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Design of a Round Shaped Cutter

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Shaped cutters are used for processing surfaces of a complex profile lathes of the turning group and less often on planning or slotting machines in conditions of serial and mass production, as a rule, they are special tools designed for processing one part. Shaped cutters provide a strict identity of the processed parts, a large number of overflows, high overall and dimensional stability, combination of pre- and final processing, ease of installation and adjustment on the machine, which makes them indispensable in automated production, especially on automatic lathes [1].

Shaped incisors are classified according to several characteristics: 1) the machine type: turning, automatic, planning, slotting; 2) the cutter body shape: round, disc, prismatic, rod-shaped; 3) the cutter front plane position: with conventional sharpening (=0), when the base point is set at the height of the axis of the part and with a side point (=0), when the blade section is set at the height of the axis of the part; 4) according to the position of the base surface of the cutter (the axis of the landing hole for round or the reference plane for prismatic) relative to the axis of the workpiece: the cutters of the usual installation and the cutters of a special installation; 5) by the type of the treated surface: external, internal, end. The latter are external with the base deployed at an angle of 90; 6) according to the feed direction: with radial, axial and tangential feed (radial, end and tangential cutters, respectively); 7) based on the design, the method of connecting the cutting part and the

body, the material of the cutting part: nozzle and tail (round); solid, welded, soldered; high-speed and carbide [2].

The design of shaped cutters includes the following main stages:

- preparation of the drawing of the part for the calculation of the shaped cutter;
- choice of the cutter type;
- determination of the angles of the cutting part and the angles of the cutter installation;
- determination of overall and connecting dimensions of the cutter;
- calculation of the dimensions of the cutter profile (correction calculation of the cutter);
- calculation of tolerances for profile dimensions, sharpening angles and cutter installation;
- design of the working drawing of the cutter;
- designing a template to control the profile of the cutter during its manufacture and a counter template to check the template;
- designing a holder for fixing the cutter on the machine [3].

To calculate the profile of the cutter, it is necessary to set the calculated and theoretical dimensions of the part. In order for each size to be obtained within its own tolerance field when processing a part, its average dimensions are taken as the theoretical dimensions of the part.

If the size in the drawing is without tolerance, then it is accepted according to the 9 accuracy standard. Usually, longitudinal dimensions and radii are accepted with deviations of "+, - ". Since shaped cutters, in addition to processing a given profile, also remove the chamfer from the end of the part and cut a groove to determine the operation of the cutting cutter, additional blades are needed.

We determine the overall and connecting dimensions. They are determined from design considerations depending on the depth of the shaped profile of the product and the length of the profile. Due to the presence of the rear and front corners, the profile of the cutter in the axial section and the circular cutter in the section perpendicular to the forming prisms does not coincide with the profile of the part. The height dimensions of the profile of all shaped incisors are subject to correction. The axial dimensions often remain the same as those of the part.

The purpose of the general part of the correction calculation is to determine the height dimensions of the profile of shaped blades measured in the direction perpendicular to the base of the cutter [3].

Designing in the field of tool production is the most important task, because the durability and reliability of the tool will depend on how accurately and competently the calculation will be made. During the process of modeling a cutting tool, important factors are: selection of the cutting part material, creation of the necessary tool geometry, ensuring wear resistance, etc. Thus, the creation and design of cutting tools is constantly being improved in order to obtain highly efficient and fairly inexpensive tools.

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