

## HEAT TREATMENT OF THE DISK CUTTER MODULE

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Disc cutter unit are designed for cutting gear teeth by copying. The main factor to consider when designing cutters is a special distribution of physical forces at the time of teeth contact with the surface of the workpiece. Therefore it is necessary to apply the most suitable materials with regard to their value and scarcity.

Resistance properties are properties that instrument as a whole, and not of steel. When cutting resistance properties depend on several factors: the properties of tool steel and thermal conditions of processing; the cutting conditions; the cutting process character; the properties of the material.

Under the wear resistance of cutting tools one understands the destruction of its contact surfaces due to friction on the front surface of the tool and its rear surfaces of the piece.

Technical requirements for the product should enhance the reliability of its work during the operation.

In order to save steel R6M5 was chosen. It fully meets all technical requirements and applies to all types of cutting tools in the processing of carbon-alloy structural steels.

The steel, used for production of a disc cutter module must meet the requirements: high surface hardness; the strength characteristic (tensile strength in bending); technological properties (scaling resistance; heat and thermal conductivity; machinability and hardenability; deformability; stability against the formation of cracks and etc).

Preliminary heat treatment. Annealing of high-speed steels produced for the following purposes:

- to reduce the hardness to from 207 to 300 HB after hot plastic deformation;
- to improve the machinability;
- to prepare the structure for quenching.

For this cutter, one applies isothermal annealing. Structure after annealing is grainy troost-sorbitol plus carbides.

The main and most critical operation of heat treatment is quenching in salt bath.

Tools of high speed steel heat are treated according to the following regime: the first heated in a salt bath at a temperature of 600 to 650 °C; the second heating in a salt bath at a temperature of 800 to 850 °C; the final heating in chlorbarievoy or barium bath at temperature 1210 to 1230 °C (steel R6M5); cooling during quenching can be saltpetrous bath (at 500 to 550 °C) or oil (at 20 to 140°C).

The structure of high-speed steel after tempering consists of martensite, retained austenite and carbides.

After quenching the part is subjected to tempering at 520-580 °C: reduces of the hardening stress; increases the hardness of the tool to 2-3 HRC; the transformation of retained austenite to martensite.

Low-temperature nitrocarburizing tool is a the process of saturation of the surface layers of steel products in carbon and nitrogen. Used to increase hardness and red hardness of high speed cutting tools and high-chromium steel. Carbonitriding temperature is the same as in the tempering at 580°C.

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