Cornerstone of ZKL

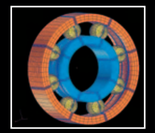
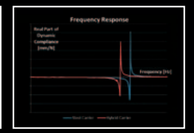
– ***Research and Development***
- New material research
- Development of Hybrid bearings (steel rings and ceramic roller elements)
- Development of special counting for current insulation and corrosion and wear resistance increase
- Grease test capabilities and equipment for tribology research
- New calculation methods based on stress state in the bearing and usage of special fatigue criteria
- Development of new types of bearing

– ***Testing Laboratory***
- Basic dynamic load tests
- Limiting speed tests
- Metallographic tests
- FEM results verification
- Production of prototypes




ZKL Services

– ***Application Engineering Department***
- Customer support in bearing selection and calculations
- Application of specific bearing design, intensive product support
- Support for selection of lubrication and fits
- Application of specific mounting instructions
- Costumer support on the spot
- Provides related training and presentations
- Recommends lubrication conditions and type of lubrications




– ***Diagnostics Department***

Most common types of bearing damage which can lead to shortened life of bearings or applications are often caused by:
- Improper maintenance procedures
- Improper installation and setup
- Inadequate lubrication

Don't solve immediate problem only by simple installation of the new bearings – solve cause of bearing failure.

ZKL is able to extend bearing life, increase productivity and reduce maintenance costs by identifying and resolving issues around the selection of bearings, mounting, lubrication and applications.

References

VALE · OKD · Czech Coal · COSECHADORAS VASSALLI · SD Severočeské doly a.s. Chomutov, člen skupiny ČEZ · SOKOLOVSKÁ UHELNÁ

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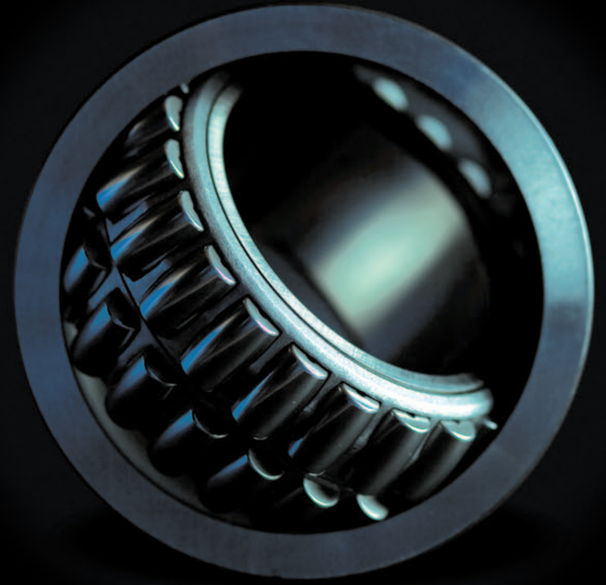
History is the basis of the present and a challenge for the **future**.

ZKL GROUP



for

MINING

ZKL Roller Bearings

ZKL is the biggest manufacturer of large-scale spherical-roller, special and split bearings in Central Europe.
In its more than sixty-year history, ZKL is a proven and reliable manufacturer and supplier of certified bearings for an entire range of industrial businesses. The manufactured series of standard and specialized ZKL bearings meets stringent demands of technically advanced customers and a wide array of industrial fields.

Comprehensive Product Range for Industrial Applications

ZKL Know-How comes out from most challenging projects:

■ Building and Structures Applications

■ Energetic Industry Applications

■ Gearboxes Applications

■ Heavy Industry Applications

■ Mining Industry Applications

■ Railway Industry Applications

■ Steel Industry Applications

■ Wind Industry Applications

and others

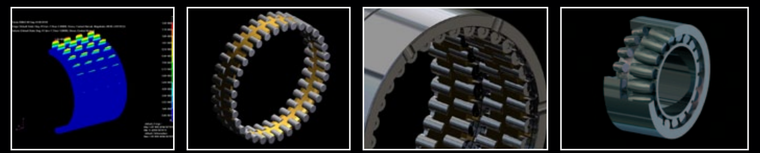
If You Have These Applications, You Need ZKL Bearings...

ZKL Standard Bearings:

ZKL is a reliable and certified supplier of standard bearings as well as special and large size bearings.
Standard ZKL bearings consist of ball bearings, spherical roller, cylindrical roller bearings, tapered roller bearings, needle roller bearings and plain bearings.

ZKL Special Bearings:

ZKL special bearings are used in the most challenging applications. ZKL produces bearings “made – to – measure”, which are developed according to customer requirements. Where other bearing suppliers stopped, ZKL starts and these bearings have the highest added value for ZKL Brand.



ZKL Split Bearings:

Split bearings are designed for easy mounting and maintenance.
Advantages:

- Easy mounting and dismounting of cross-split bearing
- Easy maintenance of cross-split bearing
- Reduction of downtime in production
- Easy check of bearing
- NO ring heating up during mounting process

This solution saves millions in maintenance cost and increases production.

ZKL NEW FORCE Bearings

New Force bearings constitute a new generation of ZKL Bearings. The application of these bearings brings longer service life of bearings, higher operation safety, prolongation of service intervals and thus a substantial reduction of operational cost for users.

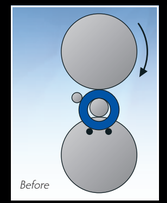
- New Force bearings are designed for most loaded mountings in gearboxes, in railway vehicles, rolling mills, paper mill machines, pumps, machine tools, power units, etc. These bearings usually work with higher reliability factor.
- Business differentiation is given by wrapping and by marking on the NEW FORCE product.

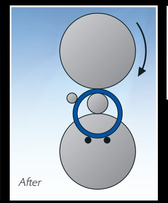
Quality and higher parameters of NEW FORCE bearings are achieved due to using:

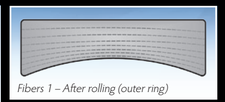
- High quality materials for bearing parts

Chemical composition of the material		C %	Si %	Mn %	P max. %	S max. %
ISO 683-17	100CrMnSi6.4	0,93–1,05	0,15–0,35	1,00–1,20	0,025	0,015
ISO 683-17	100Cr6	0,93–1,05	0,15–0,35	0,25–0,45	0,025	0,015
	Cr %	Mo max. %	Al max. %	Ti max. %	Cu max. %	O max. %
100CrMnSi6.4	1,40–1,65	0,10	0,050	0,004	0,30	0,0015
100Cr6	1,35–1,60	0,10	0,050	0,004	0,30	0,0015

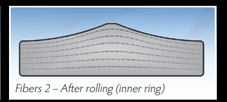
- Technology of cold and hot rolling of bearing parts
  - Higher forming degree results in optimal fiber distribution in rolled rings and positive residual stress. This technology has significant positive influence on fatigue behavior.





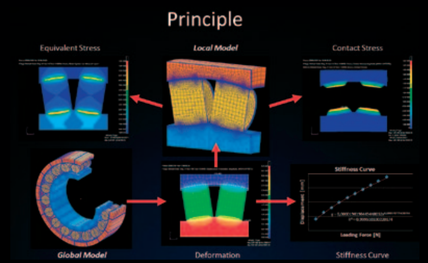


Fibers 1 – After rolling (outer ring)



Fibers 2 – After rolling (inner ring)

- Inner Design Optimization
  – ZKL Design department and Technical analysis department uses most sophisticated methods for right estimation of the inner bearing design.
  – Each bearing is analyzed using Finite Element Method (FEM) and verified by our internal methods based on stress state in the bearing.
  – Bearing design is verified by CETOL to get optimal tolerance values.



- Surface treatment of bearing parts

For friction reduction ZKL uses special coating based on Phosphate and Teflon

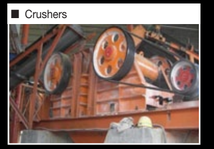
ZKL Applications in Mining

ZKL can supply certain applications:

■ Fans and air movement

■ Conveyors

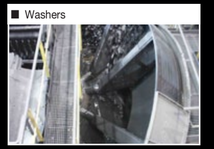
■ Crushers



■ Haulage gear and winches

■ Stacker reclaimers

■ Washers



Application of ZKL PLC 512 – 37 in excavator KU 800

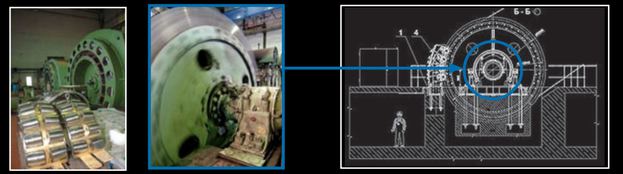
Mounting process of PLC 512-37 on excavator KU 800 in surface mine Tušimice

Placement:
- main shaft of wheel

Details about shaft:
- lenght 10,5 m
- weight 10 t including bearings

Details about bearing
- split spherical roller bearing
- outer diameter 1 000 mm
- weight 1 220 kg

Application of ZKL PLC 512-39 in deep coal mine Darkov



Bearing type: Special Split Speherical roller Bearing

Dimensions:
- outer diameter 1150mm
- weight 1710kg

Screens

- Spherical roller bearings Series 239, 240, 241
- Spherical roller bearing for vibration machines serie 223 EMHD2

Crushers

- Stone crushers are widely used in mining, metallurgy, construction, highway, railroad, etc.

Belt Conveyor

ZKL Bearings in main gearboxes:

- spherical roller bearings series 239, 240, 241 cylindrical roller bearings NU, NJ
- ZKL Bearings in belt conveyor: sphericall rolles bearings series 222, 223