

1. **I.A. Dibrov.** Recommendations of the XVIII Congress of Russian Foundrymen and the BRICS Foundry Forum transferred to the Chairman of the Government of the Russian Federation Mishustin M.V. and to the Chairman of the State Duma of the Russian Federation Volodin V.V.
2. **I.E. Illarionov, I.A. Strelnikov, N.F. Tikhonov, A.V. Korolev.** Modern non-stick coatings for casting molds and rods

Annotations. The compositions of modern non-stick coatings for molds and rods recommended for use in foundry production at machine-building and metallurgical enterprises are presented.

Keywords: molds, rods, non-stick coating, paints, sedimentation stability, compositions and properties of coatings.

3. **A.I. Pokrovsky, I.V. Rafalski, P.E. Lushchyk.** Modeling of the internal structure of a spherical graphite inclusion in ductile cast iron and its behavior under loading

Annotations. The goal of this work is to develop a finite element model of a spherical graphite inclusion in ductile cast iron, modeling the process of its destruction under bilateral compression and verification of models by performing compression experiments.

A three-dimensional model of a spherical graphite inclusion in ductile cast iron is developed and a finite element model that includes more than one million finite elements. It is constructed based on the assumption that in the center of the graphite inclusion there is a microscopic foreign spherical particle. According to one of the versions, it is a complex combination of oxides, sulfides and oxysulphides, the outer layer of this particle being coherent with the graphite lattice; according to another version, it is a particle of siliceous ferrite. This particle is framed by graphite, which has a polycrystalline sectoral structure in the form of pyramids with vertices diverging from the center of the particle; at the base of the pyramids are pentagons and hexagons. Each segment of the pyramid includes many graphite plates arranged parallel and layered on top of each other.

Numerical modeling of biaxial (quadrilateral) deformation of spherical graphite inclusion was carried out using the Ansys program. It is shown that the central particle is not deformed nor destroyed; the stresses in it do not exceed 53 MPa. It is demonstrated that destruction initially occurs along the boundaries of graphite pyramids, and at certain stages they are destroyed. In the longitudinal section, the displacement of the graphite planes inside the pyramids is also noticeable. The stresses in different parts of the pyramids differ by an order of magnitude and range from 14 MPa (mainly in the central part) to 192 MPa (at the edges of the graphite inclusion).

To verify the computer models, experiments were performed on the compression of ductile cast iron samples at a room temperature using a tensile testing machine. SEM studies have confirmed the sector-pyramidal structure of a graphite inclusion with the presence of parallel planes inside the pyramids. It has been shown experimentally that, starting from a certain load, complete destruction of the pyramid-shaped packets of graphite planes occurs. The results of modeling of quadrilateral compression adequately describe the behavior of a spherical graphite inclusion. In future, the obtained results will be used for comparison with the behavior of graphite at high-temperature (900—1000 °C) deformation of cast iron.

Keywords: ductile cast iron, casting, modeling, spheroidal graphite, internal structure of inclusion, loading, fracture.

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4. **E.H. Ri, E.D. Kim, M.A. Ermakov, G.S. Dzyuba.** Synthesis of a high-entropy alloy of the

Al—Ti—V—Zr—Nb system, reinforced with intermetallic inclusions, by the method of SHS metallurgy

Abstract. Currently, high-entropy alloy research is aimed at studying the influence of alloying elements on the alloy microstructure and properties of high-entropy alloys. The method of self-propagating high-temperature synthesis and has such advantages as low cost, speed and simplicity.

This study reports the preparation of a solid high-entropy alloy AlTiVZrNb (HES) strengthened with intermetallic inclusions by the combustion reaction in the Nb₂O₃—V₂O₃—ZrO₂—TiO₂—Al system. The results showed that the alloy consisted of a solid solution phase with a bcc crystal structure, while Al₂O₃ was the main phase in the slag. Microstructural characterization confirmed the development of an intermediate phase Al₃(Ti, Nb)₂ in the microstructure of the alloys. The hardness and density of the obtained alloy were estimated as 863 HV and 5464 kg/m³, respectively. These results confirmed that the SHS reaction is a simple method for producing AlTiVNbZr light alloy with extreme hardness

Keywords: solid solutions, microhardness, element content, liquation processes, SHS, aluminides.

5. A.A. Prikhodko, S.S. Cheshev, E.H. Ri. Improving the quality of castings in the process of improving the processing technology of the Ak7ch and Ak7pch alloy

Abstract. Currently, the demand for aluminum casting in Russia has increased several times. In connection with the development of the aviation industry, including the release of new PD8, VK650, PD35, PD-14 engines for civil aviation aircraft and helicopters such as MS-21, Superjet, Ansat, etc. The composition of these products includes castings made of Ak7ch or Ak7pch alloy, which during operation must be sealed and have the necessary requirements for mechanical and physical properties. And also have no internal defects. All these characteristics are primarily affected by the quality of the resulting alloy. According to the regulatory documentation adopted at the enterprise, the alloy processing processes, namely modification and refining, have not changed since the 90s. After analyzing Russian and foreign information sources, the technology of modification, refining and processing of the alloy using fluxes, ligature and argon treatment of the alloy was developed. Work has been carried out that allowed us to obtain high-quality results on X-ray monitoring and reduction of slag and internal defects.

Keywords: modification, flux, defects, X-ray control.

6. D.O. Levin, A.V. Sulitsin, S.V. Brusnitsyn, D.A. Usov. Investigation of the influence of tin content on the structure and properties of cast brass

Abstract. The article presents the results of a study on the effect of tin content on the structure, mechanical properties and corrosion resistance of brasses. Comparative metallographic analysis showed that an increase in tin content from 0,14 to 0,71 wt. % has virtually no effect on the ratio of α - and β -phases in the structure. Analysis of the results obtained on brass dezincification showed that with an increase in the tin content in the alloy, the dezincification depth decreases from 200...250 μ m at a tin content of 0,14 wt. % to 80...100 μ m at a tin content of 0,71 wt. %. The results of mechanical properties tests indicate an increase in the strength of the alloys with an increase in the tin content. At a tin content of 0,71 wt. %, the average strength value increases to 426 MPa.

Keywords: brass, tin, microstructure, dezincification, mechanical properties.

7. A.V. Nishchenkov. About approaches and methods to the selection of technological equipment

Annotation. The article suggests methods for selecting process equipment. It is shown that when choosing equipment, it is advisable to use static methods for assessing economic efficiency due to the possible lack of complete and accurate information, and if there are doubts about the correctness of the choice and decisionmaking, carry out clarifying calculations based on cash flows throughout the life cycle of equipment use.

Keywords: technological equipment, information, calculations of equipment usage.