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WEAR-RESISTANT FUNCTIONALLY GRADED COATINGS AND SURFACE LAYERS

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In the majority of cases of contact interaction, the most loaded part of the workpiece are the surface layers, which experience the highest loads and are subject to considerable wear. This problem is especially clearly marked in titanium alloys and in most cases is the only factor limiting their application. One of the most promising ways to improve the performance properties of materials is the creation of surface and near-surface wear-resistant layers. Application of special, in particular combined, coatings on the surfaces of parts often gives significantly better protection of the surface of the part. Industrial technologies for obtaining multilayer and adaptive coatings (with some properties varying in thickness) are of particular importance [1]. The presence of gradient structure in surface layers allows to obtain new, higher operational properties of products [2,3]. Application of functionally gradient coatings (FGC) allows to combine high adhesive and cohesive properties with high surface hardness, wear resistance, corrosion resistance, thereby obtaining products with unique characteristics. In terms of production costs, relatively simple methods of plasma and gas-dynamic spraying in the formation of FGC are the most attractive. The gradient of properties in the coating applied by one method is created by changing the composition of the sprayed material or the spraying conditions. In spite of the obvious progress in the field of FGP formation in recent years and the significant growth of research, theoretical research and development of formation principles remain insufficient.

In this paper proposed a method of forming FGC, which includes the following operations: ion cleaning of the surface and heating the sample in argon plasma, the application of nitride forming elements (nitride coating) on the surface and low-temperature (≤550 º C) nitriding in high density plasma. As a result, surface layers with greater hardness were obtained compared to the nitrided layers.

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