SKF spherical roller bearings for wind turbine main shafts

Proven, cost-effective solutions for improving turbine reliability and availability
The wind industry is under enormous pressure to reduce cost per MWh by improving turbine designs, raising performance, and increasing reliability – all while reducing maintenance costs.

Wind turbine operators must ensure that their assets remain operational for as long as possible. Turbines often operate under tough conditions, which can limit performance and reliability. The main shaft of these turbines must withstand demanding axial and radial loads. With turbines getting ever larger, this is only likely to increase. The high cost, long lead times, and technical difficulty of replacing these main shaft bearings means that operators want them to last for the turbine’s full 25-year operating life.

By fitting bearings that match the exact needs of the application, turbine reliability can be improved and bearing service life extended and thereby the levelized cost of energy (LCOE) can be reduced.

In response, SKF has created its first spherical roller bearing that is optimized for use in wind turbine main shafts.

Stay competitive and solve your technical challenges

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To make SKF spherical roller bearings an even more reliable and cost-effective choice, SKF created the first symmetrical spherical roller bearing designed explicitly for wind turbine main shafts. By eliminating unnecessary features and improving those critical to the application, SKF was able to tailor an SKF Explorer spherical roller bearing that would be even more robust and reliable in main shaft arrangements.

**SRB Wind**

SKF’s customized main shaft bearing design is optimized for a more sustainable, reliable, cost-effective solution specific to the challenging operating conditions faced by wind turbines. This unique, industry-specific solution can help meet demands for increasing size and power output of wind turbines. And, importantly, one that can reduce the levelized cost of energy, a goal that is increasingly challenging in light of dwindling government subsidies.

**Designed for longer life and improved robustness**

- Larger and more lubrication holes
- Optimized internal geometry
- Larger contact angle
- Larger diameter of rollers
- Circumferential groove on outer ring raceway
- No guide ring
- Wider outer lubrication groove
- Roller guided cast iron cage

The robust and cost-effective SRB Wind symmetric design features:

- Modified inner geometry for more robust and reliable bearing performance
- Reduced contact pressure significantly prolongs bearing calculated life
- Eliminating unnecessary internal elements like the guide ring and mid flange minimizes risk of wear
- Optimized cast iron cage for higher stiffness and increased hardness
- External groove acts as grease reservoir to enhance lubrication, reduce bearing wear and provide smoother performance
- Reduced overall weight
- Flexible design is 100% interchangeable with existing arrangements for retrofit
Improved performance for both 3-point and 2-point main shaft arrangements

Self-aligning roller bearings are expected to remain the dominant bearing type in main shaft applications for wind turbines up to 4 MW. This includes three-point-suspensions where spherical roller bearings are used for the locating position, and two-point-suspensions, which use two spherical roller bearings or in some cases a CARB bearing in the non-locating position. SKF spherical roller bearings for main shafts can be used in either arrangement.

SKF Explorer spherical roller bearings raise the performance bar

Super-clean and homogenous high-quality steel, unique heat treatment, increased material strength and wear resistance, surface finishes and lubrication in the upgraded SKF Explorer spherical roller bearing combine to provide longer service life, particularly under difficult operating conditions.

SKF NoWear Coated Bearings

NoWear from SKF is a wear-resistant carbon coating that can be applied to the rolling elements and inner ring raceway(s) of a bearing. Test results validate that SKF NoWear coating technology:

- Significantly increases main-shaft bearing reliability with the goal of reducing LCoE
- Increases wear resistance on the raceway surfaces
- Reduces friction and prolongs grease life
- Significantly limits wear to avoid micropitting

LAD test results, time to starvation

<table>
<thead>
<tr>
<th>Grease base oil viscosity (cSt)</th>
<th>Time to starvation (Hours)</th>
<th>Suspended test</th>
<th>Past Suspended</th>
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<tbody>
<tr>
<td>Steel roller</td>
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<tr>
<td>Steel roller</td>
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<tr>
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Exceeded 1800 hours

skf.com/us/industries/wind-energy

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