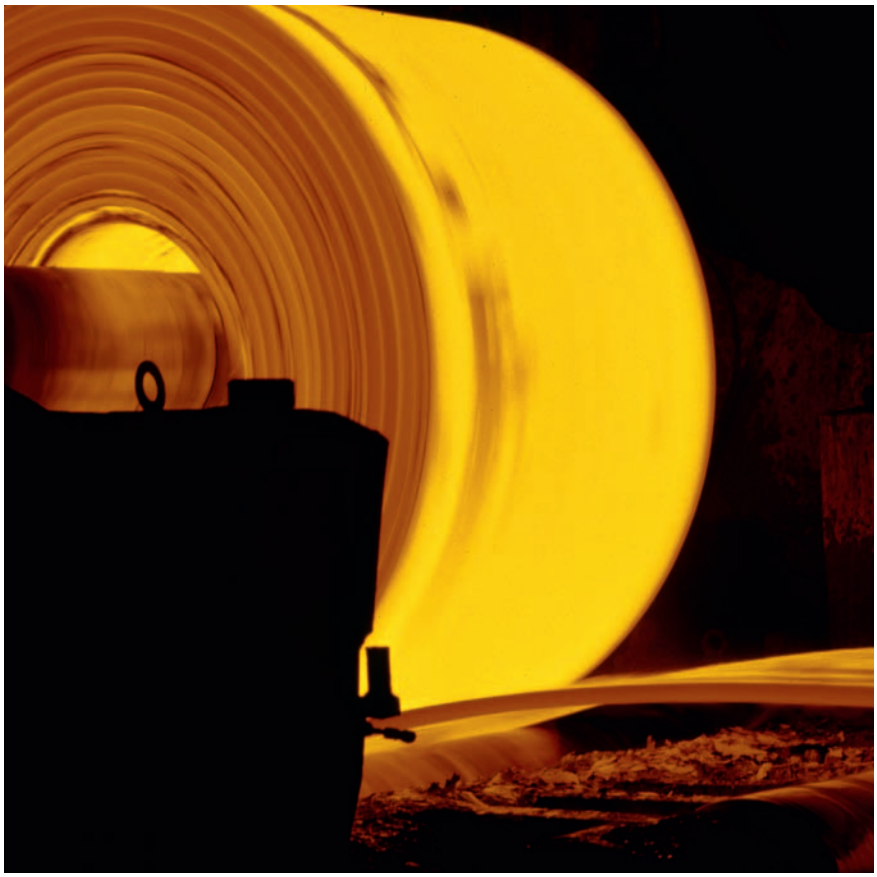
SCHAEFFLER

Bearing Solutions and Services for the Metal Industry

LUK INA FAG

With knowledge and experience…

FAG Kugelfischer was the pioneer of the rolling bearing industry, the historic beginning of which was marked by the invention of the ball mill by Friedrich Fischer in 1883. INA's success story began in 1949 with the development of the needle roller and cage assembly by Dr. Georg Schaeffler, an ingenious idea that helped the needle roller bearing achieve an industrial breakthrough. With its two strong product brands INA and FAG, Schaeffler currently has a high-performance range of rolling bearings as well as products and services of unsurpassed quality due to the joint research and development of both brands. Schaeffler has its own competence group for equipping plants for producing and forming steel and non-ferrous metals. Our specialists know practically every bearing location in metallurgical plants and rolling mills, since we have been working with plant manufacturers and operators for several decades. Hundreds of steelworks benefit from the quality of our customized solutions that are efficient and safe and achieve ever-increasing production speeds while maintaining outstanding reliability.

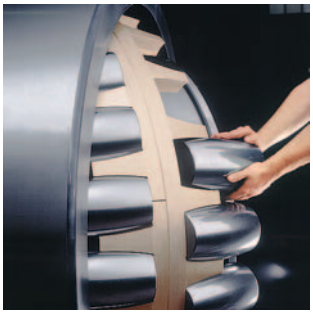


High-performance and customer-oriented

- Expert support by experienced engineers
- Optimized services for all rolling bearing products and applications
- Application-specific bearing designs, intensive product support, and a complete product range
- Products specifically designed for challenging and widely varying operating conditions
- Optimized bearing, material, and seal combinations
- BEARINX® calculation program for the best possible product selection
- X-life premium products
- Binding quality and environmental policy worldwide (ISO 9000/QS 9000, ISO/TS 16949:2002, ISO 14001)
- General and customer-specific training programs
- Bearings for the entire range of metallurgical plant and rolling mill equipment

... and a comprehensive range of bearings and services

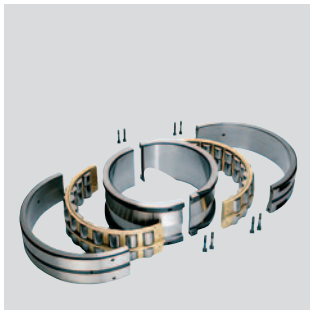
• Condition-oriented maintenance



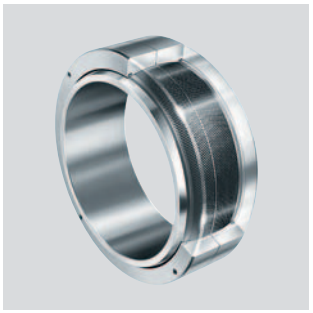
• Cost-effective reconditioning

• Bearing housings

• Spherical roller bearings

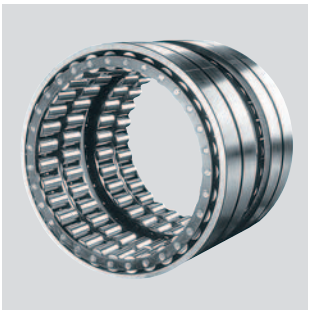


• Split spherical roller bearings

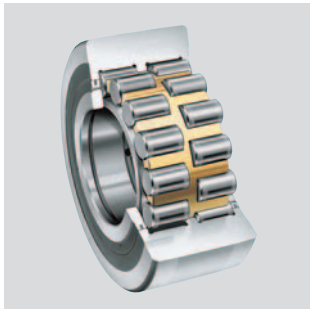


• Spherical plain bearings with ELGOGLIDE®

• Multi-row tapered roller bearings

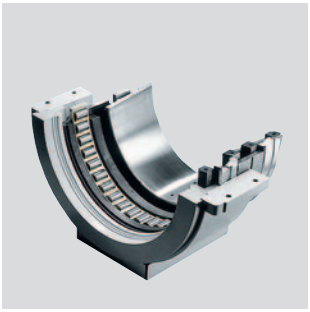


• Multi-row cylindrical roller bearings



• Yoke type track rollers

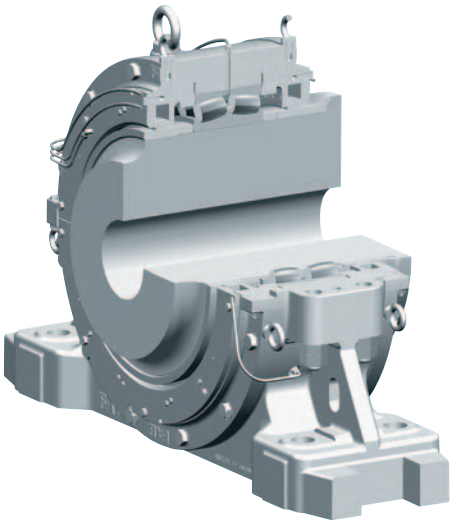
• Full complement cylindrical roller bearings

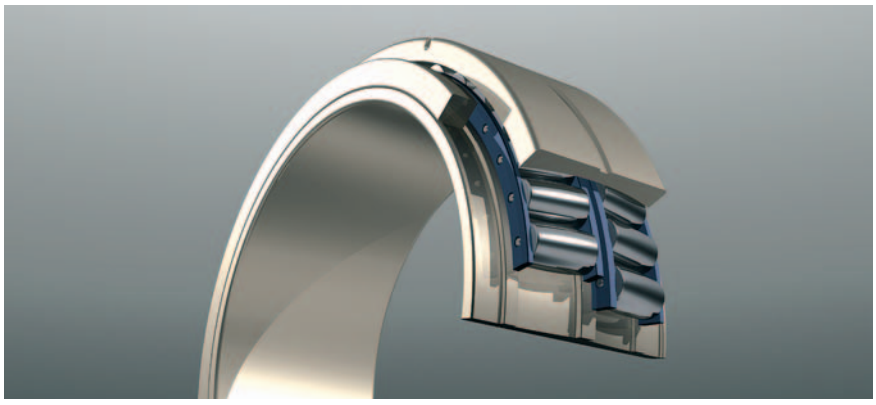


• Special cylindrical roller bearings

• Needle roller bearings

Safe movement under extreme load and heat



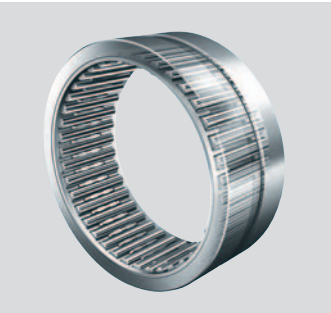


Split bearings reduce downtimes and mounting costs

Converters

Converters are used to produce steel from pig iron. A full converter vessel can weigh up to 2,000 tons. Long-life ELGES plain bearings are used to support the vessel in a trunnion ring that is itself supported in the converter housing with a swivel facility for pouring. The swivel movement is carried out slowly under a large mass and shock loads, so the bearings must have an extremely high static load carrying capacity. Misalignments and deformations in the structure must be compensated. For this application, we have developed robust spherical roller bearings with outside diameters of up to 1750 mm that have proven successful in day-to-day operation in more than 200 converter systems around the world. The main gears in the gearbox are supported by FAG deep groove ball bearings or cylindrical roller bearings; bearing diameters of more than 2000 mm are not unusual here.

Maintenance-free, extremely wear-resistant spherical plain bearings with ELGOGLIDE®



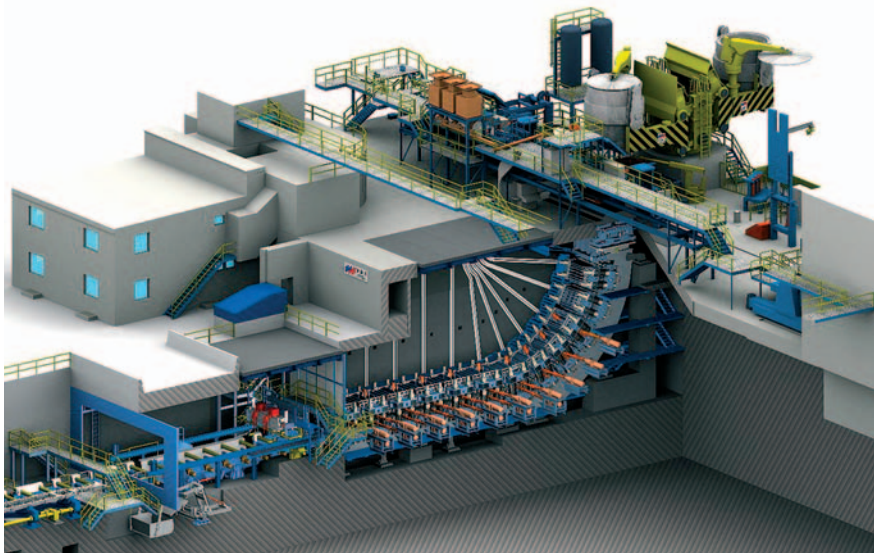
Robust needle roller bearings in X-life quality

Sealed spherical roller bearings reduce lubricant consumption by up to 80 %

Spherical roller bearings in water-cooled housings

Ladle turrets

A ladle turret carries ladles between the casting position and the tapping position, thus ensuring smooth operation of the continuous casting machine. The bearing supports are continually subjected to high loads as well as abrupt shocks and tilting moments. The cylindrical roller bearings, axial spherical roller bearings, and spherical plain bearings are designed specifically for these loads.



Continuous casting plant with ladle turret (picture: VOEST-ALPINE Industrieanlagen GmbH & Co)

Continuous casting plants

In this essential forming process, steel is continuously cast through a mold to form a strand. During the cooling phase, the strand is transported and supported by slowly rotating rollers. The bearing supports for the rollers must function reliably – under high loads, at high temperatures, and when subjected to water spray.

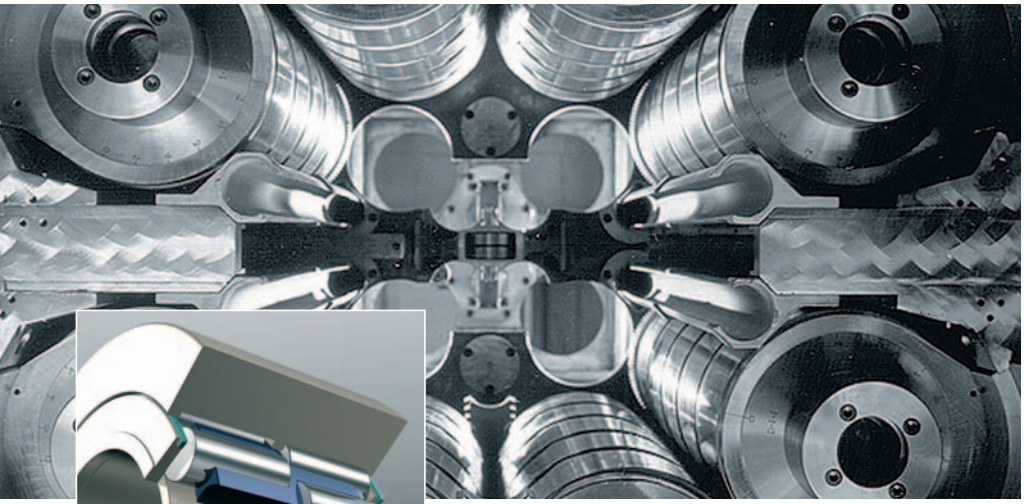
With our CoCaB product range (**Co**ntinuous **Ca**ster **B**earing), Schaeffler offers bearing solutions that are perfectly matched to the requirements of continuous casting plants: INA machined needle roller bearings, FAG spherical roller bearings, cylindrical roller bearings (open or sealed versions), bearing housings with cooling water circulation, split spherical roller bearings, and cylindrical roller bearings for locations that are difficult to access.

Without doubt a highlight of our CoCaB range is the ideal non-locating bearing solution – the full complement cylindrical roller bearing:

- Extremely high radial load carrying capacity
- Axial displacement without constraining forces
- Capable of compensating for angular misalignment
- Simple and quick to mount

Reliable performers in rolling mills

Multi-row tapered roller bearings and cylindrical roller bearings in rolling mills



Back-up rollers ensure uniform sheet thickness, even to accuracies of a few microns

Hot rolling

Hot rolling is carried out above the re-crystallization temperature of the rolling stock. Depending on the product, a distinction is made between plate, hot strip, section, bar, and wire mills. The angular adjustment of the chocks in rolling mills allows the use of four-row tapered roller bearings and multi-row cylindrical roller bearings as radial bearings. The design of the radial bearings depends on the application: Angular contact ball bearings for rapidly rotating rolls under low axial load, double-row tapered roller bearings and axial spherical roller bearings for bearing locations subjected to high axial loads.

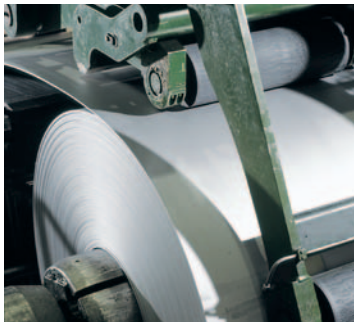
Cold rolling

In the cold rolling process, cold strip is generally shaped without prior heating. In comparison with the hot rolling process, higher dimensional accuracy and surface quality together with smaller sheet thicknesses are achieved. Four-row FAG cylindrical roller bearings in version F12 fulfill the high demand for precision, even in high-speed rolling mills for aluminum. In multi-roll mills for stock that is difficult to roll, cylindrical roller bearings are used as back-up roller systems and ensure uniform sheet thickness and surface quality under extremely high loads.

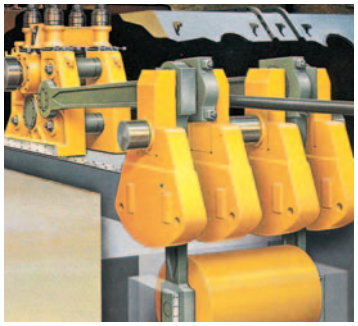
The perfect match, even for peripheral applications

High-speed laying head with special cylindrical roller bearings, angular contact ball bearings, and spindle bearings

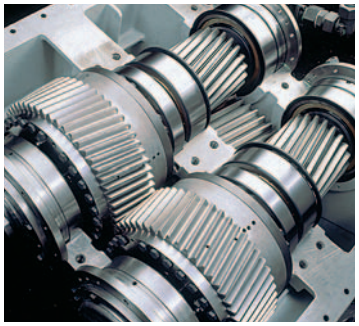
For the exceptional demands of rolling mills as well as the downstream plant and processes for the further processing of rolled stock, we have developed a wide range of application-specific solutions in close partnership with our customers.



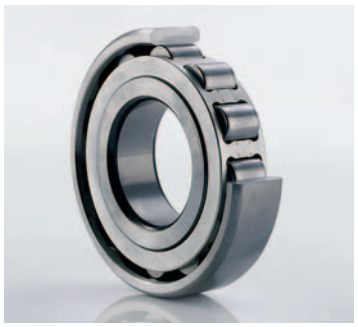
Coiler with tapered roller bearings and cylindrical roller bearings



Cold pilger machine for rolling seamless tubes with special spherical roller bearings

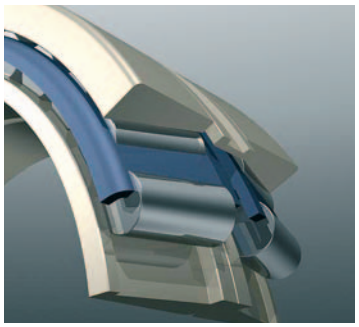


Rolling mill gearbox with tapered roller bearings and cylindrical roller bearings



Cylindrical roller bearings with silver-plated cages for high-speed areas in wire mill finishing blocks

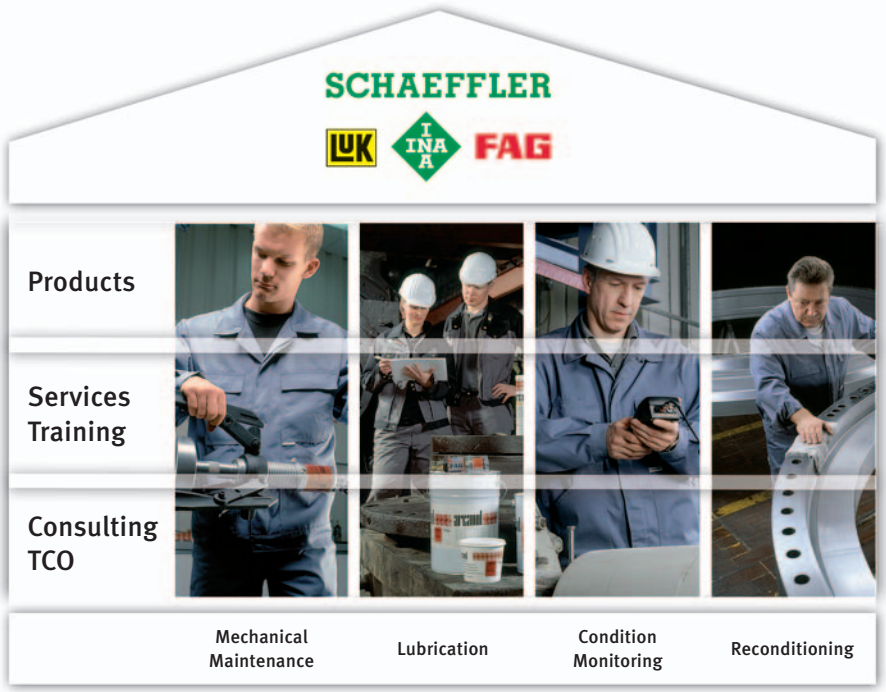
High-precision angular contact ball bearings

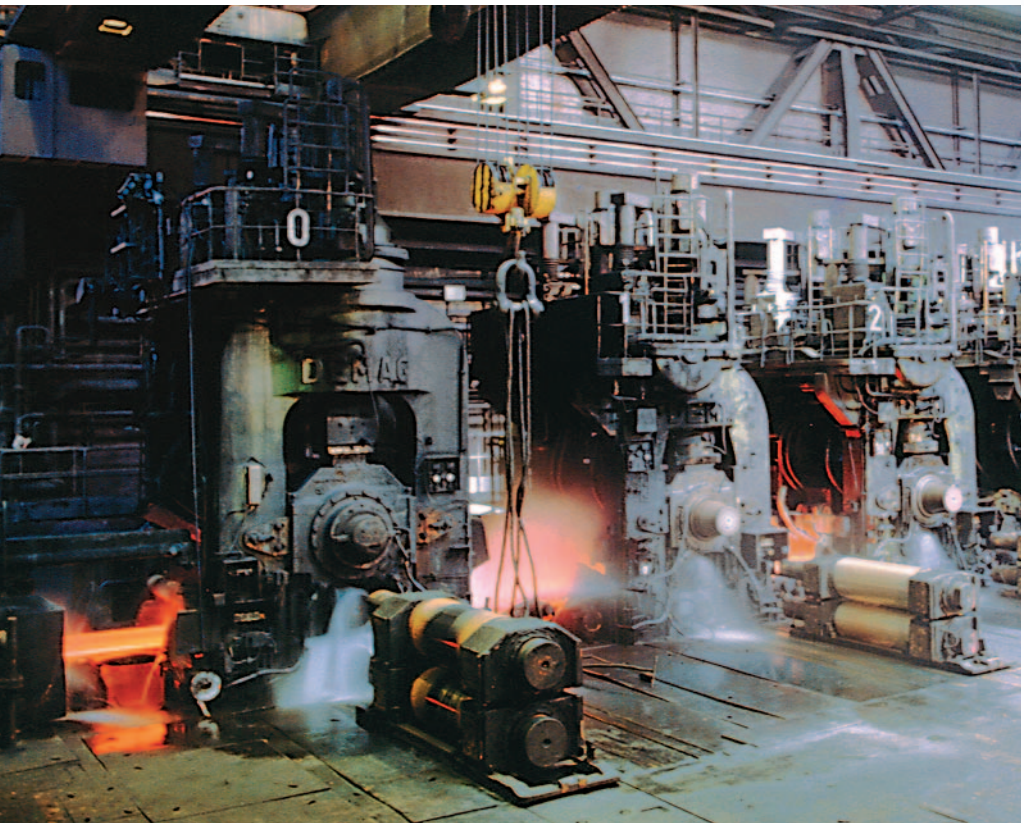


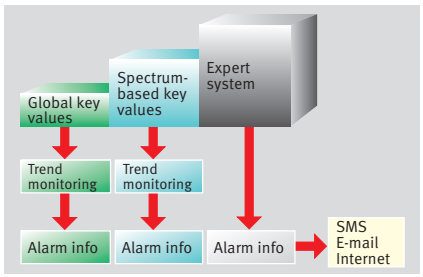
Double-row tapered roller bearings

Services for all rolling bearing products and applications

Capital-intensive production facilities require permanent availability, which is provided by top quality equipment and an intelligent life cycle service that leaves nothing to chance. For rolling bearings operating under particularly wear-intensive conditions, this means that reliable products and services for mounting, lubrication, condition monitoring, and reconditioning of rolling bearings are required. This is exactly where Schaeffler is the partner for you.







Our portfolio of maintenance and quality assurance services ranges from installation and plant monitoring through to the introduction and implementation of preventive maintenance measures. The reconditioning of rolling bearings, for instance, another service offered by Schaeffler, has short delivery times and thus makes a decisive contribution to ensuring the permanent availability of plants and machinery. A wide range of mounting and alignment tools, gages, and lubricants – in addition to our training program – facilitates maintenance work and helps design work processes more efficiently.

Thanks to many years of experience and highly-qualified specialists, Schaeffler is the expert partner for customer-focused solutions for all aspects of the life cycle of rolling bearings. This includes condition monitoring by remote diagnosis for significantly increasing machine availability. In addition to conventional plant monitoring, the FAG DTECT X1s system contributes to ensuring consistent rolling stock quality (chatter mark detection).

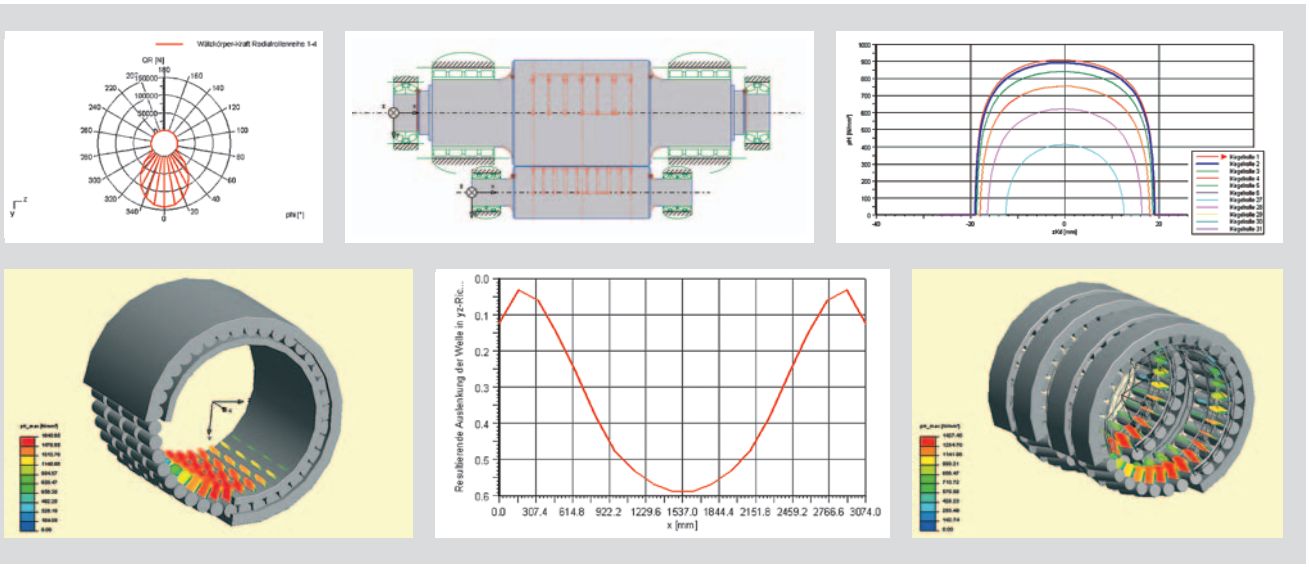
Fast and flexible

Monitoring systems that are matched to customer requirements detect damage at a very early stage. Planning reliability increases because unplanned downtimes can be prevented and bearing replacements can be scheduled in advance. Schaeffler supports steel production worldwide with state-of-the-art technology. If personal intervention is required, highly-qualified technicians and engineers are available to help on site, if necessary only a short while after the call for help. Excellent security is ensured by service contracts with scope and terms designed to match the plant, the operating conditions, and the customer requirements in particular. We will be happy to provide you with further information.

www.schaeffler.com/services

industrial-services@schaeffler.com

Speed and convenience through practical software



BEARINX®

The BEARINX® software can be used, for example, to calculate the bending behavior of elastically supported rolls under any desired load. The support reactions, the internal loads in the rolling bearings, the comparative stresses of the shafts, and the most important key values are presented in numeric and diagrammatic form.

BEARINX® takes account of:

- The elasticity of smooth and stepped rolls, both hollow and solid, made from various materials and their transverse force deformation
- Shaft loads resulting from rolling forces and bending moments or from the external forces acting on the bearings
- Shaft support by rolling bearings without linear spring support; the bearing geometry, bearing clearance, rolling element and raceway profiles, and special conditions in loading are included
- Any number of load cases

Results that can be documented:

- Deflection and inclination of the roll axis at freely selectable locations
- Curves for transverse force and bending moments
- Stresses, bearing reaction forces, and bearing deflection
- Load conditions of the individual rolling elements
- Pressure distribution in the rolling contacts of the individual rolling elements
- Parameter analyses of all input variables

In the calculation of fatigue life, the actual loads in the rolling contact calculated with BEARINX® are taken into account.

medias*® *professional

Our electronic support and selection system ***medias***® *professional* provides information on more than 40,000 standard products for approximately 60 industrial sectors.

It includes:

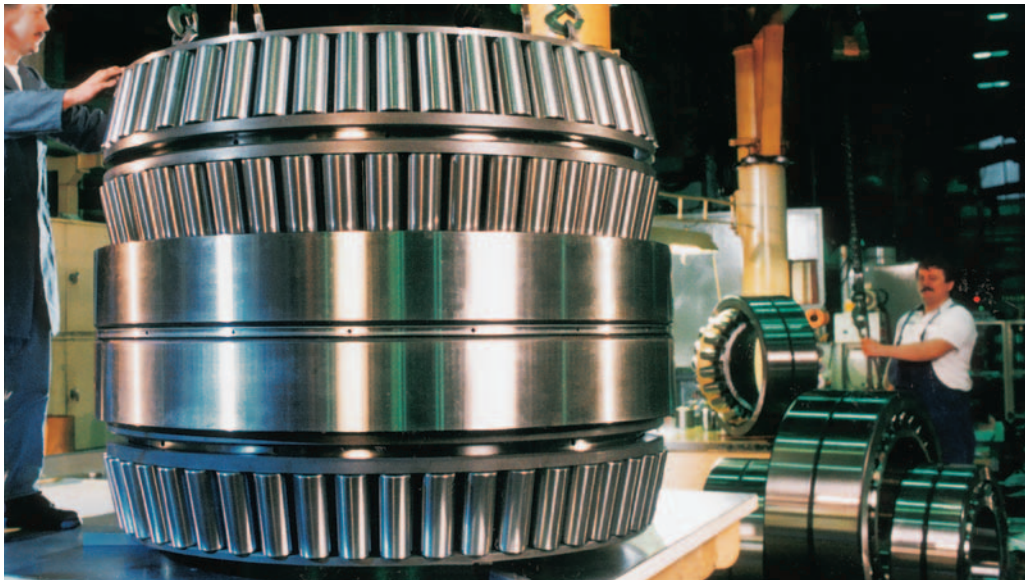
- Detailed product information
- Comprehensive design and safety tips
- Details of bearing design
- Representative mounting examples
- CAD downloads
- Tables showing accuracies, tolerances, and internal clearance
- Bearing seals

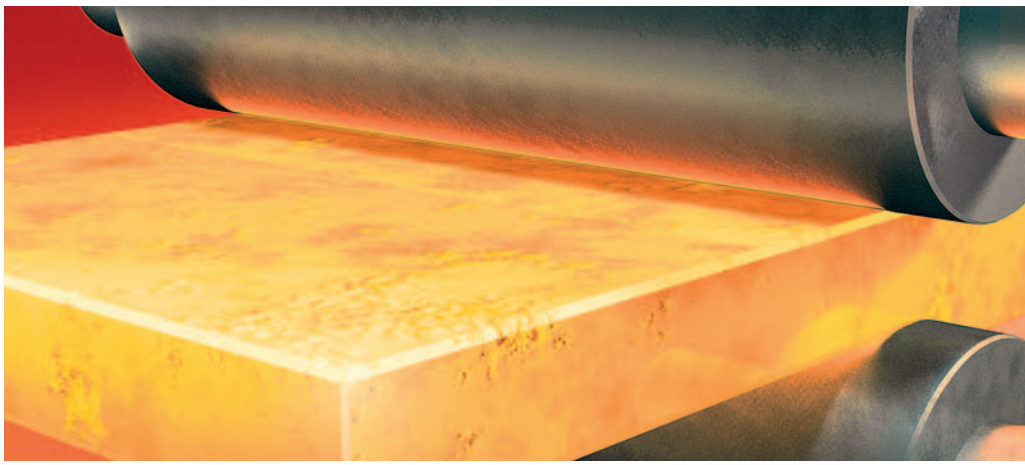
You will find the ***medias***® product catalog on the internet at:
http://medias.schaeffler.com

Products and services from one source

Schaeffler has expert knowledge of bearing technology, comprehensive expertise in metallurgical plant and rolling mill applications, and many years of experience in working with the steel industry. With the focus on maximum availability and quality, original equipment manufacturers and plant end-users are offered a complete range with comprehensive service:

- Expert technical consultation, bearing design, and product recommendation
- A comprehensive bearing range comprising products from INA, FAG, and ELGES
- Customer support when mounting bearings through mounting instructions, training courses, and experienced service personnel
- Comprehensive service consultation before and after purchase
- Condition monitoring of bearing supports with remote diagnosis
- Worldwide presence and rapid active assistance in all regions





X-life – measurably superior

X-life is a seal of quality for particularly high-performance products from Schaeffler's INA and FAG brands.

X-life products are characterized by higher dynamic load ratings compared with previous standard products and make new designs possible.

- X-life increases the rating life of the bearing support under the same loads and in the same design envelope
- Alternatively, an X-life bearing can support higher loads in the same design envelope and with the same rating life
- If the rating life and the loads remain unchanged, X-life bearings allow performance to be improved, the design envelope to be optimized, and weight to be reduced.

X-life therefore makes a significant contribution to increasing the overall efficiency of customer applications.

MATNR 036946710-0000 / PME / US-D / 201401.5 / Printed in Germany

Schaeffler Technologies GmbH & Co. KG

Georg-Schäfer-Strasse 30
97421 Schweinfurt
Germany
Internet www.schaeffler.com
E-Mail steel@schaeffler.com

In Germany:
Phone 0180 5003872
Fax 0180 5003873

From other countries:
Phone +49 9721 91-0
Fax +49 9721 91-3435

Issued: 2014, January