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RESEARCH OF DEPENDENCE OF CARBIDE CUTTERS ESISTANCE ON THEIR GEOMETRICAL PARAMETERS IN THE SPRAYED COATINGS PROCESSING

Among the materials used for spraying, resistant self-fluxing alloys based on nickel, cobalt and copper, and mixtures of chromium carbides and borides, tungsten, titanium and others play an important part. These materials resist abrasive wear in chemically active environment at normal and high temperatures. They are temperature-resistant, heatproof, work well in pairs of metal-metal friction with different oils.

Chemically resistant coatings on nickel base of self-fluxing alloys belong to a class of hard materials. The hardness of the sprayed coating depending on the powder brand is in the range of 35 ... 64 HRCe.

The current practice of processing of hard wear-resistant coatings is based mainly on the use of abrasive machining methods. The use of grinding is justified, but the processing of wear-resistant coatings accompanied by formation of scorching, grinding cracks impairs the operational properties of the treated surface. Peculiarities of cutting cover are determined by their structure and properties, the presence of significant macro deviations; structure and chemical heterogeneity; the difference in hardness; low plastic properties; high porosity; presence solid inclusions in the material; significant oxidative layer on the surface. In this regard, the coating treatment is accompanied by reduced resistance tool, a high temperature in the cutting zone, chip formation and cleavage significant fluctuation cutting forces.

Geometrical cutters significantly affect the process of cutting layer strain, force and cutting temperature, intensity of wear, and therefore the stability of the incisors. The improvement of the technical and economic parameters of processing of solid sprayed coatings can be achieved by selecting the optimal values of the geometric parameters of the tool. Since the stability of the tool depends on its geometric parameters, the increase of its stability when processing sprayed coatings by choosing the optimal values of the geometric parameters of the tool is an urgent task.

The aim of research is to improve the stability of the tool in the processing of wear-resistant sprayed coating of Ni-Cr-B-Si system.

The aim of the study is to determine the stability of cutters depending on their geometrical parameters.

Research of the dependence of the tool sustainability on its front angle. Research of the dependence of the lathe tool resistance on its front angle γ is performed in the processing of sprayed coatings on the basis of self-fluxing alloy PG-SR2. Coatings were sprayed by flame method on samples of steel 45 with a diameter of 50 mm and a length of 500 mm. Covering hardness is 40 ... 45 HRCe. The thickness of the coating layer is.5 mm.

Experiments were conducted on screw-cutting lathe 16K20 without cooling the external longitudinal turning. Hard alloy tools VK3 were tested.

Coating processing was performed in the following modes: cutting speed - V = 22,6 m per min, V_2 = 35,3 m per min, feed - S = 0,15 mm per rev, cutting depth - t = 0,2 mm.

Wearability on the back surface of the tool was taken as the blunting criterion. Measuring of the value of area operation was carried out with the Brinell magnifying glass. Limit value of wear on the back surface was set equal to 0.4 mm.

Input factor is a front cutter angle γ set at a given level (Table. 1). The initial factor is the stability of the tool τ. The result of the experiment is the values of output factor (Table. 1).

Table 1

Measurement results of tool sustainability

Research number i	Cutter front angle γ, degree	The stability of the tool at cutting speeds V_1 = 22,6 m per min., τ, min.	The stability of the tool at cutting speeds V_2 = 35,3 m per min., τ, min.
1	-5	50	16
2	0	42	24
3	+15	28	12

Research of the dependence of the tool sustainability on its main angle in the plan. Research of the stability of turning tools on the main angle φ is made in terms of the processing of sprayed coatings on the basis of self-fluxing alloy PG-SR2. Coatings were sprayed by flame method on samples of steel 45 with a diameter of 50 mm and a length of 500 mm. Covering hardness is 40 ... 45 HRCe. The thickness of the coating layer is 1.5 mm.

Experiments were conducted on screw-cutting lathe 16K20 without cooling the external longitudinal turning. Hard alloy tools VK3 were tested.

Coating processing was performed in the following modes: cutting speed - V = 22,6 m per min, feed - S = 0,125 mm per rev, cutting depth - t = 0,2 mm.

Wearability on the back surface of the tool was taken as the blunting criterion. Measuring of the value of area operation was carried out with the Brinell magnifying glass. Limit value of wear on the back surface was set equal to 0.4 mm.

Input factor is a main angle in the plan φ set at a given level (Table. 2). The initial factor is the stability of the tool τ. The result of the experiment is the values of output factor (Table. 2).

Table 2

Measurement results of tool sustainability

Research number i	Main angle in the plan φ, degree	Tool sustainability τ, min.
1	30	58
2	90	40

According to the results of research presented in Tables 2 and 3, histograms of dependencies of turning tool resistance in the processing of sprayed coatings on its geometrical parameters are built (see. Fig. 1, 2).

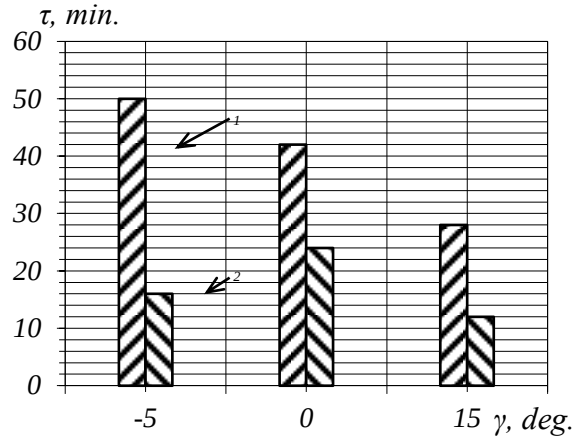

Figure 1. Dependence of τ tool stability on its front angle in the plan γ at cutting speeds:
1 – 22,6 m per min.; *2* – 35,3 m per min.

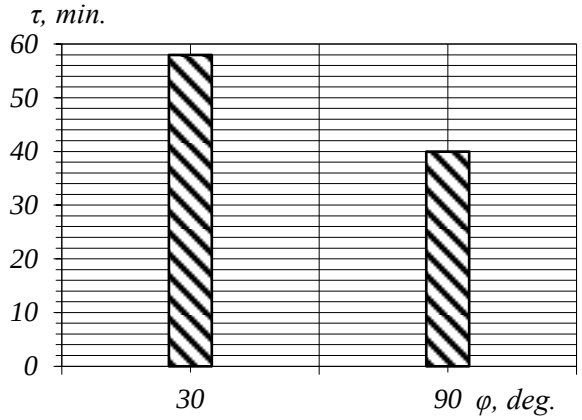

Figure 2. Dependence of τ turning tools stability on the main angle in the plan φ

Conclusions.

1. The studies found that with increasing of front angle of cutter its resistance decreases.

2. The studies found that with the increase of the main angle in the plan the stability of the tool decreases.

3. Since the processing of wear-resistant sprayed coatings between resistant carbide cutters and geometrical parameters of the tool there is a connection, so it makes it possible to determine the optimal values of these parameters.