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Znaczenie strontu i tytanu w kształtowaniu mikrostruktury i własności żeliwa chromowego

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Abstract

The dissertation was focused on the subject of modified wear resistant chromium cast iron. The work began with a literature review on white cast irons, their purpose and modelling of their properties through the use of alloying and modifying additives. Basic information related to crystallization of wear resistant white chromium cast iron were discussed and the essence of the modification process was demonstrated. Selected theories of modification were presented. Particular attention was placed on effects of the modification process described in scientific literature in relation to the discussed material. A series of information on the impact of various modifiers on changes in the crystallization process of alloys and on the improvement of their functional and mechanical properties was presented.

The second part of the work contains a report on Authors own research. First, the preliminary tests on white high-chromium cast iron with the addition of selected surface-active and inoculating modifiers were described. Based on the microstructure analyses and wear resistance tests on the obtained alloys, the modifiers to be used in the specific experiment were selected and theses were formulated. In the experiment, 16 high-chromium cast iron melts with 20% Cr content and a variable amount of additive in the form of metallic strontium and ferro-titanium were carried out with registration of temperature changes during crystallization. Analysis of crystallization by the ATD method, microstructure examination, reciprocating motion wear test and pin-on-disc method wear test, micro and macro hardness tests and impact strength were examined.

Performed analyses allowed to assess the effectiveness of used additives, their impact on the microstructure of castings and their functional properties. Problems related with effectiveness of titanium modification resulting from adding too much modifier were presented. The dependence of wear resistance and impact strength on variable amounts of strontium and titanium addition was indicated. The synergy effect present during simultaneous modification with strontium as a surface active element and titanium as nucleus-forming element for both austenite and M_7C_3 carbides was assessed.