STUDY OF TRANSITION ZONE METAL PLATING IN RECOVERY CONTACT ASSEMBLIES OF ELECTRICAL APPLIANCES

I. Radko

The study of physical processes that occur in the transition zone of restoring contact with metal platings units of electric vehicles, a prerequisite for further combat with electric erosion, which is a major cause of destruction of electric vehicles.

The purpose of research - the creation of contact nodes in their recovery that will extend the duration of the electrical system as a whole and improve the economic efficiency of its use.

Materials and methods of research. Past studies of the interaction of particles sprayed surface showed that it is possible to present the phases of the formation of physical contact activation contact surfaces to form chemical atomic bonds on the verge of distribution. It was established that the quality and coverage of formation is caused by adhesion of the coating base, coefficient and porosity using powder coating.

The structure of the transition zone between the coating and the foundation has not been studied sufficiently accurate because of the great complexity of studying the structure of marginal areas. Because the coating materials and bases have different properties, namely hardness at different grinding that is performed before Metallographic studies; on the brink of transition step is formed that prevents simultaneously conduct etching and coating base; separate digestion grindin air cavity in the study of microstructures is like groove. The second reason is that in most cases the thickness of the layer formed on the brink of distribution in the interaction of particles with the material base, is not very large, which does not conduct a thorough investigation.

Connections sprayed coating with the base at the expense of mechanical coupling particles napylyayutsya with performances and cavity on the surface of the base, formed by pre-treatment.

Mechanical grip is enhanced as a result of fusing or chemical interaction of particles with napylyayutsya basis. In the study of the contact zone between the coating and the basis should also pay attention to areas where connectivity is on thin oxide films formed on the surfaces of particles and sprayed basis.

On the strength of clutch cover with the base effect and physical links, which appear in the form of molecular bonds. They appear when that material deposited material foundations and the grid are approximately the same size. In areas of the base, which has a high surface activity, the nature of the connection is determined by diffusion processes. Currently, this type of connection for sprayed coatings are not sufficiently understood.

Results. Sketch. 1 shows a fracture coating of carbon steel 0.5 mm thick deposited on the basis of low-carbon steel, which is a thread. In determining the strength of coupling destruction of the sample as occurred on the border between the base and the surface of the particles sprayed and sprayed on the material. When spraying based on thin layer of molybdenum for the same cover, carbon steel 0.5 mm thick molybdenum particles detachment from the base after the test sample for adhesion did not occur (Fig. 2). The destruction of the coating takes place in the joints of the grains of molybdenum grains sprayed carbon steel.

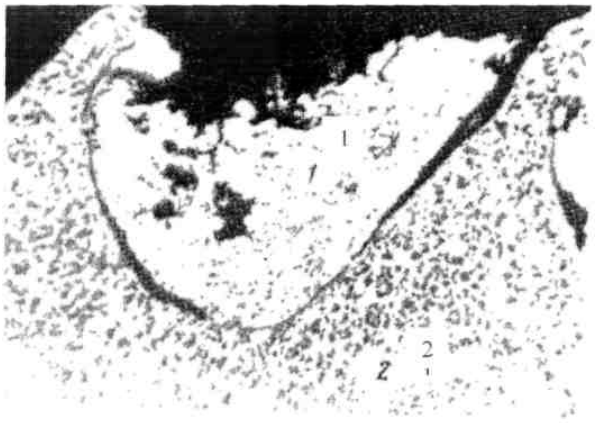

Fig. 1. The destruction of coating deposition on the basis of low carbon steel (increase x60x3 / 5)

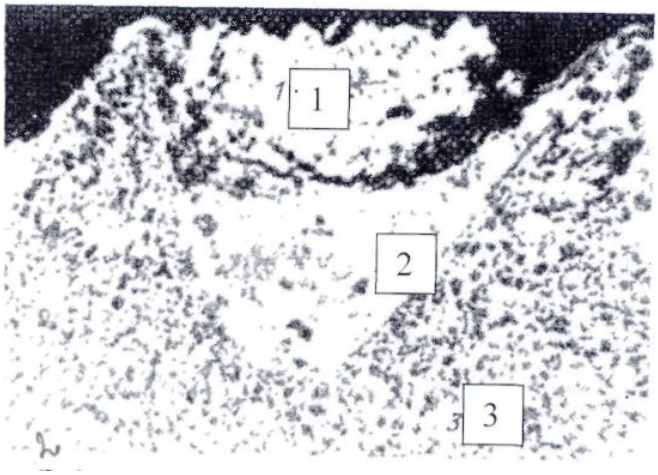

Fig. 2. Destruction of steel coating, spraying on the basis of low carbon steel with molybdenum sublayer (increase x60x3/5):

1 - Steel coverage; 2 - sublayer of molybdenum; 3 - the basis of

Good adhesion to the surface molybdenum steel base due its high vapor pressure of oxides. When moving particles of molybdenum from the nozzle to the surface of the base vodka is their oxidation, accompanied by intense evaporation oxides. As a result, molten particles of molybdenum at the time of collision is easily broken, and pure molybdenum having a high temperature in contact with the surface of the base. Passes melting molybdenum particles of material bases in some areas and the formation of metallic bonds.

Sketch. 3 shows the microstructure of the transition zone in which there was sprayed molybdenum compounds with the metal base. Molybdenum wire progra applied spray (spraying conditions: 2mm wire diameter, vodka Mark 33, acetylene pressure of 1.1 kg / cm2, oxygen pressure 1.6 kgf / cm2, compressed air pressure of 3.2 kg / cm2, spraying distance 150 mm) to the base from low carbon steel, the surface of which was subjected to chemical polishing. From the figure shows that the coverage of a foundation formed on the intermediate layer. The thickness of the intermediate layer is 1 micron. According to research interlayer consists primarily of Fe3Mo2.ta Re7Mo6.

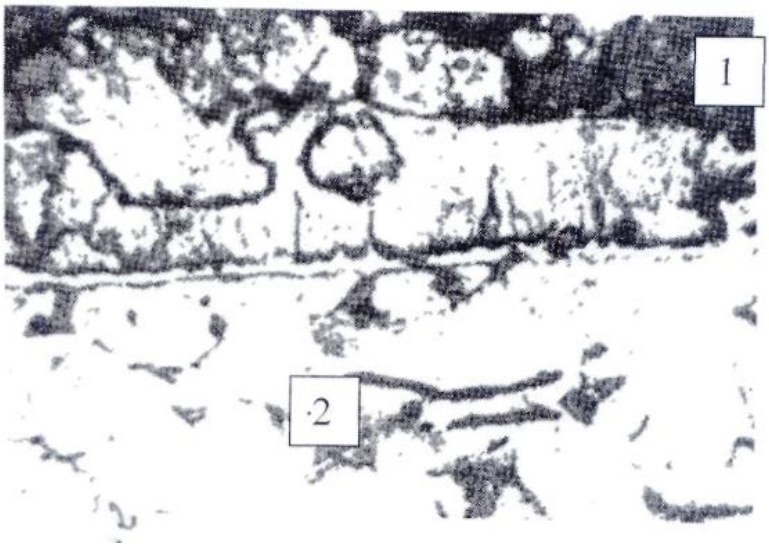

Figure 3. The microstructure of the transition zone molybdenum coating deposited on the surface of a polished base with low carbon steel (increase x920x35/5):

1 - molybdenum coating; 2 - low-carbon steel

Sketch. 4 shows electron micrographs molybdenum coating, plasma coating applied on the basis of low carbon steel. Lots of penetration shown by arrows.

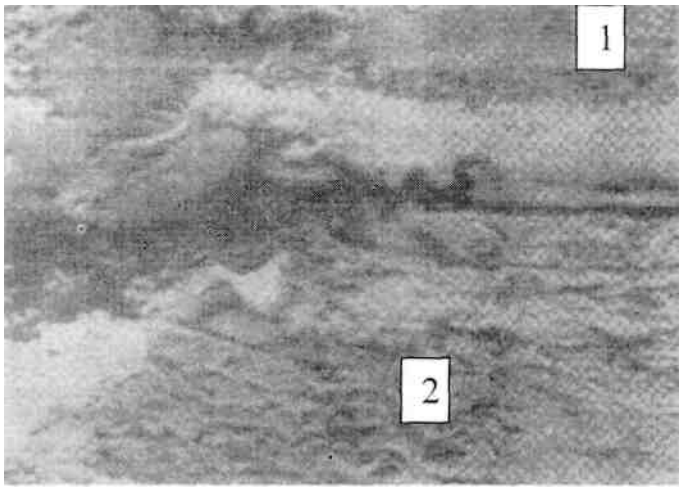

Fig. 4. Electron micrograph of molybdenum intermediate layer deterioration between coating and coated the basis of low carbon steel (increase x7500x3/5):

1 - molybdenum coating; 2 - low-carbon coating

If you hold the plasma deposition of tungsten on the pre-heated to 1120-1480 ° C tungsten plate in a particularly pure nitrogen environment, you can get

coverage, fused to the base. When preheating temperature higher than 1200 ° C between tungsten and tungsten basis covering a zone of solid solution. Figure 5 shows the structure of the transition zone between the base and the tungsten surface.

Molybdenum coating has very good connections with the base which is aluminum. However, copper and copper alloy adhesion it low. When spraying molybdenum copper because of its high thermal conductivity is rapid cooling particles of molybdenum at the time of collision with the base and melted transition layer is formed.

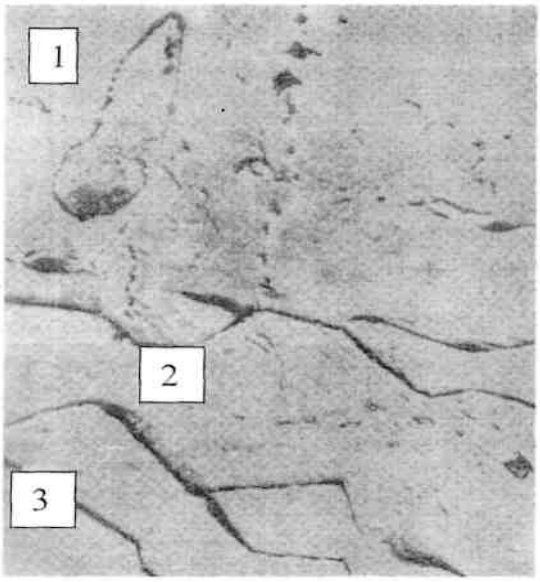

Figure 5. Electron micrograph of tungsten coating deposited on previously prepared base of tungsten (increasing x 10000x3 / 5):

1 - sprayed coatings; 2 - surface of the base; 3 - the basis

Conclutions

Investigation of the transition zone between the coating and the foundation suggests that the connection is sprayed coatings with the base at the expense of mechanical grip powder deposited with irregularities on the base surface formed prior. It is enhanced as a result of chemical interaction or alloying particles napylyuyutsya.