TECHNOLOGICAL BASES FOR MANUFACTURING CASTINGS FROM AN IRON-BASED ALLOY WITH INCREASED MECHANICAL AND OPERATIONAL PROPERTIES

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Over the past two decades, low-cost alloys based on the iron-manganese-silicon system with shape memory effect have attracted a lot of attention. These alloys are considered as an economical alternative to expensive alloys based on nickel and titanium. However, existing iron-based alloys with a shape memory effect have a number of unresolved issues, namely, they do not always provide a sufficient value of the shape memory effect coefficient while maintaining a high level of operational properties. Therefore, a promising direction and urgent task of foundry production is the creation of new iron-based alloys with a shape memory effect with a reasonable selection of the chemical composition of alloys to ensure high values of operational properties.

Therefore, a promising direction and urgent task of foundry production is the creation of new iron-based alloys with a shape memory effect with a reasonable selection of the chemical composition of alloys to ensure high values of operational properties. The analysis of literature data showed that the cheapest group of alloys with a shape memory effect is alloys based on iron of the austenitic class. One of the applications of such alloys can be used as power elements for non-welding joints of structures, high-stress pipelines, use as elastic elements, etc.

There are a number of iron-based alloys with a shape memory effect, and this effect is also evident in some well-known austenitic Steels. However, the disadvantages of known alloys are low corrosion resistance, for example, due to the high content of manganese, low scale resistance, insufficient strength and viscosity indicators, and the formation of a brittle phase. Also, the main disadvantage of this group of alloys is the low degree of shape restoration. The reason for these disadvantages is mainly the chemical composition of the alloy.

An alloy with a reasonable chemical composition was obtained, which is a high-alloy austenitic heat-resistant steel with carbide hardening. The highest content of the alloying element is Chromium, so this iron – based alloy can also be called chromium steel. The proposed alloy has a high degree of shape restoration while maintaining such important properties as strength, viscosity, corrosion and scale resistance. Studies of the microstructure of the proposed iron-based alloy confirmed the presence of dispersed particles. Their greatest accumulation is observed along the boundaries of sub-grains and grains. In the grain body, the presence of dispersed particles is minimized. The content of chemical elements in the steel under study varies significantly depending on their location.