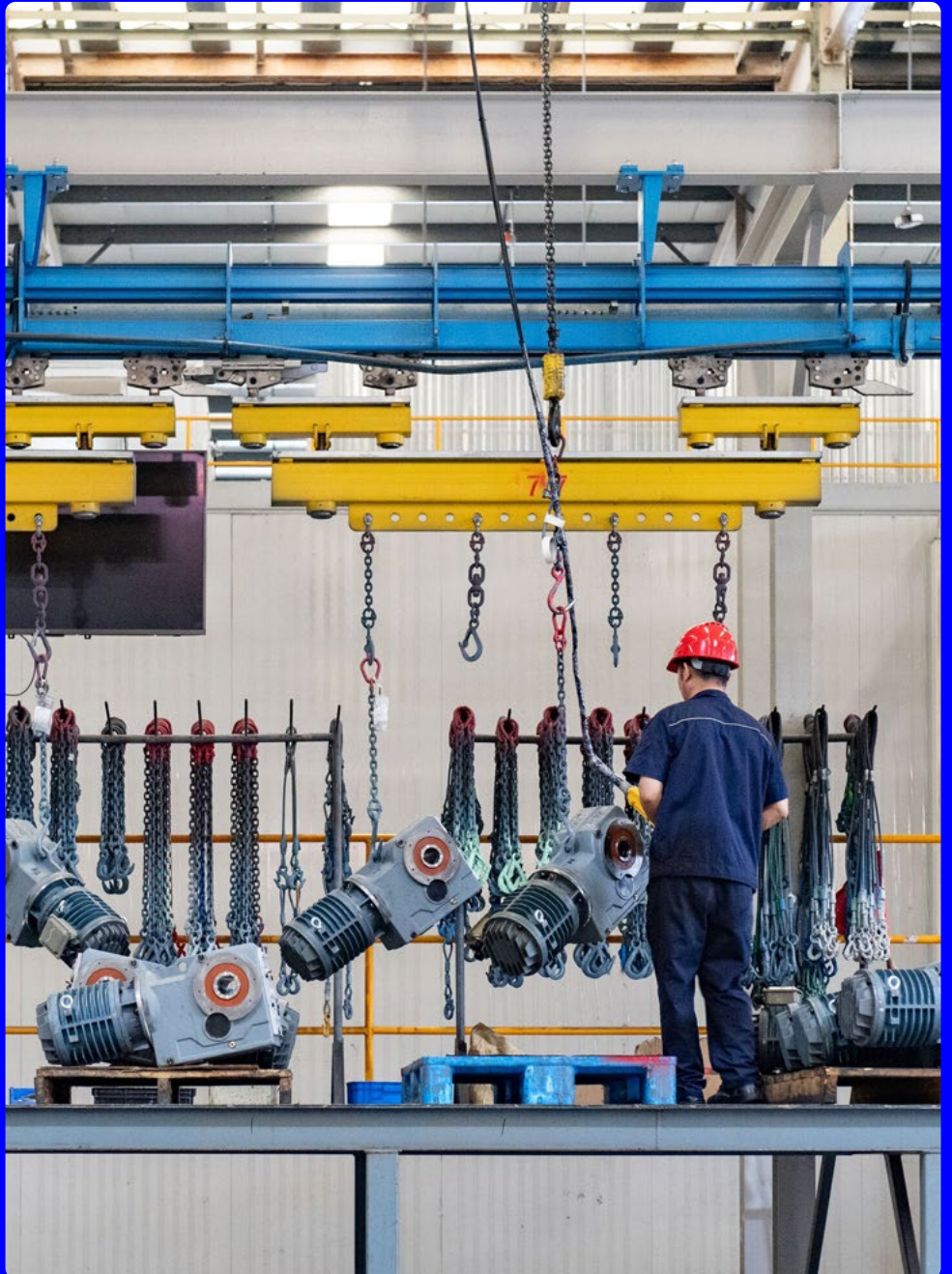


SKF

BOOST YOUR BUSINESS PERFORMANCE WITH SKF SEALS

Protecting assets for cleaner, longer,
and safer operations



20%

of premature bearing failures are related to sealing issues

Safeguarding your assets



Sustainability at work

SKF sealing systems protect your system and assets from contaminants and minimize lubricant leakage. By reducing friction, these systems can also significantly lower energy consumption, which in turn reduces CO₂ emissions, contributing to a safer and healthier environment. We're actively innovating in materials and manufacturing, collaborating with external experts and focusing on improving seal performance. Optimized seals extend service life and maintenance intervals. Digital technologies such as Artificial Intelligence (AI) are also used to improve our processes and product quality.

Seals have a critical impact on system performance. The life and reliability of what is often considered a simple component can make all the difference to your products and operations. SKF's extensive manufacturing and R&D capabilities enable a level of sealing systems support that provides the breadth and depth typically found in several specialized companies. With expertise in bearings, seals, lubrication and related science and technology, SKF is a single source for advanced sealing solutions. Together we re-imagine rotation for a better tomorrow by creating intelligent and clean solutions for people and the planet.

Customer centric excellence

As a leading manufacturer in the sealing industry, SKF understands its customers' unique needs and pain points, such as: leakage prevention, contamination exclusion, durability and longevity, customization and compatibility, reduced friction and energy efficiency, ease of installation and maintenance, compliance with industry standards and regulations, and cost-effectiveness. We value our customers' experiences and insights and incorporate their feedback into our decision-making process to make the best choices for their unique needs.

Empowering your business

At SKF, we care about your business. With extensive industry knowledge, we tailor solutions to your needs. Our cutting-edge research in sealing technology - materials, design and tribology, the science of friction, lubrication and wear - increases system productivity and improves your technology solutions.

Global availability

SKF is committed and globally equipped to meet your operational needs. Operating in more than 130 countries, we provide sealing solutions for a wide range of applications, from prototype to volume production. Services include seal analysis, testing, installation support and training. Count on SKF for application engineering and aftermarket support close to you.

Combined offers

Benefit from SKF's expertise in integrating technologies and tailoring solutions in bearings, seals, services and lubrication systems. We understand the challenges from the outset, whether for a new system or maintenance, resulting in a proven package of knowledge. This knowledge is based on years of experience, direct involvement with industry and ongoing research collaboration with top universities and scientific centres.



Specific solutions for unique demands

Sealing solutions from SKF include a comprehensive, globally available portfolio of sealing products and services for virtually all industries. As a specialist in both bearings and seals, SKF is able to combine these products and their functions into high performance units, providing a unique advantage.



Seals for motor vehicles and eMobility

SKF offers a wide range of advanced sealing solutions for motor vehicles, passenger cars, light and heavy commercial vehicles, buses, trucks and two-wheelers.

SKF's dynamic sealing portfolio includes products for powertrain (engines and transmissions), chassis and wheel-end applications. High pressure valve stem seals, low friction bonded piston seals and low friction engine seals are some of the innovations that help reduce friction and CO₂ emissions to meet customer needs and regulatory requirements. They complement well-established products such as the SCOTSEAL range for heavy duty wheel ends, which offer easy maintenance and long life, or dual compound fork seals for mountain bikes.

Low friction seals for eDrive units are tailored to the requirements of electric motors, combining robust sealing performance with defined shaft rotation in high-speed applications.

Industrial power transmission seals

In dynamic seals, sealing function is as important as friction management. The performance and lifetime of your power

train transmission arrangement is directly related to the sealing solution. SKF's range of sealing solutions supports virtually every industrial sector and application, from pumps, gearboxes and compressors to machine tools, turbines, heavy industry rolling mills and tunnel boring machines.

Examples of SKF's offerings include the range of metric outer diameter rubber shaft seals with materials specifically designed to be compatible with aggressive gearbox oils.

Sealing heavy-duty industrial applications is a major challenge due to the extreme conditions they often face. Equipment in industries such as metals, mining, cement, pulp and paper, and wind turbines require robust radial shaft seals that can withstand a wide range of temperatures, speeds and abrasive contaminants. SKF offers a comprehensive range of sealing solutions tailored to these demanding environments.

SKF's expertise in the renewable energy industry extends to seals for marine, wind and hydropower applications. Our customized sealing solutions are designed to withstand harsh marine conditions and ensure the long-term viability of the technology. For wind energy, SKF's seals are designed to improve turbine performance



and reliability, reducing maintenance costs and contributing to more cost-effective power generation.

In addition to seals, SKF offers shaft protection solutions through its SPEEDI-SLEEVE range, which provides a seal counter-face to help reduce downtime and improve sealing system performance.

Fluid power seals

Sealing solutions for fluid power applications such as hydraulic cylinders must meet the demands of extreme operating conditions and power density, which in turn place high demands on seal design and material development. SKF materials are proprietary formulations that offer excellent chemical compatibility with various hydraulic fluids and mechanical properties such as wear and extrusion resistance and low compression set.

SKF offers both standard and customized solutions for fluid power applications. These include wiper seals, rod seals, guide rings, piston seals, static seals and rotary manifold seals. Sealing solutions are also offered for shock-loaded linear actuators operating in a wide temperature range. Buffer seals and high-strength anti-extrusion rings accommodate the high-pressure spikes that occur in applications.

Practical cases:

- **Mudblock seal for less friction and higher protection**
The multi-lip design, MUD11, with integrated counter surface prevents the ingress of contaminants and keeps lubricants in the bearing. This results in up to 20% less seal friction than competitive seals, thus minimizing energy loss and improving efficiency. Customers benefit from improved reliability and reduced costs and can expect up to 50% longer seal operating life than competitive seals.
- **Longer life for bearings**
Manufacturers in the metal industry have partnered with SKF to implement our revolutionary TENUTE TR/8/PTV seal, which incorporates our patented rubber energized PTFE sealing lip design innovation. It withstands demanding application rolling speeds while maintaining ideal rigidity, thus extending seal life by at least three times and reducing maintenance requirements.
- **Smooth operation in hydraulics**
Hydraulic cylinders in agricultural vehicles must provide the power to steer, lift, pull and push in all operating conditions. However, leaks can cause cylinders to malfunction, resulting in equipment breakdown. Our seals undergo extensive in-house testing, such as the SKF S1S rod seal made of ECOPUR, which can withstand 400 bar and higher pressure spikes.
- **Fulfilling food and beverage standards**
Seals play a key role in hygienic design. To optimize performance, it's essential to have a sealing solution that works without fail, eliminating gaps or dead spots where residue can accumulate. In addition, the material must meet food safety standards and be resistant to cleaning chemicals. A distinctive blue colour is also essential to facilitate rapid detection of a seal failure.

Fluid handling seals

Sealing solutions for fluid handling applications may need to operate in contact with various types of fluids or slurries, some of which require strict regulatory compliance. SKF offers metal spring loaded seals. These seals meet the needs of industries such as oil and gas or food and beverage, which require specific regulations such as FDA, EU and 3A approved materials.

Customized machined seals

We are a global market and technology leader in high quality custom engineered sealing solutions, offering a comprehensive range of machined seals for many industries.

The innovative production system - SEAL JET - reduces production and delivery times to a minimum. Virtually any type of seal can be produced for any application, in any size and design.



SCOTSEAL for trouble-free operation

Scotseal X-Treme for commercial truck, bus and trailer fleet wheel-end applications and trouble-free operation. It reduces frictional running torque by approximately 30% compared to its closest competitor, which in turn reduces operating temperatures by 15%, resulting in longer seal life.

Expertise in full circle

Seal design and material, product and process development, combined with simulation techniques and advanced failure analysis, are essential elements for successful seal development. SKF combines these elements with its application expertise to provide solutions based on an understanding of sealing systems under real conditions. SKF works in close partnership with its customers to understand specific requirements and develop the right material.

Materials

SKF is a pioneer in materials development with a dual focus on customer needs and sustainability. Innovation, which is at the core of our approach, where we continuously explore new materials and manufacturing techniques. This is complemented by collaboration with external academic and industry experts as well as internal teams, especially in the areas of material characterization and advancing seal performance.

SKF’s customer-centric philosophy places great emphasis on involving customers in our material and design processes. The insights provided by customers guide SKF’s research and development, allowing us to tailor products to meet specific needs and challenges. This strategy leads to product excellence and fosters long-term trust and partnerships.

One of the most critical elements in sealing technology is the selection of suitable materials to meet demanding requirements. Seals must be able to withstand increasingly high temperatures, forces and pressures. Specific media and lubricant properties must also be considered. Some media require strict regulatory compliance, such as for food and beverage applications. In other cases, new generation biodegradable hydraulic fluids or alternative fuels - such as hydrogen - for automotive applications require special consideration.

SKF has the capability to design seals in a wide range of materials including elastomers, polyurethanes, thermoplastics and special materials such as high-performance plastics. Proprietary materials provide the right solution for different applications. ECOPUR is a thermoplastic polyurethane (TPU) material with unique high abrasion resistance, low compression set, high physical properties and tear strength, making it particularly suitable for use in hydraulic applications. In addition to materials, coatings also play an important role, whether to accommodate small imperfections in the housing bore surface, such as SKF Bore tite coating, or to increase durability, such as the metallic coating used in the SPEEDI-SLEEVE Gold version.



The art of digital twin and analysis

The SKF Seals digital twin platform combines advanced dynamic simulation methods with proprietary analytical models developed in-house (such as Finite Element Analysis, or FEA), which are critical to achieving a high degree of consistency between simulation and physical reality. This process provides SKF designers with a tool to simulate almost any operating condition with different seal geometries to identify critical areas in the seal design. Data from thousands of seal tests performed each year provide valuable knowledge and complement or validate the digital twin approach.

Testing

The range of tests includes durability, contamination exclusion, salt fog corrosion, cold temperature test, pumping rate for ro-

tary, linear and static seals, friction torque, dry wear and material compatibility tests. SKF also has application-specific test rigs designed to simulate the real working conditions of the product installed in the customer’s actual application.

Dynamic application tests are continuously monitored to verify parameters such as under lip temperature, friction force, oil leakage and a host of other test conditions. Samples are analysed to characterise failure modes using state-of-the-art instrumentation. This enables SKF to continuously develop new solutions for every industry and application.

SKF has a global network of test facilities to analyse the different variables in which the seal operates. SKF laboratories are equipped with both static and pulsating

high pressure test rigs capable of generating pressures up to 3 000 bar and temperature extremes from –40 to 150 °C. Facilities include a clean room test facility that meets medical device requirements.

System knowledge

Combining expertise in seals, bearings and lubrication systems with application knowledge and tribology expertise gives SKF a deep understanding of the system in which the seal will operate.

Proprietary innovations

SKF has developed an innovative and patented process where PTFE (Polytetrafluoroethylene) is bonded to the NBR (Nitrile Butadiene Rubber) sealing lip. This proprietary technique is an important innovation in sealing technology that contributes to the performance and durability of seals in various applications. Alongside our patented PTFE bonding process, SKF’s introduction of the SEAL JET system has revolutionized machined sealing. This innovative technology offers precise, on-demand machining of seals, remaining a cornerstone of our business and optimizing both flexibility and system performance.

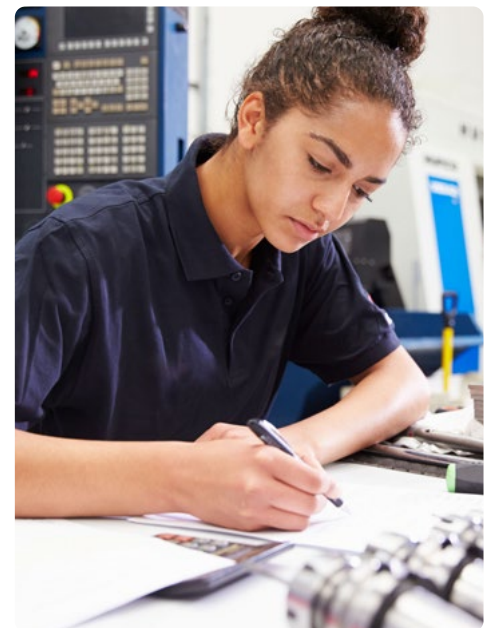




SKF seals footprint

SKF has dedicated sales, engineering and service teams in every market around the world. This brings us closer to customers and their technical centres to better respond to needs and requirements across organizations and markets.

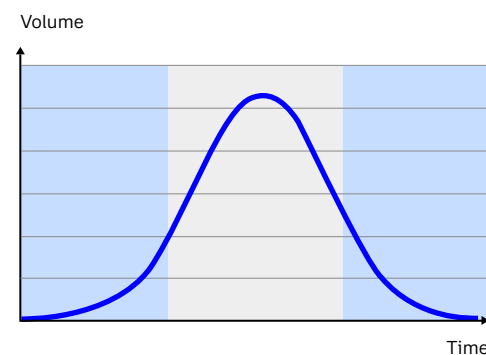
SKF is closer to the customer than many other manufacturers through efficient logistics services, distributors and manufacturing facilities around the world. SKF's experienced people make the difference with their professionalism and commitment to each customer. SKF is present in more than 130 countries through sales offices and authorized distributors.



The proximity and flexibility you can count on

SKF's unique production model can respond quickly to your supply needs, whether you require large volumes or a single seal for a range of standard or customized applications.

Product life cycle stages



- Machined seals**
Cost-effective production of low-volume prototypes and seals with short lead times (during launch, initial growth, decline and to meet replacement demand).
- Moulded seals**
Cost-effective production of customized and standard catalogue seals in medium and high volumes (growth and maturity phase).

Moulded seal production technology enables cost-effective production of seals in medium to high volumes. SKF has expertise in compression, injection and transfer moulding technologies and the most appropriate process will be used to meet your requirements.

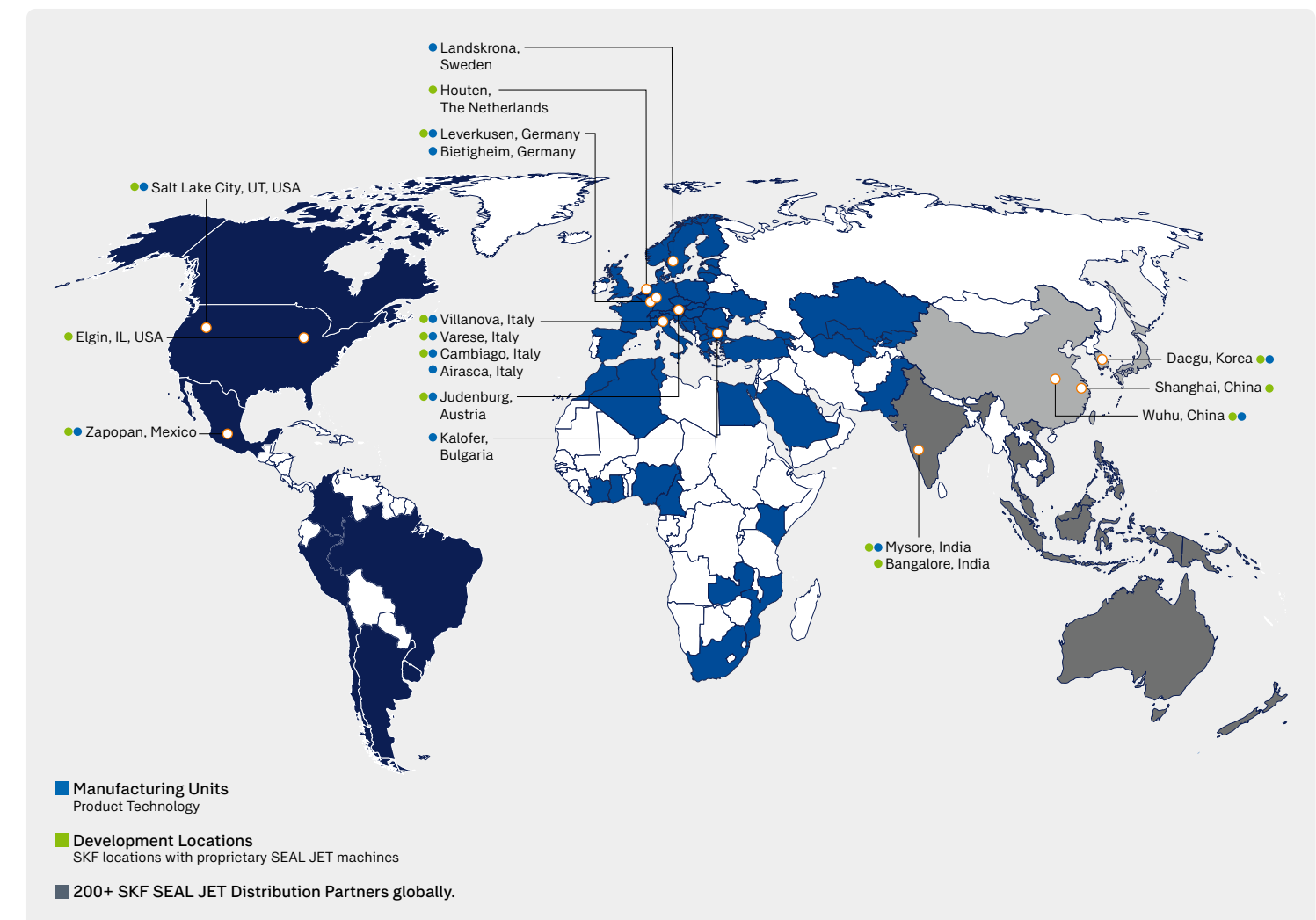
We can produce seals with diameters ranging from 2.2 mm to 18 000 mm and more. SKF can produce many seal designs,

such as metal-encapsulated seals, rubber outside diameter seals with metal inserts, fabric-reinforced as well as all-rubber types, which allow the customization of large diameter seals that meet the requirements of the industry.

One of the specialities is the polyurethane-based seal that can be welded on site to reduce downtime.

SEAL JET technology for the production of machined seals is based on proprietary software and special tools developed by SKF for machining various polymers, especially polyurethanes.

Without tooling costs, it enables fast and flexible production of prototypes for innovative applications, low volume production or replacement seals.



At home in any industry

Our story unfolds through strategic acquisitions around the world, from Chicago Rawhide, now CR Seals, to most recently Tenute. We've intricately integrated different specialized technologies, making them an integral part of our DNA.



SKF's systems approach to bearing and seal design, together with its wide range of materials and designs, can help customers improve their product performance and gain a competitive edge in the marketplace.

SKF sealing solutions are at home in every industry, providing superior performance and a competitive advantage:

- Cars
- Two-wheelers
- Off highway vehicles (Construction vehicles)
- Agriculture
- Mining, mineral processing and cement
- Metal industries
- Hydropower
- Machine tools
- Trucks
- Railways
- Food and beverage
- Gearbox, pumps, compressors
- Pulp and paper
- Wind energy
- Tunnel boring machines
- Marine

Customers demand machines with reduced friction, faster operation, greater durability and safety. Meeting these needs in a sustainable way is critical to building a better future, where advanced solutions drive progress while protecting the environment.



