

Improvement of large cylindrical roller bearing cage for mud pump

With the continuous development of modern drilling technology, the performance requirements of the mud pump are higher, and there is a further requirement for the performance of the mud pump bearing. Large cylindrical roller bearing assembly, this kind of bearing is installed on the oil mud pump, the whole machine works in the field, the speed is 120 r/min, heavy load, continuous operation, the working temperature is generally between 40 ~ 80 °C. In order to better adapt to the needs of the market, [our company](#) has partially optimized the design of the mud pump series bearings, such as the structure of the cage.

Product handling impact on quality:

The cage is cumbersome in the processing process and labor intensive. Each process relies on manual operation of the machine tool. The processing steps are: casting blank ? rough inner and outer diameters ? fine inner and outer diameters, chamfering ? fine car cutting ? fine Car flat cut off, chamfer ? scribe ? rough drill pocket ? rough milling pocket ? fine milling pocket ? insert pocket fillet ? milling oil groove ? drill rivet hole ? drill rivet sink hole ? burr ? sand blasting ? Oiling, packaging ? storage. The cage is to be transported several times during the processing. The diameter of this type of product is between 600 and 980mm, and the weight of the roughing blank is between 30 and 80kg. The material of the product is ZCu AL10Fe3 (aluminum bronze). The multiple handling increases the labor intensity of the workers, and it is easy to encounter the phenomenon of jamming during the handling process, which affects the appearance quality of the product. In order to achieve the appearance quality of the product, it is necessary to polish the surface of the product to cause damage to the surface, causing some of the surface to be excessively polished, which seriously affects the accuracy of the product size, and may become a potential factor affecting the rotation accuracy of the bearing.

Reasons why certain processes affect product quality:

- (1) A rough drilling process. In each pocket of the product, rough drilling is required. In the same pocket, the diameter of the rough hole is different. The operator has to adjust the drilling position multiple times and replace the drill bit to minimize the amount of milling left for the rough milling process. The card is added to increase the labor intensity of the employee, and the position of the product is adjusted several times. The jaws will have fine copper scraps, causing pinching of the end face.
- (2) Rough milling pocket process. When machining the product, the operator keeps turning the milling machine radial feed handle and the axial feed hand
The shank shall be loosened and clamped once per pocket, resulting in internal stress, which will cause deformation of the product in the future. At the same time, the labor intensity of the worker is large, and the cage can be milled per shift, and the production efficiency is low.
- (3) Finishing and milling process. The same as the rough milling process, except that you change the milling machine again, the same problem exists.
- (4) Insert the pocket hole rounding process. Inserting each pocket fillet, the operator must simultaneously move the radial feed handle and the axial feed handle, and simultaneously operate the two hands to grasp the feed amount manually, and each pocket has four rounded corners. Each pocket should be elastically held four times. During the cutting process, the impact of the cage is large, and the roughness of the inserted part cannot meet the process design requirements. In addition, after

processing a cage, the overall shape of the cage becomes a polygonal shape, which causes the geometry of the cage to change. In order to ensure that the inner and outer diameters of the cage are coaxial, a full circle must be performed, which increases the workload.

(5) Drilling rivet hole process. After the cage has been processed in the above multiple processes, it needs to be rounded. After the whole circle, there is also deformation. The vertical dimension of the original pocket is also changed. It is necessary to re-mill the pocket once on the milling machine. After the artificial rounding, Rework rivet hole size to process requirements. However, after being placed for a period of time, the stress generated during the original machining process is released, and the cage is restored to the geometry before shaping. The geometric shape changes the center diameter of the rivet hole with the change, and the rivet is assembled when the bearing is assembled. When the roller recess is in contact, the roller will wear the rivet and cause the bearing to fail.