

OPTIMIZATION OF DRILLING PROCESS PARAMETERS

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**Abstract:** *The article describes the essence of holes and the process of obtaining them, analyzes the methods of processing holes, the parameters of the process of drilling holes, optimizing the drilling process by choosing the most optimal drill.*

**Key words:** *Hole, through, blind, drills, drilling machine, drills with interchangeable tips.*

A hole is the result of extracting a certain amount of material from the internal cavity of the part, which has a certain shape, and is produced mainly by drills.

Holes can be through - these are holes that pass through the part, and can be blind - these are holes that do not reach another parallel plane of the part, these holes are drilled to a certain depth, i.e. smaller part size.

Parts with holes in their design are made in a variety of ways. For example, if there is a hole in the design of a part that is too small in diameter, then most likely the workpiece of this part will be made without a hole, for its subsequent opening with a drilling machine and a drill of the required diameter. And in parts with a large hole diameter, the workpiece will be designed in such a way that there will be a hole in its design, but with a smaller diameter than the finished part, this is done in order to further bring it to the desired size using the optimal hole finishing tool.

The opening of the internal holes of parts is carried out in most cases using a drilling machine.

Drilling machines are designed for drilling blind and through holes in solid material, reaming, countersinking, reaming, cutting internal threads, cutting discs from sheet material. To perform such operations, drills, countersinks, reamers, taps and other tools are used. The shaping movements in the processing of holes on drilling machines are the main rotational movement of the tool and the translational movement of the tool along its axis.

The main parameter of the machine is the largest nominal diameter of drilling a hole (for steel). In addition, the machine is characterized by overhang and the largest spindle travel, speed and other indicators.

Drilling machines are divided into the following types:

- Vertical drilling machines;
- One-spindle semiautomatic devices;
- Multi-spindle semiautomatic devices;
- Coordinate boring machines;
- Radial drilling machines;
- Horizontal boring;

- Diamond boring;
- Horizontal drilling machines;

Drilling is a technological operation of successive gradual removal of layers of the base material (in our case, it is metal) by means of a cutting tool in a circle of the required diameter.

This procedure is performed by combining movements of two types - translational, as well as rotational. Obtaining the specified hole sizes in blanks requires precise compliance with the following operating parameters:

- the speed of movement in the vertical or horizontal direction, which is determined by the relative position in the space of the workpiece and the drill;
- speed of rotary movement of the cutting tool.

Often, in order to obtain a given accuracy, a pre-drilling step is carried out. It is called "black". This operation is performed with a reduced level of precision. It is followed by a cleanup. At this stage, high-precision units and fixtures / tools for metal blanks are involved. The following drilling options are available:

- using
- specialized metal-cutting or drilling machines;
- hand tools (we are talking primarily about a drill).

On a metal-cutting - lathe - machine, the drill is fixed in an element of this unit called the "tailstock", and the workpiece, clamped by the jaws of the cartridge, rotates. In the drilling machine, the drill is already rotating, also fixed in the chuck. The locksmith smoothly brings it to the place of processing marked on the outer surface of the workpiece. When created by the first method, the holes obtained are characterized by higher accuracy and are distinguished by less rough walls.

There are three most important parameters when drilling a hole:

- Holediameter
- Holedepth
- Holequality

A rare type of drilling tool manages to completely dominate the field of such a metalworking process as drilling holes. The tool used in the field of metalworking is usually represented by several subspecies, the characteristics of which are updated as the main series is updated and improved. A rare type of drilling tool manages to completely dominate the field of such a metalworking process as drilling holes. The tool used in the field of metalworking is usually represented by several subspecies, the characteristics of which are updated as the main series is updated and improved.

The cutting tool, its strength and performance is also one of the most important parameters of the hole drilling process. Therefore, the improvement and optimization of the cutting tool will lead us to the desired result and will increase the efficiency of this process.

Nowadays, there are drills with interchangeable tips.

The use of interchangeable tip drills is limited both by their own capabilities and by the peculiarities of the application in terms of minimum and maximum allowable tip diameters and equipment technological parameters, however, when used correctly, they can achieve excellent results.

To be most effective, an exchangeable drill should achieve IT9 to IT11 tolerances and an average roughness of less than 2.5 microns, depending on the particular application. Hole depth

should be up to 12 diameters with standard drilling parameters for small and medium depth holes, high stability of indicators and depth of holes, as well as the possibility of obtaining stepped holes and chamfers. There needs to be the potential to increase penetration rates, increase tip life, and provide fast and safe automatic tip changes in today's automated equipment.

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