

SKF Explorer self-aligning roller bearings

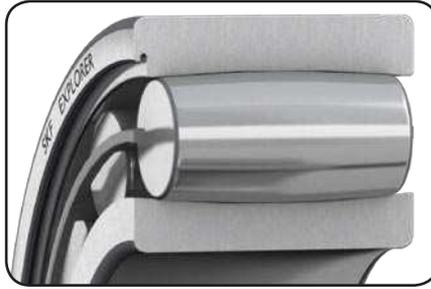
Now with extended bearing service life



SKF Explorer bearings – The world sta

Certified performance

The SKF Explorer performance class has been certified by Det Norske Veritas and Germanischer Lloyd to last longer than standard bearings.



Standard for endurance and performance

SKF has raised the performance bar for its full line of SKF Explorer self-aligning roller bearings. These bearings now feature the unique attributes of SKF Explorer bearings combined with improved wear resistance.

Self-aligning roller bearings are typically used in demanding process equipment that requires a high degree of reliability even where there are high levels of contamination and poor lubrication conditions.

To meet the needs of those challenging applications, SKF developed the SKF Explorer performance class of bearings, which has set the world standard for endurance and performance.

The unique engineering, manufacturing and material improvements of SKF Explorer bearings have been shown to:

- increase uptime
- improve reliability
- increase productivity
- reduce noise and vibration levels

The financial and environmental benefits

Because SKF Explorer bearings run cooler, smoother and longer than non-SKF Explorer bearings, they can extend maintenance intervals, help to increase productivity and contribute to a more profitable bottom line.

SKF Explorer bearings also contribute to decreased environmental impact through downsizing and reducing both lubricant and energy consumption.

Test conditions

Original test results of SKF Explorer performance class spherical roller bearings compared to competitors', prior to the upgrade.

Bearing basic designation: 22220

Sample: 35 bearings per brand

Load: 140 kN

C/P: 3,0

κ : 1,76

Speed: 1 500 r/min



Increase bearing service life

All standard SKF spherical roller bearings, CARB toroidal bearings and most spherical roller thrust bearings are now manufactured to SKF Explorer performance class specifications. All have been upgraded to a new level of performance.

Combining the clean and homogenous high-quality steel used in the original SKF Explorer bearings with an improved heat treatment process, upgraded SKF Explorer bearings provide longer service life, particularly under difficult operating conditions.

Find out how upgraded SKF Explorer bearings can improve the reliability and performance of your application.

SKF Explorer bearings raise the

Tested against the best

When SKF materials experts developed the upgraded bearing steel, they tested it against the best – original SKF Explorer bearing steel. During these demanding tests, researchers were not interested in knowing how much better the upgraded SKF Explorer bearings would perform compared to the competition. They wanted to know how much better they would perform against an already proven leader in the market.

When compared to original SKF Explorer bearings, the upgraded bearings have a superior balance between hardness and toughness. This advancement gives SKF Explorer self-aligning roller bearings a higher degree of wear resistance, enabling longer service life, especially in applications affected by high contamination or poor lubrication conditions.

Improved performance under tough operating conditions

SKF upgraded bearing steel can extend the service life of SKF Explorer self-aligning roller bearings regardless of the application. However, the benefits are most noticeable in applications where bearings are subjected to contaminated or poor lubrication conditions.

Upgraded SKF Explorer bearings can provide the following benefits:

- **Significantly improved wear resistance**

SKF compared the wear resistance of upgraded SKF Explorer bearings to original SKF Explorer bearings.

The test results showed that upgraded bearings were significantly more wear resistant than the original SKF Explorer bearings (→ **diagram 1**).

Customer benefits

When compared to original SKF Explorer bearings, the upgraded bearings further improve:

- Bearing service life
- Wear resistance
- Contamination resistance
- Robustness
- Reliability

Industries and applications

- Mining, mineral processing, cement
- Material handling
- Metals
- Industrial transmissions
- Preheaters
- Wind power
- Marine

Diagram 1

Relative wear for different bearing steels: Medium and large size bearings

Test conditions

Lubricant: Turbo T 68 mineral oil containing 3g/l of cast iron powder
 κ : 1,2
C/P: 3,4
Speed: 525 r/min
Running time: 72 hours
All components were weighed before and after the test



performance bar

- **Extended service life under poor lubrication conditions**

Tests have been conducted at the SKF Engineering & Research Centre to verify the service life of upgraded SKF bearings.

The results (→ **diagram 2**) show conclusively that upgraded SKF Explorer bearings last twice as long as the original, when used under poor lubrication conditions.

- **Extended service life under contaminated conditions**

The SKF Engineering & Research Centre also performed endurance tests under contaminated conditions that verified performance improvements of the upgraded SKF Explorer bearings.

These test results showed (→ **diagram 3**) that the upgraded SKF Explorer bearings provide almost twice the service life under contaminated operating conditions.

Diagram 2

Service life under poor lubrication conditions

Test conditions

Bearings: 22220 E
Load: 140 kN
Speed: 1 500 r/min

Lubricant: Turbo T 9 mineral oil
 κ : 0,45
Operating temperature = 75 °C

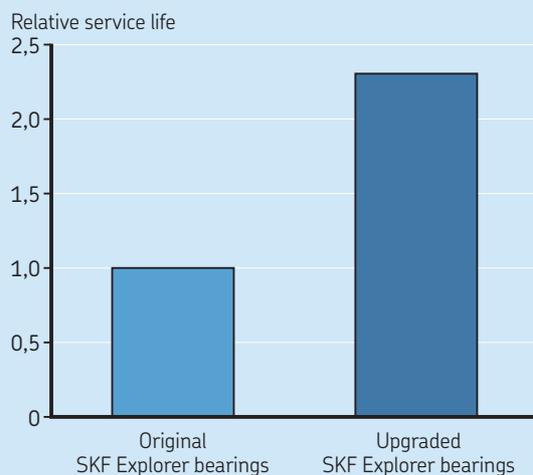


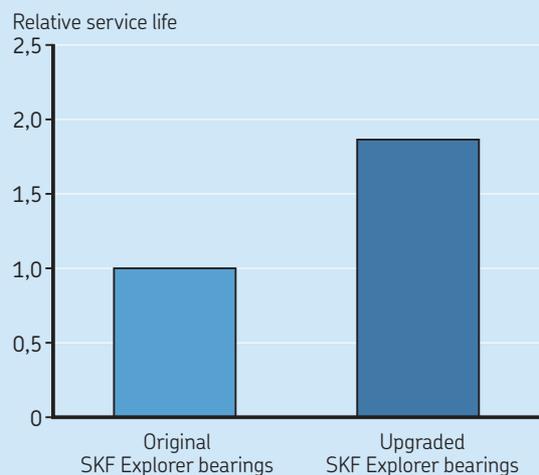
Diagram 3

Service life under contaminated conditions

Test conditions

Bearings: 22220 E
The bearings were run-in under contaminated conditions.
 $\eta_c = 0,2$

Operating conditions after cleaning
Load: 140 kN
C/P: 3,0
Speed: 1 500 r/min
Lubricant: Turbo T 68 mineral oil
 κ : 2,1



Medium and large-size bearings provide additional benefits

In applications involving large process machinery, downtime caused by bearing failure can be very costly. When this downtime is unplanned, costs can skyrocket due to lost productivity. The upgraded line of SKF Explorer self-aligning roller bearings provides a solution.

- **Extended failure mode**

SKF upgraded steel increases hardness, while maintaining or improving toughness. Tests indicate that upgraded SKF bearings, like the original, extend the time from initial spall to through-fracture.

This means that once early signs of bearing damage have been detected, the bearing will continue to operate longer, providing more time to plan, order parts and prepare for a shutdown; thereby reducing downtime and its related costs.

To verify the extended failure mode of upgraded SKF Explorer bearings, through-fracture tests of rings were performed. In these tests, upgraded SKF Explorer bearings were compared to original SKF Explorer bearings.

The results shown in **Diagram 4** indicate that the average radial crack depth at through-fracture, for rings in upgraded SKF Explorer bearings, is deeper than for original SKF Explorer bearings. This shows that medium and large-size upgraded SKF Explorer bearings, like the original, extend the time from initial spall to through-fracture. The extended failure mode, when part of a proactive maintenance program, can virtually eliminate unplanned downtime.

Diagram 5 shows the flange strength of upgraded SKF Explorer spherical roller thrust bearings, which were tested against original SKF Explorer bearings.

After the flanges on the original SKF Explorer bearing steel fractured, the upgraded SKF Explorer bearings ran twice as long and had only developed spalls.

For additional information visit us on the web: www.skf.com/upgrade

Diagram 4

Average radial crack depth at through fracture

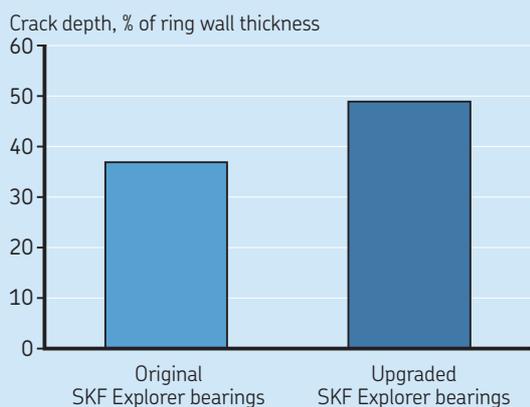
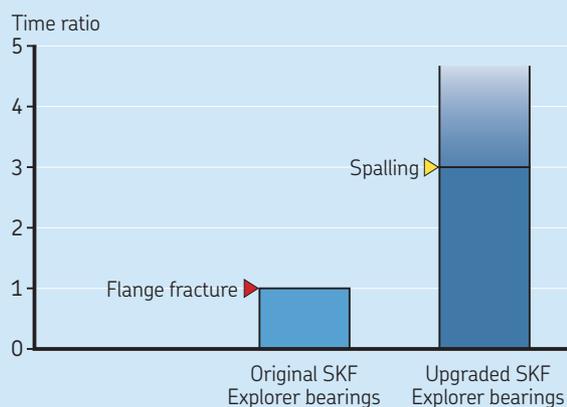
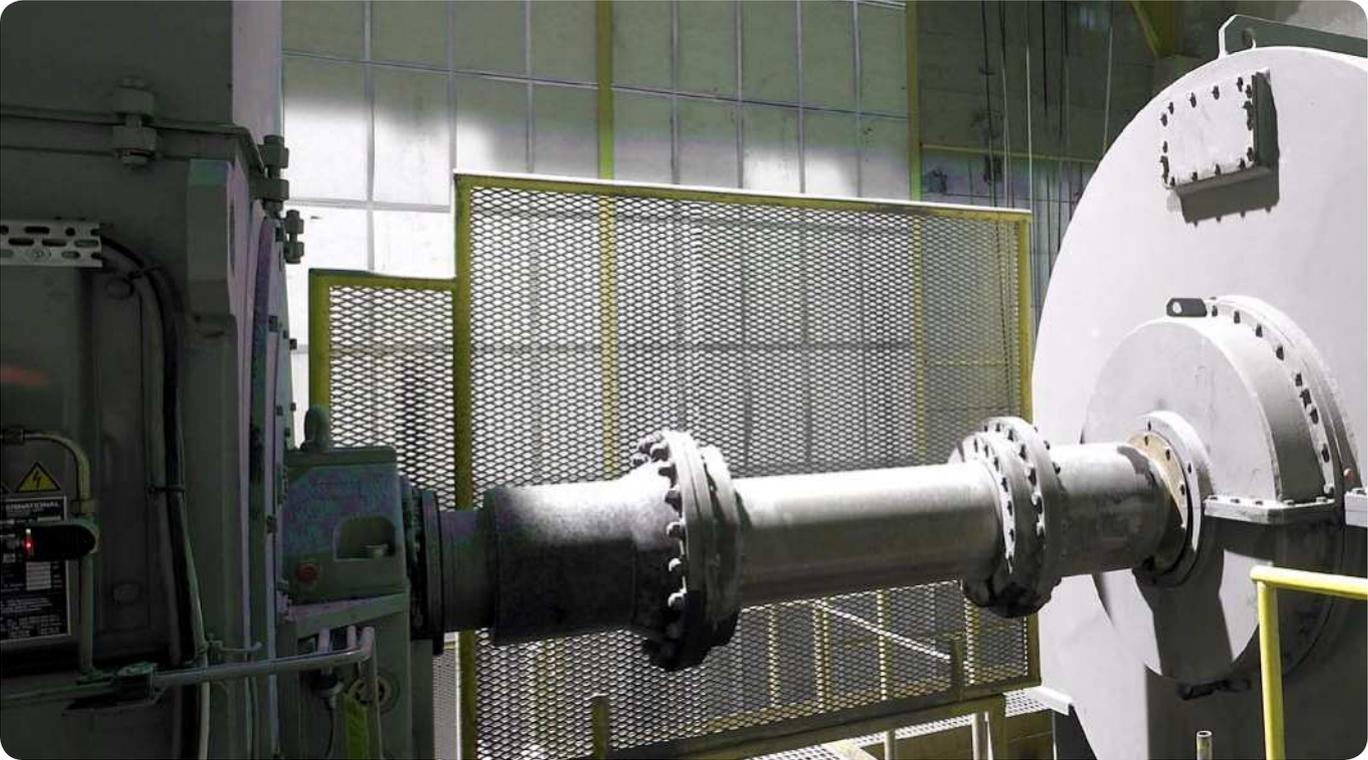
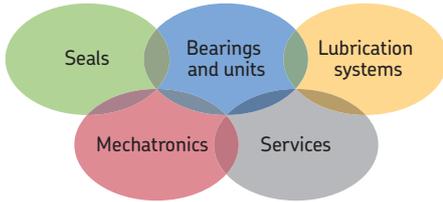


Diagram 5

Spherical roller thrust bearing flange fracture test – Time to failure Medium and large-size bearings







The Power of Knowledge Engineering

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 systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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