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# ENSURING OF ACCURACY AT TURNING OF NON-RIGID PARTS

Nowadays, due to ensuring the competitiveness of domestic products both in the domestic and the world market, high standards are imposed on its quality.

Improvement of the quality of machine-building production is associated with the improvement of the technology of its production and the introduction of progressive processing methods into production. Particular attention is paid to ensuring accuracy of processing and giving the surface layer of machine parts with the necessary physical and mechanical properties.

In recent years, as a result of the widespread use of materials with high strength and special properties, a trend has been observed in the machine building industry to reduce metal consumption and the mass of machines, and as a consequence, the formation of a large number of non-rigid parts.

Ensuring the accuracy of non-rigid parts is associated with considerable difficulties due to technological residual deformations. The residual deformations of the parts arise as a result of disturbance of the equilibrium of their stressed state during the technological process and constitute the main part of the total error of processing. Elimination of residual deformations in the manufacture of non-rigid parts has become one of the most important problems in engineering technology [1].

One of the most important technological tasks in the processing of non-rigid parts is to ensure their geometric accuracy. Such typical part is the body of rotation in the form of thin-walled metal bodies.

The low rigidity of such parts is a deterrent in the designation of cutting regimes, which reduces the processing capacity. For the same reason, the permissible wear value of the contact surfaces of tools is reduced. As a result, the potential resource of modern high-priced replaceable polyhedral plates is not fully used, and the cost of processing increases.

To ensure the accuracy of this class of parts, it is necessary to take into account the individual design features of the machined parts. For thin-walled metal bodies such feature is the presence of a concentrically located ring, which by means of 3 bridges rigidly connected with the main body of the part. When turning the inner diameter of 105 mm and cutting the internal thread of the joint venture 105x3 the detail is fixed for the external diameter of 111 mm in 3 cams with special enclosing sectors. This makes it possible to reduce the amount of unavoidable faceting in the cross section of the thin-walled body of the part. Nevertheless, at the first stages when testing the technology for manufacturing this part on a machine tool with a numerical control model 16A20F3S49, the value of this error was reached to 0.1 mm, which exceeds the permissible value, and the defect for this reason was 10%. The technology of this stage was follows: turning of the thread diameter was carried out in one installation with a change in roughing and finishing passages with the same cutter [2, p.79].

It should be noted that was expected 3 “petal” cut, caused by the application of three-claw chuck but in reality there was 4 “petal” cut. The formation of such shape of cut can be explained as follows. When installing parts in the chuck of the machine are observed its certain angular orientation with respect to one of the three gaps between the cams, against which there is a mark on the end face of the cartridge.This is due to the presence on the opposite end of the parts of three projections, the outer diameter of which is greater than the diameter of 111 mm, along which it is fixed. On the outer diameter of the part, this is not subjected to processing, stamped, located opposite one of the bridges, connecting the outer ring with the body of the part. This stigma serves as a reference mark for the part.

When the part is unfastened after the treatment, it is elastic “recovery”, as a result of which a form error is formed, different from the classical 3 “petal” cut, characteristic after processing of smooth thin-walled rings. To reduce the percentage of rejects, the technology variant described above was revised. The difference was that the roughing and finishing of turning were performed as independent operations. In addition, a time interval of 20-24 hours was introduced between them. Such a holding time promotes a more complete redistribution of residual stresses in the design of the part after roughing and, as a consequence, stabilizes its diametric dimensions.

During fixing the part before finishing turning, a change in the angular orientation was introduced, namely, it was rotated around its axis by 120° clockwise [3, p.60; 4, p.31].

From the data obtained, it follows that the shape error is approximated to a “multi-petal” cut, the maximum value of which is within acceptable limits.

Thus, taking into account the individual features of this part in the development of the technology of its production allowed improving the accuracy of its processing and preserving the reject in terms of cutting to 1%.

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