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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.

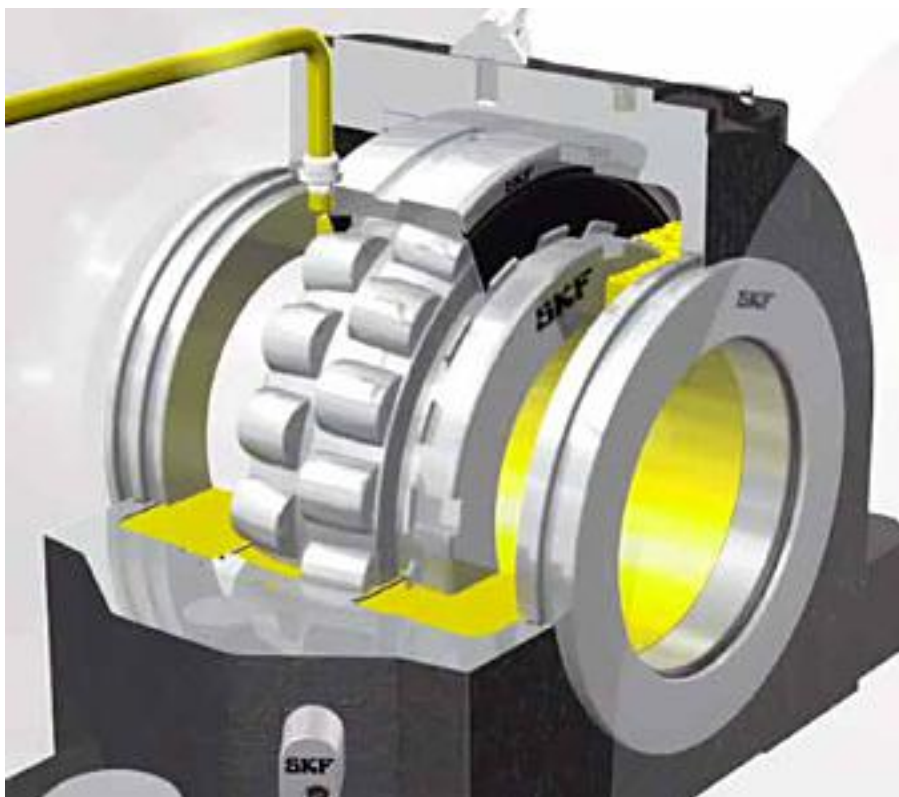


### SKF Energy Efficient deep groove ball bearings

Ideal for use in bulk conveyors and more, SKF Energy Efficient (E2) bearings offer reduced energy use, increased service life and reduced total cost of ownership.

These bearings can provide more than twice the service life, while reducing frictional losses in the bearing by at least 30% when compared to the same size SKF Explorer bearing. This results in energy savings over the life of the application. It also reduces operating temperature and helps extend grease life.

- Lower total cost of ownership
- Reduced energy use
- Longer bearing service life
- Reduced operating temperature
- Higher speed capability



### 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
- SKF split block housings
- Standard SKF L or S-type seals for SNL housings and Posi-Trac Plus seals for SAF and SAFD housings
- SKF LGGB2 biodegradable or LGEP2 as the barrier grease

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



### SKF 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. 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 blocks 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 mm 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 accommodate misalignment and axial displacement within the bearing, without inducing internal axial loads 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 with centered rollers. 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 radial loads.



### Split roller bearings

The SKF range of split roller bearings is ideal for use in machinery such as conveyors where changing a regular one-piece bearing would require the dismantling 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).

The SKF range of split roller bearing solutions include:

- SKF split spherical roller bearings (made to order)
- Cooper split cylindrical and tapered roller bearings with housing units – the industry's widest standard range up to 1500 mm shaft diameter and made to order solutions



### 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



### SKF trunnion support housings

Designed for reliable operation in severe cement and grinding mill environments, the new generation of SKF trunnion support housings features two robust, double V-ring seals that keep lubricants in and contaminants out. The housings provide excellent grease retention, even with high-pressure water cleaning. Seals are easy to replace.

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



### 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, 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 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.

### SDAF housings (inch)

SKF SDAF pillow (plummer) block 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.



## 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 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 sealing solutions

- Radial shaft seals
- Custom machined 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
- Retains the lubricant
- Effectively protect against contamination
- Resist chemicals
- Reduce relubrication and cleaning costs
- Minimize risk of leakage and environmental impact



### 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.

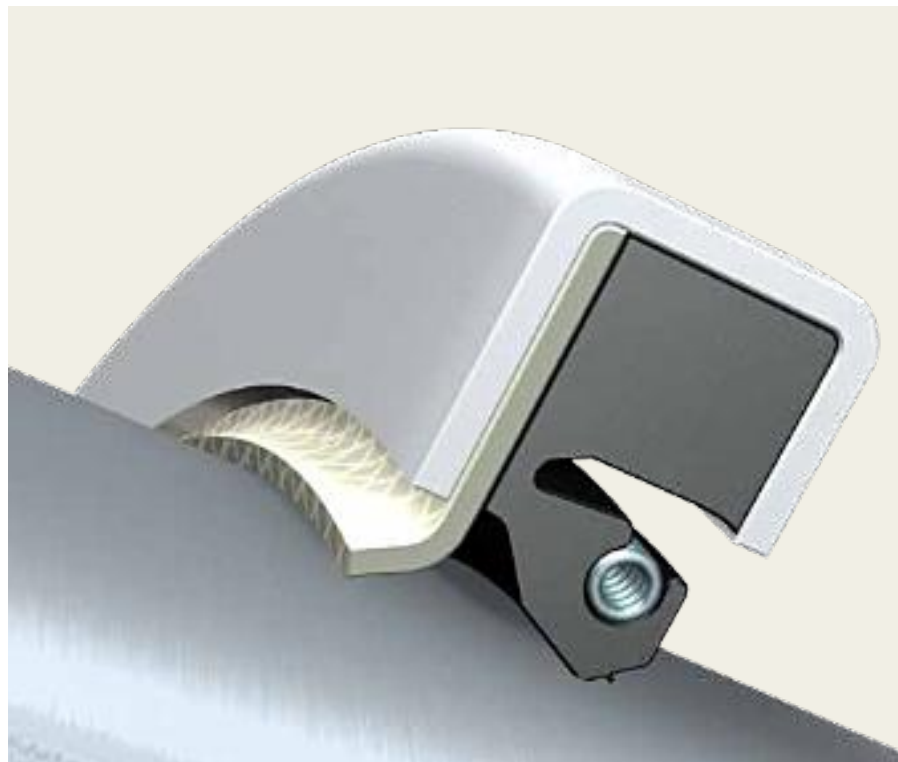




### Large diameter seals

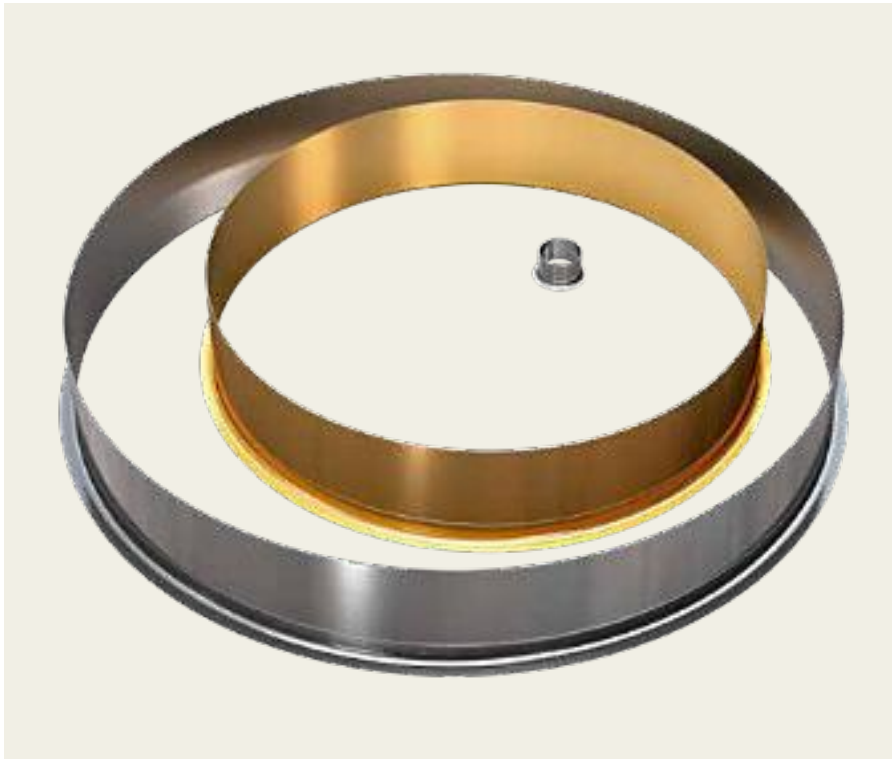
Large diameter seals from SKF are molded seals for large mining and cement machinery and are easily customized for specific requirements. The seals (HDSF2) are optionally available with a PTFE excluder/wiper to protect the primary seal element from exposure to abrasive contamination. The large seals 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.



### 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.

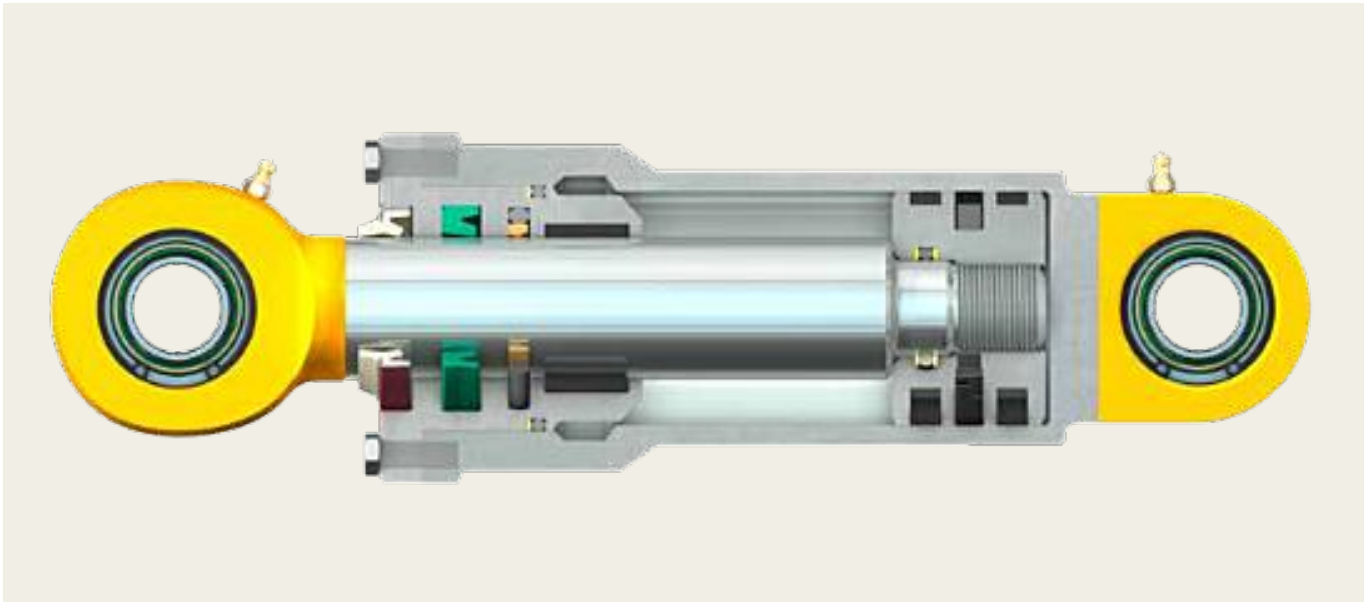
Often capable of delivering a better quality counterface for the seal lip than the original shaft, SKF Speedi-Sleeve:

- 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.



## 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*

# 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
- Spandau screw pumps
- Automatic spray lubrication system for kiln riding rings

## 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 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 SYSTEM 24

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 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
- Temperature range -10 to 70 °C (-14 to 158 °F)
- Integrated controls, reservoir, valves, monitoring
- Equipped with heating element



### 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 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 particles.

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 two-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. 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 24V 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



### Spandau screw pumps

Spandau screw pumps for oil circulating systems used in mining machinery must be very sturdy. Sand, chips and other contaminants are common in mining applications where ordinary screw pumps very quickly become damaged and start to fail. Spandau screw pumps offer high quality solutions for mining applications.

Due to their optimized design and special hardened materials, Spandau LMP pumps are clearly superior in mining applications where almost all competitor's pumps fail in terms of mileage and pump downtime.

Technical data:

- Flow rates up to 670 l/min
- Delivery pressures up to 120 bar
- Temperature range from 0 to 80 °C



### 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.



# Maintenance products

- Alignment tools
- Maintenance facility products
- Hydraulic assist systems
- Hydraulic bolt tensioners
- SensorMount
- 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 80



TKSA 60



### Maintenance facility 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

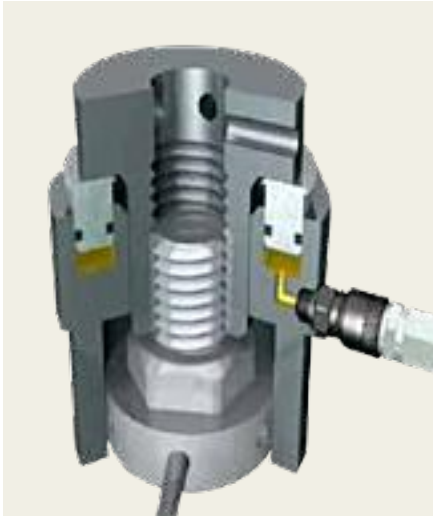
The SKF Oil Injection Method uses adapter sleeves with oil supply ducts and distribution grooves to mount and dismount bearings. This method helps prevent shaft damage and is quick, safe and easy. A thin film of oil is injected under high pressure between the mating surfaces, which virtually eliminates the friction between the surfaces, reducing the power required to 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.



### SensorMount

For large size bearings, mounting errors are one of the most common causes of failures. The SensorMount system consists of a bearing with an integrated sensor and a dedicated handheld indicator. It enables large size, tapered bore SKF spherical roller bearings of CAK design and CARB to be mounted in an easy to use, fast and reliable way.



### 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 Idler Sound Monitor Kit
- SKF Microlog Analyzers
- Intrinsically safe SKF Microlog Analyzer
- SKF Multilog On-line Systems
- SKF Copperhead fault detection system
- SKF Copperhead sensors
- Electric motor analyzers and service



### SKF Idler Sound Monitor Kit

Conveyors are an important part of a material conveying system in the mining and cement industries. Failure of an idler can lead to belt damage, expensive downtime and lost production.

The SKF Idler Sound Monitor Kit is a handheld monitoring device for early detection of faults in conveyor impact, support and return idlers. Using acoustic enveloping technology, the SKF Idler Sound Monitor Kit distinguishes between the sounds of a good idler and a faulty one even in high ambient noise environments.

It detects faulty idlers earlier and more reliably than when a maintenance worker walks the length of the conveyor belt to listen or look for problems. The device also provides shorter measurement time and earlier fault detection than a thermographic camera.

Kit includes:

- SKF Microlog Analyzer with Idler Sound Monitor module
- Headphones
- Microphone

With the Idler Sound Monitor Kit, the screen of the SKF Microlog displays a simple to understand “traffic light” visual alarm:

- Green for OK
- Yellow to indicate a “suspect” idler
- Red to indicate a “bad” idler



## SKF Microlog Analyzers

The Microlog Analyzer range includes route-based instruments that work with powerful SKF predictive maintenance software systems and stand-alone instruments that offer on-the-spot advice and signal analysis capabilities. The SKF Microlog enables you to migrate from time-based to condition-based maintenance, helping you to reduce the risk of unplanned downtime, reduce operational costs, and optimize manpower resources.

- Rugged, ergonomic design
- Use with magnetic or permanent mounted sensors
- Analysis using SKF Aptitude Monitoring Suites or by SKF Remote Diagnostics Services
- Available with multi-channels for balancing, orbit and model analysis
- Some models approved "Intrinsic Safe" for use in gassy mines



### Intrinsically safe SKF Microlog Analyzer

Operations and maintenance personnel faced with hazardous environments in their plant and mine locations must use data collection instruments with an “intrinsically safe” (IS) designation. The SKF Microlog Analyzer CMXA 51-IS is an intrinsically safe, rugged and portable, hand-held instrument used for the collection of vibration, process, and dynamic data in underground gassy mines.

The SKF Microlog Analyzer CMXA 51-IS has achieved the Intrinsic Safety rating from the European regulatory agency, SIRA, and is rated Group I (Mining).

- ATEX and IECEx
- Ga Ex ia IIC T4 (Ta -20 to +50 °C)
- Ma Ex ia I (Ta 0 to +50 °C)
- Complete system includes ATEX approved sensor



### SKF Multilog On-line Systems

SKF Multilog On-Line Systems use permanently installed sensors to alert plant and mine personnel of deteriorating machine condition changes. The systems are ideal for unsafe and hard-to-reach stationary machinery and mobile machinery. SKF Multilog systems transmits data to a local host computer running SKF @ptitude Monitoring Suites software for analysis or to the SKF One Global Cloud for analysis by the SKF Remote Monitoring Services.



### SKF Copperhead fault detection system

SKF Copperhead is a low channel fault detection system based on the SKF Copperhead Transmitter Unit (CMPT CTU), the Alarm and Display Module (CMPT DCL), and SKF Copperhead sensors. The system is designed to endure harsh conditions in mines, mineral processing, and the cement industry. The system has a unique ability to monitor both normal and low speed machinery.

Able to be used as a stand-alone device or integrated it into a plant automation system, the system detects faults such as:

- Loose parts
- Unbalance
- Bearing damage
- Lack of lubrication
- High temperatures



### SKF Copperhead sensors

SKF Copperhead accelerometer sensors have a rugged low-profile construction with integral cables for use specifically in mining and cement applications. They are permanently mounted on the machinery for improved data collection and safety. They can be used with a periodic (Microlog) or continuous monitoring (transmitter or on-line system) programme.

- 100 mV/g sensitivity standard
- Optional 230 mV/g for low-speed applications
- Available with optional temperature monitoring
- Available IECEx Group 1 M1 for use in gassy mines



### Electric motor analyzers and service

A part of SKF since 2007, Baker Instrument solutions include a wide range of products for static testing and dynamic motor monitoring designed to help mining operations avoid unexpected downtime from electric motor failures. As part of our Predictive Maintenance programmes, SKF engineers can provide electrical motor current analysis services to help increase reliability and productivity.

# 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

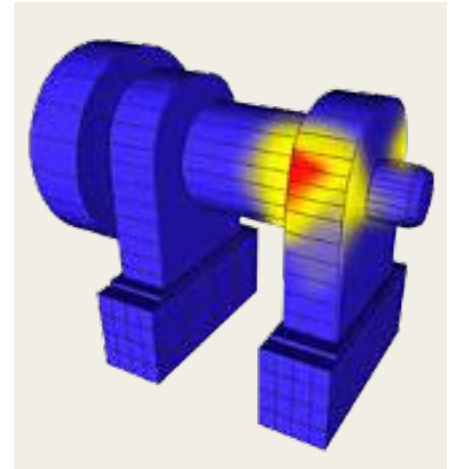
- Precision alignment and balancing
- SKF Engineering Simulation Service
- SKF Remote Monitoring Service
- Predictive Maintenance (PdM)
- SKF Root Cause Analysis (RCA)
- Proactive Reliability Maintenance (PRM)
- Bearing and housing remanufacturing services
- Reliability Engineering Services
- SKF Advanced Modelling and Simulation
- SKF Certified Rebuilder Program
- SKF pinion and trunnion bearing inspection service
- Bearing mounting and dismounting services



## 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. To achieve this goal, 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



### 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



### SKF Root Cause Analysis (RCA)

SKF experts can perform Root Cause Analysis (RCA) on bearings and other components for operators of machinery. RCA can determine the condition of the bearings (e.g., rolling surfaces, rings, cages). It can also determine how well the bearing was fitted in the machine, and the effectiveness of the lubrication and sealing in the machine. Results from RCA can be used to make improvements to machine reliability through changes to the bearings (e.g., type, clearances, cages), changes to the bearing fitting on the shaft or in the housing and/or changes to lubrication and sealing.



### 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



### 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
- Lubrication Management
- Risk Based Maintenance
- Operator Driven Reliability (ODR)

## SKF Advanced Modelling and Simulation

SKF Advanced Simulations and Modelling service 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 Certified Rebuilder Program

Producers often use off-site rebuilders to repair and refurbish motors, gearboxes and conveyor pulleys. Too often their work is not done well resulting in failures and higher costs. The SKF Certified Rebuilder Program audits the facility, procedures and workmanship, provides training, and works with the rebuilders as partners. Certified programs are available for rebuilders of motors, gearboxes, pumps and conveyor pulleys.

- Better quality rebuilds
- Improved service life
- Avoid downtime
- Reduced costs



### 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.

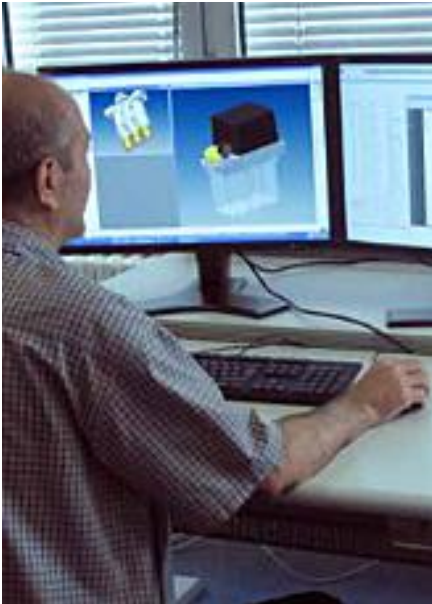


### Bearing mounting and dismounting services

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
- Applications Engineering
- Advanced Modelling and Simulation
- Design for Six Sigma
- Engineering Simulation Services
- Root Cause Analysis (RCA)
- Product testing and evaluations



### 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.



### Applications Engineering

Backed by a unique combination of competencies from different design engineering fields, SKF Applications 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.



### SKF Advanced Modelling and Simulation

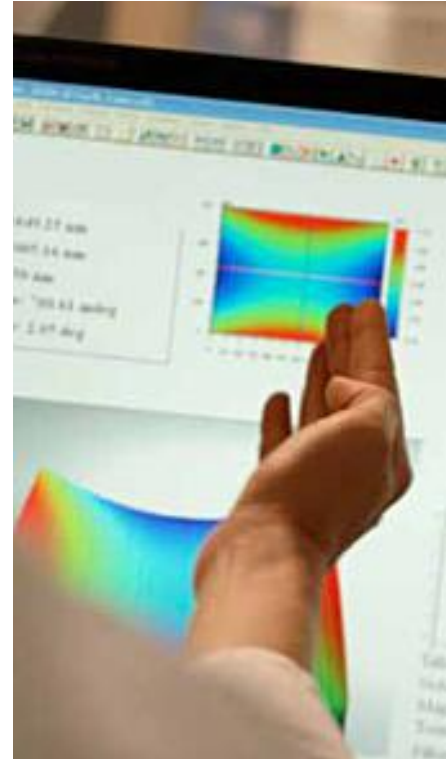
SKF Advanced Modelling and Simulation services can be employed by manufacturers (OEMs) to support product development and validation of new and existing machine designs. SKF uses numerical analysis and simulations to analytically investigate recommendations for new designs to enhance performance and reliability. 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 from the very start, adding value to your products and differentiating them from the competition.



### 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.



### Engineering Simulation Services

SKF Engineering Simulation Services can be employed by manufacturers (OEMs) to validate new machine prototypes and investigate poor performance or reliability in new or existing designs. The service uses actual operating measurements of the machine structure as input for the numerical simulations to establish the machine model. The service can be used to shorten new machine development time to market and resolve problems in newly launched machines.



### SKF Root Cause Analysis (RCA)

SKF experts can perform Root Cause Analysis (RCA) to support validation of prototype machinery, testing by manufacturers (OEMs) and investigate failures in operating machinery for OEMs and consultancies. RCA results can be used after prototype testing to verify the proper selection of bearings, the proper bearing fitting in the machine and the effectiveness of the lubrication and sealing in new machine designs. RCA of operating failures can be used to investigate reliability improvements or warranty issues in existing machine designs.



### 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.

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