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Improving the reliability of friction nodes in laser welding

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Laser cladding is used in case, when the thermal impact should be minimal. Using laser welding depending on operational requirements can be applied on the surface, which include wear-resistant, corrosion-resistant and other components, that allows to satisfy the increasing demands for high wear resistance and durability in a wide range of operating conditions, including dynamic loading.

In the process of laser cladding with coaxial feeding of powder to transport the gas generates a stream surfaced filler material that melts under the influence of powerful laser radiation. On the surface of the substrate occurs bath melt, which after hardening forms a single weld platen.

The experiments with powder on the basis of Nickel was produced at the processing facility HUFFMAN HC-205 is equipped with fiber laser LS-3,5 capacity of 3500 watts, manufactured at OOO "IRE-Polus". For development of technological process of laser welding was used mass flow of powder - 1.5-6 g/min; pressure argon - 2 ATM., a stream of argon - 3 l/min; powder with particle size from 40 to 160 microns.

Microhardness of the samples was measured by Vickers and accounted for the deposited layers 4250...MP. Testing of the samples on the strength of adhesion of the coating to the substrate was performed in accordance with RM-87 "Definition of durability of coupling of thermal coating with the base metal. In the results of tests obtained values of strength of adhesion of coatings within 295...524 MPa depending on the mode of processing and structure of a powder material. For comparison, the strength of adhesion of coatings in high-speed plating does not exceed 80 MPa. In addition, defined shear stresses slice of the base material, which amounted to 330 MPa.

Wear-resistant coatings were applied to the samples-clips diameter of 48 mm Investigated four types of laser coatings: P 1; P 2; P 3; and P 4. Tested samples-clips without coverage. Samples-pads made from carbon quality steel 35. On working surfaces of samples-pads inflicted babbitt coating. The covering material samples-pads - babbitt B83. Tested on a machine of friction MI-1 of the deposited coatings in the pair with babbitt B showed increase of wear resistance 2...4 times in comparison with steels 35 and NM. Developed the method of calculation of tribological characteristics of friction pairs.

To determine the optimal technology of surface hardening were testing fatigue bending with rotation. Base test is assumed to equal 2.106 cycles. We investigated smooth samples with diameter of 7,5mm in a minimum cross-section. The width of the weld zone in the sample was in the range of 30 35 mm.

Selection of the optimal technology of welding allows to improve the characteristics of fatigue resistance. Application after laser welding subsequent mechanical treatment improves the characteristics of fatigue resistance weld samples.

The adhesive strength of the deposited coating above durability of the basic material on the shift of construction of machine parts, under optimal conditions cladding.