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NEW DEVELOPMENT RESOURCE-EFFICIENT TECHNOLOGY FOR THE PRODUCTION OF SLIDING BEARINGS USING POWDER METALLURGY

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Annotation: This article provides ideas on the development of a new resource-efficient technology for the production of sliding bearings using the powder metallurgy method.

Key words: Powder metallurgy, sliding bearings, resource-efficient technology.

Shafts and axles are held by means of special details-supports. The bearing is derived from the word "ship" (English-shaft, German-zappen, Dutch-shiffen, i.e. shaft). Bearings serve as a support for shafts and rotating axes, receive radial and axial forces and transmit them to the machine body. In order for the FIK of the machine not to decrease, the loss in the bearings should be minimal.

Bearings are divided into two large groups depending on the nature of friction:
• sliding bearings;
• rolling bearings.

Bearings are installed on the supports of the shaft and axis and act as a support, that is, they directly receive the force falling on the support. The performance and durability of the machine largely depends on the quality of the bearing. Therefore, it is necessary to pay special attention to the issues of choosing bearings and monitoring them during the work process. The rotating shaft or shaft is rubbed in the bearings, depending on the type of friction, the bearings are divided into sliding bearings and rolling bearings. Also, different bearings are used for forces acting in different directions. For example, radial bearings to receive forces acting perpendicular to the shaft axis; and! support bearings to receive forces directed along the axis; Radial support bearings are used for forces acting perpendicular to the shaft axis and along the shaft axis.

A phenomenon of sliding friction occurs in sliding bearings. The part of the shaft and axles intended for support is called sapfa. The shape of the cup can be cylindrical, conical, zoldy [1].

Disadvantages: use of non-ferrous metal; the difficulty of creating a friction mode in the liquid; length in relation to the length of the axis; when lubrication is not good, a lot of energy is spent on friction; high use of oil for lubrication. The use of sliding bearings is less common than rolling bearings, and is used in the following cases: in cases where it is necessary to use bearings with separable supports, rolling bearings are not made for such shafts; in rotating shaft supports with a large vibration, in which the oil layer dampens this vibration; when it is required to install high-precision bearings on supports; on shaft supports operating in water and aggressive environments, in such cases rolling bearings do not work [2].

In plain bearings, the liner rather than the shaft end wears out relatively quickly, as shafts are more expensive to replace than liners. The shaft shafts are thermally treated to reduce corrosion. Drinking materials are made of metal, metal-ceramic and non-metallic materials with low coefficient of friction, corrosion resistance, heat transfer, and corrosion resistance. Metallic drinks. Bronze, babbitt, aluminum alloys and antifriction cast iron are used as materials. In mechanisms moving with high load and medium speed, drinks made of bronzes of BrOlOFl, Br04TS4 Sl7 and other brands with antifriction properties are used. Aluminum (BrA9JZL) and lead (BrS30) alloy alloys are used in shafts with shafts. AChS-l cast iron materials with anti-friction properties are used in slow-moving mechanisms. Metal-ceramic drinks are made by adding graphite, tin and lead to copper or metal powders in a pressing process. Because these drinks are porous, they are impregnated with oil, as a result, they are not lubricated during operation. Such fluids are used in slow-moving mechanisms, in units that are difficult to lubricate. In non-metallic drinks, they are made of ASP brand plastics or rubber and similar materials, which have anti-friction properties. These drinks also work well when diluted with water. Drinks were prepared so that they do not move along the axis. The thickness of the wall s depends on the diameter d of the shaft and the material, and the thickness of the cast iron and bronze walls is S = 0.03d+l-4mm. The size of the chip is b = 1.2S, h = 0.6S (Fig.

9.5). In large series of drinks, the friction surface is covered with tape. In this case, the thickness of the tape is up to 1.5-2.5 mm, and the thickness of the anti-friction material used for coating can be up to 0.2-0.3 mm [3].

The ratio of bearing length to diameter, i.e. 1/d, has a great influence on the performance of bearings. If this value is small, there is a risk of oil leakage from the hub, if this value is large, the pressure on the friction surface is unevenly distributed, as a result, wear is accelerated in places of high pressure. Therefore, it is recommended to choose this value depending on the working process. For example. 0.5-0.6 in car engines; 0.5-0.9 in diesel bearings; 0.6-0.9 on rolling machines; and in general mechanical engineering, up to 1.5 can be accepted. As soon as the shaft begins to rotate, its surface begins to slide and rub against the bearing. If the corrosion of the surface of the casting exceeds a certain limit, the performance of the mechanism will deteriorate. Bearing durability is mainly determined by the rate of wear. The rate of corrosion largely depends on the environment between the surfaces where the friction process occurs. Depending on this environment, friction is divided into three types: 1. Dry friction - friction between non-moistened surfaces. 2. Friction in liquid - where the rubbing surfaces are completely separated from each other by a viscous oil layer. The thickness of the oil layer must be greater than the sum of the roughnesses formed during processing on the surfaces of the shaft and the casting, i.e. h>R7[+l7, boMish (Fig. 9.6). The frictional resistance to movement in the liquid is very small (friction coefficient 0.005) [4].

Therefore, when using sliding bearings, it is necessary to try to create conditions in which there is friction in the liquid. 3. Friction in wet dry and wet liquid. In this case, even if the working surfaces are sufficiently lubricated, there is no oil layer separating the two surfaces completely. If the friction is close to sand friction, semi-dry friction. if there is friction in liquid, it is called semi-liquid friction. When friction occurs in semi-liquid, the coefficient of friction is in the range of 0.008-0.1, and in the case of semi-dry friction, it is in the range of 0.1-0.2. Of the above types of friction, the most favorable for sliding bearings is fluid friction (Fig. 9.6). The serviceability of sliding bearings is determined by their resistance to corrosion. Plain bearings that work in semi-dry and semi-liquid conditions are mandatory. In this case, the value of the average pressure between the reservoir and the reservoir is limited. as a result, conditions for lubrication are created. The theoretical foundations of the operation of the mechanism nodes in the mode of friction in the liquid are based on the theory of hydrodynamics. this theory was created by N. Petrov in 1883. In this theory, pressure in bearings, speed, and resistance to work si 1 j in the fluid environment are seen as interrelated. In this theory, the hydrodynamic pressure is given based on the fact that the space between two mutually moving bodies is like an oil layer (Fig. 9.7) due to the formation of an opposite pressure equal to the external force. Due to the high viscosity of the oil, the rotation speed of the spindle is high. The value of h will be large. As the load increases, the value of h decreases. The following conditions must be met to create the friction mode in the liquid, namely: 1. Sufficient and continuous supply of oil of a certain viscosity. 2. The space between the rubbing surfaces should be wedge-shaped, for this the number of rotations of the shafts is sufficient, and the hydrodynamic pressure equal to the external friction in the oil layer on the resulting wedge-shaped surface, creating a friction mode in the liquid. 3. The oil should completely separate the two rubbing surfaces from each other. For mechanisms operating in the mode of friction in liquid, the hydrodynamic calculation is the main one, in which the oil layer, the average heating level and the volume of consumed oil are determined. The heating level of oils should be 60-75°C [5].

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