ZKL NEWS

December 2023, Issue No. 65

ZKL GROUP

THE FUTURE OF RAIL TRANSPORT

read more on page 3

CEO Opening speech
page 2

Ongoing investments
page 6

ZKL bearings for agriculture
page 7

Read further in this issue:

Testing laboratory news
page 8

Technical and product training offer
page 9

Successful Succession in Company Leadership

Since January 2023, the ZKL Group has a new CEO. The position has been assumed by the son of the founder, Ing. Jiří Prášil Jr. The current CEO, Ing. Jiří Prášil, CSc., retains the option of strategic oversight as the Chairman of the Board of the ZKL Group.

The past 24 years of building the ZKL Group haven't always been straightforward. However, the company has succeeded in finding and stabilizing a team of individuals with a passion for engineering and a shared vision. Their goals include preserving traditional engineering production in the Czech Republic and establishing the ZKL bearing brand as a quality product at a competitive price.

The incoming CEO, Ing. Jiří Prášil Jr. began working at the ZKL Group even before completing his university studies at the Brno University of Technology (VUT). He successfully defended his master's degree in engineering with honours from the Institute of Mechanics of Solids and Mechatronics in 2011. Starting in 2007, he worked at ZKL as a design engineer, and after graduating from the university, he established the technical analysis department specializing in the finite element method and simulation of bearing applications.

In 2014, he became the head of the technical support department, and in 2015, he assumed the position of production director at one of the group's manufacturing plants. Since 2016, he has been serving as the Executive Director of ZKL Bearings CZ, a.s., responsible for the sale and distribution of products under the ZKL brand.

"Taking over the leadership of the company is a significant commitment to me, towards my family, our customers, and colleagues. I greatly appreciate the trust placed in me," says Jiří Prášil Jr. "We will continue to uphold the company's core values and pursue the vision of becoming a leading global manufacturer of technologically advanced bearings," he further comments on his goals.

Opening Speech

Dear business partners,

Until now, my father, Jiří Prášil senior, has been acquainting you with our results, strategy, and technological infrastructure development. I will continue in this tradition and keep you informed about our company's activities through the company magazine ZKL News.

The market situation is not simple, especially for industrial companies manufacturing in Europe. We are grappling with the impacts of expensive inputs, electricity and gas, and high inflation due to their significant volatility. Even though input prices are decreasing, uncertainty persists. Nowhere else in the world is there such instability in energy prices. Central banks are raising rates to curb inflation. However, many companies rely on credit financing, which means that high interest rates translate into higher costs. High inflation then puts pressure for higher wages for employees, making the industry in Europe less competitive.

Like other industrial enterprises, ZKL is also facing these pressures. We've managed to transfer a portion of the increased costs onto the market, subdued some within internal margins, and handled a part through production rationalization. This has resulted in revenue growth of approximately 6%. We had planned for higher revenues, but considering the decline in demand not only in Europe, we consider this outcome a success.

In terms of revenue, we're succeeding in expanding our business activities in the East, especially in China. Regarding product demand, we're experiencing the highest sales in applications for the railway industry. We've secured orders for bearings used in traction motors, for rail vehicle axles, and for new gearboxes.

We are investing both in our Brno and Klášterec facilities. In ZKL Brno, we are implementing manufacturing and quality control technologies to produce tapered roller bearings, while in ZKL Klášterec nad Ohří, we have successfully completed a project for an automated inspection line for roller bearings used in rail vehicle axles. In both plants, we're also investing in energy self-sufficiency and gradually installing photovoltaic power plants. Thanks to these measures, we expect a reduction in electricity consumption of up to 30% in 2024.

We are in discussions with customers in Poland and Germany regarding potential projects, and in case of successful contracting, we are prepared to invest in a new production line. The line is already in the project phase, and we expect installation to take place at the beginning of 2025.

We've encountered challenges in maximizing the utilization of our available capacity for producing large-size bearings. However, the sales department is actively engaging with new clients for sampling new bearing types. Therefore, I believe that there will be improvements during the period from 2024 to 2025.

The year 2023 was a year of investment for ZKL, not only in the machinery park but also in the development of IT technologies and internal process optimizations. Alongside the IT support department at ZKL, we successfully launched a customer section enabling orders not just from stock but also for free production. We strongly support this development to optimize activities within the sales department.

Moreover, we launched the 'digital factory' module through the corporate intranet, granting access to manufacturing and assembly orders for everyone. This has led to a reduction in internal communication.

There aren't enough pages in this magazine to describe everything we managed to implement during 2023. Therefore, the rest of the details will be revealed at our upcoming customer days, to which you will be invited by ZKL's sales managers. I believe that we will successfully conclude the year 2023 with better financial indicators than in 2022, and we will enter 2024 stronger, all thanks to you—our loyal customers—who prefer collaborating with an experienced bearing manufacturer.

Ing. Jiří Prášil Jr.
CEO of ZKL, a.s.

The Future of Rail Transport

The railway industry is a traditional sector in the Czech Republic with a long history. The production program of bearings for railway vehicles at ZKL GROUP is one of the strategic pillars with increasing importance. It is a segment with a higher inertia of the innovation cycle, but despite that, ZKL works every year on improving and expanding the range of products and services offered.

There's really something to build on. The history of railway transportation in the Czech Lands dates back to the mid-19th century when the first horse-drawn and later steam railways began operating. The strong industrialization of Bohemia and Moravia, followed by the development of new technologies, placed increasing demands on transportation. More goods needed to be transported quickly. Therefore, it's not surprising that railway technology production also emerged here, including companies like Škoda Works, ČKD, and subsequently research and development centres. The tradition of developing and manufacturing railway vehicles and related products for railway or urban transportation has a solid foundation in the Czech Republic.

RAILWAYS – AN ATTRACTIVE AND SUSTAINABLE MODE OF TRANSPORT

The worldwide significance of freight rail transport in individual countries and target trade areas is evident from the map below (freight transport of one ton of goods per one kilometer relative to GDP). The greater utilization of freight rail transport is particularly seen in the transportation of raw materials such as coal, ores, oil, etc., for subsequent processing.

From a technical perspective, these areas can be divided into three main groups according to current requirements:

1) Countries with requirements according to the European Union – standards EN 12080, EN 12081, EN 12082, and technical specifications for interoperability (TSI) based on European Commission regulations.
2) Former Soviet Union countries – Here, bearing requirements are based on GOST standards or national standards derived with minimal deviations from them, such as DSTU in Ukraine.
3) Countries with requirements according to the Association of American Railroads (AAR).

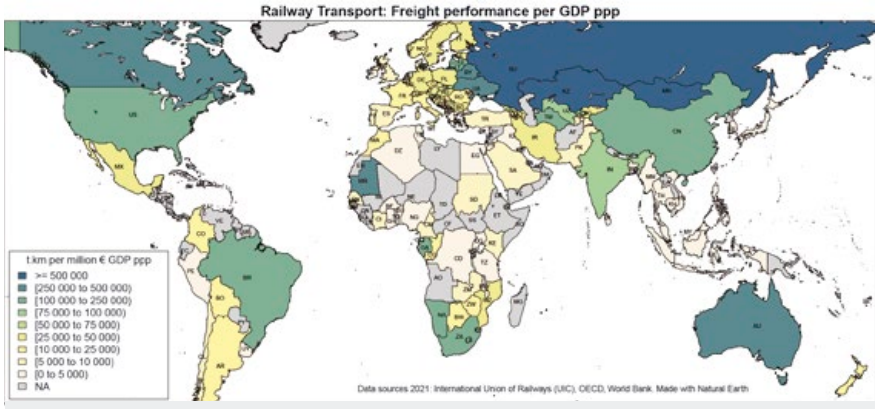
In the long term, there is a global effort within the International Union of Railways (UIC) to unify requirements, but this process, of course, may take decades from obvious reasons.

ZKL BEARINGS – ENGINEERED FOR EXCELLENCE, TRUSTED FOR PERFORMANCE

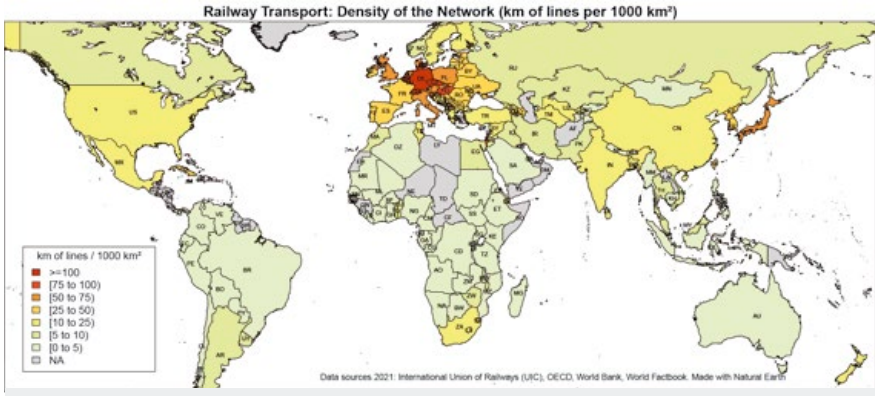
ZKL offers a comprehensive range of bearings for various applications, including in-depth services such as application engineering, consulting, analysis, and refurbishment of ZKL bearing units. Investments are being made in the automation and optimization of the production of axle bearings in the field of metrology and NDT in both manufacturing plants in Klášterec nad Ohří and Brno. Over this year, the development of new types of tapered roller bearings for axles (TBU) and a complete range of bearings for traction drives has taken place. This includes several bearings of type QJ, NU, NJ, including special single-row tapered roller bearings. At the same time, new production capacities are being established to increase the production of this type of bearings in the coming year. Below, we present a selection of some bearing types in serial production or undergoing certification.

"We provide our business partner with fast and original solutions of high utility value. This not only characterizes the ZKL brand but the entire group."

Ing. Libor Nohál
Technical Director of ZKL Group



The second indicator of the importance of railway transportation in individual countries is the density of railroads per square kilometer. Here, we can see that the Czech Republic, along with Germany and Switzerland, rank among the world's leaders. In passenger transportation, we expect development especially in public transport and high-speed rail.



Current developments in the world are changing the market landscape, and especially the decline of certain products in Europe offers an advantageous position for the development of the bearing trade. Among the most significant countries, we include the Czech Republic, Germany, Switzerland, Ukraine, Kazakhstan, Australia, Canada, China, the USA, and Brazil.

Axle bearings for freight wagons

Cylindrical roller bearings are especially suitable for carrying high radial loads and axial shock loads at high rotational frequencies. These

LEARN MORE ABOUT ZKL BEARINGS FOR RAILWAY APPLICATIONS.

continued on next page >

The Future of Rail Transport

> continued from previous page

bearings have an optimized internal design to withstand dynamic forces in both radial and axial directions and to ensure perfect lubrication under all operating conditions. Upgraded versions of the bearings have been certified according to the latest requirements of EN 12082:2017 and TSI.

- WJ/WJP 130x240TNG (PLC 410-33/34.2)
- WJ/WJP 120x240TNG (PLC 410-13/14.2)

Tapered roller bearing units

These are special double-row tapered roller bearings for the support of axles in high-speed passenger and freight rail vehicles. ZKL is investing in modern production facilities as part of the plan to expand the production of next-generation tapered roller bearings in the Brno plant. The installation of new machinery and its commissioning is proceeding according to the plan, and the production of the first CTBU (compact tapered roller bearing units) and single-row tapered roller bearings for customers in the railway sector is already underway. These bearings are designed for comprehensive installation in the traction bogie of rail vehicles, from the axle to the motor. This investment follows the previous development of a new series of long-life bearings.

- TBU 130×230
- TBU 130×210
- TBU 7"×12" (AAR CLASS G)
- TBU 6"×11" (AAR CLASS E)

Compact roller units

Especially for use in suburban trains like EMUs (Electric Multiple Units), ZKL offers several compact roller units.

- CRU 120×215TNG
- CRU 130×240TNG

Bearings for traction drives

New bearing dimensions for traction motors are being added to the already established axle bearings. Special roller bearings in the TM01 design are being developed for foreign customers engaged in the production of diesel-electric locomotives. The design of the bearings uses a massive one-piece brass cage guided on rolling elements of the "EMP" type. The cage design and guiding surfaces are engineered to achieve optimal lubrication of the bearings and low heat generation. These cage types are intended for medium and large-sized traction motor bearings and for high loads, including shock loads.

Another special feature is the ceramic coating on the outer ring of the bearing. The Al2O3 coating insulates the bearing from the external structure, preventing the passage of stray electrical currents through the bearing. The passage of electrical current is a negative phenomenon, as it causes electrical erosion on the raceways of the rings and significantly shortens the life of affected bearings. ZKL bearings for traction motors are designed to withstand the most challenging operating conditions.

ZKL ORIGINAL SOLUTIONS

All the mentioned innovations share several common characteristics. These are products with high added value for the end user, whether measured by reliability, lifespan, low energy consumption, or low life cycle costs. These are primarily ZKL's original solutions protected by patent rights.

TRAINING AND BEARING REMANUFACTURING, OR WE DON'T FORGET ABOUT COMPLEXITY

Our ambition is to provide our customers with comprehensive solutions, not only for railway applications. Therefore, we offer specialized services from our experienced engineers and technicians, including training in the field of railway bearings and bearing remanufacturing. You can learn more on page 9.

As a supplier of railway bearing units, we also ensure their renovation through remanufacturing, which is an integral part of their lifecycle. Renovation must be conducted correctly because an unprofessional intervention in the bearing can lead to its shortened lifespan instead of an extension. Inexpert remanufacturing can paradoxically be the reason for premature bearing failure. An important imperative of the present is also the emphasis on an ecological approach, and this supports the renovation of bearings.

All the steps we are taking in research, development, and production lead to fulfilling the ZKL Group's strategy: to provide our customers with a comprehensive range of railway bearings and complete solutions for a more reliable and safer mobility tomorrow.

Ing. Libor Nohál, Ph.D.
Technical Director and Executive Director of ZKL – Výzkum a vývoj, a.s.

Investments

Introducing Automation for Railway Enhanced Roller Bearings Quality Control

The demand for cylindrical roller bearings for railway applications is increasing year-on-year. To enhance competitiveness in this challenging market, it is necessary to streamline the manufacturing and quality control processes. That's why in 2021, we decided to implement automation and autonomous control procedures, resulting in reduced overall production times and increased productivity.

By automating the finishing operations, we eliminate the human element and its subsequent impact on the final quality of bearings for railway transportation, which is closely monitored and subject to not only high quality but also durability requirements.

Each bearing component that goes through the assembly line is uniquely marked, meaning it has its history recorded, along with all the controlled and measured parameters. This allows us to trace when the bearing was manufactured, inspected, and with what parameters, even after several years. This is made possible by a specific database connected through a superior autonomous control system with the inspection line.

At the beginning of the assembly line, the entire production series of bearing rings is always placed in the input storage. Subsequently, the components are individually fed into the first station of the line, which is the laser marking station. Here, two DataMatrix codes are

laser-marked on each ring, which then identify and link it in each of the following devices, where non-destructive testing or measured parameters are assigned to the respective inspected ring in the database.

Next is the continuous ultrasonic washer, in which the components progress through several parts. The first part is a tank with a cleaning fluid, where impurities are removed from the part using ultrasonic waves. The ring is then moved to a rinsing fluid and transitions to the drying section, where it gets rid of excess moisture. The washer is equipped with cooling to ambient temperature because it is followed by another device - the parameter measurement station. Here, we check the measured parameters with precision to 1 micron. The measuring equipment was developed specifically for ZKL and allows for the evaluation of all critical dimensions and internal geometry parameters. A single inspection fixture will be used to measure all required parameters for all types of rings.

Furthermore, the external surfaces of the components are inspected to identify surface and subsurface defects such as cracks, fissures, inclusions, burn marks, and the like. The inspection is carried out using two robots, allowing for a comprehensive examination of the required inspection area of the bearing ring, which rotates around its axis during the inspection.

The last step is the ultrasonic inspection block. This test reveals defects located beneath the surfaces of the rolling elements of the bearing components. The station consists of two separate positions for testing internal and external rings. After the automated inspection is completed, a manipulator moves the ring from the working area back to the conveyor, which, after assessing whether it's "OK" or "NOT OK," proceeds to the second washer. The second washer, which also marks the end of the inspection line process, cleans, preserves, and dries the bearing components. The rings then exit to the output storage.

The entire line's cycle is designed for continuous operation. Each of the devices communicates with a superior control system, which monitors the line's operation and safety while also ensuring the storage of information in a database. This automatic data collection allows for the sharing of unique data about specific bearings, with online data processing across the entire corporation through the overarching enterprise system.

By implementing the automated assembly line, we have created the technological and economic conditions for the completion of roller bearings with improved performance, intended for use in railway vehicles. Simultaneously, this has expanded the automated CNC-controlled production process of railway bearings, which have been manufactured on a modern production line since 2016, incorporating turning and grinding operations. This improvement enhances working conditions for the operating staff, especially considering that the heaviest component of the bearing assembly weighs 8 kg. Automation of the inspection process eliminates physically demanding tasks for operators while also enhancing the quality and productivity of work.

For this project, we took advantage of a grant opportunity, and in June 2023, we commenced the fully automated inspection of bearing rings.

Ing. Jarmila Bůchová
Project manager
ZKL Klášterec nad Ohří, a.s.

Investments

Strengthening and Development of Industrial Research and Innovation of Thrust Bearings

The range of thrust ball bearings represents a significant amount of the bearing production manufactured and sold by ZKL Klášterec, positioning us among the leading manufacturers in this design category in Europe. The expansion of the portfolio of manufactured thrust ball bearings up to 500 mm diameter was supported by grant projects. In June 2023, the second project, aimed at developing the activities of the Research and Development Centre - "Development of Industrial Research and Innovation of Thrust Bearings in ZKL Klášterec nad Ohří," co-financed by the European Union, was successfully completed.

In the first phase, suitable technology was acquired for ZKL Klášterec, which allows achieving the required quality of the connecting dimensions and raceways of the manufactured bearing rings. This involved machines for precision grinding of inner dimensions and raceways, as well as a superfinishing machine for raceways.

Modern manufacturing technologies were complemented by a CNC grinding machine BRD 420 CNC HP for precision grinding of the sides/faces of bearing components and a CNC BK 420 CNC HP grinding machine for precision grinding of the surface of bearing components. Both machines are also equipped with part feeders.

To further enhance the Research Centre, it was necessary to accurately measure the bearing parts using the most advanced measuring instruments and subsequently evaluate them. KEYENCE VK-X3050 microscope is one of the acquired measuring devices for measuring surface deformations, roughness, and surface structure. It can detect surface changes as small as 1 µm, measuring complex shapes and roughness. Each scan contains nearly 800,000 data points, used for quick 3D surface visualization and evaluation, it enables more precise analysis of manufactured surface. The microscope simplifies roughness control and ensures immediate optimization of technological processes used and verified in the research phase of new projects.

Another acquired measuring instrument is the Talyrond 585 PRO (HS) roundness gauge, which can measure roundness deviations on bearing raceways, surface cylindricity, holes, and rotational surfaces, as well as flatness of end faces and other flat surfaces on bearing components. It is a highly precise, computer-controlled model for measuring rotationally symmetric workpieces. It features high positioning speed, automatic centering and levelling, maximum accuracy, a large measurement volume, and the ability to handle very heavy workpieces. It is automatically positionable with freely definable sensor system angle settings, equipped with ABS scales in the X and Z axes, and has a fully automatic rotational and pivoting sensor system. The Talyrond 585 PRO gauge enables the inspection and measurement of less accessible areas on bearing rings, such as raceways. It significantly decreases the manpower needed for measurements, thereby expediting and improving the confirmation of established parameters.

The measurement research centre also included the acquisition of the MPTR-20PC/AQ instrument, which is designed for measuring the absolute value of the radius, shape deviations, and distances from the end face in a single plane of the raceways of thrust ball bearings. Its design is intended for use in manufacturing measurement laboratories and research centres.

All these technologies, both in manufacturing and measurement, support the further development of thrust ball bearings from 190 mm to 500 mm diameter. There is a significant improvement in the quality parameters of the bearing's functional surfaces, a reduction of rolling friction loss, resulting in an extended lifespan and reduced energy consumption during operation.

Ing. Jarmila Bůchová
Project manager
ZKL Klášterec nad Ohří, a.s.

Contributing to Energy Resource Conservation

Like other corporate buildings, the manufacturing facility in Klášterec nad Ohří has undergone initiatives aimed at conserving key energy resources, including electricity and heat supplied through the central heat supply system.

Further reduction in heat consumption was achieved by improving the thermal properties of the facility. Around the entire perimeter of the production hall and covering a total area of nearly 15,000 square meters, all openings – doors, gates, and windows – were replaced with materials that have the desired thermal insulation properties. Additionally, the building's exterior shell was insulated and then adorned with a new facade finish. An integral part of these measures included insulating the entire roof of both the production hall and the administrative section of the building, along with necessary replacements of roof skylights and the installation of new plastic roof covering.

During the roofing installation, we prepared for another investment project related to energy savings, specifically the establishment of a photovoltaic power plant with an installed capacity of 925 kWp. We plan to commence electricity production from renewable sources at the beginning of 2024. All the electricity generated by the sun will be used for our own consumption, leading to further savings not only in energy but also financially. These saved funds will be allocated towards the refurbishment of additional production machinery or the planned revitalization of the premises and engineering networks.

Ing. Jarmila Bůchová
Project manager
ZKL Klášterec nad Ohří, a.s.

Enhancing Agricultural Equipment Efficiency with ZKL Bearings

Agriculture is a vital industry that sustains the entire planet. When cultivating crops in the fields and subsequently harvesting them, farmers rely on favourable weather conditions, as they need to gather as much yield as possible in a short time. Due to these demanding and uncontrollable circumstances, they must depend on the safe and trouble-free operation of bearings in agricultural machinery. At ZKL, we are acutely aware of this. Our bearings offer long-term and reliable machine performance under any climatic conditions.

ZKL bearings are designed to withstand the extreme demands of agricultural machinery operation. Tractors, combines, self-propelled forage harvesters, cultivation equipment, hay balers, rotary hay rakes, plows, spreaders, seeders, and other tractor accessories are built as field working machines and aren't always handled gently. Agricultural machinery relies on high-performance roller bearings for their operation. Such bearings often have non-standard dimensions, work exclusively during the seasonal period, are exposed to moist and dusty environments, and face variable loads. ZKL places great emphasis on material quality, heat treatment, and precise manufacturing processes. Only bearings manufactured in this manner can be relied upon by farmers during the peak seasonal work.

The most frequently requested types from the ZKL product range are:

- standard single-row or double-row ball bearings
- self-aligning ball bearings
- sealed angular contact ball bearings
- stainless steel ball bearings
- special ball bearings
- standard tapered roller bearings
- cylindrical roller bearings
- special double-row spherical roller bearings
- mounted bearings type UCF, UCP
- spherical plain bearings type GE, GEH

Therefore, ZKL offers a wide range of bearings for agriculture. From standard ball, roller, tapered, and spherical bearings to stainless steel, sealed, self-aligning, needle, and even mounted and special bearings. In addition to the comprehensive selection of standard bearings, ZKL is highly flexible when it comes to developing custom solutions for its customers.

Widely used are **bearings with a hexagonal hole**, which find application in many cultivation machines, from soil preparation before sowing, through sowing crops, to subsequent soil treatment after harvesting.

In addition to bearings with a hexagonal hole, there are also **bearings with a square hole** available, which provide solutions for forage harvesting machines. These are bearings for auger conveyors, input drums, feeding drapers, cutting rollers, and fans. They also offer solutions for wheel mounts and chaff separators.

A significant portion of bearings for agricultural machinery consists of **mounted bearings**, which are composed of a double-sealed single-row ball bearing with a spherical outer ring. Such mounted bearings can be purchased separately or as a complete unit, where the bearing is directly mounted in a housing cast from cast iron or stamped steel. There are two types of housings: pedestal and flanged. The bearings are filled with high-quality ZKL lubricants, and the housing features a grease nipple for lubrication. This type of bearing is designed for applications where they are used as guiding bearings or for the purpose of accommodating short shafts in disc harrows, seeders, cultivation equipment, and other agricultural machinery.

ZKL consistently provides **bearings for structural units** that meet the specific needs of particular applications in tractor engines and transmissions. Tapered roller bearings of metric or inch dimensions are used here, as well as double-row spherical and ball bearings for axles, auxiliary drives, output shafts, multipliers, wheel hubs, planetary gearboxes, differentials, and reducers, for example.

Are you interested in the topic of agricultural bearings? For detailed information about this product range and its benefits, please contact our Technical Support Department.

Ing. Adam Líčeník
Application Engineer
ZKL – Výzkum a vývoj, a.s.

Examples of commonly used ZKL bearings with a hexagonal hole

ZKL bearing	d [mm]	D [mm]	B [mm]	Cr [kN]	C0r [kN]
204KRR2	17,65	47	20,96	12,80	6,70
205KRR2	22,25	52	25,40	14,02	7,88
207KRRB12	28,60	72	25,00	25,67	15,30

Examples of commonly used ZKL bearings with a square hole

ZKL bearing	d [mm]	D [mm]	B [mm]	Cr [kN]	C0r [kN]
W208PPB5	29,970	80	36,52	30	18
W208PPB6	26,162	80	36,52	30	18

Examples of ZKL mounted units

ZKL bearing	d [mm]	D [mm]	B [mm]	Cr [kN]	C0r [kN]
UCP204	19,05	47	31,0	12,84	6,65
UCF205	25,40	52	35,7	14,02	7,88
UCF208	40,00	130	51,2	29,52	18,14
UCF209	45,00	137	52,2	31,67	20,68

Contact details:
ZKL – Výzkum a vývoj, a.s.
Technical Support Department

support@zkl.cz

+420 544 135 412

News from the Testing Laboratory

In ZKL, we have a testing laboratory equipped with machines for rolling bearing testing and material contact fatigue testing. We provide material analysis, lubricant analysis, and metrology of rotating parts. We asked Jakub Němeček, the head of the ZKL – Výzkum a vývoj Testing Laboratory, about the next solved issues and news.

Analysing Industrial Surface Treatments: Does Your Surface Finish Meet Your Needs?

■ ***Why should you be interested in surface finish analysis?***

Are you dealing with corrosion? Do you need to prevent electrical current leakage through your product? Do you want to extend the lifespan of product parts and enhance resistance to wear?

The clear answer to these problems lies in the surface treatment of materials through coating, spraying, or chemical-thermal processing. Our hi-tech laboratory equipment is dedicated to the analysis of the surfaces of metal materials used in the machinery industry. This primarily involves surface treatments that protect the material from corrosion or wear. For these purposes, coatings are typically used, however each coating has its specific properties and applications.

■ ***How do we examine coatings?***

The thickness of coatings ranges from a few micrometres to tenths of millimetres. Exploring such small dimensions requires significant magnification under a microscope. For these purposes, we use an electron microscope.

In our laboratory, we have the **TESCAN VEGA** scanning electron microscope at our disposal, which enables us to observe:

1. The microstructure of the surface with nanometre-level resolution.
2. Surface topology using a combination of detectors, including material defects assessment (cracks, inclusions).
3. Material chemical composition using an EDS detector, including distinguishing between the material and the surface layer composition.

Producing Plastic and Rubber Moulded Parts? Do you have quality control equipment for these parts?

Parts made from plastics or rubber using moulding may have a different shape than the mould. Measuring thin-walled parts by touch method is challenging due to their low stiffness.

■ ***How to inspect these parts?***

We perform the inspection of flexible or complex-shaped parts using optical 3D scanning. This method involves projecting patterns onto the inspected part and capturing them with two cameras in a defined position. Image processing from the cameras allows for identifying the shape of the parts with accuracy to a hundredth of a millimetre.

The device also includes a rotary table for inspecting multiply symmetric parts, such as bearing cages, for example.

■ ***What kind of instrument is it?***

This is the **ATOS Q 12M 3D scanner**, which can:

1. Capture a point cloud and create a real component model - compare this model with the design CAD model and assess deviations.
2. Provide more information about the point cloud on a small, functionally crucial surface than traditional 3D measurements on a formed part.
3. The non-contact measurement method is suitable for flexible or complex-shaped components that are challenging to measure using conventional approaches.

Do you perform surface heat treatment on steel parts? Do you know the hardness and the depth of hardened layer of the final surface?

■ ***What is it good for? A practical example***

A customer approached us with a crack in their component. After checking the drawing,

we found that it was in a location with a surface heat-treated layer.

■ ***Cause analysis***

The crack occurred at the point where the heat treatment starts technologically. Due to the technology, the termination of the heat treatment affected the already quenched area, causing it to tempered. The area did not have sufficient hardness, and additional stress was induced in the material. The crack was a result of the heat treatment process.

■ ***How did we find out?***

By checking the hardness in the vicinity of the crack using the **Microhardness Tester ATM Q30 CHD Master+**.

1. The device assisted us in hardness checks at specified points around the crack.
2. The point placement was done through the use of a camera and precise positioning.

Are you interested in these analyses? We can utilize our available capacity specifically for you.

Ing. Jakub Němeček
Head of Testing Laboratory
+420 544 135 371
jakub.nemecek@zkl.cz

ZKL NEWS
ZKL Group Magazine
This Issue: December 2023
Run by Editorial Board
For needs of ZKL Group published by ZKL, a. s., Jedovnická 8, 628 00 Brno
Phone: +420 544 135 403
Fax: +420 544 233 484
Editor in Chief:
Ing. Hana Luxová,
Ing. Libor Nohál, Ph.D.
Registered at Ministry of Culture of Czech Republic under Ref. No. E 11989.
Type Setting and Print:
Ideal Graphics s. r. o.
www.ideal-studio.cz

Mastering the Know-How: Let Us Train You Too!

You can find ZKL bearings in gearboxes, railway bogies, rolling mills, mining hoists, industrial fans, and agricultural machinery. Each of these applications has different operating conditions, bearings are lubricated in various modes, and their assembly and disassembly are carried out using different methods. If you are looking for advice on the design, selection, assembly, operation, and disassembly of bearings, please contact our application engineers.

We asked Tomáš Novák, the Head of the Technical Sales Support Department, about the training provided.

■ ***What training do you offer?***

Our qualified engineers are professionals in all areas - in application engineering, experts in bearing assembly and lubrication. They are willing to provide you with specialized training not only on basic topics but often expand it according to customer preferences. This helps improve your knowledge of bearing products and prevent premature bearing failures.

■ ***Why are training sessions important?***

Up to one-sixth of all premature bearing failures are caused by improperly performed assembly. Therefore, both the assembly and disassembly of bearings require well-trained and experienced personnel, cleanliness at the workplace, and appropriate tools and equipment. At ZKL, we have a team of experienced assembly engineers who will assist you in assembling and disassembling standard and special bearings anywhere in the world.

The same applies to bearing lubrication. Up to one-third of all bearing failures are due to incorrect lubrication. Therefore, it is crucial to know what type of oil or grease to use for lubricating the bearing during operation, how often to change it, and in what quantity to replenish it. All this information can be obtained through our training sessions.

■ ***Where are the training sessions held?***

We travel around the world to serve our customers, but we can also conduct training sessions in the form of webinars. Practical training on bearing assembly and disassembly can be completed in our specialized assembly workshop at ZKL headquarters in Brno.

■ ***In which languages do you offer training?***

We primarily conduct technical training in Czech, English, and German.

■ ***What will you gain from the training?***

In addition to new knowledge and practical skills, we can also prepare assembly and maintenance manuals for you upon request, such as those for railway bearings, bearings for wind energy, split bearings, and others.

■ ***So, what types of training can we order from you?***

We offer training in the following areas:

• Introduction to Roller Bearings (4 hours)

Our training will help you gain an overview of the roller bearing range. You will become familiar with the basic principles of classification and marking. You will be able to assess the suitability of a specific bearing for a particular application.

• Selection of Roller Bearing Arrangements (3 hours)

You've finally found the suitable bearing for your application, but you're not sure what to do next? Our training will provide you with an overview of proven roller bearing arrangements. You will learn how to properly design seating surfaces on the shaft and in the housing. You will gain knowledge about bearing clearance and its impact on durability.

• Mounting and Dismounting Procedures of Roller Bearings (3 hours theory, 3 hours practical)

Did you know that up to one-sixth of premature bearing failures are caused by improper assembly? Our training will provide you with an overview of verified mounting and dismounting procedures. You will learn how to use mounting tools correctly. You will practically test 5 mounting and 4 dismounting methods in our training room. You will learn about the challenges of cold and hot mounting.

• Roller Bearings Lubrication (3 hours)

Are you facing a challenge in choosing the appropriate lubricant? Our training will provide you with knowledge in the field of lubrication with greases and oils. You will learn how much lubricant to apply during initial assembly and at what intervals to reapply it. You will also understand the importance of maintaining cleanliness and the role of temperature in the process.

• Roller Bearings Failures and their Causes (3 hours)

You've done everything correctly, but the bearing still fails? Our training will provide you with an introduction to the topic of failure cause analysis. We will explore common causes such as material fatigue or inadequate lubrication. With the increasing electrification, there is also a need to pay more attention to the passage of electrical current through the bearing.

■ ***Can you provide some examples of completed training sessions?***

After the period of the coronavirus when we conducted online training, we returned to in-person training last year. We have completed several training sessions primarily focused on bearing assembly and disassembly. Other topics covered in the training included bearing defects and damage, as well as the evaluation of bearing suitability for further operation. Our range of customers is very diverse, including a German railway bogie manufacturer, a Czech company in the raw materials mining sector, and, last but not least, the Czech division of a South Korean company producing components for the automotive industry.

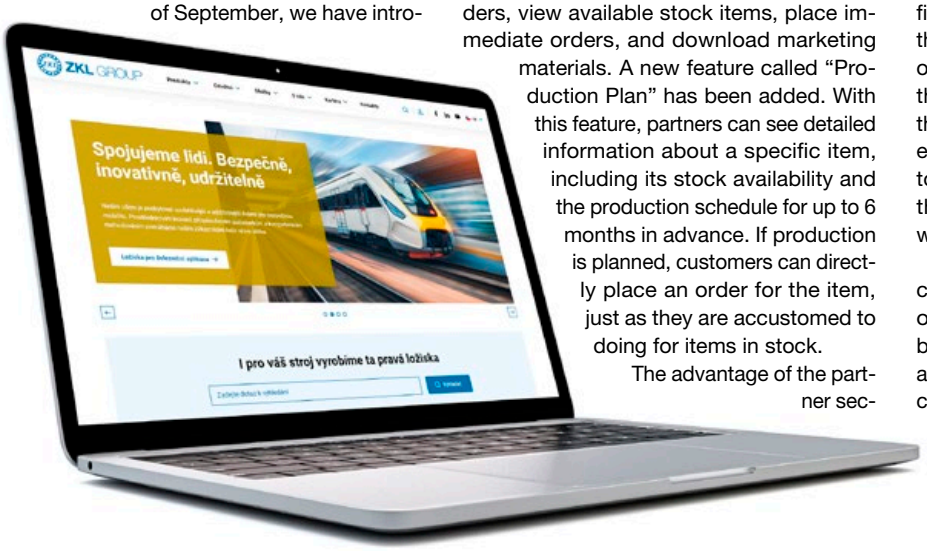
Ing. Tomáš Novák
Head of Technical Sales Support Department

In 2020, he successfully completed his studies at the Faculty of Mechanical Engineering of Brno University of Technology. As part of his education, he also spent a semester at the Technical University in Darmstadt, where he gained a wealth of life and professional experience. Since 2020, he has been working at the group company ZKL – Výzkum a vývoj. Even in the final year of his studies, he took on a part-time position as a Junior Application Engineer, and after passing his final exams, he smoothly transitioned into a full-time role. Today, he holds the position of Head of the Technical Sales Support Department. *„Our primary objective is to incorporate customer requirements into our products and manufacture competitive roller bearings in the Czech Republic. While it may appear that bearings are a mature technology, there are still new developments to be made. Notable challenges include bearings used in wind turbines or bearings in the drives and axles of railway vehicles,“* says Tomáš Novák.

Contact details:
ZKL – Výzkum a vývoj, a.s.
Technical Support Department
support@zkl.cz www.zkl.cz
+420 544 135 412

Enhancing Customer Services

We have successfully extended our commitment of improving the customer service also to the online environment. At the end of September, we have introduced new features on our website.



After logging into "ZKL Partner Section", customers can check the status of their orders, view available stock items, place immediate orders, and download marketing materials. A new feature called "Production Plan" has been added. With this feature, partners can see detailed information about a specific item, including its stock availability and the production schedule for up to 6 months in advance. If production is planned, customers can directly place an order for the item, just as they are accustomed to doing for items in stock.

The advantage of the partner section is that our customers have access to information whenever they need it. Ordering through the website saves them time. If they find an item on the website, they can place the order immediately without the need to call or email a ZKL sales manager. Orders sent through the website are directly entered into the SAP information system, and our managers processes them. If the customers prefer to search for items in Excel, they can export the production schedule displayed on the website to a CSV file and work with it further.

We firmly believe that this innovation will contribute to streamlining and accelerating our work and the development of mutual business with our partners. If you don't have access to the 'ZKL partner section' yet please contact our sales representatives. We will be happy to set it up for you.

Ing. Hana Luxová
Marketing
ZKL Bearings CZ, a.s.

Authorized Distributors Conference 2023

On 11 May, the traditional conference of authorized distributors of the ZKL brand took place. This year we were visited by distributors not only from the Czech Republic, but also from Central, Eastern and Western Europe.

A block of lectures was prepared for the distributors at the ZKL Group headquarters followed by a tour of the production. In the Brno plant, the guests got acquainted with the new developments in production, saw the modernized production halls and the newly acquired machinery for the expansion of the production of railway bearings in Brno.

For the afternoon and evening programme, the conference participants moved to the South Moravian town of Lednice. They took a tour of the castle park and a boat ride to the minaret. Those who did not hesitate to climb the 302 steps could admire a beautiful view of the surrounding landscape of the Lednice-Valtice area. The late evening was enjoyed in a friendly atmosphere with discussions over local Moravian wine and beer or dancing.

We would like to thank all guests for their participation, and we look forward to the next meeting.

Ing. Hana Luxová
Marketing
ZKL Bearings CZ, a.s.

News from Latin America

In Latin America, the year 2023 brings new challenges due to the global crisis associated with high living and production costs, the ongoing war in Europe, and significant climate instability in various parts of the world. In this situation, it is crucial to continue reaching agreements with our customers to collectively adapt to what lies ahead and find the best options and solutions together. Therefore, at the end of November 2022, a business trip to Argentina was conducted by Mr. Jiří Prášil Jr., the Executive Director of ZKL Bearings CZ, and Mr. Radovan Brila, the Sales Manager for the Latin American region.

Together, we visited our strategic partners, Rodamientos Iriondo S.R.L., Lagger y Pandolfi S.R.L, Rodamar S.R.L, and Tottis S.A., with whom we have maintained close relationships for over 25 years. We discussed mutual expectations for this year, considering global and regional contexts. We touched on various issues related to economic policies and climate changes affecting the region's foreign trade. We talked about the worst drought since 2018, which affected countries that are significant grain producers - Argentina, Bolivia, Paraguay, and Uruguay in the first half of the year.

We also met with representatives of the Peruvian company IDRE S.A. They presented us the project of opening their own warehouse in 2024 in the port of Chancay. Located 60 km from Lima, Chancay is the largest port in Latin America, which aims to transform the country into the first logistics centre in the Pacific. The project is expected to bring new business opportunities, which we view positively for our continued presence in the region.

Our partners also provided recommendations regarding the development of certain types of bearings for agricultural machinery. These suggestions are carefully analysed on our part. Mayfer S.A., in collaboration with two other official distributors, Lagger y Pandolfi (Argentina) and Automovil Supply S.A. (Paraguay), have been working together to expand the product range. Over the past two years, we have successfully developed and added various products to our range, such as stainless-steel bearings, air conditioning bearings, certain types of bearings for agricultural machinery and equipment, and more.

In the second half of this year, we have been working intensively on brand acceptance in the railway and steel sectors in the Latin American region. We are developing this project primarily in collaboration with Rodamar S.R.L., with whom we have agreed to achieve this goal. In September, we visited our distributors in Brazil, which is a significant market full of challenges that we believe we can capture under certain conditions. We are also expanding cooperation with OEM customers in the industrial manufacturing sector. We have had positive experiences in Argentina, where these customers trust not only our traditional quality but also our ability to adapt and mutually achieve a better and more efficient delivery plan, which is currently essential for the proper development of our business activities.

Finally, we would like to express our gratitude to all our official importers and distributors who, despite numerous unfavourable scenarios and predictions, continue to demonstrate their commitment to our brand by consistently achieving better results. We hope that global and business conditions will allow us to achieve increasing sales year after year.

Pablo Méndez
ZKL Rodamientos S.A.

Contact details:

Pablo Méndez +54 9 11 3944 – 6505
Silvina Tomassoni +54 9 11 6241 – 7681
Edson Almeida +55 11 9 8197 – 6117

pablomendez@zklgroup.com.ar
stomassoni@zklgroup.com.ar
soporte@zklgroup.com.ar

Pablo.mendez998
stomassoni
edsonzkl3010

zkl_rodamientos_sa

www.zkl.eu

Recapping Rail Business Days 2023

From June 5th to 7th, we participated in the international Rail Business Days exhibition in Ostrava, dedicated to railway transportation. At our booth, we showcased solutions for more reliable and safer mobility, including various exhibits from our extensive range of railway bearings.

After last year's event at the Brno Exhibition Centre, the exhibition returned to its traditional home in Ostrava. However, this year's event took place at a different location, the newly renovated Trojhalí Karolína complex, which provided a representative venue for the exhibition and its accompanying conference.

Visitors had the opportunity to see several premieres on the tracks. For the first time, the RegioFox unit and the three-car RegioPanter for Czech Railways were on live display. Another novelty was the double-decker KISS EMU unit for the ZSSK carrier.

Both exhibitors and visitors expressed great satisfaction, reflected in the closing figures: over 8,000 attendees from various professional and public backgrounds, 113 exhibitors inside and outside the exhibition area, 13 displayed vehicles on 525 meters of tracks, and three days filled with lectures, business negotiations, and networking.

Ing. Hana Luxová, *Marketing*

A Glimpse into Corporate Life

At the ZKL Group, we have long been striving to create a pleasant working environment. We are aware that interpersonal relationships in the workplace are crucial for the smooth operation of the company and individual teams. Therefore, we regularly organize events for our employees. Some of these are intended only for employees, while others are open to their family members as well. These events include Family Day and the cycling and hiking event. Both activities have a long-standing company tradition and provide an opportunity to show our families where we work or to meet with colleagues in a relaxed informal atmosphere.

ZKL Family Day

Family Day in Brno

Family Day in Brno took place on Saturday, June 16th. Family members had the opportunity to visit the production facilities during guided tours. Children participated in a game called "ZKL Treasure Hunt" during the tour. By collecting clues, they eventually assembled a prototype of the newly manufactured bearing. Those who correctly solved the puzzle received a sweet reward at the end of the journey. As part of the tour, it was also possible to make a short excursion into the newly renovated Hall No. 32, which is gradually being equipped with new technology to expand the production range of railway bearings at ZKL Brno plant. Participants could even try their hand at assembling serial production bearings.

During Family Day, children had a blast with various attractions, whether it was castles with slides or smaller challenges that tested their skills and coordination, competing with a "balloon" clown. For the older kids and their parents, there was a bull riding activity, and the best performers were rewarded with tangible prizes.

Family Day in Klášterec nad Ohří

We have been organizing the Family Day at our production plant in Klášterec nad Ohří since last year. This year, the popular event took place on September 2nd and was designed as a farewell to the summer.

The weather was lovely, allowing the children to enjoy all the prepared attractions and competitions to their heart's content. There was a big inflatable castle with a slide, as well as wooden medieval games. Face painting, helium-filled balloons, and horseback riding were also part of the fun. The skills of working with horses were demonstrated throughout the event. Members of the local volunteer fire brigade created foam for the children, providing them with plenty of space to play around.

A novelty was the opportunity to try remote-controlled car models. For young drivers, there was a track with a challenging terrain where they had to skillfully and without collisions maneuver their assigned car or tracked vehicle.

Most of the attendees took the opportunity to visit the entire production hall, guided by the Executive Director Miroslav Bárta and Production Director Jiří Seidl.

Refreshments were available throughout the event, and at the end, children could choose from a large variety of prepared gifts using their competition cards. The highlight of the event was a raffle in which all attending employees had a chance to win.

Both events were successful, and everyone enjoyed them in beautiful weather. We thank all for their participation, the organizers for a wonderfully prepared event, and look forward to seeing you next year!

Dagmar Vymazalová
and Jarmila Bůchová
Head of event teams of ZKL Brno and Klášterec nad Ohří

Group Cycle Tour 2023

A sports day is an ideal informal occasion for employees from both of our production plants to come together. Every year, we always look forward to going on a bike ride or a hike together, whether in the vicinity of Brno or Klášterec.

This year, we headed to Křivoklátsko region. The cyclists had a challenging 66 km ahead of them. They set off from the hotel towards Krakovec Castle, where the famous Czech fairy tale "Long Live Ghosts" was filmed. Along the way, they enjoyed the views from the lookout tower on Senecká hora, not far from Rakovník. Afterward, they made a stop for renowned ice cream in Senomaty. Then, they visited Křivoklát Castle. From Křivoklát, they cycled along the river to pub "U Rozvědčíka", where they had a well-deserved lunch, relaxed, and embarked on their journey back to the hotel.

Hikers took a bus to Křivoklát Castle. Here, we split into several groups, each choosing their program and route back to the hotel. The longest route was about 18 km, and we truly have hikers among us who covered the entire route on foot. They deserve a great admiration from the rest of us.

After an afternoon of relaxation at the hotel and a delicious dinner, friendly conversations continued well into the night. Like every year, this corporate trip was a pleasant break from our workdays and an opportunity to get to know our colleagues better.

Lucie Drdová
Head of event, ZKL Klášterec nad Ohří, a.s.