

SKF solutions for the mining, mineral processing and cement industries





Reliable solutions for harsh conditions

Mining, mineral processing and cement facilities share some of the world's harshest operating conditions. Heavy vibrating loads. Abrasive dust and dirt. Temperature extremes. All of which make it difficult, even dangerous to maintain machinery. Unplanned downtime and worker injuries are a constant risk. Additionally, scarcity of water, high energy costs and stringent, new environmental and safety regulatory requirements are driving mines and plants to invest in new technologies. Changing global infrastructure investments are also changing the demands for metal commodities, cement and coal production and profitability.

Optimize maintenance and operational efficiency with SKF knowledge

SKF solutions can help you extend service life, improve performance and reduce Total Cost of Ownership (TCO) of hard-to-maintain machinery. We provide proven bearing, sealing, lubrication, maintenance products and condition monitoring solutions. We also offer expert machine reliability, asset management, and lubrication management consulting to help you:

- Increase production
- Reduce downtime
- Increase overall profitability
- Reduce operating costs
- Improve worker safety
- Reduce energy consumption
- Safeguard the environment

Increase availability through SKF rotating equipment expertise

Partner with SKF to increase machine performance

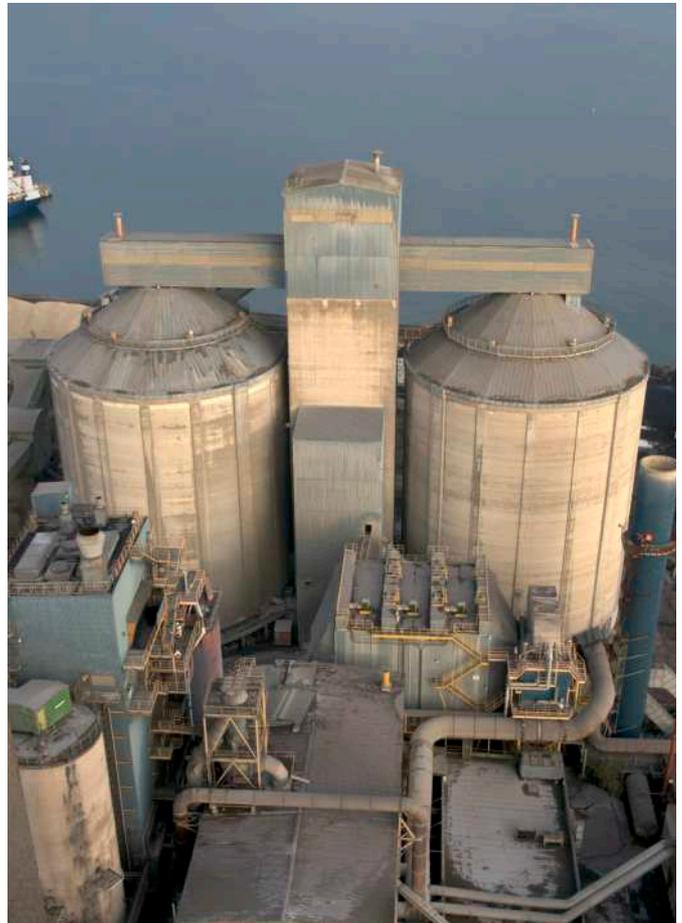
Improving availability. Extending service life. Getting machinery that runs harder and longer. Whether you are a machine manufacturer serving the mining industry, or an operator struggling to meet performance goals SKF can be your partner of choice and help you, from specification through repair, maintenance and redesign.

With experience in solving reliability problems in many types of machinery in mining operations, we can help you find solutions that improve maintenance practices, overall equipment efficiency or cost of ownership. From drills, trucks and shovels to conveyors, crushers and mills, we solve problems with solutions including bearings, seals, lubrication systems and condition monitoring.

Some solutions begin with setting a baseline to determine the true cause of a machine problem. Or, if the problem is known, SKF engineers go straight to it and apply our application expertise to increase machinery availability. With expertise in many areas that affect reliability, we are able to look at the problem from a systems perspective and provide an effective solution that can combine several SKF competency areas.

Are you getting the best performance from your equipment?

Get the most from your rotating equipment by evolving how you purchase services to increase reliability and availability. Choose from flexible supply or performance-based contracts, access data-driven insights into your machine performance from anywhere, and connect to our expertise directly to solve your problems fast.



Optimize your rotating equipment performance

Whether you want to solve a specific rotating equipment problem, increase your plant and equipment performance, or improve your overall maintenance strategy and efficiency, SKF is your partner. With access to unique application insights and the right products, technologies and solutions, we can help you achieve the performance you are looking for.



Improve output

By optimizing the performance of your rotating equipment, you can increase availability, performance rate and quality – all driving greater Overall Equipment Effectiveness, and increasing output for your business.



More reliable rotation

Poor performance and unplanned downtime don't just affect your productivity and cost of production, they can also directly affect the cost of energy, maintenance, spare parts and labour – all adding up to a greater Total Cost of Ownership (TCO). SKF can help you achieve more reliable rotation, so you can reduce your TCO.



Be more sustainable

SKF can work with you to reduce energy usage, spare parts consumption and more, helping you to deliver against your sustainability agenda, as well as saving on costs.



Gain new insights into your machinery

Gain visibility into the health of your equipment and turn data into performance-driving insights. Allowing your business to be more agile, deliver greater output, or optimise safety, reliability and sustainability. Drive forward digitalization of your operations using Internet of Things (IoT) solutions to connect to your machinery. Store and share data and benefit from Big Data through dashboards, tailored to your workflows and giving easy to understand data interpretation. Connect directly to expert diagnostics and analysis, providing unrivalled application insights and advice to improve rotating equipment performance.



Optimization of the distribution of skills

By working with SKF to connect our rotating equipment expertise to your business, you can reduce the time and cost of training for diagnostic skillsets. What's more, the current workforce can concentrate on other tasks where their expertise is needed.



Operate more safely

Planned maintenance means safer maintenance. Whether you want improve operational safety, reduce product safety risks or navigate the minefield of regulations, SKF can help you drive operational safety. With monitoring services, you can find your way to planned and safer maintenance.

Read more about Rotating Equipment Performance on skf.com/REP

Solving the unique challenges of mining applications

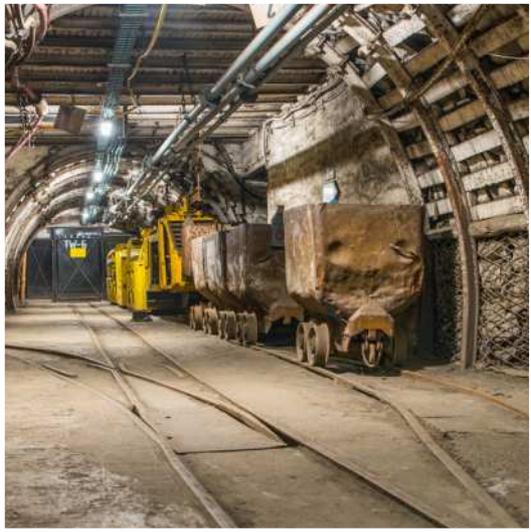
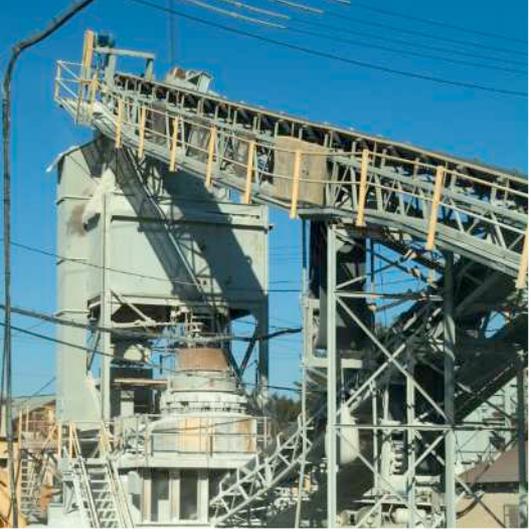


Looking to keep your haul trucks moving ore at the highest possible utilization? Want to keep your longwall system operating at maximum capability? Do you need to improve the reliability of your crushers, screens or mills? Or maybe you need solutions that can operate in the high temperatures and dust found in the kiln and clinker cooler.

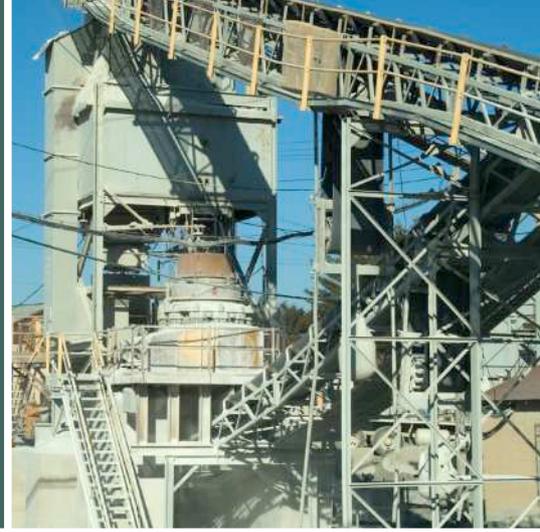
Whether your operation is involved in mining and quarrying, mineral processing or cement making, SKF has solutions for – and experience in – just about every machine type and application condition.

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Crushers



Learn more about SKF solutions for crushers

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EARLY FAULT DETECTION
CAN OFFSET THE COST OF
A PREDICTIVE
MAINTENANCE
PROGRAMME



Improve reliability and avoid unplanned downtime

Crushing ore to size takes a tough machine and tough bearings and seals. SKF has many bearing, sealing, lubrication and condition monitoring solutions to meet the specific reliability demands of crushers.



Upgraded SKF Explorer spherical roller bearings

All SKF Explorer spherical roller bearings are upgraded to a new level of performance, featuring a combination of high-quality steel and an improved heat treatment.

- Increased service life in contaminated and poor lubrication conditions
- Reduced maintenance and operating costs
- Enables downsizing for space savings
- Reduced environmental impact



SKF Power Transmission Products

Shown to effectively improve crusher productivity, SKF Power Transmission Products are designed to give engineers a wide design choice according to performance and cost considerations. SKF Power Transmission Products for crusher applications include:

- Belts
- Pulleys
- Sheaves
- Bushings



Heavy industrial seals for crushers

SKF can offer three options for seals in crushers:

- Large diameter machined seals
 - G-ECOPUR
 - Five times more abrasion resistant and three times higher tear strength
- HDS seals
 - XNBR for mining, best wear resistance for rubber compounds
 - Metal glad seal for self-retention for open housing bore
- HLS (TR/3/ML) or HLS special (TR/3/ML/PTV) seals
 - NRB with optional PTFE sealing lip for improved wear resistant compared to rubber compounds

Conveyors



Learn more about SKF solutions for conveyors

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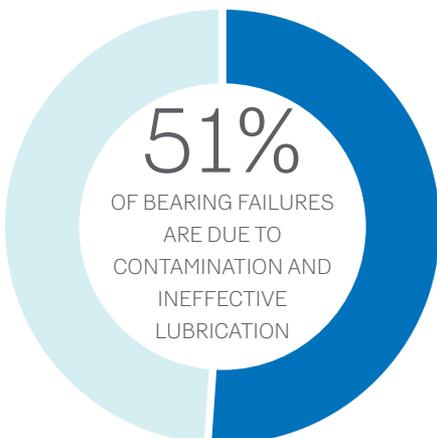
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Eliminate bearing damage from contamination

Many factors combine to bring conveyor systems to a stop. Operating conditions are hot, cold, wet, dry, dusty and/or dirty. Adding to these challenges, conveyors may also be in remote or difficult-to-maintain locations.

SKF offers solutions for the entire conveyor system. SKF products and services include a range of bearing sealing, lubrication and maintenance solutions to keep conveyors moving more productively and profitably.



SKF ConCentra roller bearing units

These factory sealed and lubricated units are an alternative to the use of split block housings and are "shaft ready" for ease of assembly onto the shaft.

SKF SYSTEM 24

These units are gas-driven single point automatic lubricators.

- Supplied ready-to-use straight from the box
- Tool-free activation and time-setting allow easy and accurate adjustment of lubrication flow

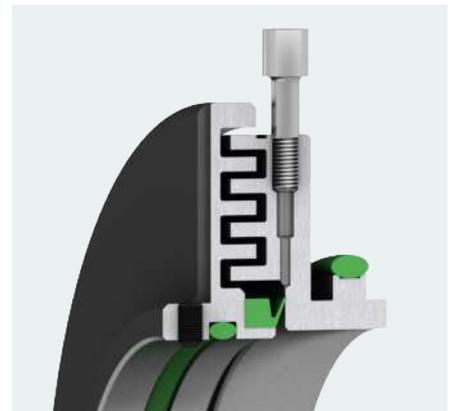
SKF Certified Rebuilder—Conveyor Pulleys

To earn the prestigious designation of SKF Certified Rebuilder, conveyor pulley shops must meet exacting standards and specifications. For you, those requirements translate into longer, more reliable pulley service life and reduced total costs.

SKF Three-barrier solution

A cost-effective and environmentally friendly option, The SKF Three-barrier solution for conveyors can extend bearing service life and reduce grease consumption. This SKF solution for conveyors consists of four components:

- Sealed SKF Explorer spherical roller bearings
- SMS (SKF Mining Specific) housing
- Standard SKF L or S-type seals for SNL housings and Posi-Trac Plus seals for SAF and SAFD housings
- Housing cavity grease (SKF recommends SKF LGGB2 biodegradable grease)



Taconite seals

Fine-grained taconite and other fine abrasive materials are extremely difficult to keep out of bearing arrangements, particularly in mining or bulk port environments when high-pressure water is used to clean the machinery. SKF Taconite Seals are labyrinth seals that are up to the task. When SKF Taconite seals are used with SKF split housings and sealed spherical bearings, it becomes the ultimate SKF Three-barrier solution.

Vibrating screens

2x

REDUCING BEARING
OPERATING TEMPERATURE BY
10 °C CAN DOUBLE
RELUBRICATION INTERVALS



Learn more about SKF solutions for vibrating screens

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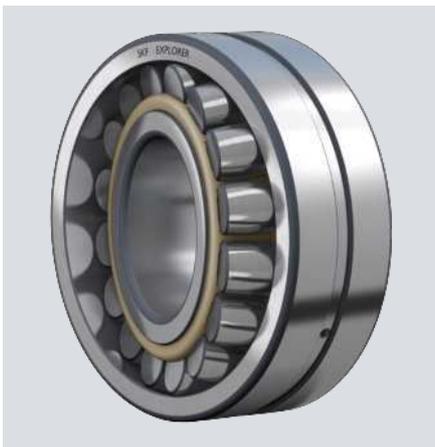
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The high cost of vibration and contamination

Along with regular exposure to the elements and abrasive dust, vibrating screens experience high vibration and heavy loads. Frequent component failures result - a condition many operators simply consider a cost of doing business.

A range of SKF bearings, seals and lubricants are specifically designed to handle the heavy loads, high vibration and contaminants that can limit reliability and productivity for vibrating screens.



SKF Explorer spherical roller bearings for vibratory applications – VA405 and VA406

SKF Explorer spherical roller bearings for vibrating screens (VA405) are proven to last twice as long as other screen bearings and operate at much cooler temperatures, which helps:

- Lower maintenance and repair costs
- Reduce downtime
- Improve safety

SKF Explorer spherical bearings (VA406) provide all the same benefits as VA405 bearings, plus they feature a PTFE coated bore which virtually eliminates fretting corrosion between the shaft and the bearing bore. This helps:

- Extend maintenance intervals
- Reduce associated labour costs



Radial shaft seals

SKF offers an array of proven shaft sealing solutions that protect bearings, keep lubricants in and improve system reliability. Our radial shaft sealing solutions include:

- Seals for general industrial applications
- Seals for heavy industrial applications
- Cassette seals



SKF LGEP 2 grease

With high levels of contamination and high operating temperatures, optimal lubrication is essential for vibrating screens. SKF LGEP 2 high load, extreme pressure grease is recommended. This mineral oil based, lithium soap thickened grease with extreme pressure additives provides good lubrication in general applications subjected to harsh conditions and vibrations.

- Excellent mechanical stability
- Extremely good corrosion inhibiting properties
- Excellent Extreme Pressure (EP) performance

Horizontal grinding mills



Learn more about SKF solutions for horizontal grinding mills

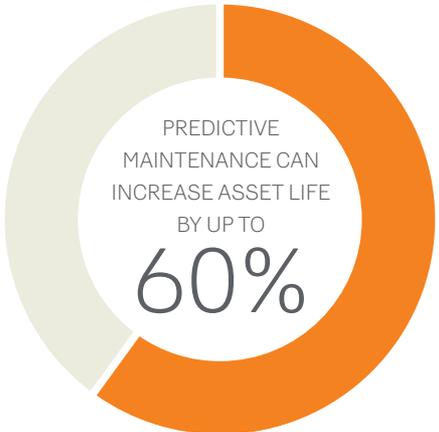
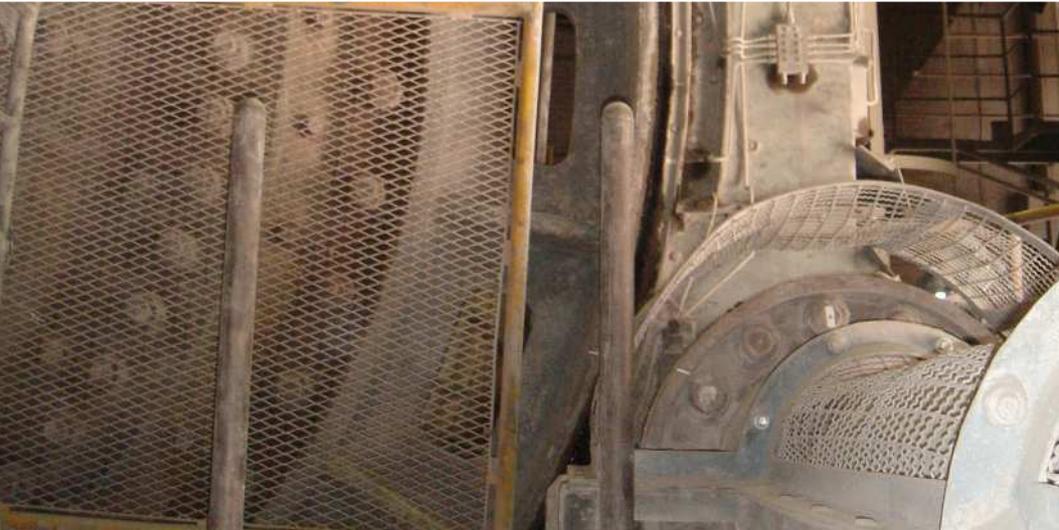
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Improved performance under high load and shock load conditions

On the outside, horizontal grinding mills often face the elements. On the inside, they endure vibration, shock loads, moderate to slow speeds, and a high concentration of particulates. Contamination, lubricant loss, even improper mounting techniques can all lead to failures for pinions or trunnions.

SKF offers a range of products and services that can protect pinions and trunnions from harsh operating conditions. SKF solutions help improve grinding mill reliability and safety while reducing maintenance and operating costs.



RecondOil box

With the RecondOil Box, oil change intervals can be significantly extended. Our Double Separation Technology (DST) removes contamination particles down to nano-size from the oil. And by keeping the oil ultra-clean continuously, the RecondOil Box allows you to use the same oil over and over again – without losing any of its original qualities.

SNL/SAF/SAFD/SDAF housings

Built to endure the punishing operating environments in mines and mills, SNL/SAF/SAFD/SDAF housings from SKF can help cut maintenance costs and drive reliability for a range of machinery, such as horizontal grinding mills. These housings are manufactured to world-class quality standards to help ensure:

- Longer service life
- Ease of mounting
- Reduced maintenance requirements
- Longer relubrication intervals

Trunnion bearing housings

FSDR .. K housings are large, low-weight pillow (plummer) block housings designed specifically for grinding mills. They operate under arduous conditions in highly contaminated environments. With their highly effective sealing solution, they enable the incorporated bearing to achieve maximum service life by preventing the ingress of contaminants and enabling easy access for inspection and maintenance when necessary.



Circulating oil systems

Available with a variety of flows and pressures, circulating oil systems from SKF provide cool, clean lubrication to machinery such as mills, kilns and fans. They also efficiently remove:

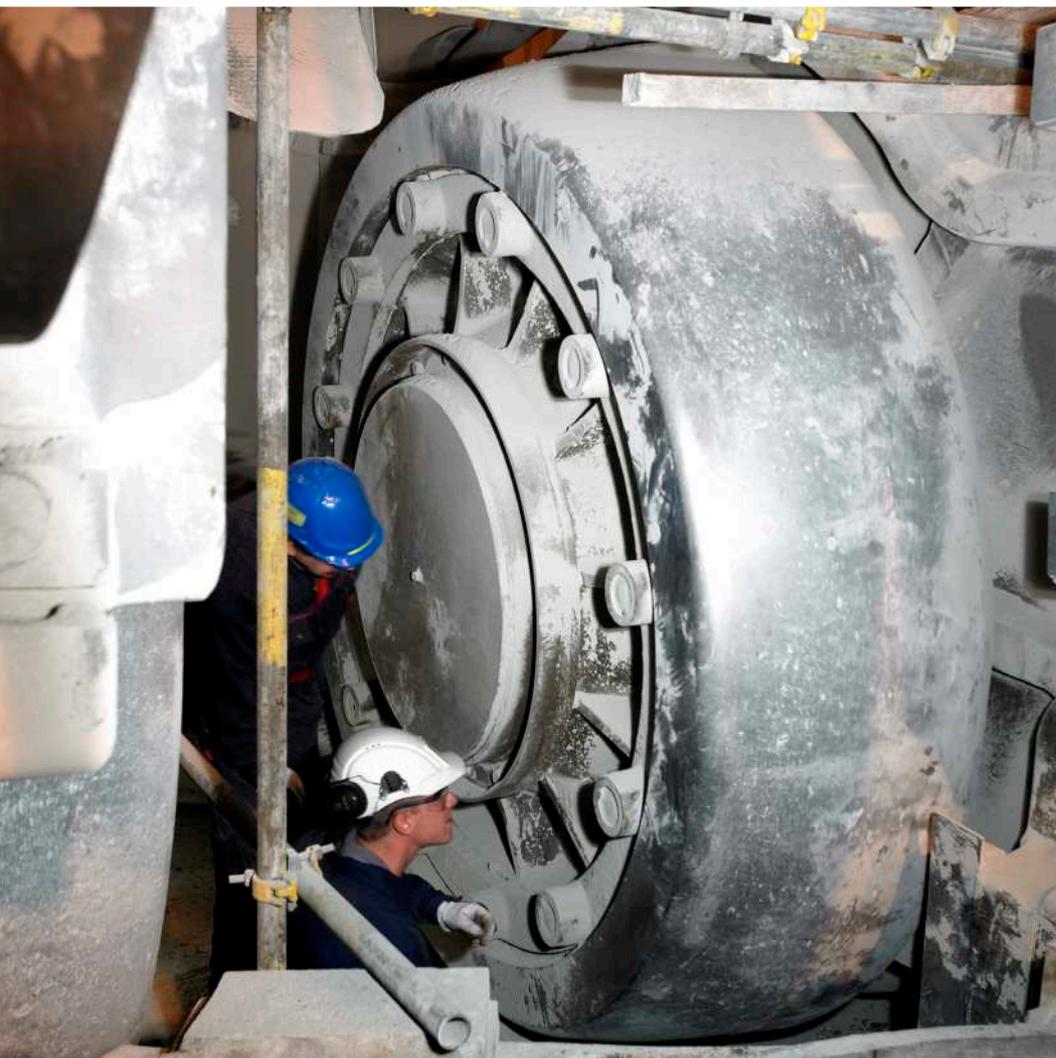
- Dirt
- Water
- Air

SKF can also provide combined high-pressure/low-flow rate and low-pressure/high-flow rate circulating oil lubrication systems.

Custom machined seals

With a unique combination of capabilities, we can deliver polymer seals for horizontal grinding mills in a very short time, in virtually any dimension and any design.

Vertical roller mills



Learn more about SKF solutions for vertical roller mills

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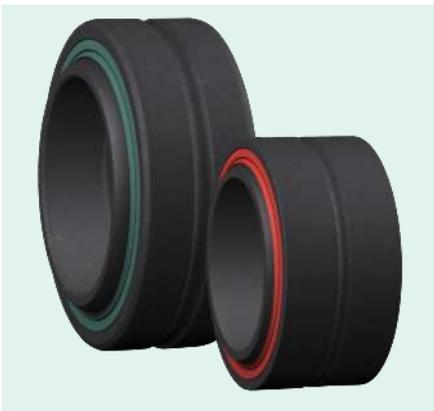
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Overcome high demands on maintenance

High temperatures and high particulate concentrations make maintenance difficult for vertical roller mills. SKF can help mill operators prevent the problems that lead to failure. Advanced bearing, sealing and lubrication technologies from SKF address contamination, inadequate lubrication, improper mounting and other operating challenges.



SKF Explorer steel/steel plain bearings

SKF Explorer steel/steel spherical plain bearings are initially lubricated and sealed to eliminate the need for relubrication in applications with low to moderate levels of contamination. This generates significant savings by reducing maintenance costs and grease consumption. These virtually maintenance-free bearings also improve reliability by eliminating failures due to missed lubrication intervals and improper lubrication practices.

- Lubricated for life
- 50% higher dynamic load rating
- Heavy-duty, triple-lip seal to retain lubricant and exclude contamination
- Available 20 to 300 mm bore size and 1 inch to 6 inch bore size
- Dimensionally interchangeable with other bearings



HDSF2 large diameter seals with PTFE excluder lip

Along with its primary elastomer sealing lip and metal case, the SKF HDSF2 large diameter seal features an auxiliary PTFE excluder lip for extra protection against dust and other contaminants. This additional defence helps extend machinery and lubricant service life and replacement intervals.

Proactive Reliability Maintenance (PRM)

An SKF PRM service contract combines Predictive Maintenance (PdM), Root Cause Analysis (RCA), and Reliability Engineering to detect, understand, and improve the performance of machinery. SKF can provide these services to raise the machine and plant Overall Equipment Effectiveness (OEE).

- Improve availability, utilization, performance
- Reduce costs
- Improve safety

Kilns and clinker coolers



Learn more about SKF solutions for kilns and clinker coolers

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Handling high temperatures, low speeds and more

A kiln's outer shell can reach 400 °C – enough to reduce lubricant viscosity inside bearings and eventually cause failures. Tumbling loads, dust and outdoor conditions can lead to shaft misalignment, bearing contamination and additional failures. Much like the rotary kilns that feed them, clinker coolers are also subject to extremely high operating temperatures and dust levels. Bearings on the cooler grates have to operate at low speeds, under moderate to high loads.

SKF solutions can keep bearings and other kiln and clinker cooler components up and running between maintenance intervals while reducing maintenance demands and costs.



SKF kiln roller support assembly

SKF offers complete new and remanufactured radial and thrust support roller assemblies for rotary kilns and drums. The bearing, housings and sealing arrangements are optimized for extended service life. The engineering and work is done at our SKF Solution Factories.

- Design and supply of new assemblies
- Evaluation and remanufacturing of rollers
- Upgraded bearings, housings and sealing
- Options with lubrication systems and machine health monitoring



Custom machined seals

Custom machined seals provide a fast, flexible alternative to moulded seal production. With a unique combination of capabilities, we can deliver polymer seals in a very short time, in virtually any dimension and any design, for virtually any industrial application.

The machined seals combine several SKF strengths, including extensive application engineering support, a wide selection of seal profiles and materials, and worldwide availability. Together, these capabilities enable on-demand manufacturing for everything from a single seal to a low-volume series, for fluid power, fluid handling and power transmission applications.

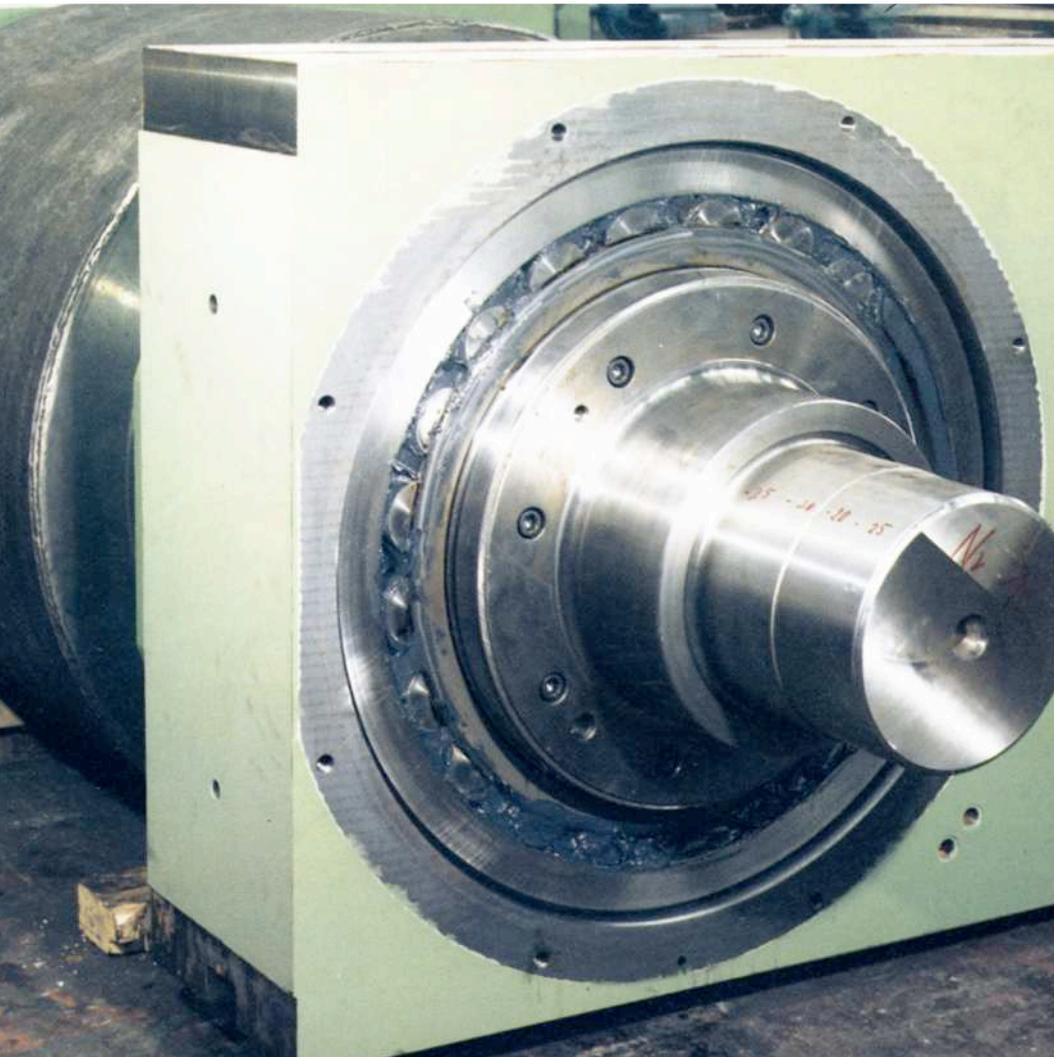
Automatic spray lubrication system for kiln riding rings

This fully automated lubrication system enables a precise and metered spray of lubricant to the contact areas between floating riding rings (tyres) and the kiln shell. A sensor counts the gaps and controls the spray impulses. The number of cycles is adjustable, and a distance of up to 1 meter can be accommodated between spray nozzle and lubrication point.

A precise application of lubricant reduces the overall required amount. The pump station, complete with controller, is fully preassembled such that manual intervention is reduced to a minimum. And, the risk of an accident that is always present with conventional manual applications is minimized.

In addition, the time required for maintenance tasks is drastically reduced.

Roller presses



Learn more about SKF solutions for roller presses

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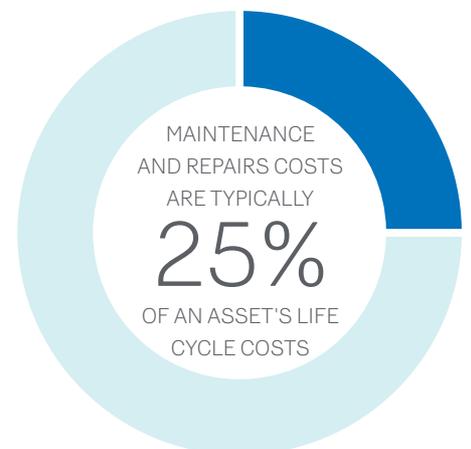
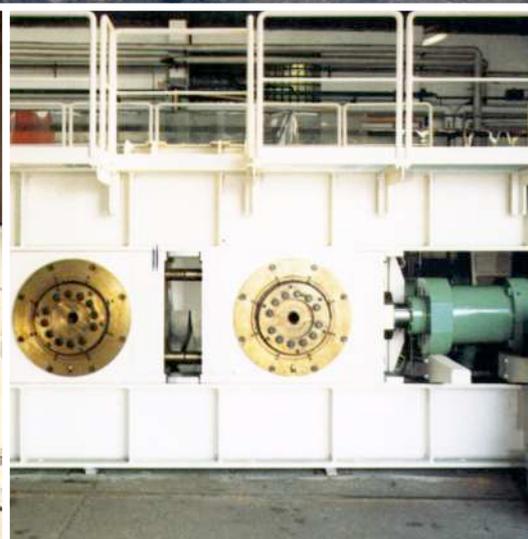
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Increase performance under heavy loads and low speeds

As the two rollers inside a roller press create smaller particulates, they endure low speeds and extremely heavy, uneven loads. Roll misalignment can affect product quality and lead to costly failures.

Bearing selection, housing and sealing design and lubrication practices are key to improving roller press reliability. At SKF, we help you find the bearing arrangements, lubrication and maintenance approaches needed to control unplanned downtime and keep roller presses more productive, for less.



SKF Multilube system

Compact, easy-to-install, modular pumping unit for use with roller presses, conveyors and other grease lubricated machines. SKF Multilube optimizes bearing service life, reduces lubricant consumption and manual maintenance.

- Compatible with all SKF greases
- Suitable for single-line, dual-line and progressive systems
- Temperature range -10 to 70 °C (-14 to 158 °F)
- Integrated controls, reservoir, values, monitoring
- Equipped with heating element



Sealed SKF Explorer spherical roller bearings for HPGRs and roller presses

Large size sealed SKF Explorer spherical roller bearings are optimised for the challenging mining environment. The sealed SKF Explorer spherical roller bearings offer doubled service life compared to open bearings and reduce lubrication consumption by 95%, leading to a reduced environmental impact and costs.



Bearing and housing remanufacturing services

Wear, rust, indentations, microcracks...roller presses can be extremely hard on bearings. Utilizing SKF remanufacturing services during planned maintenance can be an excellent way to:

- Increase bearing service life
- Reduce costs
- Reduce downtime
- Reduce environmental impact

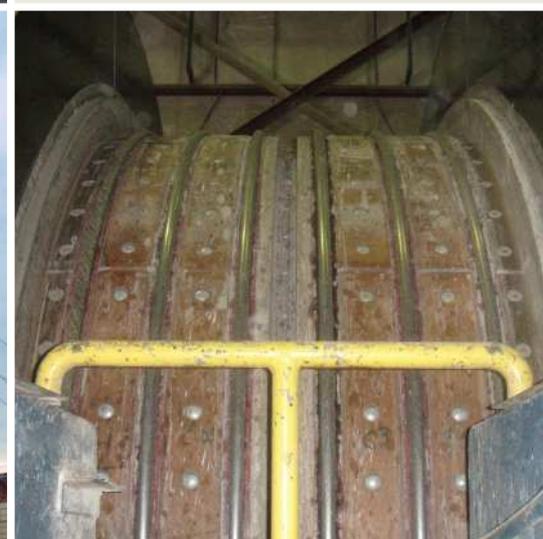
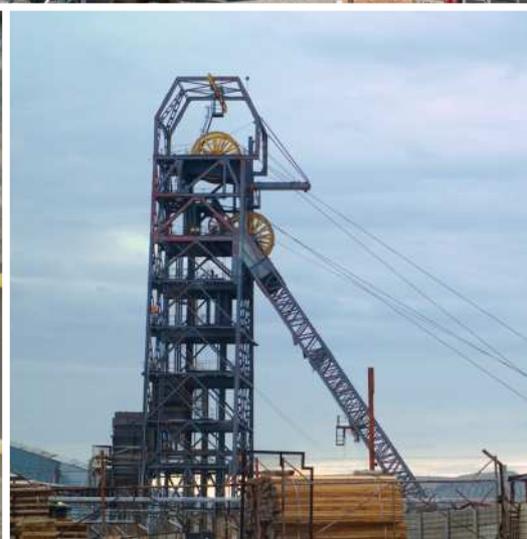
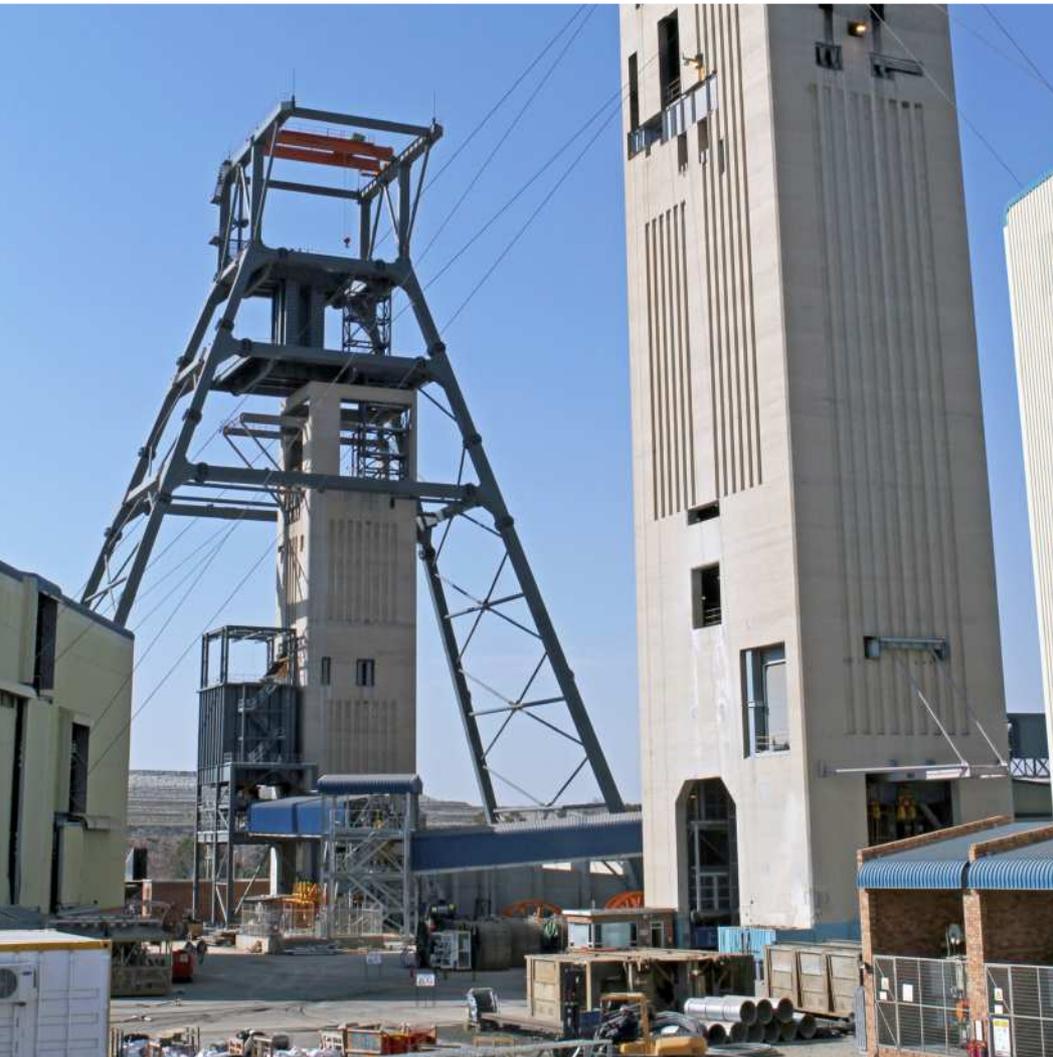
Mine hoists/ winders

10%

APPROXIMATE PERCENTAGE
OF PRODUCTION DOWNTIME
DUE TO UNPLANNED
MAINTENANCE

Learn more about SKF solutions for mine hoists

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Optimize maintenance for all conditions

Mine hoists and, in particular, drum hoist drive components are subject to several tough conditions. Heavy loads, high acceleration forces, abrasive contaminants and more can lead to bearing failures.

Optimizing maintenance is key to extending hoist operation. SKF offers a range of advanced products and services to do exactly that.



SKF Oil Injection Method

The SKF Oil Injection Method uses adapter and withdrawal sleeves with oil supply ducts and distribution grooves to mount and dismount bearings. The method can also be used with the grooving directly in the shaft and can be used to mount and dismount couplings. A thin film of oil is injected under high pressure between the mating surfaces, which virtually eliminates the friction between the surfaces, reducing the power required to remove the bearing or coupling from its seat by up to 90%.



SKF Drive-up Method

The SKF Drive-up Method is a well-proven method, unique to SKF, of accurately achieving the adjustment of spherical roller and CARB toroidal roller bearings mounted on tapered seatings. The correct fit is achieved by controlling the axial drive-up of the bearing from a predetermined position. The method incorporates the use of an SKF HMV ..E hydraulic nut fitted with a dial indicator, and a high accuracy digital pressure gauge, mounted on the selected pump.

Special hydraulic pressure tables have been developed, providing the required pressures, for each bearing type. This enables accurate positioning of the bearing at the starting point from where the axial drive-up is measured.



Predictive Maintenance (PdM)

To prevent unplanned downtime, Predictive Maintenance (PdM) programmes and condition monitoring programmes work to detect machine conditions that lead to failure. In addition to these PdM basics, SKF's programme also includes a determination of which proactive tasks can help extend machine life.

Wire rope lubrication system

The Lincoln wire rope lubrication system eliminates manual lubrication and, in turn, yields improved results. This reliable tool forces lubricant into the wire rope core to reduce friction and heat generation for longer service life.

Shovels, draglines and excavators



Learn more about SKF solutions for shovels, draglines and excavators

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Predictive maintenance provides savings of

30 to 40%

over reactive maintenance



Improve reliability under heavy loads

Mobile machinery such as shovels, draglines and excavators all face harsh outdoor conditions and heavy loads that are hard on components. Our robust range of products and services help shovels, draglines and excavators handle very aggressive environments, driving machine uptime, availability and reliability.



Slewing bearings

Slewing bearing solutions in excavators, bucket wheel excavators and stacker/ reclaimers are vital for the performance and reliability of the machines.

Due to their high carrying capacity and high resistance to overturning moments, slewing bearings from SKF improve machinery reliability, operator comfort and working accuracy and, consequently, increase the productivity of the excavator. As slewing bearings are often used in harsh conditions their service life can be decreased. To counter this, SKF offer remanufacturing services which can substantially prolong bearing service life and reduce cost and lead times. And since it requires less energy than manufacturing a new bearing, it is better for the environment as well.



Automatic lubrication systems

Automatic lubrication systems for mining applications provide the appropriate lubrication quantity at the correct intervals, minimizing friction and wear and optimizing bearing and roller press service life.

- Significant savings in repair and spares costs
- Increased machine reliability
- Up to 50% savings in lubricant costs due to accurate timing and dosing of lubricants
- Fewer shutdowns and production losses
- Reduced environmental impact
- Improved worker safety



SKF Multilog IMx-8

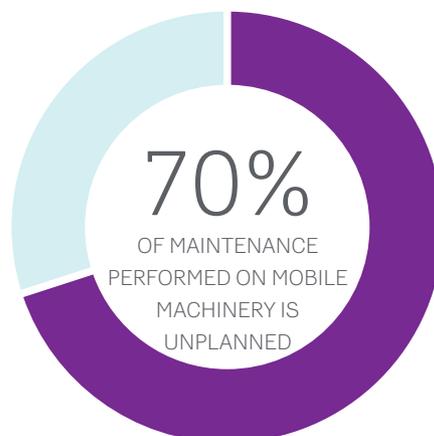
SKF Multilog IMx-8 is a complete system for early fault detection of deteriorating machine condition in shovels, draglines and excavators. It is ideal for mobile machinery. Improve availability and performance of your rotating equipment with advice for correcting existing or impending conditions. Machine intelligence from IMx data will help you avoid unplanned downtime and schedule maintenance proactively, prolonging machine availability and minimizing maintenance and repair costs.

Haul trucks



Learn more about SKF solutions for haul trucks

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Meeting productivity challenges from pit to crusher

Haul trucks are often the primary means of material transfer from shovels or excavators to crushers. Avoiding unexpected or catastrophic failures on these expensive pieces of machinery is crucial.

SKF solutions for mining haul trucks can help improve reliability, availability and profitability.



Tapered roller bearings

SKF offers a wide assortment of tapered roller bearings, including double row tapered roller bearings suitable for many mining applications. SKF double row tapered roller bearings carry heavy loads and have high stiffness. They are suitable for the accommodation of combined (radial and axial) loads and can locate a shaft axially in both directions with a precise axial clearance or preload.



Maintenance facility products: hydraulic seals

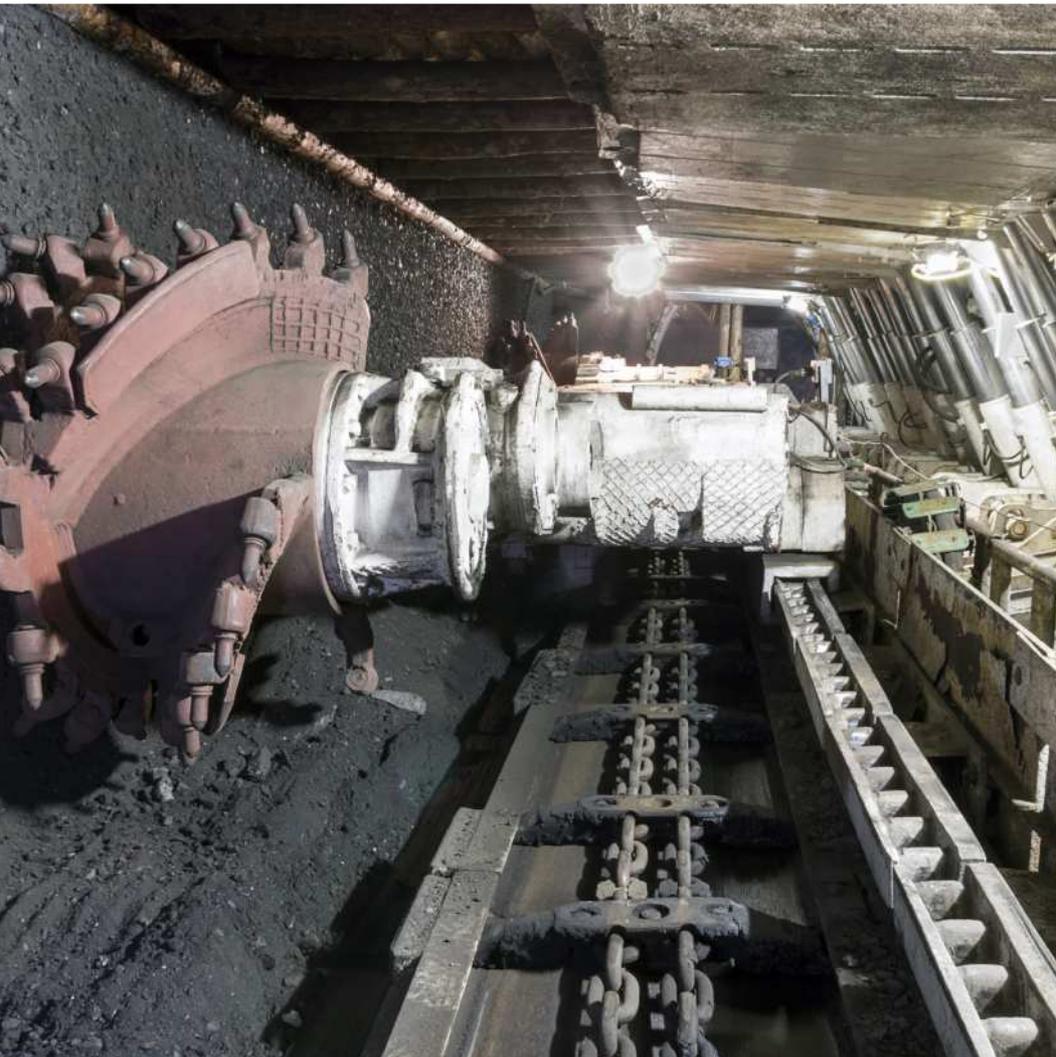
To optimize haul truck reliability and availability, SKF offers seals that can withstand extreme operating conditions and high-power density demands. Our range of hydraulic seals include seals for rods and buffers seals for pistons. Each and every one a product of engineering expertise aiming to solve customer challenges.



Condition monitoring for trucks

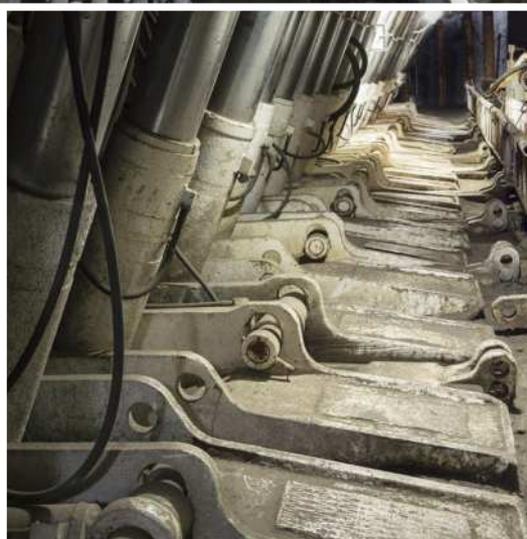
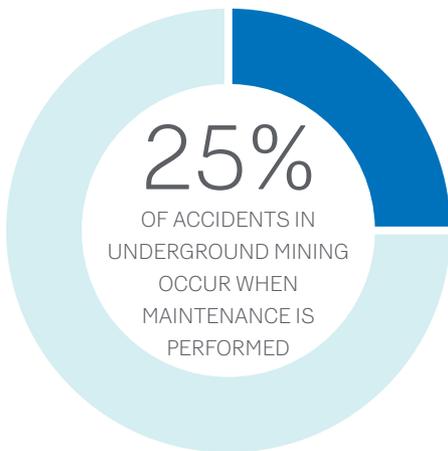
Diagnosing structural and machinery problems accurately can help avoid unplanned downtime for haul trucks and mobile machinery. Using condition monitoring such as IMx-8 is a way to achieve this goal. Install IMx-8 with sensors to collect and relay data from mobile rotating machinery to help avoid malfunctioning and unplanned stops. IMx-8 integrates easily with other IMx units and can connect with the SKF Cloud for storing and sharing data, enabling SKF Remote Diagnostic Services for expert reporting and recommendations.

Longwall systems



Learn more about SKF solutions for longwall systems

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Traversing coal seams with more reliability

When longwall shearers, roof supports or Armoured Face Conveyors (AFC) fail prematurely safety is compromised and downtime costs start limiting the advantages of longwall mining.

A wide range of SKF product and services are available to help keep longwall costs low by preventing unplanned downtime, reducing maintenance and more.



Sealed SKF Explorer spherical roller bearings

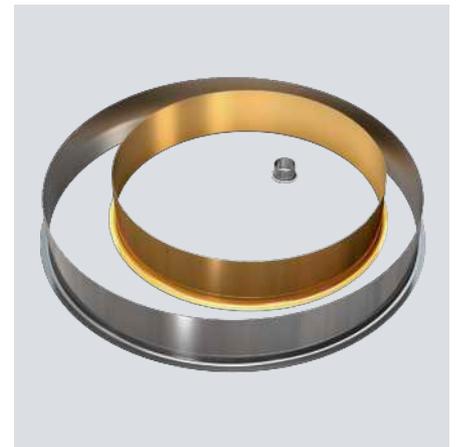
Ideal for use in contaminated environments, these bearings are pre-lubricated with a specially formulated bearing grease and sealed with highly effective contact seals. The seals protect the bearing and lubricant from contaminants that might otherwise cause premature bearing failure.

- Increased service life in contaminated environments
- Minimum lubricant consumption
- Reduced maintenance and operating costs
- Reduced environmental impact
- Pre-lubricated and sealed – enables easy mounting



Hydraulic seals

For fluid power applications like hydraulic cylinders, seals have to withstand extreme operating conditions and high power density demands. SKF can meet these requirements with highly engineered designs and proprietary material formulations that provide outstanding mechanical properties and excellent chemical compatibility with various hydraulic fluids. Our hydraulic seal solutions include piston seals as well as rod and buffer seals.

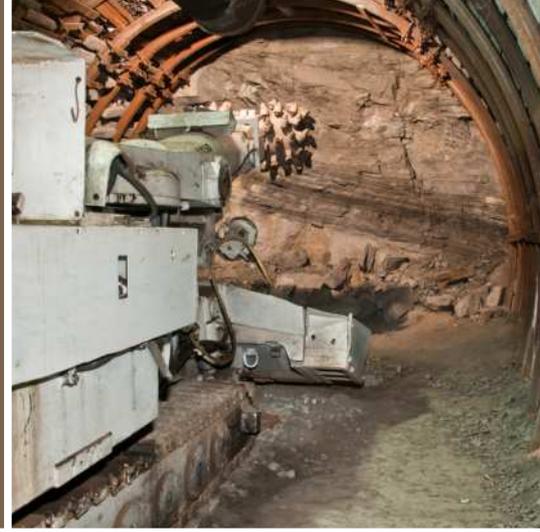


SKF Speedi-Sleeve

SKF Speedi-Sleeve is a very thin-walled shaft repair sleeve that provides a quicker, more cost-effective alternative to dismantling and re-machining a worn shaft.

- Eliminates expense of replacing or reworking shafts
- Requires no shaft disassembly or machining
- Enables same size replacement seal as original
- Provides an excellent, wear-resistant sealing surface
- Installs easily with no power tools or heating
- Can also be used on new machinery

Continuous miners, shuttle cars and feeder breakers



Learn more about SKF solutions for underground mining machinery

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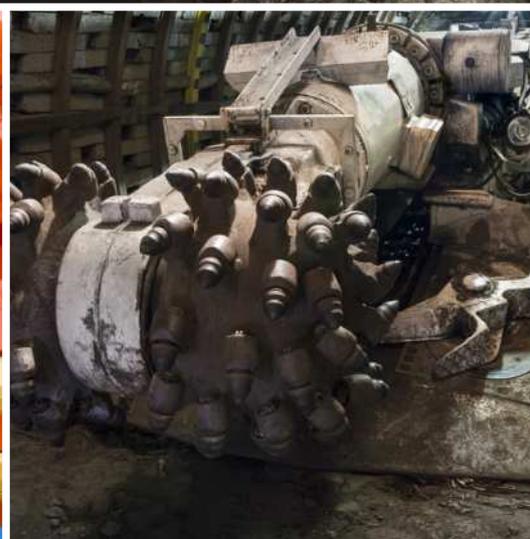
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Workers are 28% more likely to have an accident performing reactive maintenance compared to planned maintenance

Avoid costly machine downtime

Losing a continuous miner for hours or days can send maintenance and unplanned downtime costs soaring. Machinery manufacturers can face warranty costs and dissatisfied customers.

Prevent costly bearing failures with solutions from SKF. We can help keep wheeled or tracked continuous miners moving in spite of coal dust, water spray, high temperatures or heavy shock loads.



Cylindrical roller bearings

SKF cylindrical roller bearings accommodate heavy radial loads, rapid accelerations and high speeds. Our full complement cylindrical roller bearings incorporate a maximum number of rollers and are therefore suitable for very heavy radial loads at moderate speeds. SKF high-capacity cylindrical roller bearings combine the high load carrying capacity of a full complement bearing with the high-speed capability of a bearing with a cage.



SKF Multilog IMx-8

SKF Multilog IMx-8 is a complete system for early fault detection of deteriorating machine condition for underground mining machinery. It is ideal for unsafe and hard-to-reach stationary machinery and mobile machinery. Improve availability and performance of your rotating equipment with advice for correcting existing or impending conditions. Machine intelligence from IMx data will help you avoid unplanned downtime and schedule maintenance proactively, prolonging machine availability and minimizing maintenance and repair costs.



Seals and sealing solutions

Particulate contamination and leakage are serious challenges for bearings in continuous miners. The right seal reduces friction, retains lubricant and keeps contaminants out of the bearing – all of which helps extend bearing service life.

- Withstand high or low operating temperatures
- Effectively protect against contamination
- Resist chemicals as required
- Reduce relubrication and cleaning costs
- Minimize risk of leakage and environmental impact



Overcoming common challenges

Machines in mines, quarries and cement plants are designed to perform tough jobs and have to operate in harsh conditions. Most of these machines are located outside and are subjected to weather conditions that can include large temperature fluctuations, rain, wind and more. SKF can help operators overcome many of the most common challenges they face on a daily basis.



Contamination

Mineral extraction and processing creates a large amount of dust, which can be very abrasive. Bearings, couplings, chains and other machine components often fail due to particle contamination. Mixed with lubricant, small particles will become a grinding medium that wears down the components causing them to deteriorate. Larger particles create indentations on the bearing rolling surfaces causing failure. Finally, water corrodes metallic parts and modifies lubricant properties. These issues can be mitigated by using proper technical solutions and/or best practices including:

- Use of proper sealing solutions such as sealed bearings, shaft seals and SKF Speedi-Sleeve wear sleeves
- Adapting relubrication intervals or using centralized lubrication systems
- Correct maintenance tools will decrease maintenance operations and contamination risks
- Upgraded SKF Explorer spherical roller bearings, CARB toroidal roller bearings and spherical roller thrust bearings all have improved heat treatment - making them much less prone to wear - and provide longer service life in contaminated and poor lubrication conditions



Poor lubrication

In mines, quarries and cement plants, many bearing applications run at low speeds, under high loads and sometimes in high temperatures. They can also be located in remote places where relubrication is not always possible. Under such conditions, proper lubrication is critical for the bearings and for the machinery as a whole.

- Selection of specific and tested lubricants is critical
- Use of an automatic lubrication system will ensure that the machine is running with the right amount of clean lubricant at all times, even if it is in a remote location
- A lubrication system audit or management service can decrease lubricant consumption and fix leakage problems



Compromised safety

Safety is a priority for mining companies. It is a daily challenge to find ways to decrease risks of injuries or disasters. Risks include lubricant leakages which can lead to worker slippages or fires, injuries due to working in dangerous locations (e.g., remote or high places), danger working with heavy parts and much more. Most accidents in mining occur during maintenance on machinery.

- Use of an automatic lubrication system decreases quantity of lubricant, which reduces probability of leakages
- Suitable seals reduce maintenance requirements and leakages
- Reduced need for workers to go to hazardous locations for relubrication if automatic lubrication system is installed
- Using dedicated maintenance tools will limit injury risks by decreasing maintenance operation time and making maintenance easier
- Predictive Maintenance (e.g., thermography, vibration analysis) of machines helps avoid unnecessary maintenance downtime and in some cases can be done remotely, which limits workers' exposure to hazardous machinery and areas
- Using optimized bearings, sleeves, housings and seals can improve machine reliability and ease of assembly and disassembly

High maintenance costs

Heavy machines mean high maintenance costs: expensive spare parts, rental of heavy cranes, long maintenance downtimes. These costs are even higher when the downtime is unplanned. Add poor machine reliability to the mix and maintenance costs can begin to soar even higher.

- Optimal products (e.g., bearings, sleeves, housings, seals, transmission products) mounted with best practices (e.g., mechanical services or training) and proper tools can extend service life and decrease downtime
- Predictive maintenance minimizes unplanned maintenance stops and supports in identifying problem causes
- Proper maintenance tools enable better repairs so spare parts will run optimally
- Bearing and housing remanufacturing decreases spare parts costs and increases their availability
- Asset management services optimize maintenance practices and increase machinery availability



Lost productivity and profitability

Every time production is stopped because of unplanned downtime, every hour represents huge financial losses. In a market that is becoming more and more competitive, profitability and productivity are the keys to success.

- Asset management services increase machine availability while decreasing cost of use
- Lubrication Management reduces lubricant consumption and costs, improves cleanliness and efficiency
- SKF services (e.g., mechanical, Predictive Maintenance) ensure jobs are done using best practices and stops are planned to minimize production loss and optimize machine availability
- Bearing and housing remanufacturing offers faster delivery time than ordering new products

Machine downtime

Keeping machines in an optimal state of operation helps operators reach productivity targets and keeps maintenance costs low. This can be achieved by selecting the proper products, using best mounting and maintenance practices and by monitoring mechanical, hydraulic and electrical parts.

- SKF's improved heat treatment of the SKF Explorer spherical roller bearings, CARB toroidal roller bearings and spherical thrust roller bearings minimizes the impact of poor lubrication and contamination on service life
- SKF Application Engineering can support in selecting optimized technical solutions and designs
- Condition monitoring solutions detect early failures, which allows for dismantling of bearings before heavy damage occurs and supports Root Cause Analysis (RCA) of failures
- Root Cause Analysis can help identify and prevent the problems that lead to failure and downtime
- SKF can work to improve sealing solutions (existing or new) in order to keep machinery as clean as possible and increase service life
- Proper maintenance tools help the bearings perform to their fullest potential



Advanced solutions for optimizing productivity

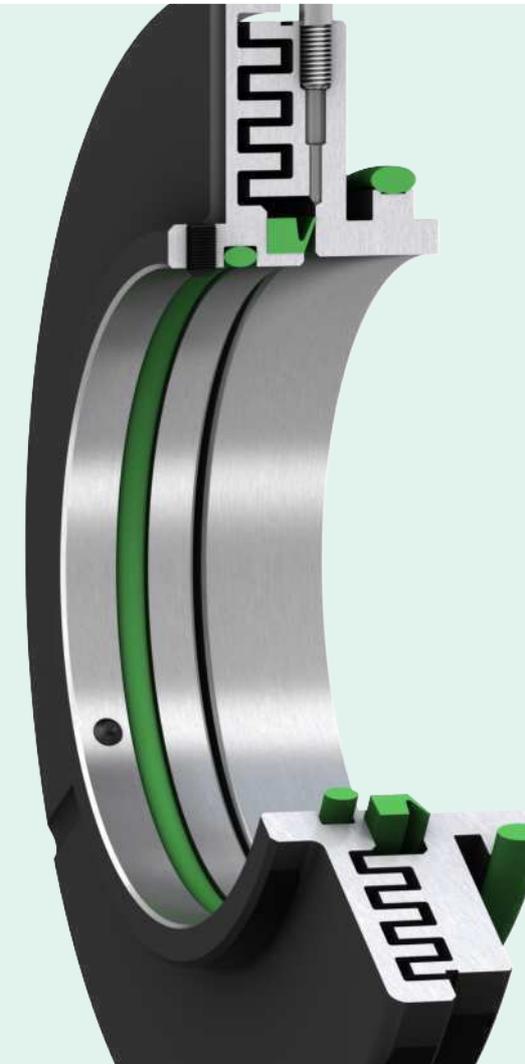
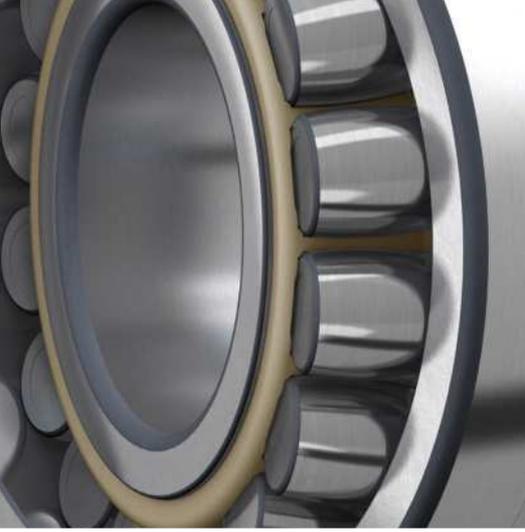


In mining and quarrying, climates range from polar cold to desert heat. Altitudes span 4 300 metres above sea level to 3 800 metres below ground. Punishing weather and abrasive contaminants take their toll on machinery and workers alike. Miners and cement producers face these tough conditions with their mobile and stationary machinery. Conditions like these demand reliable machinery, components and suppliers.

Backed by decades of industry experience, SKF products can help drive reliability, safety and sustainability for a range of mining and quarrying, mineral processing and cement making machinery. From bearings and housings to lubrication systems and beyond, we offer a wide range of solutions to help keep your machinery up and running - with reduced need for maintenance, at a lower cost.

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Bearings, housings and accessories

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- SKF ConCentra roller bearing units
- CARB toroidal roller bearings
- Spherical roller thrust bearings
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- SKF Cooper split spherical roller bearings
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- SKF trunnion bearing housings for grinding mills
- SKF Explorer steel/steel plain bearings
- SKF hydrostatic shoe bearings
- SAF bearing housings
- SAFD bearing housings
- SDAF bearing housings
- SNL bearing housings
- Oil injection sleeves



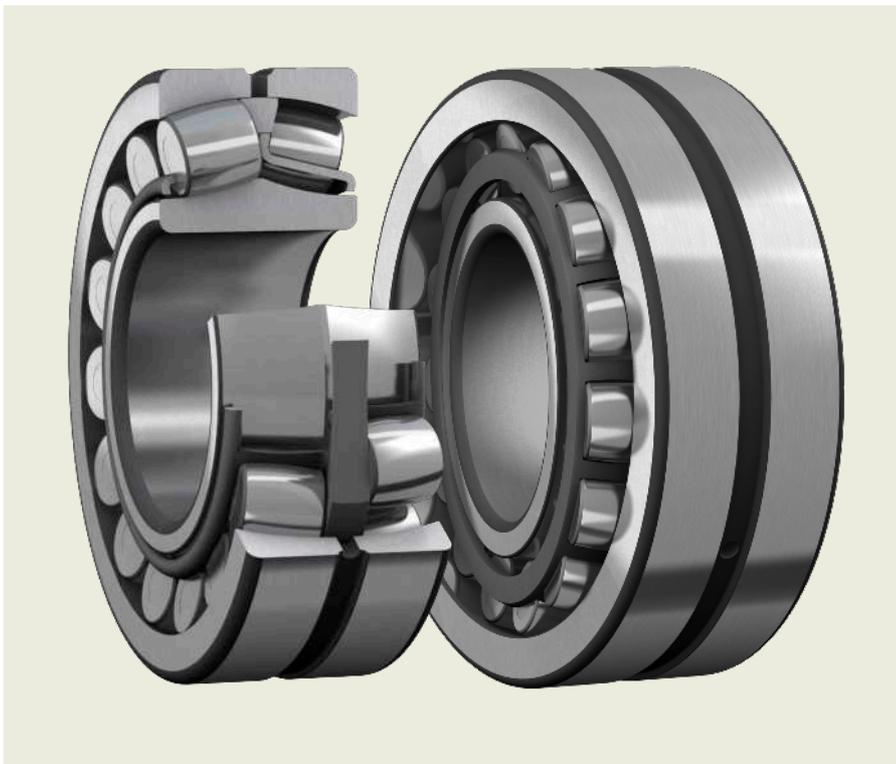
Upgraded SKF Explorer spherical roller bearings

Ideal for a wide range of mining applications, SKF spherical roller bearings can accommodate heavy radial and heavy axial loads in applications prone to misalignment or shaft deflections.

Sealed spherical roller bearings have the same features and basic design as open (unsealed) spherical roller bearings, but are equipped with contact seals fitted in recesses in the outer ring.

All SKF Explorer spherical roller bearings have been upgraded to a new level of performance, featuring a combination of high-quality steel and an improved heat treatment. The result: improved service life performance in contaminated and poor lubrication conditions - an important feature for those bearings used in mining applications.

- Increased service life in contaminated and poor lubrication conditions
- Minimum lubricant consumption
- Reduced maintenance and operating costs
- Space saving
- Reduced environmental impact
- Sealed spherical roller bearings up to 1 250 mm bore



SKF Explorer spherical roller bearings for vibratory applications - VA405 and VA406

SKF Explorer spherical roller bearings for vibrating screens (VA405) are proven to last twice as long as other screen bearings and operate at much cooler temperatures. This means lower maintenance and repair costs, reduced downtime, and improved safety.

SKF Explorer spherical roller bearings for vibrating screens feature:

- 3-piece hardened steel cage system with outer ring centred guide ring
- C4 internal radial clearance
- Reduced bore and outside diameter tolerances

And SKF Explorer spherical bearings with PTFE coated bore (VA406) provide additional benefits for vibrating screen applications. The special PTFE coating virtually eliminates fretting corrosion between the shaft and the bearing bore. This extends maintenance intervals and reduces associated labour costs.

- Longer service life
- Cooler running
- Reduces maintenance
- Extends maintenance intervals
- Reduces downtime
- Improves safety



Cylindrical roller bearings

While they are available in many designs, series and sizes, the majority of SKF cylindrical roller bearings are single row bearings with a cage. High-capacity bearings, double row bearings, multi-row bearings, single, double and multi-row full complement bearings (without a cage) and split bearings complete the SKF standard assortment.

Bearings with a cage can accommodate heavy radial loads, rapid accelerations and high speeds. Full complement bearings incorporate a maximum number of rollers and are therefore suitable for very heavy radial loads at moderate speeds. SKF high-capacity cylindrical roller bearings combine the high load carrying capacity of a full complement bearing with the high-speed capability of a bearing with a cage.



Large size sealed SKF Explorer spherical roller bearings for HPGRs and roller presses

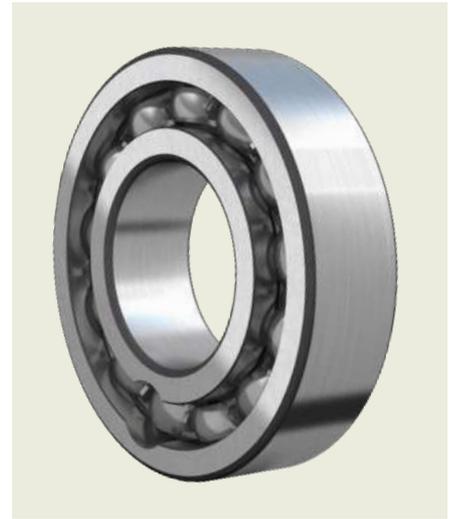
Large size sealed SKF Explorer spherical roller bearings can reduce grease consumption by 95% and offer double service life compared to open bearings. They are optimised for the harsh conditions that roller presses are exposed to in a mining and cement environment. Furthermore, since the seal keeps lubrication in and contamination out, purging is avoided and less grease is needed. Using larger size sealed SKF Explorer spherical roller bearings leads to reduced environmental impact and costs.



Tapered roller bearings

SKF offers a wide assortment of tapered roller bearings, including double row tapered roller bearings suitable for many mining applications.

SKF double row tapered roller bearings can carry heavy loads and have high stiffness. They are suitable for the accommodation of combined (radial and axial) loads and can locate a shaft axially in both directions with a given axial clearance or a given preload.



Deep groove ball bearings

SKF deep groove ball bearings are particularly versatile. They are simple in design, non-separable, suitable for high and very high speeds and are robust in operation, requiring little maintenance. Because deep groove ball bearings are the most widely used bearing type, they are available from SKF in many designs, variants and sizes.



SKF Three-barrier solution

For highly contaminated environments, SKF recommends the SKF Three-barrier solution, as contaminants must pass through three barriers to reach the bearing. The SKF Three-barrier solution extends bearing service life without the use of large quantities of grease to purge contamination. This SKF solution consists of:

- Sealed SKF Explorer spherical roller bearings
- SMS (SKF Mining Specific) housing
- Standard SKF L or S-type seals for SNL housings and Posi-Trac Plus seals for SAF and SAFD housings
- Housing cavity grease (SKF recommends SKF LGGB2 bio-degradable or LGEP2 grease)

When SKF Taconite seals are used with this solution, it becomes the ultimate SKF Three-barrier solution.



SKF Taconite seals

Taconite and other fine abrasive materials are extremely difficult to keep out of bearing arrangements, particularly in mining or bulk port environments. SKF Taconite seals are labyrinth seals that are up to the task.

The SKF Taconite seal consists of two rings (one stationary and one rotating), which form a very narrow labyrinth between the two rings. The rotating labyrinth ring carries a V-ring seal that seals against the stationary labyrinth ring. The V-ring seal resists contaminants from entering the bearing housing and aids the purging of contamination and old grease when the seal is re-greased.



SKF ConCentra roller bearing units

SKF ConCentra roller bearing units are an alternative to the use of split block housings. The unit is factory-assembled, sealed and greased. It is a single unit compared to the multiple number of parts comprising a split block, sleeve, bearing and seal assembly. The units are "shaft-ready". The assembly time and skill required to mount the unit is much less than with a split block assembly. Slide the unit onto the shaft and tighten the screws to securely lock it in place. The factory-assembled unit avoids the exposure to contamination that assembling a bearing into a split block housing risks.

- "Shaft-ready" for mounting on the shaft
- Nearly 360° ConCentra fitting with shaft
- Upgraded SKF Explorer spherical roller bearing inside
- Highly effective sealing
- Available in sizes 35 to 110 mm metric and 1 ⁷/₁₆ inch to 4 ¹⁵/₁₆ inch



CARB toroidal roller bearings

The CARB toroidal roller bearing was developed by SKF specially for the non-locating position in a self-aligning bearing system. These bearings can accommodate misalignment and axial displacement within the bearing, without inducing internal axial loads and with virtually no increase in friction.

This eliminates having to compromise between tight fit and axial freedom, permitting tight fits to be used to eliminate "creep" and fretting corrosion.

The results are lower operating temperatures and vibration levels, and improvements in reliability, bearing and lubricant life, and energy consumption.

SKF CARB toroidal roller bearings (VG114 suffix) feature a surface hardened steel cage. These bearings are recommended for vibrating screens.



Spherical roller thrust bearings

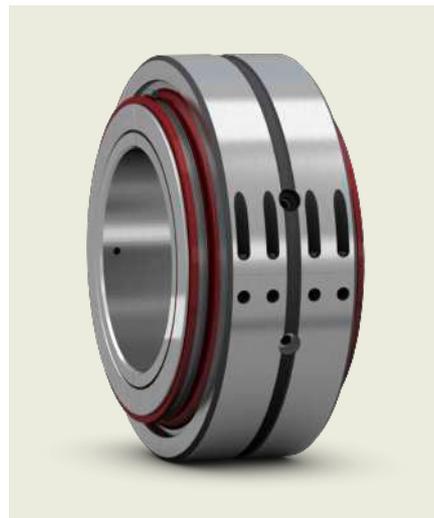
SKF spherical roller thrust bearings have specially designed raceways and accommodate a large number of asymmetrical rollers. The rollers have an optimum conformity with the washer raceways to optimize load distribution along the roller length. Therefore, they can accommodate relatively high speeds, heavy axial loads in one direction and heavy combined axial and radial loads.



SKF Cooper split roller bearings

The SKF range of split roller bearings is ideal for use in machinery such as ball mills, crushers and mine winders where changing a regular one-piece bearing would require the dismounting of the drive coupling and the movement of other parts of the driveline such as the gearbox and motor. The split roller bearing avoids expensive downtime and maintenance costs. Split roller bearings reduce the mean time to repair (MTTR).

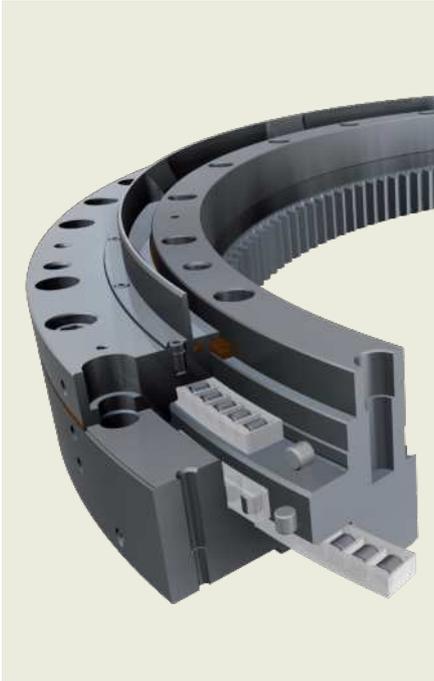
SKF Cooper split cylindrical and tapered roller bearings with housing units – the industry's widest standard range up to 1 500 mm shaft diameter and made to order solutions.



SKF Cooper split spherical roller bearings

SKF Cooper split spherical roller bearings (sealed or open) are designed to be easily replaced in situ and require very few changes to the shaft alignment or driveline – reducing mean time to repair (MTTR) by two-thirds.

- Allows safer and time-saving in situ bearing replacements in the trapped position on conveyor pulleys, stacker reclaimers and other machinery
- Sealed variant available for increased protection against contamination and reduced maintenance
- Longer service life (MTBF) compared to other split bearings, thanks to the wire cut inner and outer ring manufacturing technique and sealed versions
- Sealed variant reduces grease consumption – and cuts environmental impact
- Compatible with SKF metric and inch split block housings
- Reduced risk of shaft fretting with better axial clamping
- Interchangeable with competitors' split spherical roller bearings and split block housings



Slewing bearings

Slewing bearing solutions in excavators, bucket wheel excavators and stacker/reclaimers are vital for the performance and reliability of the machines.

Due to their high carrying capacity and high resistance to overturning moments, slewing bearings from SKF improve machinery reliability, operator comfort and working accuracy and, consequently, increase the productivity of the excavator.



SKF kiln roller support assembly

SKF offers complete new and remanufactured radial and thrust support roller assemblies for rotary kilns and drums. The bearing, housings and sealing arrangements are optimized for extended service life. The engineering and work is done at our SKF Solution Factories.

- Design and supply of new assemblies
- Evaluation and remanufacturing of rollers
- Upgraded bearings, housings and sealing
- Options with lubrication systems and machine health monitoring



Oil injection sleeves

These adapter sleeves with oil supply ducts and distribution grooves enable use of the SKF Oil Injection Method to mount and dismount bearings. This method helps prevent shaft damage and is quick, safe and easy. A thin film of oil is injected under high pressure between the mating surfaces, which virtually eliminates the friction between the surfaces, reducing the power required to mount or remove the bearing or coupling from its seat by up to 90%.

SKF offers a complete range of tools to suit most bearings, coupling and gears, including hand and air-operated pumps and oil injectors, with pressures up to 400 MPa.



SKF Explorer steel/steel plain bearings

SKF Explorer steel/steel plain bearings are initially lubricated and sealed to eliminate the need for relubrication in applications with low to moderate levels of contamination. This generates significant savings by reducing maintenance costs and grease consumption. These virtually maintenance-free bearings also improve reliability by eliminating failures due to missed lubrication intervals and improper lubrication practices. All of this adds up to reduced Total Cost of Ownership (TCO).

- Increases uptime and productivity
- Minimizes risk of premature failures due to poor lubrication conditions
- Reduces total cost of ownership
- Improved reliability
- Eliminates grease purging into the environment



SKF hydrostatic shoe bearings

Capable of handling the world's heaviest loads in the harshest conditions, SKF hydrostatic shoe bearings operate with a supply of pressurized oil to support the massive loads. Designed to work with grinding mills, kilns and cement mills, these unique bearings offer:

- High carrying capacity
- Unlimited support diameters
- Virtually no friction or wear
- Independence of speed or rotational direction
- High running accuracy and stiffness



Bearing housings

Built to endure the punishing operating environments in mines and mills, bearing housings from SKF can help cut maintenance costs and drive reliability for a range of machinery, such as horizontal grinding mills. SKF housings are manufactured to world-class quality standards.

SNL housings (metric)

SNL plummer block housings are the most popular SKF bearing housings on the market, developed to be the first choice for design, quality and economy.

SNL plummer block housings enable the incorporated bearings to achieve maximum service life with less need for maintenance. Different housing variants and seal designs are available, making the use of tailored housings virtually unnecessary and enabling cost-effective bearing arrangements to be made.

SAF housings (inch)

SAF pillow (plummer) block housings are the SKF standard bearing housings for inch shafts. Because of their versatility it is seldom necessary to resort to tailored housings for specific applications. They are typically supplied as kits together with a bearing and an adapter sleeve, but all parts are also available separately.

SAFD housings (inch)

SKF SAFD housings combine the same robust design and machining accuracy as the SKF SAF grey cast-iron bearing housings with the rigid strength, high impact strength and fatigue resistance of spheroidal graphite cast (ductile) iron material, making them ideal for high loads or low-temperature environments. SAFD housings are made from ASTM A536 Grade 65-45-12 spheroidal graphite cast iron (ductile iron) as standard.

SDAF housings (inch)

SKF SDAF pillow (plummer) block bearing housings were specially designed for applications with inch size shafts where heavy thrust loads and/or shock loads require a housing of exceptionally sturdy construction. The split housings can be used for spherical roller bearings as well as CARB bearings.

Trunnion bearing housings for grinding mills

Designed to improve reliability in grinding mills, the new generation of SKF trunnion bearing housings are split housings consisting of base, cap and split cover with seals. The base ends are machined to make alignment easier and to provide flat surfaces for stops. The seals are combined multi-stage labyrinth and V-ring seals to retain lubricant and exclude contamination, even with high-pressure washdowns. The seals are split for easy inspection and cleaning.

- Extend trunnion bearing service life
- Reduce maintenance costs
- Reduce grease consumption
- Reduce environmental impact

SKF sealing solutions

- SKF Taconite seals
- Radial shaft seals
- Custom machined seals
- TXL seals
- Large diameter seals
- SKF Speedi-Sleeve
- HDSF2 large diameter seals with PTFE excluder lip
- V-ring seals
- Hydraulic seals

SKF seals and sealing solutions

Leakage and contamination are serious challenges for machinery – particularly bearings and gears – in mining and cement applications. The right seal reduces friction, retains lubricant and keeps contaminants out of the machinery - all of which helps extend the service life. SKF seals and sealing solutions:

- Withstand high or low operating temperatures
- Retain the lubricant
- Effectively protect against contamination
- Resist chemicals
- Reduce relubrication and cleaning costs
- Minimize risk of leakage and environmental impact



Taconite seal

The SKF Taconite Seal consists of two rings (one stationary and one rotating) which form a very narrow labyrinth between the two rings. The rotating labyrinth ring carries a V-ring seal that seals against the stationary labyrinth ring. The V-ring seal blocks contaminants from entering the bearing housing and aids the purging of contamination and old grease. The taconite seal is optimized for extremely contaminated and wet applications

Radial shaft seals

SKF offers an array of proven shaft sealing solutions that protect bearings, keep lubricants in and improve system reliability. Our radial shaft sealing solutions include:

- Seals for general industrial applications
- Seals for heavy industrial applications
- Cassette seals

SKF seals for heavy industrial applications are often used in the mining industry where keeping lubricants in and contaminants out of systems is a serious challenge. SKF can meet this challenge with heavy-duty metal-cased seals, rubber outside diameter seals with metal inserts or rubber reinforcement, and polyurethane seals. Reinforced all-rubber HSS seals feature a harder grade material for the part of the seal body that contacts the housing bore, improving stability during operation and installation.



Custom machined seals

Custom machined seals provide a fast, flexible alternative to moulded seal production. With a unique combination of capabilities, we can deliver polymer seals in a very short time, in virtually any dimension and any design, for virtually any industrial application.

The machined seals combine several SKF strengths, including extensive application engineering support, a wide selection of seal profiles and materials, and worldwide availability. Together, these capabilities enable on-demand manufacturing for everything from a single seal to a low-volume series, for fluid power, fluid handling and power transmission applications.



TXL seals

The TXL contact seal design is ideal for applications where better sealing is needed than provided by a labyrinth seal and where space does not allow a taconite seal. Most suited to speeds up to 11 m/s, these seals can also be used with the sealed SKF Cooper split spherical roller bearing. TXL seals are available with a split that makes replacement quick and easy.

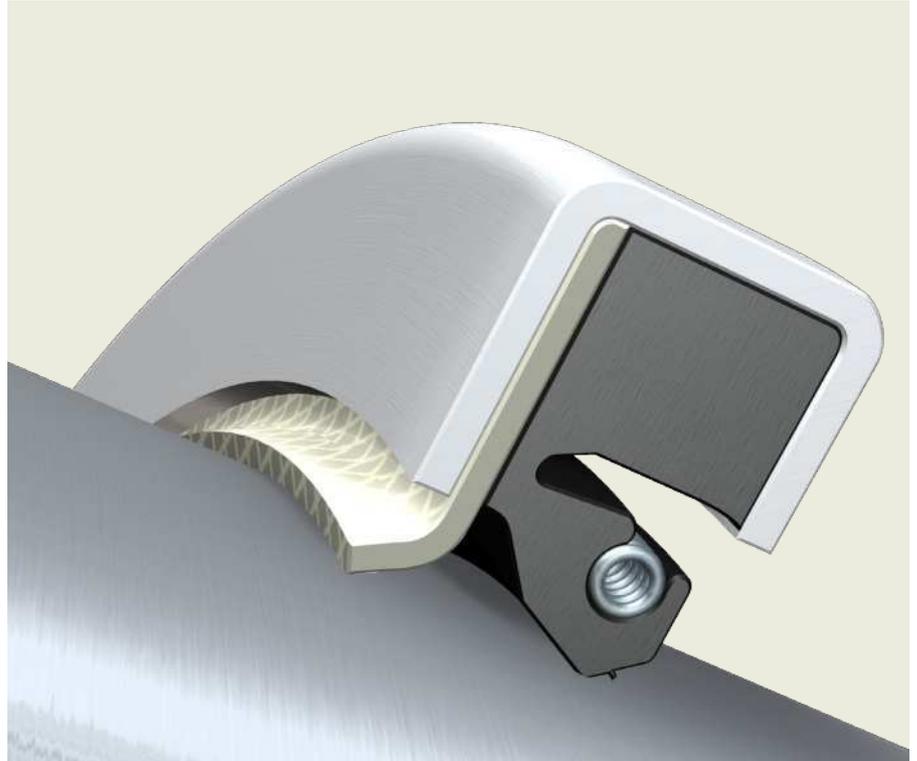
- Optimized protection
- Compact dimensions
- Split for easy replacement
- Standard size range of the shelf
- Made for SNL housing range
- Most suited to speeds up to 11 m/s
- Size range: 25mm - 140mm shaft diameter
- Material: Polyurethan (ECOPUR)
- Beyond the standard range we can offer the machined seal version: TXL-P seals



Large diameter seals

Large diameter seals from SKF are molded seals for large mining and cement machinery and are easily customized for specific requirements. These seals are optionally available with a PTFE excluder/wiper lip to protect the primary seal element from exposure to abrasive contamination (variant HDSF2). Large seals are optionally available in an all, non-metallic construction to allow in-situ installation in machinery, avoiding the need for a complete rebuild. Large diameter wear sleeves are also available.

- Easily customized to suit specific requirements
- Available up to 1 500 mm (59 inch) diameter
- Optional seal materials
- Optional PTFE excluder/wiper to protect the primary seal
- Optional split seal construction for in-situ installation



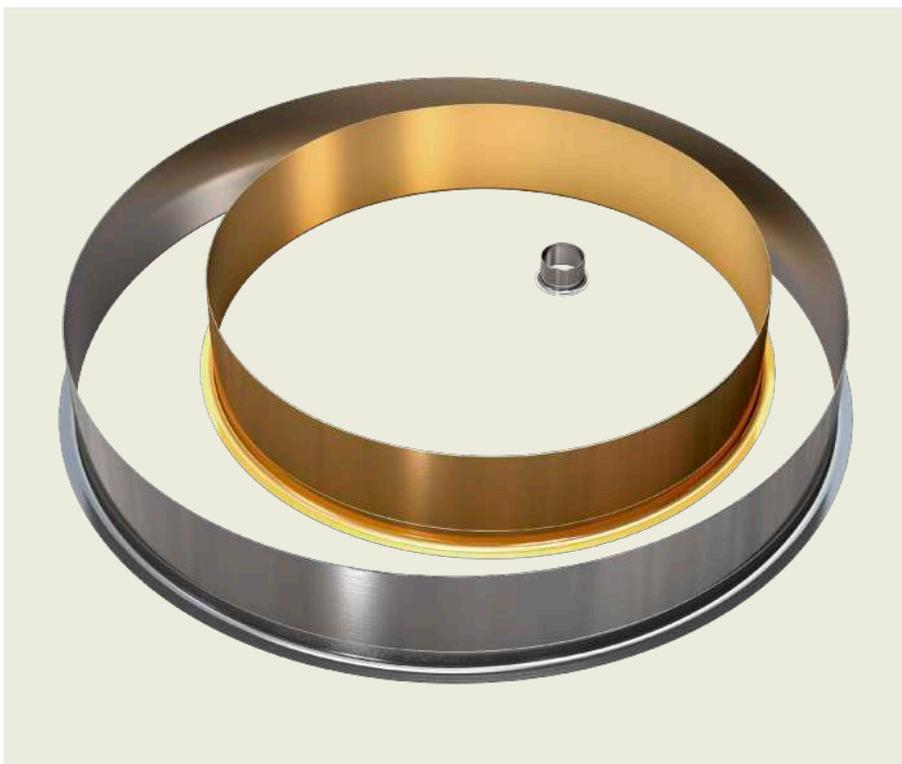
HDSF2 large diameter seals with PTFE excluder lip

Along with its primary elastomer sealing lip and metal case, the SKF HDSF2 large diameter seal features an auxiliary PTFE excluder lip for extra protection against dust and other contaminants. This additional defence helps extend machinery and lubricant service life and replacement intervals.

Heavy industrial seal

Seals have a crucial impact on system performance life and reliability of what is often considered a simple component can make all the difference to your product and operations. For applications like horizontal grinding mills SKF offers large diameter machined seals.

- G-ECOPUR
- Five times more abrasion resistant and three times more tear strength compared to rubber compounds
- Heavy contamination dust particles, best wear resistance of SKF seals offering
- Axial clamping
- One seal to medium quantities
- Flexible in size without tooling costs



SKF Speedi-Sleeve

SKF Speedi-Sleeve is a very thin-walled shaft repair sleeve that provides a quicker, more cost-effective alternative to dismantling and re-machining a worn shaft. An SKF Speedi-Sleeve mounts quickly and easily without power tools or heating.

Often capable of delivering a better quality counterface for the seal lip than the original shaft, SKF Speedi-Sleeve:

- Eliminates expense of replacing or reworking shafts
- Requires no shaft disassembly or machining
- Enables same size replacement seal as original
- Provides an excellent, wear-resistant sealing surface
- Installs easily with no power tools or heating



V-ring seals

V-ring seals from SKF offer an easy-to-install solution for rotating shaft applications, including use as a secondary seal in highly contaminated environments. They can be stretched and, depending on the size, pushed over other components like flanges, pulleys or even housings.



HDS1 heavy industrial seals

Along with its primary elastomer sealing lip and metal case, the SKF HDS1 heavy industrial seal is a self-retaining seal for open housings.

- Retention of oil
- Exclusion of contaminants
- Reliable spring retention
- Sturdy design for heavy duty handling



Hydraulic seals

For fluid power applications like hydraulic cylinders, seals must withstand extreme operating conditions and high power density demands. SKF can meet these requirements with highly engineered designs and proprietary material formulations that provide outstanding mechanical properties and excellent chemical compatibility with various hydraulic fluids.

Our hydraulic seal solutions include:

Piston seals: Optimized for single and double-acting cylinders, piston seals prevent flow past the piston while allowing an oil film to minimize friction and wear

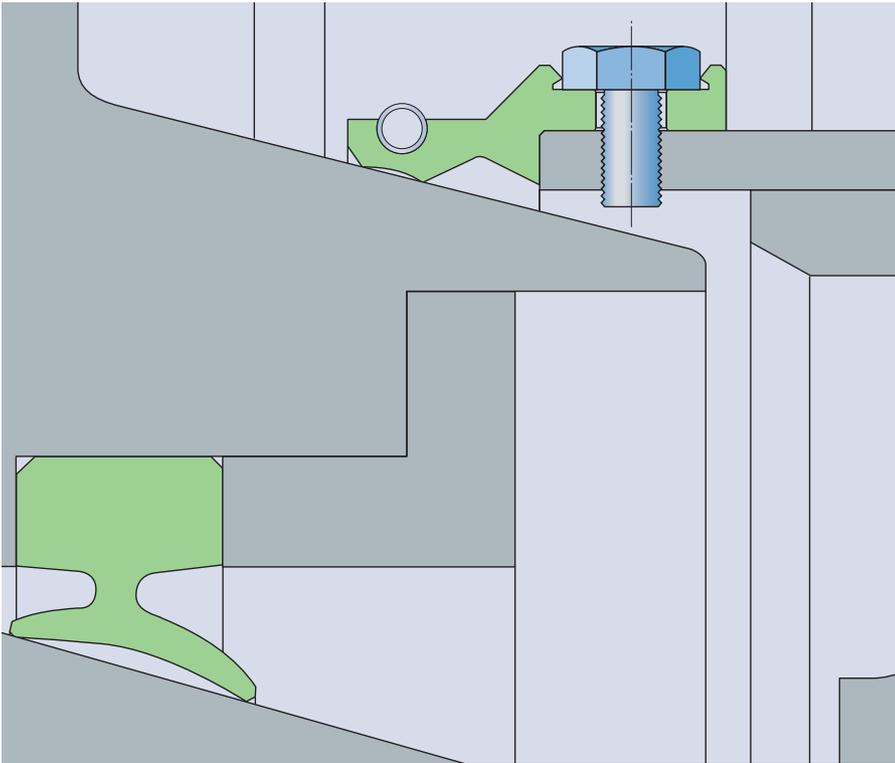
Rod and buffer seals: SKF has a wide range of rod and buffer seals that have a long life and boost reliability



Piston seals



Rod and buffer seals



TR4 wheel hub seals

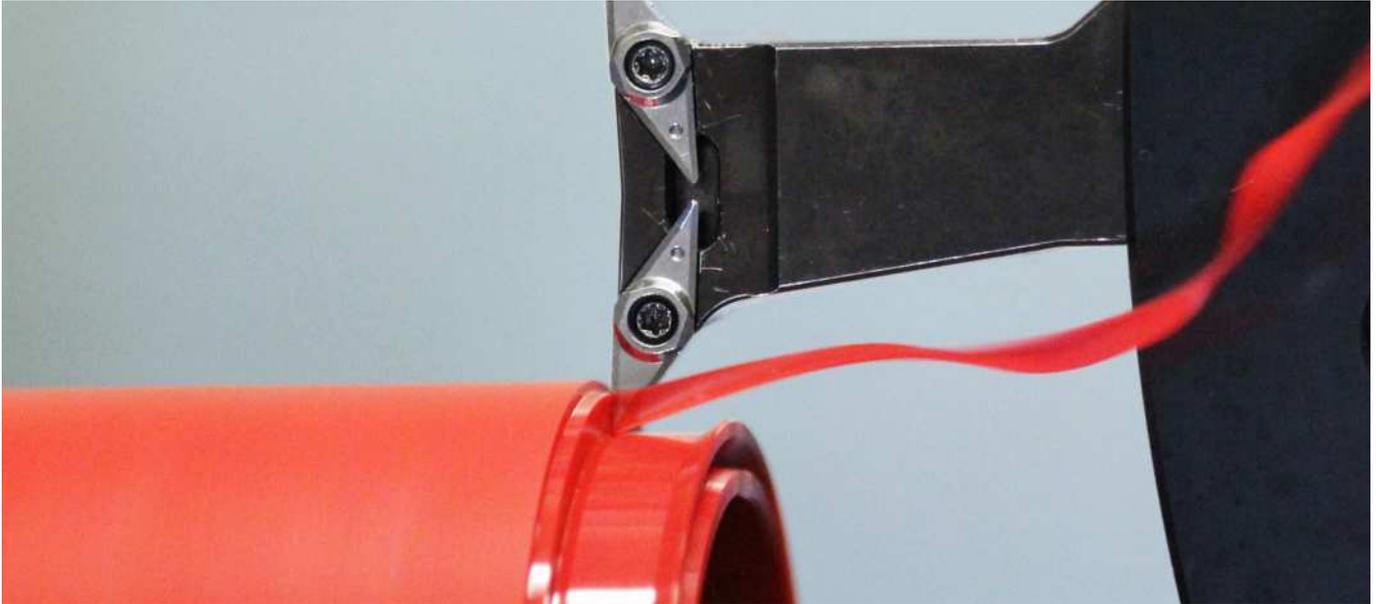
TR4 wheel hub seals from SKF feature a primary elastomer sealing lip with metal insert. The self-retaining seal for open housings offers following benefits:

- Especially designed for high runout
- Exclusion of water and solid contaminants
- Reliable lubricant retention

Customized machined sealing solution for mining bucket wheel excavators

For mining bucket wheel excavators SKF can offer a proven solution that has been customized with an application specific design:

- Material: H-ECOPUR
- Application specific design
- Wear resistant and reliable solution
- Easy installation



Special wiper seal, machined seal

SKF is the global market and technology leader in high quality custom engineered sealing solutions offering a comprehensive range of machined seals for heavy industries.

The innovative production system - SKF SEAL JET - reduces manufacturing and dispatch time to a minimum. Virtually any kind of seal for any conceivable application, in any dimension and design, can be produced. This flexible concept allows to solve the special needs for challenging conditions like aggressive fluids, heavy contamination or special housings.

For applications like continuous miners, shuttle cars and feeder breakers SKF can offer a machined special wiper seal that is made of H-ECOPUR/SKF Ecopeak and for the exclusion of heavy and sticky contamination:

- Wiper with scraping function
- Increased abrasion and wear resistance
- Resistance to high pressure peaks
- Easy installation procedure
- Superior compatibility with water based hydraulic fluids

SKF lubrication solutions

- SKF LGEP 2 grease
- SKF LGEV 2 grease
- SKF SYSTEM 24
- SKF Multilube system
- SKF grease spraying system for large open gears
- Automatic lubrication systems
- Circulating oil systems
- Oil injectors and hydraulic pumps
- FlowMaster pumps
- Wire rope lubrication system
- RecondOil box
- Oil conditioning unit
- Automatic spray lubrication system for kiln riding rings
- TLMR system
- Lubrication management (see next chapter on page 76)

SKF greases

Poor lubrication accounts for over 36% of premature bearing failures. SKF greases offer major advantages. They are designed and tested to perform under real conditions. Product data include specific test results enabling a better selection and strict quality control of every production batch helps ensure consistent performance.

We offer a wide range of grease for the mining industry, including:

- Greases for high load applications
- Greases for high temperature applications
- Greases for low temperature applications
- Greases for special requirements
- Oils



SKF LGEP 2 grease

With high levels of contamination and high operating temperatures, optimal lubrication is essential for crushers, vibrating screens, mills and conveyors. For these applications, SKF LGEP 2 high load, extreme pressure grease is recommended. This mineral oil based, lithium soap thickened grease with extreme pressure additives provides good lubrication in general applications subjected to harsh conditions and vibrations.

- Excellent mechanical stability
- Extremely good corrosion inhibiting properties
- Excellent EP performance

Typical applications:

- Conveyors
- Crushers
- Screens
- Bucket elevators
- Mill pinions
- Fans
- Separators



SKF Multilube system

Compact, easy-to-install, modular pumping unit for use with roller presses, conveyors and other grease lubricated machines. SKF Multilube optimizes bearing service life, reduces lubricant consumption and manual maintenance.

- Compatible with all SKF greases
- Suitable with single-line, dual-line and progressive systems
- Integrated controls, reservoir, valves, monitoring
- Equipped with heating element



SKF SYSTEM 24 automatic lubricators

The units are supplied ready-to-use straight from the box and filled with a wide range of high performance SKF lubricants. Tool-free activation and time-setting allow easy and accurate adjustment of lubrication flow.

With SKF SYSTEM 24 the correct amount of grease can be applied 24 hours per day, seven days per week, 52 weeks per year, if required. All you have to do is set the automatic timer.

- Significant time and labour savings compared to manual lubrication
- Easily controls the amount of grease used in each application

SKF LGEV 2 grease

SKF LGEV 2 is a mineral oil based grease, using a lithium-calcium soap. Its high content of molybdenum disulphide and graphite, in conjunction with an extremely high viscosity oil, provide outstanding protection under the harshest conditions involving high loads, slow rotations and severe vibrations.

- Extremely suitable for lubricating large spherical roller bearings subject to high loads and slow rotations, a situation where microslip is likely to occur
- Extremely mechanically stable providing good water resistance and corrosion protection

Typical applications:

- Trunnion bearings on rotating drums
- Support and thrust rollers on rotary kilns and dryers
- Bucket wheel excavators
- Slewing ring bearings
- High pressure roller mills
- Crushers



SKF grease spraying system for large open gears

This lubrication system sprays lubricant automatically onto the gear teeth, offering many advantages, including:

- The spraying covers the entire surface of the gear teeth obtaining a homogeneous film thickness
- The SKF grease spraying system is automated, providing the possibility for continuous or cyclic lubrication.
- Users can adjust the lubrication cycle according to their requirements for increased production rates or temperature variations for example
- The system is equipped with monitoring and safety devices for optimum operation.



Automatic lubricant dispenser TLMR series

Suitable for operating conditions with various levels of temperature and vibration, the robust SKF Automatic Lubricant Dispenser is a single point automatic lubricator designed to supply grease to a single lubrication point. With a relatively high pressure of 30 bars, this lubricator can operate at long distances providing optimum results with difficult-to-reach and unsafe lubrication locations.



Automatic lubrication systems

SKF and Lincoln lubrication systems for mining applications provide the appropriate lubrication quantity at the correct intervals, minimizing friction and wear and optimizing bearing and roller press service life.

- Significant savings in repair and spare costs
- Increased machine reliability
- Up to 50% savings in lubricant costs due to accurate timing and dosing of lubricants
- Fewer shutdowns and production losses
- Reduced environmental impact
- Improved worker safety



Circulating oil systems

Circulating oil systems from SKF are designed to provide lubricant and cooling to bearings and machinery components in nearly every size of machine, including ball mills, kilns and clinker coolers. They also efficiently remove dirt, water and air.

An oil supply system delivers the lubricant to the metering devices with individual settings. The feed rates can be controlled visually or electronically. Monitoring systems are available for predictive maintenance.

- Patented air and water-removal design prolongs oil life
- Precise flow meter
- 1/3 the volume compared to conventional systems – provides cost savings



FlowMaster pumps

These pumps are versatile – as a centralized lubrication pump for progressive, single-line or dual-line systems; for lubrication of breaker hammers; or for manually activated lubrication of points that are not connected to an automated system.

The high performance of the pump enables lubricant to be pumped at low temperatures. They can work with temperatures to $-40\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$). The lubricant output is easily adjustable by varying the speed of the drive.

Lincoln FlowMaster pumps are rotary-activated piston pumps. They are available in hydraulic or 24 V DC versions. Custom-tailored pump stations are designed and manufactured to suit your needs.



Wire rope lubrication system

The Lincoln wire rope lubrication system eliminates manual lubrication and, in turn, yields improved results. This reliable tool forces lubricant into the wire rope core to reduce friction and heat generation for longer service life.

The wire rope lubrication system applies the right amount of lubricant, distributes it evenly and eliminates over-lubrication waste.

- Increases wire rope life
- Reduces lubrication time by up to 90%
- Reduces lubricant waste and environmental contamination



RecondOil box

With the RecondOil Box, oil change intervals can be significantly extended. Our Double Separation Technology (DST) removes contamination particles down to nano-size from the oil. And by keeping the oil ultra-clean continuously, the RecondOil Box allows you to use the same oil over and over again – without losing any of its original qualities.



Automatic spray lubrication system for kiln riding rings

This fully automated lubrication system enables a precise and metered spray of lubricant to the contact areas between floating riding rings (tyres) and kiln shell. A sensor counts the gaps and controls the spray impulses. The number of cycles is adjustable, and a distance of up to 1 meter can be accommodated between spray nozzle and lubrication point.

A precise application of lubricant reduces the overall required amount. The pump station, complete with controller, is fully preassembled such that manual intervention is reduced to a minimum. And, the risk of an accident that is always present with conventional manual applications is minimized. In addition, the time required for maintenance tasks is drastically reduced.



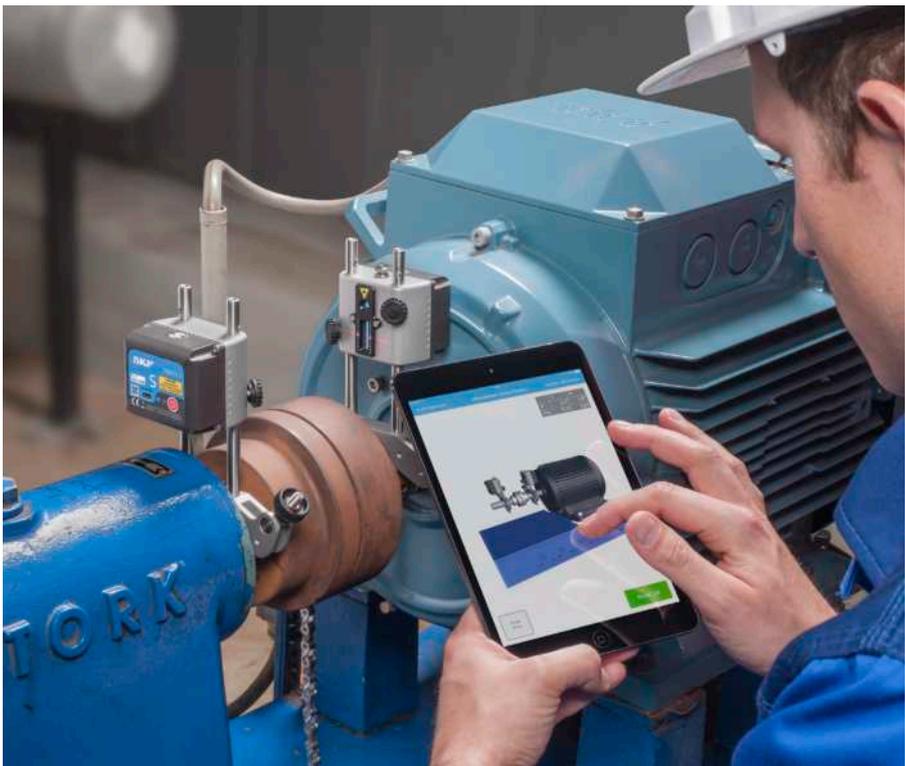
Oil conditioning unit

SKF Oil Conditioning Unit (OCU) is a compact low-pressure filtration and cooling unit designed for use in “kidney loop” circuits, when the existing oil filtration and cooling is not satisfactory or does not exist at all.

- Standard filter cartridge elements, $\beta_{20} = 1000$
 - Other filtration ratings available on special request
 - Low noise, high efficiency motor
 - Clogging indicator for dirty filter
 - Standard connectors to oil reservoirs
 - Optional cooler, water or air
 - Optional moisture monitoring
 - Optional cooling water valve for optimal lubrication conditions
- Oil sampling port
 - IP 65
 - Can be equipped with RecondOil technology from the factory

Maintenance products

- Alignment tools
- Maintenance facility products
- Hydraulic assist systems
- Hydraulic bolt tensioners
- SKF Power Transmission Products



Alignment tools

If a machine driveline is not properly aligned, the misalignment can cause the couplings and bearings to suffer additional load, friction and vibration. These can accelerate fatigue and reduce the bearing's, as well as other machine components, service life. Furthermore, increased vibration and friction can significantly increase energy consumption and the risk of premature failures.

SKF has developed, after extensive consultation with users, a range of affordable shaft and belt alignment tools that allow customers to increase their machine reliability through easy-to-use and accurate alignment.



TKSA 51



TKSA 71



Maintenance products

From grease guns to used fluid systems, SKF offers a comprehensive line of premium Lincoln lubrication tools and machinery, including:

- Hand-held lubrication machinery (grease guns)
- Pumps and accessories
- Reels and meters
- Used fluid systems

Mounting and dismounting bearings using hydraulic techniques

SKF invented hydraulic techniques for mounting bearings in the 1940s. Since then, the SKF hydraulic methods have been further developed to become the preferred mounting methods for larger bearings as well as other components.

These techniques have helped to simplify bearing arrangements and facilitate correct and easy mounting. Using SKF hydraulic techniques for bearing dismounting reduces the risk of damaging the bearing or its seating. Additionally, greater withdrawal forces can be applied with less effort and maximum control, allowing quick and safe dismounting.

- Quick, efficient bearing mounting and dismounting
- Improves safety with the elimination of unsafe tools
- Reduces repair costs with less downtime and labour
- Eliminates rework with accurate first-time bearing mounting

SKF has a full range of hydraulic assist system components, including:

- Hydraulic nuts
- Pumps and hoses
- Fittings
- Couplings
- Oil injection adapter sleeves for use with bearings



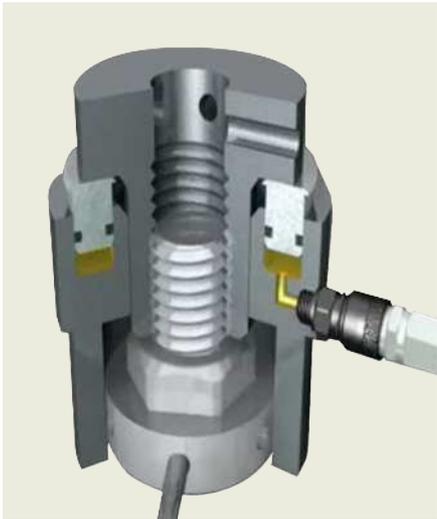
SKF Oil Injection Method

The SKF Oil Injection Method uses adapter and withdrawal sleeves with oil supply ducts and distribution grooves to mount and dismount bearings. The method can also be used with the grooving directly in the shaft and can be used to mount and dismount couplings. A thin film of oil is injected under high pressure between the mating surfaces, which virtually eliminates the friction between the surfaces, reducing the power required to remove the bearing or coupling from its seat by up to 90%.

SKF Drive-up Method

The SKF Drive-up Method is a well-proven method, unique to SKF, of accurately achieving the adjustment of spherical roller and CARB toroidal roller bearings mounted on tapered seatings. The correct fit is achieved by controlling the axial drive-up of the bearing from a predetermined position. The method incorporates the use of an SKF HMV ..E hydraulic nut fitted with a dial indicator, and a high accuracy digital pressure gauge, mounted on the selected pump.

Special hydraulic pressure tables have been developed, providing the required pressures, for each bearing type. This enables accurate positioning of the bearing at the starting point from where the axial drive-up is measured



Hydraulic bolt tensioners

Ideal for high tension bolt assemblies in grinding mills, cement mills and tunnel boring machines, SKF offers Hydrocam tensioners. This comprehensive range manual and automatic hydraulic bolt tensioners can be used anywhere to perform reliable, repeatable tightening operations.



SKF Power Transmission Products

To help optimize overall machine performance, SKF has developed our own range of power transmission products. SKF Power Transmission Products are designed to give design and maintenance engineers a wide selection of products to choose from in order to meet their unique application requirements. Products include:

- Belts
- Pulleys
- Sheaves
- Chains
- Couplings

These power transmission products are delivered with the same speed and accuracy that is the hallmark of our industry-leading logistics. This means you get just what you need, just when you need it to increase your facility's uptime.

Condition monitoring solutions

- SKF Multilog IMx-8
- SKF Copperhead sensors



SKF Multilog IMx-8

A complete system for early fault detection of deteriorating machine condition in plants and mines, SKF Multilog IMx-8 is ideal for unsafe and hard-to-reach stationary machinery and mobile machinery. It can improve availability and performance of your rotating equipment with advice for correcting existing or impending conditions. Machine intelligence from the collected data will help you avoid unplanned downtime and schedule maintenance proactively, prolonging machine availability and minimizing maintenance and repair costs.

SKF Copperhead sensor

SKF Copperhead sensors are rugged vibration and temperature sensors that are designed to endure harsh conditions in mines, mineral processing, and the cement industry.

- 100 mV/g sensitivity
- CMPT 2310TA and CMPT 2310ACT include an integral temperature sensor (10 mV/°C)
- Rugged design, stainless steel, hermetically sealed sensor housing, IP 67

Optimize asset efficiency with SKF expertise



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Machine installation. Plant or mine commissioning. Problem solving for bad actor machinery. Shut down services. Whether you're an operator or an OEM, SKF engineers and technicians have the expertise and experience needed to tackle your toughest challenges.

SKF services can make your assets more productive, producing more without increasing capital spending on new machinery, ultimately increasing your Return on Assets (ROA).

From spot services such as balancing and machine alignment, to contracts for periodic services, SKF services can help keep your mining machinery running as efficiently, reliably and profitably as possible.



Plant- and mine-wide services

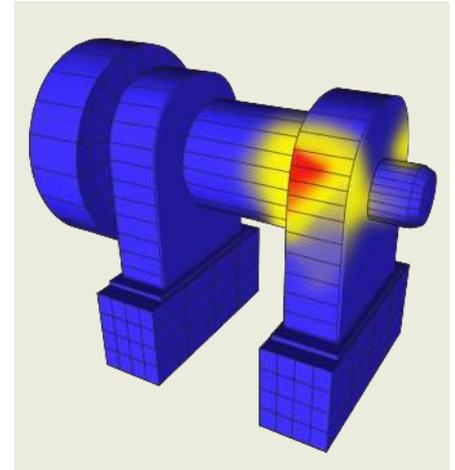
- Precision alignment and balancing
- SKF Engineering Simulation Service
- SKF Remote Monitoring Service
- Predictive Maintenance (PdM)
- Proactive Reliability Maintenance (PRM)
- Bearing and housing remanufacturing services
- Reliability Engineering Services
- SKF Advanced Modelling and Simulation
- SKF pinion and trunnion bearing inspection service
- Bearing mounting and dismounting services
- Lubrication management
- Rotating Equipment Performance (on page 5)



Precision alignment and balancing

SKF can supply experienced alignment service teams to tackle the most complex rotating and geometrical alignment jobs. This service is supported by a dedicated SKF alignment competence centre and a database of procedures for handling difficult alignment jobs, using the latest technology. In addition, our experienced alignment teams can assist in installation and machine alignment.

In addition, SKF Reliability Engineers experienced in the art of balancing critical machinery can perform precision balancing services, utilizing our Predictive Maintenance (PdM) competence center and state of the art instrumentation.



SKF Engineering Simulation Service

Diagnosing structural and machinery problems accurately can help avoid unplanned shutdowns of mining machinery. For bearing customers, SKF engineers can collect machine and structural field vibration measurements and use them as input for a comprehensive simulation analysis, which includes:

- Modal analysis
- Operational Deflection Shapes (ODS) analysis
- Finite Element Analysis (FEA)
- Simulations using proprietary SKF software programs

Combined, these analyses enable SKF to identify points of excessive deflection or weakness on the machinery and surrounding structures. Once these areas have been identified, SKF can model different solutions to solve the problem.



SKF Remote Monitoring Service

With our web-enabled SKF Remote Monitoring Service, your world-class predictive maintenance programme for periodic or continuous monitoring of critical machinery is just an Internet connection away.

SKF Remote Monitoring Service combines SKF condition monitoring tools to collect data, SKF experts to analyze data and the Internet to communicate machine health status for informed decision-making.

This service is ideal for plants with limited staff trained in predictive maintenance techniques, or operations with sites located remotely from a central facility. Benefits include:

- Capital investment cost savings
- Increased data integrity
- Expert SKF analysis and recommendations
- Global, 24/7 access to reports and data



Proactive Reliability Maintenance (PRM)

An SKF PRM service contract combines Predictive Maintenance (PdM), Root Cause Analysis (RCA), and Reliability Engineering to detect, understand, and improve the performance of machinery. SKF can provide these services to raise the machine and plant Overall Equipment Effectiveness (OEE).

- Improve availability, utilization, performance
- Reduce costs
- Improve safety

Lubrication Management

Lubrication is often understated, and many required activities are overlooked. SKF can help you get a world-class lubrication program where we secure that the right lubricant is provided in the right quantity to the right point at the right time with the right method. This can generate cost savings related to decreased downtime, optimization of workers time, and energy consumption. The SKF Lubrication Management programme defines a structured process to help you build a strong lubrication programme and overcome issues like lubricant contamination, lubricant chemical degradation, wrong lubricant selection and insufficient or misleading knowledge.

The programme consists of the following steps:

- SKF Client Needs Analysis
- SKF Lubrication Audit
- Improvement proposal
- Design and implementation
- Optimisation



Predictive Maintenance (PdM)

To prevent unplanned downtime, Predictive Maintenance (PdM) programmes and condition monitoring programmes work to detect machine conditions that lead to failure. In addition to these PdM basics, SKF's programme also includes a determination of which proactive tasks can help extend machine life. SKF PdM services for mining applications include:

- Vibration analysis
- Non destructive testing (NDT)
- Oil analysis
- Thermography
- Motor current analysis
- Wire rope inspection



Bearing and housing remanufacturing services

Large bearings and housings are sometimes removed from operation still having remaining useful life. And sometimes large bearings and housings are not handled or stored well and can get slightly damaged, dirty and rusty. These are possible opportunities for remanufacturing and reduced delivery time and cost compared to making new purchases.

- SKF standard warranty
- Reduced delivery time and cost
- SKF can remanufacture other brands



Reliability Engineering Services

With SKF Reliability Engineering Services, we apply our Asset Efficiency Optimization (AEO) process to your operation. First, our Consultancy service experts help you identify improvement opportunities and develop plans to achieve them. SKF can then implement and execute your plan, or train your team to do so. SKF works with you to do whatever is best for your bottom line.

Our Reliability Engineering Services for mining include:

- Client Needs Analysis (CNA)
- Maintenance Strategy Review (MSR)
- Spares Optimization and Management
- Lubrication Consultancy and Lubrication Management
- Risk Based Maintenance
- Operator Driven Reliability (ODR)



SKF Advanced Modelling and Simulation

SKF Advanced Simulations and Modelling service is available for SKF customers and can be employed by mine and plant operators to investigate reliability and performance problems in existing structures and machinery. SKF uses numerical analysis and simulations to analytically investigate the root cause of machinery performance and failures. Root Cause Analysis, metallurgical and lubrication analysis and other studies can be incorporated into the investigation.

Our unique tools and know-how in the field of dynamic simulations, material science, condition monitoring and lubrication will help you get it right.



SKF pinion and trunnion bearing inspection service

SKF offers a range of drive line mechanical services including pinion and trunnion bearing inspection service, which can help cut mill operating costs and extend machinery life cycles.



Bearing mounting and dismounting services

Approximately 16% of all premature bearing failures are a result of poor fitting or using incorrect mounting techniques. SKF can help customers avoid the potential pitfalls involved with bearing mounting and dismounting procedures. Along with enjoying additional time to devote to other duties, maintenance teams can avoid the errors that could cost the operation in the long run.

Services for consultancies and manufacturers (OEMs)

- Specification review and improvement
- Application Engineering
- Design for Six Sigma
- Product testing and evaluations



Application Engineering

Backed by a unique combination of competencies from different design engineering fields, SKF Application Engineering services include:

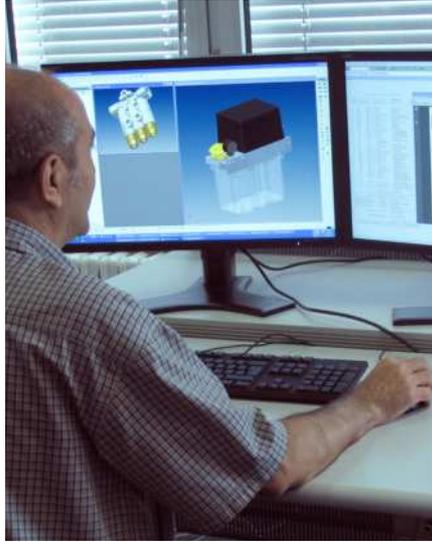
- Virtual testing using dynamic simulations of rotating machinery
- Lubrication and surface engineering
- Material analysis and evaluation
- Bearing, lubrication and sealing selection

SKF can support you from your first ideas to the end of product development. We can then continue to work with you with field test evaluations, lubrication management services and root cause analysis to determine the cause of failures and apply our application engineering knowledge to assist with redesign.



Design for Six Sigma

As part of our services for designing and developing mining machinery, SKF offers design for Six Sigma projects. At the core of Six Sigma is a formalized, systematic, heavily results oriented, process improvement methodology, tailor-made to achieve improvements on variation first of all, but also in cycle time (production speed) and yield (total production) and other wastes.



Specification review and improvement

As you develop your specification, our research and development programmes and testing facilities can support project conception and feasibility. And we can help you choose from thousands of off-the-shelf products, as well as fully customized solutions, to help your project become a reality.



Product testing and evaluations

Expert SKF testing services include prototype testing in actual application conditions, as well as portable, end-of-production-line quality test systems. These services can contribute to your quality control process and give you and your customer greater confidence in your products.

skf.com | skf.com/mining

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