



Optimize performance and reliability

with SKF solutions for the oil and gas industry



The Power of Knowledge Engineering

Out here, reliable performance



really is the bottom line

Operating conditions in the oil and gas industry have always been among the world's most punishing. Severe temperatures. Extreme pressures. Shock loads. Abrasive environments that can degrade equipment and force costly, unplanned shutdowns.

For some fields, the grueling conditions are getting even worse. Thanks to continued increasing demand, exploration and production companies are heading into ultra-deep waters, drilling into previously unimaginable depths and pushing equipment to new limits.

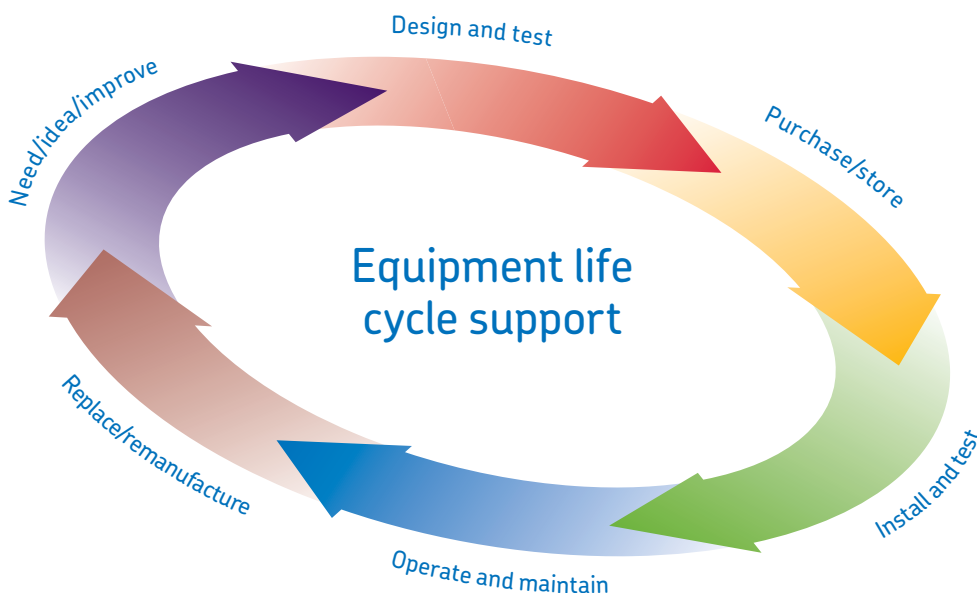
As locations grow more remote and day rates grow more expensive, companies are trying to reduce the need for maintenance and operating costs while increasing reserve output and production. Not the easiest thing to do with senior employee ranks shrinking, and health, safety and environmental regulations expanding.

SKF can help

With expertise in bearings, seals, lubrication systems and lubricants, linear motion technologies and a range of services, SKF offers a single-source for a range of integrated solutions to common oil and gas industry application problems.

These solutions range from specialized bearing types for rig surface equipment to sealed, pressure-compensated bearing units for deep downhole drilling and production. SKF also provides intrinsically safe condition monitoring for explosive environments, plus expert consultancy and reliability services to help both original equipment manufacturers and end-users:

- **increase performance and reliability**
- **reduce operating costs**
- **cut maintenance costs**
- **boost production**
- **reduce lubricant usage**
- **enhance worker safety**
- **upgrade equipment**
- **minimize capital expenses**
- **satisfy environmental regulations**



Support at every stage

From developing new products to remanufacturing existing products, SKF delivers in-depth support for designers, manufacturers and end-users at every point in the equipment lifecycle.



A platform for improved equipment performance

Bearings and units

SKF works closely with customers to address increasing industry demands on oil and gas production equipment, from rate of penetration to sub-sea reliability and maintainability. As a result, specialized SKF solutions are at work today in a wide range of equipment including tri-cone drill bits, down hole motors, top drives, equivalent circulating density systems, sub-sea pumps and compressors.

Using advanced SKF modelling and simulation software, SKF engineers are able to optimize bearing designs to increase equipment performance and productivity. Unitized, sealed designs, super strength steels, and ceramic elements combine to enable SKF bearings to cope with the harshest operating conditions including sour gas attack, cryogenic and sub-sea environments.

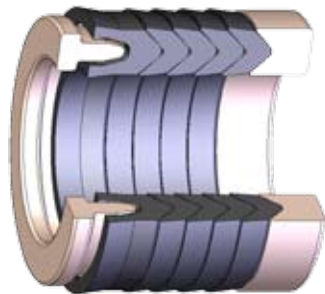


Seals

Drawing on extensive oil field experience, SKF provides high quality, highly reliable sealing solutions for an extensive range of oil field equipment operating in extreme temperatures ranging from -240 to 300 °C, and under pressures from vacuum to 172 MPa. SKF sealing solutions have been proven on critical equipment such as drill motors, measurement-while-drilling tools, electric submersible, positive suction and injection pumps, packers, wash pipes, blow-out preventers, valves, sub-sea chokes, risers, pipes, equivalent circulating density systems and slew rings.

SKF application engineers have the competence and experience to provide custom-made sealing solutions to complex problems, utilizing industry standard and in-house developed materials.

Computer aided design and finite element analysis can be employed to develop custom engineered sealing solutions that meet specific customer requirements.



Lubrication

Since developing the first greases for rolling element bearings, SKF has extended its capabilities to reduce lubrication related problems in equipment such as motors, pumps, top drive gearboxes, turbines and compressors. Solutions range from basic oil management to simple automatic lubricators and more complex intrinsically safe multi-channel grease and oil lubrication systems. These systems provide more efficient, controlled lubrication of machines, significantly reducing unplanned failures due to lubrication problems while enabling smoother running and extended maintenance intervals.



Mechatronics

Integrating mechanical, electronic and information processing technologies, SKF mechatronics solutions are enabling designers to move from hydraulic and pneumatic actuation to a new generation of lightweight, energy-efficient and more environmentally friendly solutions. Applications include sub-sea electric valve actuators, Christmas trees, blow-out preventers, gate valves, encoders, measurement-while-drilling tools and winches.



SKF magnetic bearings enable critical high speed equipment to operate without oil and are virtually maintenance-free. Applications for magnetic bearings can include turboexpanders, generators, and compressors in both pipelines and production facilities.



ance, productivity and profitability

Services



For over 25 years, SKF has provided a wide range of on- and off-site services to help oil and gas industry customers optimize overall equipment effectiveness and reduce downtime, maintenance and lifecycle costs.

Provided under the SKF Asset Efficiency Optimization umbrella, services and support range from maintenance strategy reviews and spare parts optimization to predictive maintenance and operator driven reliability programmes. SKF also can assist in the population of enterprise asset management and computerized maintenance management systems.



SKF's intrinsically safe monitoring and protection systems are used to maintain critical machine integrity and provide machine condition and process data to specialists locally, as well as through remote monitoring and reporting. SKF continually develops advanced monitoring systems using the latest wireless and distributed system technologies to minimize installation costs for both new equipment and retrofits.



Real world solutions

The benefits of SKF solutions and services are not just hypothetical. In decades of close cooperation with oil and gas producers, large and small, we have been able to help deliver substantial and measurable improvements in machine reliability and maintenance efficiency. A few examples are briefly noted here:

By implementing an SKF maintenance strategy review, a North Sea customer was able to reduce annual maintenance costs by 20%.



Installation of SKF's 'sour gas' bearings in a gas compressor enabled a Canadian customer to extend maintenance intervals from three months to three years.



Installing SKF magnetic bearings in a Norwegian customer's turboexpanders resulted in a reliability rating of 99.6 % and significantly reduced maintenance costs.





Integrated product development

Whether developing equipment for exploration, production, topsides, sub-sea or land-based applications, today's designers face a constant challenge: satisfying customer demand for more reliable, productive equipment that requires less maintenance and has lower operating costs. SKF can help.

Design for Six Sigma is part of SKF's product development process. The concept helps to reduce product emergencies after launch, product recalls and warranty issues. It also helps to reduce engineering changes late in the process that can increase the risk of problems developing after the product launch. Design for Six Sigma is part of the SKF Six Sigma programme that SKF uses to achieve sustained and controlled improvements in our business and our customers' business.

SKF Engineering Consultancy Services

With more than 100 years of rotating machinery expertise and extensive oil and gas industry application experience, SKF consultants can help you take designs from concept to reality, whether it be drilling equipment, top drive gearbox or other rotating equipment.

Using advanced, proprietary simulation software, SKF can optimize designs while still in the prototype stage, reducing development time and helping to make sure that your new design will be 'right'

from the start. Or we can help you troubleshoot an existing design to better understand the cause of failure or underperformance.

You can explore the merits of various options prior to prototyping, or subject prototypes to actual application conditions with a virtual SKF test rig. Our experienced engineering consultants can perform root cause failure analysis, as well as metallurgical, lubrication, seal and chemistry testing. In short, SKF Engineering Consultancy Services can help you outperform the competition.

Benefits include:

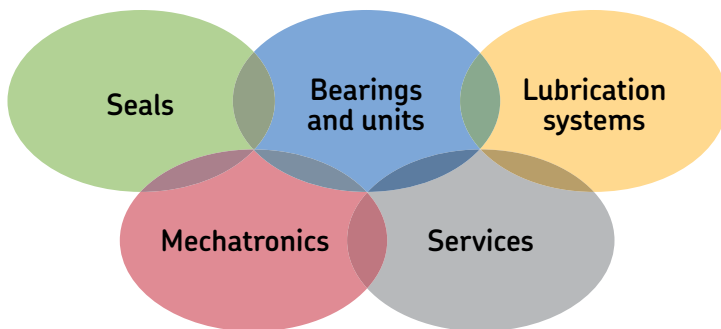
- reduced total costs
- reduced product lifecycle costs
- reduced time to market
- improved manufacturing and assembly
- faster delivery times
- improved product reliability
- reduced product maintenance
- lighter, more compact designs
- improved energy efficiency



*See inserts for more details
about SKF solutions for the
oil and gas industry.*

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Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units; seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management services. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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