

1.2.23. EDDY-CURRENT TESTING OF QUALITY OF CHROME-NICKEL COATINGS PRODUCED DURING GAS-POWDER LASER CLADDING AND SUBSEQUENT STABILIZING ANNEALING

Makarov A.V., Gorkunov E.S., Malygina I.Yu., Institute of Machine Science
UrO RAS, Yekaterinburg, Russia;
Kogan L.Kh., Institute of Physics of Metals UrO RAS, Yekaterinburg, Russia;
Savrai R.A., Osintseva A.L., Institute of Machine Science UrO RAS,
Yekaterinburg, Russia

Possibility of application of eddy-current method for evaluation of composition, hardness and wear resistance during abrasive exposure and sliding friction of Cr-Ni and Cr-Ni-Co coatings obtained under the method of gas-powder laser weld depositing. It is shown that coatings differing by chemical composition of carbide phases and metal substrate and possessing with different levels of hardness and wear resistance are featured by different values of eddy-current characteristics. This indicates the possibility of application of eddy-current method for testing and evaluation of the coating brand, as well as hardness and wear resistance laser weld deposits of various types. Unambiguous variations of eddy-current instrument readings across the thickness of weld deposited layer and depending on the coating thickness are revealed. These variations are conditioned by strong differences in electromagnetic characteristics of weld deposits and steel substrate of specimens. Methodology of eddy-current testing of the thickness of coatings on the ferromagnetic steel substrate is proposed. It makes it possible to evaluate the quality of reinforcing laser weld depositing and subsequent grinding, as well as to monitor the coating state in the process of operation and to predict the remaining service life of deposited products subjected to intensive wear (destruction). Possibility of application of eddy-current method for testing the hardness and wear resistance of coatings subjected to additional exposure at temperatures of 200 – 1,100°C is established. Variation of heating temperature exerts non-monotonous influence on physical and mechanical properties of coatings and readings of eddy-current instrument with extremum within the range of 900 – 950°C. Moreover, tempering at temperatures of above 950 – 1,000°C results in sharp increasing of hardness and tribological characteristics of coatings up to the levels corresponding with or even exceeding their initial values. It opens prospects for creation of the methodology of eddy-current testing of quality of the new combines treatment of coatings, including laser weld depositing with subsequent stabilizing high-temperature annealing.

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