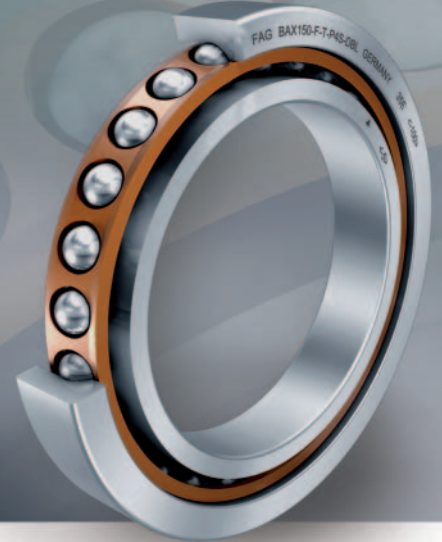




FAG

added
competence



FAG BAX Axial Bearings

High speed bearings for main spindles

SCHAEFFLER

FAG BAX Axial Bearings

Ordering example: BAX110-F-T-P4S-DBL



Figure 1 - FAG BAX – High speed axial bearing for main spindles

The new series of high speed axial bearings (BAX) combines high axial load carrying capacity and rigidity with the suitability for high speeds of main spindle bearings, Figure 1. When used in combination with modern, high speed cylindrical roller bearings of types N10 and NN30 in particular, it is possible to realise high speed spindles with high axial and radial rigidity and load carrying capacity. Since no tilting moments must be supported, the kinematic characteristics under combined load are not impaired, which makes this bearing arrangement particularly robust.

Overall, this means increases in productivity for the machine tool through the use of spindles with:

- excellent machining accuracy
- suitability for very high speeds
- bearing arrangements with high load carrying capacity
- extremely high cutting performance.

Bearing designs

BAX bearings correspond in their diameter to bearings of size 70 and are thus matched to the diameters of cylindrical roller bearings of series N10 and NN30. The possible bore diameters are between 50 mm and 200 mm.

BAX bearings fundamentally have a contact angle of 30° , but are optionally available as 40° bearings for even higher rigidity. They are equipped with a hard material fabric cage and have

the accuracy class P4S. BAX bearings are generally offered as ready-to-fit sets of the arrangement DB in the preload classes L and M.

The new high speed FAG axial bearings for main spindles are dimensionally compatible with double direction axial angular contact ball bearings of design 2344. Substitution is possible with only slight changes to adjacent components and without changes to the shaft and housing, Figure 2. BAX bearings are, in the same way as double direction axial angular contact ball bearings, not radially retained and thus can only support axial loads.

In addition to the standard design with steel balls, the bearings are also available for achieving speed parameters up to $1\,350\,000\text{ min}^{-1} \cdot \text{mm}$ in a hybrid version (HCBAX).

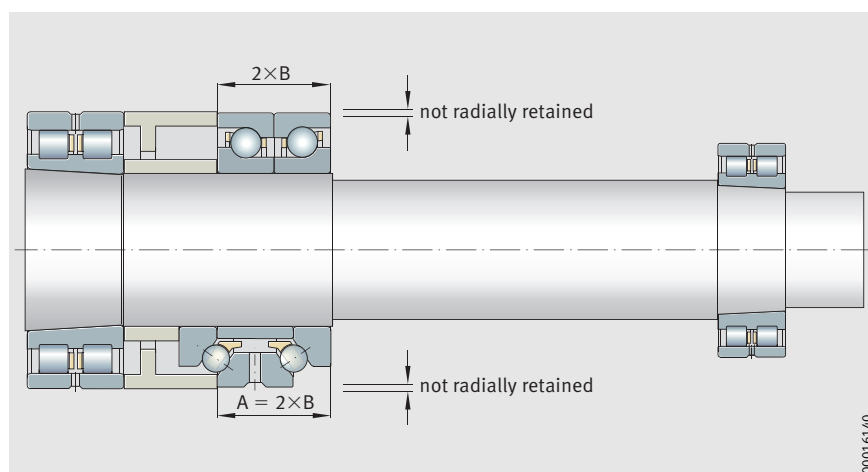


Figure 2 - Comparison – BAX bearing with double direction axial angular contact ball bearings

**Factor 2,5 in radial rigidity,
axial rigidity 60% higher**

The comparison of basic rigidities shows that the bearing arrangement with a double row cylindrical roller bearing and a double direction axial angular contact ball bearing has a radial rigidity approximately 2,5 times as high as that with four spindle bearings of the same size, *Figure 3*. In axial rigidity, the advantage is still 60%.

Comparison of the speed capacity and rigidity of different bearing arrangements

- Bearing arrangement with four spindle bearings of type B7014-E-T-P4S-UL in a tandem-O-tandem arrangement and a double row cylindrical roller bearing NN3011-ASK-M-SP, *Figure 4*
- Bearing arrangement with a double direction axial angular contact ball bearing 234414-M-SP and two cylindrical roller bearings NN3014-ASK-M-SP and NN3011-ASK-M-SP, *Figure 5*
- Bearing arrangement with two high speed axial bearings BAX70-F-T-P4S-UM and two cylindrical roller bearings NN3014-ASK-M-SP and NN3011-ASK-M-SP, *Figure 6*, page 4.

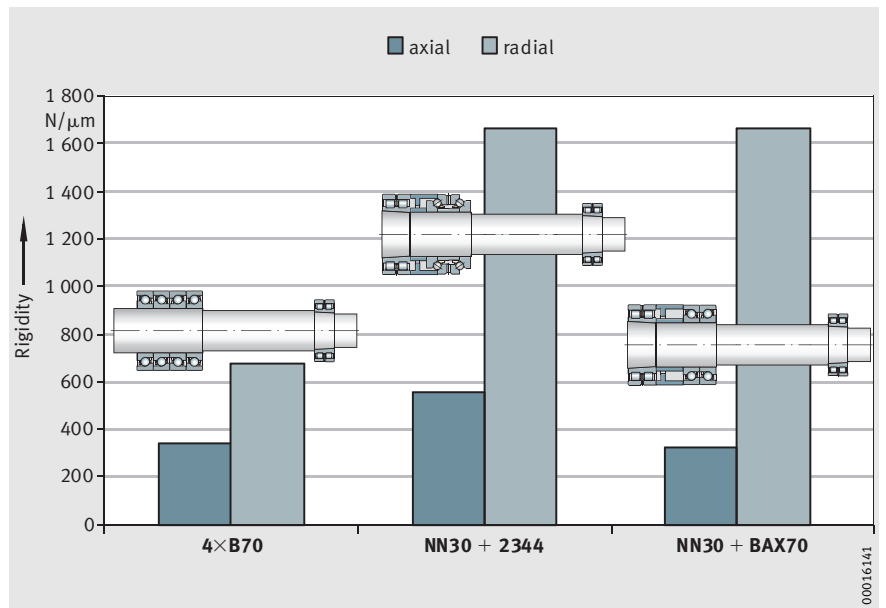


Figure 3 · Comparison – rigidity

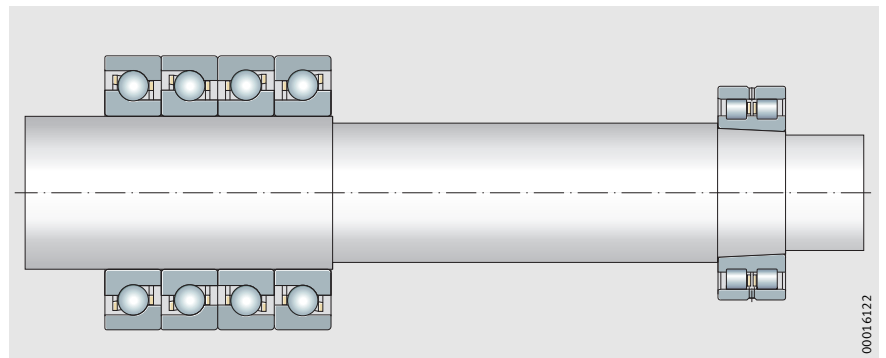


Figure 4 · Bearing arrangement with spindle bearings

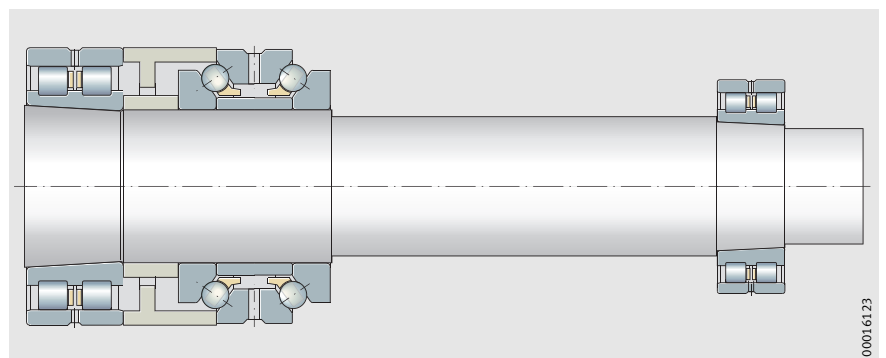


Figure 5 · Bearing arrangement with double direction axial angular contact ball bearings

Axial bearings with suitability for high speeds for spindle bearings

If the double direction axial angular contact ball bearing is replaced by two high speed axial bearings BAX, the radial rigidity is preserved in full. The axial rigidity is at the level of the bearing arrangement variant with the spindle bearings. In terms of possible maximum speed, however, the bearing arrangement with the BAX bearings is significantly higher than that with a double row axial angular contact ball bearing, *Figure 7*.

With grease lubrication, it achieves the speed capacity of the spindle bearing design, *Figure 8*, page 5.

In the hybrid version, the achievable speed level approaches that of hybrid spindle bearings, so bearing arrangements with high rigidity for speed parameters up to $1\,350\,000\text{ min}^{-1} \cdot \text{mm}$ in combination with single row cylindrical roller bearings are possible.

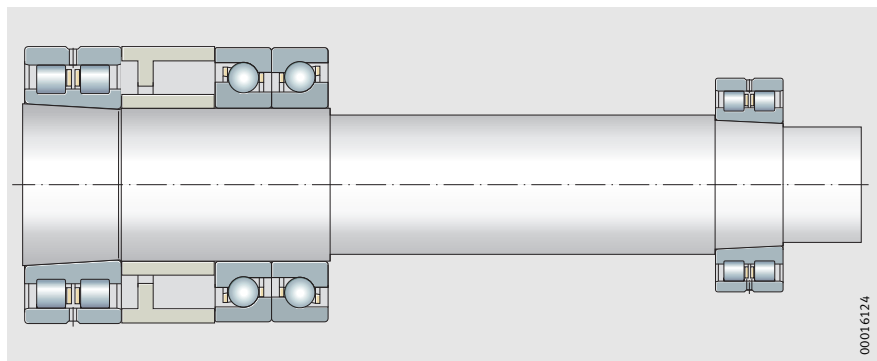


Figure 6 · Bearing arrangement with high speed axial angular contact ball bearings

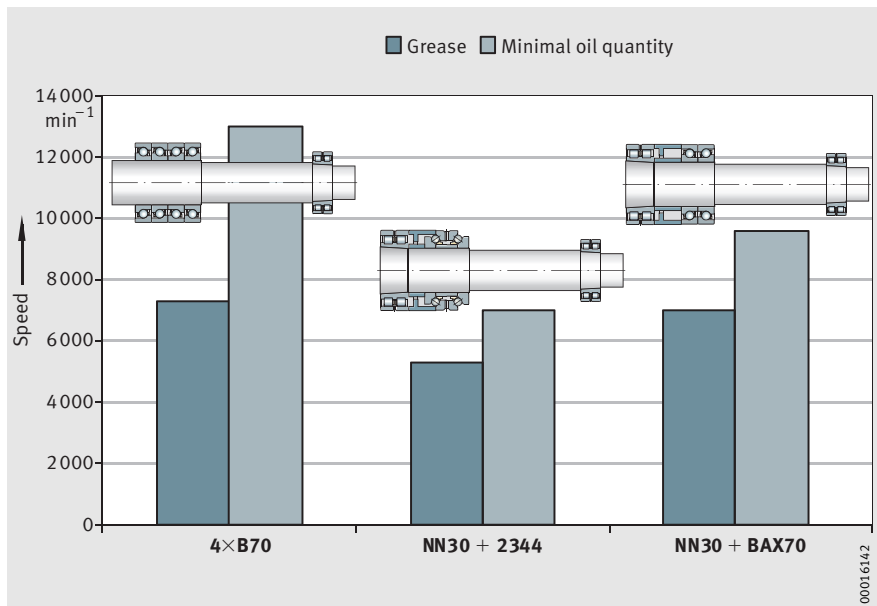


Figure 7 · Comparison – speed

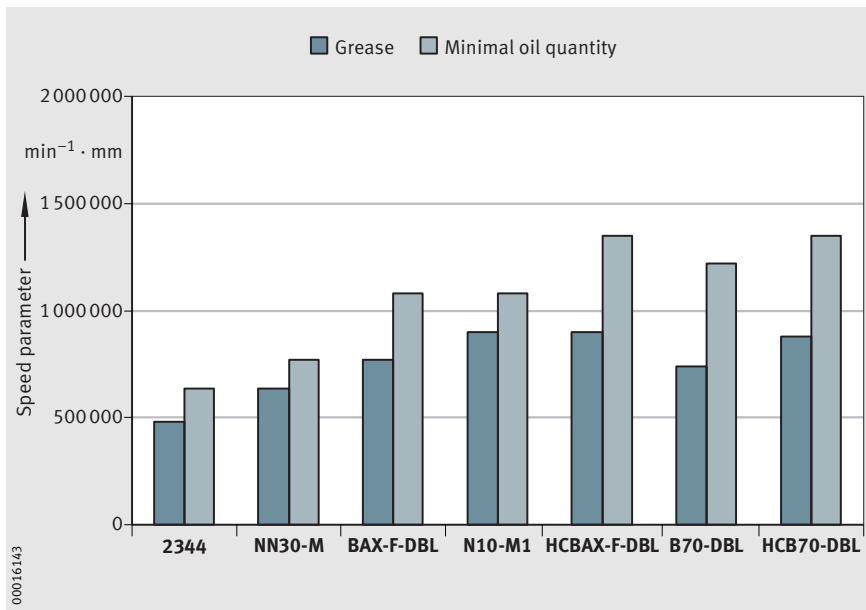


Figure 8 · Comparison – suitability for speed

Summary

The new high speed axial bearings FAG BAX have high axial load carrying capacity and rigidity, but also achieve the suitability for high speeds of main spindle bearings. These bearings with a 30° contact angle, used directly in combination with high speed single or double row cylindrical roller bearings of designs N or NN30, are extremely suitable for applications in milling spindles and machining centres.



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