Formation of energy flows during laser and combined material processing

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Abstract

The task of creating dynamic systems for the generation of energy flows with a controlled spatial distribution of power density is relevant during laser and combined processing of parts. Research was carried out on the redistribution of laser radiation power generated by dynamic focusators. An optical device based on two reflective dynamic focusators was created to perform laser thermal and combined processing of materials using continuous radiation of CO2 lasers. A unified computational algorithm was developed to determine the parameters of the applied energy flows required to create a temperature field in the product providing the intended change in the state of the technological object during the laser and combined processing. The power distribution of laser radiation is calculated for a uniform change in the state of the material at the target depth over the width of the heat-affected zone. The experimental data obtained indicate the expediency of using the technological optical systems based on radiation focusators in plasma-laser coating and thermal hardening to increase the wear resistance of parts operating under friction conditions.

Keywords: material processing, laser, energy flow, radiation, focusator, CO2, optical system, plasma-laser coating, thermal hardening.

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Access full text (in Russian)

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