What is radial clearance and when should different clearances be used?

by Mike Mortensen - Director of Engineering RBI-USA

Internal clearance is defined as the total distance that the inner ring and outer ring can be displaced in relation to each other. It can be expressed in terms of both the axial and the radial direction. Typically, the internal clearance for radial ball bearings is specified in the radial direction. Figure 1 shows a diagram of what internal clearance is. Different applications may require different clearances to accommodate a variety of operational conditions. Generally, the clearance after mounting and during operation should be close to zero. Therefore, it is important to know the application conditions in order to know how much clearance will be removed during operation.

Tight clearances are often used to accommodate applications that involve heavy shock loads and require minimal noise/vibration. If the internal clearance is reduced too much, many complications may occur. The bearing may seize up, the bearing may generate too much heat, the bearing may not tolerate tight press fits, and the bearing may not be able to handle the effects of thermal expansion.

Loose clearances are often used to accommodate applications that involve tight shaft/housing fits, thermal expansion of components, and possible mounting misalignment. If the internal clearance is too high, a couple of complications may occur. There may be excessive noise/vibrations as well as too much play during operation.

Again, the goal is ensure that the clearance after mounting and during operation is close to zero. If the clearance during operation is negative, a preload condition will occur and the bearing life will be greatly reduced. If the clearance during operation is too high, there can be excessive play that may permit the bearing to vibrate or be noisy during operation. It is better to have a little extra clearance than to have a preload condition.

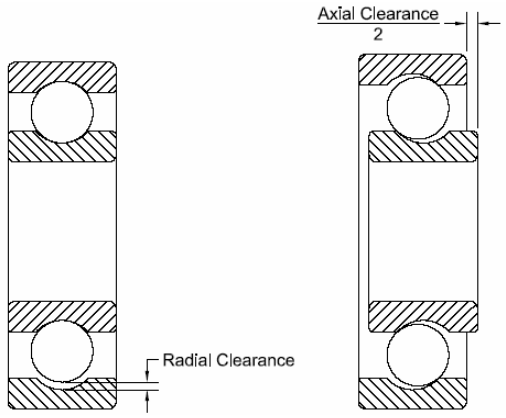

Figure 1. Diagram showing radial and axial clearance.