

1. **P.L. Kokovin, B.V. Ovsyannikov, A.V. Sulitsin, T.V. Maltseva.** Investigation of interaction of aluminum alloy melt with ceramic foam filter

Annotation. The study of the purity of the melt in the process of casting aluminum alloys of the Al—Zn—Mg—Cu system by the PoDFA method revealed a rather high content of spinel $AlMg_2O_4$ [1—3]. The presence of spinel was also found in the study of defects detected by ultrasonic testing of deformed semi-finished products. X-ray microspectral analysis of defects detected in semi-finished products from alloys of the Al—Mg and Al—Zn—Mg—Cu systems, as well as used ceramic foam filters, showed that the main reason for the appearance of spinel in ingots is the interaction of the melt with the material of the ceramic foam filter.

Keywords: aluminum alloys, melt, spinel, ceramic foam filter, non-metallic inclusions, ultrasonic testing.

2. **M.V. Maisuradze, Yu.V. Yudin, V.A. Khotino.** Microstructure and properties of castings made of 40KHN2MA steel, made by casting according to cast models

Annotation. A study of the microstructure and mechanical properties of a lost wax casting of steel 4340 was carried out. Compared to a part made from hot-rolled steel, a cast part has a significantly lower level of ductility, toughness and fatigue strength. The characteristic defects were revealed in the cast part that lead to a deterioration in the viscosity and plasticity: dendritic segregation, pores, cracks, surface decarburization.

Keywords: steel; lost wax casting; heat treatment; microstructure; defects; mechanical properties.

3. **N.A. Zakharov, L.G. Znamensky, E.A. Sinitsyn.** Progressive compositions of ceramic molds in casting according to burnt models

Abstract. The article analyzes casting technologies by cavityless, investment, lost foam casting. In order to improve processes precision-investment casting by cavityless casting the manufacturing technology has been developed ceramic molds made of inorganic domestic materials. The development efficiency is achieved through the use of water metallophosphate binder materials «Inorganics» and mullitized sealants and stucco domestic production. The methods of quantitative X-ray phase analysis and dilatometric analysis the composition and properties are investigated molding materials and also the physical and mechanical characteristics of the obtained ceramic molds. Installed acceleration forming and increasing their strength. Pilot test the developed technology has shown quality improvement economic and environmental indicators of production investment casting made of heat-resistant steels for the oil and gas complex of the country.

Keywords: cavityless casting, investment casting, lost foam casting, ceramic mold, investment, binder material «Inorganics», mullitized sealant, precision-investment casting, heat-resistant steel, oil and gas complex.

4. **V.M. Kolokoltsev, E.V. Petrochenko, O.S. Molochkova.** Metallurgical factors affecting the composite structure, mechanical and operational properties of complex-alloyed white cast iron

Annotation. The article presents the results of a study of the treatment of alloyed white cast iron with additives as modifiers of calcium-strontium carbonate. As a result, it was determined that when up to 5 kg per ton of calcium-strontium carbonate is introduced into the melt, the wear resistance of cast iron increases.

Keywords: White cast iron, modification, calciumstrontium carbonate

5. **F.I. Panteleenko, R.Yu. Popov, V.T. Shmuradko, A.S. Samsonova.** About the problems and results of obtaining products from technical ceramics for metallurgical production. Message 2

Annotation. The article presents the results of research in the field of synthesis of multifunctional ceramic materials for metallurgical, machine-tool and other industries related to the processing of metals, their alloys and products from them; current trends and trends associated with the production of products from such materials; provides information on expanding the domestic raw material base for the production of ceramics with the involvement of domestic enterprises, and also, the prospects for the development of industrial potential for the organization of the production of such products.

Keywords: metallurgy, metalworking, ceramic materials and products, raw materials, synthesis, physical and technical characteristics, production.

6. **V.V. Desnitsky, L.V. Desnitskaya, I.A. Matveev.** Investigation of technological properties of molding mixtures manufactured by alpha-set process

Abstract. A method has been developed for calculating the required compliance of the molding mixture, ensuring the absence of hot cracks in the casting. For each moment of time, the increment of deformation is determined by the temperature change, and the increment of stress, by the value of the elastic modulus, which is summed up with the accumulated to the current moment of time.

Data on the properties of molding mixtures at different temperatures and ratios of the hardener and molding sands were obtained. For each moment of time, the increment of deformation is determined by the temperature change, and the increment of stress by the value of the elastic modulus.

The implementation of these conditions showed the absence of hot cracks in the casting.

Keywords: alpha-set process, force braking of casting shrinkage, softening of the molding mixture, hot cracks in the casting, regeneration of the molding mixture, binders of the molding mixture, stresses in the casting.

7. **I.A. Pankovets, V.S. Puteev.** Annealing of work pieces of hypereutectoid grades of steels

Annotation. The process of heat treatment (homogenization) of work pieces before rolling has been developed, the homogenization annealing of hypereutectoid grades of steels in rolling production has been improved. Because of the improvement, it was possible to combine the process of heating to the temperature of plastic deformation and the process of homogenization of work pieces. In particular, the optimal mode of heating and holding at certain temperatures in a pass-through heating furnace was determined in order to reduce the carbide heterogeneity (liquation) of steel and reduce costs. Homogenization is a technological

process carried out over a two- or multiphase system, during which the degree of heterogeneity of the distribution of carbide phases over the volume of a heterophase system decreases.

Keywords: heating furnace, heat treatment, annealing, homogenization, carbide heterogeneity, hypereutectoid steel grades, bearing steels.