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Modification of boride layers on alloy steel by impulse electron beam

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The development and implementation of new coatings and layers with a specific complex of physicochemical, mechanical, and functional properties are of significant fundamental and applied importance for expanding the performance characteristics of machine parts and tools and increasing their service life. The excellent resistance of boron-based diffusion layers and coatings to abrasive, corrosive, and erosive wear is the reason for their widespread use as protective coatings on parts of high-tech products of power and unique mechanical engineering and in the production of critical technological equipment. Despite the benefits, such coatings and layers have several serious disadvantages, such as high fragility, a small thickness of the modified layer, insufficient quality of the surface morphology, which often requires subsequent mechanical processing. Nowadays, the technological possibilities of creating new materials by common thermal-chemical treatment are practically exhausted. The use of concentrated energy sources, such as intense pulsed electron beams, to modify the surface properties of machine parts and tools allows flexible regulation of the structural-phase state of materials in a wide range.
The current research aims to create functional layers on the surface of alloy steels by subsequent processing of diffusion boride layers by an intense pulsed electron beam of a megawatt power level. A modernized electron source with a plasma cathode allows generating an electron beam of millisecond duration, where its power and the temperature of the irradiated surface can be controlled during a single pulse.

Speaker Country

Russia

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