INFLUENCE OF THE ENERGY IVHFCT ON STRUCTURE FORMATION AND PROPERTIES OF DEPOSITED COATINGS*

Yu. N. SARAEV [1], V. P. BEZBORODOV [1], M. V. PEROVSKAYA [1], V. M. SEMENCHUK [1],B. S.BRAVERMAN [2], K. A. BOLGARU [2]

[1] Institute of strength physics and materials science SB RAS,
Academichesky Avenue, 2/4, Russia, Tomsk, 634055, phone: 8(3822)286850

[2]Department of structural Macrokinetics of TSC SB RAS

To control droplet formation, transfer of electrode metal, crystallization of the surfacing bath, the control of changes in arc voltage, current, instantaneous arc power was used. New methods of diagnostics of fast processes of heat and mass transfer which accompany melting, transfer and crystallization of metal from a melt were applied.

Surfacing was carried out with electrodes EN-60M on plates of steel 09G2C thickness of 6 mm. Surfacing electrodes carried out one and two layers. An experimental complex consisting of a power supply PHOEBUS-315 "MAGMA" with pulse-arc surfacing mode, sensors for measuring energy parameters, a recorder of these parameters AWR-224 MD and a personal computer was used. Current modulation frequency: 1-5 Hz. Analysis of the microstructure was carried out on microscopes “Axio Observer D1m” and “Neophot-32”. Microstructure studies were carried out in the Central part of the coating layers, in the transition zone to the base metal - in the areas of overheating and normalization. The microhardness of the deposited coatings, the ZTV metal and the base metal was measured on the Leika microhardometer.

The structure of the deposited coating metal and its properties are influenced by the technological parameters of the surfacing process, the number and size of alloying elements. When changing the surfacing mode, the melting process of the coating material changes.

The construction of histograms of the average level of microhardness of coatings deposited at DC modes and with pulse changes in energy parameters showed that the application of the second layer leads to an increase in performance. When using pulsed changes in energy parameters, the levels of microhardness of coatings are higher when surfacing both one and two layers. The construction of histograms of the average level of wear resistance of coatings deposited by electrodes in the DC mode showed that this characteristic is higher when surfacing a single layer.

By the directed high-energy influence of the arc on the melt of the deposited coating, its constant reciprocating motion is achieved, thanks to the periodic force action of the arc with the frequency of current modulation. Such surfacing provides cyclical flow of physical and metallurgical processes at the stages of formation of the melt bath and promotes its active mixing. This mixing of the melt under pulsed high-energy action of the arc contributes to the alignment of its heat content and ensures that the required amount of molten metal under the arc to the beginning of the current pulse action, contributing to a decrease in the depth of penetration. The periodic motion of the metal in the melt also contributes to a more uniform distribution of alloying elements in the volume of the molten metal. The use of pulse-arc surfacing technology allows to control the processes of formation of weld metal from the melt through programmable heat input into the surfacing zone and, as a consequence, to grind the structure of the coating metal and improve its properties. When grinding the structure of the deposited coatings, their properties are increased. The use of pulsed energy parameters during surfacing allows to increase the structural homogeneity of the coating cross-section.

Modification of the coating material using pulsed changes in energy parameters allows to increase the dispersion of the structure of the deposited coating, leads to an increase in its hardness and wear resistance.

The use of pulse energy parameters during surfacing allows to increase structural homogeneity in the cross-section of the coating.

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