The Design of the Car Connecting Rod Processing

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Abstract

The role of the engine connecting rod is to connect the piston and the crankshaft so that the linear reciprocating motion of the piston becomes a turning motion of the crank to output power. Therefore, the machining accuracy of the connecting rod will directly affect the performance of the engine, and the selection of the process is the main factor affecting the accuracy. This article mainly discusses the processing technology of the connecting rod. To improve the machining accuracy and productivity of the connecting rod and reduce the labor intensity.

Keywords

Connecting rod; deformation; processing technology.

1. Introduction

With the popularity of automobiles, the engine's quality and transmission requirements are high. The connecting rod is one of the main transmission components in the engine. It is mainly connected to the piston and the crankshaft, so that the reciprocating linear motion of the piston becomes a turning motion of the crank. Transmission power. The connecting rod mainly processes blanks through a forging process and performs various processing to improve its accuracy. The connecting rod mainly includes a connecting rod body and a connecting rod cover. The big head hole of the connecting rod is assembled with the crankshaft with bolts and nuts. In order to reduce wear and facilitate maintenance, thin-walled metal bushings are generally installed in the large bore of the connecting rod. The bottom of the bearing is steel and a layer of wear-resistant Babbitt bearing metal is poured on its inner surface. There is a set of spacers between the connecting rod body and the connecting rod cover. The wear of the bearing pads can be compensated by using these spacers. The small end of the connecting rod is connected to the piston with a piston pin. The bronze bushing is pressed into the small hole to reduce the wear of the small hole and the piston pin, and it is easy to repair and replace after the wear. The high alternating load that the connecting rod bears during the movement, the pressure of the gas produces great compressive stress and longitudinal bending stress in the shaft. The inertia force caused by the weight of the piston and connecting rod causes the connecting rod to bear tensile stress, so the connecting rod is subjected to dynamic load with impact properties. Therefore, the connecting rod produced and processed not only requires sufficient strength and rigidity, but also must there is good accuracy to maintain the reliability and stability of its work.

2. Main Technical Requirements for Connecting Rod

In order to make the large head hole closely fit with the bearing shell and the cry an shaft, the small head hole and the piston pin, the adverse effect of the impact is reduced and the heat transfer is facilitated. The head hole tolerance grade is generally IT6, and the surface roughness Ra should not be greater than 0.4 am; the burr tolerance of the large head hole is 0.012 mm, the tolerance of the small head whole is IT8, and the surface roughness Ra should not be greater than 3.2 am. The head hole of the small head bushing has a cylindricity tolerance of 0.0025mm and a parallel line tolerance of 0.04/100mm.

The verticality of the center line of the big head hole affects the installation and wear of the bearing bush and even causes burns; therefore, it also puts forward certain requirements: It is required that the

verticality tolerance level should not be lower than IT9 (the big head hole facing both ends of the big head hole The perpendicularity of the shaft line is 0.08mm in 100mm length). The connecting rod is subjected to a sharp dynamic load during the work process. This dynamic load is transmitted to the two bolts and nuts of the connecting rod body and connecting rod cover. Therefore, in addition to the high technical requirements for bolts and nuts, certain requirements have been put forward for installing the two power bolt holes and end faces. Regulation: The bolt holes shall be processed according to IT8 tolerance grade and surface roughness Ra shall not be greater than 6.3μm; the symmetry tolerance of the two bolt holes on the split surface of the large head hole shall be 0.25mm.

At the same time, according to actual experience, the mass error between the small head and large head of the connecting rod cannot exceed ±3g.

3. Linkage Processing

3.1 Connecting Rod Processing Technology

The main processing surface of the connecting rod is the size of the head hole and the two ends; then the connecting surface of the connecting rod body and the cover; more important is the bearing shell, oil hole, bolt seat surface. Remove the blank for conditioning. Use a milling machine to mill the plane of the two ends of the connecting rod. The reserved amount is generally 0.5 mm, leaving sufficient margin for subsequent finishing. The grinding machine uses the large plane as the positioning surface and grinds the other large plane. Drill, expand, and ream small holes with the rough ground plane as a reference. With the base surface and large and small head holes positioned, the work piece is milled on both sides to ensure symmetry. This plane is the reference surface for the process. Use a large hole in the boring machine to rough the connecting rod and chamfer both ends. Grinding both ends of the connecting rod, precision large end face thickness and tolerances. Base surface, a side of the positioning, semi-finished big head hole, fine boring head hole to the required size, center distance 195 ± 0.8 mm. The large holes are ground to the specified requirements, and then the dimensions and accuracy of each part are examined and non-destructive inspections are performed. Finally, the qualified parts are put in stock.

Linkage rod machining process formulation mainly considers the processing requirements of each processing surface. Therefore, the machining process route of the connecting rod is mainly divided into three stages: 1) mechanical processing before the connecting rod body and cover are cut open; 2) mechanical processing after connecting the connecting rod body and cover; 3) connecting rod Body and cover machining after installation. The first stage is to prepare a fine baseline for the preparation of subsequent processing. The second stage is the semi-finishing of various surfaces, such as the machining of large head holes, bearing bushes, etc. The third stage is finishing, mainly to achieve the requirements of various sizes and precision. Therefore, the first stage is mainly rough machining, and the remaining two stages are semi-finishing and finishing.

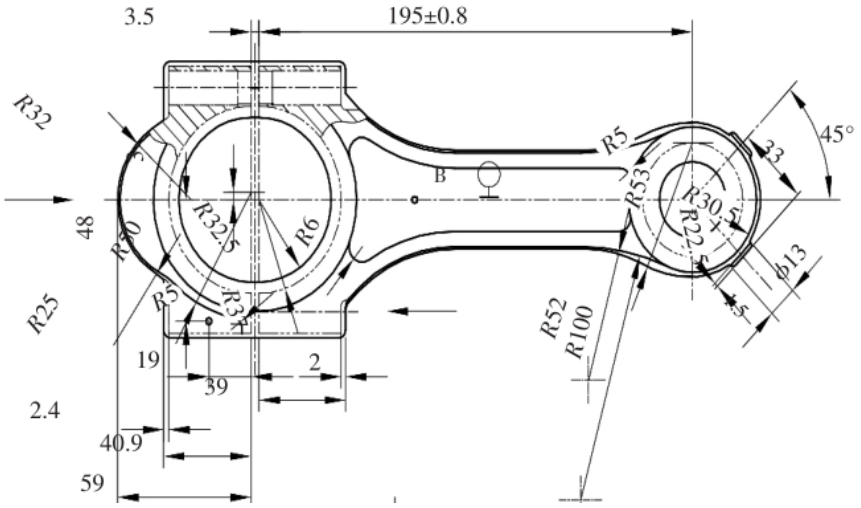

Fig 1. Link diagram

3.2 Link Inspection

The test of connecting rod is an important procedure in its processing. It needs to be inspected during the processing and processing. Because the stiffness of the connecting rod we need is not good, it is relatively easy to be affected by external influences, and generally it will leave a comparative advantage in its processing. Large margins cause greater internal stresses. Make it more vulnerable to damage. Therefore, it is necessary to accurately inspect the accuracy and size requirements of the processed parts. The test of the connecting rod mainly includes the dimensional requirements and the processing accuracy of each side, the cylindricity of the hole, the size of the inner diameter, and the like. Checking the connecting rod according to the connecting part drawing is an integral part of machining. According to the actual situation, the parallelism of the holes at the two ends of the connecting rod can be tested with the mandrel; selecting a good jig in the test is helpful for our inspection. The contour V-block can be used to support the connecting rod's mandrel; for large the end and the little end are tested in the same way. The detection of the verticality of the screw hole and the connecting surface of the connecting rod requires the production of a special inspection tool, the use of mandrels to detect tolerances, and the use of feeler gauges for inspection and inspection of the dimensions and accuracy of the various parts. Finally, non-destructive testing and hardness testing are performed.

4. Conclusion

Automotive engine connecting rod processing technology. In general, the shape of the connecting rod part is not easy to process and its rigidity is not good. The precision of some processing is very high, and in the actual processing, we need to select the positioning base surface and the reference to ensure the accuracy of each processing surface. Select the size of the connecting rod head and end face as the main positioning base surface, while selecting the two sides of the large head hole as a general positioning reference. In order to ensure the dimensional precision and shape accuracy of the small head hole, the processing principle of self-referenced can be adopted; the center distance accuracy of the head hole can be guaranteed, and the principle of mutual reference can be used for processing. This article has developed a reasonable processing technology by analyzing the accuracy and size requirements of specific parts.

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