Investigation of Qualitative Parameters of Surface Layers Formed by Stepwise Carburizing and Sulfo-Carburizing of Steel Parts With the Use of Electroerosion Alloying Method

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There are represented the results of the investigation of qualitative parameters of surface layers formed by stepwise carburizing and sulfo-carburizing of steel parts with the use of the method of electroerosion alloying (EEA) 20 steel. As a result of stepwise carburizing by the EEA method: the roughness of the surface layer decreases from Ra=4.79 to Ra = 1.10 μm and from Rz=13.62 to Rz=3.14 μm; the microhardness of the white layer (near-surface layer of increased hardness) decreases from 950 HV to 720 HV; the increased hardness zone depth decreases from 130 to 100 μm. It has been stated that at sulfo-carburizing of steel parts with the use of the method of electroerosion alloying (EEA), the surface roughness and the depth of the layer having a higher sulfur content increase with increasing discharge energy, and the amount of sulfur decreases in the very surface and along the depth of the layer while deepening thereof. As a result of micro-X-ray spectral analysis, it has been found out that on the modes of the discharge energy values of 0.13; 0.55 and 3.4 J, on the surfaces of 20 steel, there are formed the layers saturated with sulfur having the depth values of ~ 60, 90, and 150 μm respectively. The metallographic analysis of the coatings after sulfo-carburizing by the EEA method showed that the microstructure obtained consisted of 2 zones, namely, the diffusion zone and the zone of base metal. The durametric analysis indicated that in the surface layer, there could be distinguished three portions, namely, the near-surface portion, which was characterized by the lower values of microhardness, the strengthened layer portion, where the maximum microhardness

value was observed, and the portion of base metal. The microhardness values of the zones are determined by the energy parameters of the EEA process. The greater discharge energy value produces the higher microhardness value for the layer having a lower microhardness as well as for the strengthened layer.

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