SCHAEFFLER

We pioneer motion

Mining and Processing Playbook

Schaeffler’s products and services for raw material extraction and minerals processing

Interactive e-booklet

Start

Mining and Processing Playbook

This Schaeffler Playbook supports sales activities in raw material extraction and minerals processing. It provides valuable information about all aspects of the industry and shows what makes Schaeffler the leading technology partner for the sector: the products, systems, and solutions with which Schaeffler helps the industry to reach its goals. From the production process and the (user-specific) product and service portfolio to customized solutions, this Playbook answers every question, all for the purpose of meeting our goal of giving our customers the best advice possible.

Mining Processes

The term mining covers many different steps that serve to develop, extract, and process important raw materials. A basic distinction is drawn between underground mining and open-pit mining. The latter category is further divided into continuous and discontinuous mining processes.

Open-pit Mining (Continuous)

Open-pit Mining (Discontinuous)

Underground Mining

Further Processing

Open-pit Mining (Continuous)

Continuous open-pit mining is mainly characterized by its conveyor system that keeps the mined material constantly moving. Bucket wheel excavators are responsible for both removing overburden and extracting raw materials. Both products are transported to their final destination via conveyor belts.

Overburden

Preparation
For harder soil and rock layers, the mine is prepared using explosives.

1 Preparation

2 Removal

Bucket wheel excavators remove the overburden and in this way expose the raw material.

3 Transport

A system of conveyor belts transports the overburden to pits that have already been depleted.

4 Dumping

The overburden is dumped there by stackers and the pit is recultivated.

Raw materials

2 Extraction

Bucket wheel excavators extract the raw materials at the exposed sites.

3 Transport

The raw materials are removed from the site via a conveyor system.

4 Further processing

Depending on the material, the raw materials are processed on site or transported elsewhere.

Open-pit Mining (Discontinuous)

In discontinuous open-pit mining, the excavation process centers on various types of excavators. Gigantic draglines expose the raw materials, which are removed by rope and hydraulic shovels. An army of dump trucks then transports the materials to processing or storage sites.

Overburden and Raw Materials

1 Preparation

For harder soil and rock layers, the mine is prepared using explosives.

2 Removal and dumping

The overburden is removed at one site by large draglines and dumped at another site.

3 Extraction

Rope and hydraulic shovels remove the exposed raw materials and load them onto dump trucks.

4 Transport

The dump trucks transport the raw materials to storage sites or for further processing.

5 Further processing

Depending on the material, the raw materials are processed on site or transported elsewhere.

Underground Mining

In underground mining, the protection of people and machines is prioritized. Sufficient fresh air is supplied via supply shafts and water drainage systems are deployed. The materials are transported to the surface for further processing via the tunnel and shaft system.

Overburden and Raw Materials

In preparation, a tunnel system with supply shafts is created and a ventilation and water drainage system are installed for occupational safety purposes.

1 Preparation

2 Removal / Extraction

Overburden or raw materials are removed by means of long-wall miners or excavators.

3 Transport

The materials are transported to the surface by means of mine hoists.

The material is transported to the production shafts via the tunnel system with transport machines or conveyor systems.

4 Further processing

The raw materials are either processed on site or transported elsewhere.

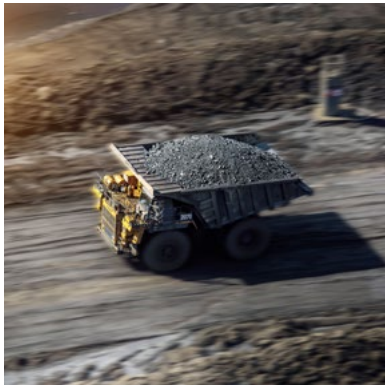
Overview of the Most Important Applications

Bucket wheel excavators

Conveyor systems

Draglines, rope- and hydraulic shovels

Dump trucks



Mine hoist

Longwall miners

Tunnel boring machines

Crushers

Roller presses

Ball mills

Facts and Figures

1,200 METERS
DEEPEST OPEN-PIT MINE
Copper mine, Utah, U.S.

15 km²
LARGEST OPEN-PIT MINE
Chuquicamata, Chile

CHINA, 26 %
Country with the world's largest mining industry

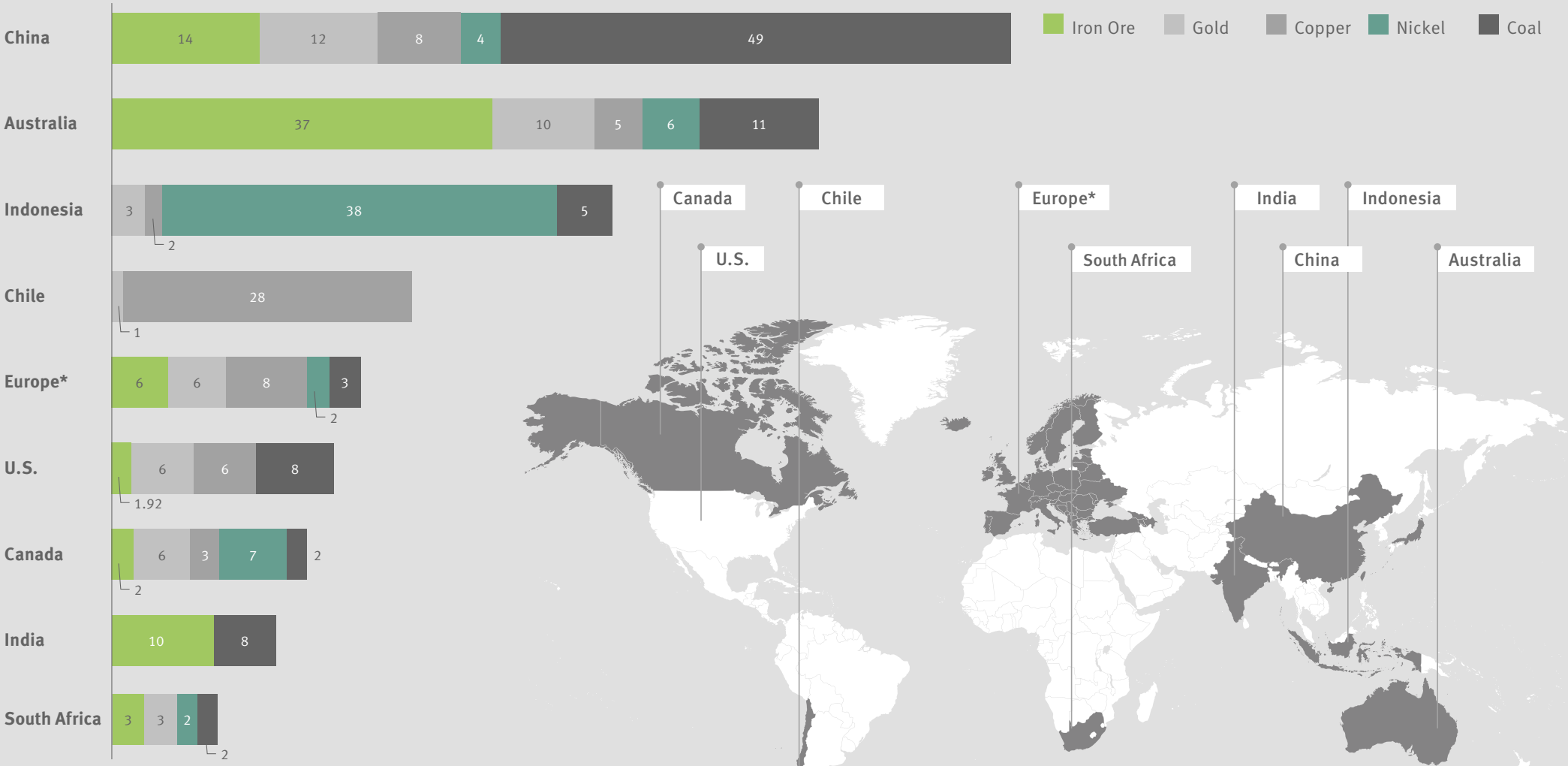
925 BILLION USD
REVENUE OF THE GLOBAL MINING INDUSTRY 2021

135,000
NUMBER OF EMPLOYEES
At the largest mining company (Glencore)

4,500 km long
LARGEST UNDERGROUND MINE
El Teniente, Chile

Did you know?
The world's largest conveyor belt, 102 kilometers long, extends from Bou Craa, Morocco, to the Atlantic coast. With its innovative SNS housing specially designed for large bearings, Schaeffler sets a new standard for applications of this magnitude.

Share of Global Mineral Production as a Percentage



*Not including Russia

Source: https://www.world-mining-data.info
(Figures rounded in this view.)

Schaeffler for the Mining Industry

Schaeffler – Your Partner for the Mining Industry

Schaeffler is a partner of leading manufacturers and operators in the raw materials processing industry. Our broad range of products and services enables us to help our customers worldwide optimize their plant processes.

Successful together
The harsh operating conditions in raw material extraction and processing impose tough demands on the performance and operational safety of all the components used. Thanks to years of close collaboration with our customers and extensive shared experience, we have a thorough understanding of the special challenges the raw materials processing industry presents. That means we are able to offer solutions that always utilize state of the art technologies while keeping the needs of the industry in mind.

With Schaeffler, companies can also rely on:

- A global network of experts
- Broad-based expertise with bearings
- User-friendly engineering tools in medias
- Sustainable product concepts

Benefits offered by Schaeffler in the mining industry at a glance

Top supplier to plant manufacturers	End-to-end **expert knowledge**	Leader in **wireless machine diagnostics**	Forward-looking with **automated lubrication**

Proven in practice: our customer success stories

We regularly work with our customers to put special projects into practice with individual solutions which combine or complement products and services from our catalog.

Original equipment manufacturers (OEM)

- C. u. A. Heiderich ›
- SIEMAG TECBERG ›
- MWM Elektro ›
- TAKRAF GmbH ›

Maintenance, repair, and operations (MRO)

- MVM Mátra Energia Zrt. ›
- Adaro Indonesia ›
- Pilbara Iron ›
- Compañia de Minas Buenaventura ›

Schaeffler Products and Services for Mining and Raw Material Processing

The extremely harsh operating and environmental conditions in the mining industry require equipment that meets the toughest demands. Thanks to our close collaboration with our customers, we're familiar with the specific requirements of the industry. Our high-quality bearings are specially designed to withstand a dusty and humid operating environment as well as high operating and impact loads. As a leading roller bearing manufacturer, we work with manufacturers and operators to support the mining industry with comprehensive solutions. In addition to a large number of customized solutions, we also offer a broad portfolio of innovative products and services across a bearing's entire life cycle.

Schaeffler roller bearings for mining and raw material processing

Spherical roller bearings

Split spherical roller bearings

Axial spherical roller bearings

Cylindrical roller bearings

Axial cylindrical roller bearings

Tapered roller bearings

Plummer block housings

Deep groove ball bearings

Spherical plain bearings

Slewing rings

Your advantages

- Decades of experience
- Proven quality
- High level of operational safety
- Long life
- High load-carrying capacity and stability
- Reduced maintenance requirements
- Easy to install and remove
- Temperature resistance
- Suitable for heavy vibration stress

Schaeffler services for mining and raw material processing

Mounting tools and services

Lubrication solutions

Monitoring solutions and services

Remanufacturing services

Expert services

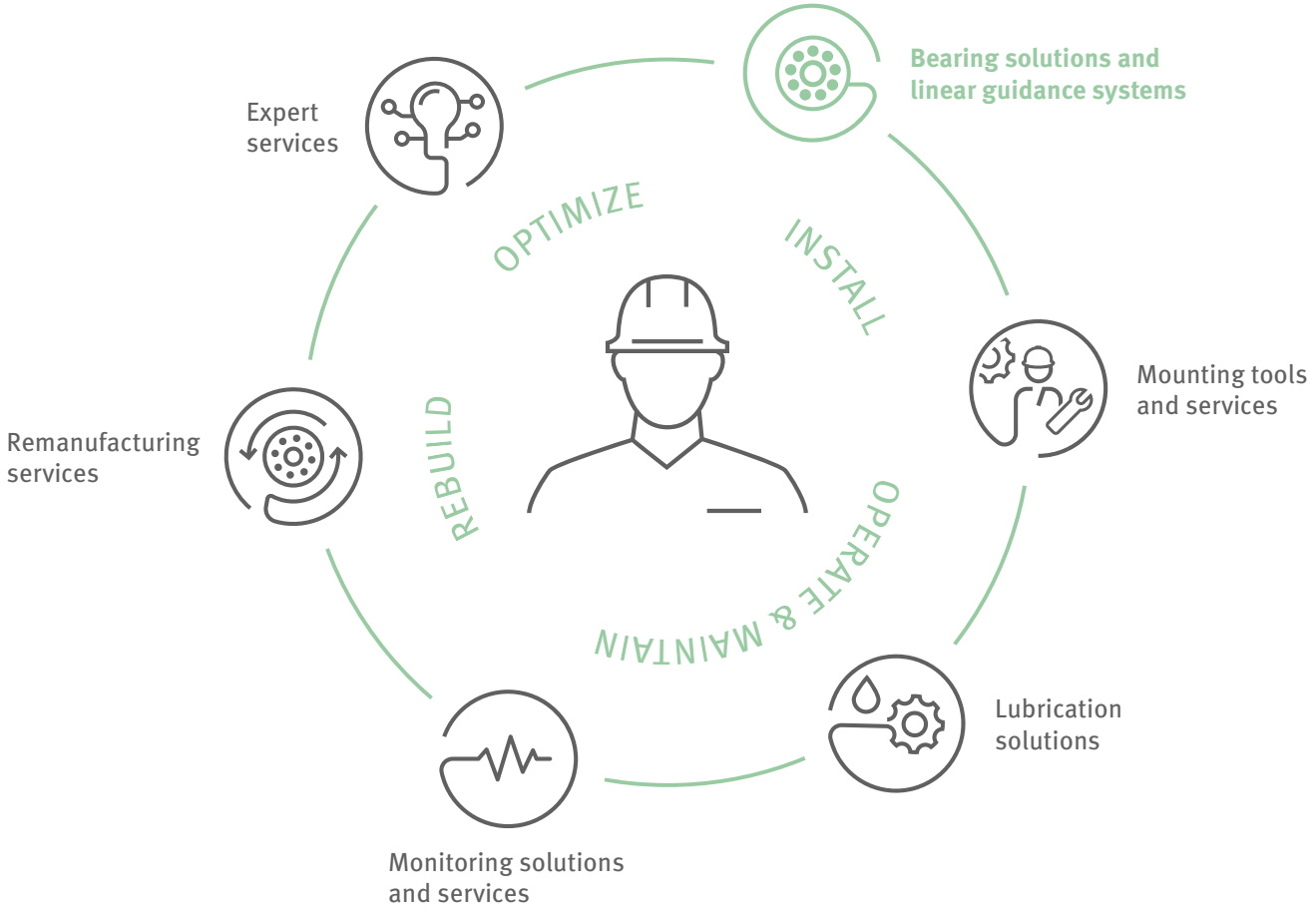
Added Value in Every Phase of the Life Cycle

Our customers are at the center of everything we do. No matter what industry they come from: we equip them with our innovations for pioneering motion. From bearing solutions to complete linear guidance systems, that's how we pioneer motion for the industry of the future.

What's more, we create innovations to extend the lifetime of these solutions. And with over 100 years of experience in the bearing business, we have earned the experience it takes to add value to every stage of the solution lifetime.

From the moment one of our solutions is installed to how it is operated and maintained: Schaeffler has a full portfolio of solutions and services to support maintenance teams and managers. Called Schaeffler Lifetime Solutions, the portfolio includes mounting tools and services as well as solutions and services for condition monitoring and lubrication.

But the lifetime does not end there. Schaeffler also offers remanufacturing services to extend the lifecycle of bearings belonging to our customers and expert services to optimize their use. And that's how we add value over the lifetime for our customers.



Bearing Solutions for Mining

As one of the world's largest roller bearing manufacturers, Schaeffler is an important partner for mining and raw material processers. Based on our in-depth industry knowledge, we provide our customers with optimum bearing solutions for their applications – for maximum reliability even under the harshest ambient conditions.

Navigation instructions:
With the help of this overview, you can quickly and easily access the corresponding content in the Playbook by clicking the respective application or product in the table.

	Bucket wheel excavators	Conveyor systems	Draglines, robes and hydraulic shovels	Dump trucks	Mine hoists	Longwall miners	Mine fans	Tunnel boring machines	Crushers	Roller presses	Ball mills	Electric motors
1 Spherical roller bearings ›	●	●	●	●	●	●	●	●	●	●	●	
2 Split spherical roller bearings ›	●	●			●		●					
3 Axial spherical roller bearings ›							●	●		●		
4 Cylindrical roller bearings ›	●		●	●	●	●	●		●	●		●
5 Axial cylindrical roller bearings ›									●			
6 Tapered roller bearings ›		●	●	●		●		●	●			
7 Plummer block housings ›	●	●	●		●		●		●		●	
8 Deep groove ball bearings ›		●		●			●					●
9 Spherical plain bearings ›	●		●	●					●	●		
10 Slewing rings ›	●					●		●				

Lifetime Solutions ›

Lifetime Solutions for Mining

Schaeffler Lifetime Solutions offers an end-to-end portfolio specially tailored to the needs of maintenance teams and plant managers. From assembly to condition monitoring and smart lubrication, our products, solutions, and services are perfectly coordinated and help prevent up to 100% of all machine outages. Keep your machines rolling with Schaeffler.

Navigation instructions:
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		Bucket wheel excavators	Conveyor systems	Draglines, robes and hydraulic shovels	Dump trucks	Mine hoists	Longwall miners	Mine fans	Tunnel boring machines	Crushers	Roller presses	Ball mills	Electric motors
1	ProLink CMS ›	●	●	●	●	●	●*	●	●*	●	●	●	●
2	SmartCheck ›	●	●	●	●	●		●	●*	●		●	●
3	OPTIME Condition Monitoring ›	●	●	●				●*			●*	●*	●
4	OPTIME C1 ›	●	●	●				●*		●*			●
5	CONCEPT1–8 ›	●	●	●				●*		●*			●
6	ARCANOL ›	●	●	●	●	●	●	●	●	●	●	●	●
7	GreaseCheck ›	●		●		●			●		●		
8	LASER-EQUILIGN2 ›	●	●	●	●	●	●		●	●		●	●
9	MF-GENERATOR ›	●		●	●	●	●		●	●	●	●	
10	HEATER ›	●	●	●	●	●	●	●	●	●	●	●	●
11	Hydraulic pumps ›	●		●	●	●	●		●	●	●	●	
12	Hydraulic nuts HYDNUT ›	●		●	●	●	●		●	●	●	●	
13	Mechanical tools ›	●	●	●	●	●	●	●	●	●	●	●	●
14	Remanufacturing ›	●	●	●	●	●			●		●		

*Only partially applicable

Our comprehensive offerings are supplemented by a variety of expert services › and trainings ›.

Bearing Solutions ›

Application-Specific Solutions

Bucket Wheel Excavators

Stress endurance test for all components

Function in mining

- Raw material and overburden extraction in open-pit mining
- As a combination machine for stockpile loading and reclaiming

Challenges

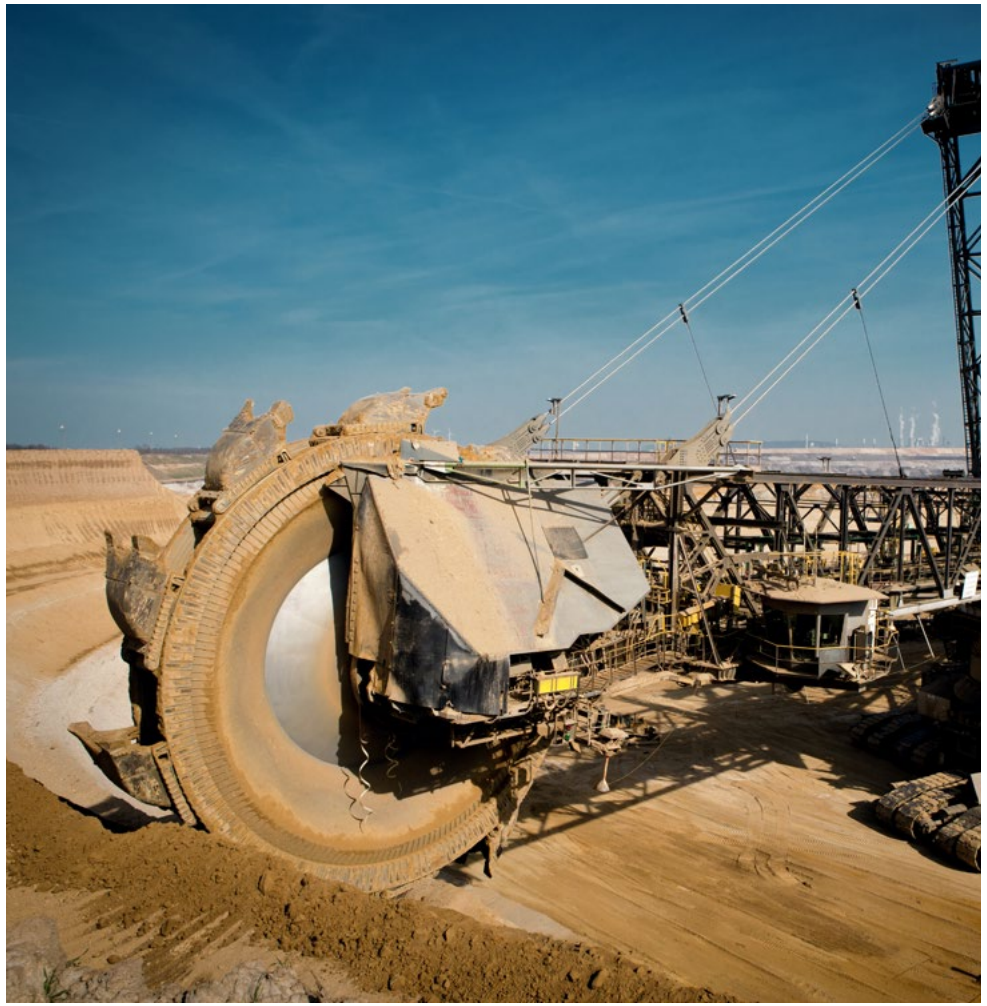
- Intensive dust generation
- Low speeds combined with high loads
- Subject to static loads and vibration
- Shaft deflections and misalignments at the bucket wheel shaft
- Fast bearing replacement in difficult-to-reach locations
- Forged shaft flanges make unsplit bearing designs more difficult

Schaeffler's solutions

- Bucket wheel shaft: large (split) spherical roller bearing to balance angular misalignments
- Gearbox bearing: split cylindrical roller bearings with pin cage for simple bearing replacement
- Robust plummer block housings with combined seals for protection against contaminants
- Condition monitoring at the main bearing arrangement, large gear units, and auxiliary units to increase plant availability
- Smart lubricators from the CONCEPT series and ARCANOL high-performance greases

Bearing Solutions ›

Lifetime Solutions ›



Conveyor Systems

Essential intermediary between all processes

Function in mining

- Material transport, sometimes across long distances

Challenges

- Dusty and humid operating environments (e.g., caused by water spray systems)
- Shaft deflections and misalignments
- High maintenance overhead due to long transport distances and many bearing locations
- High power consumption by the plant
- High follow-up costs when a machine fails

Schaeffler's solutions

- Drum bearings: split or unsplit (sealed) spherical roller bearings with the X-life seal of quality assurance
- Support rollers: friction-optimized ball bearings (maintenance-free with lifetime lubrication)
- Robust plummer block housings with combined seals for protection against contaminants
- SPA take-up housings for the easy adjustment of belt tension
- OPTIME Condition Monitoring for wireless and cost-efficient monitoring of the condition in many bearing locations
- Smart and wireless OPTIME C1 lubricators
- ProLink and SmartCheck for main drives and transfer stations

Bearing Solutions ›

Lifetime Solutions ›

Draglines, Ropes and Hydraulic Shovels

Maximum efficiency under high tension

Function in mining

- Draglines: removal of overburden, sometimes with simultaneous dumping (direct dumping)
- Rope and hydraulic shovels: raw material excavation and loading of dump trucks

Challenges

- Twenty-four-hour continuous operation
- High demand for component reliability
- High-level load-carrying capacity, shock resistance, and low-maintenance overhead required
- High-humidity and dirt levels

Schaeffler's solutions

- Spherical roller bearings for maximum basic load rating despite limited installation space
- Paired taper roller bearings, often case-hardened in rope sheaves for maximum durability
- Cylindrical roller bearings
- Condition monitoring in large gear units and auxiliary units to increase plant availability
- OPTIME Condition Monitoring for wireless and cost-efficient condition monitoring
- Smart lubricators from the CONCEPT series

Bearing Solutions ›

Lifetime Solutions ›

Dump Trucks

Traveling the globe on giant wheels

Function in mining

- Transport of raw materials

Challenges

- Wheel bearings installed in thin-walled adjacent construction
- Maximum resistance to the effects of dirt and dust
- High wear and overrolling resistance required
- Risk of current discharge in electric motors and generators
- Heavy loads as well as vibrations and impact loads
- High temperature stress (electric motors)

Schaeffler's solutions

- Wheel bearings: case-hardened tapered roller bearings in O arrangement (possibly with pin cage) to increase durability
- Planetary gear bearing: special spherical roller and cylindrical roller bearings, optional as direct bearing with outer ring guided cage for supporting centrifugal forces
- Electric motors/power generators: current-insulated (ceramic coating) deep groove ball bearings and cylindrical roller bearings
- Condition monitoring: ProLink or SmartCheck for critical components like gear units, OPTIME Condition Monitoring for auxiliary units

Bearing Solutions ›
Lifetime Solutions ›

Mine Hoists

Connecting processes above and below ground level

Function in mining

- Raising and lowering raw materials, devices, and personnel

Challenges

- Extreme safety and reliability requirements
- Frequent start-ups due to reversible operation, mixed friction conditions during acceleration and braking phase
- Heavy loads
- Minimal downtimes for bearing replacement
- Bearing installation with an outer ring diameter of sometimes more than 2,000 mm

Schaeffler's solutions

- Large (split) spherical roller bearings, including with pin cage for minimal downtimes
- Cylindrical roller bearings with aligning capability for free-floating bearing effect
- Paired taper roller bearings for rope sheaves
- Standard plummer block housings from the SNS series and customer-specific housing solutions made of spheroidal graphite cast iron, including preparation for condition monitoring
- SmartCheck and ProLink for reliable vibration detection
- Lubrication with ARCANOL high-performance greases like ARCANOL LOAD400 with effective additives

Bearing Solutions ›

Lifetime Solutions ›

Langwall Miners

Defying the most extreme conditions

Function in mining

- Extraction of soft and hard rock under ground (shearer loader)
- Production of underground infrastructure routes (continuous miner)

Challenges

- Extremely high degree of contamination, operation with decontaminated lubricant
- Continuously high impact loads
- Strong vibrations and high friction
- Humidity and moisture
- Use in potentially explosive areas

Schaeffler's solutions

- Spherical roller bearings and cylindrical roller bearings in many versions for customized solutions
- Tapered roller bearings with customer-specific axial clearance, some in case-hardened steel
- Slewing rings for a space-saving design and high rigidity under moment load
- ProLink for vibration monitoring (deployment limited, compliance with EX protection)

Bearing Solutions ›

Lifetime Solutions ›

Mine Fans

For an optimal fresh air supply

Function in mining

- Fresh air supply for people and machinery in the mine
- Discharge of recycled air and harmful gases
- Dust reduction
- Air conditioning and cooling of the mine

Challenges

- High axial loads high in comparison to radial loads
- Critical temperature development due to high speeds
- Risk of slippage, imbalance
- Misalignment
- Subject to dust and dirt

Schaeffler's solutions

- Select spherical roller bearing series (especially 223 and 222) with the X-life seal of quality assurance for supporting high speeds
- SNS and SES housings including a variety of sealing options
- Condition monitoring solutions in compliance with applicable mining regulations
- Automatic (and smart) lubricators from the CONCEPT series and OPTIME C1
- Lubrication with ARCANOL high-performance greases

Bearing Solutions ›

Lifetime Solutions ›

Tunnel Boring Machines

Boring a way for industry

Function in mining

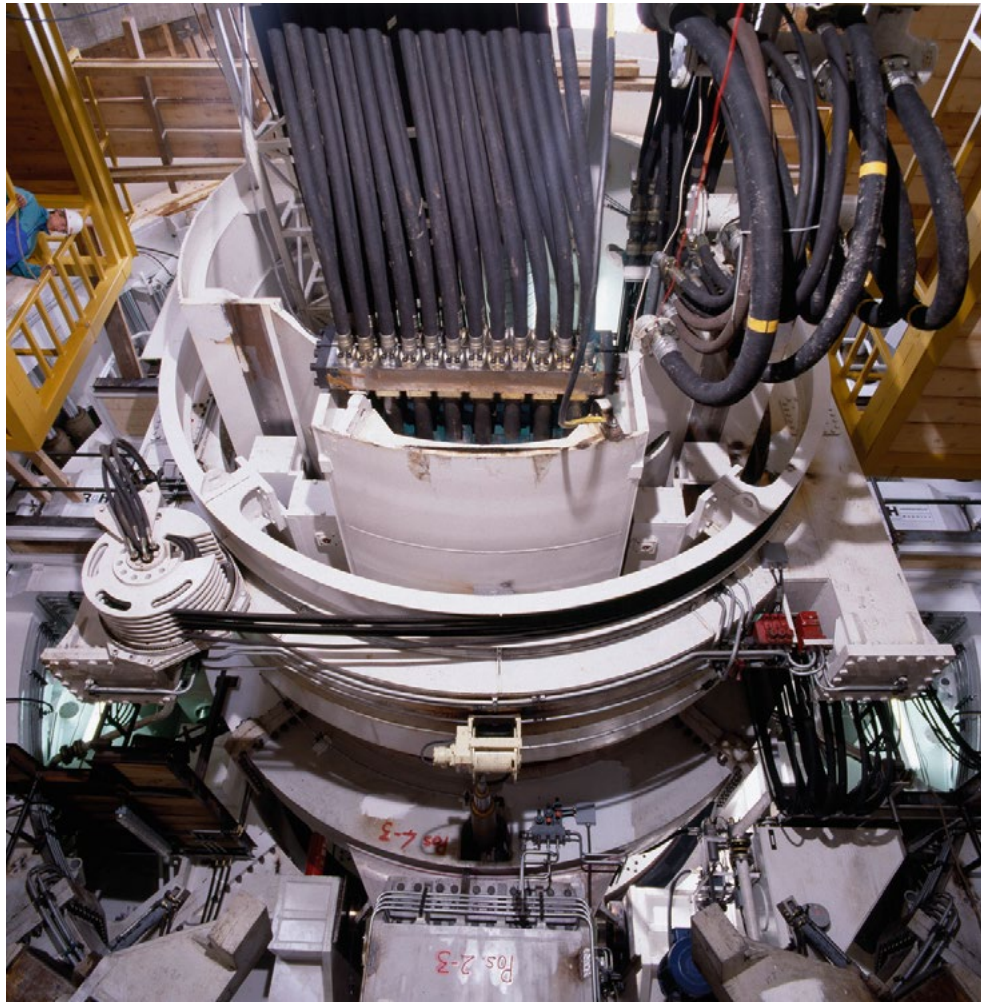
- Tunnel excavation (e.g., supply tunnel) in underground mining
- Tunnel construction for civil infrastructure

Challenges

- Changing operating conditions (hard rock to sand)
- Main bearings: rotation, feed forces, and powerful tilting moments (drilling plate)
- Roller bits: heavy strain on bearings and seals due to impact loads, high temperatures, humidity, and dust generation, resulting in massive bearing wear caused by mixed friction

Schaeffler's solutions

- Axial/radial cylindrical roller bearings or tapered roller bearings in an O arrangement as main bearing of drilling plate
- Roller bits: preloaded, in some cases coated tapered roller bearings made of case-hardened steel in an O arrangement to maximize operating life in the case of dirt ingress
- Spherical roller bearings in a wide variety of versions for customized solutions
- Condition monitoring: ProLink CMS for main bearings while complying with applicable mining regulations (e.g., EX protection)



Bearing Solutions ›

Lifetime Solutions ›

Crushers

Extreme performance under the toughest conditions

Function in mining

- Coarse crushing and precrushing of brittle, medium-hard, and hard materials

Challenges

- Heavy radial loads
- Impact loads
- Mine deflections
- Intensive dust generation

Schaeffler's solutions

- Spherical roller bearings with the X-life seal of quality
- SNS plummer block housings
- ARCANOL LOAD lubricants with EP additives
- Condition monitoring solutions for rotating rolling bearings to increase system availability

Bearing Solutions ›

Lifetime Solutions ›

Roller Presses

High level of efficiency with little energy

Function in mining

- Grinding of ore
- Increasingly replacing ball mills (more compact design, better efficiency)

Challenges

- Heavy radial loads
- Mine deflections
- Intensive dust generation
- Difficult relubrication conditions

Schaeffler's solutions

- Multi-row cylindrical roller bearings and spherical plain bearings with the X-life seal of quality for high-level load-carrying capacity in compact installation spaces
- Spherical roller bearings with specially profiled rollers
- ARCANOL LOAD lubricants with EP additives
- Condition monitoring solutions on the main bearings, large gear units, and auxiliary units to increase system availability

Bearing Solutions ›

Lifetime Solutions ›

Ball Mills

High operational reliability despite extreme temperature fluctuation

Function in mining

- Grinding of ore

Challenges

- Compensation of misalignments
- Impact loads
- Extreme temperature fluctuation
- Difficult lubrication conditions (mixed friction)
- Intensive dust generation

Schaeffler's solutions

- Spherical roller bearings with the X-life seal of quality
- SNS plummer block housings for the drive system
- Special Schaeffler housing solutions for the main bearing
- Condition monitoring solutions for the main rolling bearings, gear units, and auxiliary units to increase system availability

Bearing Solutions ›

Lifetime Solutions ›

Electric Motors

Drive the industry

Function in mining

- Responsible for the drives of many mining industry applications

Challenges

- Long-term machine availability with lowest-possible maintenance overheads
- Risk of current discharge in bearing
- Lifetime lubrication
- High operating temperatures

Schaeffler's solutions

- Friction-optimized deep groove ball and cylindrical roller bearings
- Other rolling bearings commonly used in electric motors, such as angular contact bearings, spindle bearings, and axial spherical roller bearings
- Aluminum oxide coating (J20) or versions with ceramic balls for electrical insulation
- Various condition monitoring systems (OPTIME Condition Monitoring, SmartCheck, ProLink CMS)
- Optimum lubrication with automatic CONCEPT lubricators or the smart OPTIME C1 lubricator solution
- High-temperature greases such as the ARCANOL TEMP series

Bearing Solutions ›

Lifetime Solutions ›

Products and Services

Bearing Solutions ›

Lifetime Solutions ›

Bearing Solutions

Spherical Roller Bearings

For special loads and long service life

Designed for the highest loads, Schaeffler's spherical roller bearings are made for plants in which high stresses occur and where shaft deflections or misalignments have to be compensated. In every area of application, they are distinctive for their high performance and reliability.

X-life increases performance, cost-effectiveness, operating life, and reliability. Decisive advantages from which customers benefit include optimum kinematics, low wear, and a 60% longer service life, with low maintenance requirements and minimal costs compared to the previous standard. The versatile bearings also save space as significantly smaller bearings can easily match the performance of larger variants.

X-life
proven to be better

Application areas ›

Product information ↗

Performance increased by 50% thanks to global cooperation

One of the largest copper mines in the US wanted to increase its conveyor throughput by 50% – and with no structural change to the material handling systems. The Schaeffler Global Technology Network worked closely with them on this solution. As a result of this collaboration, experts from the US, Germany, and Canada not only achieved the desired increase in throughput but also improved their system availability.

Read the full story ↗

One bearing, many solutions

Schaeffler offers a wide range of standard bearings, as well as the necessary expertise and infrastructure to solve a range of challenges.

- Radial spherical roller bearings, also available in sealed form
- Spherical roller bearings with end-profiled rollers ›
- Special spherical roller bearings for vibratory machinery
- Split spherical roller bearings ›
- Axial spherical roller bearings ›

Find out more ↗

Spherical Roller Bearings with End-Profiled Rollers

The solution for bearings exposed to particularly heavy stresses

The harsh operating and environmental conditions in the mining industry and raw materials processes put extreme stress on the bearings used in these applications. In roller presses, for example, they are exposed to high grinding forces and impact loads. Service changes, which are necessary at regular intervals, quickly let dust and other contaminants penetrate the bearing. The dirt particles act like sandpaper and facilitate early material fatigue, which leads to edge loading and further accelerates wear. With end-profiled rollers, the defined removal of material helps to reduce the edge loading and thus prevents wear. The result is a significant improvement in bearing service life.

15%

The modified line contact between the rollers and races prevents harmful edge stress. This improves service life by up to 15 percent.

The switch to spherical roller bearings with end-profiled rollers helps reduce edge stress caused by abrasive material wear by up to 20 percent.

20%

Application areas ›

ADVANCED STANDARD FOR SPHERICAL ROLLER BEARINGS: THE 241 SERIES WITH BORE DIAMETERS FROM 400 MM*

*Also available for other bearing sizes soon.

Benefits at a glance

- Improved overload protection
- Improved service life
- Improved wear resistance
- Improved system availability
- Improved operational safety

Split Spherical Roller Bearings

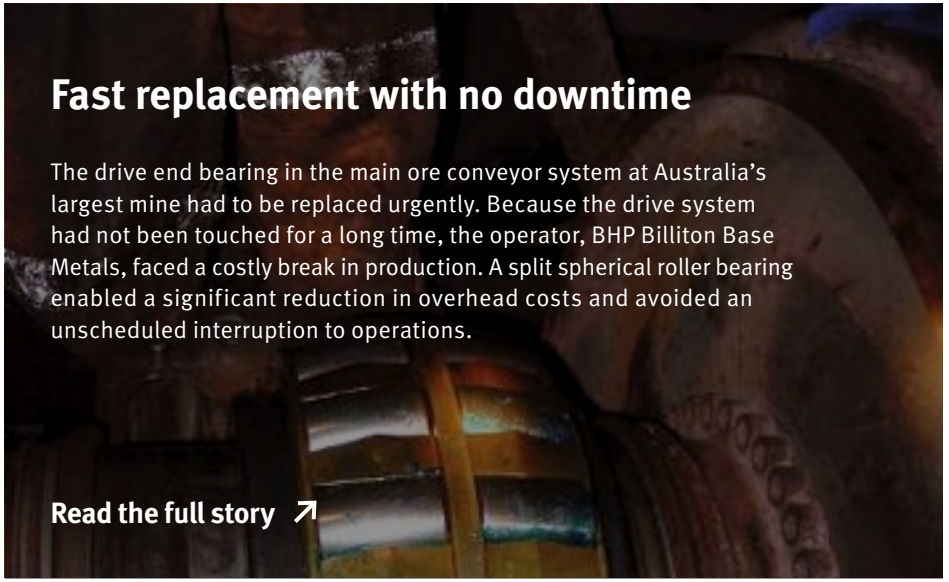
For short downtime and easy maintenance

Split bearings shorten downtimes in the event of bearing replacement and massively reduce the associated costs. They are mainly used where the replacement of unsplit bearings would require time-consuming additional work, such as the dismantlement of drive systems or removal of gears.

Split spherical roller bearings have a cylindrical bore. They are generally fitted in place of unsplit spherical roller bearings with an adapter sleeve. The inner and outer rings and the cage with roller and cage assembly are separated into two halves. The bearings are hinged in the middle and the affected half can be removed. This reduces the amount of maintenance required. In terms of purchase, split pendulum tube bearings are a greater investment compared to the unsplit ones. However, such an investment will pay for itself very quickly through reduced assembly costs and shorter system or machine downtime. Unsplit spherical roller bearings can be replaced by split spherical roller bearings of the same dimensions.

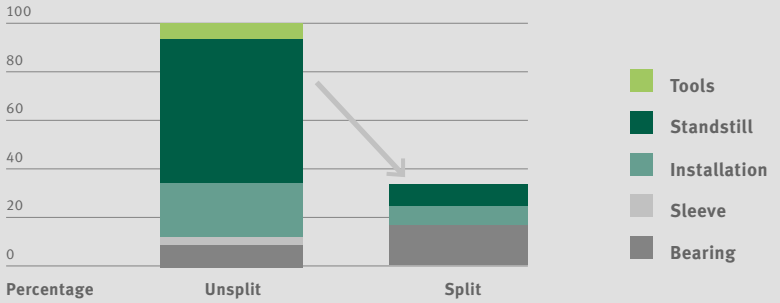
Application areas ›

Product information ↗



Technical and financial advantages

Savings: The installation of split spherical roller bearings reduces machine and system downtimes and significantly lowers installation costs.



Axial Spherical Roller Bearings

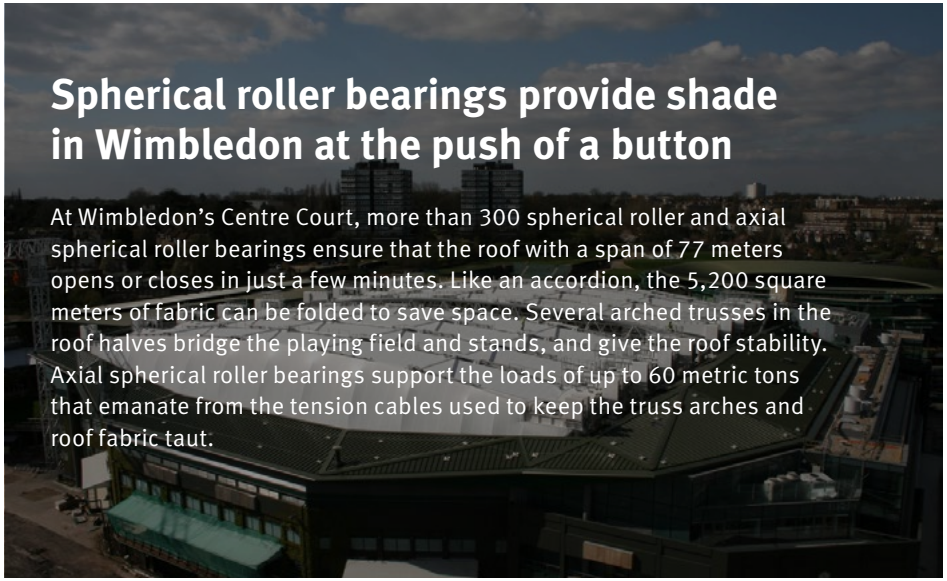
For very heavy axial loads and high speeds

Axial spherical roller bearings are single-row roller bearings with an angular adjustment capability. They consist of solid shaft and housing locating washers and asymmetrical barrel rollers with cages that hold the roller and cage assembly together with the shaft locating washer.

Axial spherical roller bearings absorb very high axial loads and enable relatively high operating speeds, even under the harshest environmental conditions. The bearings can be disassembled, which means the bearing components can be fitted separately. A range of sizes are available in the X-life version. This quality seal guarantees features such as maximum lifespan and service life, and the best load capacity even at maximum speeds. The higher dynamic load ratings compared to conventional versions open up new design opportunities for axial spherical roller bearings in X-life quality. That means they are ideally suited for downsizing, for example.

Application areas ›

Product information ↗

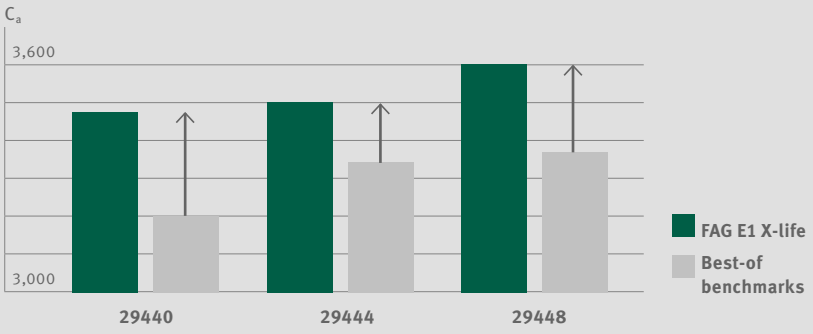


Spherical roller bearings provide shade in Wimbledon at the push of a button

At Wimbledon's Centre Court, more than 300 spherical roller and axial spherical roller bearings ensure that the roof with a span of 77 meters opens or closes in just a few minutes. Like an accordion, the 5,200 square meters of fabric can be folded to save space. Several arched trusses in the roof halves bridge the playing field and stands, and give the roof stability. Axial spherical roller bearings support the loads of up to 60 metric tons that emanate from the tension cables used to keep the truss arches and roof fabric taut.

The highest performing bearings on the market

- 45% longer service life
- 12% higher dynamic load rating
- 4% higher static load rating
- Up to 20% less friction
- 14% higher fatigue limit load
- 7% higher speeds



Cylindrical Roller Bearings

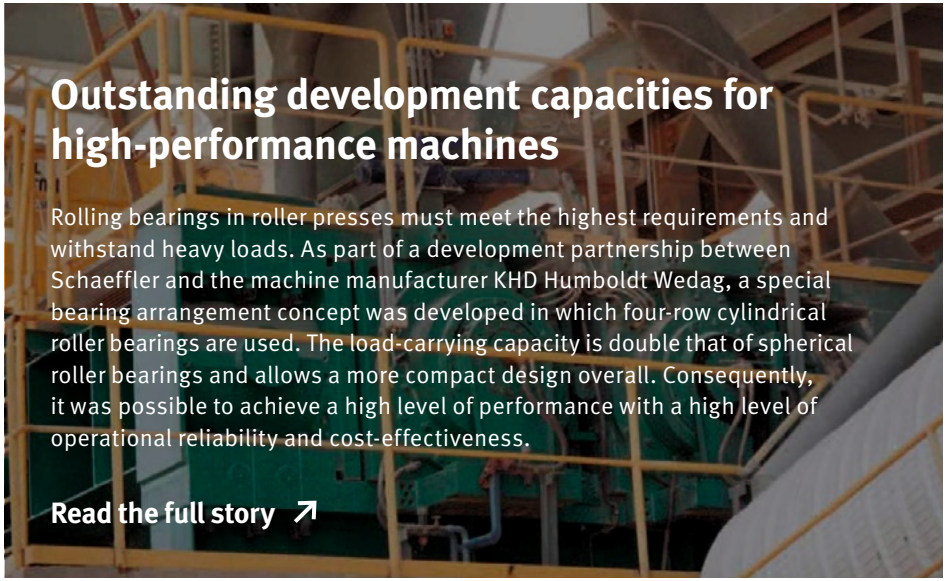
For heavy radial and axial loads

Able to withstand enormous forces: Our cylindrical roller bearings can withstand extremely heavy radial loads, and can also handle axial forces if they are used as support or locating bearings. Radial loads are transferred via the race, while axial loads are transferred via the rolling-element end faces and ribs.

Cylindrical roller bearings are available in a wide range of designs, dimensional ranges, and sizes to meet specific requirements. A development partnership between Schaeffler and leading machine manufacturers resulted in a proven product solution for the raw material processing industry: four-row cylindrical roller bearings. The advantage of this special design is a maximization of the number of rolling elements per row. The load-bearing capacity is significantly increased and at the same time a more compact design is made possible. The four-row cylindrical roller bearings can be dismantled and are particularly easy to fit. This also makes it easier to inspect the races on the bearing rings. Overall, four-row cylindrical roller bearings are an exceptionally economical and operationally reliable solution for your application.

Application areas ›

Product information ↗



Outstanding development capacities for high-performance machines

Rolling bearings in roller presses must meet the highest requirements and withstand heavy loads. As part of a development partnership between Schaeffler and the machine manufacturer KHD Humboldt Wedag, a special bearing arrangement concept was developed in which four-row cylindrical roller bearings are used. The load-carrying capacity is double that of spherical roller bearings and allows a more compact design overall. Consequently, it was possible to achieve a high level of performance with a high level of operational reliability and cost-effectiveness.

Read the full story ↗

Large-size bearings with cages in the new TB design

All TB series cylindrical roller bearings with cages have a completely updated bearing design, which contributes directly to the advantages of TB rollers:

- Increased axial load-carrying capacity facilitates new bearing support concepts and design possibilities (downsizing)
- A higher level of energy efficiency due to the reduced frictional torque
- Lower operating costs due to reduced energy consumption
- Increased performance while maintaining the same costs
- Suitable for very high speeds

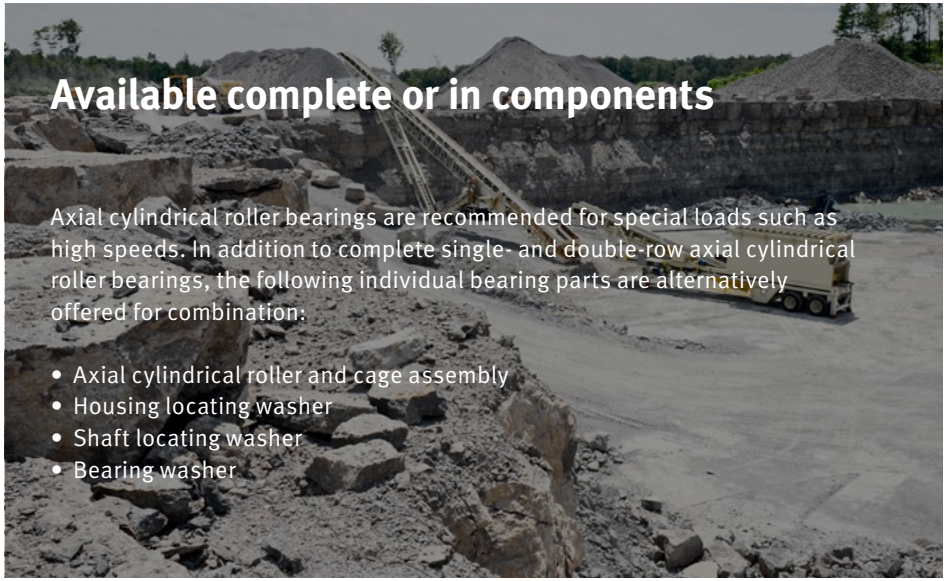
Read more ↗

Axial Cylindrical Roller Bearings

For high load capacity with low overall height

Axial cylindrical roller bearings are a combination of axial cylindrical roller cage assemblies, housing locating washers, and shaft locating washers. The bearings have a very low axial section height, high load capacity, and high rigidity and can support axial forces in one direction. This application is advisable at high speeds, for example.

Single- and double-row axial cylindrical roller bearings are particularly suitable where high axial and impact loads act on one side but there are no radial loads. They are also an excellent choice when the load-carrying capacity of corresponding axial deep groove ball bearings is no longer sufficient. In contrast to the ball, the roller has a larger contact area perpendicular to the roller axis. As a result, it can transmit higher forces, is stiffer, and tolerates smaller rolling elements for the same load in diameter. That makes axial cylindrical roller bearings ideal in very small axial spaces. As standard bearings, they are also a low-cost alternative to self-configured bearing concepts.



Available complete or in components

Axial cylindrical roller bearings are recommended for special loads such as high speeds. In addition to complete single- and double-row axial cylindrical roller bearings, the following individual bearing parts are alternatively offered for combination:

- Axial cylindrical roller and cage assembly
- Housing locating washer
- Shaft locating washer
- Bearing washer

Recommended cages

Solid cages made of brass and polyamide PA66 are the standard for axial cylindrical roller bearings. Brass cages are preferred for continuously high temperatures and applications with difficult operating conditions. The cage design depends on the bearing series and size. Axial cylindrical roller bearings with a brass or polyamide PA66 cage can be used in a wide range of temperatures. Temperatures from –20 °C to +120 °C are possible.

Application areas ›

Product information ↗

Tapered Roller Bearings

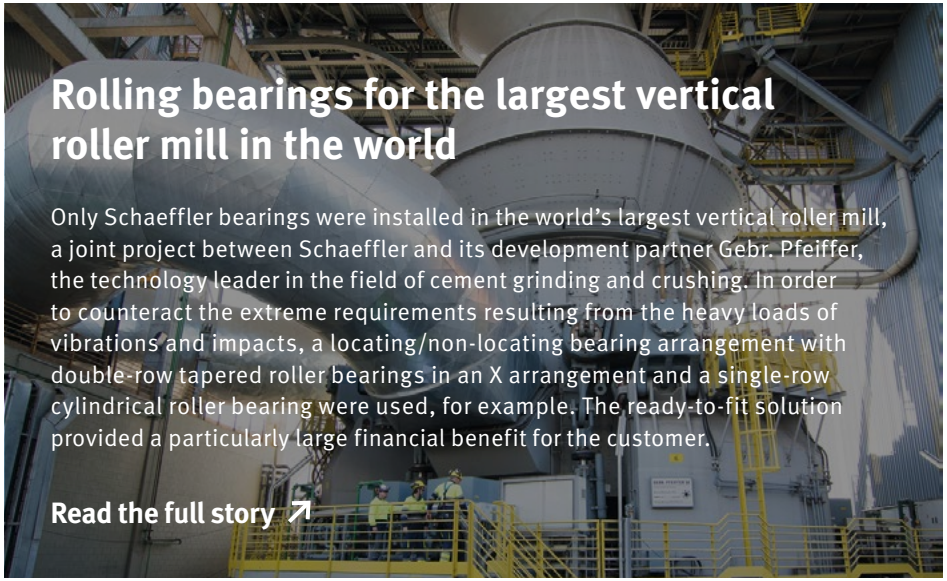
Bearings with optimum load distribution

Heavy-duty, reliable, and energy efficient: Tapered roller bearings balance loads effectively due to their bearing spacing and ensure precise and rigid shaft guidance. They have a broad speed range and are easy to adjust, disassemble, and assemble.

Tapered roller bearings with large bore diameters are used in grinding rolls, for example. Large tapered roller bearings withstand the massive radial and axial loads with equal effectiveness. They are also characterized by a broad usable range of speeds. The tapered roller bearings reliably withstand loads even under adverse conditions and ensure precise and rigid shaft guidance. The adjustability and removability of the bearings ensure easy installation and maintenance. Many of our tapered roller bearing standard series are available in X-life quality. The effect: higher load capacity, less maintenance, longer service life, and optimized overall cost-effectiveness. We also offer a wide range of flexible and individual product solutions through our concept of partnership-based development.

Application areas ›

Product information ↗



Customized tapered roller bearings

The customized solutions offered by Schaeffler in the form of specially adapted tapered roller bearing units offer a number of special advantages:

- The bearings are ready to fit
- Reduced installation costs for the customer and end operator
- Bearing dimensions specially adapted to customer requirements
- Maximum operational reliability
- Long life span
- Significant economic benefit for the customer

Plummer Block Housings

For a balanced distribution of loads

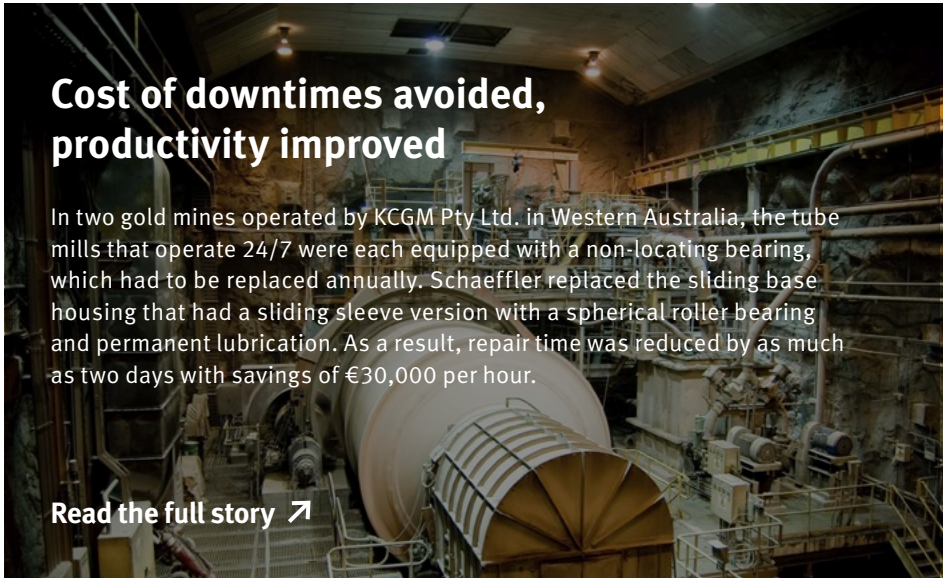
The Schaeffler portfolio offers a wide selection of standard housings for a large number of different applications. They can also be specially configured – for example, with regard to the desired bearing type, lubrication, or sealing of the housing.

The standard housing portfolio includes split and unsplit plummer block housings. Since the upper part of the housing is removable in the split design, installation and maintenance are much easier. If harsh environmental conditions and enormous stress on the bearing arrangement are to be expected, unsplit plummer block housings should be selected for easy access to the installed bearings and seals. Schaeffler also offers special housings when standard housings can no longer satisfy all requirements in particularly complex applications.

To the housing selection assistant ↗

Application areas ›

Product information ↗



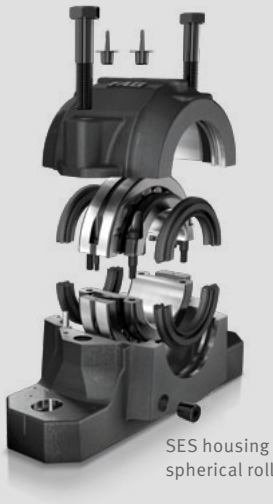
Cost of downtimes avoided, productivity improved

In two gold mines operated by KCGM Pty Ltd. in Western Australia, the tube mills that operate 24/7 were each equipped with a non-locating bearing, which had to be replaced annually. Schaeffler replaced the sliding base housing that had a sliding sleeve version with a spherical roller bearing and permanent lubrication. As a result, repair time was reduced by as much as two days with savings of €30,000 per hour.

Read the full story ↗

Housing types for the mining industry

- Split housings
  - SES for shaft sizes up to 140 mm
  - SNS for shaft sizes from 140 mm
  - RLE for 241 series spherical roller bearings
  - LOE, especially for oil lubrication
  - SAF500 (U.S. market) for shaft sizes from 1 3/8 in
- Unsplit housings
  - BND for especially high loads



SES housing with split spherical roller bearing

More about SES housings ↗

Deep Groove Ball Bearings

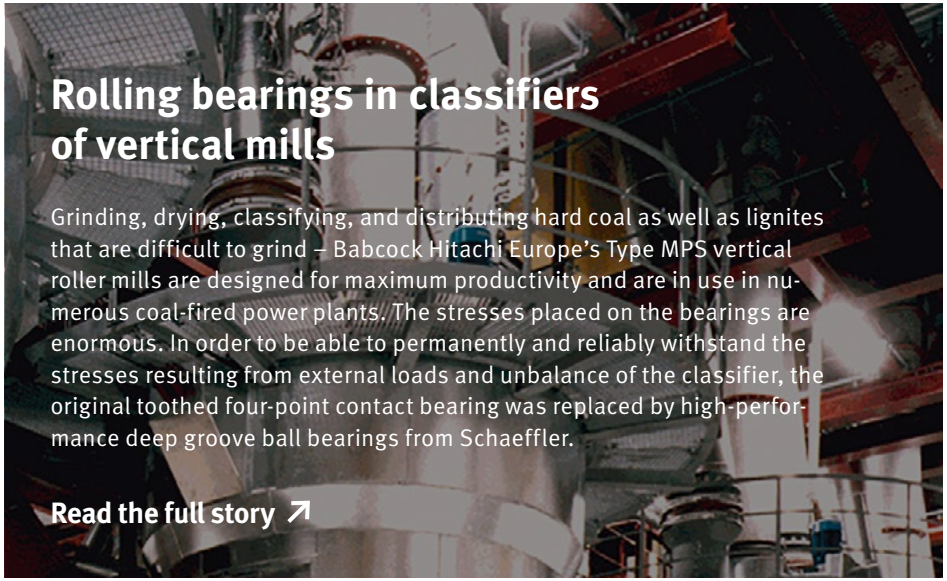
For low-friction, reliable operation

Deep groove ball bearings are versatile, self-retaining bearings. These bearings, with a simple design, high resistance, durability, and low maintenance, are available in different variants: single-row or double-row, open or sealed design, and unidirectional and bidirectional.

Single-row deep groove ball bearings are designed for high speeds and can accommodate both radial and axial forces. If a large radial load-carrying capacity is required for which single-row deep groove ball bearings are not sufficient, the double-row variants are the best choice. They can be subjected to higher loads because of the larger number of rolling elements. Since the bearings also support loads caused by tilting, they are suitable for particularly short shafts that are only to be supported by one bearing. Deep groove ball bearings are especially used in electric motors for driving industrial pumps and fans in mining as well as in support rollers in conveyor systems.

Application areas ›

Product information ↗



Rolling bearings in classifiers of vertical mills

Grinding, drying, classifying, and distributing hard coal as well as lignites that are difficult to grind – Babcock Hitachi Europe's Type MPS vertical roller mills are designed for maximum productivity and are in use in numerous coal-fired power plants. The stresses placed on the bearings are enormous. In order to be able to permanently and reliably withstand the stresses resulting from external loads and unbalance of the classifier, the original toothed four-point contact bearing was replaced by high-performance deep groove ball bearings from Schaeffler.

Read the full story ↗

Generation C deep groove ball bearings

More durable, quieter, lower friction

- Refined manufacturing processes
- Reduced amount of noise generated
- Improved osculation and less friction
- Optimized bearing kinematics
- Improvement of cage roundness, waviness, and roughness
- High sealing effect without friction losses

Spherical Plain Bearings (Plain Bearings)

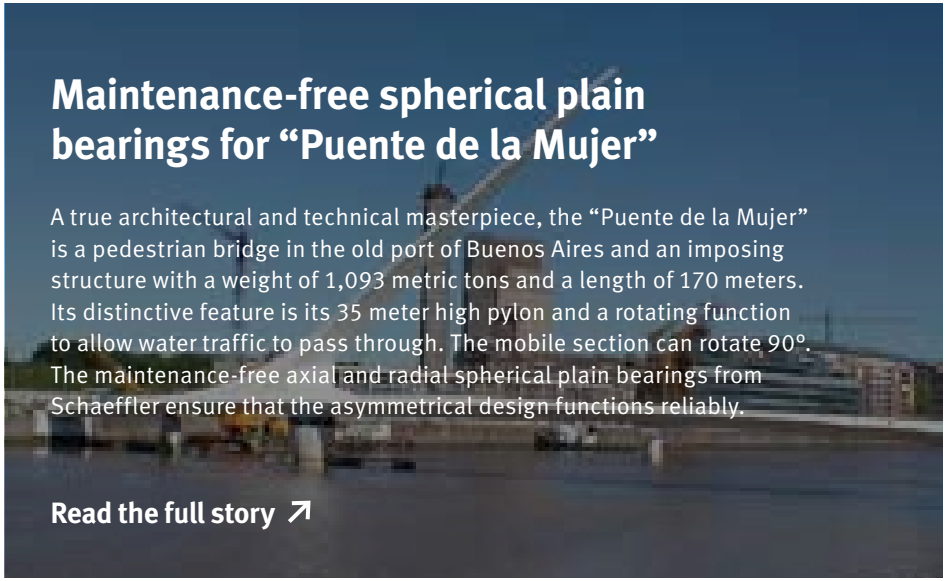
Maintenance-free and environmentally friendly with long service life

Spherical plain bearings feature extremely low coefficients of friction and low wear of the sliding surfaces. At the same time, they have excellent sealing. The result is lengthy service lives, easier maintenance, and a substantial reduction in maintenance overheads.

Users benefit from significant savings in maintenance costs and lubricant usage, as plain bearings are either maintenance-free or, thanks to their superior optimized sealing, significantly reduce the amount of maintenance required. Maintenance-free spherical plain bearings are self-lubricating by means of polytetrafluoroethylene (PTFE) and do not require any maintenance or lubrication. Innovative sliding materials such as ELGOGLIDE, PTFE-GFRP ELGOTEX, or the metal-polymer composite E40 significantly reduce friction in spherical plain bearings, heads, bushings, washers, and strips. Compared in terms of performance and combined with the optimized sealing, spherical plain bearings requiring maintenance offer protection against dirt, which extends the service life.

Application areas ›

Product information ↗



Advantages of spherical plain bearings with ELGOGLIDE

- Suitable for medium to heavy loads
- No relubrication required
- No maintenance
- Low friction
- Insulating
- Impact-absorbing

Slewing Rings

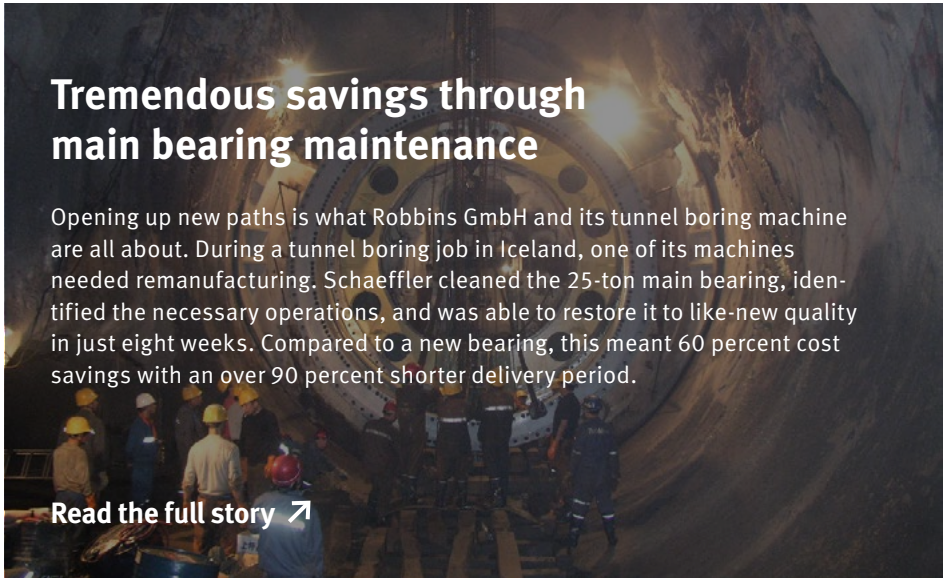
For radial, axial, and tilting moment loads

Slewing rings are commonly extremely large ball or roller bearings with a high load-carrying capacity and are primarily used in areas with heavy machinery construction. They're specially designed for oscillating motion, slow rotary motion, and high loads while reliably supporting stationary axial forces and tilting moments.

Thanks to their design, slewing rings can often be reduced to a single bearing in cases where bearing arrangements make up a combination of radial and axial bearings. Because this reduces – in some cases considerably – the costs and work required for the adjacent construction, they're considered to be especially cost-effective. They're deployed where there are heavy loads and high safety requirements and, above all, where slow rotary and swivel motions need to be withstood. The bearing rings are manufactured without gear teeth but are also available with external or internal gear teeth for drive solutions. Slewing rings are available in a variety of versions, including as four point contact bearings, crossed roller bearings, and Y-bearings.

Application areas ›

Product information ↗

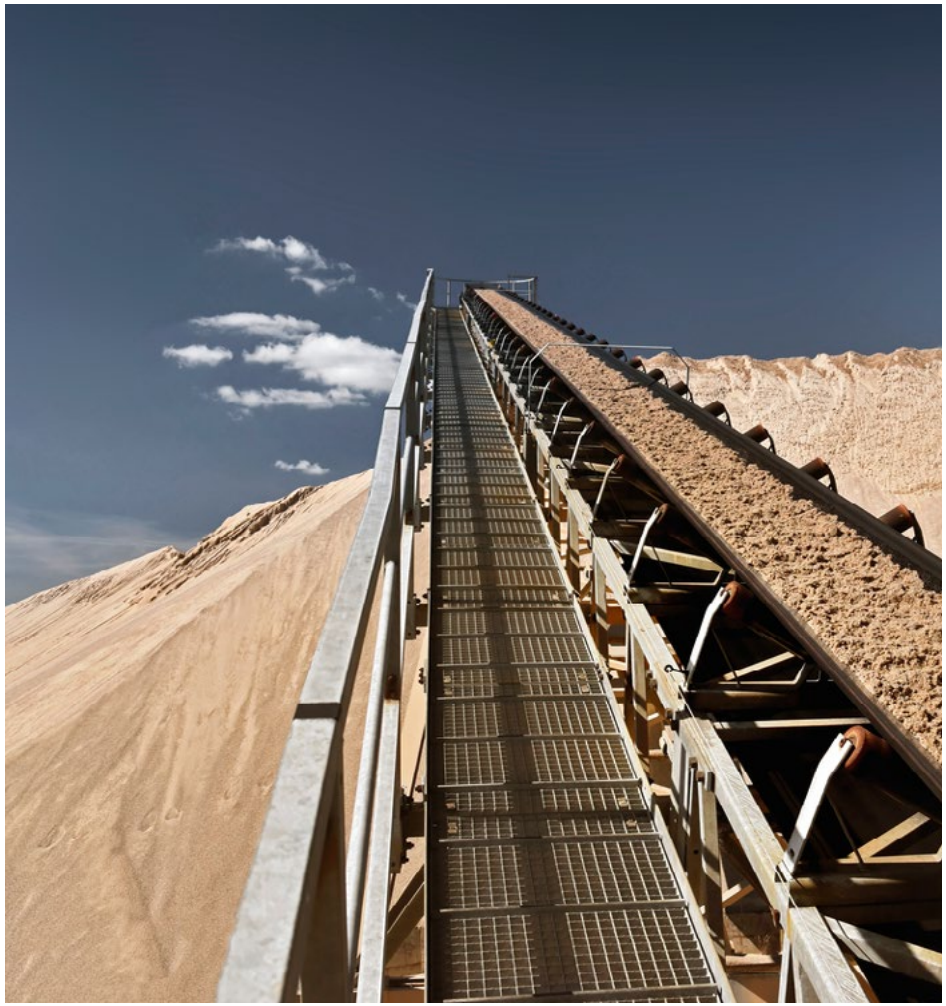


Differences between four-point and crossed roller bearings

Four point contact bearings:
- Only slight demand on the flatness and perpendicularity of the adjacent construction
- Low requirements for accuracy and rigidity of the bearing arrangement
- Compact thanks to single-row design
- Application areas: metalworking machines, construction machinery

Crossed roller bearings:
- Support higher loads than four point contact bearings
- Free from stick-slip and low rotational resistance for consistent operation
- Axial and radial runout accuracy and rigidity
- Application areas: robots, machine tools

Lifetime Solutions



ProLink CMS

Multi-channel condition monitoring system for vibration measurement

ProLink CMS monitors the condition of machinery and equipment by measuring vibrations. The system is ideally suited for monitoring complex aggregates in the mining industry and, thanks to remote sensor technology, is ideal for use in harsh ambient conditions.

ProLink is a vibration monitoring system for ongoing frequency-selective plant monitoring. It consists of a processor module and up to four vibration modules as well as four further I/O modules for the detection of additional signals, such as temperature, loads or similar. This covers a wide range of applications. Integrated Schaeffler SmartWeb software is used for simple configuration. The connected modules along with their inputs and outputs are configured in it and adapted to the system on site. After the analysis, the system can transmit characteristic values or alarms (up to a maximum 32 analog signals) to a control system. With the help of interfaces such as OPC/UA or Profinet, all information from the ProLink can be transmitted to the higher-level control system.

Application areas ›

Product information ↗

Sustainable, new fan concept at car manufacturer

This renowned car manufacturer can only manage an output of 255,000 vehicles per year when there is sufficient fresh air in its factory halls. Fans ensure this air supply. If they fail, there will be production losses. That is why the customer opted for intelligent condition monitoring from Schaeffler. ProLink CMS is used for this purpose. The system monitors all bearings, belts, and motors across the entire ventilation system.

Read the full story ↗

Advantages at a glance

- Simple commissioning, immediately ready for use
- Wide range of integration options
- Visualization of all information about the system status
- Early fault detection
- Connectivity with digital infrastructure

SmartCheck

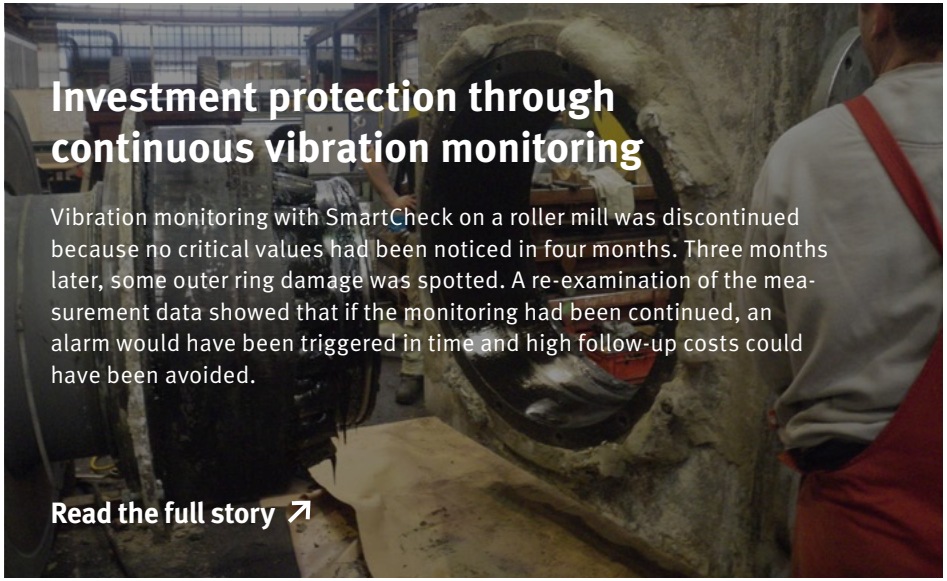
Online measuring system for decentralized machine monitoring

The SmartCheck is a compact, innovative, modular online measuring system for continuous, decentralized monitoring of machinery and process parameters. The system is particularly attractive for assemblies where monitoring was previously too cost-intensive.

Companies often forgo continuous monitoring of standard units such as pumps, motors, and gearboxes for cost reasons. SmartCheck changes this. The system offers the same performance features as expensive monitoring systems, but is compact, easy to install, and easy to operate. The power, speed, and temperature of multiple motors can be viewed in a Web browser after installation and set-up. Alarms go off if a limit is exceeded. In addition, a connection to the control system or the control station is possible using analog and digital interfaces. SmartCheck can be expanded on a modular basis. This means that the system can be adapted at any time as requirements change.

Application areas ›

Product information ↗



Investment protection through continuous vibration monitoring

Vibration monitoring with SmartCheck on a roller mill was discontinued because no critical values had been noticed in four months. Three months later, some outer ring damage was spotted. A re-examination of the measurement data showed that if the monitoring had been continued, an alarm would have been triggered in time and high follow-up costs could have been avoided.

Read the full story ↗

Function

The device can be connected to the control system or the control station using analog and digital interfaces, for example.

OPTIME Ecosystem

Easy in every way

Consisting of award-winning solutions for both condition monitoring and smart lubrication, the OPTIME Ecosystem reduces unplanned downtime by making predictive maintenance easy for the process industry. Here is an overview of the ecosystem's elements and how they work together.

OPTIME User Interface
Including an intuitive mobile app, dashboard, and expert viewer: these user interfaces give users easy access to the right information at the right time, no matter where they are or what their role is.

OPTIME Cloud & Analytics
With unlimited processing power and capacity, OPTIME Cloud & Analytics takes huge amounts of data and makes it easy to understand and work with.

OPTIME REST-API
The OPTIME REST-API makes it easy to connect the OPTIME Ecosystem to other existing systems – and get the most out of the data collected.

OPTIME Gateway
A standalone device that lets users connect to the OPTIME Cloud via a mobile network or ethernet. Makes secure cloud connectivity and IT integration easy.

OPTIME Mesh Network
Connecting all OPTIME Ecosystem devices via the gateways: The automatic and self-healing OPTIME Mesh Network is easy to set up, needs low energy, and makes large-scale installations possible.

OPTIME Condition Monitoring
Wireless vibration sensors that let users monitor their machines from wherever they are.

OPTIME Smart Lubrication
Smart lubricators that simplify the complex job of machine lubrication.

OPTIME Connector Service
The OPTIME Connector Service lets users easily connect even more devices to the OPTIME Ecosystem and get a more comprehensive overview of what their machines are doing.

Application areas ›

Product information ↗

More about OPTIME Condition Monitoring ›

More about OPTIME C1 ›

OPTIME Condition Monitoring

Plug. Play. Predict.

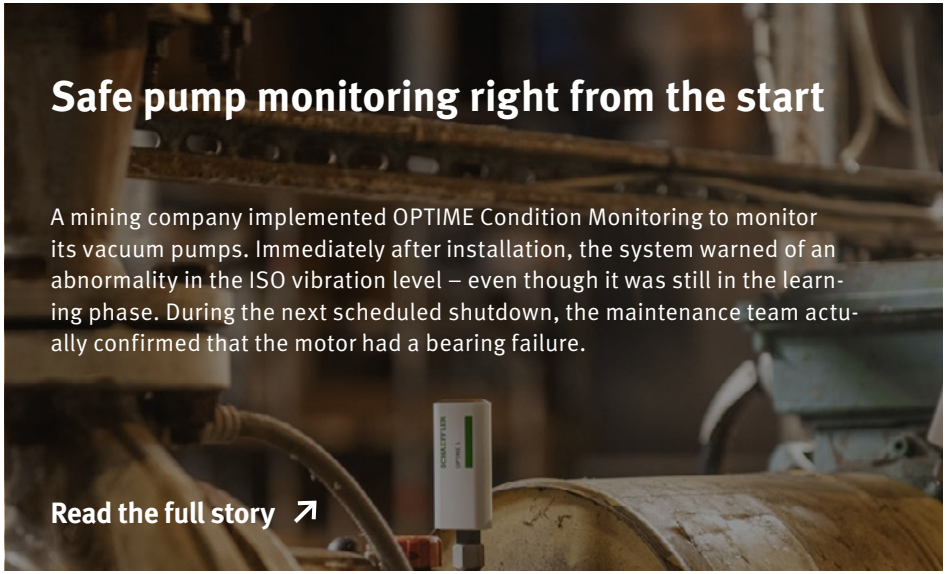
Condition monitoring can be expensive. Which is why up to 95% of all machines inside factories are only sporadically monitored – or not at all. This can lead to breakdowns and unplanned downtime.

Schaeffler's OPTIME Condition Monitoring solution helps eliminate such downtime thanks to wireless vibration sensors that can detect potential damage, imbalances, and misalignments weeks in advance. Its simple plug-and-play functionality means installing it takes mere minutes – no prior experience required. This allows entire plants to be monitored in just a single day.

The wireless condition monitoring solution also works with almost all machines – and is more affordable than most other condition monitoring solutions. And scaling up is a lways possible as additional vibration sensors can be easily added at any time.

Application areas ›

Product information ↗



OPTIME Ecosystem

Easy in every way

Consisting of award-winning solutions for both condition monitoring and smart lubrication, the OPTIME Ecosystem reduces expensive downtime by making predictive maintenance easy for the process industry.

OPTIME Ecosystem ›

OPTIME C1

Turn complexity into simplicity

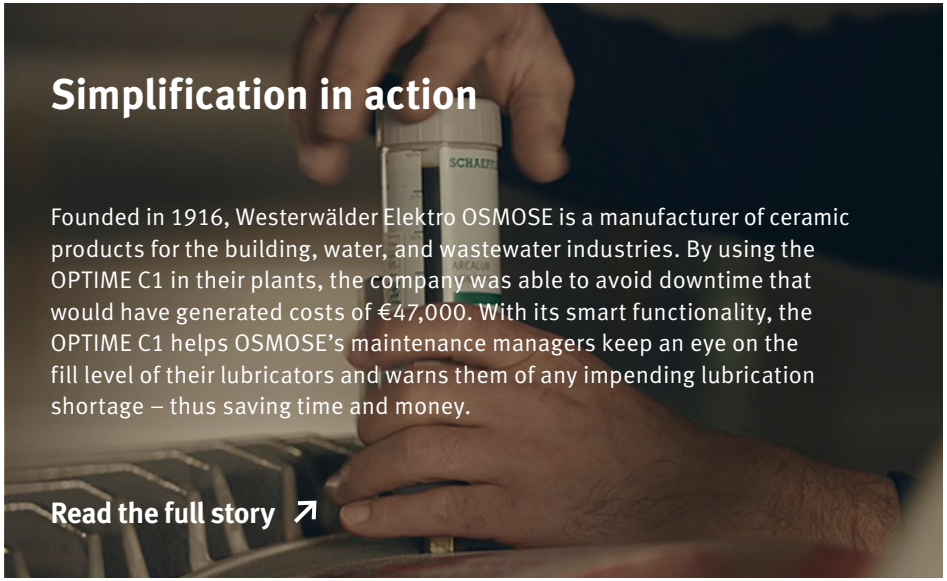
The world is complex. And so is the job of a maintenance manager. And part of that complexity comes from the truly insignificant things. The tasks they wish they could cut out of their daily routines – but can't. Because there's been simply no better way of doing it. Not till now at least.

Combining all the benefits of automatic lubrication with award-winning smart technology: the OPTIME C1 is the world's first truly smart lubricator and eliminates tasks such as lubricating by hand. Such as having to manually check many lubrication points. Instead: all the maintenance manager needs to do to check on the status of their lubrication points is to check the app – from wherever they are.

With an extremely intuitive interface, the OPTIME C1 will tell the user which lubrication points are insufficiently supplied and which cartridges need to be refilled or replaced. Thus eliminating premature bearing failure caused by insufficient and/or incorrect lubrication – and eliminating downtime.

Application areas ›

Product information ↗



OPTIME Ecosystem

Easy in every way

Did you know that the OPTIME C1 is part of a larger ecosystem that helps reduce expensive downtime? Find out more.

OPTIME Ecosystem ›

CONCEPT1–8

Precise, automatic grease and/or oil lubrication

Almost all bearings can be supplied with precise amounts of oil or grease using the automatic lubricators in the CONCEPT series. The range covers single-point devices for entry-level automatic lubrication and complex solutions that can even be integrated into control systems.

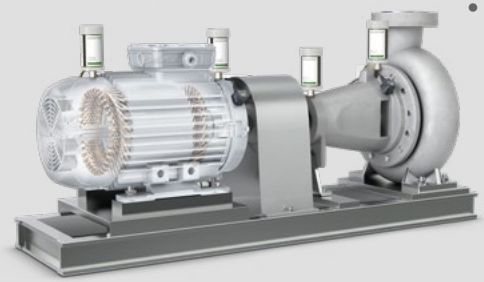
The CONCEPT1–8 electrochemical lubricators offers a low-cost and versatile solution for supplying equipment with grease or oil. The lubricant is dispensed by gas pressure built up by means of an electrochemical drive unit. CONCEPT2, CONCEPT4, and CONCEPT8 are electromechanical lubricators and are used for more complex requirements, such as when there are a large number of different lubrication points. They differ in the number of outlets (2, 4, and 8), in whether grease or oil is used, and in whether the dispensing process is to be triggered by internal pulses, for example.

Application areas ›

Product information ↗

Advantages at a glance

- Lubrication for almost all systems
- Premium lubricants
- Future-oriented expertise
- Flexible programmability



ARCANOL

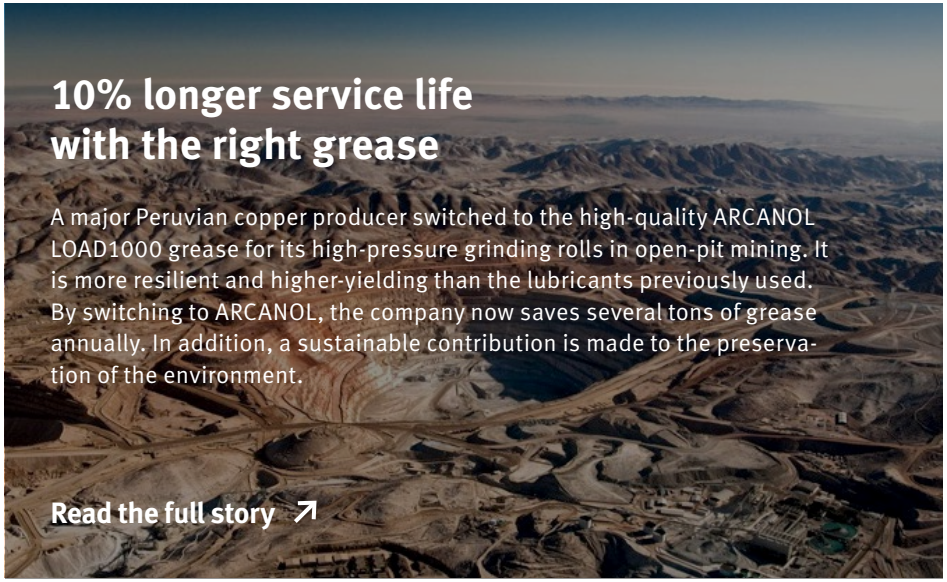
Lubricants for every application

Perfectly matched lubrication increases the performance and service life of a rolling bearing immensely. With ARCANOL, Schaeffer developed a lubricant range that is divided into four different application groups, covering almost all areas of application.

The ARCANOL grease range includes multi-purpose, heavy-duty, high temperature, and specialty greases and currently features 22 different lubricant grades in up to eight different container sizes. ARCANOL greases generally have better characteristics than regular greases. The respective composition was analyzed and tested for each individual application area using modern processes and systems under different operating conditions and with rolling bearings of all designs. They are subjected to a new quality inspection before delivery. This means that there is clear evidence of the quality of each batch. Assembly paste and corrosion protection oil complete the lubricant portfolio.

Application areas ›

Product information ↗



10% longer service life with the right grease

A major Peruvian copper producer switched to the high-quality ARCANOL LOAD1000 grease for its high-pressure grinding rolls in open-pit mining. It is more resilient and higher-yielding than the lubricants previously used. By switching to ARCANOL, the company now saves several tons of grease annually. In addition, a sustainable contribution is made to the preservation of the environment.

Read the full story ↗

Advantages at a glance

- Lubricant matched to the application
- Consistent, high quality standard
- Extended rolling bearing life
- Great savings in grease consumption

Accessories and services for lubrication ›

Accessories and Services for Lubrication

Manual lubrication tools and more

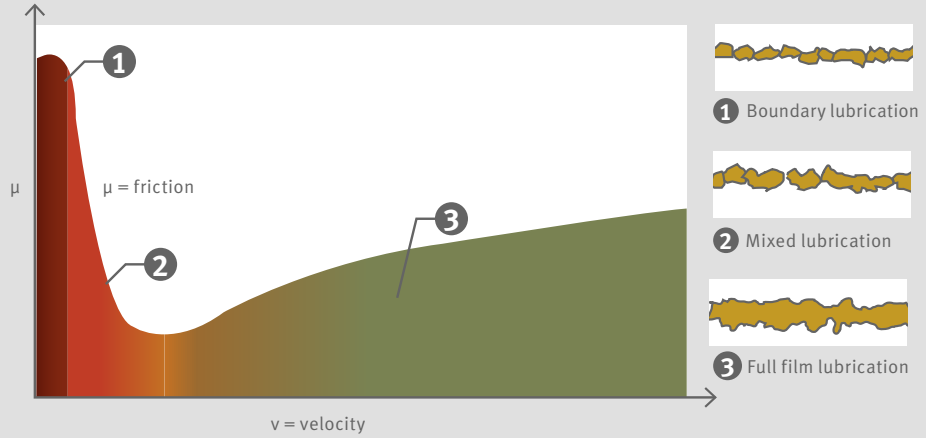
The optimized lubrication portfolio is complemented by accessories for automatic lubricators, manual lubrication tools, customized lubricant cartridges, and assembly pastes, as well as oil for corrosion protection.

If automatic lubrication is not possible or not desired, the optimal amount of grease can be applied with grease dispensing guns or grease pumps and other tools from Schaeffler during manual lubrication. The mounting paste facilitates the sliding of bearing rings and prevents stick/slip effects, scoring, wear, and fretting corrosion. It also provides protection against corrosion. The paste can be used at temperatures between –30 °C and +150 °C. It is resistant to water, steam, and many alkaline and acid agents. Anti-corrosive oil protects all bare metal surfaces, for example on equipment and machinery, and especially unpacked bearings when stored indoors.

Application areas ›

Product information ↗

Comparison: Wear with and without lubrication



GreaseCheck

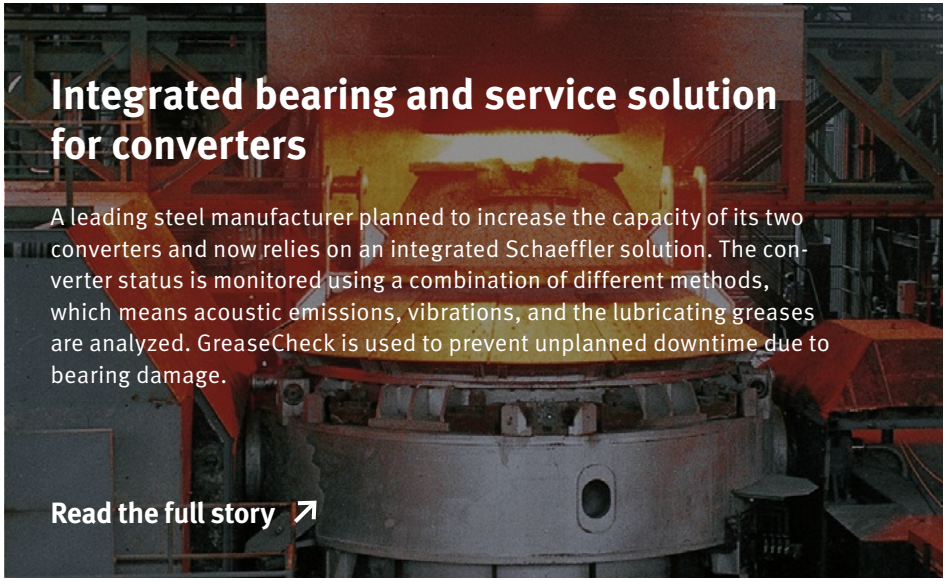
Optical measuring system for condition monitoring for greases

Changes in a grease's condition can be detected with GreaseCheck long before damage from vibration changes becomes measurable. This allows lubrication to be planned precisely. The customer is free to decide whether to relubricate or replace the grease completely.

GreaseCheck is a self-sufficient, maintenance-free, optical measuring system. It consists of a grease sensor and an evaluation unit. The sensor has analog, digital, and CAN bus interfaces. They can be used to monitor grease contamination, consistency, and water content during operation. This information is transferred by cable to the evaluation unit which in turn generates an analog signal that provides the user with information about the condition of the grease rapidly and easily. This enables maintenance teams to perform grease relubrication based on actual demand. There is no need for time-consuming calculations of the lubrication quantity or unnecessary relubrication.

Application areas ›

Product information ↗

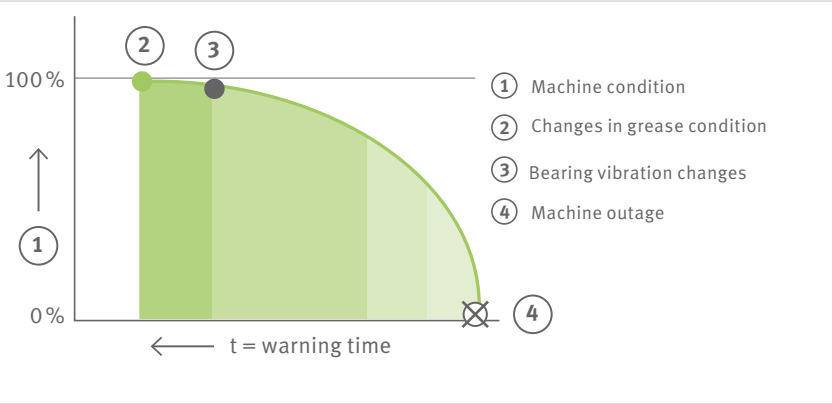


Integrated bearing and service solution for converters

A leading steel manufacturer planned to increase the capacity of its two converters and now relies on an integrated Schaeffler solution. The converter status is monitored using a combination of different methods, which means acoustic emissions, vibrations, and the lubricating greases are analyzed. GreaseCheck is used to prevent unplanned downtime due to bearing damage.

Read the full story ↗

Extended warning time with GreaseCheck



LASER-EQUILIGN2

For precise and cost-effective shaft alignment

Designed for aligning rotating shafts to avoid downtime: With its single-laser technology, the LASER-EQUILIGN2 alignment system offers maximum user-friendliness, precision, energy, and cost efficiency.

Interrupted processes increase the cost of any operation. If rotating shafts are not correctly aligned, they can result in unintentionally high vibrations, temperature increases, energy consumption, and therefore downtime. LASER-EQUILIGN2 helps to avoid unplanned downtime. This is because it improves the alignment of the shafts of pumps, compressors, and gearboxes with each other. This innovative laser system lets machine performance and plant availability be increased while reducing operating costs because rotating shafts are perfectly aligned with LASER-EQUILIGN2.

Application areas ›

Product information ↗

One laser to combat downtime

Approximately 60 percent of all unplanned downtime in production plants is attributable to unbalance and misalignment. Such incidents can be avoided with the LASER-EQUILIGN2 shaft alignment device.

Sample calculation: Lowering electricity costs

Precise alignment with LASER-EQUILIGN2 significantly reduces operating costs. This example shows the savings resulting from 1% lower power consumption by six machines running at 75 to 200 kW (running time 8h/day).

Motor power	75 kW	100 kW	200 kW
Annual energy cost	€37,440	€49,920	€99,840
Expected energy reduction	1%	1%	1%
Saving per machine	€374	€499	€998
Saving with six machines	**€2,244**	**€2,994**	**€5,988**

MF-GENERATOR

Induction systems with medium frequency technology for large components

Induction systems with medium frequency technology (MFT) is used to heat rolling bearings so that they can be easily installed or removed. The plant consists of a generator and – depending on the requirements – a fixed or flexible inductor, which is placed on the workpiece.

Medium frequency technology systems can also be used for thermal assembly and disassembly, and can significantly reduce energy costs. With an efficiency of over 90%, They are significantly more energy-efficient than conventional heating devices. The compact systems can even be used in areas that are difficult to access. In all devices for heating, the temperature can be adjusted up and down continuously.

Application areas ›

Product information ↗

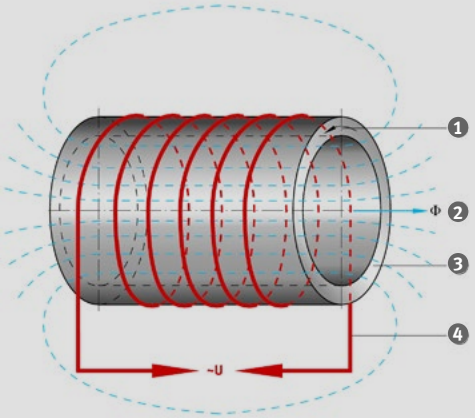
More than €300,000 saved thanks to a high-performance heating device

With an installed production capacity of five million metric tons of cement per year, Asia Cement Public Company Limited is one of the largest cement producers in Thailand. Previously, this customer usually needed about 30 days to overhaul a large raw material mill gearbox. The highly efficient Schaeffler heating device with medium-frequency technology and flexible inductors was used to accomplish this overhaul faster and more economically. It achieved its goal despite the very large components that had to be warmed up for removal and installation.

Read the full story ↗

MFT functionality principle

1. Short-circuit current IR in the bearing ring
2. Alternating magnetic field
3. Bearing ring
4. Exciter coil



HEATER

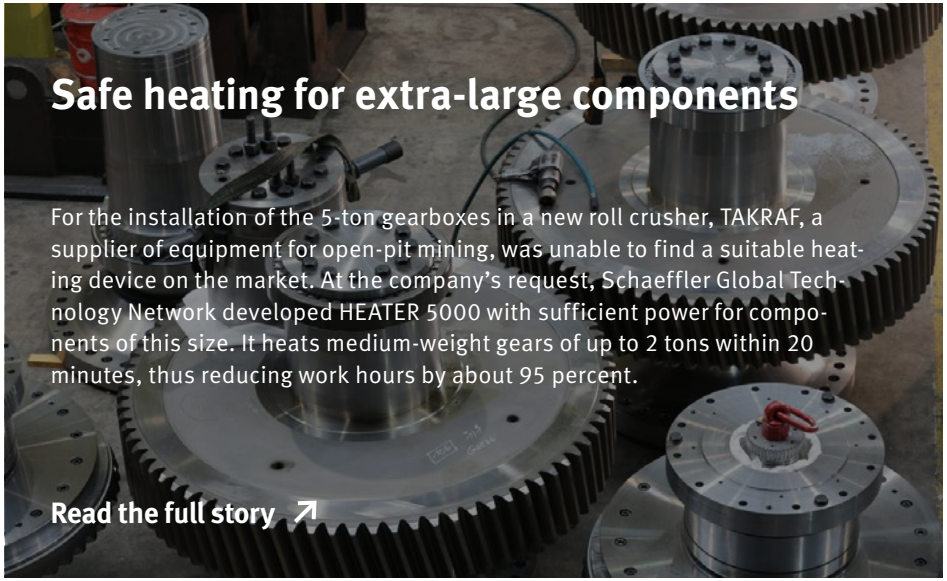
Inductive heat for precise and sustainable assembly

Sealed and greased spherical plain bearings can also be heated with the HEATER induction heating devices for spherical plain bearings with a mass of up to 1,200 kg. In addition to the regular HEATER tabletop and floor-standing units for larger warehouses, HEATER devices can also be upgraded to a mobile version.

The HEATER product line is available in two series. The BASIC series has all the necessary basic functions for induction heating and is suitable for harsh ambient conditions. The HEATER BASIC units are available in either table-top or floor standing configurations for a maximum rolling bearing mass of up to 1,600 kg. The SMART models have a delta-T control system, which is recommended for rolling bearings with low radial clearance. They can precisely document the heating process, which can be important for particularly safety-relevant applications, for example.

Application areas ›

Product information ↗



Available heating methods

HEATER BASIC

- The temperature mode (controlled heating)
- The time mode (serial heating without temperature sensor)

HEATER SMART

- The temperature mode (controlled heating)
- The time mode (serial heating without temperature sensor)
- The time and temperature mode (select target temperature or heating time)
- The temperature and velocity mode (with maximum temperature gradient per time unit)

Hydraulic Pumps

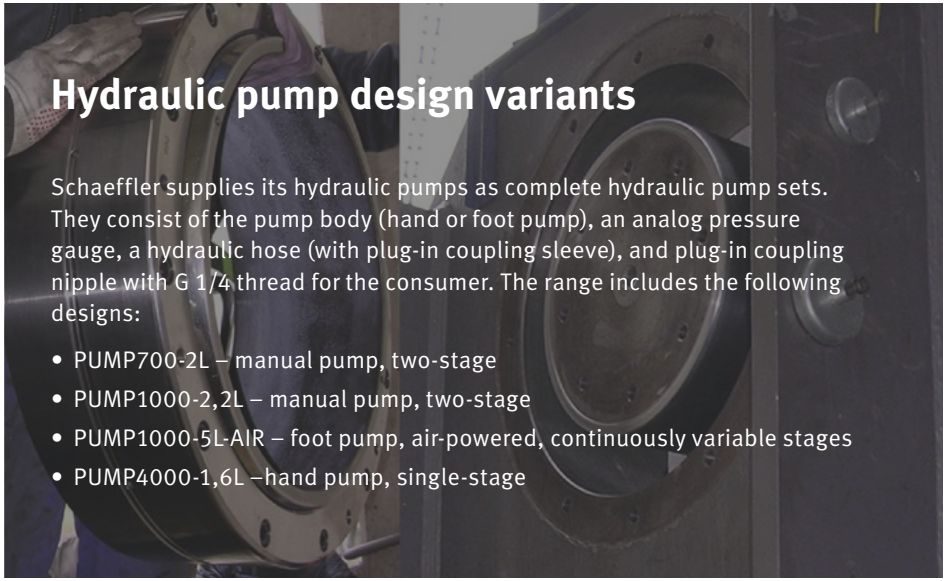
For simple installation and removal of rolling bearings in conjunction with hydraulic nuts

Comfortable work with little force required for assembly and disassembly. Hydraulic hand and foot pumps are used for the installation or removal of rolling bearings in conjunction with hydraulic nuts to pressurize them.

The pumps are also used for the installation and removal of roller bearings with a tight fit, as well as other rotary machine elements where oil is pressed between the fitting surfaces for widening. The risk of bearing damage is significantly reduced because the components and rolling bearings can be precisely positioned by defining a starting pressure. The hydraulic pumps are available in different versions, which can be manual or air-operated. There is a perfectly fitting variant for almost every application.

Application areas ›

Product information ↗



Hydraulic pump design variants

Schaeffler supplies its hydraulic pumps as complete hydraulic pump sets. They consist of the pump body (hand or foot pump), an analog pressure gauge, a hydraulic hose (with plug-in coupling sleeve), and plug-in coupling nipple with G 1/4 thread for the consumer. The range includes the following designs:

- PUMP700-2L – manual pump, two-stage
- PUMP1000-2,2L – manual pump, two-stage
- PUMP1000-5L-AIR – foot pump, air-powered, continuously variable stages
- PUMP4000-1,6L –hand pump, single-stage

Advantages at a glance

- Work can be done comfortably with minimal force being required
- Risk of damage to rolling bearings is reduced
- Allows precise positioning of rolling bearings
- Oil can easily be refilled
- A digital measuring gauge can be used to monitor the drive-up distance
- Options for surface pressures of up to 200 N/mm²
- Wide range of accessories available

Hydraulic Nuts HYDNUT

For strong contact forces

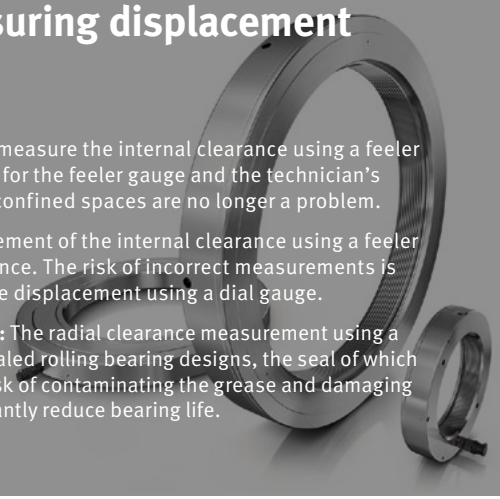
If a lot of force is needed when assembling and disassembling bearings, hydraulic tools such as hydraulic nuts can be valuable tools. When fitting and removing large-size bearings and machine components with a conical bore, they are the first choice.

The application of hydraulic nuts such as HYDNUT..-E and HYDNUT..-E-INCH involves pressing rolling bearings or other ring-shaped components with a conical bore onto a conical seat. They are used mainly when significant force is required and cannot be achieved with pressure screws. In addition, it is easier to set the radial internal clearance for bearings. The hydraulic nut can also be used for disassembly if fastening withdrawal sleeves or adapter sleeves. The HYDNUT..-HEAVY hydraulic nut is ideal for assembling press-fit assemblies where very high drive-up forces are required for gears, shaft couplings, crushers, and roller presses, for example. The HYDNUT..-HEAVY variant is also suitable for special applications, such as those without threads on the shaft or sleeve.

Application areas ›

Product information ↗

Advantages of measuring displacement during mounting



Simplified installation: To be able to measure the internal clearance using a feeler gauge, there must be sufficient space for the feeler gauge and the technician's hand. When using a dial gauge, even confined spaces are no longer a problem.

Safety and accuracy: Correct measurement of the internal clearance using a feeler gauge requires a great deal of experience. The risk of incorrect measurements is almost eliminated when measuring the displacement using a dial gauge.

Correct installation of sealed bearings: The radial clearance measurement using a feeler gauge is also possible for the sealed rolling bearing designs, the seal of which can be removed. However, there is a risk of contaminating the grease and damaging the seal. Both of these factors significantly reduce bearing life.

Abbreviation Name	Format	Application
HYDNUT50-E to HYDNUT200-E	With DIN 13 metric fine thread	Standard adapter and withdrawal sleeves with metric dimensions, shaft journals with metric thread
HYDNUT205-E to HYDNUT1180-E	With DIN 103 trapezoidal thread	
HYDNUT50-E-INCH to HYDNUT950-E-INCH	Standard adapter and withdrawal sleeves with metric dimensions, shaft journals with metric thread	Shaft journals or sleeves with inch-based thread
HYDNUT100-HEAVY to HYDNUT900-HEAVY	Reinforced finish without thread	For heavy mounting forces, e.g., shipbuilding

Mechanical Tools

For professional assembly, disassembly, and maintenance

Mechanical tools are indispensable for mounting, dismounting, and maintaining bearings. The Schaeffler portfolio includes tools that cover all life cycle phases of the rolling bearing while taking into account the total costs for the customer.

For all assembly and maintenance work, it is important to keep the necessary downtimes of the production operation as short as possible. The work must be fast, without quality and safety taking a back seat. Schaeffler's high-quality transport and assembly tools, extraction solutions, and installation tool sets, as well as socket wrenches and hook wrenches provide the prerequisites for completing all activities efficiently and maximizing system availability for customers.

Application areas ›

Product information ↗

Mounting tool sets
for mounting small rolling bearings gently

Transport and mounting tool
for lifting and transporting large bearings by crane safely

Socket and hook wrenches
for tightening and loosening locknuts efficiently

Three-section extraction plates
for extraction without damage – by gripping the bearing directly on the inner ring and transmitting the extraction force via the rolling elements

Mechanical extractors
for dismounting bearings and bearing inner rings, and other components cost-effectively

Hydraulic extractors
for dismounting bearings, and bearing inner rings even if high extraction forces are required, and for disassembling other components

Remanufacturing of Bearings

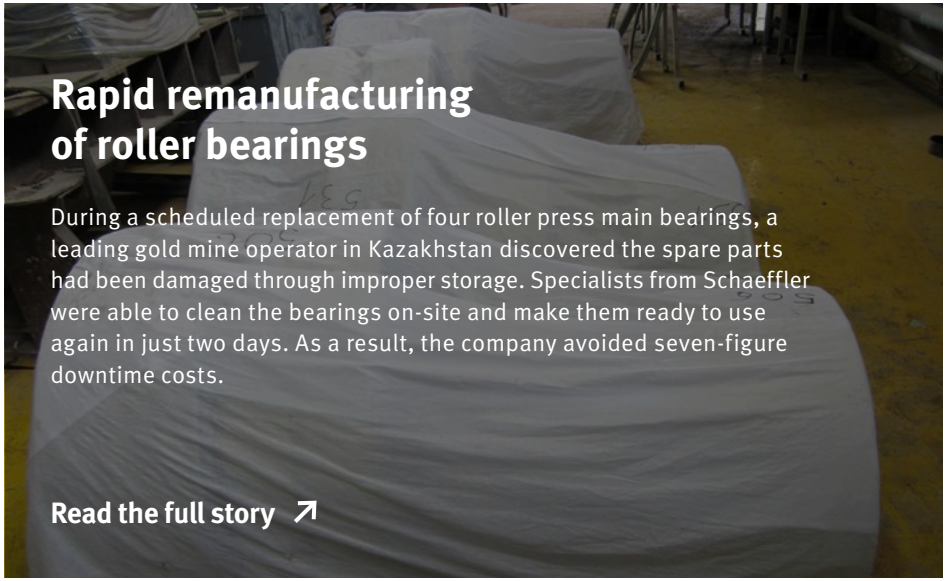
Sustainable option to extend service life

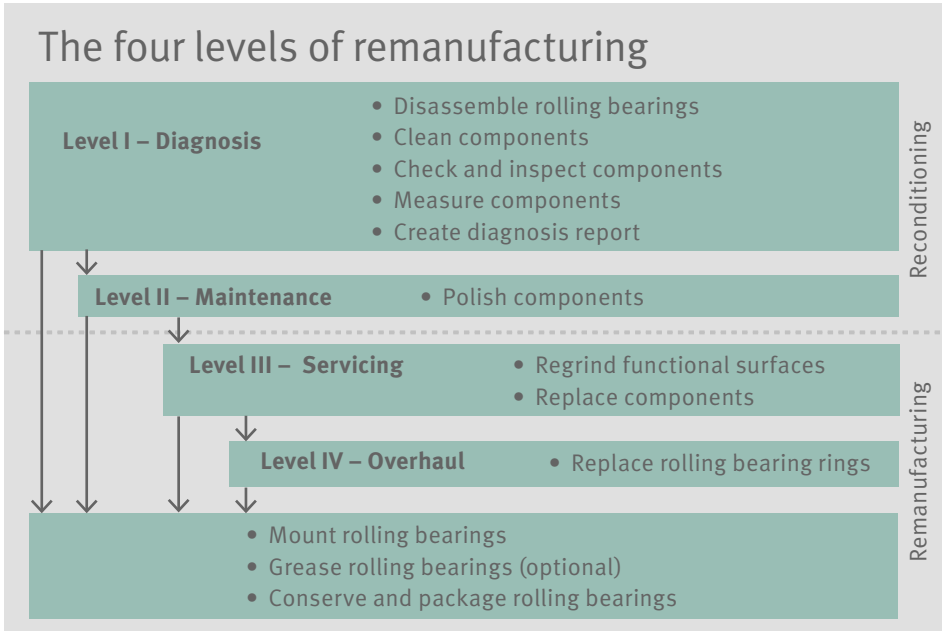
Bearings are often replaced even though they can be restored to as-new condition through proper remanufacturing. In general, the costs for such remanufacturing are significantly lower than the costs of a new bearing – with shorter delivery times in most cases.

Schaeffler carries out the remanufacturing in compliance with and control of all norms and standards worldwide. Before remanufacturing, the bearing is professionally dismantled, cleaned, and examined. Once the damage analysis is complete, the necessary work steps for restoration are determined and a quotation is prepared. Like new bearings, the remanufactured bearings pass through the accredited Schaeffler test laboratories. This service is currently used primarily by the rail and aviation industries, but is also being considered for manufacturing, which uses bearings with larger diameters. Here, too, service can significantly reduce life cycle costs.

Application areas ›

Product information ↗





Customer Success Stories

- C. u. A. Heiderich GmbH
- SIEMAG TECBERG
- MWM Elektro
- TAKRAF GmbH
- MVM Mátra Energia Zrt
- Adaro Indonesia
- Pilbara Iron
- Compañia de Minas Buenaventura

C. u. A. Heiderich GmbH

For over 100 years, C. u. A. Heiderich has been one of the most important manufacturers of welded rope sheaves, blocks, and hook blocks. The medium-sized German company is responsible for supplying and producing components for conveying equipment worldwide.

Challenges

The company received an order to produce heavy-duty rope sheaves for a shaft-sinking facility for Deilmann-Haniel GmbH in Belarus. The time pressure was intense because the delivery had to take place in less than six months. The bearing components for the rope sheaves had to be custom-designed to withstand loads in excess of 91 tons and a temperature of –20°C.
In order to achieve the adequate notched bar impact strength at low temperatures, a special material had to be developed. For the design of the bearing arrangements in the rope sheaves, C. u. A. Heiderich sought assistance from Schaeffler.

Solution

Taking into account the design envelope, load, and operating conditions, Schaeffler experts recommended the use of SNS plummer block housings and spherical roller bearings with a cylindrical shaft seat. The spheroidal graphite cast iron material with low-temperature suitability was manufactured specifically for the housings. Unlike standard gray cast iron, spheroidal graphite cast iron is suitable for low temperatures, making it more flexible to use. The bearings were redimensioned in accordance with the requirements and filled with a low-temperature grease that can withstand operating temperatures as low as –20°C.

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

SNS plummer block housings: For a longer bearing life

The innovative housing design optimally distributes loads for large bearings and offers many advantages:

- 50% longer bearing life
- Maximum sealing performance
- Spheroidal graphite cast iron as standard material (EN-GJS-400)
- Easy to replace
- Easy installation and maintenance
- Predefined condition monitoring slots
- Simplified, optimal lubricant supply

SIEMAG TECBERG

SIEMAG TECBERG is a market leader in the category of winders. Solutions by the Germany-based company are used worldwide in deep mines and open-pit mines.

Challenges

The Palabora Mining Company, a customer of SIEMAG TECBERG, operates a copper mine in South Africa. A twin-shaft system comprising a production shaft and a service shaft was to connect the open-pit mine to the deep mine. The bottom depth was about 1,400 meters. SIEMAG TECBERG supplied the Koepe winders for both shafts: two 4-rope winders with an integral drive for the production shaft, one 6-rope winder with an integral drive for the service shaft, and one 2-rope winder for the personnel hoist. For the bearing arrangement, SIEMAG TECBERG cooperated with Schaeffler.

Solution

Schaeffler supplied the roller bearings for the winders and the associated deflection sheaves. The bearing arrangement for the main shaft consists of two F-578799.01.PRL spherical roller bearings with rotating outer rings. The deflection sheaves are supported by two F-803738.TR2S tapered roller bearings in an adjusted arrangement with an intermediate ring set. The basic rating life corresponds to the requisite machine life of 25 years. The bearings are greased with ARCANOL LOAD400, a lithium soap grease with EP additives.

Technical data

Bearing arrangement for main shaft:

Two F-578799.01 spherical roller bearings

Rating life L10h for spherical roller bearings

- 139,000 h in a 4-rope winder
- 77,000 h in the 6- rope winder

Bearing arrangement for deflection sheave:

Each sheave is supported by two F-803738.TR2S tapered roller bearings

- 200,000 h

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

MWM Elektro

The Polish company MWM Elektro is one of Europe's market leaders in the development, manufacturing, and modernization of mine hoists, shaft signaling and power supply systems, and control and monitoring systems for mine ventilation and pumping stations.

Challenges

A Koepe hoisting machine from MWM Elektro is deployed in the L-VI mine hoist of the ZG Lubin copper mine, which is operated by KGHM Polska Miedź S.A., one of the largest copper and silver producers in the world. As part of the largest modernization project in the history of the mine, the existing ventilation shaft for multipurpose hoisting in the L-VI shaft was to be fully rebuilt. State-of-the-art technology and solution expertise were required to guarantee reliable operation and the safety of personnel and machinery. MWM Elektro chose high-quality bearings and sensor technology from Schaeffler and entrusted the task of mounting to Schaeffler's experts.

Solution

Schaeffler was already supporting the company with roller bearing calculation using its in-house BEARINX calculation program, including shaft and traction sheave modeling. The mounting of the two high-performance spherical roller bearings designed for 25 years of continuous operation was performed by Schaeffler's service experts. For condition monitoring, the SmartCheck condition monitoring solution was installed, tested on site, and linked to the machine controller in the control cabinet. Use of SmartCheck enables reliable temperature and vibration detection despite the short time window with constant speeds. Schaeffler was involved in the entire process, from selection of suitable bearing arrangement versions, to expert mounting and lubrication, all the way to the installation of the condition monitoring system.

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

Overview of customer benefits

- One central point of contact for the entire project
- All products and services from a single source
- Professional mounting
- Optimal lubrication
- Powerful condition monitoring system
- More user-friendly control of machinery

TAKRAF GmbH

For almost 200 years, TAKRAF GmbH has been making a name in the fields of open-pit mining equipment and bulk materials. In the late nineties, the company developed a new generation of large gearboxes for bucket wheel excavators, of which more than 20 are currently in operation in mines all over the world.

Challenges

One of the output shaft bearings in a bucket wheel gearbox was to be replaced without dismounting and opening the gearbox. This was to avoid having to completely dismount and transport the machine component to and from a workshop. All the work had to be carried out within a few days during a scheduled shutdown of the bucket wheel excavator. The confined space made replacing the bearing especially difficult.

Solution

Schaeffler specially developed a bearing for TAKRAF that is based on the Z-531338.ZL split cylindrical roller bearing. The bearing consists of one regular (two-piece) split outer ring and one roller/cage assembly, but with a triple split inner ring. The segments of the inner and outer rings are made of through-hardened steel. To ensure a successful bearing replacement, Schaeffler and TAKRAF planned every dismounting and mounting ahead of time. Special tools were made and then tested in the workshop under simulated conditions.

Technical information about the solution

- Bearing: Z-531338.ZL split cylindrical roller bearing
- Bore diameter: 1,400 mm
- Outside diameter: 1,700 mm
- Width: 225 mm
- Mass: 910 kg
- Dynamic load rating: 5,400 kN

Thanks to the solution from Schaeffler, the bucket wheel gearbox did not have to be dismounted completely and taken to a workshop. The bearing was replaced on-site without a loss of quality during a scheduled shutdown. This made it possible to significantly reduce the amount of work and cost of replacement.

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

MVM Mátra Energia Zrt

MVM Mátra Energia Zrt. is Hungary's second-largest energy supplier with a capacity of around 950 megawatts. The power plant is supplied by Visonta lignite open-pit mines.

Challenges

Every year, belt conveyors in Visonta move about 20 million cubic meters of lignite and other raw materials across long distances. Dirt and vibrations can interfere with the process sequence and shorten the service life of the drive motors. That's why a continuous and precise supply of fresh lubricants is necessary. However, existing lubricators did not meet the requirements of MVM Mátra Energia Zrt. in terms of sustainability and simplicity. The company contacted its local authorized Schaeffler distributor EBT Szerviz because it already had success using other Schaeffler solutions.

Solution

Schaeffler and EBT Szerviz recommended the CONCEPT1 automatic lubricator. This cost-effective solution is easy to install and can be filled up to three times, which significantly reduces the amount of waste. It also extends bearing life and is suitable for machines that are difficult to access. Around 300 CONCEPT1 lubricators are currently being deployed in Visonta. They serve to supplement 130 CONCEPT8 and 60 CONCEPT2 lubricators that supply the drum belts' drive motors and roller bearings. MVM Mátra Energia Zrt. also relies on various Schaeffler bearing solutions such as OPTIME Condition Monitoring sensors.

Overview of customer benefits

- Precise automatic lubrication
- Easy to install, use, and maintain
- Greater sustainability (can be filled up to three times)
- Extended bearing life and increased safety
- ATEX certification for use in potentially explosive atmospheres

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

Adaro Indonesia

Adaro Indonesia is one of the largest coal mining operators in Southeast Asia, producing more than 54 million tons of coal in 2020 alone.

Challenges

The bearings of the conveyor belts are highly stressed due to the harsh operating conditions in open-pit mining. The threat of a shutdown is always looming. Regular maintenance is required but is often time-consuming and dangerous due to the difficulty of accessing the bearings. That's why the open-pit mining company Adaro Indonesia was looking to Schaeffler for a predictive condition monitoring solution that reduces maintenance outlay and safety risks as well as minimizes unplanned downtime.

Solution

Schaeffler's experts recommended the condition monitoring solution with SmartCheck and the Schaeffler Smart Utility software. The robust und easy-to-operate system detects changes in vibration behavior in real time. Six SmartChecks were installed and the vibration sensors were connected to a local network to enable central monitoring of the conveyor belts. As a result, the former time-based maintenance routine was converted to a purely "as-and-when-needed" basis.

Overview of customer benefits

- Condition monitoring in real time
- Rapid detection of bearing defects
- Minimal unplanned downtimes
- Reduced risk of injury for the maintenance team
- Transparent data for diagnosis
- Optimized planning of resources and inventory

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

Pilbara Iron

Pilbara Iron is a member of the Rio Tinto Group, one of the largest mining groups in the world. It manages large iron ore mines in the north of Western Australia as well as the railway and port facilities necessary for the ore's transport.

Challenges

Dampier Port Operations, managed by Pilbara Iron, includes two ship-loading terminals, each equipped with appliances for train unloading, ore stockpiling, ore blending, and ship loading. The bearings on a bucket wheel excavator drive were due to be replaced but the standard unsplit SGC Pillow Block housing was extremely difficult to access. Replacement of the spherical roller bearings was expected to take 72 hours. This would have meant downtime costs of €1,100 per hour. Pilbara Iron turned to Schaeffler in order to find a less expensive solution.

Solution

Schaeffler recommended replacing the conventional spherical roller bearings with split spherical roller bearings. The price of a split spherical roller bearing was €16,670, whereas the cost of a standard spherical roller bearing was €2,780. However, split spherical roller bearings reduce production downtime costs because they're simpler to maintain and much easier to install. As a result, Dampier was able to install the split bearings in the existing housing without having to remove the drive shaft.

Thanks to the use of split spherical roller bearings, downtime was reduced by 50 percent to a total of 36 hours, corresponding to cost savings of €40,000. Taking into account the additional costs for a split spherical roller bearing as well as the reduced labor costs for one fitter (€39/hour), the minimum savings achieved for each bearing replacement are displayed here:

Potential savings

€27.514

Reduced downtime	€40,000
– Additional bearing costs	€13,890
Lower labor costs (1 fitter) or (€39/hour):	€1,404
Savings per bearing replacement:	**€27,514**

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

Compañia de Minas Buenaventura

Compañia de Minas Buenaventura is one of the leading mining companies in Peru. At seven locations, it mines process gold, silver, and other metals.

Challenges

For its operations in Uchucchacua, the company purchased a used tube mill that was delivered in separate pieces. Mounting the four new spherical roller bearings was especially challenging. The outer diameter of these roller bearings is more than 1.5 meters. Incorrect mounting or damage can quickly lead to multiple days of plant downtime and corresponding production shutdowns. The company had no experience in mounting large bearings and asked Schaeffler for support.

Solution

Mounting experts from the Schaeffler Technology Center in Sorocaba worked closely with the contractors engaged by Compañia de Minas Buenaventura. Together they planned and implemented the bearing mounting. They received support from Schaeffler's competence center for grinding mills (ASB Grinding Mills Competence Center) headquartered in Melbourne, Australia. This excellent team effort exemplifies the tight network of Schaeffler's experts worldwide and showcases their comprehensive experience in the mining industry.

Potential savings

Thanks to the expert support provided by Schaeffler, the roller bearings in Uchucchacua could be quickly and successfully mounted. For Compañia de Minas Buenaventura, this reduced the risk of bearing damage and unplanned downtimes. The downtime costs of a tube mill amount to approximately €10,000 per hour.

Potential savings

€720.000

1 day (= 24 hours) at €10,000 per hour	€240,000
2 days at €10,000 per hour	€480,000
3 days at €10,000 per hour	€720,000
Cost saving for each downtime avoided	**€720.000**

Read the full story ↗

Bearing Solutions ›

Lifetime Solutions ›

Digital Tools and Support

medias ›

Partner Portal ›

Expert Services ›

Trainings ›

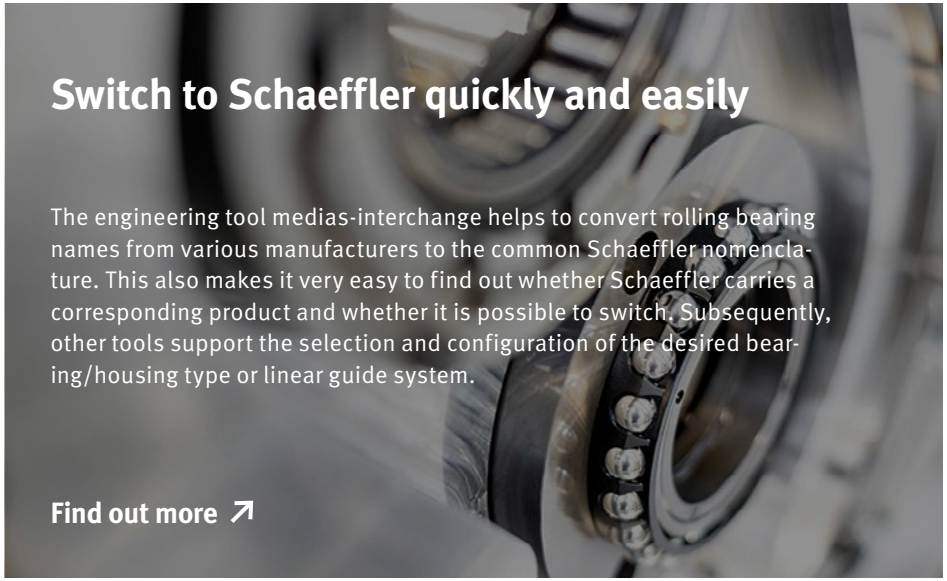
medias

Knowledge database and digital product catalog

In addition to the Schaeffler product catalog, medias provides detailed information on all products and solutions, including a knowledge database with useful materials, such as white papers and online trainings. Calculation and configuration tools provide support in product selection.

More than just an online store
With the medias platform, Schaeffler fully supports its customers in selecting, configuring, and ordering products. It not only gives you detailed information on products and services in the form of a comprehensive knowledge database, but also advanced e-commerce functions and the necessary tools to help you calculate and configure the products you need in line with your requirements. You can get access to additional exclusive content with a free medias Plus membership. Registered business customers can expect an expanded product catalog and even more efficient ordering and communication processes with medias Business.

Further information ↗



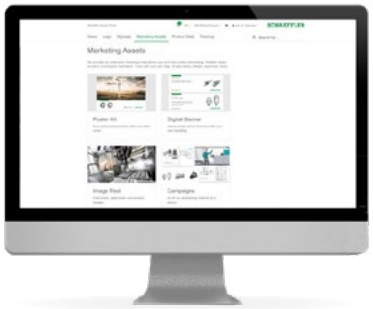
medias offers these engineering tools:

- Linear configurator:
  – Complete system
  – Track
  – Carriage
- Bearing selection assistant
- Housing selection assistant
- Linear selection assistant
- medias-interchange
- Heating manager
- Bearing frequency calculator
- Grease selection guide

To the engineering tools ↗

Partner Portal

The platform for certified Schaeffler partners

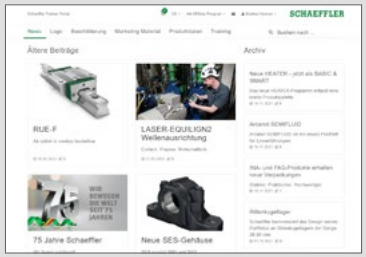


With the Partner Portal, Schaeffler has created a unique platform that provides certified partners with comprehensive information about its broad product and service portfolio and presents innovations. In addition, dealers are provided with useful material to support the sale of and consultations regarding Schaeffler products.

Schaeffler has a long tradition of cooperating closely with manufacturers and customers in the development of products and solutions. This philosophy is also reflected in the Partner Portal. Certified Schaeffler partners can find all the information they need about our products and services here, including product data and images for use in product catalogs, news, and training for their sales staff. In addition, our partners receive access to exclusive marketing material which can help gain customers.

To the Partner Portal ↗

What you will find on the Partner Portal:



- News and updates
- Training
- Campaign material on products and industries
- Product information
- Marketing materials with individual personalization options

Expert Services

Condition monitoring and maintenance

Schaeffler services provide support for the use of suitable monitoring systems. This includes not only hardware selection, but also system configuration and, where necessary, its integration into existing systems. Condition monitoring during operation is also provided on request.

Our service specialists support customers throughout the entire service life of their equipment and bearings. They advise about suitable monitoring solutions prior to purchase, and subsequently provide on-site or remote installation assistance and support for configuration and commissioning. On request, they can also provide continuous condition monitoring during operation via online connection or carry out regular on-site measurements for vibration analyses. If malfunctions occur on a machine, they trace faults through comprehensive diagnostics, such as torque detection or endoscopy. They rectify faults such as unbalances or incorrect lubrication quickly and accurately.

Further information ↗

The optimum bearing solution thanks to professional damage analysis

Thai mining company Sasin Mine Co., Ltd. noticed a marked rise in temperature alongside unusual noises in its vibrating screens. Both were incorrectly attributed to quality shortcomings in the FAG bearings that had been installed not long before. An extensive data analysis by experts from Schaeffler identified the actual cause, and an appropriate bearing solution was implemented using the BEARINX calculation program, which prevented unnecessary long-term system downtime.

Read the full story ↗

Services at a glance

- Condition monitoring consulting
- System history
- On-site support for installation and commissioning
- Remote support during installation
- Vibration analyses
- Remote monitoring
- Maintenance and repair

Trainings

Certified expertise from maintenance specialists

Customized training modules familiarize customers with all important Schaeffler products for bearing maintenance. Customers learn details about proper lubrication and detailed know-how about condition-based machine monitoring.

The training courses offered for condition-based machine monitoring start with basic knowledge and an overview of the products that can be used in condition monitoring. Additional training courses expand the theoretical expertise gained and are complemented by practical exercises. They prepare for certification courses according to ISO 18436-2. Customers can have their knowledge tested and certified at various levels. Training programs tailored to specific needs are available. In these cases, the modular training program is also customized for balancing bearings or on the subject of lubrication.

Further information ↗

Products
- Product training sessions from the rotary, linear, and service areas
- Sector-based product training sessions

Assembly
- Assembly and disassembly of rotary and linear products
- Large bearing assembly

Basic principles
- Basic training sessions, including sector relevance
- Kinematics, speed, lubrication, and fault analysis

Lifetime Solutions
- Vibration analysis
- Balancing and aligning
- Condition monitoring

Aftersales and Customer Service

Literature and Publications ›

Contact ›

Literature and Publications

- Condition monitoring with OPTIME

  How I don’t leave it for the next shift ↗

- Brochure

  Rolling bearings and services for mining and raw materials processing ↗

- Mining publications

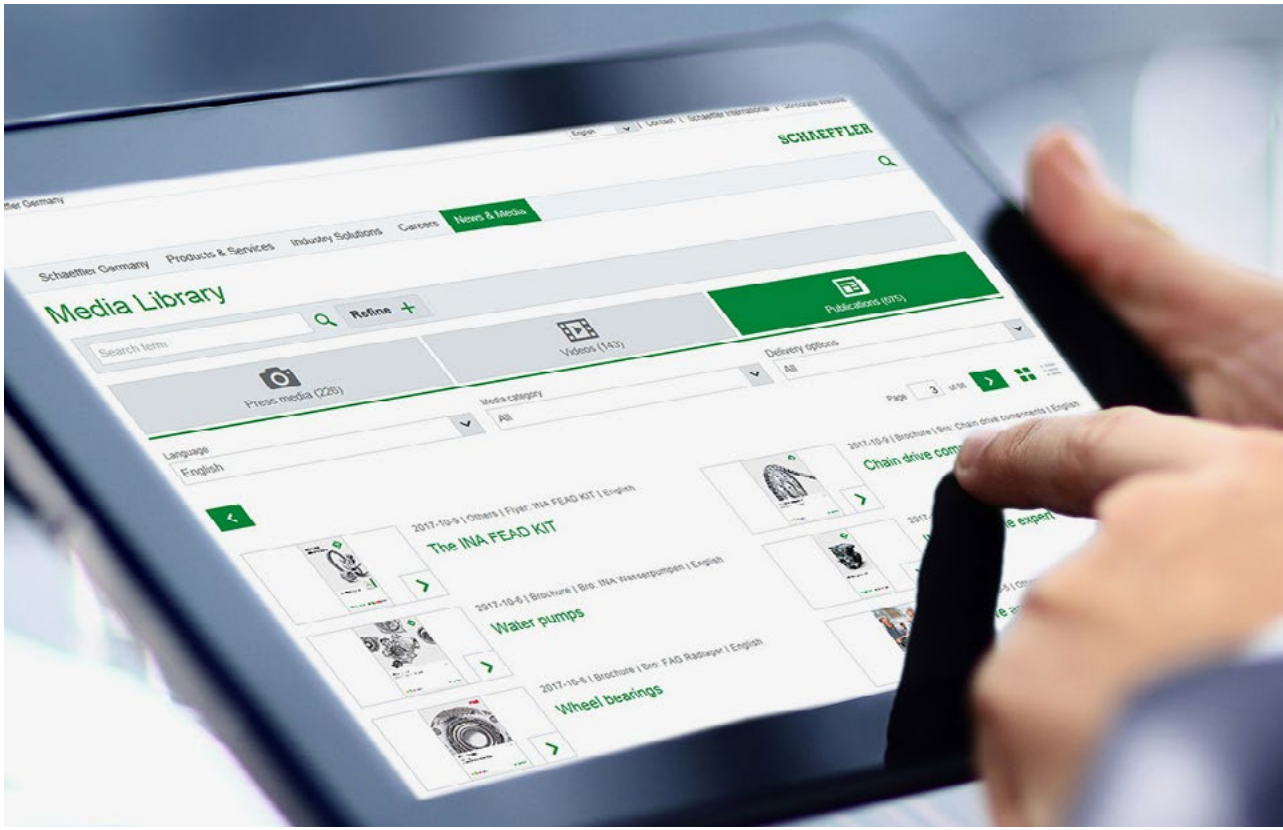
  Media library ↗

- Catalog HR1:

  Media library ↗

- Condition Monitoring Manual (print edition)

  Order book ↗



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