have to handle higher speeds due to speed-reduction ratios of 15:1 or higher."

The role of research

Erdemir explains that fundamental research can help in two ways:

1. Development of a new breed of ultra-low viscosity lubricants and greases specifically tailored toward the special driving requirements or regimes of EVs, and, more importantly,
2. Development of lubricious coatings and/or tribomaterials that are fully compatible with these low-viscosity lubricants so that they work together to provide high resistance to wear and scuffing and, hence, long life (if possible fill-for-life) under the much harsher operating conditions and severe lubrication regimes, which will be triggered by the use of increasingly lower viscosity lubricants.

"Despite increasingly harsher operating conditions, these new lubricants and greases will have to work harmoniously with the material side and increase efficiency and, hence, need to be formulated differently than what is currently used in current ICEs," Erdemir says. "When and if heavier (steel, cast iron, etc.) tribomaterials are replaced by lighter weight alternatives, then the R&D for a new breed of lubricants compatible with such new materials also may be very important."

He adds that most, if not all, current funds are supporting advanced battery R&D in private, academic and public institutions. "It will be very worthwhile to consider some of these funds for the development of more advanced lubricants and materials that will impact efficiency and durability in EVs as well," he says. "My lab performs very extensive R&D work for the development of next-generation batteries/EVs, but there is not much work going on at present in the development of more advanced lubricants or materials tailored or directed to EV uses."

Gangopadhyay, Shi and Qureshi agree that industry-wide fluid specifications for EVs would be beneficial. "At this stage it is highly desirable and recommended that OEMs, tier suppliers, oil companies and additive manufacturers work in developing system solutions in unison," Qureshi says. "This collaborative effort would be most time efficient with maximum return on investment for all the stakeholders."

The long-term market for EVs

Shi explains that General Motors has shared a vision for a world with zero crashes, zero emissions and zero congestion. "The development of EVs is a key contributor to reduce CO_2 emissions," he says. "Additionally, with the drop in battery price and increase of energy density, the cost of EV manufacturing is approaching the traditional ICE-based vehicles. Lower maintenance and refueling costs are among the two major cost differentiators between EV and ICE-based vehicles. Finally, General Motors believes EVs provide the right platform for future autonomous and connectivity technology to enable future mobility."

The driving force behind development of hybrid/electric vehicles is to reduce CO_2 emission and air pollution. Gangopadhyay explains, "The strict legislation introduced by many countries is accelerating the development. Some European countries are considering a zero-emission zone in some cities while China is mandating certain percentages of vehicles sold must be battery electric.

"It is projected that there will be increased penetration of hybrid vehicles in the next 15-20 years. The EV penetration is expected to be slower than full hybrid vehicles. Therefore, ICEs are going to be around for quite some time."

"Currently most non-conventional vehicles are hybrid and will remain so for a long period of time," Qureshi concludes.

References

1. Internal combustion engine.
2. The eAxle is a cost effective and compact electric drive solution for electric vehicles and hybrid applications. The electric motor, power electronics and transmission are combined in a compact unit directly powering the vehicle's axle. Available at **www.quora.com/What-is-the-difference-between-micro-hybrids-mild-hybrids-and-full-hybrids-vehicles.**
3. Noise, vibration, harshness.
4. Some fluids can corrode copper components.
5. The primary difference between a full hybrid and mild hybrid is a full hybrid has a battery that can power the vehicle alone for at least several miles at moderate speed. A mild hybrid is able to accelerate the vehicle from a stop but can't run the vehicle alone. Available here.
6. The P2 module combines a high-voltage electric traction motor, engine disconnect clutch, clutch control module and dual mass flywheel into a single package. It rests between the engine and transmission.
7. An insulated-gate bipolar transistor (IGBT) is a three-terminal power semiconductor device primarily used as an electronic switch that combines high efficiency and fast switching. Available at **https://en.wikipedia.org/wiki/Insulated-gate_bipolar_transistor.**
8. Automatic transmission fluid.

Jeanna Van Rensselar heads her own communication/public relations firm, Smart PR Communications, in Naperville, Ill. You can reach her at jeanna@smartprcommunications.com.

KEY CONCEPTS

- Electric vehicles alter but don't diminish the application of tribology.
- Concerns consumers have about EVs include high vehicle cost, limited driving range and battery-charging issues.
- The development and adoption of hybrid vehicles for the consumer market will continue to be robust, while in the near term all electric vehicles will continue to evolve.

Reprinted with permission from the issue of TLT, the monthly magazine of the Society of Tribologists and Lubrication Engineers, an international not-for-profit professional society headquartered in Park Ridge, Illinois, USA www.stle.org.

BOWMAN®

Supplying industry with quality parts and services since 1975




Stock Holding	Reduce your stock and let Bowman hold it for you
Testing	In-house facility is able to test bearings on behalf of our customers
Range	The largest and most extensive ranges from one supplier
Special Sizes	Rapid modification of standard parts and manufacture of non-standard sizes
Quality	Our quality products and services are second to none

www.bowman.co.uk

WMX® WMO® BOWMET® WMU® WMB® oilite® BEARINGS

NEW

DU

BEARINGS · TRANSMIS

Many of the world's most prestigious original equipment manufacturers in the automotive, agricultural, industrial and recreational sectors rely on quality Dunlop products.

A comprehensive network of MRO & replacement distributors throughout Europe and the rest of the World ensures our products are readily available quickly and efficiently.

UK and European Manufacturing

We are proud to be a committed European manufacturer of Bearings,Transmissions and Linkages, we believe in the future of European manufacturing and will continue to focus and further enhance the requirements and expectations of our customers globally.

Therefore we are pleased to announce our latest product range of Dunlop premium 'Housed Bearing Units'. Manufactured in the UK and although of the highest quality priced to compete with all mid-level to high end competitor's brands.

Dunlop's new series of housed bearing units are designed for a wide range of demanding applications.

- **100% noise tested to Electric Motor Quality (EMQ) standards**
- **100% precision testing of alignment torque**
- **Made from AISI 52100 bearing steel and high- grade cast iron**
- **Low noise retainer and low noise grease**
- **Tighter dimensional tolerances reduce vibration so that it dramatically increases bearing life**
- **Suitable for high speed applications**
- **UCPE has solid base for greater rigidity**
- **Nylon patched grub screw is proven to provide greater locking power between the bearing and shaft**
- **Ranges UCPE - UCF - UCFL to suit both metric and imperial shaft sizes.**

For further enquiries contact us at sales@

NLOP™

SIONS · LINKAGES

UK MANUFACTURED PREMIUM BEARINGS

www.dunlopbtl.com/bearing-catalogue

We welcome your enquiries. Please contact us at

sales@dunlopbtl.com

European Distribution Centre:
MPT House, Brunswick Road,
Cobbs Wood Industrial Estate
Ashford, Kent, TN23 1EL
United Kingdom

UK Manufacturing Centre:
Unit 46, Werdohl Way,
No.1 Industrial Estate,
Consett, County Durham,
DH8 6SZ
United Kingdom

@dunlopbtl.com or call +44 (0)1233 663340

CARTER

Revolutionary ideas in motion

Need Technical Asistance?

Immediate response time with full design & engineering support.

Call +44(01)865 821720

Aerospace approved bearings keep **critical** components working while you're 38000ft up

From flap actuators to instrumentation, from fuel valves to door latches all aerospace bearings come with the stringent quality assurances.

Silverthin precision thin section bearings manufactured in the USA

Lightweight aluminium slewing rings and split thin section bearings

Hybrid and Ceramic Bearings

Aerospace custom bearing for satellite and flight critical applications

Revolutionary Ideas In Motion

www.carterbearings.co.uk

sales@carterbearings.co.uk

Carter Manufacturing Limited is AS9120A & BS EN 9001:2008 certified to supply bearings for Aviation, Space, Defence, Motorsport and Industrial Requirements

nqa. AS9120 Registered

ISO9001:2008 Rev A

CASE STUDY:

Slow-Speed Bearing on Oven Motor

“Failure Detection using Ultrasound”

Slow Speed Bearing Inspection with Ultrasound

Vibration analysis has long been the instrument of choice to use for bearings and other rotating equipment. More commonly, ultrasound is being used in conjunction with vibration analysis to help technicians confirm the condition of mechanical assets.

Because of the versatility of ultrasound, if a facility does not have a robust vibration analysis program in place, ultrasound can be implemented to detect early stage bearing failures, as well as other issues. If the vibration analysis is performed by an outside service provider on a quarterly or monthly basis, ultrasound can be used during the interim. This will help the facility to know the condition of some of the more critical assets prior to the service provider entering the facility; therefore, the service provider’s time can be used more efficiently because the plant knows if there are any prominent problems with the assets that are being monitored by ultrasound. The service provider can then prioritise based off the ultrasound findings.

Another scenario in which ultrasound may be used first over vibration analysis is with the monitoring of slow speed bearings. Slow speed bearing monitoring with ultrasound is easier than you might think. Because most high-end ultrasound instruments have a wide sensitivity range and frequency tuning, it is possible to listen to the acoustic quality of the bearing, especially at slower speeds. In extreme slow speed bearing applications (usually less than 25rpm), the bearing will produce little to no ultrasonic noise.

In that case, it is important to not only listen to the sound of the bearing,

but more importantly to analyse the recorded ultrasound sound file in a spectrum analysis software, focusing on the time wave form to see if there are any anomalies present. If “crackling” or “popping” sounds are present, then there is some indication of a deformity occurring. In bearing speeds above 25rpm, it is possible to set a baseline decibel level and trend the associated decibel level readings over time.

Using Ultrasound to Identify Oven Motor Bearing Failure

An inspection with an ultrasound instrument was carried out on a site with a newly installed oven dryer. This was a large drum oven, about 20 meters long by 5 meters wide. It was rotated by 4 large motors, each of them having two large sets of bearings. These motors rotate the oven and are rotating at a speed of around 7-10 rpm. Meaning we are talking about a case of extreme slow speed bearings, which is usually a challenge to inspect.

An ultrasonic instrument was used to inspect all bearings – almost all of them presented a nice and smooth sound and a 0dB reading, except for one. On one of the bearings from this set, the ultrasonic instrument was displaying 2dB instead of 0. Also, the sound heard from the headphones was different: it was not smooth as in the other bearings and it presented a repetitive “knocking” sound. This gave the inspector an indication that something might have been wrong with this specific bearing.

After the results from the ultrasonic inspection, a grease sample was taken to confirm if there was any damage on the bearing – in which case the grease sample would show metal contamination. The results from the grease analysis showed indeed the presence of metal particles, confirming the damage as indicated by the ultrasound instrument.

The next step was naturally scheduling an outage to replace the bearing, which was in a very bad condition as it can be seen in the images. Part of the outer race came away as it was opened. It was also noticeable that one of the rollers had moved 90 degrees. The cage had been totally damaged too.

Ultrasound and Slow Speed Bearings – the Method

As we can see, ultrasound technology is very useful when trying to monitor the condition of slow speed bearings, and an ultrasonic instrument/sensor is able to provide maintenance personnel with a warning of failure, even in extreme slow speeds like in this case.

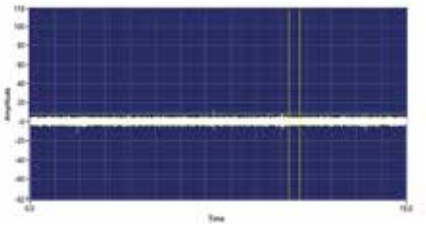
With bearings rotating at normal speeds, ultrasonic inspection can be performed by comparing changes in dB values, establishing that a bearing with a certain value above a decibel baseline will need lubrication or be already in a failure state, depending on how much decibels it is above the baseline.

However, with slow speed bearings, comparing dB levels and establishing alarms is not enough: in many situations the difference in the dB levels will not be significant or even non-existent, in which case the inspector might think there is nothing wrong with it.

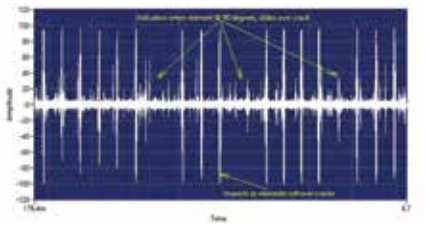
For slow speed bearings, one must rely on the sound quality and the sound pattern. For this, it is necessary to use an ultrasonic instrument with sound recording capabilities, like the Ultraprobe 15000, and then analyse the sound file on a sound spectrum analysis software like the Spectralyzer from UE Systems. Then, maintenance professionals can simply record the sound produced by a slow-speed bearing, load the file in Spectralyzer and analyse it in the Time Series view.

The spectrum analysis of this oven motor bearing shows clearly where the roller at 90 degrees hits the crack as the knock stops briefly. Thus, the sound pattern indicates already an existing problem, being the most reliable source of information when determining the condition of a slow-speed bearing using ultrasound.

On the other hand, the spectrum of a recorded sound from one of the “good” bearings shows a very different picture: a very uniform spectrum with almost no changes in the amplitude.



— Sound Spectrum of a “good” bearing. Very uniform and no changes in amplitude.



— Sound Spectrum of the damaged bearing, where the peaks in amplitude give the inspector a clear sign of damage.

This find has saved the company a significant amount of money, as it was necessary to get cranes in to replace such a big bearing, a job that took up to 6 hours. Luckily this was done during a planned outage, avoiding the costs of unplanned downtime.

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

DUROLUB© solutions for:

Food and Beverage,

pharmaceutical industries

The next generation bearing lubrication made available to everyone by

thb

The basic requirement for any operation in food and beverage, pharmaceutical industries is a clean and hygienic environment. Regular cleaning, often with aggressive chemicals and high pressure cleaners, is a daily standard procedure. Any contamination of the product by oil or grease must be minimized. Production processes, like cleaning - cooling - baking, demand special attention to the bearing lubrication:

The typical challenges for the bearing lubrication are:

- wet environment - process water
- cleaning - (detergents / chemicals)
- pressure cleaning
- hot or cold processing
- food grade lubricant suitable for incidental contact with processed product
- low maintainance costs
- reduced environmental impact

The thb lub-systems Durolub© variants are the high-end solution to all these challenges. We fill our compound lubricants in any type and brand of bearings. You are not forced to buy a specific brand for whatsoever reason.

WET ENVIRONMENT

Water and moisture inside a bearing decreases the lubrication effectiveness of the lubricant, cause wear and corrosion. The bearing will fail prematurely. Frequent relubrication tends to be unsuccessful and contaminates the environment.

Durolub© DL is a thermally treated polymer compound with a high performance synthetic oil, which cannot be washed out of the bearing. It is extremely resistant to water and resistant to most acids, leaches and solvents

PRESSURE CLEANING

Integrated seals will be deflected inward the bearing by the water jet, water / detergent can easily move into the bearing, the lubricant will be washed out of the bearing.

Durolub© DL is filled into all free space of the bearing. After the thermal treatment Durolub© is a solid compound which provides additional support to integrated seals and avoids the inward deflection.

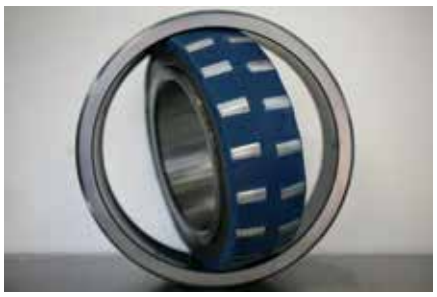
HOT PROCESSING

Operating temperatures above 100°C reduce the life-time of ordinary mineral-oil based lubricants significantly. Seal and cage material needs to be adjusted, the thermal treatment of bearing rings should be according to the planned operating temperature range.

thb offers a wide range of products for grease / polyglycol / solid and solid lubricants. There is also a special Durolub© variant called Durolub© SLC.

Durolub© SLC is a special dry lubricant compound filled into the free space of the bearing. During rotation of the bearing, small quantities of the dry lubricant are transferred to the contacting surfaces. This, about 1µm thick lubrication film, lubricates the bearings and can be used for operating temperatures up to 300°C - temperature peaks are causing no problems, only above 350°C the efficiency of DL-SLC is reduced by oxidation.

The typical application in the food and beverage industry are bakery ovens.



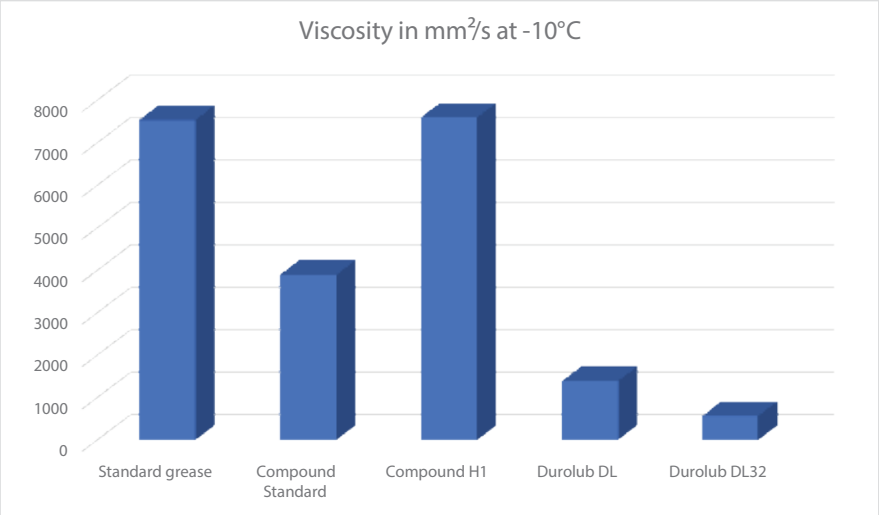
— Durolub©DL150 in a spherical roller bearing

— Durolub©SLC in a ball bearing

COLD PROCESSING

Operating temperatures around and less than 0°C increase the viscosity of the lubricant significantly. Standard lubricants often reach a critical high viscosity already at +10°C, the lubricant is getting „too thick“ and doesn´t lubricate the bearings properly. Mixed friction causes wear and high friction torques, energy costs for operation are high, bearings will fail prematurely.

Durolub© DL32 contains a special low viscosity base-oil which is suitable for operating bearings at very low temperatures. Starting temperatures, as low as -50°C, can be realized.



FOOD GRADE SOLUTION / ANTIMICROBIAL OPTION

Durolub© DL / DL32 / DL150 are certified H1 for incidental contact with food. Furthermore they are Halal and Kosher certified.

Durolub© DL series is optional available with antimicrobial additives to prevent microbial growth. There will be no microbial contamination of the end-product just in case of incidental contact.

Durolub© SLC is not supposed to get in contact with food.

MAINTENAINCE COST/ ENVIRONMENTAL IMPACT

Bearings lubricated with Durolub© contain up to 5 times more oil than greased bearings. Highest quality synthetic oils, which cannot be washed and the support of integrated seals offer the maximum grease life time. The bearings are practically maintenance free. There is no regular regreasing necessary, no excessive grease is around your applications. This all saves lots of time, money and is the best solution for the environment.

For any further details just contact:

Tel. : +43 676 3973077
Mail : office@thb.at
Web : www.thb.at / www.durolub.com
Address: Langwieserstrasse 134
4802 Ebensee / Austria

In a world of challenges, we find solutions

PUSH THE BOUNDARIES OF POSSIBILITY WITH GGB

Using our wealth of tribological expertise, we partner with customers to develop unique, reliable solutions that make them more successful—and make the world a more efficient and sustainable place.

ggbearings.com

NEW POLYMER COATINGS
Discover more at ggbearings.com/en/company/ggb-tribological-coatings

THE TRIBOLOGICAL SERVICE PROVIDER FOR INDUSTRIAL PROGRESS, REGARDLESS OF SHAPE AND MATERIAL

GGB, an EnPro Industries company

GGB

GGB Heilbronn GmbH | Ochsenbrunnenstr. 9 | D-74078 Heilbronn | Tel: +49 7131 269 0 | Fax: +49 7131 269 500 | germany@ggbearings.com

ZEN™ CERAMIC BEARINGS PROUD SPONSOR OF THE PARALYMPIC MEDALLIST AMADOR GRANADOS

ZEN™
zenceramic.com

Due to Amador's special needs and the tough demands of the Paralympic competition, finding the perfect bearing to help him to achieve his goals was a challenge for the ZEN team.

Amador needed a bearing which could adapt to his tailor-made bike and allow him to reach high speeds.

Finally, the chosen bearing was a 6001-CE-PEEK-ZrO2 with solid ceramic ZrO2 balls and Inner and, outer races with a special PEEK machined cage.

Because of the material and features of the chosen bearing, Amador was able to achieve peak performance on his bicycle and helped him to win a Paralympic medal.

A STORY OF PERSONAL TRIUMPH

Due to a birth defect in his feet, Amador had to undergo multiple painful surgeries as young as 1 month old. This held him back from his dream: to be a great sportsman.

After several years of bad medical advice and suffering, destiny played its part, Amador found a way to make his dream come true, through the Paralympic cycling.

Thanks to his hard work and bravery, Amador finally won a medal at Rio 2016 Summer Paralympics.

PRÜFTECHNIK

THE MAKERS OF OPTALIGN® AND ROTALIGN®

QUALITY MEANS TO US:

STAYING AHEAD OF THE GAME.

We serve the world's maintenance professionals with innovative solutions for plant reliability.

- Portable vibration analysis and field balancing
- Online Condition Monitoring
- Early wear detection
- Worldwide vibration training and monitoring services

INNOVATION MADE IN GERMANY.

Find out how we boost uptime.

PRÜFTECHNIK
PROVEN QUALITY
▸ Made in Germany
▸ Global Presence
▸ Qualified Support
▸ Quality Service

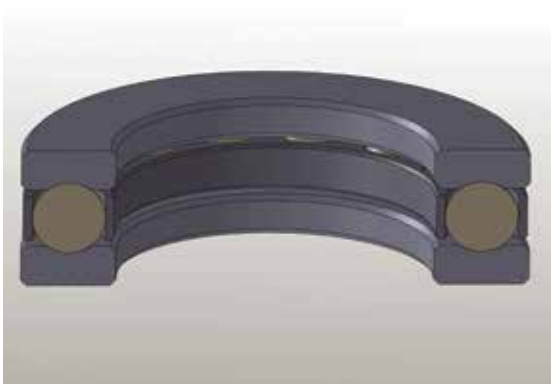
PRÜFTECHNIK Dieter Busch AG
Oskar-Messter-Str. 19-21
85737 Ismaning
Tel.: +49 89 99616-0
info@pruftechnik.com
pruftechnik.com

What Happened in the Bearing Industry First Half of 2019

March 06

Auburn Bearing Now Offering Miniature Thrust Bearings

Auburn Bearing & Manufacturing is excited to announce the addition of two miniature thrust ball bearing series, the F series and the FM series, to its trusted line of thrust bearing products. These two lines of miniature ball thrust bearings are made with high precision and can accommodate axial loads in a single direction only. The only difference between the two series' lies in their raceway; the F series is designed with flat raceways, while the FM series is designed with grooved raceways which accommodate similar applications that require larger speed and load ratings.



The miniature thrust bearings found in these bearing series are typically manufactured in SAE 52100 chrome steel, and are available in bore sizes as small as 2 mm and as large as 18 mm and race ODs as small as 6 mm and as large as 20 mm. Upon request, ABM can manufacture these bearings in stainless steel or other materials. ABM also supports modification of these bearings to accommodate customer's custom design and special dimension requirements. Common applications for these bearing series include medical devices, miniature machines, and jacks.

March 16

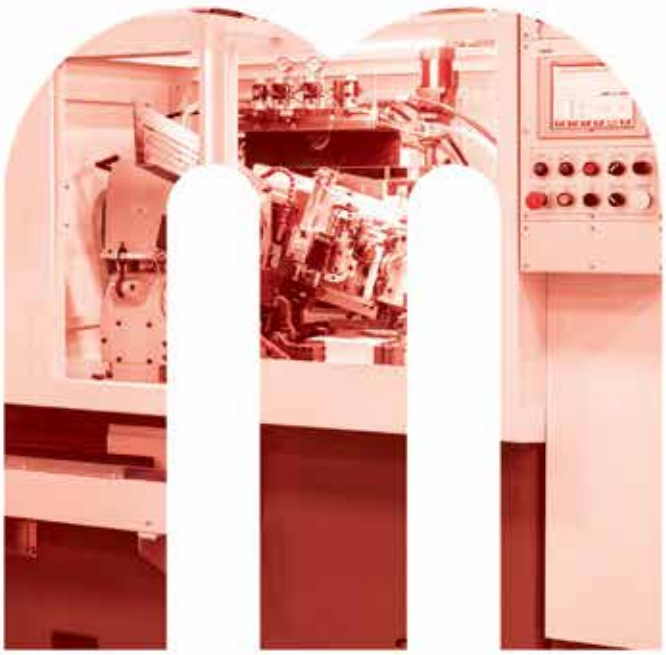
Sanyo Special Steel's acquisition of Ovako completed

Both Ovako and Sanyo Special Steel are now part of the Nippon Steel & Sumitomo Metal Corporation.

Sanyo Special Steel's acquisition of Ovako has been completed as planned. In conjunction with the acquisition, Nippon Steel & Sumitomo Metal Corporation (NSSMC) has increased its ownership in Sanyo Special Steel, which now becomes a majority-owned subsidiary of NSSMC. This enables a closer cooperation between the three companies with the ambition to become the world leader in specialty steel. "Sanyo Special Steel has extensive experience of manufacturing high-quality steel. Together, we will be able to benefit from each other's expertise, experience and global reach within the NSSMC group. We look forward to further strengthen Ovako's commercial offering in specialty steel to our customers in the global market," says Marcus Hedblom, President and CEO of Ovako.

— Marcus Hedblom President and CEO at Ovako

Sanyo Special Steel is a leading long specialty steel company. They provide various special steel bars and seamless tubes, including bearing, engineering, stainless, heat resistant and tool steel as well as metal powder and powder metallurgy products. They also offer formed & fabricated materials. Sanyo Special Steel has around 2,600 employees and net sales of EUR 1,200 million in 2017. The company is listed on the Tokyo Stock Exchange.



The Smart Choice for Bearing Manufacturers

Grinders | Superfinishers | High Frequency Spindles
Expand Your Manufacturing Capabilities with
SMSB Grinders, Superfinishers, and High Frequency Spindles

www.smsb.co.kr

SMSB
SMART MACHINE STRONG BEARING

Head Office & Factory
18, yeondeok-ro 15 beon-gil, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
TEL:+82-55-716-2876 FAX:+82-505-719-2876 E-mail : smsb.co.kr@gmail.com


EPTDA
EMEA POWER TRANSMISSION
DISTRIBUTORS ASSOCIATION
ANNUAL CONVENTION
TENERIFE
25 - 27 SEPTEMBER
2019
LEADING EXECUTIVE EVENT
FOR THE
PT/MC INDUSTRY

March 17

ABB Ability™ launches Smart Sensor for checking condition of bearings

ABB has launched the ABB Ability™ Smart Sensor for Dodge mounted bearings, part of the ABB Ability™ Digital Powertrain, that enables "health checks" for bearings. The smart sensor technology provides an early indicator of any potential problems by assessing the condition of bearings from vibration and temperature information. This helps to prevent downtime on applications such as bulk material handling conveyors typically found in the mining, aggregate and cement industries, as well as applications in the food and beverage and air handling sectors.

ABB Ability™ Smart Sensor for mounted bearings use the latest algorithms to assess, manage and ensure performance of components. Eighty percent of bearing failures are lubrication related and a bearing "running hot" can indicate that proper lubrication procedures are not in place. Monitoring a bearing's vibration can indicate potential system problems.

March 19

Specialist distributor helps launch greener, cleaner bearings for food and drinks manufacturers

Leading industrial parts distributor Antifriction has signed a deal with Swedish multi-national SKF to stock its new blue range of Food Line ball bearing units. The ground-breaking bearings aim to improve health and safety for food and drinks manufacturers by lowering the risk of bacteria in hard to clean areas using innovative sealing systems, high performing bearing grease and completely sealed units.

The components are 100% recyclable and the bearings improve energy efficiency by reducing the need for hot water to remove environmental waste. The new Food Line bearings do not require relubrication or the need to clean excess bearing grease, which can lead to production downtime. With less cleaning required, it is expected bearing lifespans will be lengthened.

March 29

The leading bearing grinding machine manufacturer runs on green energy

Troy, MI – Meccanica Nova SpA, a leading manufacturer of state-of-the-art CNC Grinding Systems for the automotive, aerospace and bearing industry, and parent company to Meccanica Nova Corporation, stays committed to our planet.

Since its inception in 1937 Meccanica Nova's philosophy has been to reinvest profits into the company. "We believe that our philosophy to reinvest profits back into our company has helped us maintain our benchmark status in the industry", said Andrea Catone, Director of Sales & Marketing for Meccanica Nova SpA. During its history, Meccanica Nova has always been sensitive to the environment and the future of generations to come. While 2019 is well under way, Meccanica Nova is very proud of a milestone achieved at the conclusion of 2018, Meccanica Nova SpA, our factory located in Bologna, Italy was pleased to celebrate the 10th anniversary of the installation of a photovoltaic power system. Throughout all these years the sun has been our factories primary energy source. Our choice to invest into renewables was the natural consequence of our daily commitment to preserving the environment we live and work in, an opportunity we couldn't pass on then and remain committed too today.

Thanks to our 3,425 photovoltaic solar panels, with the conclusion of 2018 Meccanica Nova produced over 7,244,020 kW of clean energy, thus achieving the ambitious goal we had initially set ourselves 10-years prior.

April 02

Award: sensor bearing named innovation of the year by MAGNA

NTN-SNR ROULEMENTS and EFI AUTOMOTIVE, sensor specialists, commit to the motors of the future. They have revealed a sensor bearing that optimizes the control of electric motors for cars. MAGNA POWERTRAIN, a leading player in e-mobility solutions, has awarded them its first 2018 prize for innovation in the "Electrification" category. This innovation addresses a high demand from manufacturers: to find alternative solutions to existing standards. An angle sensor has been integrated into the bearing to offer a better compactness and an easier mounting. It guarantees precision measurement and safe operation.

The sensor bearing was awarded the first prize in the "Supplier Innovation Challenge" in the "electrification" category. Magna Powertrain awards prizes for original equipment manufacturers' best innovations. It has recognized the sensor bearing as a major advance for tomorrow's vehicles. Electric and hybrid vehicles will make up to 40% of of the automotive market in 2025. NTN-SNR and EFI assert their intention to be the leaders in electric motor future developments.

April 11

SKF teams up with MCB for automotive aftermarket services in the Middle East

This is the focal point of the newly established partnership between SKF, the world's leading original equipment manufacturer (OEM), and Mineral Circles Bearings (MCB), one of the pioneering auto bearing specialists in the UAE.

As SKF's new automotive distributor for the Middle East, MCB now offers aftermarket product support and sales that covers passenger cars (PC) and light commercial vehicles (LCV) with an added bonus of supplying bearing units for the agricultural sector. "We are seen by well-known Swedish brand, SKF, as a company with a deep understanding of the Middle Eastern market, a company that can make the impossible possible," says MCB's Managing Director and in-house engineer Hassanein Alwan. "SKF's drive for innovation is a never ending story which gives it a competitive edge today and for the future. Unlike any other, its strength is not mainly in its products but on its constant evolution without the fear of failure. These are the values that we connect with SKF," he added. Foreseeing challenges since the Middle East bearing industry views business in a price-centric way, Alwan is confident that SKF will fulfill its commitment to provide training and technical support which will not just give added value to the resellers but to the end users as well.

THE BEST TRANSMISSION AND SOLUTION CHAIN.

FROM THE BEST SUPPLIER TO THE BEARING TRADE.

SORTED.

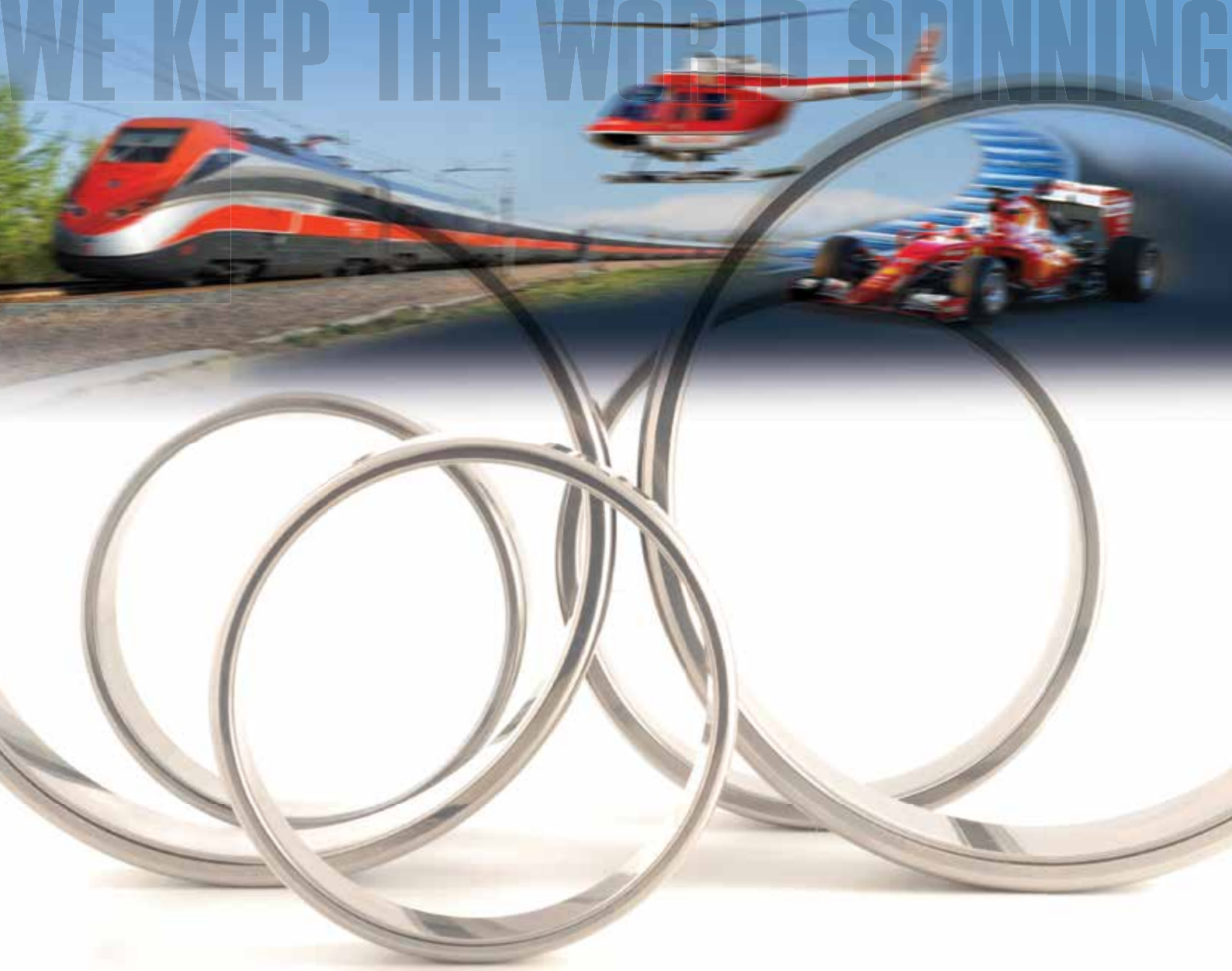
RENOLD

Superior Chain Technology

DON'T BE CHAINED TO YOUR CURRENT RENOLD SUPPLIER.
GODIVA BEARINGS ARE TRADE-ONLY AND DO NOT COMPETE WITH YOU.

CONTACT GODIVA BEARINGS TODAY!

Dudley: +44 (0) 1384 240 005 | Newcastle: +44 (0) 191 272 5225
dudley@godiva-bearings.co.uk | newcastle@godiva-bearings.co.uk



Ring Specialist
for Bearing Application

Dimensional Range from 3 to 300 mm

• Machining • Heat treatment • Vibropolishing • Grinding • Surface coatings

italy made

www.prosino.com
info@prosino.com

PROSINO

The best choice among bearing producers

April 16

Celebrating 100 years of the spherical roller bearing

The spherical roller bearing, that helps engineers accommodate heavy radial and axial loads in applications prone to misalignment or shaft deflections, celebrates its 100th birthday this year thanks to SKF.

Originally developed in 1919 by an SKF engineer, Arvid Palmgren, the spherical roller bearing (SRB) has since made its mark worldwide.

Created to complement the self-aligning ball bearing, due to its ability to accommodate misalignment under heavy loads, the initial SKF design has now become part of the largest family of products in the industry.

On the fabled Las Vegas Strip in the US, the High Roller ferris wheel contains two of the largest SRBs ever produced by SKF, each weighing in at 8.8 tonnes! SKF spherical roller bearings can be found in many applications, including some where you might not expect them. A good example is the Bahrain World Trade Center, where three tower wind turbines, each 29 metres in diameter, are architecturally installed

between the two 240-metre-high (50-storey) towers and generate 1,300 MWh per year. The main shafts of the turbines were equipped with SKF spherical roller bearings. The turbines went online in March 2008 and are operational 50 percent of the time, depending on wind conditions. Another alluring application fitted with SRBs is the rebirth of the Zeppelin after 60 years of absence following the Hindenburg disaster. SKF was brought in by ZF, the gearbox manufacturer for the Zeppelin NT, to help the new and improved airships to propel forward.

May 03

Schaeffler acquires XTRONIC GmbH

On May 3, 2019, Schaeffler AG, acting via its subsidiary Schaeffler Technologies AG & Co. KG, signed a purchase agreement for the acquisition of XTRONIC GmbH. The parties have agreed not to disclose the purchase price. The takeover of the Böblingen, Germany-based company is expected to be completed in June 2019, once all closing conditions have been met.

XTRONIC is a technology partner that develops customer-specific software and electronics solutions for the international automotive industry. The owner-managed company employs some 170 people at its locations in Böblingen and Wolfsburg, Germany, and provides services and solutions in a range of areas, including automated driving applications, electric mobility, functional safety, as well as methods, tools and test systems. Founded twenty

years ago, XTRONIC worked closely with Paravan on the development of the “Space Drive” drive-by-wire system and its customers include several well-known automotive manufacturers and suppliers.

May 07

Schaeffler and Mitsubishi Electric announce global strategic partnership

- Leveraging "e-F@ctory" solutions.
- Strategic collaboration for the future of production.
- Industry 4.0 product solutions towards smart manufacturing.

Mitsubishi Electric Corporation and Schaeffler Technologies AG & Co. KG have announced a global strategic partnership as part of the e-F@ctory Alliance network. Since 2010, both companies have been partners in the e-F@ctory Alliance, which is part of Mitsubishi Electric Corporation's e-F@ctory Concept. This concept supports companies with measures within the framework of the digital transformation, such as the integration of machine and plant data into MES (manufacturing execution systems) and ERP (enterprise resource planning) systems.

Industry 4.0 scenarios are characterised by highly individualised products in very flexible manufacturing conditions. Along with production technology, Industry 4.0 also comprises digitally

connected components and machines. Dr. Stefan Spindler, CEO Industrial of Schaeffler AG, explained: "To provide Industry 4.0 solutions with substantial added-value for the customer, we need collaboration across different companies. With the technological expertise and systems know-how of Schaeffler and Mitsubishi Electric teamed up in this global strategic partnership, we'll be able to offer intelligent solutions tailored to customer and market requirements to optimise manufacturing operations and equipment lifecycle costs."

May 09

ACORN becomes UK stockist for Timken Type E Tapered Roller Bearing Housed Units

Acorn Industrial Services Ltd has increased its range of Timken products by investing in a large stockholding of Timken Type E tapered roller bearing housed units. The new range will enable customers to slash their downtime by receiving and fitting the units to their machinery the same day.

Timken Type E housed units are bringing a new standard of performance to the tapered roller bearing market. Their robust housing, outstanding load carrying capacity and high misalignment capability delivers a 55% increase in service life when compared to industry-standard housed units equipped with standard Timken bearings.

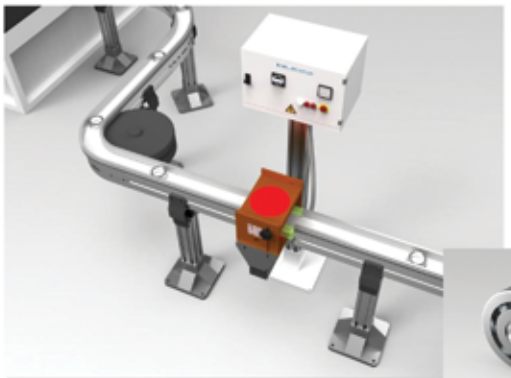
Gavin Stacey, ACORN's Sales Director, commented: "At ACORN, we are continuously striving to help our customers to reduce downtime. The addition of Timken Type E housed units to our stockholding gives maintenance engineers same day access to this versatile range of bearing units, which are directly interchangeable with similar housed units by brands such as DODGE® and Browning®." Renowned across the globe for being the pioneer

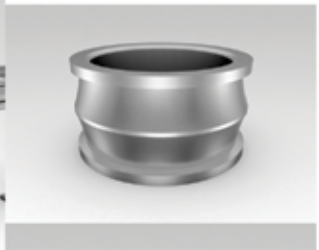
of tapered roller bearings, Timken has over a century of experience in the manufacture of premium quality engineering components. The Timken offering includes a full range of bearings, transmission, gearboxes, belts and chain, which are used all over the world in many industrial sectors, such as mining, cement & aggregates, pulp & paper and water treatment industries.

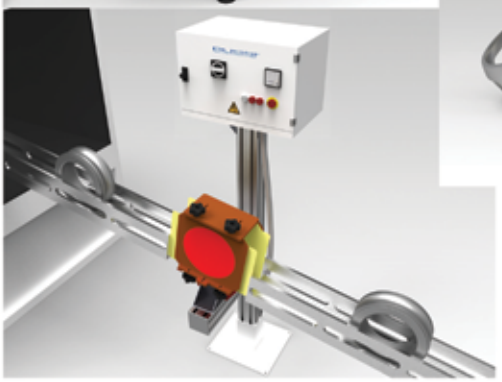
BUSSI®
DEMAGNETIZING SYSTEMS

EXCELLENCE IN DEMAGNETIZATION

EXTEND BEARING LIFE WITH BUSSI ELECTRONIC DEMAGNETIZERS







During the manufacturing process, the demagnetization, as magnetic pre-washing, is the optimal preparation for the bearing components cleanliness.

Bussi Demagnetizers prevent from friction, limited fluency, early wear and reduced life of the bearings.

DISCOVER OUR SOLUTIONS DEDICATED TO THE BEARING INDUSTRY

DISCOVER BUSSI DEMAGNETIZERS KEY TECHNICAL ADVANTAGES:

- MINIMUM RESIDUAL MAGNETISM
- MINIMUM ENERGY CONSUMPTION
- HIGH DEMAGNETIZING VALUES REPEATABILITY
- EASY PARTS TRANSFER WITH NO MAGNETIC RETENTION
- EASY IN PROCESS INTEGRATION WITH I/O INTERFACE
- STANDARD A DEDICATED SOLUTION DESIGN
- HIGHLY DURABLE INVESTMENT

Bussi Demagnetizing Systems
Via Valpellice 13, 10060
San Secondo di Pinerolo (TO) - ITALY
T. +39 0121 500660 F. +39 0121 501397

www.bussi-demagnetizers.com
bussi@bussi.it

Lustor System

Lubrication Storage System

LUSTOR

LUBRICATION STORAGE SYSTEM

The System that keeps your oil clean

Enluse B.V. - www.enluse.com - info@enluse.com

April 10

Schaeffler invests 45 million euros in new Vietnam plant

Schaeffler celebrated the opening of its new plant in Bien Hoa, Vietnam. The automotive and industrial supplier invested over 45 million euros in the construction of this new production plant. The company will create around 300 new jobs here by the end of the year. High-ranking representatives from politics and business as well as customers and partners participated in the ceremony to mark the plant's inauguration.

Georg F. W. Schaeffler, shareholder and Chairman of the Supervisory Board of Schaeffler AG, said in his opening speech: "Vietnam was Schaeffler's first manufacturing location in Southeast Asia more than eleven years ago. There are many reasons for our continued commitment in Vietnam. Its favorable strategic location in Asia, well-diversified, stable, and fast-growing economy, and its young, well-educated, and ambitious population are just a few examples."

The new plant in Vietnam has been developed based on a modular concept and further expansions are planned over the next few years. The plant currently covers an area of around 25,000 square meters. "In addition to our production facilities in Korea, we opened a new plant for automotive products in Thailand in 2016 and today we are proud to celebrate the opening of this state-of-the-art facility for products from our Industrial division in Vietnam," said Dr. Stefan Spindler, CEO Industrial at Schaeffler. Products manufactured in Vietnam will be supplied to customers across various industrial sectors including agriculture, construction and mining, power transmission, food processing, textile, paper, steel, cement and motorcycles.

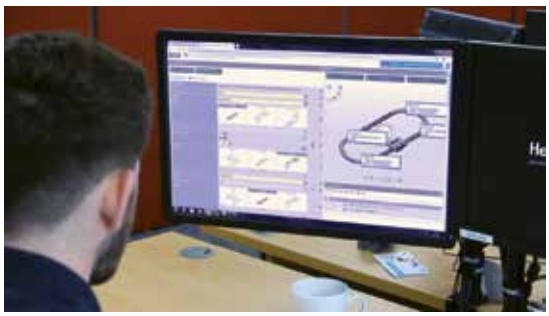
May 15

HepcoMotion Announces a New PRT2 Product Configurator

HepcoMotion is pleased to announce a new product configurator for its PRT2 track system. Making the design process much easier and quicker, the PRT2 configurator allows designers to quickly configure a track system which can then be imported directly into their assembly.

Rather than having to download all the parts separately, build the assembly and mate all of the components together, the system makes the design process much quicker and easier. Any track system containing up to 17 segments or slides can be configured; carriages and bleed lubrication can also be incorporated. The model can be quickly exported as a complete assembly into multiple file formats – allowing the customer to conveniently check details such as hole positions, machine clearances and fixture details.

Designed to save time and offer greater convenience, the PRT2 configurator is easily accessible from the HepcoMotion website (www.hepcomotion.com).



June 04

Lamond & Murray joins Hayley 247

Hayley 247 Engineering Services is proud to announce the acquisition of Fife based company Lamond & Murray Ltd (L&M). The deal was completed on the 4th June 2019 and will see Lamond & Murray as specialist facility operation to Hayley 247.

Hayley 247 has seen an unprecedented level of investment. The acquisition of Lamond & Murray follows shortly after the purchase of Drive Management Services in December 2018. This forms part of a wider strategy to enhance service provision within the group. Lamond & Murray was formed in 1921 by Charles Lamond & Walter Murray to manufacture haulages or winding equipment for the nearby mining industry. The company was involved in the "war effort" from 1939-1945 and made equipment for elevating heavy artillery. By the end of the war the demand for haulages was dwindling and the company began to specialise in gear manufacture and soon became established as one of Scotland's leading sub-contract gear makers.

June 05

The ZEN Group releases a new standard catalogue with seven new product ranges and more than 300 pages

The ZEN Group is proud to announce the release of their new standard catalogue.

This improved version can be downloaded from their website www.zen.biz.
It includes 6 new product ranges:

- CSK One- way Clutch Bearings,
- Stud type Track Rollers & Yoke type Track Rollers
- Ultra Thin Section Series
- Rod Ends
- Spherical Plain Bearings
- Axial Cylindrical Roller Bearings

As well as a complete **update of their 6.000 product lines.**

With more than 300 pages, they've presented in a clear and simple way, all the technical information of the bearings manufactured by ZEN.
For more information, visit zen.biz

CELEBRATING 50 YEARS
1968 - 2018

KING TIGER

NUMBER ONE in Quality in Durability in Performance

STRENGTH OF A TIGER

Adapter Sleeve | Hydraulic Adapter Sleeve | Withdrawal Sleeve | Hydraulic Withdrawal Sleeve

BEARING SLEEVE SOLUTIONS

Lock Nuts | Lock Washer | Hook Spanner

PRECISION SERIES LOCK NUTS

KMT SERIES | GUK SERIES | ZM SERIES | KMFE SERIES | N/AN SERIES

A.NAIRSONS INDUSTRIES (INDIA)
Phone : +91-161-2844570 sales@ktkingtiger.com www.ktkingtiger.com

June 11

Volkswagen and NSK Cooperation Agreement on EPS

NSK and Volkswagen AG have announced today a formal cooperation agreement between the two companies' steering divisions with the aim to further increase the power of innovation in steering. Both companies have agreed on in-depth development cooperation.

Comment from Dr. Stefan Sommer, Board of Management of Volkswagen AG:
The cooperation agreement with NSK as one of the world's leading manufacturers of steering systems is a meaningful step to strategically expand our international development and production and to further strengthen our innovative strength in the chassis business.

Comment from Thomas Schmall, CEO of Volkswagen Group Components:
Volkswagen Group Components has been a steering specialist for many years. The in-depth development cooperation enables us to make intensive use of the know-how of both partners and thus to further advance future products.

Comment from EVP Masatada Fumoto, Head of NSK's Steering and Actuator Division Headquarters:
The cooperation agreement with Volkswagen is strategically significant to further expand our product portfolio and global production. The two parties complement each other in many areas, and we will continue to strengthen our relationship as we drive for future innovation.

June 14

Nomo acquires JokiLaakeri

Nomo, part of Axel Johnson International, strengthens its position further on the Finnish market by acquiring the mechanical power transmission specialist JokiLaakeri.

"The acquisition of JokiLaakeri is fully in line with our strategic objective to take the leading position as technical solution provider within the fields of bearings, power transmissions, seals and related services in the Nordic market. JokiLaakeri becoming a part of Nomo is a great fit in terms of employees, products and geography", says Mattias Jaginder, CEO of Nomo.

JokiLaakeri is a well-reputed multi-brand bearing distributor that combines their product offering with strong technical knowledge and smart logistical solutions to customers on the Finnish market. The company was founded in 1991 and has an annual turnover of approximately 18 MEUR. JokiLaakeri has a leading market position in Tampere, the key industrial region in Finland, with branches in Lahti, Vaasa and Oulu, complementing Nomo's geographical presence on the Finnish market. "Being part of Nomo and Axel Johnson International will allow us to improve our business and strengthen our offering in Finland. I am convinced that Nomo is the best possible owner for JokiLaakeri's employees, customers and suppliers", says Jori Paatsjoki, CEO at JokiLaakeri. The acquisition was closed 14 June 2019.

GODIVA BEARINGS

THE SOLE UK SUPPLIERS OF

NACHI

EXCLUSIVELY AVAILABLE TO THE TRADE.

GODIVA BEARINGS ARE YOUR ONLY SOURCE FOR ALL NACHI PRODUCTS. GET IN TOUCH WITH US TO FIND OUT MORE ABOUT OUR ENTIRE RANGE!

DUDLEY
Dudley: +44 (0) 1384 240 005
dudley@godiva-bearings.co.uk

NEWCASTLE
Newcastle: +44 (0) 191 272 5225
newcastle@godiva-bearings.co.uk

August 04

EPTDA welcomes four new members

EPTDA, the leading executive association for Power Transmission and Motion Control (PTMC) industry across EMEA, is pleased to add four new members to its representation: Carter Bearings Ltd, Chiaravalli Group SpA, Industrial Clutch Parts Ltd. and Unsal Makina A.S.

CARTER BEARINGS LTD.

Carter Bearings' manufacturing value is demonstrated by their ability to provide Custom Bearing assemblies with demanding, precise dimensional tolerances into the Industrial & Aerospace market. Producing samples from a sketch, blueprint or by reverse engineering, their In-house Engineering group can provide an assembly to fit any individual requirements. Carter utilizes cutting edge technology to deliver novel solutions into the: Aerospace, Space, SatCom, Defense, Cryogenic, Ultra High Vacuum, Robotic, Nuclear, Semiconductor, Pharmaceutical and other challenging markets. The company is registered in the United Kingdom and Spain. It is accredited to ISO9001 including AS9120 RevB Quality Certificates that ensure the highest possible standards are implemented.

CHIARAVALLI GROUP SPA

Chiaravalli is one of Europe's leading companies in distributing and manufacturing components intended for mechanical transmission. Chiaravalli, together with LMC, its associated company, designs and manufactures high-precision mechanical components intended for the most varied industrial sectors. The group's logistics center in Cantalupa relies on an integrated computer system to provide product stocking, withdrawing, packing and dispatching. Storage area is equipped with top-notch logistics computer systems.

INDUSTRIAL CLUTCH PARTS LTD.

Established in 1994, Industrial Clutch Parts (ICP), is a global specialist supplier of brakes, clutches, couplings and friction material to all types of industry. Working with many original equipment manufacturers (OEM's) and a capability to supply the aftermarket with OEM quality materials. Headquartered in the United Kingdom, ICP is well represented globally with offices in USA, Canada, Germany, Spain, South America and the Middle East. With specialist knowledge across a range of industries Industrial Clutch Parts regularly supply into Aerospace, Agriculture, Automotive, Chemical, Energy, Engineering, Food, Gas, Leisure, Marine, Mining, Oil, Paper, Packaging, Renewable, Steel, Theater and Wind.

UNSAL MAKINA A.S.

Founded in 1969, Unsal Makina A.S. is one of the oldest and most experienced companies of power transmission industry in Turkey. Their quality standards are formed and defined by the market demands and standards of their world-renowned German power transmission partners. The company is highly experienced in non-standard, special production, project-based production, customization thanks to the successful partnership with market leaders for more than seven years. Established in 1969 in Kayseri, Unsal Makina is an integrated facility within 10,000 sqm area, power transmission bodies, v pulley, bushing pulley, poly v pulley, timing pulley, coupling, taper bushing and taper lock manufacturing.

Bearing EXPO & Conference

India 2019

15 - 16 October

NEHRU CENTRE
Dr. Annie Besant Road, Worli 400018 MUMBAI



"International Event for Bearing & Rolling Equipment Components Industry"

www.bearing-expo.com/india2019

Connect to the worldwide bearing industry network

ORGANIZED BY Bearing NEWS Bearing CLOUD.com

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

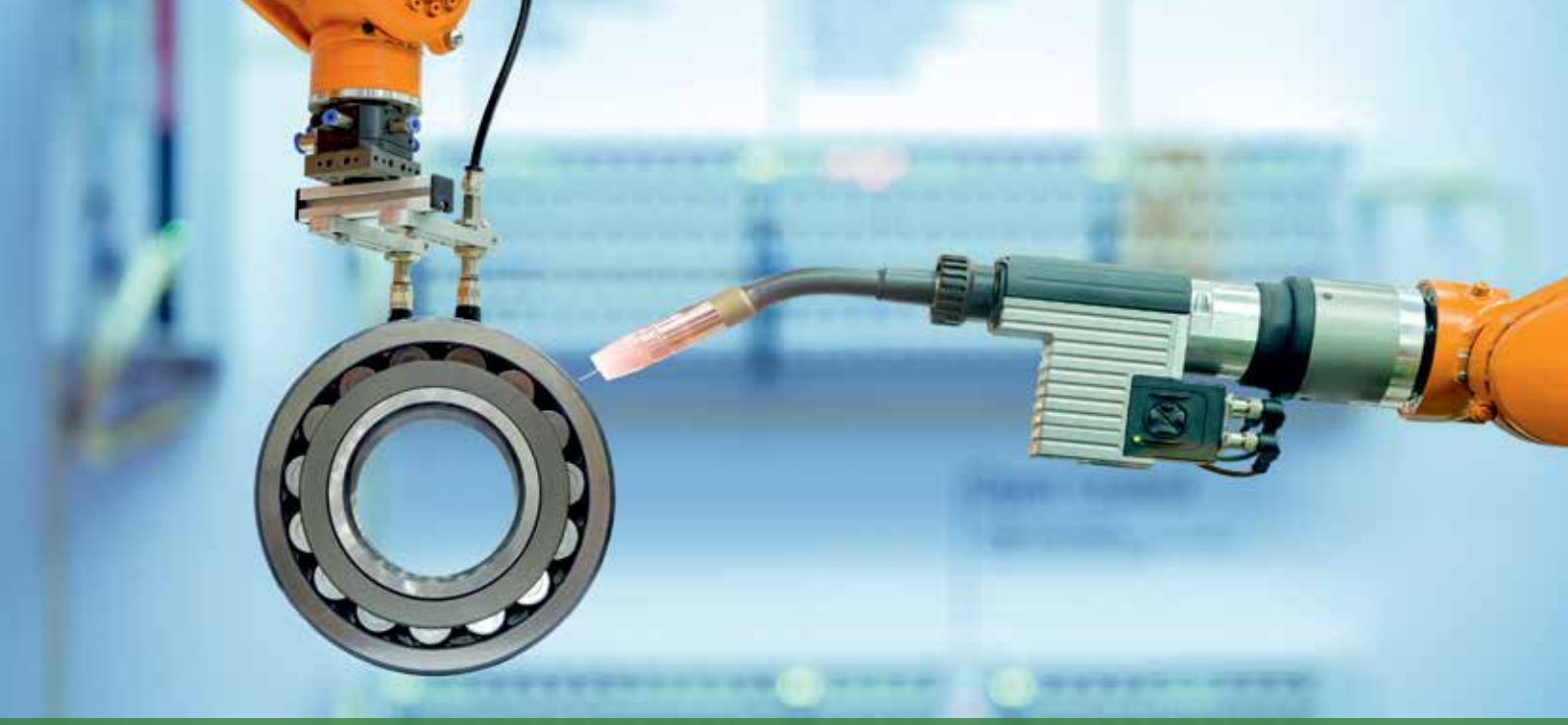
- Global & Local Bearing Manufacturers
- Power Transmission Companies
- International and Local Distributor Companies
- Lubrication Companies
- Equipment Manufacturers
- Bearing Production Machinery Companies
- Solution Providers
- Engineering Companies
- Associations and Service Organizations

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

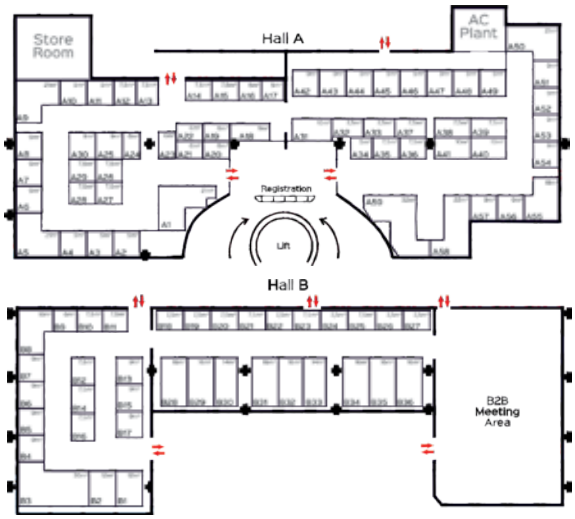


Exhibition & B2B Meetings

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.



EXHIBITORS & SPONSORS

MEDIA PARTNERS

CONFERENCE SPONSORS

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.

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

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)

Bhagwan Shekhawat
URB (India)

David Beattie
DASH Engineering (Australia)

Christian Kunze
FVA (Germany)

Manufacturer of High Quality Rolling Bearings

bmi®
Since 1974

www.bmibearings.com

BEARING MANUFACTURING INDIA

2020 CHINA INTERNATIONAL BEARING INDUSTRY EXHIBITION

BEARING 2020

MAY 13-16 2020

National Exhibition and Convertion Center (Shanghai)

CBIA

Sponsor:
CHINA BEARING INDUSTRY ASSOCIATION

Organizer:
CBIA (BEIJING) EXHIBITION CO., LTD.

Bearing EXPO & Conference

International Partner:
BEARING EXPO
www.bearing-expo.com

CHINA INTERNATIONAL BEARING INDUSTRY EXHIBITION 2020

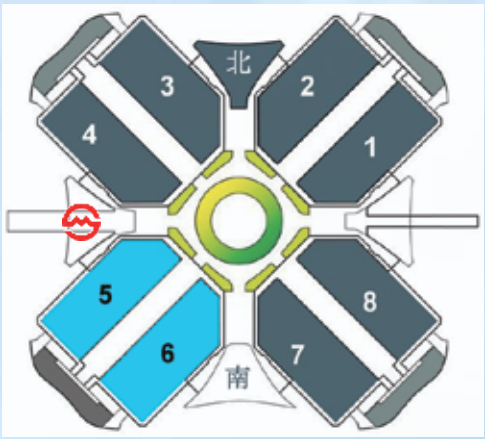
Covering an area of 53000 sqm with estimated 1000 exhibitors and 60000 visitors from all around the world will gather together during China International Bearing Fair between 13 - 16 May 2020.

Apart from previous year's the exhibition will be held this time in the new venue of National Exhibition and Convention Center in Shanghai. The exhibits include all types of bearings, and will cover special bearing industry equipment, precision measuring devices, transmission components, lubricant grease, solutions and accessories.

More opportunities for entering the Chinese bearing market, supplier development, and finding new business partners can be realized for International delegates during the B2B program sessions and at BearingEXPO International pavilion.

There will be simultaneously 5 different exhibitions in parallel halls at the same date and venue:

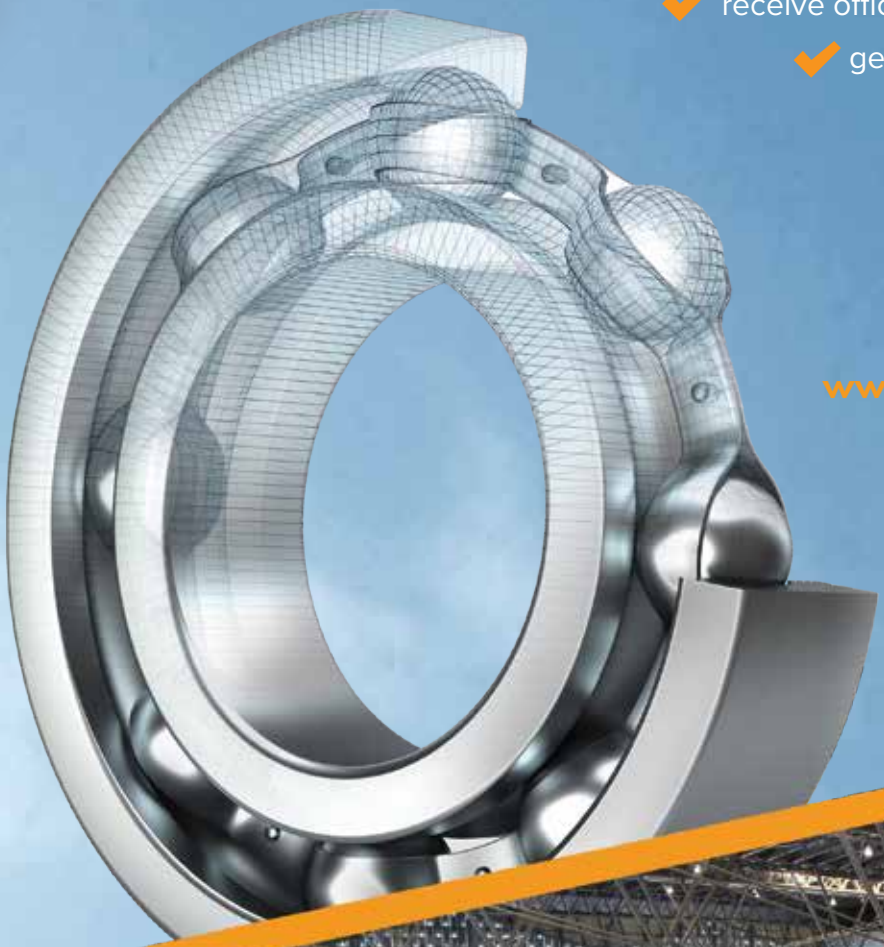
- The 20th China international Metallurgical Industry Expo
- The 18th China International Foundry Expo (METAL CHINA)
- The 18th China International Industrial Furnace Exhibition
- The 16th China International Refractory Material and Industrial Ceramic Exhibition
- The 14th China International Die Casting Industry Exhibition



Subscribe Now To The Leading International Bearing Industry Fair In China

Contact us to join the International BearingEXPO pavilion during Shanghai Bearing Fair 2020:

- get a discount for your booth booking
- reserve your hotel at discounted price
- receive official invitation letter for your VISA application
- get your free entrance badge without queuing
- join the B2B meeting program



Contact Us: info@bearing-expo.com

www.bearing-expo.com/bearing2020

Deutsche Messe

FIERA MILANO

PTC MDA ASIA

23-26 October 2019 •Shanghai, China

BearingEXPO Pavilion at PTC ASIA 2019

Bearing EXPO & Conference

The second edition of the International BearingEXPO & Conference in Shanghai will be held this year during the PTC ASIA show between 23 – 26 October 2019. After the successful introduction in 2018, the concept will be enlarged with the BearingEXPO Pavilion and B2B meetings, designed for the International bearing manufacturers, distributors, end-users and solution providers.

1,300+ exhibitors (2018)

70,000 sqm display area (2018)

100,616 visits (2018)

Previous big brands at PTC ASIA

C&U Cooperation and Unity · LYC 中国·洛轴 · TIMKEN · SCHAEFFLER · ZWZ · SKF

Facts & Figures of PTC ASIA

Date	**23-26 October 2019**
Scale	**9 halls with nearly 100,000 sqm**
Exhibitors	**Around 1.500 exhibitors expected**
Visitors	**Over 100.616 visitors (2018)**
Location	**Shanghai New International Expo Center (SNIEC)**

Product categories of the BearingEXPO Pavilion

Bearings, Lubrication, Heating Equipment, Bearing Mounting Tools, Bearing Components, Various Solutions

PTC MDA ASIA

PTC ASIA 2019
Location: SHANGHAI
Date: 23-26 October 2019

This event includes:
- BearingEXPO Pavilion
- Bearing Conference
- B2B Meetings

www.ptc-asia.com

BearingEXPO Pavilion at PTC ASIA 2019

Top 7 reasons to attend

- Meet potential customers for your offered solutions and products
- Increase your brand's visibility with the PTC ASIA's and BearingEXPO sponsorship opportunities
- Meet potential suppliers and diversify your product and solutions portfolio
- Gain inside information, share and generate new ideas, and discuss industry related issues with professionals during the conference
- Stay up-to-date on new technologies from international key note speakers
- Develop powerful connections with local and international bearing and PT/MC industry contacts
- Enjoy China and gather inspiring impressions from your stay in Shanghai

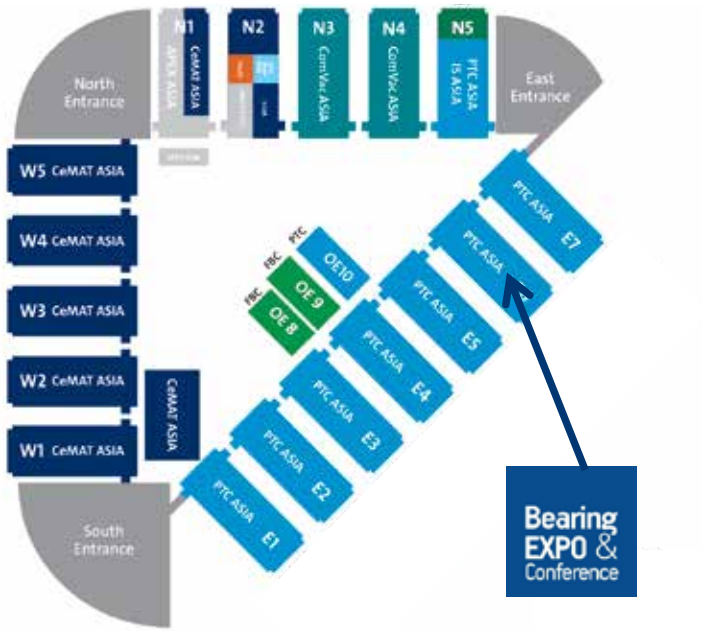
What is BearingEXPO & Conference

BearingEXPO & Conference Shanghai at the PTC ASIA 2019 is the meeting point for the bearing and rolling equipment components industry during a 4 days exhibition, conference and B2B meeting sessions – serving a wide scope of local and International audience of bearing 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 developments, rising protectionism, environmental issues, digitalization and increasing steel prices – which creates both threads and opportunities for companies. China 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.

Map of exhibition grounds



www.ptc-asia.com

BearingEXPO Pavilion at PTC ASIA 2019

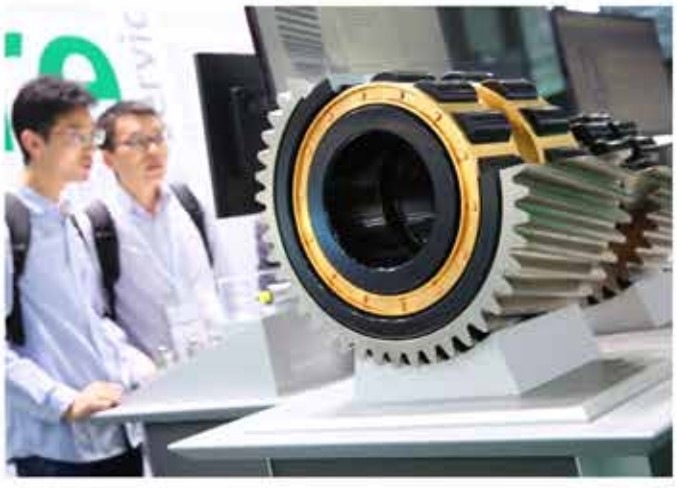
BearingEXPO Pavilion

Stand price	RMB/sqm (incl. 6% VAT)
Unit price (1 sqm)	2,125.30
6 sqm	12,751.80
9 sqm	19,127.70
18 sqm	38,255.40

BearingEXPO Pavilion stand package includes:

- Carpeting
- Reception table with 1 barstool
- Round table
- 3 black leather arm chairs
- Waste basket
- Fascia board
- 500 W socket
- Storage room (for 9 sqm and 18 sqm stand)
- Stand building system (4 m height)

BearingNews.com and the exhibition organizer offer exhibitors extensive support to make a participation as easy and convenient as possible. Potential exhibitors will be informed about all possible participation and additional service options. In addition to the group pavilion, BearingNews.com will also offer speaking possibilities at the BearingEXPO Conference and matchmaking services during the exhibition.



Reserve a spot until **September 31st!**

To sign up or for more information about BearingEXPO at PTC ASIA, please contact us!

Kenan Özcan
Founder of BearingNews.com

Mobile +32 489 32 85 21
Email info@bearing-expo.co
Web www.bearing-expo.com

www.ptc-asia.com

Submission deadline for
abstracts: 15 October, 2019

Call for Papers

BEARING WORLD by FVA

3rd International FVA-Conference

The Expert Forum for Bearings – Rolling and Plain Bearings!

31 March – 1 April, 2020 in Hannover, Germany

FVA sharing drive innovation

#BEARINGWORLD
#FVABearings

fva-net.de
bearingworld.org

INVITATION

**BEARING WORLD presented by FVA –
Third expert forum "Industrial Research and Science in Dialogue with Practical Application" focusing on the topic of bearings in theory and application.**

Ladies and gentlemen,

In technology, wherever there is movement, rolling element and plain bearings are an essential. This is true for general mechanical engineering, the automotive industry and others. Bearings transmit operating forces between moving machine components, and therefore play a crucial role in functionality, efficiency, and service life of the overall machine or system. The stresses on rolling bearings in particular are very high, and will continue to increase in the future, as will expectations of reliability. Therefore, appropriate bearing selection and dimensioning as well as the optimal design of the bearing environment are indispensable. This requires constant growth in expertise based on practical experience and scientific knowledge. This includes, for example, bearing installation to ensure optimum clearance and preload, lubrication and sealing design, corrosion protection, condition monitoring, and targeted improvements based on extensive failure analysis.

BEARING WORLD focuses on all aspects of bearings.

The goal of BEARING WORLD is to promote the exchange of knowledge and experience between universities and engineers from the industry who are involved in or responsible for the design, development, manufacturing and assembly, or the practical operation or maintenance of bearings.

Be part of it! Contribute to the programme by providing your knowledge and experience, and take advantage of the opportunity to share information!

We look forward to receiving your proposals for the FVA-BEARING WORLD.

The BEARING WORLD Programme Committee

PRIMARY TOPICS

BEARING WORLD focuses on all facets of bearings and all involved components, with special emphasis on rolling bearings – in combination with or comparison to plain or magnetic bearings.

» Drive technology applications and challenges to bearings
» Calculation and bearing dimensioning
» Life and durability
» Energy efficiency
» Rolling bearing dynamics
» NVH (noise, vibration, harshness)
» Bearing damage
» Protective seals for rolling bearings
» Manufacturing aspects, tolerances
» Validation
» Lubrication
» Lab testing vs. field performance
» Smart bearings
» Model-based systems engineering

Trade exhibition

Offer the participants further information about your presentation at your company stand at the trade fair. Information on the exhibition can be found at **bearingworld.org.**

Programme Committee

Dirk Arnold, Forschungsvereinigung Antriebstechnik e.V.
Dr. Victor Aul, ZF Friedrichshafen AG
Dr. Elmar Busche, Volkswagen AG
Prof. Brigitte Clausen, Leibniz-Institut IWT Bremen
Dr. Ralf Dinter, Siemens AG
Wolfgang Gläntz, SKF GmbH
Dr. Christoph Hentschke, RENK AG
Prof. Georg Jacobs, MSE RWTH Aachen University
Prof. Eckard Kirchner, pmd TU Darmstadt
Dr. Oliver Koch, Schaeffler Technologies AG & Co. KG
Prof. Erhard Leidich, IKAT TU Chemnitz
Prof. Gerhard Poll, IMKT Leibniz Universität Hannover
Dr. Volker Rombach, NTN Wälzlager (Europa) GmbH
Prof. Bernd Sauer, MEGT University of Kaiserslautern
Prof. Hubert Schwarze, ITR TU Clausthal
Prof. Sandro Wartzack, KTmfk Uni Erlangen-Nürnberg
Andreas Weber, Vestas Nacelles Deutschland GmbH

Scientific Board

More than thirty renowned scientists from 11 countries from all over the world are gathered here. They review and evaluate the conference presentations before they are published in the Bearing World Journal. In addition, some of them will be available at the conference as moderators, speakers and discussion partners.

Industrial research and science in dialogue with practice – this is what makes the international FVA-Expert Forum Bearing World a special event you shouldn't miss.
Be there – whether as a speaker or participant.
See you in Hannover 2020!

Image Sources: FVA e.V., juergenmai.com, Schaeffler Technologies AG & Co.KG, SKF GmbH

SUBMISSION CONDITIONS

Please submit your abstract by
15 October, 2019

» Please use the online portal at bearingworld.org to submit your abstract. Abstracts must include the name, address, telephone number and e-mail address of all authors and must be assigned to one of the main topics.
» The conference will be held in English.
» Conference report for the conference proceedings in English.
» Presentation slides in English.
» Each presenter will be allocated 20 minutes for presentation plus 5 minutes for discussion.
» Participants will receive download links for authorised presentations after the conference.

Key Deadlines

Deadline for abstracts: 15 October, 2019
Submission of Conference report: 31 January, 2020

Process

All abstracts will be submitted to the Programme Committee for selection.

Peer-Reviewed Bearing World Journal

Additionally, it is possible to publish your contribution as extended paper in our high-class scientific "Bearing World Journal", which will be published after the congress. Please mark the checkbox in submission form if you are interested in that.

Benefits for Presenters

» Free participation in the conference
» Refreshments and evening event
» Free copy of the conference proceedings
» Optional publication in scientific "Bearing World Journal"
» Free copy of scientific "Bearing World Journal"

Organisation

Head of Programme Committee and Scientific Board, Editor of Bearing World Journal
Prof. Gerhard Poll, IMKT Leibniz Universität Hannover

Conference Organisation

Dirk Arnold
T +49.69.6603-1632
dirk.arnold@vdma.org

Brigitte Becker
T +49.69.6603-1597
brigitte.becker@fva-service.de

Location
Wienecke XI.
Hildesheimer Strasse 380
D-30519 Hannover

Technical Sponsor
Forschungsvereinigung Antriebstechnik e.V. (FVA)
Lyoner Strasse 18, D-60528 Frankfurt

Organiser
FVA GmbH, Lyoner Strasse 18, D-60528 Frankfurt

More information at fva-net.de

Media partner:

Bearing-NEWS.com

lubricants
an Open Access Journal by MDPI

www.premierbearing.com

PREMIER

One Vision
One Commitment
One Drive

To be the No.1 Choice of the Customers

HIGHEST SALES AWARD 2018

Premier Bearings is proud to receive the
'Highest Sales Award 2018' for Schaeffler Products

For the last four decades, Premier Bearing has been transforming experience and excellence into a winning formula. This year, like the past 15 years, we are continuing the winning habit as the No.1 Industrial distributor for Schaeffler products.

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.

Founded in 1975, the Premier Group is India's leading industrial bearing distributor, with 23 branches across India. Embracing the "ease of doing business" approach, we strive to be a partner that enhances the productivity of customers.

SCHAEFFLER

INA FAG

Authorised Industrial Distributors

Premier India Bearings Ltd.

Head Office: 1407, 'Diamond Heritage' 16 Strand Road, Kolkata-700001
Ph.: +91 33 4033-2000 • Email: admin@inpremier.com

Kolkata | Ahmedabad | Bengaluru | Bharuch | Bhopal | Bhiwadi | Chandigarh | Chennai | Coimbatore Gandhidham | Gurugram-NCR | Guwahati | Hosur | Hospet | Jamshedpur | Kochi | Ludhiana | Mumbai Nashik | Raipur | Surat | Trichy | Vijayawada

Bearing-EXPO.com

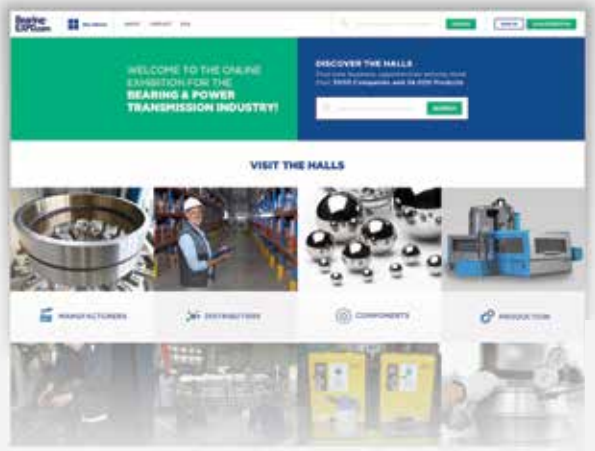
THE ONLINE EXHIBITION FOR THE
BEARING & POWER TRANSMISSION INDUSTRY IS OPEN FOR REGISTRATIONS

www.bearing-expo.com

VISIT & RESERVE YOUR BOOTH!

MANUFACTURERS	DISTIRIBUTORS	COMPONENTS
PRODUCTION	MAINTENANCE	TOOLS & EQUIPMENT
LUBRICATION	METROLOGY	ENGINEERING & DESIGN
MECHANICAL POWER TRANSMISSION	ASIAN MANUFACTURERS	ORGANIZATIONS

Find What You Are Looking *for*
With The New
SEARCH Feature!

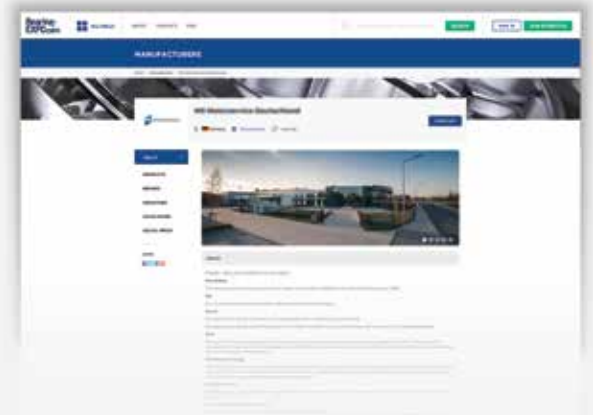


HOMEPAGE

Access ALL BearingEXPO, BearingCLOUD, BearingNEWS and BearingDATA services from one single page!

HALL PAGES

Search and Find easily Product Categories



PROFILE PAGES

Connect and Communicate with Bearing & Rolling Equipment Components Industry Companies, Organizations and Manufacturers

The Largest Network *for*
The Bearing & Rolling Equipment Components
Industry!

Updated with New Features & Design!

www.bearing-expo.com

BEARING & GEARBOX SEMINARS

USA (INDIANA) OCTOBER 2019

SEMINAR PROGRAM

BEARINGS

7th of October 2019
Development of bearing suppliers and quality control during purchasing

8th of October 2019
Basics of bearing technology

9th of October 2019
Bearing failures: Investigation and analysis of practical examples

GEARBOXES

10th of October 2019
Preventive maintenance and condition monitoring of industrial gearboxes

11th of October 2019
Supplier development for large industrial gearboxes and quality control during purchasing

BEARING SEMINARS

Development of bearing suppliers and quality control during purchasing

7th of October 2019, 10:00 a.m. – 05:00 p.m.

Global sourcing of bearings opens plenty of opportunities for optimization of supply chains. However, any new supplier approval goes along with a certain quality risk. Therefore, this seminar is focused on the following subjects:

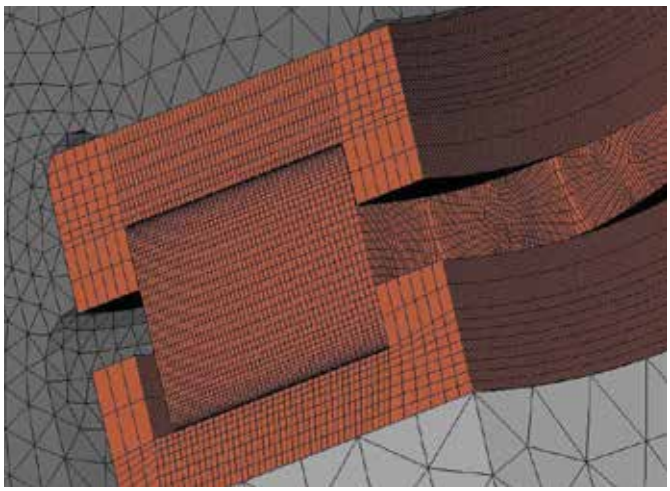
1. Definition of quality requirements, technical specifications
2. Approach during supplier visits and audits
3. Requirements related to documentation of production
4. Methods for incoming inspection
5. Concepts for quality control

Basics of bearing technology

8th of October 2019, 10:00 a.m. – 05:00 p.m.

This one day seminar provides basic knowledge especially for design of bearing arrangements and for quality assurance during purchasing. Lectures shall focus especially on:

1. Types, Properties, Concepts
2. Basics of Tribology
3. Raceway crowning
4. Material properties
5. Sample assessement



Bearing Failures: Investigation and analysis of practical examples

9th of October 2019, 10:00 a.m. – 05:00 p.m.

Identification and understanding of failure root causes is necessary in order to initiate the required counter measures. Therefore, this seminar shall show based on practical examples how damage characteristics can be identified and to which conclusion they lead. Main topics are especially:

1. Methods for damage investigation
2. Damage mechanisms
3. Quality characteristics of bearings
4. Examples from numerous applications

GEARBOX SEMINARS

Preventive maintenance and condition monitoring of industrial gearboxes

10th of October 2019, 10:00 a.m. – 05:00 p.m.

In many technical systems, breakdowns of particular components lead to enormous subsequent costs as production will be affected significantly. Detection of damages at early stages can lead to minimization of downtime and helps to avoid secondary damages by which overall breakdown costs can be highly reduced. Therefore, this seminar refers to the following topics:

1. Investigation of lubricants
2. Regular inspection and endoscopy
3. Vibration measurement and analysis of obtained results
4. Automation of shutdown in case of detected defect

Supplier development for large industrial gearboxes and quality control during purchasing

11th of October 2019, 10:00 a.m. – 05:00 p.m.

Large industrial gearboxes are typically produced in small series while frequently, individual solutions are requested which require close collaboration between supplier and customer. Here, especially clear communication of requirements, verification of technical concepts and of course the general assessment of production processes are essential. Accordingly, the topics of this seminar are:

1. Structure and content of technical specifications
2. Verification of technical documents such as drawings, stress and lifetime calculations of shafts, gearings, bearings and housings
3. Approach during supplier visits and audits
4. Requirements related to documentation of production
5. Methods for incoming and production related inspection

“Special Deals“

BEARING PACKAGE

- ☑ Development of bearing suppliers and quality control during purchasing
- ☑ Basics of bearing technology
- ☑ Bearing failures: Investigation and analysis of practical examples

GEARBOX PACKAGE

- ☑ Bearing failures: Investigation and analysis of practical examples
- ☑ Preventive maintenance and condition monitoring of industrial gearboxes
- ☑ Supplier development for large industrial gearboxes and quality control

GROUP-RATES

- ☑ Special rates for groups of the three people.
- ☑ For larges groups, individials quotes will be prepared.

You can download the registration form and all the seminar details on the Elgeti Engineering website at **www.elgeti-engineering.de** in order to susbcribe for one or more of the training seminars or contact Ms. Carolin Cosler on **cc@elgeti-engineering.de** or call **+49 241 169 193 25**

Elgeti Engineering USA Inc.
Ms. Carolin Cosler
2909 Village Lane #3C
Valparaiso, IN-46383
Phone: + 49 241 169 193 0
Fax: +49 241 169 193 0

Efficient maintenance thanks to **simalube, simatherm and simatool**

The availability and optimal utilization of production facilities are the most important factors for the profitability of companies. Production and resulting yield losses due to unplanned plant shutdowns are no longer tolerated today. In order to reduce unwanted failures and allow planned maintenance intervals to be as long as possible, preventive measures must be taken. Proper lubrication as well as a professional installation and removal of rolling bearings are very demanding and important maintenance tasks.

Proper lubrication of bearings

It is essential to select the correct lubricants and then supply them to the lubrication points in a suitable form and in the correct quantities. Likewise, the selection of the lubrication system is crucial; a choice must be made according to the requirements. For lubrication, expensive high-performance lubricants of the latest technologies are increasingly being used today.

It is therefore all the more astonishing that re-lubrication is usually carried out by hand and that only 5% of all lubrication points are equipped with an automatic system. Obviously there is a lot of catching up to do here, be it as a retrofit or the initial installation. In both cases, simalube automatic lubricant dispensers from the Swiss manufacturer simatec are the ideal solution. The customer can select the sizes, lubricants and running times of the dispensers and thus receive the tailor-made solution for each lubrication point. Each lubrication point is supplied independently, reliably and continuously with the daily lubricant quantity pre-selected by the customer.

The lubricators generate exactly the pressure required to deliver greases or oils to the lubrication points. Separation of oil and thickener is avoided, the consistency remains constant and the

freshly fed lubricant delivers its full capability at the lubrication point. The wear on the components is reduced, unplanned downtime avoided and maintenance intervals extended. By eliminating manual lubrication, valuable time is also saved.

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. 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 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. 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.

In summary, the following measures are important in order to ensure a longer lifespan of your bearings and thus your machines:

Use inductive heating: Prior to the heating process, the maximum heating temperature allowed has to be checked. Over- or preheating could cause damage to the bearing and result in bearing failure at worst. The best method to reach/set the correct heating temperature is heating the bearing with a simatherm induction heater. Therefore, bearings should always be heated with induction heaters where the exact temperature can be set and constantly controlled.

Always use the proper tools: A correct installation or removal is crucial for a long lifespan of your bearings. Professional tools like bearing pullers or bearing fitting tool kits will ensure a safe mounting and dismounting process and therefore reduce the risk of damage. simatool toolkits are the perfect solution for a professional assembly and disassembly of rolling bearings.

Proper lubrication: As mentioned above, proper lubrication is crucial and very demanding if you want to increase the lifetime of your bearing. It is important to select the correct lubricants and then supply them to the lubrication points in a suitable form and in the correct quantities. simalube automatic lubricators offer the perfect solution.

For more information, visit simatec.com

WAFIOS
UMFORMTECHNIK

Made in Germany

A new standard for production of balls and rollers

BR

Cold Former BR220

- Hydraulic driven push-out aid for change overs
- System to process the residual wire at the end of the coil
- Ejecting stroke infinitely adjustable (motorized – option)
- Very precise working linear material feeding system for volume consistency of less than 0,3 %

KOREA METAL WEEK 2015

WAFIOS Umformtechnik
at the **Korea Metal week**
from 28th – 31st October 2015

wire® South America

WAFIOS Umformtechnik
at the **WIRE South America**
Sao Paulo, Brazil
from 6th – 8th October 2015

Manufacturer
WAFIOS
Umformtechnik GmbH
Im Rehsiepen 35
42369 Wuppertal
Phone +49 (202) 46 68-0
sales@wafios-umformtechnik.de
www.wafios-umformtechnik.com

WAFIOS (Shanghai)
Machinery Co.,Ltd
威夫斯(上海)机械有限公司
No. 99-1, Hongjian Road,
Minghang District, Shanghai
China, 200336
威夫斯(上海)机械有限公司上海
市闵行区虹建路99号1幢1楼
200336
tony_wafios@163.com
Mobile Phone: 0086 13814861671

Precision Parts
Forming Machinery

More food safety through the new "Blue Range" of SKF Food Line ball bearing units:

Reduce impurities instead of spreading them

Innovative blue ball bearing units by SKF open up new possibilities for the hygienic design of food production plants. Thanks to their high reliability, the "Blue Range" of the SKF Food Line ball bearing units also contributes to reducing maintenance costs while helping food and beverage manufacturers to achieve greater sustainability.

The new Blue Range by SKF Food Line ball bearing units supports the industry to improve food safety. The background to SKF's new development is the fact that the food and beverage industry has been suffering from a drastic increase in recalls since 2012. For example, the recalls by the US Food and Drug Administration (FDA) increased 92.7 percent in six years, and the US Department of Agriculture (USDA) also registered an increase of 83.4 percent.[1] The bacterial contamination and undeclared allergens with a total of 75 percent are now the main causes of FDA recalls.[2]

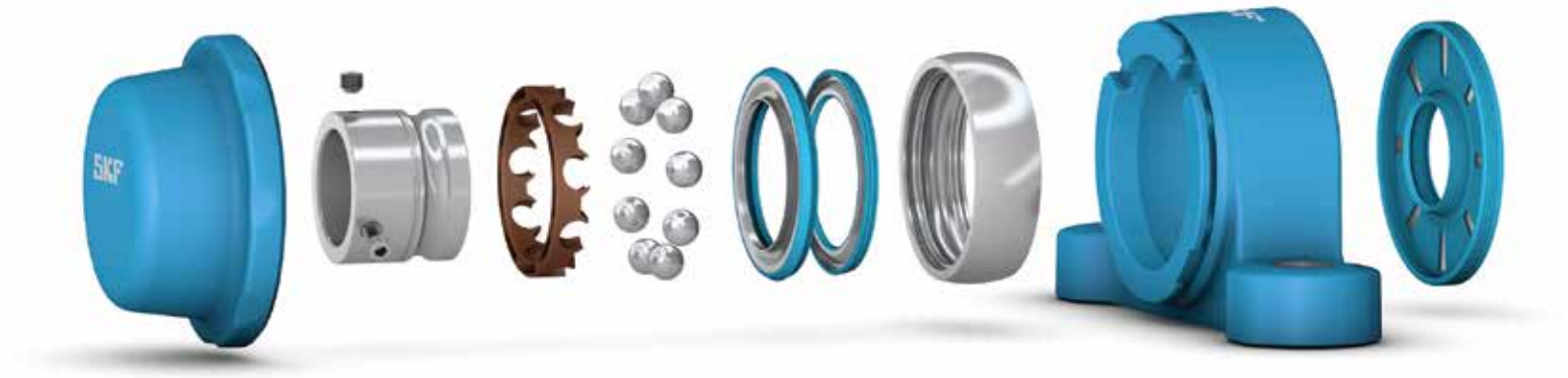
Sticking point components

In light of such developments, it is not surprising that the food and beverage industry is desperately seeking proactive solutions to improve food safety. Superordinated approaches have highest priority for many of the responsible individuals, but they often enough lack the necessary knowledge about contamination risks at the component level - and how to eliminate such production-related risks.

"Obviously, most companies have taken various safety precautions to protect their food," said Victoria van Camp, CFO Board member responsible for technology, business and product development, "ranging from simple signs that request regular hand washing to the purchase of 'food-safe' machines constructed under specific hygiene considerations. "

— Image 2: Victoria van Camp, Member of the Board of SKF responsible for Technology, Business and Product Development: „The traditional re-lubricating of food production machines as well as the usual wet and dry cleaning of the bearings installed therein can become a 'hidden breeding grounds' for contamination. To prevent such hazards, we have implemented a new hygiene concept with the Blue Range of the SKF Food Line ball bearing units. "

—Image 1: The innovative SKF Food Line ball bearing units of the Blue Range counteract the unwanted spread of bacteria through cleaning processes in food production plants.



—Image 3: SKF has developed the new Blue Range of its Food Line ball bearing units from scratch - component by component.

Hidden breeding grounds

The problem is that the traditional relubricating of such machines as well as the usual wet and dry cleaning of the bearings installed therein could become “hidden breeding grounds” for contamination. And these contaminants can easily spread throughout the plant through “droplet transmission” in the air, through effluents, or through contaminated lubricants. “To prevent such dangers, a new hygiene concept had to be produced. And that’s exactly what we’ve implemented with the Blue Range of the SKF Food Line ball bearing units, “says van Camp.

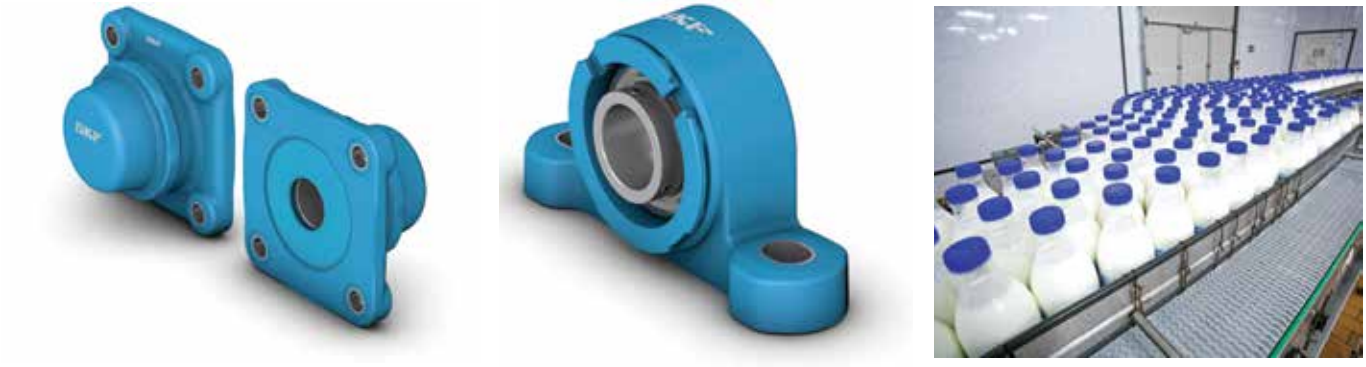
SKF has re-developed these ball bearing units from scratch - component by component - to optimize hygiene, performance and food safety. Thanks to their innovative sealing system, a special, food grade and allergen-free grease and the complete static and dynamic tightness of the extremely well-sealed units, the latest SKF Food Line solutions offer outstanding performance benefits to their users.

Benefits for OEMs and end users

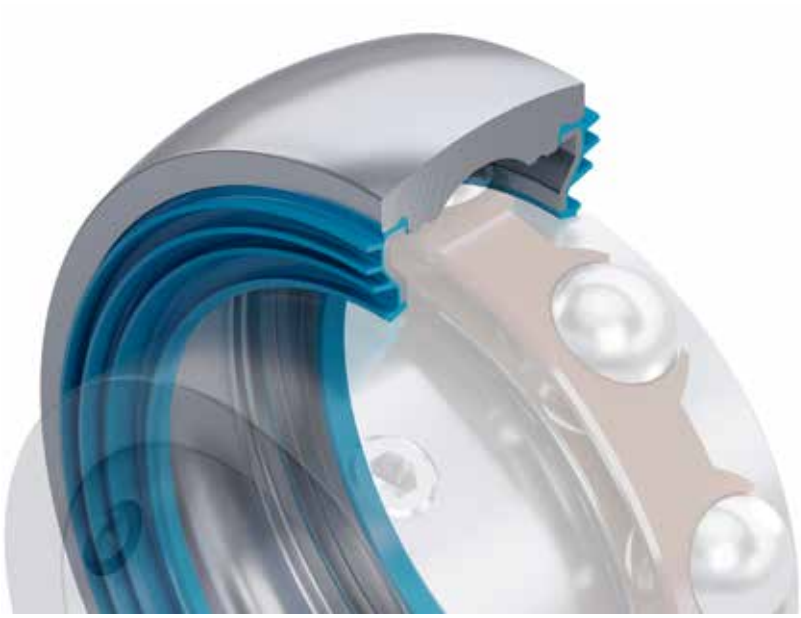
Example of original equipment manufacturer: OEMs can improve the performance of their food processing equipment both in terms of production and hygiene by using storage units that not only last longer, but also are relubrication-free and extremely easy to clean. This, in turn, helps food and beverage manufacturers reduce food safety risks. Because the particularly “hygiene-conscious” design of the storage units, which includes an extremely smooth surface, counteracts bacterial accumulation even in hard-to-reach areas. Thus, the Blue Range reduces the risk of bacteria unintentionally spreading throughout the system during the cleaning processes.

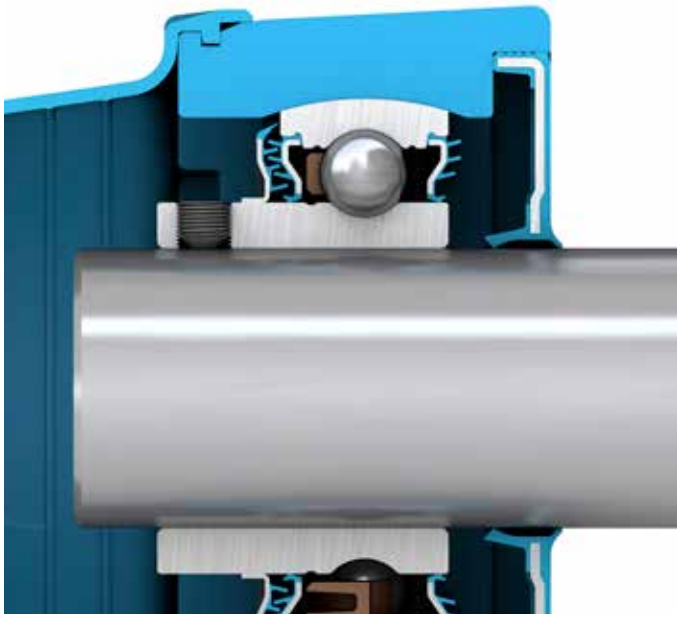
In addition, the blue ball bearing units contribute to a higher availability of the production equipment: They do not need to be re-lubricated, so the equipment can continue to run without the usual stops for lubrication. The time required to remove excess bearing grease is eliminated. And the minimized downtime ultimately maximizes productivity.

This also means that SKF’s new blue ball bearing units eliminate the re-lubrication costs as well as reducing the frequency of bearing replacement - even under harsh environmental conditions. Thus, the food and beverage manufacturers can save several times: in terms of lubrication material, including



— Image 4: Hanks to their extremely smooth surfaces and exceptional tightness, the SKF’s Blue Food Line bearing units support the industry to increase the food safety.





— Image 5: The lifetime-lubricated Blue Range SKF Food Line ball bearing units not only reduce the risk of contamination but also the maintenance effort.

the associated workload as well as in terms of spare parts procurement.

Better ecological balance

Last but not least, the Blue Range SKF Food Line ball bearing units also optimize the ecological balance of their users. After all, the companies now require around a third less hot water for cleaning their plants and avoid contaminating their wastewater with excess bearing grease.

The disposal of contaminated cleaning agents lapse. In addition, with the new blue SKF Food Line warehouses, companies use components that can be recycled up to 59 percent and recover

— Image 6: Direct line to learn more about the brand new Blue Range SKF Food Line ball bearing units.

—Image 7: This video demonstrates how bacteria can spread through cleaning operations on "conventional" bearings.

—Image 8: Blue Range's chief developer, Fabio Falaschi from the SKF Innovation Office in Italy, explains some features of the new SKF Food Line ball bearing units in this video.

up to 41 percent of their energy. As a result, the food and beverage industry can move from a waste management strategy to a more preventive approach.

1. *Food Safety Tech Staff, "FDA Food Recalls Up Nearly 93% Since 2012," Food Safety Tech, Feb 16, 2018.*
2. *Stericycle, "Recall Index," Q4 2017.*

The rise of recycled bearings

Bearings are circular, much like the economy they are used in. As more customers avoid disposing of bearings needlessly, Chris Johnson, managing director of bearing re-lubricator SMB Bearings, explains the sudden surge in popularity of reusing and recycling ball bearings through relubrication.

Bearing relubrication has never been in such high demand. This process involves cleaning out bearing grease and replacing it with new lubrication. Manufacturers have long needed these kinds of services to fill new bearings with non-standard lubricants, but its prevalence of re-lubrication for older bearings is particularly striking.

Returning resources for reuse, rather than the traditional 'take-make-dispose' approach, is gaining traction across all industries. Bearing relubrication is a great example of how this method benefits the customer. The process can revitalise bearings that may have already endured years of use, provided wear is very slight, and allows users to extend the lifespan of their bearings and reduce costs.

With the right re-lubrication equipment, bearings can be restored for many more years of use. But, why would bearings

require a change in oil or grease? It may be that the bearings have been stored for many years and the grease has exceeded its shelf life. This can happen when some of the oil leeches out making the grease less effective. Usually, the bearings are in otherwise excellent condition so relubrication restores them to an “as new” state. Alternatively, they might be re-serviced for an entirely different use.

Take this as example. A bearing that once had relatively low levels of rotation in a slow-moving application, is set to be reused in an application that exposes the bearing to extreme temperatures. Suddenly, the old lubrication doesn’t meet the brief. In this instance, the bearing should be completely cleaned out and filled with grease that is rated to the required temperature. Previously used bearings should only be relubricated after carefully checking for damage or wear and even then, only used for non-critical applications.

However, many bearing manufacturers simply aren’t interested in relubricating small volumes of bearings. Or, if they agree to the job, there are painfully long lead times. Ultimately, many bearing manufacturers prefer to focus on large order volumes.

This can be problematic for customers requiring small volumes of bearings, particularly for use in niche applications. Luckily, SMB Bearings can relubricate even just a handful of bearings quickly.

The re-lubrication service uses a range of bearing degreasing methods, such as ultrasonic degreasing, to clean bearing surfaces thoroughly. This process uses ultrasound, usually from 20 to 40 kHz, to agitate the fluid.

Re-serviced bearings are then returned to the customer with any choice of oil, grease, dry lubricant or even no lubricant at all. This process can also accurately control the amount of grease used for re-lubrication. For example, the bearings may be filled with high-precision instrument grease and the amount can be varied, depending on customer requirements, to within a few milligrams, using highly sensitive weighing equipment.

Maintaining this accuracy is not an easy task, particularly for shielded bearings. The right bearing re-lubrication provider should have the necessary equipment to carry out this kind of servicing without removing any shields or seals.

There’s no doubt, relubrication provides a great deal of flexibility in terms of bearing re-use. With many different industries set to benefit from the cost-saving relubrication process, the savings are not just attributed to not buying brand new bearings, but also the reduced problems associated with incorrectly-lubricated bearings.

As the masters of ultra-roundness, bearings certainly have their place in the circular economy. It makes sense that the demand for bearing relubrication is unwaveringly high at present ¬– it can only benefit the environment and profit margins.

About SMB Bearings

SMB Bearings originally specialised in miniature bearings, thin-section bearings and stainless steel bearings. By natural progression, the company expanded the range to include other corrosion resistant bearings such as plastic bearings, 316 stainless bearings and ceramic bearings.

Remaining a specialist business, SMB Bearings provide a high level of product knowledge, providing bearing and lubrication solutions to existing or potential customers, whether individuals or large corporations.

SMB Bearings does not just sell bearings, but helps to solve your problems. For further information please visit www.smbbearings.com

The Online Warehouse

For Bearing Distributors Worldwide

Bearing CLOUD.com

22318KW33

LOGIN | JOIN US

powered by Bearing-News.com

BEARINGS PULLEYS SPROCKETS SEALS CHAINS BELTS

100% Automated Sales of Your Stocks

Available Languages:
English, German, Turkish, Italian, French, Spanish, Portuguese, Russian, Chinese

join the network
www.bearingcloud.com

Download the **BearingCLOUD App!**

- ✓ Search Stocks
- ✓ Check Companies
- ✓ Send inquiries
- ✓ Chat Function

NEW
NATIONAL ACCOUNT

for details **www.bearingcloud.com**

Scan this code or visit
www.bearingcloud.com/apps

GET IT ON Google Play

Download on the App Store

MESYS Software Version 07/2019 is available

Version 07/2019 of MESYS Shaft and Bearing analysis software is now available under Downloads and provides additional functionality.

General Extensions

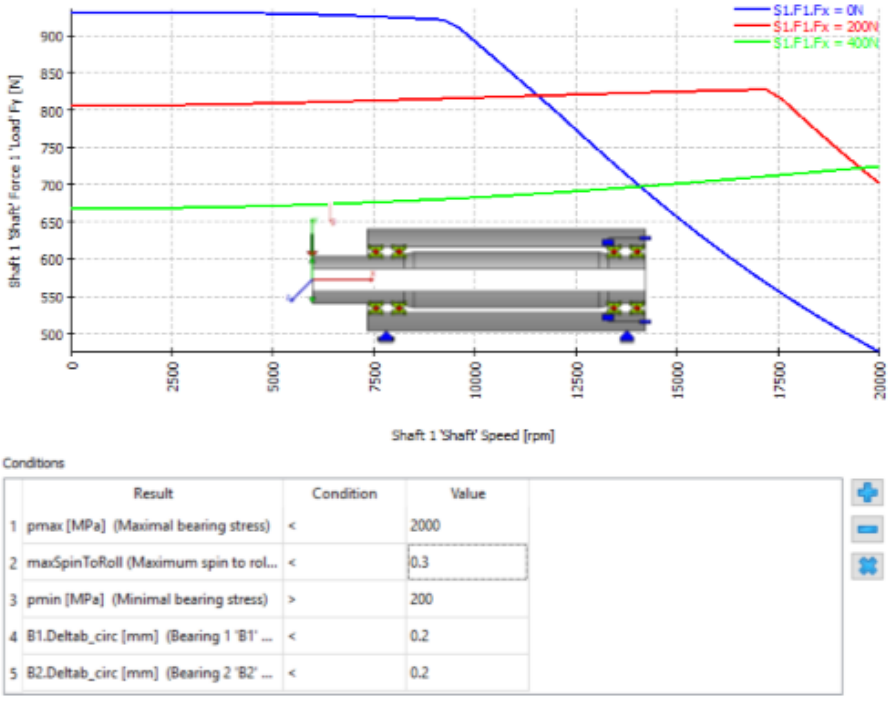
The parameter variation now allows an additional optimization step. For example, the maximum permissible radial force can be calculated for each case dependent on different criteria.

Data points of diagrams can now by exported in XLSX format. The curves can also be copied from one diagram into another, this can be used for comparison of results.
Some additional methods were added to the COM interface. For example, a method to retrieve the stiffness matrix of bearings and ball screws.

Extensions in the Bearing Calculation

The bearing databases from Schaeffler and SKF are updated to latest data from the manufacturers. These only contain catalog data. The internal geometry is approximated by the software.

A new database from HQW Precision GmbH is added containing spindle bearings up to 30 bore diameter. This database contains internal geometry provided by HQW and the internal geometry is hidden. Further databases with internal geometry are available from GMN, IBC and CSC on request from the manufacturer.
Three-point bearings were added as bearing type. They have one full radius on one race and two radii like in four-point bearings on the other race. The load capacity is calculated based on angular contact bearings using the free contact angle.
An additional option for roller profiles was added allowing the input of two tangential radii.



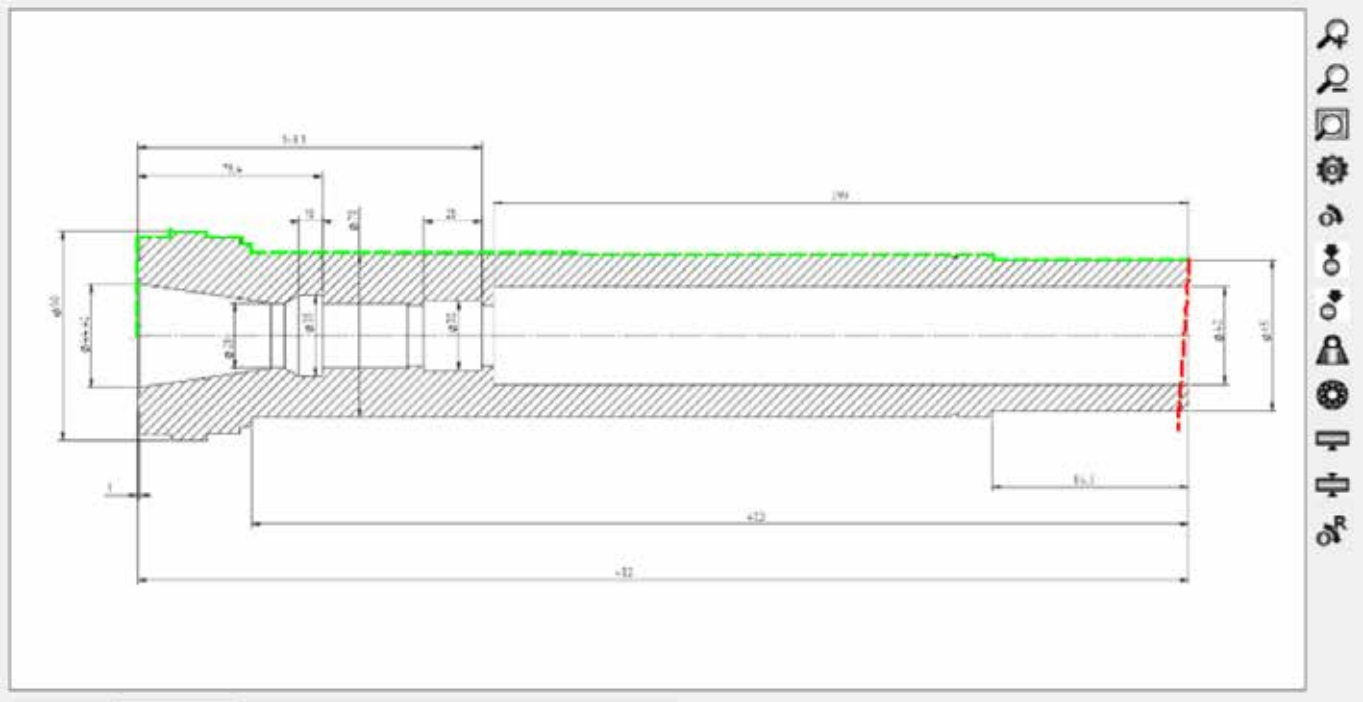
— Permissible radial force for different speed and axial forces based on several conditions.

Gyroscopic moments can now be considered on all ball bearing types including four-point bearings, where it was not supported before.

Extensions in the Shaft Calculation

A background drawing can by added by pasting it from the clipboard. Then the shaft geometry can be drawn as a polygon. This can be used if shaft geometry was just provided as a PDF. The CAD import as DXF or STEP now also allows a rotation of the drawing in case the shaft axis is not the x-axis.

Harmonic response can now be calculated on periodic displacements in addition to periodic forces. Excitations can be defined for supports connected to the rigid environment. They can also be defined for bearings based on inner or outer ring rotation or for gear mesh frequencies of cylindrical gears.
For planetary gear stages the results are now reported for supports of all planets and also the results for all gear pairs are provided. They were calculated before but not available in the standard report or result overview. The results for different planets can be different in case additional forces are applied to planet carrier or the rings gear.

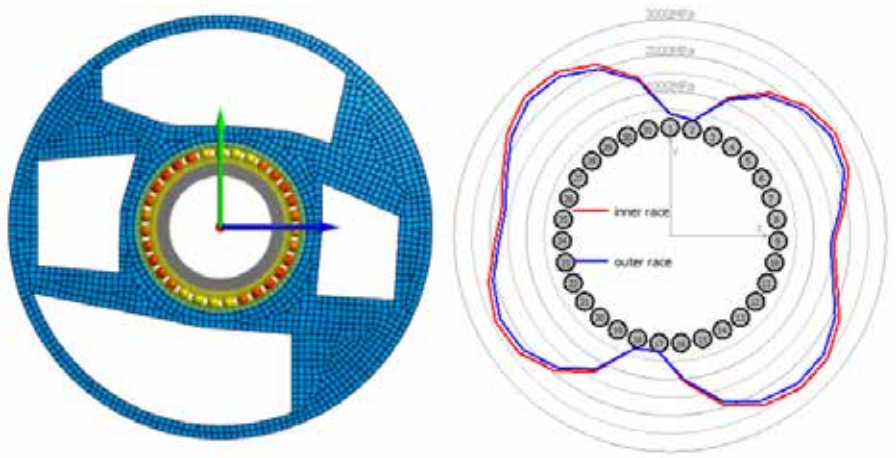


— *Import of background graphic and geometry input as polygon*

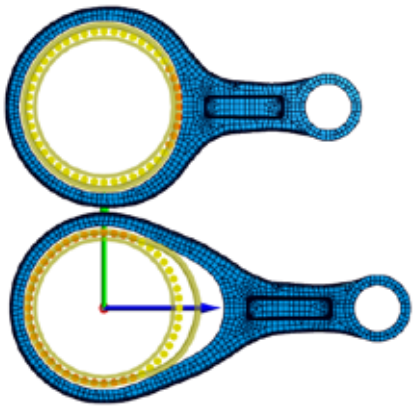
For 3D-elastic parts with elastic bearings, now contact between bearing ring and part can be considered. The fitting is then considered in the contact model instead in the operating clearance of the bearing.

It is now possible to consider centrifugal expansion on 3D-elastic parts. Additional new features for 3D-elastic parts are new possibilities for mesh import and mesh export. Also new faces for connection with supports can now be defined directly within the software.

Visit us at booth #3933 at Motion+Power Technology Expo in Detroit on October 15-19.



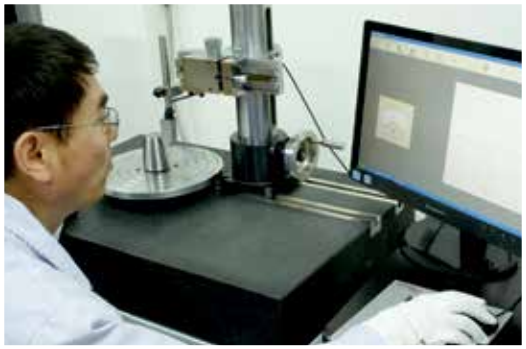
— *Pressure distribution in a wheel bearing after mounting without external loads. Fitting is considered in contact model.*



— *Piston-rod with elastic bearing ring under pressure and tension.*

For further information, please contact:

MESYS AG
Technoparkstrasse 1
CH-8005 Zürich
www.mesys.ag
info@mesys.ch
+41 44 4556800





High-Tech production
for High-Precision Bearings

WBJF BEARINGS 金峰轴承

Wafangdian Jinfeng Bearing Manufactoring Co. Ltd.
No.28 Xi'an North Street,
116300 Wafangdian City
Liaoning Province, CHINA

E: song@wbjf.com
W: www.wbjf.com
P: +86 411 39107728/39107338
F: +86 411 39107007/39107728

Nexen ring drive for
precision rotary motion control in measuring system

— The Compact Ring Drive system (CRD) from Nexen with precision grade bearing and drive mechanism in a sealed housing

Compact ring drive systems from Nexen are used in industrial rotary applications where high positional accuracy and dynamic performance are required. The custom rotary indexer CRD350 was developed jointly with the metrology specialist Mahr for a French automotive manufacturer.

Headquartered in Germany, Mahr GmbH is a global manufacturer of production measuring technology and is active all over the world. From the simple caliper gauge to precision optical measuring systems, Mahr is a key supplier in a wide range of industries including the automotive industry, medical technology, aviation, optics and renewable energies. In many sectors where precision is an essential production factor, equipment from Mahr is at work, delivering supreme accuracy in measuring dimensions, contours and surfaces with the smallest possible tolerances.

— Custom solution from Mahr for measuring an engine component with CRD350 Compact Ring Drive from Nexen

Mahr received the order to develop a customer-specific system for measuring the roughness of a key engine component for a French car maker. To complete the order, Mahr entered into partnership with Unicum Transmission de Puissance, Nexen's sales and marketing partner in France. After a preliminary study which they completed jointly, Mahr and Unicum together developed an innovative solution, the only one of its kind in Europe: the Nexen CRD350 rotary indexer. It is capable of very high positioning accuracy during rotation and remarkable dynamic output.

The rotary table is based on a roller-pinion system. It enables both dynamic movements and an exceptional level of positional accuracy. The performance parameters of the rotary table are impressive: Accurate to 35 arc seconds, maximum speed 94 rpm, maximum torque 564 Nm. Besides these advantages, the Nexen CRD350 is an exceptionally compact drive solution without backlash, requiring no maintenance or lubrication.

"The rotary table includes the Nexen roller-pinion system with a special ring gear and high-performance cross roller bearings for outstanding load capacity and rigidity. The system is mounted on a cast part. The central passthrough of the annular design allows the essential access to the middle of the table, which is extremely convenient for routing electrical wires or inserting other machine components", explains Alain Fourcroy, sales engineer for Unicum. "The application meets the expectations of the end customer in every detail. By combining the expertise of our two companies, we have completed a project unlike any other with complete success."

"Demand and need are at above average levels at the moment", says Jacques Loiseau, special developments manager at Mahr. "For further developments, we want the rotary table to be able to deliver the same accuracy with eccentric loading as well. At the moment, the overhung load is about 250 kg with an eccentricity of 200 mm. Despite the challenges, we were able to satisfy this requirement with complete success: the ability to handle heavy loads with zero backlash."

— The CRD350 Compact Ring Drive from Nexen in the customer-specific measuring system by Mahr

Its low structural height and generally compact design make the ring drive system extremely versatile. Apart from this customer-specific development for Mahr, Nexen CRD ring drive systems are used in a wide range of applications including cutting and gantry systems, medical devices, robots, machine tools, semiconductor production, materials handling and aerospace.

— The CRD350 Compact Ring Drive from Nexen in the customer-specific measuring system by Mahr

Besides ring drive systems, Nexen produces roller pinion, linear and rotary drive systems, industrial brakes, clutches, torque limiters, overload protection devices, and control systems. The company is headquartered in the USA, with their European office based in Wemmel, Belgium. Nexen holds 120 US and international patents. The products are available from over 40 sales offices and more than 1,500 distributor outlets worldwide.

About Mahr GmbH:

Mahr GmbH is headquartered in Göttingen, Germany, and specializes in production measuring technology. Besides high-performance measuring instruments for testing workpiece geometries, extremely accurate gear and metering pumps with high-precision ball guides represent a major element in the company's product portfolio for multifunctional implementation in mechanical engineering projects. For the plastics processing industry, Mahr offers highly precise metered dispensing solutions. As an application specialist in production measuring technology, Mahr provides solutions to its customers' metrological tasks and serves as a consulting partner in all quality-critical questions. The midsize, family-owned company has 1,900 employees and is active worldwide. Internet: www.mahr.com

About Nexen Group, Inc.:

Nexen Group, Inc. is a worldwide leader in power transmission, linear and rotary motion, and tension control components. Nexen holds 120 US and international patents. A privately held company, Nexen traces its origins back to 1902. For nearly 50 years, Nexen has been producing industrial brakes, clutches, torque limiters, overload protection devices and control systems for a variety of industrial applications ranging from packing equipment to sawmills and automobile conveyor systems. Nexen's customers span every industry – from multi-national corporations to small businesses – and range from design engineers to plant maintenance. Headquartered in the USA and with the European office based in Wemmel, Belgium, Nexen has more 40 sales offices and more than 1,500 distributor outlets worldwide. Visit www.nexengroup.com for more information.

GODIVA BEARINGS

PROUD SUPPLIERS OF

IKO

FOR OVER 35 YEARS!

GODIVA BEARINGS STOCK THE ENTIRE IKO RANGE.

EXCLUSIVELY AVAILABLE TO THE TRADE.

DUDLEY
Dudley: +44 (0) 1384 240 005
dudley@godiva-bearings.co.uk

NEWCASTLE
Newcastle: +44 (0) 191 272 5225
newcastle@godiva-bearings.co.uk

The largest warehouse in Italy with 56.000 stock pallets

New branches and distributors all around the world

The most complete and reliable range on the market

STRENGTH POINTS

Bearings production China

Linear System production Taiwan

ISB® INDUSTRIES

SINCE 1981 THE GREEN BRAND FOR YOU

ISB India

Rod Ends production Italy

ISB Shanghai

ISB Spain

ISB Brasil

ISB Central America

AVAILABLE FROM OUR SELECTED DEALERS

isb-industries.com


NACHI
NACHI EUROPE GmbH
OUR SYNERGY
YOUR PERFORMANCE
NACHI BEARINGS
Highest quality – Made in Japan
Outstanding performance and reliability extend
NACHI bearing life. The comprehensive product
range satisfies a wide scope of applications.
MADE IN JAPAN
www.nachi.de
BEARINGS | HYDRAULICS | ROBOTICS | TOOLS