

Development of a technological method for increasing the operational characteristics of parts by laser treatment and determination of requirements for the application of beam focusators

S.P. Murzin¹

¹Samara State Aerospace University (SSAU)

Abstract

Successful implementation of technological processes of laser treatment is possible only if a certain spatial intensity profile is formed in a given area on the surface of the part. This is achieved by using special optical systems - beam focusators. A technological method was developed to improve the performance characteristics of parts with the adjustable spatial distribution of beam power. Distinctive features of the method areas follows: the shape of the laser spot and the distribution of the beam power density are considered as the main parameters of the treatment mode, the choice of parameters of the lasers ource and the development of technological optical systems is performed in accordance with the results of solving the inverse heat conduction problem. The permissible error of adjustment of the optical element and the required accuracy of setting the parameters of the focusable beam and the angle of rotation of the focusator are determined for use of focusators in technological processes of laser treatment of parts.

Keywords: method, laser treatment, part, beam, focusator.

Citation: Murzin SP. Development of a Technological Method for Increasing the Operational Characteristics of Parts by Laser Treatment and Determination of Requirements for the Application of Beam Focusators. *Computer Optics* 2006; 30: 44-48.

[Access full text \(in Russian\)](#)

References:

- [1] Soifer VA, ed. *Methods for computer design of diffractive optical elements*. New York: John Willey & Sons Inc; 2002.
- [2] Murzin SP. Increasing the efficiency of laser treatment of materials using elements of computer optics. *J Adv Mater* 2003; 10(2): 181-185.
- [3] Kazanskiy NL, Mordasov VI, Murzin SP. Formation of energy flows during the laser and combined processing of materials [In Russian]. *Computer Optics* 2003; 25: 120-125.
- [4] Barvinok VA. *Stressed state control and properties of plasma-sprayed coatings* [In Russian]. Moscow: "Mashinostroenie" Publisher; 1990.
- [5] Gureev DM, Jamshchikov SV. *Fundamentals of physics of lasers and laser material processing* [In Russian]. Samara: Publishing House of Samara State Technical University; 2001.
- [6] Rykalin NN, Uglov AA, Zuev IV, Kokora AN. *Laser and electron beam processing of materials* [In Russian]. Moscow: "Mashinostroenie" Publisher; 1985.
- [7] Danilov VA, Dubov MV. Effects of distortions in incident-beam intensity on focusator operation. *Computer Optics: Physical Principles* 1987; 1(1): 39-49.