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THEORETICAL AND TECHNOLOGICAL PECULIARITIES OF STRUCTURAL OPTIMIZATION OF TURNING OPERATION OF BORING

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Structural optimization of turning boring operation is considered as a process in which the sequence of the working and auxiliary moves of a cutting tool is determined to minimize the main processing time. The basis of structural optimization techniques is an information and mathematical software. Depending on the design of the hole, it will have the n-th number of steps. Determination of treatment options with any number n can be encoded in the form of elementary parts Zij each of which is limited to the faces and forms a cylinder hole part. The variants of combining the elementary parts of Zij into the k-th allowance are given by the equation. The equation codes the composition of the allowances for each step that it can form.

However this equation does not describe how the allowances of each step can be combined into treatment options. In the future the treatment options will be represented as an ordered set Ωi. Obviously, for any treatment option, the elementary part of Zij cannot simultaneously be a part of two or more level allowances, otherwise there will be zones of intersection or void areas.

There is the problem of determining all accessible treatment options. The solution to this problem consists of two stages: the construction of a graph whose tops are the allowances of steps. This problem is solved by completion of the matrix of the graph; the check of treatment options of elements of set Ωi.

At the last stage, a treatment option with a smaller total number of working and auxiliary moves is selected.

Modern equipment, processing methods and progressive cutting tools expand the technological features of obtaining holes. On turning machining centers, when boring holes, you can remove the allowance by using both longitudinal and transverse moves of the cutting tool. Modern methods of drilling and milling allow to obtain high quality holes with minimal time and tools. The use of automatic systems tool setting for the size and modern processing methods allows to exclude a large number of auxiliary moves and reduces the total number of tools in the store.

We can draw the following conclusions.

1. The technique of structural optimization of technological transitions of boring stepped holes has been developed.

2. Structural optimization, application of modern processing methods and progressive cutting tools allow to increase machining productivity approximately up to 0,15 times due to reduction of the main time.