INFLUENCE OF ENERGY ACTION MODES ON HEAT AND MASS TRANSFER OF SURFACING MATERIAL, FORMATION OF STRUCTURE AND PROPERTIES OF COATINGS*

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The possibility of influencing the characteristics of heat and mass transfer of the surfacing material and the formation of a dispersed structure in the coatings, increasing their properties when modifying the molten metal is studied.

To solve the problem of controlling droplet formation, transfer of electrode metal, crystallization of the surfacing bath, it is important to control changes in arc voltage, current, instantaneous arc power. New methods of diagnostics of rapidly occurring heat and mass transfer processes accompanying melting, transfer and crystallization of metal from the melt were applied. Steel 09G2S was used to study the influence of surfacing modes at direct current and pulse change of energy parameters of the modes. Surfacing was performed by electrodes T-590-N. Powders of titanium nitrides and carbides were used as a dispersed component. A mixture of powder granules with a liquid glass binder was applied in a thin layer to the electrode coatings. Surfacing by electrodes was carried out by one and two layers. The research complex consisting of the inverter power supply PHOEBUS-315 "MAGMA" with the mode of pulse-arc surfacing, sensors of measurements of the main energy parameters, the Registrar of these parameters AWR-224 MD and the personal computer was applied. The frequency of current modulation was regulated in the range: 1-5 Hz. The analysis of the microstructures of the base metal, the metal of the deposited layer and the zone of thermal influence was carried out with the help of microscopes “Axio Observer D1m” and “Neophot-32”. Measurement of microhardness was carried out on the device Leika. Abrasive wear resistance of the coating surface was determined according to GOST 23.208-79.

Hardening of the deposited coating occurs due to the formation of a new surface layer. The properties of the deposited surface depend on the type of alloying elements that determine the phase composition, the boundaries of phase transitions and mechanical characteristics.

Technological parameters of the surfacing process affect the structure of the deposited metal and its properties. When changing the surfacing mode, the melting process of the material and the chemical homogeneity of the deposited layer change. The coating deposited by T-590 electrodes on the pulse mode has a more uniform structure.

A comprehensive approach to improving the properties of coatings using the method of modifying their materials during surfacing is proposed.

Changing the energy parameters during surfacing allows to reduce the structural heterogeneity of the coating cross-section by reducing the size of the structural components.

Modification allows to increase dispersion of structure and hardness of coatings.

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