THERMOPHYSICAL AND PHYSICOMECHANICAL PROPERTIES OF PRODUCTS OBTAINED BY SELECTIVE LASER MELTING

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Additive Manufacturing is one of the fastest growing areas of engineering. They allow you to make any product layer-by-layer technology on the basis of a three dimensional model: a new product is "grown" from "nothing" (from a consumable material in the form of the powder or polymer "wire"). Depending on the technology, the object may receive various properties that differ from the properties of the primary consumable material.

The method of selective laser melting (SLM), one of the technologies of additive manufacturing, is increasingly used in the industry of the Republic of Tatarstan. Such large enterprises as KAPO OJSC, KMPO OJSC and Sokol Design Bureau are beginning to use this technology to create prototypes of metal powders, master models and molds for aviation equipment. To introduce this technology into production, it is necessary to investigate the properties of products obtained by selective laser melting.

The most widely used in the SLM production are powders of tool and stainless steels. One of such powders is stainless dispersion-hardening martensitic steel 17-4 PH (15-17.5 Cr, 3-5 Ni, 3-5 Cu, $<$ 1 Mn, Si, 0.15-0.45 Nb, balance Fe). or a long time, steel 17-4 PH was the most popular among the dispersion-hardening grades, due to the flexible variation of its properties, and was actively used in the aerospace and chemical industries. But there are differences in thermophysical and physicomechanical characteristics between products created using SLM technology and products machined on lathes.

The aim of the work is to study the thermophysical and mechanical characteristics of metal products obtained using SLM technology from 17-4 PH steel powder.

To this end, the following tasks were solved: 1) forming samples from 17-4 PH steel powder using the SLM method; 2) carrying out heat treatment of samples; 3) conducting research on the thermophysical and mechanical characteristics of the samples before and after heat treatment; 4) determination of the optimal modes of SLM processes and heat treatment.