Paper Titles

Modeling Technological Parameters for Producing Combined Electrospark Deposition Coatings

Abstract:

The paper represents a formalized methodology for solving the problem of creating fundamentally new materials, such as "base - coating" ones, which have increased surface wear resistance and relatively high strength and viscosity. Electrospark alloying (ESA) method is proposed as a process for depositing protective coatings on metal surfaces. There are considered the issues of improving the quality of the coatings formed by the ESA method. There is specified a feature of processing the surfaces having been treated with the use of the ESA method, which feature being associated with a relatively small thickness of the layers formed (tens of micrometers). Since to reduce the roughness of the surface, the process of grinding is difficult or even unacceptable to perform, it has been suggested to use the method of surface plastic deformation (SPD). One of the effective SPD methods for finishing the parts is a diamond smoothing process, which, in contrast to running-in with a ball or roller, allows processing the parts of very high hardness values. As a reserve to improve the quality of coatings formed by the ESA method, there is considered a process for producing combined electrospark deposition coatings (CEC) with hard wear-resistant and soft anti-friction metals integrated therein. There are represented the results of mass transfer process investigation performed at forming the CEC on the specimens of steel 45 with indium, tin and copper being used as soft antifriction metals, and tungsten and hard alloy of VK8 grade applied as wear-resistant materials. There is represented a mathematical model for calculating the main ESA technological parameters being necessary for forming the CEC and allowing to predict the weight gain (increase in weight) and size gain (increase in size) at the cathode (the part). It allows predicting the CEC main technological parameters for any electrode pair materials (substrate material and electrode materials making up the CEC).

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