

ZKL NEWS

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ZKL GROUP

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Opening speech



Dear Business Partners,

In southern Moravia, the month of September is associated with two major events. It is the harvest of grapes at South Moravian vineyards, the so-called vintage, and the Inter-

national Engineering Fair in Brno. This time of the year can be considered one of the most pleasant times to get cheered up. This autumn, however, is different from the previous ones, due to the ever-worsening mood of the business environment stemming from the expected economic development of the industry in Europe and in the Czech Republic as well. How does this mood affect the ZKL Group companies? The answer can be found in the published results of the first half of 2019.

The comparison with the 1st halves of the previous years shows improving results and trends in both the sales and the labour productivity, as well as the efficiency of manufacturing processes in the two main manufacturing plants – Brno and Klášterec nad Ohří. It is mainly due to the supplies of bearings in the power engineering sector in Europe, India, China, and then the increased demand for bearings for railway transport.

Indicator	1-6/2017 reality	1-6/2018 reality	1-6/2019 reality	2018/2019 index
Revenues from sales (CZK thous.)	533 033	550 742	575 972	1.05
Added value (CZK thous.)	206 282	198 526	221 640	1.12
Result from operations – EBITDA (CZK thous.)	64 924	60 964	77 068	1.26
Productivity (Added value / Personnel expenses)	1.39	1.30	1.41	1.08

Given that the results of the 1st half of 2019 show an improvement, one could say that our businesses are outside the branches, which are currently affected by the decline in demand. Such industry is mainly the manufacturing of components for the automotive industry. We only supply bearings for the automotive industry in a special design for transmissions and fitting race cars wheels, and therefore this particular commodity's volume is not significant for our production. For this reason, it can be expected that the decrease in demand might not be that important for our businesses.

Where are ZKL bearings heading for, and who is buying our products? The engineering discipline of the ZKL roller bearings and its development lies upon the following foundations:

- Developing the awareness of the traditional ZKL brand, which has since the second half of the last century been associated with the industrialisation of many countries in Asia, Eastern Europe and South America.

- The development of trade with ZKL bearings in more than 80 countries worldwide.
- Administering a portfolio of about 400 customers.
- Technical and production potential for the manufacturing of bearings from 100 mm to 2000 mm in diameter, both in the technology and in the personnel area.

The management of the ZKL Group is oriented towards the development of these factors in our growth, and therefore I believe that we will be able to skip the generally expected recession of the Czech industry.

I wish all our customers a lot of success in their business life. We will be very pleased if you decide to use ZKL bearings for your business. At the same time, let me invite you to the autumn Engineering Fair that is held in Brno, where in our stand we will be ready to introduce our new products and an exhibit that is designed for the contest for the 2019 Best Innovative Product.

Ing. Jiří Prášil, CSc., *General Manager of ZKL, a.s.*

We are introducing the authorised dealer of ZKL bearing products in the Slovak Republic: DEXIS SLOVAKIA has long been an authorised distributor of ZKL

DEXIS SLOVAKIA has been operating at the Slovak market since 1991, when it was created by merging DELUX s.r.o. and SLS-TECHNACO s.r.o. It gained its place in the market as a leading supplier of personal protective equipment, hygiene products, bearings and bearing technology, spare parts and solutions for industrial consumers on the Slovak market. The company is a member of a multinational group Descours & Cabaud, whose tradition lasts for over 235 years. The Group also operates in 13 countries, has a network of 600 branches with more than 13 thousand qualified employees.

DEXIS SLOVAKIA is a leading industrial distributor and provider of advanced solutions and services that our customers like to use in order to reduce total acquisition costs. The segment that currently requires optimisation is the seg-



ment of substitutional consumption which, thanks to the expanding cooperation between ZKL and DEXIS, is provided regularly also to our customers. The main tools of modern purchasing, logistics and warehousing tools in DEXIS SLOVAKIA include:

- **B2B portal** for perfect management of outsourcing materials to customers and monitoring company expenses, level-to-level approval, managing consignment stock, linking purchased item and customer's cost centre.
- **SafetyBox dispensing machine system** – it's good to have things under control.

- **Packaging** of goods for employees or machine (spare parts kits).
- **Private e-shop** precisely tailored to customer needs.
- **DEXIS ZPS** – your sheltered workshop providing compensation.
- **Expert advice** through product managers.
- **Machinery diagnostics.**

Successful operation and growth of DEXIS on the market is closely connected with the ZKL brand, not only as its authorised distributor, but also as a leading and strategic partner of ZKL Bearings CZ a.s.

DEXIS – proud distributor of ZKL

2019 Distributor's Conference



The Distributor's Conference is a traditional event organised for the authorised distributors of ZKL brand. The first meeting took place in 1993 in the beautiful surroundings of Brno dam at Kozi horka (Goat's Hill). Major Czech and Slovak companies were invited to the event and cooperation in the distribution of the ZKL bearing range was discussed. The result of this meeting and those that followed was an establishment of an authorised distribution network in the Czech and Slovak Republics.



After several years, the purely Czech-Slovak event has become a large-scale conference. Some distributor companies from Central Europe, especially Austria, Poland, Germany and Italy, joined the guests of the conference.

The biggest event so far was the conference to the 70th anniversary of founding the ZKL Brno factory. It took place in 2017 and was attended by guests from all over the world, including India and China. On the occasion of this important anniversary, a space for presentation was given to our representatives from foreign subsidiaries. They then shared their experiences and problems they were facing in their territories. The best distributors were officially awarded by annual plaquettes.

Regular conference attendees include not only long-term authorised distributors of our brand, but also new business partners. The



initial part of the conference containing business and technical presentations, followed by a guided tour in the premises of the ZKL Brno factory, is especially intended for new partners. However, even long-term business partners of the event find the conference valuable due to shared innovations and experiences in the field. The informal part of the conference then gives space to all to have fun together when enjoying good food and drinks, engaging in discussions and deepening business relationships. In today's Internet age, personal meetings and shared experiences are very important and are the basis for building a well-functioning long-term cooperation.

programme. It was held in the nearby Moravian Karst, which is world known for its stalactite caves, Macocha Abyss, prehistoric cave findings in the Bull rock (Byčí skála) and the Shed cave (Kulna). The guests then had a tour of the famous Punkva caves with a boat ride on the river Punkva. The day ended at the Rock Mill (Skalni mlyn) in friendly debates over Moravian wine, Czech beer and dancing.

We would like to thank all participants for coming, and we are looking forward to our next meetings.

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



Interview with Jiří Šafek, Executive Director of ZKL – Výzkum a vývoj



Mr Šafek, first of all, could you please outline the history of Research and Development in ZKL?

The history dates back to 1953, when the Research Institute for rolling bearings was founded in Brno. It was used as a development and technology base for the needs of the then Czechoslovak bearing industry. In 1999, this activity was taken up by ZKL – Výzkum a vývoj, a.s. (Research and Development, (R&D), JSC), which celebrated 20 years of its existence this May.

Is this company then the direct successor to the original Institute?

Yes – in the construction – design – and testing of bearings. Among other things, it took over the research archive from the Institute, as well. Some workers, including my predecessor Vladimír Zikmund, moved smoothly from the former research institute for rolling bearings to the newly formed company ZKL Group. It is yet interesting that the original Institute still exists, but operates in a completely different sector.

Let's move to the activities of the current R&D – could you introduce the main sections?

The company consists of three departments. In terms of research, the main bearer is the Department of Design and Technical Calculations. It is driven by design engineers and CAE engineers, who are engaged in the research and development of new types of bearings, as well as in the creating of drawings of already developed types of bearings.

Can you be more specific?

A good example might be the creation of our premium range of bearings named New Force, which we have begun developing several years ago. We have been progressively supplementing these series to make it as integrated as possible. I can also mention the development and design of bearings based on customer requirements, when we are outlined the intended application of the bearing, including its parameters that the bearing has to comply with. We are then able to design a bearing that is tailored to the customer.

What are other departments engaged in?

Another cornerstone of the company is the testing laboratory. It has yet several functions – firstly, bearings developed and designed by the design department are tested there. Secondly, the testing laboratory collaborates with manufacturing plants. The collaboration is aimed both

at verifying the quality of bearings manufactured in factories, and on collaboration in the field of metallography and metrology. For instance, we create metrological regulations, provide metrological evaluations or metallographic analyses for production plants. Besides that, both departments provide services to external customers.

What kind of services?

The Design department offers design services, for example structural services and strength calculations using the finite element method (FEM analysis), while the Testing laboratory offers services mainly in the field of material analyses and metrological evaluations. It is important to note that we extend these services beyond the bearing industry and we are able to work with customers across the industry in general.

You haven't mentioned the last department. Can you describe its activity?

This is a technical sales support department where application engineers operate. This department is focused mainly on the collaboration with end customers, both with the Original Equipment Manufacture (OEM) who fit our bearings in their devices, and with final users of those machines and devices. The spectrum of activity of this department is very broad and includes, for example, design of bearing arrangements, including the creation of calculation reports, solving various issues related to the proper function of the bearings – all the way to the supervision of the installation of bearings at the customer's. If necessary, trips of application engineers directly to customers' sites are a commonplace.

Development of Railway Sector

Could you specify in what industries ZKL bearings are used?

ZKL has a comprehensive range of bearings suitable for use in a wide range of conventional industries. We supply small bearings intended for use for example in electric motors, industrial transmissions and pumps, as well as large bearings designed for use in the mining and steel industry. In addition to conventional industries we also focus on the development and manufacture of bearings for specific segments, such as wind energy and railway transport.

You have mentioned the railway sector; are you planning further activities in this field?

We are, for sure. A few years ago, we invested heavily in machinery for the manufacture of bearings for railway applications, and since then we have continued to develop our activities in this area, particularly in the development and manufacture of bearings for railway applications, and in new business opportunities. We have already succeeded in penetrating into India, which has one of the largest railway networks in the world and invests considerable funds in the reconstruction and maintenance of their wagon fleet.

What is the main goal in this context?

Axle bearings need special certification. Supplying railways must be supported by technical reports, calculations and tests. We therefore cooperate with manufacturing plants to obtain the necessary certificates that are crucial for us to be able to properly develop our business within the sector of railway bearings.

Is it a long way?

Relatively so; we have been working on this project for quite some time – we are talking years here. Disregarding bureaucracy, bearings also have to be tested on special certified test benches, which are just few across Europe. The test itself yet takes several months to a year.

Why is this field so interesting in your view?

In particular, as the world population grows. Especially in Asia, there is a need to transport a large number of people or large volumes of cargo. In comparison with other modes of transport, rail transport has lower environmental impact, and globally there is a great emphasis on its development. That's why we try to take significant steps in this field.

Competitive Advantages

What is the structure of personnel in R&D?

In R&D we have a mix of employees with different work experiences. On the one hand, we have experienced senior engineers, some of them had worked at the Research Institute for rolling bearings and have years of experience in this field. On the other hand, we have young engineers, often graduates of technical universities, who are very well versed in modern design and calculation software, and are not burdened with any stereotypes. Such mix of experience and "predatory youth" gives us a very good background not only for further development of research and development activities, but also for the development of services. Our goal is to make other companies see ZKL not only as a manufacturer and supplier of bearings, but also as a partner in services, not only in the bearing segment, but also in general mechanical engineering.

In this context, the advantages that you have over your competitors may certainly help you.

If we have ZKL compared with companies that only import and sell bearings, our great advantage is the fact that we have our own research and development, a sophisticated inspection system, and innovative processes established. We simply have been developing products continuously and we are a European manufacturer, which is also reflected in the price – compared to importers.

And what about the big companies in the industry?

Compared to them, we are much more flexible. We are able to develop and make special bearings according to specific customer requirements. This takes either much longer to big companies, or they don't seem to be willing enough to deal with this type of activities.

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How is ZKL's technical background?

It's our next huge advantage over the competition. Although there are application engineers operating in some competing companies, they are not so close to the design department. Thus, they are only able to create a limited conceptual design. In ZKL's R&D, the departments are somewhat interrelated, and so we are able to complete the project – from winning the assignment, evaluation, draft design and creating the drawing dossier – to the manufacturing of the necessary parts and supervision at the assembly site. In short, we have everything we need under one roof.

Most Interesting Projects

You have worked four years as the head of Research and Development. Can you pinpoint the most interesting projects which you have worked on during that time? I would mention a project I worked on about 2 years ago – we cooperated with Skoda Motorsport. Our factory designed a wheel bearing for a special rally car Skoda Fabia R5 and in R&D we were making calculations of bearings arrangements including stress analyses. Those were showing how the bearing would function

in different situations. As such, this was a relatively large and successful project.

How did you get to such a prestigious contract?

It was particularly the availability of our products and services that helped us. This project fully reflected the advantages of ZKL: high technical expertise, flexibility and reasonable price. As a result, we were able to develop not only the bearing itself and submit the required calculations and technical analyses, but mainly to manufacture bearings in small batches at a desired price level.

In recent years, ZKL is however being linked to projects in wind power engineering.

Yes, this project has started about 4 years ago when we began working with one of the leading European manufacturer of wind turbines. All the companies within the Group structure have been participating – including salesmen, workers in the manufacturing and applications engineers. In this sector, it is no longer enough to make just a bearing; you need to work out technical calculations and submit technical reports documenting that everything will really work so as to meet the requirements for the certification of a wind power station.

To what extent is this a flagship project?

It has become one of the leading programmes for ZKL; we have still been expanding the collaboration and the product range. Whilst today we supply bearings for the main shafts, we have been approached to supply bearings for wind turbine gearboxes even by other manufacturers operating in this sector.

During the time of your engagement here, R&D was appointed an expert institute.

Yes, it was one of the unfinished goals that I had challenged myself with when joining the company. Finally, in June 2015, the company ZKL – Výzkum a vývoj, a.s. (Research and Development, JSC), was given the status of an expert institution in the field of "General Mechanical Engineering – bearings and accessories", and a total of three judicial experts were appointed from our ranks. One in metrology, one in metallography and one in general mechanical engineering.

Let's take a look into the future – what are the main R&D targets besides the expansion to external services?

The main objective is still working for the Group as a technology centre. It means expanding the portfolio and coming up with innovations so that ZKL is always able to keep pace with the competition.

ZKL has significantly extended its machine park

This year, ZKL Brno's machine park was finally extended significantly. After the first 2017 investment in a vertical lathe BASICTURN 1250 C2 made by TOSHULIN a.s., an even larger and more modern machine was purchased from the same manufacturer – BASICTURN 1600 S2. It is a comprehensive lathe solution for technologically very demanding machining of hardened bearing rings.

Extraordinary machine parameters are already apparent from its weight, which reaches 46 tonnes. This value was not reached even by – for example – the Soviet tank T-72. A fully controlled CNC machine with a clamping plate of 1600 mm also has a lot of power due to an engine with a power output of 58 kW. That

gives it the opportunity to machine parts up to 2000 mm in diameter and up to 12 tonnes in weight. Modern control system Sinumerik 840D SL and other Siemens electronics ensures precision machining of complex shaped parts. Machining tools are stored in a twelve-slot magazine and, after an automatic exchange, they are measured automatically by an integrated Renishaw tool probe.



Thanks to a better-precision measuring of linear axes, the machine is capable of machining accuracy up to 0.01 mm. This is allowed to a great extent thanks to our workers, Peter Hos and Milan Kozak, who have been operating the adjacent BT 1250 for two years now. Interesting is also their history in ZKL Brno.



Both started as serial production tool setters: Peter Hos 14 years ago, Milan Kozak even 27 years ago. They have been using fully these years of experience and knowledge and, they also pass them gradually on to their successors. They regularly train newcomers and can help on machines they have previously left.

Installation of a machine worth over 13 million Czech Crowns in building 5 took place in the first half of 2019. The main objective was to improve the manufacturing capacities associated with wind energy projects.

David Kalina
Process Engineer, ZKL Brno, a.s.

Customer solutions of bearings – ZKL in Motorsports



ZKL offers comprehensive services for designing an ideal solution of bearing arrangements. Our engineers are able to offer services

ranging from application consultancy, numerical simulations, design and manufacture of customer bearings to training and servicing. We

are pleased that ZKL products help our customers to achieve ambitious goals. An example might be the success of Skoda Motorsport at the recent Barum Czech Rally Zlín 2019. In this race, nine out of ten first places were won by crews with SKODA FABIA R5 and FABIA R5 evo, for which ZKL developed wheel bearings, and collaborated to optimise fitting of these.

In addition to the most advanced rally cars, the Barum Rally audience could under the Star Rally Historic see also the original legendary Skoda Felicias KIT CAR in ZKL colours. This is the first SKODA rally car fully developed in cooperation with the Volkswagen Group. The car was unveiled to the public in 1995 and its success with drivers like Emil Triner, Pavel Sibera and Stig Blomqvist in the world rally marked the beginning of a new era for Skoda Motorsport.

Ing. Libor Nohál, Ph.D.
Head of Design Department
ZKL – Výzkum a vývoj, a.s.

Sealed double row angular contact ball bearings

The global trend in the bearing industry is currently offering customers products with the highest utility value. Besides innovations to the internal bearing geometries focused on enhancing their operating parameters, the focus is more and more on the development of bearings with integrated seals. These are bearings that are factory filled with grease and meet customer requirements, as concerns the simplicity of installation and operational maintenance.

In addition to the most advanced sealed single row deep groove ball bearings, other type sealed bearings are being increasingly used in the industry. ZKL does not stay behind in the sector. Besides the aforementioned single row deep groove ball bearings and sealed spherical roller bearings, ZKL offers its customers also sealed double row angular contact ball bearings. The development of these bearings was started already in 2013, and the company currently manufactures 20 dimensional types of 32 and 33 series with bore diameters ranging between 10 and 85 mm.

In terms of dimensions, sealed double row angular contact ball bearings are based on its open (non-sealed) variant. These are bearings with two rows of rolling elements having a contact angle of 25° in a back-to-back arrangement. With this arrangement, bearings are able to carry radial loads, axial loads in both directions and tilting moments.

The bearings are fitted with polyamide cages, and do not have a filling slots in the outer ring. Because of that, low level of vibrations and noise is achieved. The bearings are filled in the factory with high quality lithium

grease Shell Gadus S2 V100 3 and on both sides provided with a seal of nitrile rubber reinforced with steel plates. The sealing lip is in contact with inner ring shoulder and prevents not only ingress of dirt into the bearing, but also leakage of the grease from the bearing. With regard to the material of the cage and the sealing, the allowable operating temperature range is between -30 to 110 °C.

The main advantages of these bearings include the following features:

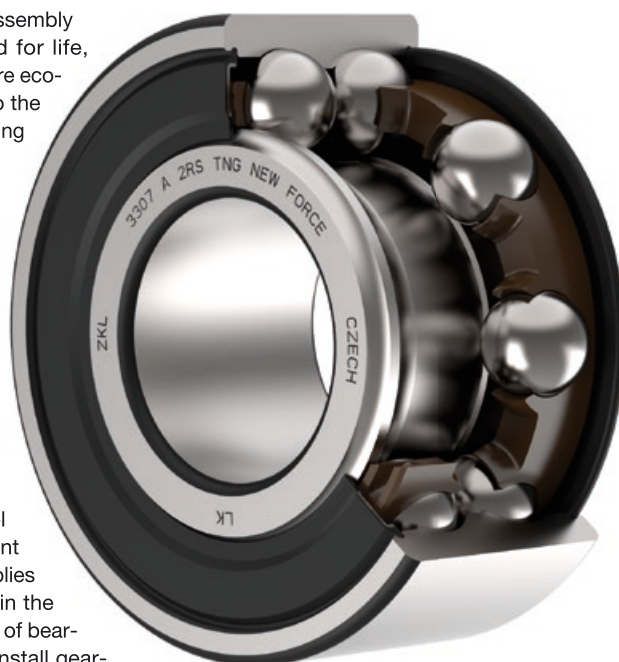
- the possibility of transmitting axial loads in both directions and tilting moments
- the bearing is ready to use – no need for lubrication during the assembly
- the bearing is greased for life, making its operation more economical and friendlier to the environment than a bearing without seal
- low noise and vibration levels.

This type of bearing finds its use wherever transfer of axial loads in both directions combined with radial loads is required along with quiet and maintenance-free operation. Typical representatives of suitable applications are gearboxes with bevel or worm gears, or different types of pumps. ZKL supplies one important customer in the Middle East with this type of bearings, who uses them to install gear-

boxes intended to drive passenger lifts. It is an application which successfully utilises the main advantages of these bearings: low noise and vibrations, maintenance-free operation, high durability and high reliability.

If you are interested in more detailed information about these bearings and the current product range, please contact the ZKL Technical Support Department via the following e-mail address: support@zkl.cz.

Ing. Jan Křemen
Head of the Technical Support Department
ZKL – Výzkum a vývoj, a.s.



Summary of activities in Latin America

A concern for ZKL's activities in Latin America, the first half of this year was marked by a wide range of exciting events. The first major event this year was the EXPOAGRO Fair in San Nicolas, a province of Buenos Aires. The Fair has long been considered the largest event organised in the country that is associated with the agricultural sector. ZKL representatives appeared among the exhibitors, thus enabling ZKL to confirm its position as one of the main suppliers of bearings in the industry.

During the four-day event, ZKL representatives had the opportunity to meet personally with customers, and also exchange experience and knowledge of their own business activities. Our representatives also actively sought new business opportunities in candidates who were choosing a top-quality supplier of bearings. We can certainly say that our direct participation in this Fair had a positive outcome. This was the first step towards visiting OEM users, both independently and together with our authorised distributors.

The Fair also confirmed that due to the long-term operation in the Argentine market the connection of ZKL brand with the segment of bearings is almost notorious, which was also acknowledged by the end users. Yet it still opens up space for further growth, which can be further developed.

Another important event was the EXPONOR Fair, where we participated in the stand of RODAMENDEZ LTDA – our authorised distributor in Chile. In their stand, Rodamendez presented an entire range of products they offer in this highly competitive market, including our bearings.

For quite some time, the EXPONOR Fair has been combining the latest trends related to the mining industry. This unusually large exhibition was held in the Chilean Antofagasta, the mining heartland of the country, which represents 54 % of the total production of metallic and non-metallic minerals. ZKL's presence at such an important event was a great opportunity to introduce the company, and mainly to slowly break into this highly professional sector.



In addition to our participation in trade fairs, we also made a number of technical and business visits to our customers in Ecuador, Uruguay, Chile and Argentina. We tried to point out not only our presence in the market. Our aim was also to encourage end users and consumers for us to become in their eyes the best possible alternative in terms of quality and origin of bearings manufacture.

The first half of this year was relatively rich in a variety of activities. But there is still a lot of work ahead of us. We therefore plan to continue to communicate with each of our already established distributors. Our goal is also to establish further cooperation with those who seem to be interesting partners for ZKL. The second half of the year holds a lot of challenges for us that we will try to deal with successfully. Finally, we plan to make additional investments, so that we can grow strongly across the region.

Pablo Méndez
President
ZKL Rodamientos S.A.



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Split bearings



ZKL has been for many years engaged in the development and manufacture of split roller bearings. The basic characteristics of these bearings stem from their name. These are bearings that have a radially split outer ring, an inner ring and a cage for guiding the rolling elements. The connection of the cage is designed so as to withstand the dynamic forces which the cage is exposed to during the operation. The connection of the rings is by means of screw connections with a defined torque indicated in the installation manual to every particular bearing. It ensures secure connection of these rings. Depending on the size, bearings can be fitted with clamping rings that clamp the inner ring, or are delivered without them.

However the name of the split bearing may sound easy, from the manufacturing point of view it is not at all. The key element is the heat treatment technology and the process itself of splitting the bearing rings. Both processes must be set up so that after the splitting process there is no deformation of

the bearing rings and the gap after splitting is minimised, without any cracks and other defects. These processes have undergone long-term development within ZKL, and are the intellectual property of ZKL.

The biggest advantage of split bearings is the simplification of their assembly and disassembly in hard-to-reach areas, compared to conventional unsplit bearings. Due to the use of split bearings, there is no need to remove the drive coupling and transmission at the exchange, which helps to reduce unwanted costs and downtime. A typical application where split bearing is often mounted for those reasons is e.g. mine tower elevator, bucket-wheel excavator in open cast mines or steelworks converter. Where the disassembly and assembly of an unsplit bearing would take a week, the split bearing is replaced within days. Cost savings when replacing a bearing thus generously cover any increased costs associated with its purchase. Whenever when the end user of the bearing considers replacing an unsplit bearing with a split one, it is necessary to take into account the following factors:

- changing the installation dimensions of the bearing (split bearings usually have a wider inner ring)
- change the limit speed (split bearings can operate at a maximum of 40 % limit speed of their unsplit variant)
- split bearing's carrying capacity (at the same level compared to the conventional unsplit version).

ZKL offers mainly split double row spherical roller bearings and roller bearings with dimensions of 150 mm bore diameter to an outer diameter of 1600 mm. The basic range of these bearings is given in the catalogue on the website www.zkl.eu. Current availability of a particular bearing however needs to be consulted with ZKL representatives.

If you are interested in this product range, please contact your sales representatives, or directly the ZKL Technical Support De-

partment via the following e-mail address: support@zkl.cz. Its staff will provide you with additional technical information, assess the suitability of the bearing in the given application and, if a contract is concluded, they may send a technician directly to the installation site to supervise the installation.

Ing. Jan Křemen
Head of the Technical Support Department
ZKL – Výzkum a vývoj, a.s.



Spring full of fairs

In ZKL, the spring months mean a very busy period. It's a notional culmination of the long-term effort of our teams of designers, engineers, factory workers and traders to introduce hot news from the ZKL bearing range. At that time, various domestic and international fairs or customer events are being held which we regularly attend.

We still see great importance in attending fairs and exhibitions. Even in today's fast internet time, when most businesses run through various e-shops or electronic communication, it is necessary to be able to see new products with one's own eyes, and meet with business partners in person. Personal meetings and shared experiences then leads to building long-term business relationships.

This year we attended fairs with our own stand; an integral part was also a presentation of our production and services at the stands of our business partners. Especially in remote territories, such as South America, Asia and the Russian Federation, a joint presentation is very effective. We hereby thank our partners for the presentation of our brand and ZKL bearings.

ZKL bearings could be seen at the following fairs:

- March 12–15, 2019 – EXPOAGRO – Argentina, International Agricultural Fair.
- March 20–22, 2019 – RailwayTech Indonesia – International Railway Industry Fair – presentation at the stand of PT Raja Teknik Aditama – our business partner in ASEAN.
- May 27–30, 2019 – Exponor, Chile – International Mining Industry Trade Fair, presentation at the stand of Rodamendez Ltda – our distributor in Chile.
- June 3–7, 2019 – Ugol ROSSII & MINING, Novokuznetsk Russian Federation, international fair of mining equipment – presentation at the stand of F&F GmbH – our official distributor in Russia.
- June 4–9, 2019 – BelAgro – Minsk, International Agricultural Fair – presentation at the stand of Master Podshipnik – our authorised distributor in Belarus.

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Hannover Messe 2019

German Hannover Messe is one of the largest European engineering trade fairs, and is considered the most important event identifying trends not only in Industry 4.0. This year it was held on April 1–5, and was attended by 6,500 exhibitors from 75 countries on an area of over 227,000 square meters. It attracted more than 215,000 visitors over 5 days. Outside Germany, most of them came from China (7200), the Netherlands (5900), Italy (3400), USA (3400) and Sweden (2600) – the partner country of the fair.

ZKL Group attended the fair with its own stand, where the company introduced itself as a world-renowned European manufacturer of bearings with over a 70-year history. The emphasis was on European quality, advanced manufacturing technologies and professional technical services provided to customers from various industries. The ZKL exposure was focused on introducing major 2019 projects, which are bearings for concrete mixer trucks, large-size bearings for wind

power plants, axial bearings for thermal power plants' air preheaters and sealed bearings.

Czech Raildays 2019

On June 11–13, 2019, a jubilee 20th annual international trade fair of railway and handling technology, products and services for the railway and city rail transport was held in Ostrava under the name Czech Raildays. Interest in this highly specialised fair persists among the exhibitors, as well as the public. This year's figures show that clearly. At the 20th annual fair, there were 193 exhibiting companies and total attendance reached 6400 people, while the total number of visitors included 85% of professionals.

At this fair, ZKL Group traditionally presented itself as a long-time manufacturer of a comprehensive range of ZKL bearings for rolling stock. As concerns the series production, stable base for sales of railway products is represented by rail axle roller WJ/WJP type bearings 130/240 (PLC 410-33/34.2), WJ/WJP 120/240 (PLC 410-13/14.2), tapered units (TBU 130x230, variants PLC 810-13), roller units (CBU 120x215, PLC 410-53/54.2) and various cylindrical or spherical roller bearings for traction motors.

Increased demand for railway bearings caused by a dropout in the production of some manufacturers, and lack of these products on the market brought new potential clients to the ZKL stand. Outside new contacts we were able to welcome regular customers at our stand with whom we discussed new business cases, technical support and services within ZKL. The interest in the range of ZKL railway bearings continues to grow, demonstrating the strong position of ZKL in this sector.

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

INDIA: Major breakthrough of ZKL products in railway transport

Indian railway system is one of the largest in the world. It includes 63,000 kilometres of rail tracks, nearly 8,000 locomotives and 257,000 passenger and freight wagons. The growth of the economy leads to necessary reconstruction and development of rail and railway infrastructure. Ongoing is construction of special corridors for freight rail transport, intensive electrification of tracks and construction of parallel rail tracks.

In the city of Delhi, feasibility studies of tramway projects are being conducted and almost every month a new metro line or part thereof is opened in one of the Indian cities. Not far behind are high-speed train projects. Currently, there is an ongoing construction of high-speed line between Mumbai and Ahmedabad, and also planned are several other high-speed lines, including a corridor between Delhi and Agra.

Along with infrastructure development, developing is also the segment of rail cars and locomotives. There, it involves both purchasing new and upgrading the existing cars. The key are the requirements for greater safety, comfort, cargo capacity and speed. The Indian part has also become clearly interested in research and development in the field of railways, as well as exchanging experiences, obtaining know-how and establishing cooperation in the field of innovations. Given its size and planned modernisation, the Indian railway segment represents a major potential for business cooperation in the field of railway bearings.

The railway sector is very demanding; a number of steps need to be taken from the first drafts of the product to serial supplies in terms of validation, testing and certification. ZKL follows the successful steps in approving spherical roller bearings intended for rail vehicle axles in RDSO (Research Designs & Standards Organisation) in a serial delivery for the Indian Railways.

ZKL won a tender for the purchase of spherical roller axle bearings. This success was not easy to achieve, and was worth a lot of effort of the sales people, engineers and workers in manufacturing. Only thanks to them the company was able to beat nine other tenderers

in the tender in challenging requirements for quality, price and delivery dates. Thanks to this success the manufacture will take place at the end of this year and the first series of bearings will be delivered to the customer.

In addition to spherical roller bearings manufactured in ZKL Brno, a.s., ongoing are negotiations on further expansion of cooperation in the supply of roller and sealed tapered roller bearing units from the product range of ZKL Klášterec nad Ohří, a.s.

Ing. Libor Nohál, Ph.D.
Head of Design Department
ZKL – Výzkum a vývoj, a.s.



DESIGN TRENDS:

Asymmetric design of radial spherical roller bearings

ZKL GROUP is among the leading European manufacturers of axial and radial spherical roller bearings, bearings for power engineering, chemical and heavy industry, wind power industry, railway industry and for special and custom applications. Technological development not only in the aforementioned areas is the responsibility of the ZKL Technology Centre – ZKL Výzkum a vývoj, a.s. (Research & Development). Its activity is not only focused on consulting, customer service, engineering and operational design, but also on strategic research and development of new products.

A number of bearing arrangements are usually hard to solve by a standard bearing range and require "tailored" solutions. An example would be arrangement an output shaft of transmission rotating the drum of a concrete mixer truck, or the main shaft of wind power stations. These arrangements are characterised by low



rotation speed, relatively significant radial loads, the need to bearing self-aligning and considerable axial forces acting from one side.

These applications usually use double row spherical roller bearings. However, one-sided axial forces overload one row of rolling elements of the bearing, and thereby reduce its service life. The solution is an asymmetric radial spherical roller bearing with different load capacities of individual rows of rolling elements.

Based on the feedback from its customers, ZKL has developed a special asymmetric spherical roller bearing with a cassette cage. Increased resistance to unidirectional axial load is dealt with by a different design of the rolling elements' rows.

The row that is designed to transfer the axial load has a larger contact angle and longer rolling elements provided with a DLC coating. A two-piece cassette brass cage allows inde-

pendent rotation of the rolling elements' rows. This prevents increased stress of the cage in cases where one row of rolling elements is overloaded which would hinder the second row.

The two-piece cassette brass cage used is compact, yet robust enough. In comparison with a one-piece brass cage, this one achieves better durability of the cage whilst reducing the installation space of the bearing. For the needs of increased ability to self-aligning (e.g. in concrete mixer trucks), the bearing is fitted with an extended outer ring. The bearing therefore has a longer outer ring raceway that allows increased mutual tilting ability of the bearing rings of up to 5° without negatively affecting the operation of the bearing.

Asymmetric spherical roller bearing with a cassette cage is unique in the design and combines several sub-innovations into one unit. The above described patented design will be introduced by ZKL at the 2019 International Engineering Fair in Brno.

Ing. Libor Nohál, Ph.D.
Head of Design Department
ZKL – Výzkum a vývoj, a.s.

Family Day in ZKL



On Saturday, June 22, 2019, the traditional Family Day was held, which was intended for employees and their family members, especially children. The Family Day began with a speech given by Mr. Roman Zouhar, the Executive Director of ZKL Brno, a.s. There



were refreshments available for visitors and an accompanying programme.

During factory tours, visitors had the opportunity to get acquainted with the manufacture and assembly of bearings. Visitors could try out the actual assembly of the serial



production bearings. For children there was a path for treasure during which they collected numbers to the resulting dimensional type of the largest bearing 232/750 that ZKL Brno manufactures. All treasure hunters managed to find the treasure and get the deserved reward.

Children also drew beautiful pictures for which they were rewarded with spectacular prizes.

Other attractions for children included a bouncy castle with a slide, airbrush tattoos

or different sites to test dexterity, such as catching fish. The children were also amused by a clown performance involving balloons.

Children and also adults tried to cut the record in endurance riding a rodeo bull. The best did not leave empty-handed.

This year the weather favoured the corporate event, which was reflected in the large attendance. And so the Family Day could be enjoyed properly by everyone. We look forward to seeing you next year.

Dagmar Vymazalová
Assistant to Executive Director ZKL Brno, a.s.



Redistribution of business groups within the business organisation of ZKL Bearings CZ, a.s.



Dear Business Partners,

In 2019 the company management decided to newly redistribute the business groups and move the sales territories served by the Prague branch ZKL Bearings CZ to the company headquarters in Brno. Foreign business activities have historically been managed from Prague, mainly because the best transport links to foreign countries. An equally important reason was the presence of experienced traders coming from the Foreign Trade Enterprise who were after the Velvet Revolution equipped with both language skills and experience in foreign trade. Business activities in the Czech and Slovak Republics were managed from Brno. The establishment of the ZKL Group in 1999 was followed by a gradual creation of a Brno sales group, which is now engaged mainly in European territories. With its growth over the years the location of the branch in Prague had ceased to be advantageous, and therefore it was closed as of the day of June 30, 2019. The entire business segment was grouped in the company management headquarters at Jedovnicka 8, Brno. The reason for this

was to improve, accelerate and making more effective the communication not only within the business company ZKL Bearings CZ, but also with other ZKL Group companies. Brno is headquarters for ZKL – Výzkum a vývoj (Research and Development), which provides technical and consulting services. Equally important is the ability to communicate more effectively with the manufacturing plant. What we expect from the new arrangement is better link between the business, stabilising the pricing and trade policies in individual territories and more rapid feedback to customers.

Transferring all business activities to Brno was also associated with redistribution of the business groups and establishment of new leaders for every territory.

Late June meant the end for the Prague branch at 31, Holeckova Str. and clustering the entire business section at the headquarters at 8, Jedovnicka Str. in Brno.

The business groups (OS) were redistributed, and new leaders named for every territory.

OS 41: Person in charge: Radovan Brila
Sales assistant: Kateřina Pernicová

Territory served: Latin America and Mexico

OS 42: Person in charge: Zdeněk Jareš
Sales assistants: Jarmila Klieštíková, Lenka Drozdová

Territory served: South Asia: India, Bangladesh, Nepal, Sri Lanka, ...

OS 43: People in charge: Miloš Charbuský, Stanislav Kozel

Territory served: Northern Europe, Africa, Turkey, Middle East countries

OS 44: People in charge: Jakub Konečný, Zdeněk Jareš

Sales assistant: Kateřina Pernicová

Territory served: Far East, China, U.S.A. and Canada

OS 45: Person in charge: Jaroslav Kammerer
Sales assistants: Jitka Brožová, Štěpánka Čechová

Territory served: Czech and Slovak Republics

OS 46: Person in charge: Marie Kubešová

Sales assistant: Eva Holánková

Territory served: Southern Europe, Eastern Europe and the Balkans

OS 47: Person in charge: Igor Klok

Sales assistant: Irina Lashchinina

Territory served: Russian Federation, Ukraine and Post-Soviet states

OS 48: Person in charge: Alessandro Serrelli
Sales assistant: Lada Kuncová, Kateřina Brodecká

Territory served: Western Europe

We firmly believe that the setup processes will lead to improved efficiency, which will have a positive impact on our customers.

Finally, we would like to thank our employees from the Prague branch. We greatly appreciate these many years of successful cooperation and results in which they have participated within ZKL, and which enabled us to maintain and expand our foreign trade. We do appreciate your work very much, and wish you personal and professional success in the coming years.

Ing. Jiří Prášil Jr.
Executive Director of
ZKL Bearings CZ, a.s.

ZKL Golf Cup 2019

After the last year's successful premiere, the Golf tournament named ZKL Golf Cup took place this year on June 22 at the Golf Club at Kloster Kamp in Germany.

The second annual tournament dedicated to our distributors and end customers in Germany was again very successful. The event was attended by more than 120 guests from the fields of engineering and repair shops, who could during the day exchange a lot of information from their industries. ZKL representatives also had the opportunity to better introduce to the guests the comprehensive range of the ZKL bearings and the services provided by ZKL.

We would like to use this opportunity to thank our authorised distributors from Germany, the companies Fingling and OEM Wälzlager GmbH for their gifts.

We would like to thank all attendees for their active participation and we are already looking forward to next year.

Heiko Rothe
Head of Business Development ZKL Deutschland



2019 Cycle trip of ZKL Group

On June 7–8, 2019, a ZKL Group cycle trip took place, which was this year organised by ZKL Klášterec nad Ohří, a.s. For this reason, the venue of that sporting event was this time selected near Klášterec and Kadaň, so that even colleagues from Brno could get to know a piece of the northern Bohemia.

The tourists went on a trip to the spa Eugenie and continued through a chateau park along the river towards Kadaň. After a brief stop for refreshments we arrived to the very historic city centre, where we passed the officially narrowest street in the Czech Republic – the Executioner Alley (Katova ulicka), which measures only 65 cm at its narrowest point.



Cyclists set off in the morning and went through Kadaň towards the Prunéřov power station. From there, there is a newly built cycle path along the opencast lignite mines, so it was possible to see the local “moonscape” from there. After some rest and getting new energy in the “Temple of Hops and Beer” they went on around the Nechanice Dam back to Kadaň.



In the evening we all met at the hotel restaurant where Miroslav Bárta, the Executive Director of ZKL Klášterec nad Ohří, a.s., gave a short speech, later joined by Ing. Jiří Prášil, CSc., the Group CEO. This was followed by a buffet, free entertainment, music for dancing and listening.

The next day there was again a short trip on bikes who those who were interested. Other colleagues could choose out of two options – those who do not go to Klášterec could join a tour

to our factory. And those who know the place already had an opportunity to go on a tour of the Klášterec chateau, or to the Clock Museum.

The weather was nice both days, it did not rain, and all three tours were interesting, so I dare to say that this year's bike trip was a success again. Thank you all for your participation and we look forward to the next year.

Lucie Drdová
Assistant to Executive Director
ZKL Klášterec nad Ohří, a.s.

