Selection of Slewing Bearing size

The size of a slewing bearing can be based initially on the dynamic and static load ratings of the bearing, in relation to the applied loads and the requirements regarding reliability and service life. Values for the axial dynamic load rating $C$ and axial static load rating $C_0$ are quoted in the product tables. When determining the most efficient and economical slewing bearing for a specific application,

Recommends taking the following into consideration:

loads acting on the bearing

frequency of oscillating movements

type of application

bearing size most suitable for the application

torque applied to the gear

If it is necessary to calculate the basic rating life

Recommends confirming the results by contacting the application engineering service once calculations and the selection process are complete.

1. The basic rating life is the result of a calculation that indicates the time a bearing can operate before the first sign of metal fatigue occurs on one of its rings or rolling elements.

2. Determining bearing loads

The loads and moments acting on a slewing bearing from the inherent weight of the components that it carries, and the other inertia forces, are either known or can be calculated. Assuming the conditions cited in fig. 1, the resulting loads and moments applied to the bearing can be estimated, using the following equations:
\[ Fa = Qa + G1 + G2 + G3 \]
\[ Mt = Qa \frac{L}{Hr} + Fr \frac{Hr}{Fr} + G3 \frac{L3}{Hr} - G1 \frac{L1}{L1} - G2 \frac{L2}{L2} \]

Fa = resulting axial load applied to the bearing, kN

Fr = external radial load applied to the bearing, e.g. work/wind force, kN

G1 = weight fraction 1, e.g. the counterweight, kN

G2 = weight fraction 2, e.g. the weight of the cabin, kN

G3 = weight fraction 3,
e.g. the weight of the boom, kN

Hr = distance from the bearing centre point to the line of action of the radial force Fr, m

L = distance from the centre of rotation to the centre of the lifting load, m

L1 = distance from the centre of rotation to the centre of gravity of the weight fraction 1, m

L2 = distance from the centre of rotation to the centre of gravity of the weight fraction 2, m

L3 = distance from the centre of rotation to the centre of gravity of the weight fraction 3, m

Mt = resulting tilting moment acting on the bearing, kNm

Qa = lifting load, kN

In applications where the working radii L and L3 for the lifting load and the adjustable boom vary, the maximum working radii have to be used to calculate the maximum tilting moment Mt acting on the bearing. External radial loads Fr may be neglected as long as they are \( \leq \) 5% of the axial load. If these radial loads are acting at any point other than the plane of the bearing, the resulting tilting moment should be calculated and taken into consideration. If
the radial loads exceed the ratio \( Fr/Fa = 0.6 \), it is advisable to contact the SKF application engineering service.

Determining bearing size

When determining bearing size using the static limiting load diagrams, additional forces should be taken into account. Which forces to consider depend on the type and mode of operation of the machine and operational requirements regarding service life and reliability. This is done by multiplying the resulting axial load and tilting moment by a load factor \( f_L \) as listed in table 1:

\[
Far = f_L \times Fa \\
Mtr = f_L \times Mt
\]

where

\( Far = \) maximum rated axial load, kN

\( Fa = \) resulting axial load applied to the bearing, kN

\( Mtr = \) maximum rated tilting moment, kNm

\( Mt = \) resulting tilting moment acting on the bearing, kNm

\( f_L = \) load factor

Using the calculated values for the maximum rated axial load \( Far \) and the maximum rated tilting moment \( Mtr \), the requisite slewing bearing size can be obtained from the appropriate static limiting load diagram, shown together with the slewing bearings in the product tables. Each diagram contains two curves per bearing; the solid line shows the raceway capacity and the dotted line shows the bolting capacity.
The points, where the plotlines of rated axial load $F_{ar}$ and the rated tilting moment $M_{tr}$ intersect, must always be below the capacity curves, i.e. inside the green zone. If the points of intersection are above the capacity curves, the bearing is not suitable for the application.

**Raceway capacity**

The raceway capacity is defined as the maximum static load that can be accommodated by the slewing bearing without detrimental effects on its running behaviour.

**Bolting capacity**

Bolting capacity applies to the supported bearing and the number of 10.9 strength grade (EN ISO 898) nuts and bolts used to anchor the bearing to its support surface.