Article ID: 1003-7837(2005)02,03-0638-01

Increasing of tool resistance to high-speed machining by cutting

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One of the most popular task of modern science of materials is searching of the such structural states that provide a high level of design strength, including wear resistance, thermal resistance and impact elasticity for cutting tool.

Practice of using of cutting tools produced from high-speed steel shows that in the most cases the reason of bad tool resistance is in its brittle fracture or scuffing of cutting edge due to law plastic properties. Different methods of bainitic hardening, which permit to increase sharply plastic properties of cutting tool, deserve an attention. However, for all that, the strength properties are reduced.

By the researches executed at JSC "KnAAPO" there was established, that one of perspective methods of cutting tool wear and thermal resistances increasing is bainitic hardening within bainite pre-transformation interval, as a heating and cooling surroundings, the fluidized bed of loose materials can be used.

Maximal thermal resistance peculiar to the samples produced from R18 steel after bainitic hardening within bainite pre-transformation time interval excluding interim transformation including bainite transformation. Bainitic hardening of high-speed steel within bainite pre-transformation time interval prevents carbides isolation that stimulate increasing of wear and thermal resistances. Furthermore, the special pre-transformation state, caused by atomic bonding weakening in crystal lattice lead to structure inhomogeneity ordering and improving of the cutting tool properties produced from high-speed steel. Comparative assessment of cutting tool wear resistance while high-speed machining showed that its wear resistance increasing 1.3-1.7 times as much. Using of carbonitriding for such tools increases its wear resistance 3.1 times as much and machining by electropulse influence 3.9 times as much.

The results of experiments show the prospectiveness of research works carrying out for other structural steels.

Received date: 2005-08-29