Higher-speed capability with the new BTM bearing series design

Super-precision double direction angular contact ball bearings

Improved high-speed capability with the new generation SKF BTM series

Double direction angular contact bearings, as their name implies, were developed by SKF to axially locate machine tool spindles in both directions. In these applications, a high degree of system rigidity is one of the main performance challenges, as the magnitude of elastic deformation under load determines the accuracy of the equipment.

To keep up with the ever increasing performance challenges of precision applications, SKF has completed the upgrade of the double direction angular contact thrust ball bearings assortment. The existing basic design (BTW series) is now complemented by the redesigned high-speed BTM series.

Super-precision bearings in the BTM series have been redesigned to accommodate higher speeds, anywhere from 6% to 12% depending on the size; minimize heat generation, even at higher speeds; provide high load carrying capacity and maintain a high degree of system rigidity. Bearings in the BTM series are intended for mounting in combination with cylindrical roller bearings in the NN 30 K or N 10 K series in the same housing bore.

These redesigned bearings are dimensionally and functionally interchangeable with earlier design BTM series bearings.

Bearings in the redesigned BTM series are characterized by:

- high-speed capability
- high axial load carrying capacity
- low heat generation thanks to low friction design
- high stiffness
- extended bearing service life

Bearings in the BTM series provide a high degree of reliability and superior running accuracy for various applications, including surface grinders, milling machines, machining centres and lathes.

Redesigned for improved performance

When compared to the earlier design, bearings in the new BTM series provide a number of advantages. The optimized internal geometry (e.g. raceway osculation or the increased number of balls) and the redesigned cage offer better performance in terms of higher speed and lower operating temperatures, while maintaining a high load carrying capacity.

The redesigned cage also extends bearing service life because it no longer relies on the grooves in the inner and outer rings. The grooves on the earlier designed case had a tendency to collect solid contaminants that entered the bearing.

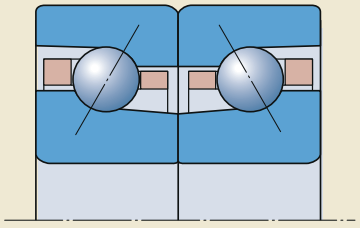
The range of BTM bearings series has been expanded to accommodate shaft diameters from 60 to 180 mm.

The assortment

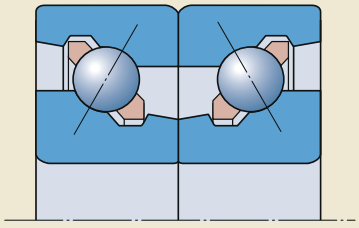
Bearings in the BTM series are sold as matched sets and conform in design to two non-separable single row angular contact ball bearings, arranged back-to-back, to carry thrust loads in both directions. These bearings are manufactured as standard with a predetermined preload so that they will have a suitable operational preload after mounting. The preload is obtained during manufacturing by precisely adjusting the standout of the inner rings versus the outer rings on the bearing set.

Bearings in the BTM series are available with a light preload (designation suffix DBA) or a heavy preload (designation suffix DBB).

Bearings in BTM series are made to a special P4C tolerance class.



BTM series new design



BTM series earlier design

To accommodate increased operational speeds, the bearings are available in a hybrid variant. These bearings equipped with ceramic balls are identified by the suffix HC, e.g. BTM 65 ATN9/HCP4CDBA.

The bore and outside diameters of bearings in the BTM series are in accordance with ISO 15:1998, Diameter Series 0 for radial bearings. The remaining principal dimensions are not standardized either nationally or internationally, but are common in the marketplace.

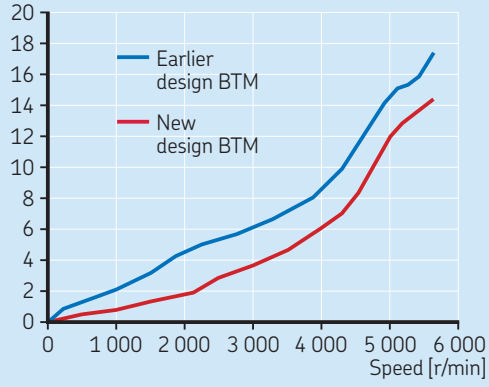
These high-speed design bearings are available with a 30° contact angle (BTM .. A/DB) or a 40° contact angle (BTM .. B/DB). Bearings with a 30° contact angle can accommodate higher speeds while bearings with a 40° contact angle are more suitable for applications that require a higher degree of axial rigidity.

Bearings with a bore diameter ranging from 60 to 130 mm are equipped with a cage made of glass fibre reinforced polyamide 66, designation suffix TN9 (this suffix was not used in the earlier design designation).

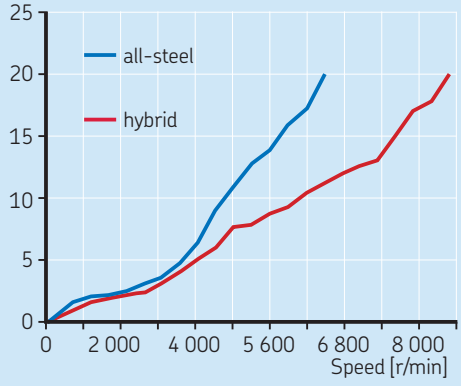
Bearings with a bore diameter ranging from 140 to 180 mm are equipped with a machined brass cages, designation suffix M.
Both cage types are ball-centred. The redesigned cages enable more effective lubricant supply to the ball contact areas resulting in lower friction and higher speed capability.

Bearings in the BTM series have the same bore and outside diameter as bearings in the BTW series, but a 25% reduced bearing width makes them particularly suitable for very compact arrangements. They can operate at higher speeds than bearings in the BTW series but cannot accommodate the same high loads or provide the same degree of axial stiffness.

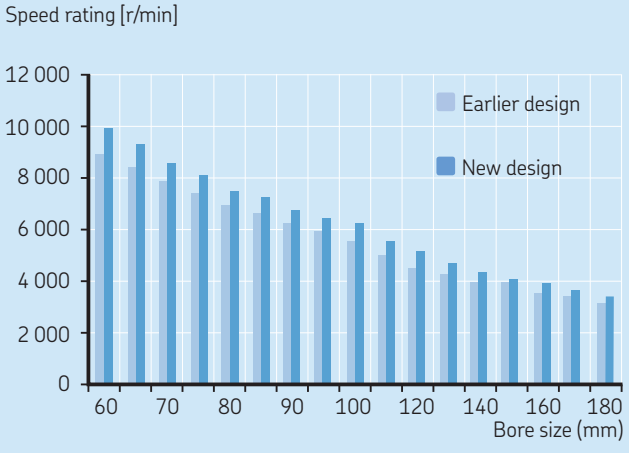
Temperature rise in grease lubricated bearings
Outer ring temperature rise type BTM 100 B/DBA
(earlier and new design)



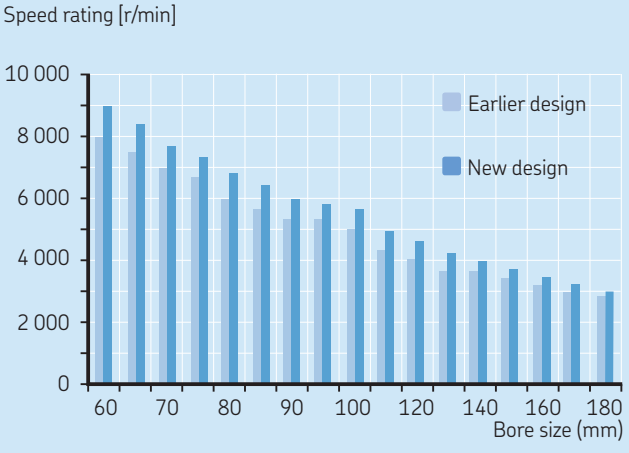
Temperature rise in grease lubricated bearings
Outer ring temperature rise type BTM 100 A/DBA
(new design, all-steel and hybrid execution)

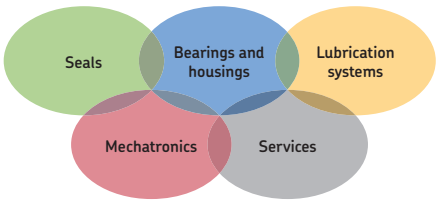


Comparison of attainable speeds – grease lubrication
Bearing series BTM .. A/DBA
(earlier and new design)



Comparison of attainable speeds – grease lubrication
Bearing series BTM .. B/DBA
(earlier and new design)





The Power of Knowledge Engineering
Combining products, people, and application-specific knowledge, SKF delivers innovative solutions to equipment manufacturers and production facilities in every major industry worldwide. Having expertise in multiple competence areas supports SKF Life Cycle Management, a proven approach to improving equipment reliability, optimizing operational and energy efficiency and reducing total cost of ownership.

These competence areas include bearings and units, seals, lubrication systems, mechatronics, and a wide range of services, from 3-D computer modelling to cloud-based condition monitoring and asset management services.

SKF's global footprint provides SKF customers with uniform quality standards and worldwide product availability. Our local presence provides direct access to the experience, knowledge and ingenuity of SKF people.

PUB BU/P2 12119/1 EN · September 2014

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