

# Characteristics, crawling and adjustability of sliding guide rail

**Guideway** is an important part of machine tool. It plays the role of supporting and guiding moving components moving along a certain track. The development of traditional guide rail is first manifested in sliding components and guide ways. In various kinds of guideways, sliding guides are widely used in CNC machine tools due to their advantages such as simple structure, convenient manufacture, good rigidity and high vibration resistance.

## 1. Characteristics of sliding guide rail

Sliding rail is characterized by the use of media between the guide and sliding parts, including solid friction materials, oil and air, etc.

The most common anti friction guide is a solid friction material, such as polyvinyl chloride or bronze mixed material, which is installed on the mobile assembly to reduce the friction of the guide rail. Anti friction materials shall be designed with oil grooves to meet the need for lubrication or other forms of lubrication between mobile components and guide surfaces.

The most widely used hydraulic medium is the hydrostatic guideway. Under pressure, hydraulic oil enters the grooves of the sliding assembly, and an oil film is formed between the guide rail and the sliding component to separate the guide rail from the mobile component, thereby greatly reducing the friction force of the mobile component and thereby lubricating. Hydrostatic guideway has good effect on lubrication of heavy load movement, and it also has certain compensation function for eccentric load. For example, when a machining machine is working on a large sand box, the sand box just moves to the end of the machine stroke. At this time, the hydrostatic guide rail can increase the oil pressure, so that the guide rail still keeps the state of horizontal load accurately. Some horizontal boring and milling machines also use this technology to compensate for spindle speed drop during deep hole machining.

Another way of using oil as a medium is the dynamic pressure guideway. The difference between it and the hydrostatic guideway is that it does not use pressure, but uses the viscosity of the oil to avoid direct contact between the moving component and the guide. The advantage is that the hydraulic pump can be saved.

Air is also a common medium between sliding guide and sliding assembly. It is also divided into two forms, pneumatic hydrostatic guideway and pneumatic dynamic guideway. Its working principle is similar to that of hydrostatic guideway and dynamic pressure rail in hydraulic guide.

## 2. The emergence of crawling phenomena.

Due to the relatively large contact area between the planar guide and the moving components, the mobile components need to overcome the inertia of the mobile components for rapid micro feed. When the ball screw or other driving forces push the mobile components to move, a slight adhesion resistance will occur. When the mobile component starts to move, it will be slightly

beat at any time because it is in the state of being caught, leading to the crawling phenomenon. The crawling phenomenon has little effect on the large movement, but it will cause a greater impact on the micro movement, and become a problem.

### **3. Adjustability of slide rail**

Tunability is a unique advantage of linear slide guide. According to the use of the guide rail, the linear sliding guide system will be equipped with adjustable edges, with one or more quantities. As the mobile components move along the side of the linear guide rail, it is necessary to ensure the tight contact between the mobile component and the side of the guide rail, so the guide rail must have adjustable function.

The most common adjustment method is to place the diagonal iron between the moving parts and the opposite side of the guide rail contact surface. The shape of the skew iron is conical strip iron. If the sliding part or guide rail is worn and the gap between the contact surfaces is generated, the guide rail can be accurately compensated by adjusting the inclined iron to eliminate the clearance between the moving parts and the guide rail.

The machine tool manufactory has developed the patented technology of automatic adjustment of slant iron and has been widely adopted. The basic principle of this technology is to make the diagonal iron maintain a fixed spring pressure. Once the moving parts or guide rail system is worn, the inclined iron can automatically eliminate the gap between the two.