THE EFFECT OF INTENSE ELECTRON BEAMS OF MICROSECOND DURATION ON THE LEVEL OF RESIDUAL STRESSES IN THE SURFACE LAYERS OF TARGETS MADE OF HEAT-RESISTANT POWDER ALLOY UNDER VOLUMETRIC IRRADIATION

O. A. BYTCENKO [1], *A.N. GROMOV* [2], *K.M.ERIKOV* [1]

[1] *Moscow Aviation Institute (National Research University), Moscow, Russian Federation*
[2] *Chernyshev Moscow Machine-Building Enterprise, Moscow, Russian Federation*

In this paper, the results of a study of residual stresses level of during simultaneous irradiation with high-current pulsed electron beams from all sides of targets made of a powder heat-resistant Co-Cr-Mo system alloy are analyzed. The data obtained are of great practical importance, since it is known that successive irradiation of one side and then the opposite side of a target made of heat-resistant alloys in the melting mode leads to the formation of residual tensile stresses. This is due to the mechanical action of the non-irradiated reverse side, thereby reducing the strength characteristics of the part. In this regard, it seems promising to apply simultaneous irradiation from all sides of the sample. It is shown that a high-current pulsed electron beam of microsecond duration with simultaneous comprehensive exposure to such samples is a highly effective tool for surface modification, providing high-speed heat treatment (quenching), recrystallization of the material in surface layers over 25 microns, and smoothing. It is shown that after irradiation at an energy density of 35 J/cm^2, the values of tensile and compressive stresses decrease. In addition, under this irradiation regime, defects in the surface layer are leveled on the surface of the samples in the form of discontinuities characteristic of parts obtained using SLS technology, i.e. there are no stress concentrators in the surface and subsurface layers within the boundaries of the modified layer, which can subsequently lead to operational destruction.

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