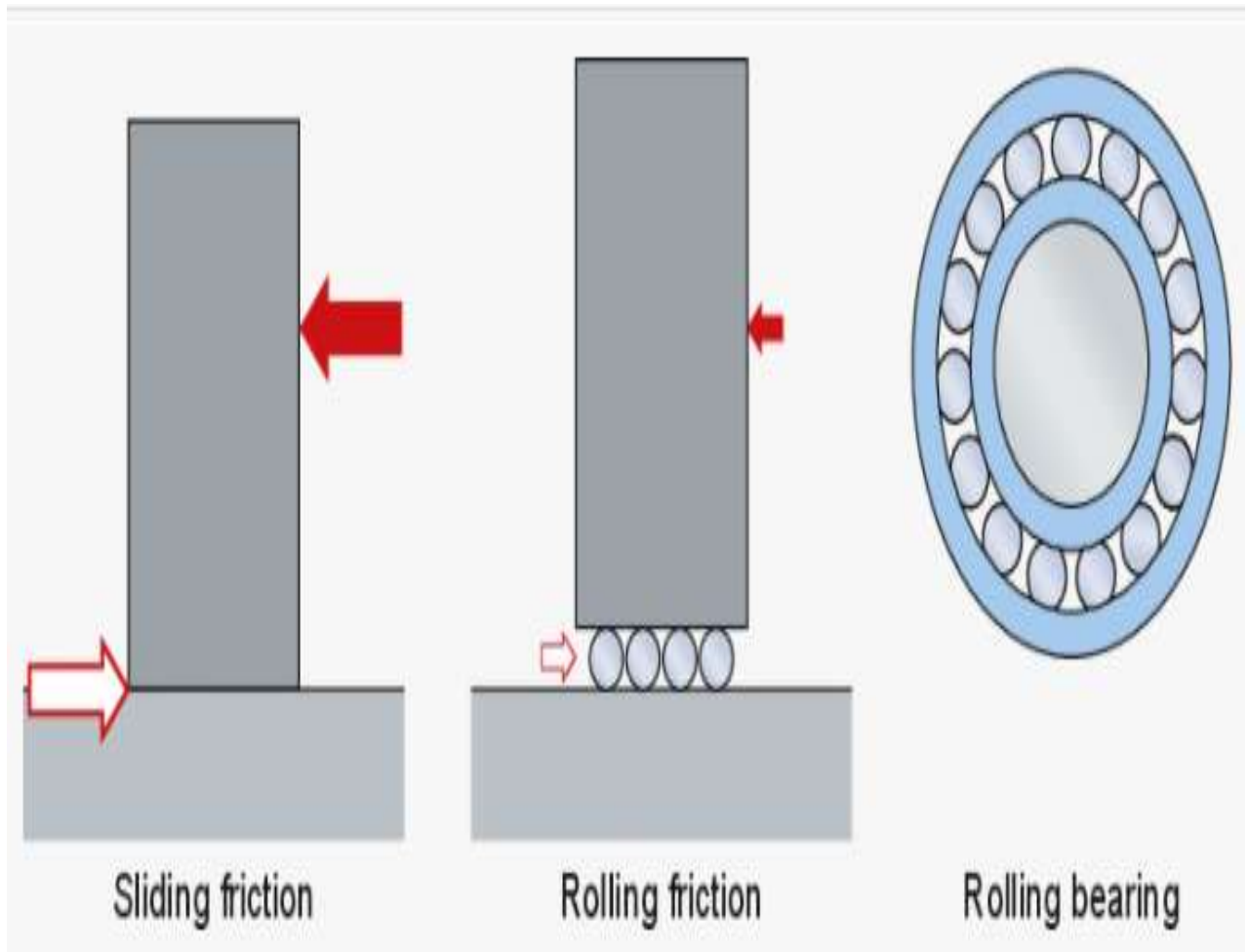


Bearing basics

Rolling bearings support and guide, with minimal friction (fig. 1), rotating or oscillating machine elements – such as shafts, axles or wheels – and transfer loads between machine components. Rolling bearings provide high precision and low friction and therefore enable high rotational speeds while reducing noise, heat, energy consumption and wear. They are cost-effective and exchangeable machine elements that typically follow national or international dimension standards.



Ball and roller bearings

The two basic types of rolling element distinguish the two basic types of rolling bearing:

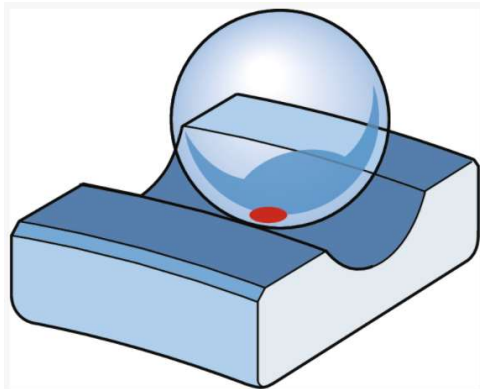
ball → ball bearing

roller → roller bearing

Balls and rollers are different in how they contact the raceways.

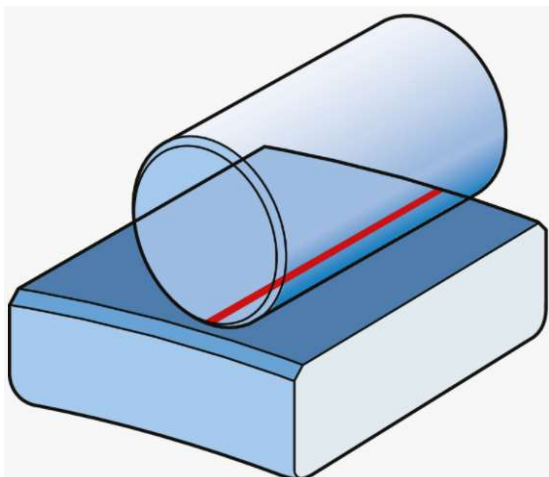
Balls make point contact with the ring raceways (fig. 2). With increasing load acting on the bearing, the contact point becomes an elliptical area. The small contact area provides low rolling friction, which enables ball bearings to accommodate high speeds but also limits their load-carrying capacity.

Fig. 2 – Point Contact



Rollers make line contact with the ring raceways (fig. 3). With increasing load acting on the bearing, the contact line becomes somewhat rectangular in shape. Because of the larger contact area and the consequently higher friction, a roller bearing can accommodate heavier loads, but lower speeds, than a same-sized ball bearing.

Fig. 3 – Line contact



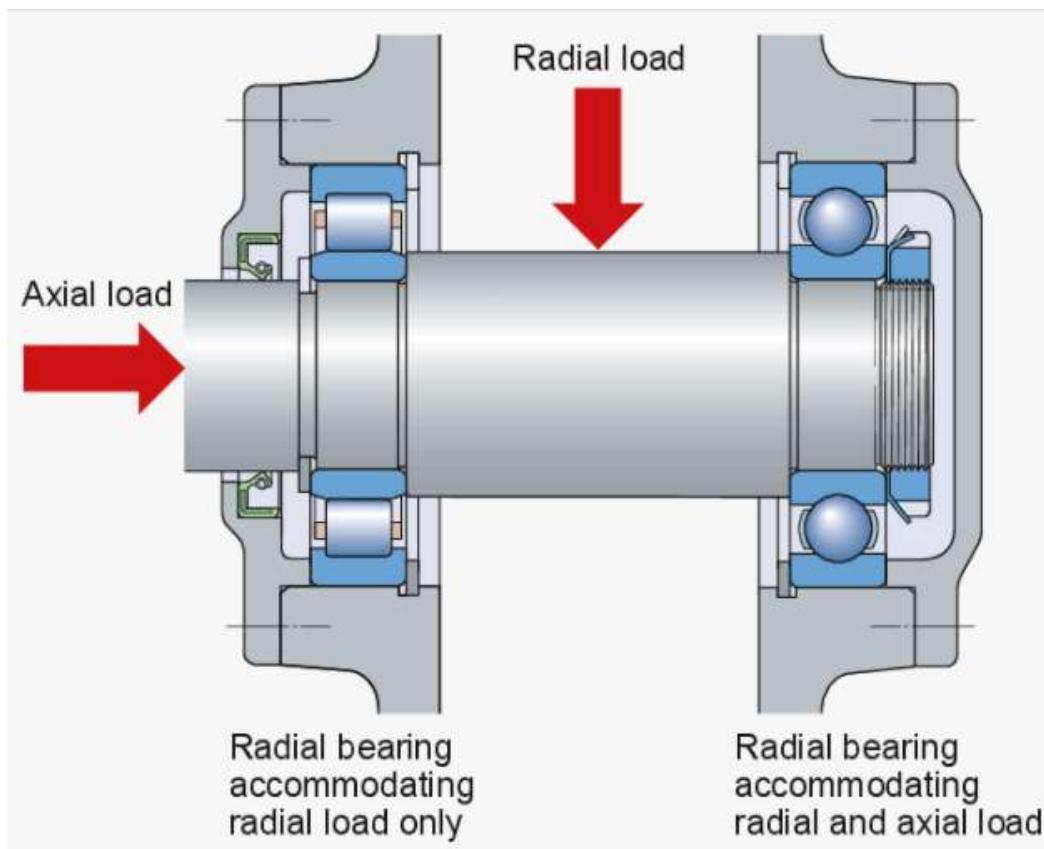
Radial and thrust bearings

Rolling bearings are classified into two groups based on the direction of the load they predominantly accommodate:

Radial bearings

Radial bearings accommodate loads that are predominantly perpendicular to the shaft. Some radial bearings can support only pure radial loads, while most can additionally accommodate some axial loads in one direction and, in some cases, both directions (fig. 4).

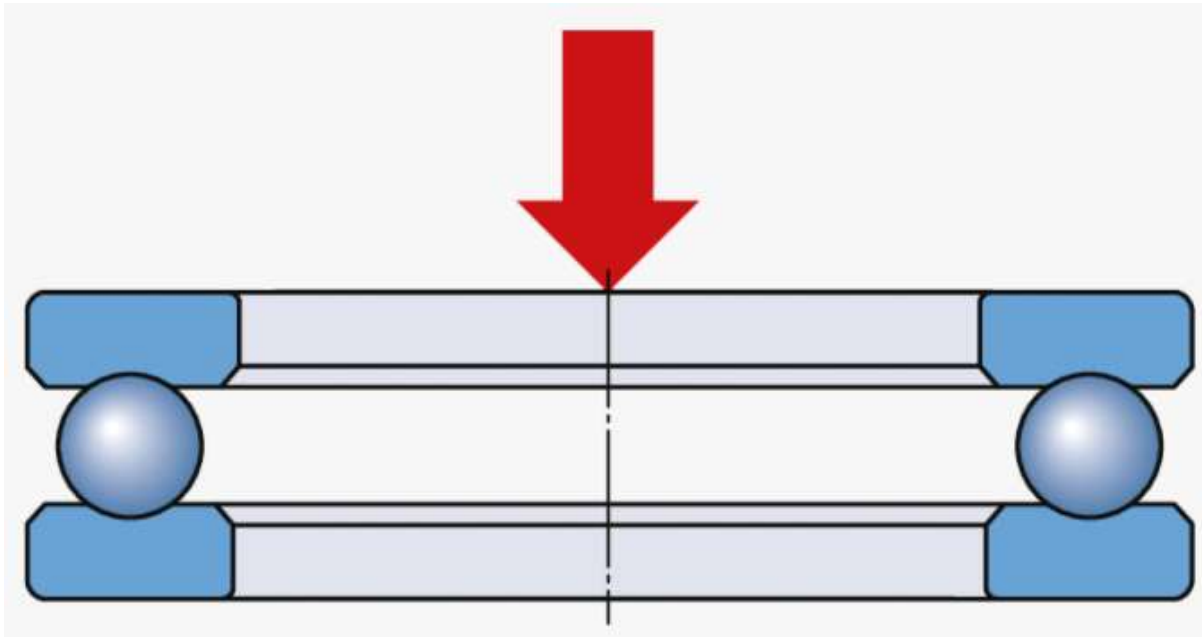
Fig.4 Radial Bearings



Thrust bearings

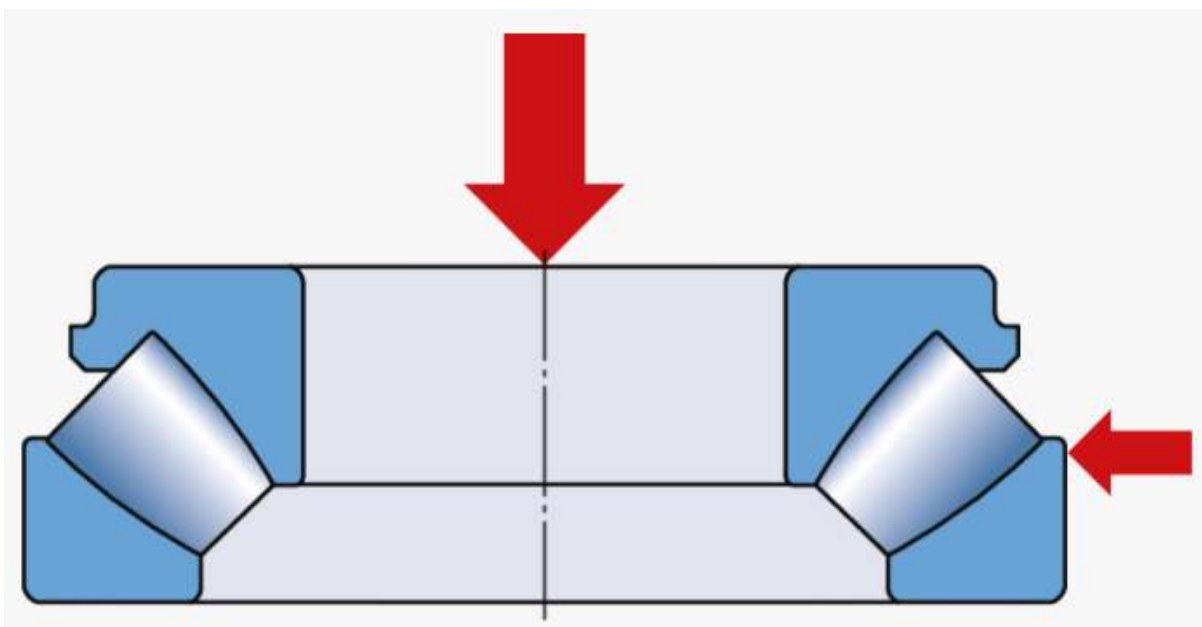
Thrust bearings accommodate loads that act predominantly along the axis of the shaft. Depending on their design, thrust bearings may support pure axial loads in one or both directions (fig. 5).

Fig. 5 Thrust bearing for pure axial load



Some thrust bearings can accommodate radial loads (combined loads, fig. 6). Thrust bearings cannot accommodate speeds as high as same-sized radial bearings.

Fig. 6 Thrust bearing for combined load



The contact angle (fig. 7) determines which group the bearing belongs to. Bearings with a contact angle $\leq 45^\circ$ are radial bearings, the others are thrust bearings.

Fig. 7 Contact angle

