RESEARCH OF FORMATION FEATURES OF BORIDING LAYERS AND STRUCTURE OBTAINED ON MARTENSITIC STEEL

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Power engineering is the main consumer of expensive high-alloy steels. In this regard, the issue of extending the service life of products made of these steels remains a constant and urgent problem. Moreover, steam turbine blades made of these steels are a complex and loaded structure, so they must have high strength and erosion-cavitation resistance.

High strength is achieved by the correct choice of material, rational alloying and the correct selection of heat treatment modes. At the same time, to ensure high erosion cavitation resistance, it is necessary to carry out a number of measures to maximize the service life of these products. From this viewpoint, such a method of chemical-thermal treatment as boriding is quite promising. In addition, the study of the distribution of diffusing and alloying elements in steel has scientific and practical value. Since alloying elements have a fairly noticeable effect on both the kinetics of the formation of boride layers and their structure, phase composition and properties. Such information makes it possible to predict the properties of diffusion layers and provide effective recommendations for strengthening the surface of high-alloy steel.

Analysis of the structure and properties of diffusion boron layers on high-alloy martensitic steel of the 15KH11MF class showed that in complex-alloyed structural steels, the influence of alloying elements on the thickness of the boride layer is usually due to the influence of one or two of the most strongly acting elements. The same can be said about the influence of alloying elements on the ratio of boride phases in the layer, their microhardness and other properties of the resulting coatings. The work pays special attention to the influence of technological parameters of the boriding process on the thickness and uniformity of the formed layer. It was found that the boron layer has a zonal structure, where a hardness gradient is observed from the surface to the core.

Thus, as a result of the study, it was found that the study of structural features indicates that the studied high-alloy steel has a reduced tendency to ferrite formation, which it acquires due to the additional introduction of molybdenum and tungsten into its composition. The features of the formation of the boron layer indicate the presence in the microstructure of three main zones with a characteristic structure, microhardness and an identified phase composition for each layer. It should be noted that the microhardness of the boride phases is close to the microhardness of the layers obtained by simultaneous saturation with chromium and boron.

The obtained results are of important practical importance for increasing the wear resistance of parts operating under conditions of friction and high temperatures.