



## Schaeffler Products and Services for the Cement Industry

We pioneer motion

**SCHAEFFLER**



## Challenges in the Cement Industry

Intensive dust formation, significant temperature variations, high shock, or impact loads – these are all harsh conditions that are prevalent in the cement industry. Our solutions make the cement production process more manageable – every step of the way. Alongside a comprehensive suite of bearings that keep machines running, Schaeffler also offers products and services that extend the product life cycle. This requires in-depth understanding and familiarity of the cement production process.

## Schaeffler – Partner to the Industry

Schaeffler is a partner of all the 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 the cement industry 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.

### Benefits offered by Schaeffler in the cement industry at a glance

**Top supplier** to plant manufacturers

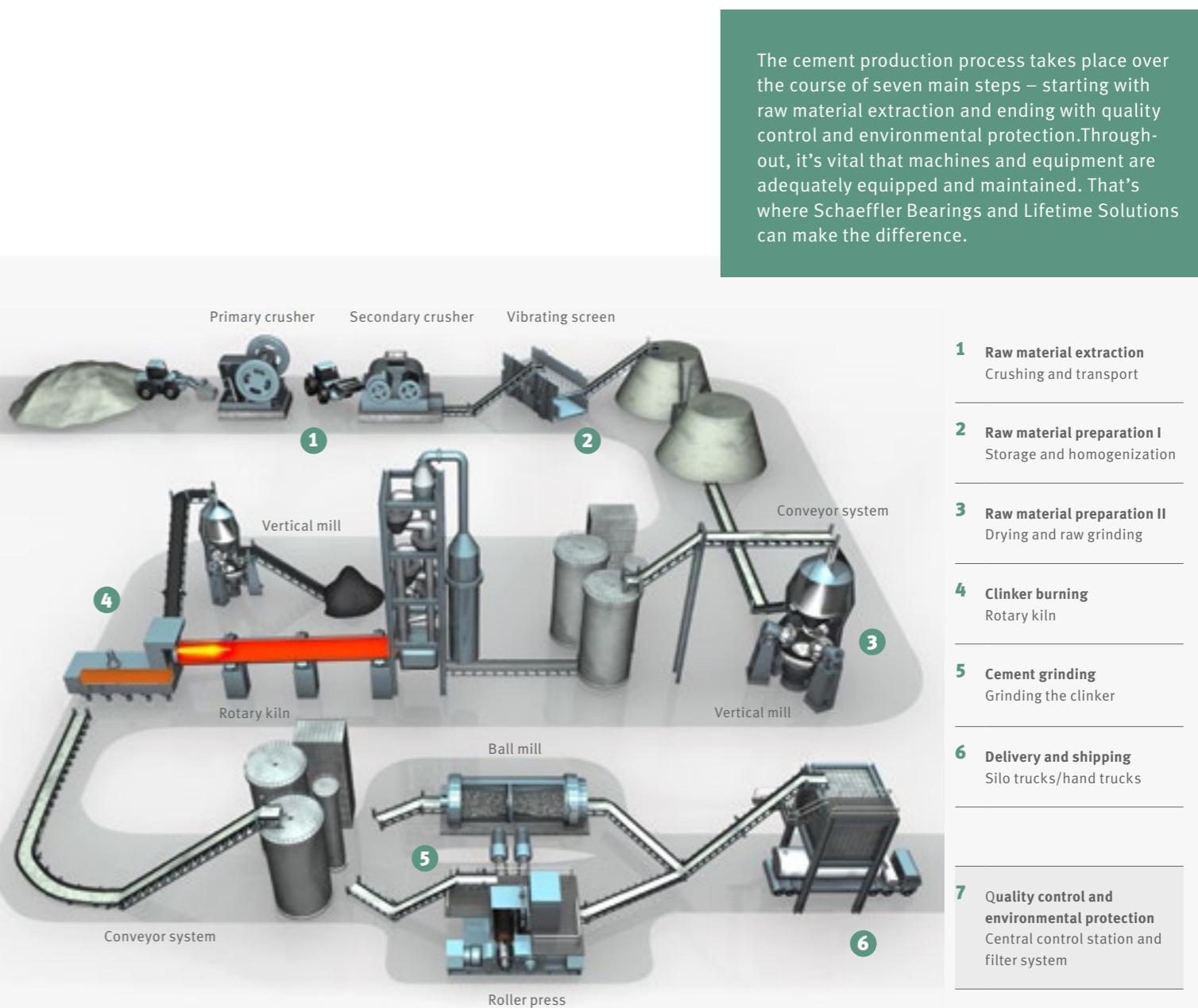
Leader in wireless machine diagnostics

End-to-end expert knowledge

Forward-looking with automated lubrication

With Schaeffler, companies can also rely on:

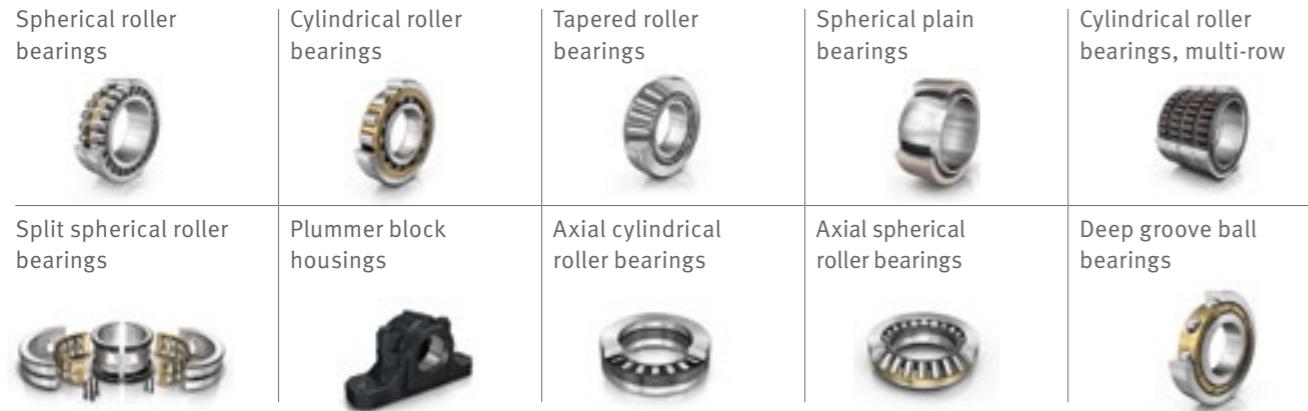
- A global network of experts
- Broad-based expertise with bearings
- User-friendly engineering tools in medias
- Sustainable product concepts



# Schaeffler Products and Services for the Cement Industry

Avoiding unnecessary plant downtime is what drives us in the development and manufacturing of innovative and high-quality rolling bearing solutions. Through intensive dialog with research and development partners as well as with manufacturers, operators, and business partners, we ensure that our bearings are perfectly designed for the adverse operating and ambient conditions in industries that process raw materials. We also ensure that they provide latitude for a wide range of individual solutions. Schaeffler further offers a wide range of products and services that are the perfect complement to its range of bearings and keep machines running.

## Schaeffler's rolling bearings for the cement industry

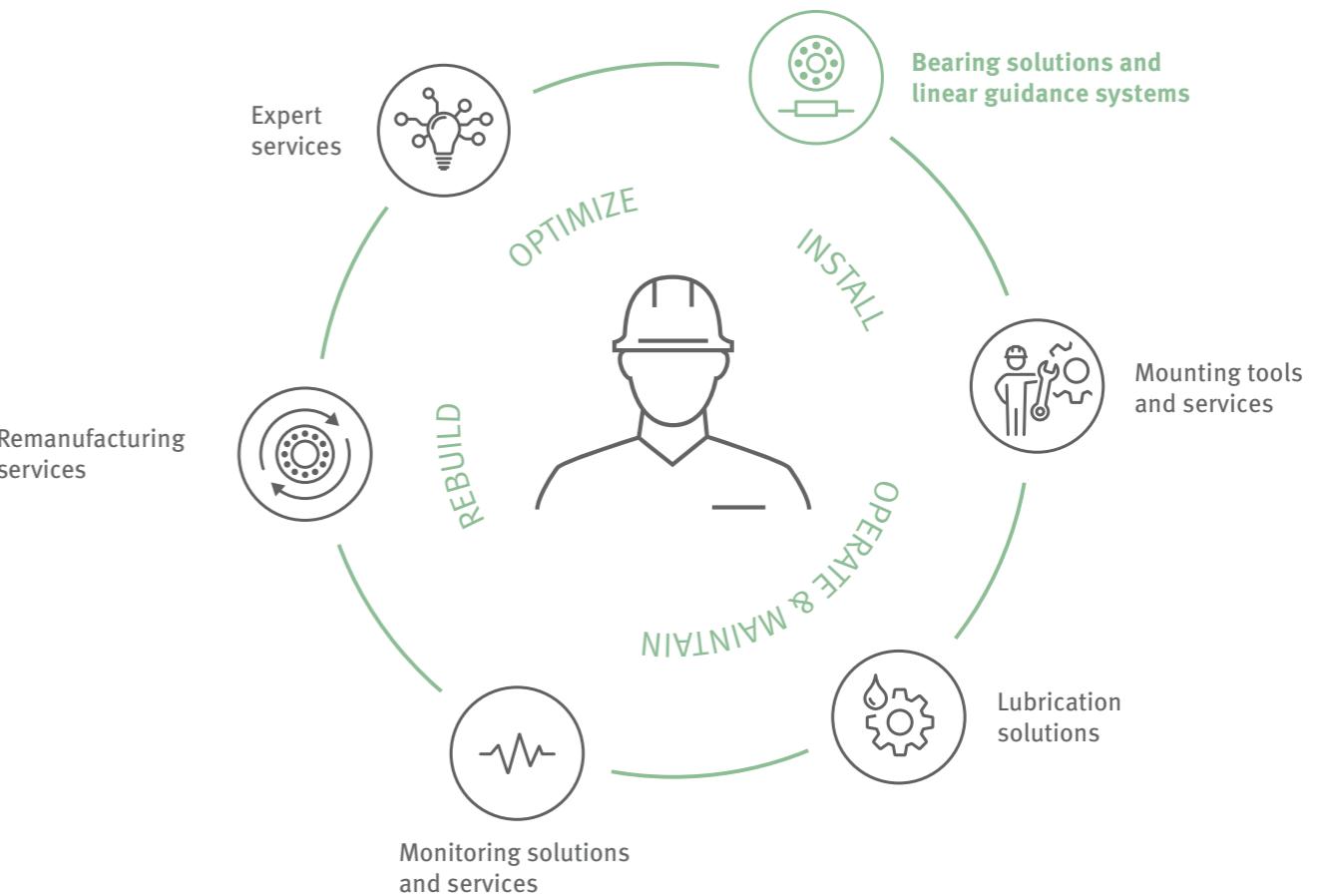


## Schaeffler's services for the cement industry



## Value at Every Stage of the Life Cycle

Schaeffler engineers solutions with an extended life cycle. With over 100 years of experience in the bearing business, expertise goes into every stage of the solution lifetime.



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, 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 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 life cycle of our customers' bearings and expert services to optimize their use. And that's how we add value over the lifetime for our customers.

# Bearing Solutions for the Cement Industry

As one of the world's largest rolling bearing manufacturers, Schaeffler is a key partner for all leading system manufacturers and operators in the cement industry. 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.

	Crushers	Vibrating screens	Rotary kilns	Roller presses	Vertical mills	Ball mills	Conveyor systems	Fans, blowers	Electric motors	Gear units
1 Spherical roller bearings	●			●	●	●	●	●	●	●
2 Special spherical roller bearings		●								
3 Cylindrical roller bearings	●	●		●	●		●	●	●	●
4 Tapered roller bearings	●		●		●					●
5 Spherical plain bearings	●			●	●					
6 Plummer block housings	●		●			●	●	●	●	
7 Split spherical roller bearings						●	●	●		
8 Axial spherical roller bearings				●						
9 Axial cylindrical roller bearings	●						●	●	●	●
10 Deep groove ball 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.



Learn more

**For reliable use in vibratory machines**  
Vibratory machines are extremely stressed and have special requirements. Most importantly, they must have high operational reliability, prevent shaft damage, and reduce repair costs. Special spherical roller bearings fulfill these tasks.



Learn more

**Bearings with optimum load distribution**  
They can support high radial and axial loads in equal measure. Depending on the arrangement, they are suitable if the shaft has to be guided axially accurately or if the bearing arrangement has to be operated axially very rigidly, clearance-free or preloaded.



Learn more

**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.



Learn more



**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 seal excellently. The result is lengthy service lives, easier maintenance, and a substantial reduction in maintenance overheads.



Learn more



**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.



Learn more



**For short downtime and easy maintenance**  
Split bearings shorten downtimes in the event of bearing replacement and massively reduce the associated costs. They are used where the replacement of unsplit bearings would require time-consuming additional work, such as when dismantling drive systems or removing gears.



Learn more



**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 a solid shaft- and 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.



Learn more



**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.



Learn more



**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.



Learn more

# Lifetime Solutions for the Cement Industry



While bearing solutions are key to a smooth operation, likewise are maintenance solutions. Schaeffler's Lifetime Solutions supports machines and bearings with all the tools maintenance teams or plant managers might need. In addition to offering products, Lifetime Solutions offers expert services and training programs.

Learn more about



	Crushers	Vibrating screens	Rotary kilns	Roller presses	Vertical mills	Conveyor systems	Ball mills	Fans, blowers	Electric motors	Gear units
1 ProLink CMS	●	●	●	●	●	●	●	●	●	●
2 SmartCheck	●	●	●	●	●	●	●	●	●	●
3 OPTIME Condition Monitoring	●				● <sup>1</sup>	● <sup>1</sup>	●	●	●	●
4 GreaseCheck					●					
5 OPTIME C1		● <sup>1</sup>		● <sup>1</sup>		● <sup>1</sup>	●	●	●	●
6 CONCEPT1-8	● <sup>1</sup>	● <sup>1</sup>			● <sup>2</sup>	● <sup>1</sup>	●	●	●	●
7 ARCANOL	●	●	●	●	●	●	●	●	●	●
8 Laser-EQUILIGN2	●	●	●	●	●	●	● <sup>2</sup>	●	●	●
9 MF-GENERATOR				●	●					
10 HEATER	●	●	●	●	●	●	●	●	●	●
11 Hydraulic pumps	●		●	●	●	●				
12 Hydraulic nuts HYDNU	●		●	●	●	●				
13 Mechanical tools	●	●	●	●	●	●	●	●	●	●
14 Remanufacturing	●			●	●	●				

<sup>1</sup> For auxiliary units

<sup>2</sup> Limitations on usage

## Schaeffler Lifetime Solutions

Keep your machines rolling

**Get your machines up and running with our tools, services, and solutions for mounting, dismantling, and alignment**

Our full array of mechanical, hydraulic, thermal, and alignment tools will help you get your machines up and running quickly and smoothly – and minimize bearing damage. Highlight solutions include flexible induction heating devices for components and bearings of all sizes as well as the LASER-EQUILIGN2 for easy machine alignment.

Learn more



**Extend the operating lifetime of your medium and large rolling bearings and have them remanufactured.**

Frequently, new rolling bearings are fitted, although the existing bearings could be returned to a like-new condition. In many cases, it is more cost-effective to recondition used rolling bearings than to install new ones. It also saves on material and energy costs and is therefore the more sustainable solution. And it does so without compromising on quality.

Learn more



**Eliminate unplanned downtime by always knowing what condition your machines are in**

From award-winning technologies for wireless condition monitoring like OPTIME Condition Monitoring to our multi-channel condition monitoring solution ProLink CMS to SmartCheck, the monitoring solution for production-critical machines: our portfolio provides answers – and is simple to implement and operate.

Learn more



**Keep your machines running smoothly with the right machine lubrication solution for every application**

Machine lubrication is often complex and time-consuming. Our portfolio of automatic lubricators from the CONCEPT line and our OPTIME Smart Lubricator paired with our range of ARCANOL industrial lubricants promise to bring the flow into your processes. So you can reduce downtime and lubricant waste.

Learn more



## 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.

Learn more about



# Application-Specific Solutions

## Crushers

Extreme performance under the toughest conditions

### Task in the cement production process

- Crushing rock for cement production

### Challenges

- Heavy radial loads
- Impact loads
- Shaft 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



## Vibrating screens

Endurance test for every bearing

### Task in the cement production process

- Screening and homogenization of the raw material

### Challenges

- Extremely heavy radial loads, including impact loads
- Fretting corrosion between bearing and shaft
- Special stress on the bearing cages due to vibrations and radial acceleration
- Circumferential shaft deflections
- Intensive dust generation

### Schaeffler's solutions

- Spherical roller bearings with the X-life seal of quality and a thin-layer chromium-plated bore according to T41D (Durotect CK)
- ARCANOL LOAD lubricants with EP additives
- Condition monitoring solutions to increase system availability



## Rotary kilns

High risk of extra costs in the event of shutdowns

### Task in the cement production process

- Firing of the raw meal with cyclone preheater
- Expulsion of CO<sub>2</sub> from the raw meal in the cyclone preheater and calciner
- Chemical conversion of the raw meal (called sintering) into cement clinker

### Challenges

- Increased temperatures
- Impact loads
- High radial and axial forces
- Intensive dust generation

### Schaeffler's solutions

- Reliable radial and axial track rollers as complete ready-to-mount units
  - Spherical roller bearings with the X-life seal of quality
  - Lubrication with ARCANOL high-performance greases



## Roller presses

High level of efficiency with little energy

### Task in the cement production process

- Grinding clinker into cement
- Grinding of crushed raw stone and burned clinker
- Increasingly replacing ball mills (more compact design, better efficiency)

### Challenges

- Heavy radial loads
- Shaft 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



## Vertical mills

High level of bearing stress due to large and dynamic loads

### Task in the cement production process

- Grinding and drying of raw materials for clinker production
- Finish grinding of cement
- Grinding coal for rotary kiln firing

### Challenges

- Heavy radial and axial loads
- Heavy impact loads
- Intensive dust generation
- Difficult lubrication conditions (mixed friction)
- High temperatures

### Schaeffler's solutions

- Tapered roller bearings, cylindrical roller bearings, spherical roller bearings, and spherical plain bearings with the X-life seal of quality for high load-carrying capacities in compact installation spaces
- Performance enhancement through material and coating solutions
- Excellent wear resistance of Schaeffler products
- Condition monitoring solutions on large gear units and auxiliary units to increase system availability



## Conveyor systems

The connecting link between all processes

### Task in the cement production process

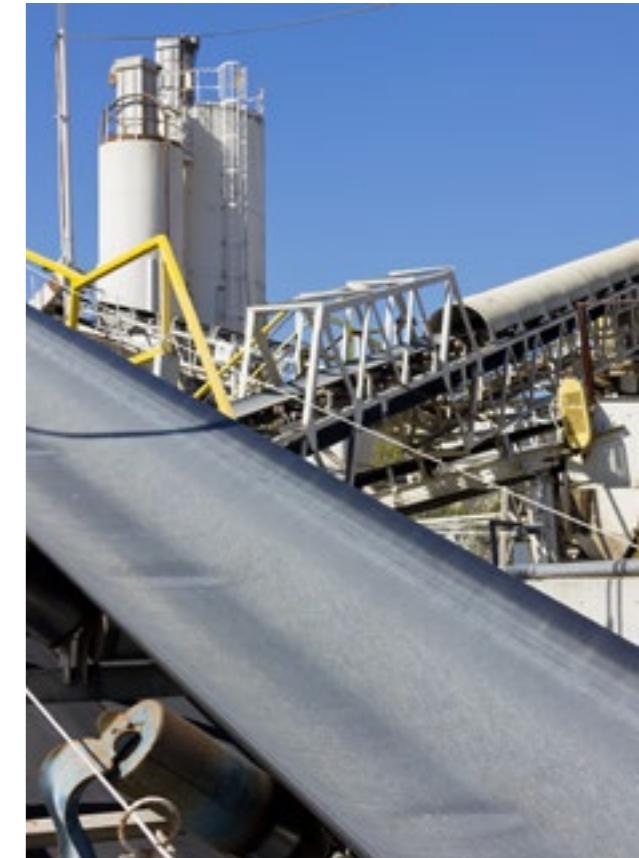
- Conveyor belt systems for transporting rock and cement clinker

### Challenges

- Heavy loads
- Dust and dirt accumulation
- Important aggregate for the supply of raw materials to the cement plant
- Extensive maintenance potentially required (many hard-to-reach bearing locations)

### Schaeffler's solutions

- Sealed spherical roller bearings with the X-life seal of quality
- Split spherical roller bearings for faster bearing replacements and shorter downtime
- SNS and SES housings including variable sealing options
- OPTIME, an intelligent and wireless condition monitoring solution for increasing the availability of conveyor belt gear units and auxiliary units
- Automated lubrication with our CONCEPT lubricators, such as the intelligent OPTIME C1



## Ball mills

High operational reliability through extreme temperature fluctuations

### Task in the cement production process

- Fine grinding of clinker to cement

### 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



## Fans, blowers

Reliable air supply ensures trouble-free plant operation

### Task in the cement production process

- For cooling, drying, and air/gas routing during the burning process
- Air-assisted transportation of ground material

### Challenges

- Heavy axial loads
- High speeds
- Imbalance
- Misalignment
- Dust and dirt accumulation

### Schaeffler's solutions

- Spherical roller bearings with the X-life seal of quality
- SNS and SES housings including variable sealing options
- OPTIME, an intelligent and wireless condition monitoring solution for increasing plant availability of auxiliary units
- Automated lubrication with our CONCEPT lubricators, such as the intelligent OPTIME C1
- ARCANOL high-performance greases



## Electric motors

Driving the industry

### Task in the cement production process

- Responsible for the drive in almost all applications

### Challenges

- Long-term machine availability with lowest possible maintenance overhead
- 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, including 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)
- Optimal lubrication with automatic CONCEPT lubricators or the smart OPTIME C1 lubricator solution
- High-temperature greases such as the ARCANOL TEMP series



## Gear units

Reliable and economical operation

### Tasks in the cement production process

- Power transmission
- Conversion of speed to torque

### Challenges

- Heavy loads
- Speed
- Design envelope
- Shaft arrangement
- Narrow radial and axial shaft guidance
- Rigidity of connector parts

### Schaeffler's solutions

- Broad portfolio of bearings: cylindrical roller bearings, spherical roller bearings, double-row tapered roller bearings, deep groove ball bearings, angular contact bearings
- Different condition monitoring systems (OPTIME Condition Monitoring, SmartCheck, ProLink CMS), and other Lifetime Solutions



# Customer Success Stories

## BHP Billiton Base Metals

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.



## Finnsementti

Comprehensive monitoring



Finnsementti, a cement manufacturer in Finland, opted for Schaeffler's OPTIME Condition Monitoring to reduce unplanned downtime. Using the wireless solution, the cement manufacturer could monitor almost all rotating machines in their plant quickly, precisely, and continuously. About 150 sensors were installed on motors, fans, pumps, and gearboxes and installation took just a few hours.



## Asia Cement Public Company Limited

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.



# medias

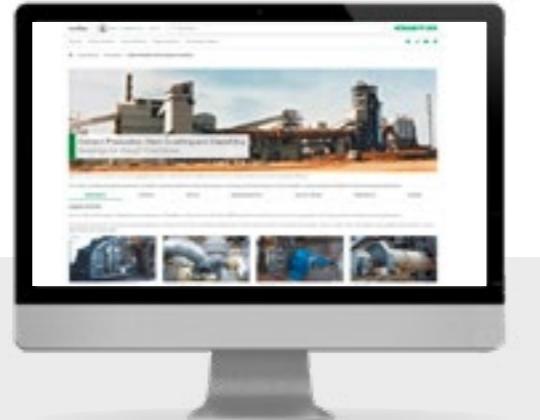
## Knowledge database and digital product catalog

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 training courses. Calculation and configuration tools provide support in product selection.

### What medias has to offer

Customers can find these features on our advanced medias e-commerce platform:

- Detailed information about products and solutions
- Specific solutions for specific industries
- Helpful engineering tools for selecting, calculating, and configuring products
- Comprehensive knowledge database as well as white papers, online courses, customer success stories, and more
- Free newsletter with industrial news from Schaeffler



Learn more about



## medias Engineering Tools

### Select, analyze, and configure bearings and accessories

How big is the design envelope? What speeds and loads does the bearing have to withstand? How important is it that it's low noise? With the medias expert tools for selecting, analyzing, and configuring bearings and all types of accessories, Schaeffler supports its customers during the development phase and guides engineers to the right product and its accessories one step at a time.



One of over 24,000: The assistant helps designers find exactly the right bearing for their application.



Comprehensive support for selecting housings and housing units: This tool takes environmental conditions into account as well as the demands on the bearing arrangement.

Never again use the wrong lubricant: This tool helps users find exactly the right grease so that their bearings run smoothly and have a long service life.



Help when converting to Schaeffler bearings: medias-interchange converts the rolling bearing designations of other manufacturers to INA/FAG nomenclature.



# 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.

### Overview of training fields



**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**

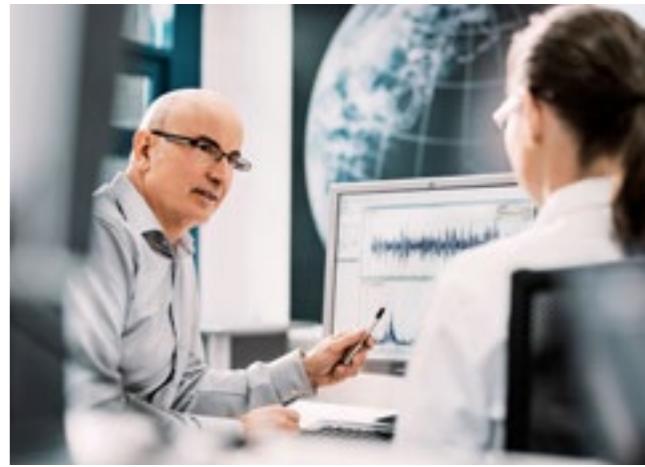
- Vibration analysis
- Balancing and aligning
- Condition monitoring

Learn more about



# Expert Services

Services across all aspects of condition monitoring



Schaeffler expert 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.

### Services at a glance

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

Learn more about



# 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.

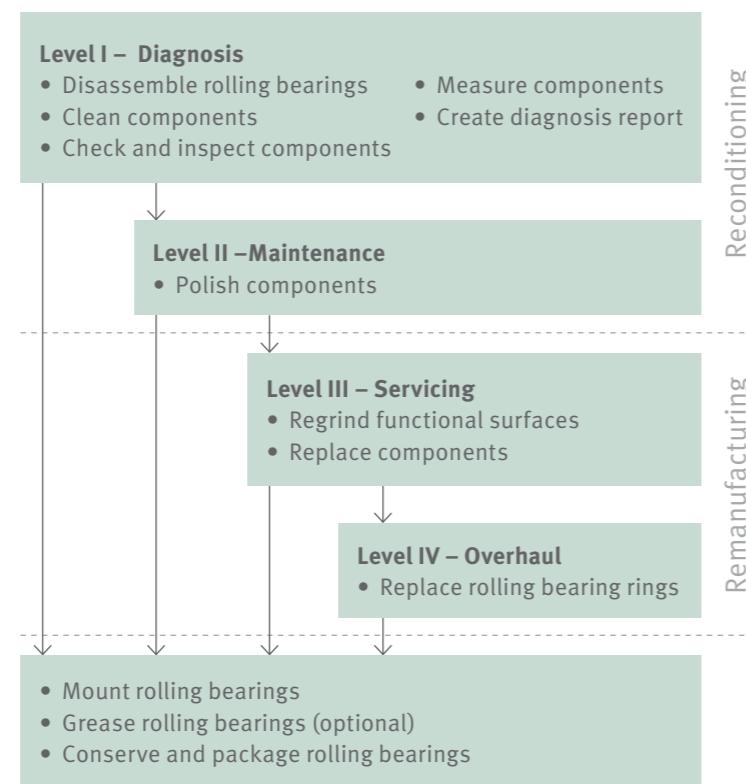


Schaeffler carries out the remanufacturing in compliance with and control of all norms and standards worldwide. Before remanufacturing, the bearing is professionally dismantled, cleaned, and examined. Once the damage analysis is complete, the necessary work steps for restoration are determined and a 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.

Learn more about



### The four levels of remanufacturing



# Making a Stand Against Product Counterfeiting together

## Stop Counterfeitors with OriginCheck

Everybody knows that counterfeit luxury products are not at all rare: Just think about watches, handbags and perfumes, and also counterfeit sports items. But what about rolling bearings or even automotive spare parts – i.e. typical Schaeffler products? Very few people think of products like these when it comes to counterfeiting. But unfortunately, this is a day-to-day reality. Since brand protection is a matter of great importance to us, we already established a central team in 2004 that focuses on combating counterfeiting: The Schaeffler Brand Protection Team.

Learn more about



### Using the OriginCheck App

You suspect you may have purchased a counterfeit Schaeffler product? Then download the OriginCheck App for a first check.



### Data Matrix Codes on Rolling Bearings

Added value in the smallest spaces

#### Dive into the world of digital possibilities.

Perhaps you have already noticed the Data Matrix Code on Schaeffler packaging and rolling bearings. Even though it may seem insignificant, this little code has a lot to offer. Specifically: a wealth of useful information that offers you clear added value throughout the entire product life cycle.

#### Data Matrix Code for bearings

The Data Matrix Code is a well-known technology for Schaeffler products. It can be found on every product packaging. There are also some bearing products that have a DMC as a direct marking in the form of laser engraving. In recent years, the importance of this marking technology has steadily increased and the applications have expanded.

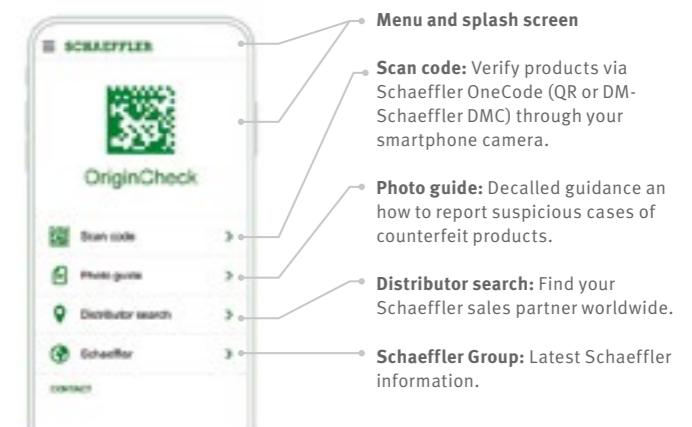
#### Applications

The Data Matrix Code provides a wealth of useful information and functions that offer you clear added value – throughout the entire product life cycle. It supports you with:

- Purchasing of products
- Logistics and transport
- Warehousing
- Origin check

#### Hint:

There are several ways to read a Schaeffler DMC but you can also just use OriginCheck.



Learn more about



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