SKF redesigns brass cages for deep groove ball bearings

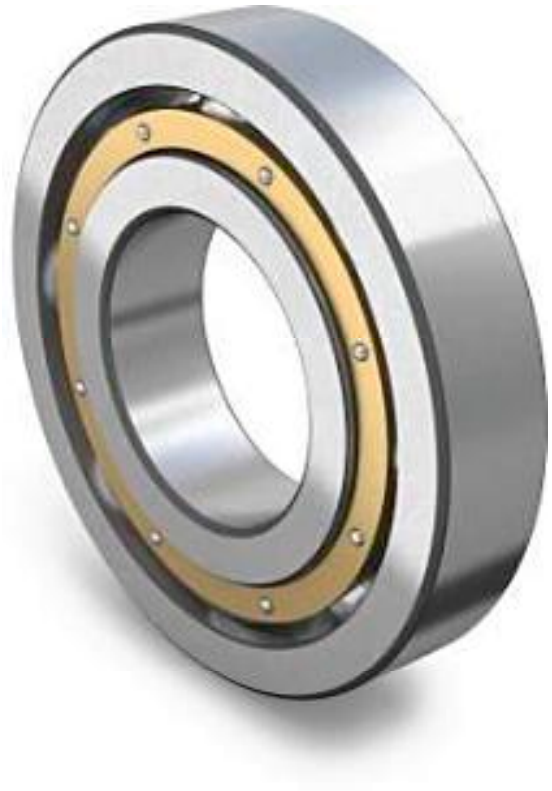
The redesigned brass cages in SKF deep groove ball bearings are better able to accommodate vibration, shock loads and temperature gradients, to meet the ever-increasing need to improve bearing performance under severe operating conditions.

Design improvements

The more robust, newly redesigned machined brass cage, identified by an M in the designation, is not just more wear resistant. It also reduces noise and vibration levels while maximizing the effects of the lubricant.

To reach this new level of performance, the following improvements were made:

- Optimised cage pocket geometry
  - Reduced contact stresses between the cage and balls
  - Improved ball guidance
  - Optimised ball-to-cage contact
  - No edge contact promotes the formation of a hydrodynamic film
- Smaller cross section reduces mass and inertia
- Improved surface finish



SKF deep groove ball bearing equipped with new brass M-cage

Performance comparison between the current and redesigned brass cage

The lower cross section of the new M-cage reduces the weight of the cage by 25%. It also increases the free space in the bearing to accommodate more lubricant. Benefits include:

- Improved wear resistance
- Improved ability to accommodate shock loads and vibration
- Lower friction-torque during start-up
- Significantly reduced noise levels

Analytical studies

Using SKF's advanced internal design, calculation and simulation tools, SKF engineers were able to confirm the technical improvements of the new cage design with regard to cage wear, stability, performance and noise.

The diagram below shows calculated results regarding the cumulative energy of ball impacts in the cage pockets for three different operating conditions compared to the previous M-cage design.

The three representative operating conditions can be found in the table below.

Cage stability

The optimized cage pocket of the redesigned M-cage provides a clear improvement in terms of guidance and stability when compared to the previous design. This was achieved, in part, by reducing cage pocket clearance. The result: a smoother and more stable running behaviour.

Cage performance and noise

The improved ball-to-cage contact geometry significantly reduces internal cage forces and impact energy.

Since the level of impact energy is reduced, the noise level produced by the new M-cage is also reduced. This has been proven by tests in both the laboratory and in customer applications.

The optimized cage pockets enable the cross section of the cage to be reduced without affecting stiffness. A lower cross section helps to reduce inertial forces in the bearing in applications where there are frequent starts and stops or high speeds.

The offer

The redesigned M-cage is an integral part of the new "quiet running" deep groove ball bearing offer (VQ658) dedicated to generators in wind turbines.

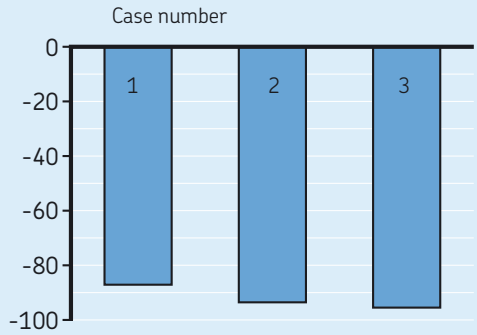
Furthermore, the newly developed M-cage design will be the standard machined brass cage for INSOCOAT deep groove ball bearings and SKF hybrid deep groove ball bearings.

The redesigned machined brass cage will retain the M in the designation suffix.

For additional information, contact the SKF application engineering service.

Detailed view of the newly redesigned M-cage pocket

Reduction of cumulative energy of the impacts in %



Case number	Clearance	C/P value	Misalignment [°]	Speed [1/min]
1	C3 min	4	0	650 000
2	C3 min	15	0	100 000
3	C3 min	15	10	650 000

Cage performance; reduction of associated impact energy level in %; previous M-cage design is shown as 0% for reference

PUB BU/S7 11661 • May 2011

Printed in #### on environmentally friendly paper.

Certain image(s) used under license from Shutterstock.com