

The use of rolling bearings on machine

The use of rolling bearings on machine tools is mainly used in the following three parts: spindle, ball screw and general drive shaft.

As the basic assembly of machine tools, spindle bearings directly affect the speed, rotation accuracy, rigidity, chatter resistance, cutting performance, noise, temperature rise and thermal deformation of machine tools, which will affect the accuracy and surface quality of machined parts. Therefore, high performance machine tools must be equipped with high-performance bearings.

The accuracy of [Industrial Bearings Solutions](#) rolling bearings is generally divided into five grades: P0, P6, P5, P4 and P2. The accuracy of bearings for precision machine tool spindles should be P5 and its superiors. For CNC machine tools, machining centers and other high speed and high precision machine tool spindle bearings, P4 and its Industrial Bearings Solutions superior super precision bearings are needed.

Spindle bearings for machine tools usually include six types of deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings, bidirectional thrust angular contact ball bearings, tapered roller bearings and thrust bearings.

With the rapid development of numerical control technology, "compound, high-speed, intelligent, precise and environmental protection" has become the main trend of the development of machine tool industry. Among them, high speed machining can effectively improve the efficiency of machine tools and shorten the processing cycle of workpieces. This requires machine tool spindle and its related parts to meet the needs of high-speed machining. At present, the spindle bearings of CNC machine tools are basically limited to four types of structural types, such as angular contact ball bearings, cylindrical roller bearings, two-way thrust angular contact ball bearings and tapered roller bearings.

Along with the rapid development of spindle of CNC machine tools, ceramic materials (mainly referred to as Si₃N₄ engineering ceramics) are ideal materials for manufacturing high-speed precision bearings because of their excellent properties such as small density, high modulus of elasticity, small thermal expansion coefficient, wear resistance, high temperature resistance and corrosion resistance. Ceramic bearings are more and more widely used. In view of the difficult workability of ceramic materials, precision ceramic bearings are mostly rolling bodies, which are ceramic and inner and outer rings which are still made of chromium steel.

The ball screw pair is a precise, efficient and sensitive driving element. Besides high precision screws, nuts and balls, attention should also be paid to bearings with high axial rigidity, small friction torque and high running accuracy. Ball screws are used to support bidirectional thrust angular contact ball bearings, tapered roller bearings, needle rollers and thrust roller combination bearings, deep groove ball bearings and thrust [ball bearings](#). At present, single row angular contact ball bearings with 60 degree contact angles are the most popular support for ball screws, and the accuracy level is mainly P4 and above.

The rolling bearings installed on the general transmission shaft for machine tools are similar to ordinary mechanical transmission bearings. They only need to meet the requirements of strength and life, and the speed can not exceed the limit speed of the bearings specified.

Under normal circumstances, the machine tool bearings mentioned by [Industrial Bearings Solutions](#) refer to machine tool spindle bearings and ball screw bearings. Precision machine tool bearings refer to spindle bearings and screw bearings with a precision of P5 and P5.