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Ground of Composition of Cone-Shaped Material Formed for Coverage Working Surfaces of Details

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Abstract: This article substantiates the composition of the powder composite material formed to cover the working surface of the parts. According to the results it is advisable to use a powder material containing the iron and nickel alloys as fillers. It was found that the composite particulate material formed on the basis of the chosen composition must izgatovlyatsya industrial method.

Keywords: Formed tapered composite material, an electric current, a welding layer, composite, polymer, cast iron block, ligurirovannaya steel, abrasive wear.

The main task of this research is to study the abrasion resistance of the welded layer obtained from the formed powder composite materials in the friction pair with different materials, to analyze the abrasion mechanism of the heterogeneous structural layer, to justify the optimal structure, size and materials.

The weld layer obtained from the formed powdery composite materials has a specific relief surface (topography) that differs from the others at the initial stage of erosion. This surface is in contact with the self-adhesive detail through the base surfaces of the hard alloys. This is why many scientists and experts have wondered whether hard alloys can cause microcracks on the surface of a bonding part, such as sandstone.

For parts operating under different conditions, the distance between the hard alloys on the surface of the welded layer will be important. This depends on the percentage ratio of the phases that make up the powdered composite materials formed. In determining this ratio, it is necessary to determine the volume that can be occupied by the solidifying phase particles when filling a given volume, as well as the volumetric ratio of the binders and fillers that fill between them.For this purpose, the size of the gap between spherical solid alloy particles with dimensions of 200… 400 μm was calculated. Its value was found to be approximately 47% of the total volume.

With this in mind, we initially used a polymer-formed, composite phase composite material consisting of tungsten carbide with a particle size of 200… 400 μm. Tungsten carbide particles occupied 40% of the sample working surface. The prepared sample was tested in a friction pair with cast iron pads. The erosion rate of the sample was found to be 60 times slower than that of refined steel. The cast iron pad, on the other hand, had twice less wear than when working in a friction pair with refined steel.

This situation can be explained by the following. The more solid alloy particles in the resulting layer, the harder it is for the abrasive particles to sink to its surface and the more shallow holes can be drilled, however, we can increase the number of solid alloy particles in the layer to a certain limit. The more solid alloy particles there are, the harder it is to move them into the base metal. Therefore, by increasing the number of solid alloy particles in the alloy, we limit its plasticity and make it brittle. [4] Machine parts are not only subject to friction but also to impact forces. From this it is clear that the wear-resistant layer should not be brittle. However, it was found that the flat placement of hard alloys on the surface of the part also has a significant effect on the corrosion resistance.

From the above, it can be seen that if the distance between the hard alloys on the restored surface of the part is large, the hard alloys can become a cutter relative to the joint itself. It follows that the area occupied by hard alloys on the surface of the part is crucial. During the study of details coated with powdered composite materials formed on the working surface, it was found that the area occupied by hard alloys should be 30… 80%. This limit of the amount of solid alloy in the layer is explained by the following.

When the area occupied by the hard alloys is less than 30%, the wear rate of the bonding part increases sharply. [4] When working with a friction pair with a refined detail refined and cemented steel, the area occupied by the hard alloy can be obtained close to the lower limit. When working in a friction pair with more soft materials, the area occupied by the hard alloy should not be less than 50%. In practice, this is achieved by changing the composition of the powdered composite material formed in the required ratio to the area that the solid alloy can occupy on the surface of the detail-coated layer.[5]

It is extremely important that the solid alloy particles are evenly distributed in the layer coated on the surface of the detail. This is because in order for the hard alloys to be held firmly in the resulting weld layer, each of its particles must be surrounded on all sides by a bonding material. The smaller the distance between the hard alloys, the less the binder material is corroded. [6] However, in the preparation of composite material formed from a mixture of powdered materials of different brands, the solid alloy particles are arranged randomly, i.e. not in a definite plane. Therefore, on the surface of the obtained layer, the particles of hard alloys cannot be evenly spaced. It follows that we can only determine the maximum value of the distance between them. In our previous studies, determine that the maximum distance between solid alloys should not exceed 4… 5 times the size of the solid alloy particles.[7]

Therefore, in order for the solid alloy particles to settle evenly in the layer, it is necessary to achieve as much as possible the amount of solid alloy in the composition of the composite material. Their exact amount is determined depending on the operating conditions of the parts.

The determination of the composition of the powdered materials for the formed powder composite material is important for its widespread application in the production of the recovery method. Studies have shown that hard alloys with an aggregate particle size (4… 40 μm) and larger particles (up to 500 μm) are more resistant to corrosion than fine particles (1… 3 μm). [8] The abrasive particle does not sink to its surface and cannot be cut or cut, so no microcracking occurs in it and the abrasive passes from the wear to the wear type in fatigue. Taking into account the brittleness and welding strength of hard alloys, the composition of the weld seam to be obtained, together with the curing phase, should again consist of a binder and a filler. The choice of the curing phase is based primarily on the requirements for its corrosion resistance, layer hardness and the degree of scarcity of the material. For layers that require 5… 10 times higher corrosion resistance, it is advisable to use powdered materials such as chrome-based PG-FX-800 and PG-FBX-6-2. If higher abrasion resistance is required, titanium-based hard alloys (T15K6, T30K4, T60K6 and PTJ23N6M) are recommended. [9] If very high abrasion resistance is required, then the use of tungsten and other hard alloys such as nitride and boride is recommended.

It is known that cobalt is mainly used as a binder in the production of carbides. Cobalt is one of the metals in the Mendeleev periodic table that is contiguous with iron and nickel. However, cobalt differs from iron and nickel in its physical and mechanical properties and scarcity, such as high liquidus temperature, density. In addition, most of the details that require restoration are steel and cast iron, which are iron alloys. In view of this, it was considered expedient to use powdered materials consisting of iron and nickel alloys as binders and fillers. The powder composite material, formed on the basis of the selected composition, was produced industrially.[10] The introduction of the

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production of molded powder composite materials according to a certain composition allows it to be introduced into the restoration of details.

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