Grinding machinery

[Abstract] Thin annular parts are more and more used in engine sealing devices. The plane grinding process of thin annular stainless steel seals is studied experimentally. During the grinding process, the high-speed rotation of the hydraulic suspension spindle and the high-viscosity hydraulic oil rub and heat up, causing the cantilever of the support spindle to expand Grinding machineand deform,

resulting in the reduction of the dimensional machining accuracy of thin annular parts. The test verified a kind of suppression measure for thermal deformation of the hydraulic spindle cantilever structure of the grinding machine, that is, reducing the viscosity of hydraulic oil, improving its thermal conductivity, reducing the deformation amount and thermal stability time of the spindle cantilever structure, and improving the machining accuracy and efficiency of parts. [Keywords:] Grinder spindle thermal Microwave heating mechanical equipmentdeformation low viscosity hydraulic oil I introduction The development and application of new high-efficiency automobile engine technology has played an important role in the development of independent new products in the domestic automobile industry. In order to effectively prevent leakage (oil

and gas) and prolong working time of engine block under high temperature and high pressure working conditions, more and more stainless steel annular thin parts with excellent machinability and stable thermochemical corrosion resistance are applied to new engine sealing devices. However, the traditional turning method is difficult to obtain high-quality machining surface and high-grade dimensional accuracy due to

the generation of chip accretion and tool feed marks remaining on the machined surface. At the same time, the annular thin part has the characteristic of low rigidity, and the traditional turning process is not easy to clamp and will result in the reduction of the machining accuracy in the cutting depth direction of the workpiece in the turning process. The grinding method of high-precision hydraulic spindle has obvious advantages over turning processing in processing efficiency and processing precision, and is increasingly applied to the forming of high-precision key parts of automobile engines. However, the high-speed rotation of the hydraulic suspension spindle and the friction and heating of the bearing hydraulic oil cause the temperature of the hydraulic oil to rise, causing the temperature rise and deformation of the cantilever structure for the machine tool supporting spindle, resulting in the repeated positioning accuracy of the high-precision grinder spindle being reduced when it is stopped several times, or It takes a long time to reach the thermal stability of the machine tool spindle when starting up again, reducing the dimensional machining accuracy and machining efficiency of parts. Second, the test device and detection method 1. Test equipment The blank material of the thin annular workpiece used for the test is processed by heat treatment 301 stainless steel. Before precision grinding, it is necessary to prepare the clamping datum plane for precision grinding process by ordinary grinding method. The test equipment for the final refining process is

shown in fig. 1. In order to reduce the thermal deformation of the workpiece caused by the heat generation of the worktable in the grinding process, the worktable uses strip-shaped electric permanent magnet suction cups as the adsorption surface with the workpiece. The electric permanent magnet chuck can not only improve the clamping speed and precision of the workpiece, but also has the characteristics of being strong, practical and efficient. As used herein, the cantilever structure used to support the spindle of the grinding machine is shown in fig.

2. The grinding spindle adopts a dynamic pressure support mode and is in a state of high-speed movement when working, and the temperature of the hydraulic oil area is increased due to friction heat generation between the surface of the spindle and the hydraulic oil. Due to the long dimension of the cantilever structure, it is easy to cause the cantilever structure