Heavy-Duty Rolling and Plain Bearings

for Mining, Processing, On- and Offshore Technology

SCHAEFFLER GROUP
INDUSTRIAL

For Advanced Bearings in the Mining and Processing Sector ...

Technical progress in the fields of mining, recovery of oil and gas, processing engineering is accelerating constantly. Powerful computers and increasingly efficient software facilitate more exact calculations and faster designing of machines and plants. New findings in materials engineering and tribology contribute to product development so that performance and reliability are continuously improved.

In the Mining and Processing sector, rolling and plain bearings contribute considerably to technical progress. Harsh operating and environmental conditions require extremely robust bearings.

Due to our research and development activities and to an intensive exchange of experience with manufacturers and operators of machines and facilities, the operational reliability of our bearings has increased constantly. The economic efficiency of the bearings has also significantly improved the economic efficiency of machines and entire plants.

Due to our development partnerships with our customers we know their respective requirements very well. And due to intensive contact to colleges and universities we are familiar with the industry's and operator's technological trends. This enables us to offer the right bearings, housings, accessories and services for the entire Mining and Processing sector.

The force with which the cutter head of tunnel boring machines is pressed against the rock in the drilling process is accommodated by FAG bearings. Many of the combination thrust & radial cylindrical roller bearings or tapered roller bearings have outside diameters up to 4.25 meters.

In All Subsectors ...

In the various “Mining and Processing” subsectors different operating conditions are encountered. Consequently, the bearings must meet special requirements, such as:

Rolling and plain bearings for the Mining Industry

- High operational reliability
- Reduced maintenance requirements
- High load carrying capacity
- Easy mounting and dismantling

Rolling bearings for Processing Engineering

- Long service life
- Highest possible load carrying capacity
- Insensitivity to impacts
- Suitability for vibrating stress

Rolling bearings for the Cement Industry

- High operational reliability
- Highest possible load carrying capacity
- Resistant to high temperatures (rotary kiln)

Rolling bearings for the Oil and Gas Exploration

- High reliability
- High load carrying capacity in an extremely confined space
- In some cases: corrosion resistance and no lubrication required

... and for all Industrial Applications

A variety of conditions have to be dealt with in the various machines used in the Mining and Processing sector. Bearing dimensions and designs are mainly determined by the following criteria:

- Load
- Speed
- Service life
- Environmental factors
- Easy maintenance

These factors, and possibly others as well, must be taken into account to a varying degree in the designing and dimensioning of the bearings. For many applications, designers can use rolling bearings and plain bearings of the standardized types and designs that are listed in our catalogs.

Other applications, however, require special rolling and plain bearings we have developed for special requirements in this industry. The largest of these bearings, which are used in tunneling machines, can have outside diameters up to 4.25 meters.

Rolling and plain bearings for plants and machines in the Mining and Processing sector, for example

Tunnel Boring Machines, Road Headers, Mine Hoists, Bucket Wheel Excavators, Draglines

Drilling Rig Units, Drilling Platforms, Mooring Buoys, Tanker Loading Points, Pumping Stations, Drilling Equipment, Pipe-laying Vessels

Jaw Crushers, Gyratory Crushers, Hammer Crushers , Vertical Grinding Mills, Roller Presses, Tube Mills, SAG Mills, Ball Mills

Vibrating Screens

Rotary Kilns, Sintering Plants

Conveyor Belts, Transport Equipment, Mine Trucks, Stackers, Reclaimers

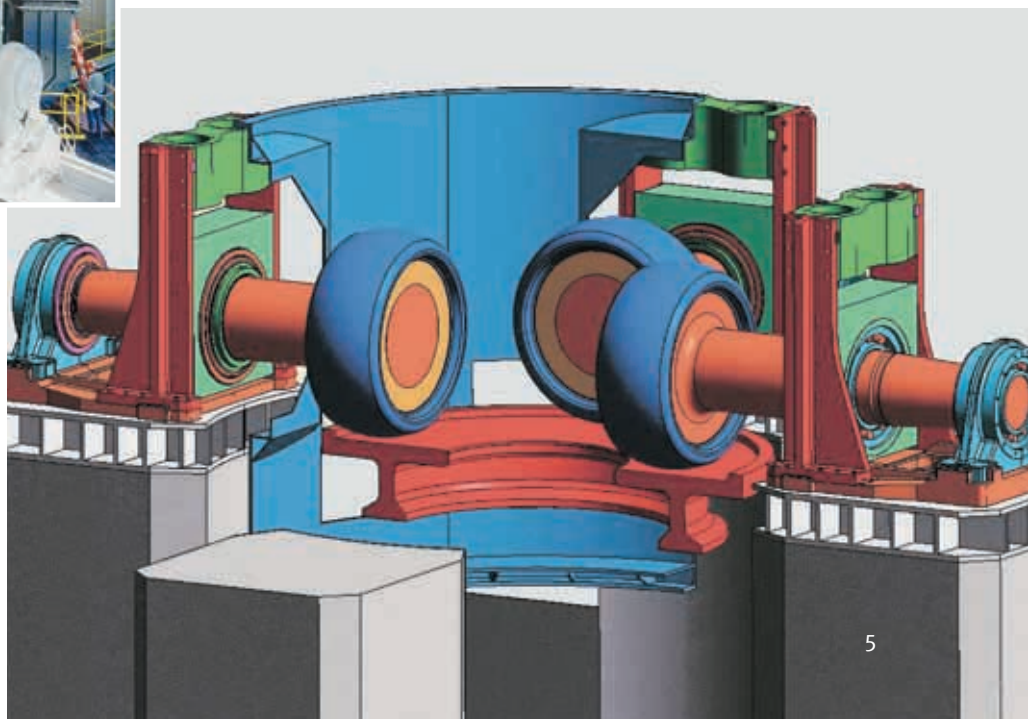
INA and FAG Rolling and Plain Bearings are the Ideal Choice for Applications Requiring

- High operational reliability
- High load carrying capacity in a confined space
- Low friction
- Resistance to high temperatures
- Low wear
- Easy mounting
- Reduced requirements on lubrication and maintenance
- Customer-oriented availability
- Cost-effectiveness

(Courtesy: Polysius AG)

Superior economy with the new concept: QUADROPOL roll mill.

Each of the four grinding roll units is equipped with two spherical roller bearings, one at the non-locating end and one at the locating end.



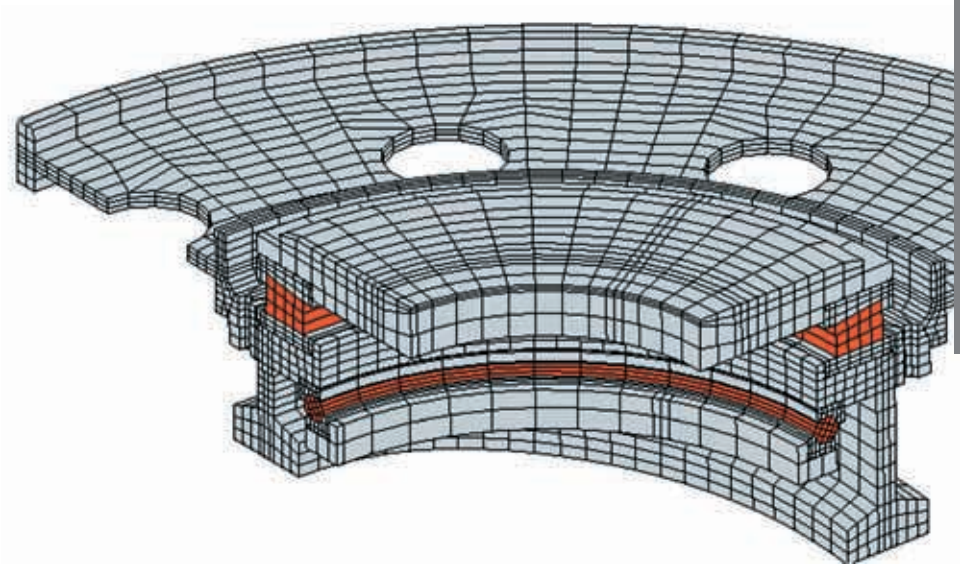
What INA and FAG Have to Offer

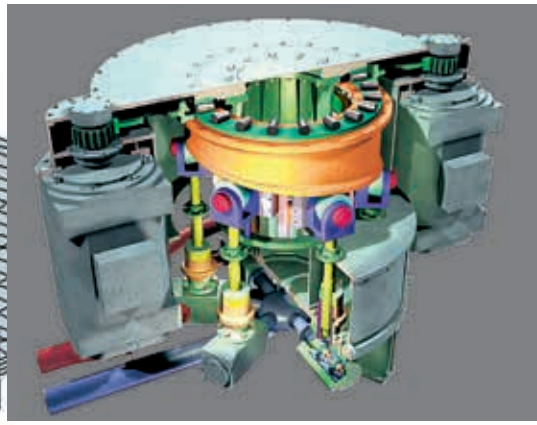
Engineering support

Increasingly shorter development cycles require correct dimensioning and designing of rolling and plain bearings from the start. This also applies to the Mining and Processing sector. Utilizing the know-how of experienced bearing specialists as early as the development phase means a savings of both time and costs for our customers. For this reason we offer designers support in the form of technical publications, our eCatalog and PC calculation programs.

INA and FAG engineers are well versed in the entire field of rolling and plain bearing engineering. They provide customers with support on all application and design issues and offer a calculation service that is tailored to this industry's specific requirements. Together with our customers we develop individual solutions to their specific problems.

At the customer's request, INA's and FAG's service for more operational reliability provides full technical support throughout the bearings' service life (see also page 10 – 11).





Rolling and Plain Bearings, Housings and Accessories – Standard and Special Designs

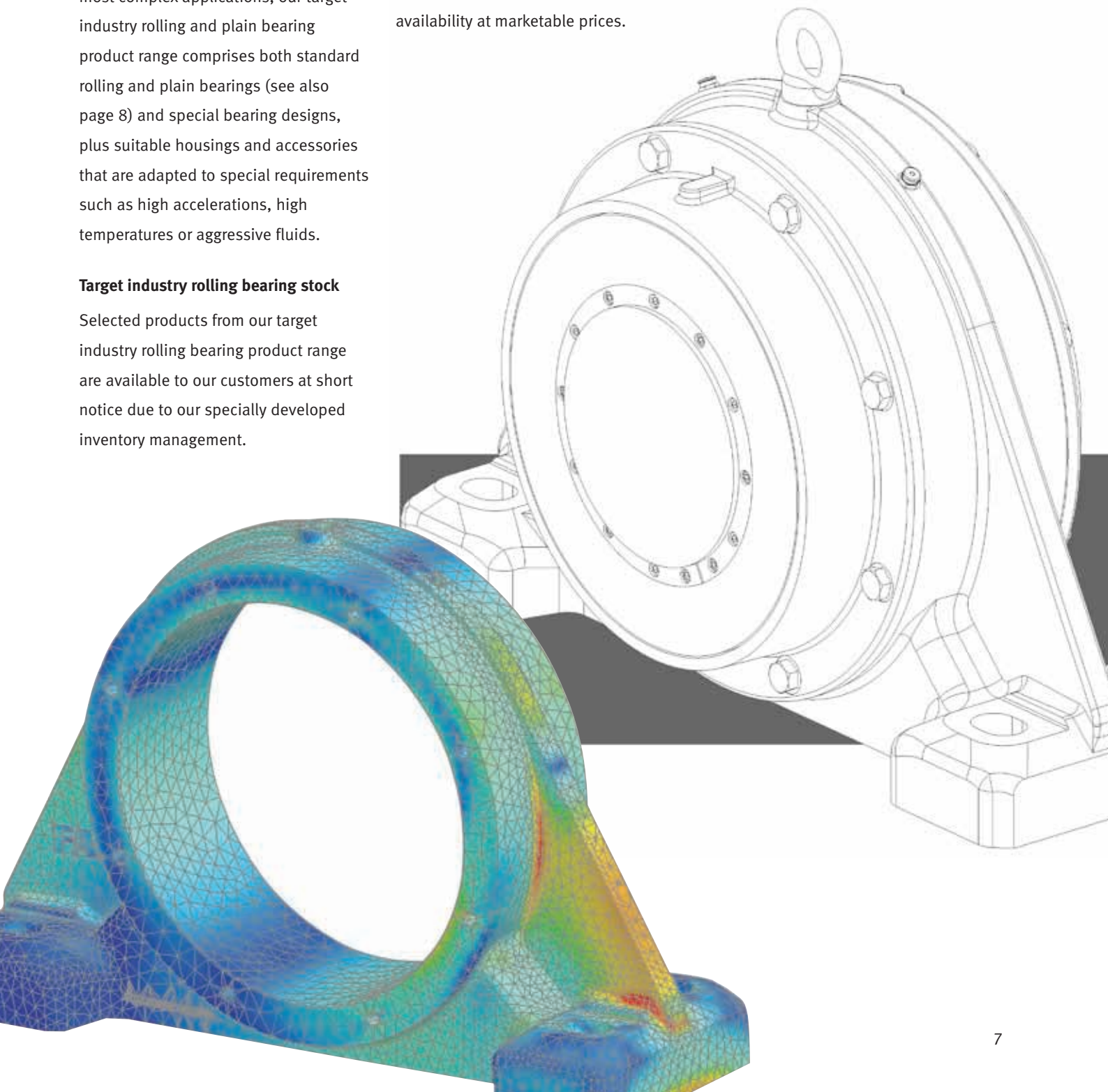
Standard and special designs

To enable our customers in the Mining and Processing sector to solve even the most complex applications, our target industry rolling and plain bearing product range comprises both standard rolling and plain bearings (see also page 8) and special bearing designs, plus suitable housings and accessories that are adapted to special requirements such as high accelerations, high temperatures or aggressive fluids.

Target industry rolling bearing stock

Selected products from our target industry rolling bearing product range are available to our customers at short notice due to our specially developed inventory management.

Our sophisticated inventory management system allows us to drastically reduce costs of stock keeping for our customers and to guarantee fast availability at marketable prices.



INA's and FAG's Electronic Support...

***medias*® 4.0 includes INA and FAG industrial products**

In this combined electronic support system, ***medias*®** now describes more than 40,000 standard products for roughly 60 sectors. For INA and FAG bearings, the system considers both extended calculations of modified rating life per DIN/ISO 281. In addition, ***medias*®** has a separate comprehensive lubricant database that includes detailed information for selecting suitable lubricants, while giving special consideration to INA and FAG lubricants.

Extensive product information, comprehensive notes on design and safety, detailed information on designing bearing supports and numerous installation examples provide the basis for designing bearing supports that are operationally reliable and efficient. 2D- and 3D-CAD downloads, tables on accuracy, tolerance, bearing clearance, information on sealing options for bearing supports, etc. facilitate design work considerably. If required, an expanded tutorial provides information on navigation steps and guides users reliably through the program.

The new ***medias*®** now provides quick access to the entire range of rolling bearings, plain bearings and linear guides produced by the Schaeffler Group.
In addition, type sheets can be prepared online in PDF format and printed – this is particularly helpful in cases where documentation must be supplied.

... Quality and Delivery

Quality management as a comprehensive approach

The quality of our products is based on the feedback we obtain from our customers. It is important to identify and meet their requirements and expectations to their satisfaction. Quality is vital with regard to both the product and all activities and services. For this reason INA and FAG decided to take a group-wide quality approach some time ago. All procedures of the INA and FAG quality assurance system are described in our quality manual and have been certified in accordance with DIN EN ISO 9000 et.seq.

On-time delivery worldwide, engineering support and sales representatives

"On-time delivery" is a decisive yardstick for evaluating the efficiency of a rolling and plain bearing manufacturer. Our sophisticated logistics concept ensures the worldwide availability of INA and FAG products.

Our sales companies and business partners in all important countries of the world offer a 24-hour delivery service.

INA and FAG distributors can be found in classified directories and/or yellow pages in the category "Rolling and Plain Bearings" or "Ball Bearings".

Welcome to the future!
Unmatched engineering excellence

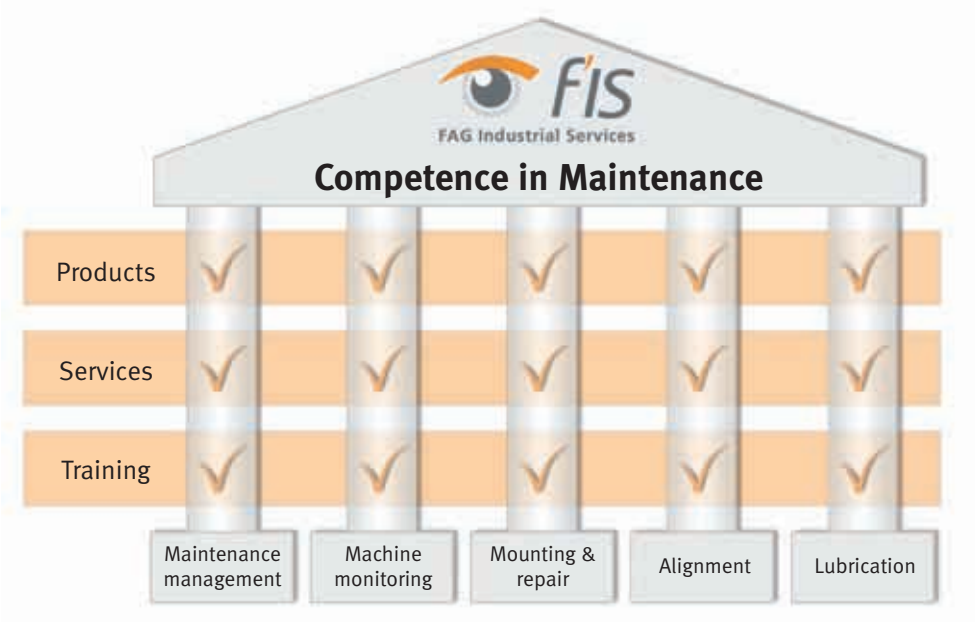
X-life, which has arisen from the new partnership between INA and FAG, is a premium quality concept that defines a new, world class benchmark for engineering achievement and organizational excellence. A standard that is absolutely second to none.

The X-life concept considers all parameters that play a crucial role throughout a product's life cycle. In addition, X-life offers convincing product features that meet and even exceed your special requirements. For example, X-life offers products and system solutions with a service life that is far beyond current standard values, extremely low-noise operation, minimal maintenance, high rigidity and high load capacity.

F'IS – INA's and FAG's Maintenance Service

FAG Industrial Services (F'IS) offers a wide range of maintenance solutions to reduce maintenance costs, prevent unplanned downtimes and increase machine availability. Many years of practical experience in this special industry segment have made us well familiar with the extremely rough operating conditions of raw materials Mining and Processing.

F'IS products, services and training are an integral part of a bearing's life cycle and are highly accepted by customers all over the world.



Our services include the following:

- Technical and organizational maintenance support
- Selection, implementation and customizing of Computerized Maintenance Management Systems (CMMS)
- Vibration analysis (condition monitoring) in the form of regular measurement campaigns, trouble shooting or remote service for early detection of bearing defects, gear mesh problems, out of balance and misalignment
- Individual customer training for condition monitoring, bearing technology and practical mounting procedures.
- Reconditioning of large bearings
- Grease and lubrication support and sales
- Tools for mounting, dismantling and measuring bearings
- Laser alignment systems
- Offline and online condition monitoring systems

Continuous training, certifications and audits help us ensure the highest service quality possible provided by our employees and partners. F'IS is represented in over 50 countries worldwide by subsidiaries or certified partners.

Products and services supplied by F'IS such as assembly tools and condition monitoring are available at: www.fis-services.com

FAG Industrial Services

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