ТЕЗИСЫ ДОКЛАДОВ

МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ «Перспективные материалы с иерархической структурой для новых технологий и надежных конструкций»

X МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ «Химия нефти и газа»

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Hybrid technologies assign fundamentally new opportunities at the present stage of the manufacturing development. One of the trends is using the ultrasonic impact device for the formation of strengthening layers and coatings.

The most advantageous method is the surface treatment by ultrasonic device with the static load of ultrasonic oscillations with the frequency of 20 kHz. The ultrasonic device is fixed on the turning or milling tool. This device executes a feed motion and can process flat surfaces as well as solids of rotation. The process has a great reliability and repeatability due to the precise control. There is no established international term for this method. It is called ultrasonic nanocrystal surface modification (UNSM) [1], ultrasonic burnishing [2], vibration-assisted ball burnishing (VABB) [3], ultrasonic finishing treatment (UFT) [4] and others.

High-frequency impacts initiate the modification of the surface layer with the gradient change of the structure in depth while UFT. The nanosized or ultrafine-grained structure with the large amount of microstructure defects is formed on the surface. Such a structure accelerates the diffusion processes. Therefore, the UFT is used as the pre-process of the surface alloying [1, 5]. Plastic deformation in the surface layer during UFT increases the density of the porous materials and improves the quality of the surface. Therefore, the UFT is used as the post-process for the deposition of gas-thermal coatings and producing products with the SLM method [6]. The ultrasonic treatment can be used as the pre-, post- and simultaneous process during the gas-thermal coatings deposition. The ultrasonic treatment of the substrate and coating material favorable affects the adhesion, structure and quality of the coating surface [7, 8].

This report is devoted to the review of the hybrid strengthened technologies combined with the UFT, including those developed by authors.

References