



## Preload and Duplex Ball Bearings

Ball bearings are preloaded for a variety of reasons:

- To eliminate radial and axial looseness
- To reduce operating noise
- To improve positioning accuracy
- To reduce repetitive runout
- To reduce the possibility of damage from vibratory loading
- To increase life and axial capacity
- To increase stiffness

There are essentially two ways to preload a ball bearing, either by using a spring or through a solid stack of parts.

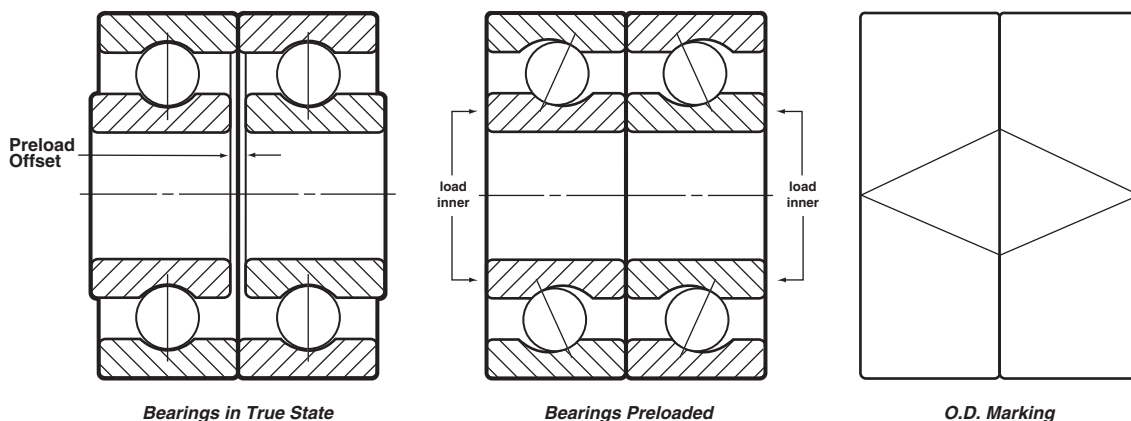
Spring preloading can consist of a coil spring or a wavy washer which applies a force against the inner or outer ring of the non-interference fitted bearing in the assembly.

Since in a spring the load is fairly consistent over a wide range of compressed length, the use of a spring

for preloading eliminates the need for holding tight location tolerances on machined parts. For example, retaining rings can be used in the spindle assembly, thus saving the cost of a locating shoulder, shims or threaded members. Normally a spring would not be used where the assembly must withstand reversing thrust loads.

A solid stack method may be used when precise location control is required. For example, as in a precision motor, the use of built-in preload is suggested. Ball bearings with built-in preload are often referred to as duplex ball bearings. When the set of bearings is assembled, the thrust load needed to make the adjacent faces of the rings contact becomes the desired preload. Built-in preload helps satisfy the requirements of increased axial and radial stiffness and deflection control.

There are three methods of mounting preloaded duplex bearings: back-to-back, face-to-face and tandem.



When a back-to-back (DB) duplex pair is mounted, the outer rings abut and the inner rings are drawn together, providing maximum stiffness.

