SKF insulated bearings for off-highway hybrid powertrains

Protect your equipment from stray electric currents with solutions from SKF

Insulated bearings increase machine uptime

Typical applications

Hybrid power trains in all off-highway vehicles, including:

- Rigid mining trucks
- Wheel loaders
- Bulldozers
- Excavators
- Tractors
- Forklift trucks
- Mobile cranes
- Telehandlers

Stray electric currents can be costly

The most common causes of stray electric currents are asymmetry in the motor's magnetic circuit, unshielded power cables, and frequency converters used in modern variable frequency drives. The increasing popularity of diesel-electric hybrid vehicles has been linked to the increase in electric current related bearing damage. Whether the current is DC, AC,or high frequency pulses, the possibility of stray electric currents passing through a bearing is very likely.

When a stray current from an electric motor uses a bearing as its path to ground, it can cause micro-cratering in the raceways of inner and outer rings and on the rolling element surfaces. Heat generated by the discharges causes local melting that creates small craters and changes in the structure of the bearing grade steel.

As a result of this initial damage, a washboard pattern may be found on the raceways and rolling elements. This secondary damage is wear caused by the dynamic effect of the rolling elements when they roll over the smaller craters.

Current discharges also cause the lubricant in the bearing to change its composition, degrade rapidly and fail prematurely. Once bearing damage from electric erosion has begun, increased noise levels, reduced effectiveness of the lubricant, increased heat and finally excessive vibration, all combine to drastically decrease bearing service life.

Protect hybrid powertrains with SKF insulated bearings

SKF has developed two electrically insulating rolling bearing solutions: SKF hybrid bearings and INSOCOAT bearings. Both offer proven electrical insulation capabilities that virtually eliminate premature bearing failures caused by stray electric currents.

Already used or in use in a number of industrial, railway and wind power applications, SKF insulated bearings are engineered to handle the frequent starts and stops and constant speed variations common to off-highway vehicles.

Optimize your insulation solution with SKF

SKF engineering consultants can work with your design team to tailor a solution that meets the needs of your application. Drawing on application experience ranging from the earliest off-highway drivetrain to the latest designs, SKF can help you:

- Increase vehicle uptime
- Streamline development processes
- Increase power density
- Decrease power losses
- Reduce noise and vibration levels
- Extend bearing/component lifecycles
- Simplify assembly

INSOCOAT bearings

INSOCOAT bearings are a well-proven, cost-effective solution for applications in which DC or low frequency AC currents are present. An INSOCOAT bearing is an electrically insulating bearing that has the outside surfaces of its inner or outer ring plasma-sprayed with aluminium-oxide to form a coating. The coating is sealed with a resin to protect against the conductive effects of water and moisture. INSOCOAT bearings have been tested to withstand voltages up to 3 000 V DC.

Features

- Reliable electric insulation
- Outstanding coating quality
- Require no special handling or mounting
- Suitable for all bearing housing types
- Bearing dimensions according to ISO
- Single row deep groove ball bearings and single row cylindrical roller bearings available as standard
- Custom designs and solutions also available

Benefits

INSOCOAT bearings

- Virtually eliminate premature bearing failures due to stray electric currents
- Help prevent lubricant degradation from current discharges
- Interchangeable with standard bearings
- Increase machine uptime
- Reduce maintenance costs

SKF hybrid bearings

Ideal for applications with high frequency currents and voltages caused by frequency converters, SKF hybrid bearings combine steel rings with silicon nitride ceramic rolling elements. In addition to superior electrical resistance, SKF hybrid bearings offer a lighter, harder, more durable alternative to conventional all-steel bearings, making them ideal for compact, high-power density designs.

Features

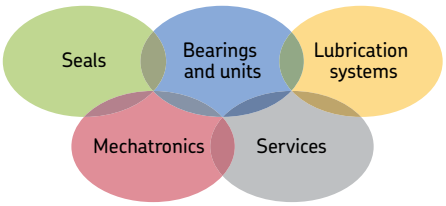
- Excellent tolerance to poor lubrication
- Require no special handling or mounting
- High vibration and wear resistance
- Low mass and reduced friction, especially at high speeds
- Available as single row deep groove ball and single row cylindrical roller bearings
- Custom designs are also available

Benefits

SKF hybrid bearings

- Long, dependable service life in variable frequency drive applications
- Virtually eliminate electrically caused lubricant degradation and accordingly increase bearing service life
- Lower bearing operating temperature at high speeds
- Reduce maintenance costs
- Increase machine uptime
- Reduce lubricant and energy consumption

For more information about INSOCOAT and SKF hybrid bearings, contact your SKF representative.



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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