

Services & Solutions

# Realizing industry's full potential



# Start realizing your full potential today.

Need to reduce manufacturing costs and time to market? Or looking to increase productivity and efficiency in your plant? Whether you are an equipment manufacturer or are running and maintaining a plant, we have services and solutions that can help you generate business results.

## Collaboration and continuous improvement

We help our customers to improve their performance in an increasingly competitive industrial marketplace by improving product designs and delivering strategies for improved maintenance and reliability performance. We can help you solve problems ranging from small technical issues all the way up to overall equipment efficiency improvement. SKF has a world-leading portfolio of technologies and services to offer you. However, our real strength is not just in providing “one-off” services or individual products. Some of the biggest benefits and improvements come from the way we collaborate with our customers, combine elements of our portfolio, and work to support their longer term needs.

## Defining your needs

We start by applying our proven methodologies to identify your needs. We can use software modelling tools combined with our extensive bearing defect knowledge and application experience to help you improve your designs and select the best bearings, seals, lubrication and even integrated monitoring technologies. We can measure your operation’s maintenance programme against industry best practices and others in your industry, and ensure that you are performing the right maintenance, on the right equipment, at the right time, helping to reduce your overall maintenance costs. We can also provide a comprehensive, independent assessment of your plant’s reliability programme. The goal of this analysis is to help you reduce operational costs by identifying areas for improved machinery management. Combining our extensive customer database with decades of application experience, we are able to deliver a comprehensive, needs-based analysis of your operation.



## Creating solutions

We have over 2 000 skilled staff who bring experience in all types of machinery, manufacturing, operations, maintenance, and management. These experts combine their deep technical knowledge of rotating equipment with our extensive technology portfolio – which includes condition monitoring, seals, lubrication, and of course bearings – to solve your problems and deliver improvements that help you become more successful.

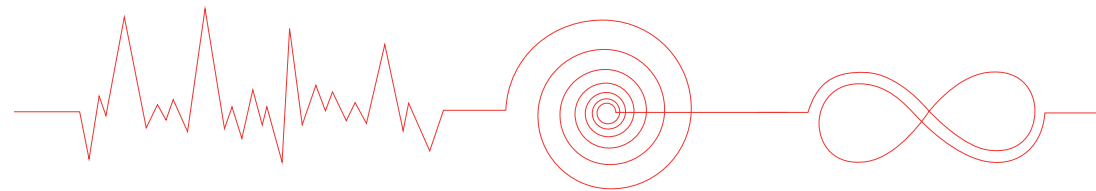
We understand the complex language of the bearing – and since the bearing is at the heart of the machine – this can tell us the dynamic health of your machinery and the condition of your bearings. SKF technologies currently monitor over 1 million assets around the world, many remotely, and we continue to develop new and innovative ways to make it easier for our customers to interpret complex machine data, see at a glance what’s happening in their plants, and get notifications when things need attention. So, we can help you to sleep better at night, knowing that your valuable industrial assets are in good hands.

And, when maintenance is required to keep your machinery working smoothly, we can offer a wide range of services to help you. For example, our SKF Services Centres offer controlled and guaranteed bearing and spindle remanufacturing processes as an alternative to replacement. And our network of certified maintenance partners can rebuild your electric motor, pump, or gearbox.

## Delivering improvement

Services & Solutions from SKF are delivered locally through 39 service centres located around the world. At these fully-equipped and expertly-staffed facilities, we put our knowledge and competence to work for you, to help you realize the full potential of your rotating machinery.

*Defining your needs, and applying our technologies, people, knowledge and services to realize your full potential*



### DETECT

Targeting machine maintenance with condition monitoring and data analysis

### SOLVE

Overcoming machine challenges with reliability engineering

### (RE)BUILD

Optimizing machine performance with customization and remanufacturing





# Differentiate through design.

Need an experienced partner who can help you differentiate your products and compete in an increasingly global marketplace? SKF works closely with original equipment manufacturers worldwide to improve machine designs and deliver more value to end users. SKF solutions for OEMs frequently incorporate multiple technologies, from bearings and seals to automatic lubrication systems and built-in condition monitoring technologies. Through the use of proprietary SKF simulation software that functions as a virtual test rig, SKF can also help you optimize designs prior to prototyping, reducing time to market and minimizing warranty issues down the road.



# Compete through performance.

Whether your function is plant management, maintenance or operations, SKF can bring together the people, technologies and services you need to achieve your goals. Applying our global experience in every major industrial segment, we can provide you with unique advantages in the areas of assessment, condition monitoring and reliability engineering to help you: increase machine availability to maximize productivity, cut costs without cutting quality, eliminate repeat and unexpected failures, reduce energy use and environmental impact, maximize maintenance efficiency, optimize manpower resources, manage inventory, ensure on-time shipping and more.



REDUCE  
**CO<sub>2</sub>**  
BY 400 TONNES



**50%**  
MORE  
UPTIME



**\$3.5**  
MILLION  
SAVED

## Root cause failure analysis

After pinpointing the root cause of recurring fan failures in an oil and gas operation, SKF used the Proactive Reliability Maintenance process to implement and maintain reliability improvements. By eliminating unplanned downtime, the programme saved the company more than \$2,5 million annually.

## Design optimization

SKF worked with a turbine manufacturer to develop a high speed turbo blower with a permanent magnet motor for the wastewater industry. SKF supplied a drop-in magnetic system unit along with a magnetic bearing controller that actively manages the magnetic bearings. This compact turbo blower uses less energy, thereby reducing CO<sub>2</sub> emissions by about 400 tonnes per year compared to conventional blower technology.

## Rapid prototyping

A well control manufacturer needed to create a new seal package for a critical new blow-out preventer (BOP) and required rapid prototyping to meet a tight development schedule. Utilizing an SKF Seal Jet machining centre, SKF responded quickly with a set of high-performance polymeric seals that met the prototype schedule, then managed the transition to molded seals, fulfilling the OEMs worldwide supply chain requirements.

## Reliability engineering

Asset management services provided by SKF helped an integrated mill in South America increase its output by 2 240 tonnes and save \$402 000 over a 3-year period. By addressing mechanical failures of intermediate gearboxes, the plant reduced downtime of the rolling mill by over 50%.

## Condition-based maintenance

One day storage of high density pulp between a pulp mill and paper mill allows no window for downtime. An SKF Integrated Maintenance Solutions contract, including several root cause analyses, reduced bearing failures by 60% and all other types of failures by 32%. Annual downtime due to mechanical issues was cut in half.

## Electric motor condition monitoring

Using advanced electric motor analysis tools, SKF helped a power plant verify that one of its submerged circulating water pumps was in risk of imminent failure. The timely intervention on that first pump helped the plant save \$3,5 million in lost generation revenue.



# Detect

## Assessing, managing and monitoring machine health

Many companies provide condition monitoring tools. What sets SKF apart is our ability to combine these technologies with our services and full portfolio. This allows us to not only provide the best condition monitoring solution but to combine this with the best sealing and lubrication solutions and the best bearing for your application, giving you the maximum improvement in operational efficiency and reduction in costs.



### Integrated condition monitoring

#### Vibration-based monitoring

SKF offers a complete range of vibration-based condition monitoring products, from basic tools to the industry's most advanced, totally integrated systems. These include SKF Microlog portable data collectors/analyzers and SKF Multilog systems for continuous, online monitoring, surveillance and protection, customized for specific industries.

In addition to dedicated tools, the SKF portfolio includes innovative technologies such as SKF Insight, which consists of self-powered, wireless sensors integrated into the bearing or housing. Also, SKF offers app-based solutions that provide machine health information on your tablet or smart phone. Wireless sensor technology, combined with advanced analytics and cloud-based connectivity solutions, provide real-time global access to machine condition data and SKF support.

#### Electric motor testing

SKF is the industry leader in electrical motor test equipment for condition monitoring, predictive maintenance, motor manufacturing and repair. Our solutions include a wide range of products for static testing and dynamic motor monitoring designed to help plants avoid unexpected downtime and electric motor failures.

### Software systems

SKF condition monitoring tools are supported by SKF @ptitude Analyst software, which provides a seamless interface to computerized maintenance management systems, enterprise asset management systems and other plant-wide systems.

Through the use of advanced analytics and proprietary algorithms, this software transforms machine data into actionable intelligence, enabling collected data to be used to improve machine reliability and operational efficiency.

### Condition-based maintenance services

SKF can help your operation move from time-based to condition-based maintenance to reduce costs, maximize machine availability and cope with demands on your manpower resources. We can train your people to use the latest tools and technologies, or manage your entire programme by providing the services you need.

### Remote diagnostic services

With SKF Remote Diagnostic Services, machine condition data is collected, either with an on-line system or with hand-held devices by skilled personnel – your own, a service partner or by SKF. Certified SKF analysts interpret and report on the data from Remote Diagnostic Centres using the most advanced, cloud-based technology and proprietary SKF signal analysis techniques. These subscription-based services provide access to machine data – and to expert SKF diagnostics – from anywhere, any time.

### Operator Driven Reliability

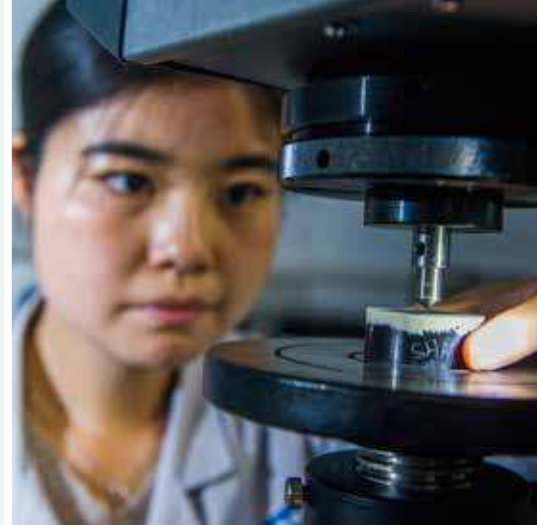
Through Operator Driven Reliability (ODR) – a process pioneered by SKF – we can empower your operators to contribute proactively to a company-wide maintenance strategy. The process is built on a simple realization – that equipment operators are usually the first to detect even the smallest changes in machine conditions. SKF can help you implement ODR via a service contract.



# Solve

## People and knowledge – connecting your world to ours

SKF is a company of problem solvers. We combine our knowledge-based services with our core technologies - bearings and units, lubrication, seals, and condition monitoring – and work closely with you to deliver ongoing improvements and provide the very best solutions matched to your needs. Whether you are designing equipment or using it in your operations, you can count on Services & Solutions from SKF to help you achieve your goals. SKF reliability engineering services have been proven to yield positive results throughout the machine life cycle, from design and procurement to machine upgrades and customized solutions.



### Tailor Made Solutions

Our services range from on the spot and one-off traditional service models, to subscription and even performance based and pay-as-you-need contracts. Our service agreements can be matched to your needs and combined as required with our technologies to deliver improvements. We have developed a set of integrated solutions that can fit individual customer needs, from advanced Condition-Based Maintenance services to Asset Performance Solutions.

### Assessment and Benchmarking

Through a set of Assessment and Benchmarking tools, we determine work activities and KPIs to measure your maintenance management process. We benchmark performance against standard KPIs, helping you to understand your current situation and identify improvement opportunities, and then develop short, medium and long term roadmaps for improvement programmes. These programmes could address a single bad actor or critical machine, or be comprehensive improvement programmes that establish continuous improvement processes where SKF shares the risks and rewards with you.

If you need to better understand and improve specific components of your maintenance function, we have a wide programme of services that can be combined to fit your specific needs:

**Spares Management and Optimization** helps you reduce inventory costs and the risk of running out of stock when a spare is needed. By providing a justifiable basis for carrying a given spare parts inventory, and linking spare parts levels to asset criticality, SKF can help you reduce purchasing, supply and inventory costs while maintaining the optimum spare parts inventory.

**Lubrication Management** defines a structured process to help you build an effective lubrication programme and overcome your challenges. Lubrication accounts for more than 36% of premature bearing failures. That's why lubrication management is so important to your operations. SKF pursues advanced research and development in tribology, and our engineers design products that solve real, everyday customer problems. As a result, we understand the challenges of your industry and can recommend the right lubrication solution for your application or even execute your lubrication function under a defined reliability improvement programme.

**Root cause analysis** will help you to identify and eliminate underlying problems. As the leader in bearing technology, we have extensive knowledge of failure modes, based on thousands of individual root cause failure investigations.

**Maintenance Strategy Review** is a service where SKF can define the maintenance plan for individual machines or for your entire plant. This is based on our long-term experience and understanding of criticality and failure modes and the necessary inspections and maintenance to optimize cost and availability.

### Training and Competence Development

We have more than 250 instructors in over 70 locations around the world working together to develop and deliver consistent high quality product and technology courses. Our complete portfolio encompasses e-learning, classroom training, hands-on workshops, onsite mentoring, instrument and software specific training and complete overall training needs analysis. Through public and onsite training options, our instructors share their knowledge and passions with you and your team and set the rhythm for you to apply new skills in real life situations. You will be encouraged to share your acquired knowledge at your facility and reap the benefits of working with the principles of best practices.



# (Re)Build

## Extending service life, reducing lead times

Today there is an increasing focus on extending the service life of equipment to reduce total cost of ownership (TCO). This can be achieved by refurbishing and upgrading bearings, units and other rotating machinery components - at a lower cost than replacement and with shorter lead times, while reducing the environmental impact. Our industry and application experience can be applied to virtually any type or design of rotating machinery component.



As components in rotating equipment become increasingly advanced, a controlled and high-quality refurbishment and upgrade service is needed to restore them to "as new" condition. We meet these demanding needs at our strategically located service centres by applying globally certified methods, work instructions and work processes, and using only high-quality spares. We also offer installation and commissioning services and work with you to help ensure availability and reduced maintenance costs during the warranty period.

## Bearing remanufacturing and refurbishment

When we refurbish bearings, we use the same quality materials, methods, work processes and machinery to rework bearings as are used to manufacture new SKF bearings. The result is a bearing that, although technically not new, will perform like new, for a much lower cost than new bearings.

Depending on the amount of remanufacturing needed, up to 90% less energy is needed to remanufacture a bearing instead of manufacturing a new one.

The bearing remanufacturing process includes acceptance criteria that deliver high quality results, even when extensive remanufacturing is needed. To provide full traceability, we use an advanced management system and we mark each bearing during the process so you will be able to trace your bearing through its future life cycle.

Typical candidates for bearing remanufacturing include large size bearings, caster bearings, backing bearings and slewing bearings from all major bearing brands.

## Gearbox remanufacturing

Gearbox reliability is constantly challenged by shock loads, vibrations and increased utilization of equipment, increased production volume demands and time-consuming maintenance. When refurbishing or upgrading a gearbox, we always use high-quality spares. If needed, we apply reversed engineering. Our service engineers can do expert gearbox assessment on-site to determine the gearbox condition and also assist with dismounting and mounting.

## Spindle services

One of SKF's core competencies is the design and manufacture of super-precision bearings for machine tool spindles. Drawing on this expertise, we have since the 1930s been a one-stop shop for spindle services, providing high quality reconditioning of defects and refurbishment, regardless of design, brand, application or technology.

Our spindle refurbishment goes beyond repair. It follows a rigid and well-proven SKF certified process. We make an inspection, disassemble the spindle, and perform a number of precision measurements. If needed, we perform a root cause analysis to determine the best solution for your individual spindle.

We use high quality spares and when finished, we make a final testing, and can help correctly install the spindle. The lead time for refurbishing a spindle at one of our service centres can be significantly shorter than replacement.

We also provide a spindle hotel in all our service centres where we store your spare spindle, test on a regular basis and keep it in running condition at all times, ready to be shipped and taken into operation when needed. This service includes an extended warranty.

## Industry-specific rebuild services

SKF provides a single resource for a complete range of components and services for specific applications, in specific industries. These range from one-stop services for pinion stands used for rotary drums in ball mills and kilns to comprehensive caster roll services for the metals industry. We also provide a wide array of specialized services to the railway and wind energy industries.

## Machine upgrades

SKF engineers can analyze your most critical equipment and processes, and offer recommendations for machine upgrades that can extend service life and improve reliability. In some cases, SKF engineers use proprietary SKF software to simulate machine performance under actual operation conditions in order to determine what machine upgrades will yield the best results.

## Mechanical services

SKF can support your staff with a range of expert mechanical services. These range from high-precision machining, bearing mounting and dismounting, to shaft alignment and balancing, all with the most advanced maintenance tools in the industry. SKF also offers custom machined seals, available with short lead times.



## The Power of Knowledge Engineering

Combining products, people, and application-specific knowledge, SKF delivers innovative solutions to equipment manufacturers and production facilities in every major industry worldwide. Having expertise in multiple competence areas supports SKF Life Cycle Management, a proven approach to improving equipment reliability, optimizing operational and energy efficiency and reducing total cost of ownership.

These competence areas include bearings and units, seals, lubrication systems, mechatronics, and a wide range of services, from 3-D computer

modelling to cloud-based condition monitoring and asset management services.

The SKF BeyondZero portfolio offers products and services with enhanced environmental performance characteristics.

SKF's global footprint provides SKF customers with uniform quality standards and worldwide product availability. Our local presence provides direct access to the experience, knowledge and ingenuity of SKF people.

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