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PECULIARITIES OF THE FORMATION  
OF FACETED HOLES BY DRILLING

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Modern engineering constantly requires the development of parts of complex shape. As a rule, parts of this kind are difficult to obtain on universal machines. Such bottlenecks include treatment of faceted holes, especially blind holes. One of the promising ways can be offered by drilling these holes with a specialized tool that works on the rolling principle.

The most widespread faceted holes in mechanical engineering are square and hexagonal holes. Based on this, the first purpose of this work is the analysis of accuracy of the processed square and hexagonal holes. While drilling such holes, the tool is unable to process the angles. From this follows the second purpose which is determining the effect of the area of the processed hole on the area of the unprocessed angles.

The bases of the tools used for drilling faceted holes are figures of constant width. A figure of constant width is a figure whose border is a curve of a constant width. The curve of a constant width is a convex shape whose width is the same regardless of the orientation of the curve.

For drilling square holes, special drills are used which are based on a Reuleaux triangle. It is a figure of constant width. In this process, a Reuleaux triangle rotates around its axis and moves along a certain trajectory. During this process, the vertices of the triangle pass almost the entire perimeter of the square, deviating only at the angles, and form almost a square. The unprocessed angles area is approximately 1.3 per cent of the square area. As a result of the research, the ratio of the area of a faceted hole and the area of unprocessed angles was obtained. This ratio can be expressed using the trend line and the obtained formula.

After examining the accuracy of the finished holes, it was revealed that the vertices of figures of constant width deviate not only in the angles of the holes, but also on the faces. The dimension of this deviation is approximately 20 micrometers.

In principle, the process of drilling square holes does not differ from the process of drilling hexagonal holes. Only the figure of constant width changes from a triangle to a pentagon. For hexagonal holes, an accuracy analysis was also performed and a ratio between the area of the processed hole and the area of the unprocessed angles was found.