

1. **K.H. Nguyen, V.D. Belov.** The influence of technological parameters on the efficiency of the modifying process by ligature copper — phosphorus of the hypereutectic Al-Si.

This article presents the results of the studies of the influence of technological parameters on the efficiency of the modifying process of the Al — 20% Si alloy with a Cu—P ligature (MF7). It is clearly shown that the size of the primary silicon crystals (PSC) in castings without phosphorus modification does not depend on the casting temperature. Temperature study range: 700—900 °C. At the same time, the size of the PSC after modification of melting with phosphorus is significantly reduced and directly depends on this temperature: the higher the casting temperature, the smaller the primary silicon crystals in the alloy structure. The maximum decrease in the size of the PSC is observed in the range of 15—20 min of holding the melt after modifying the Cu-P ligature and remains almost unchanged for 6 hours. In addition, for the specific conditions of the study in this work, it was found that the size of the PSC decreased markedly with increasing in the amount of phosphorus introduced into the melt. At the same time, the maximum modifying effect is noted when entering in its amount (0.05—0.1) % and the decrease of this effect with the subsequent increase in the number of its input from 0.1 to 0.4 % weight.

Key words: hypereutectic Al—Si alloy, microstructure, ligature Cu—P, modification, electron microscope.

2. **V.M. Karpov, V.L. Popov.** Conveyor manufacturing of grooved stone plate in metal frames.

Research results of production temperature the lining plates made on the chill frame line for the stone casting was presented. Numerical work of temperature field analysis which is formed in the lining plates under the given cooling rate was performed. The lining plate annealing parameters which is permitted to control residual stress level into stone casting articles was determined.

Key words: chill frame line, stone casting plate, step groove, residual stress, elastic region, permissible temperature gradient.

3. **Yu.N. Loginov, S.I. Stepanov, M.V. Gilev, O.Yu. Kornienko.** Titanium cellular implants produced by additive technology and its application results.

The necessary parameters of cellular structures that are in demand in medical surgical practice were discussed.

Examples of the application of selective laser melting for the manufacture of implants of titanium alloy Ti-6-4 Eli are given. The results of the use of implants in augmentation (bone tissue growth) of the trabecular defect in surgical practice are presented.

Key words: additive manufacturing, selective laser melting, 3D printing, titanium powder, cellular structures, medical implants.

4. **V.A. Smolko, E.G. Antoshkina.** Determination of surface conductivity and zeta potential of clay minerals.

In this work, studies on investigation the bentonite and kaolin clay minerals were carried out in order to identify the surface conductivity and zeta potential (ζ -potential) of its water-clay suspensions. The specimen from the Zyryanovsk deposit, were modified with carbonate, phosphate and sodium pyrophosphate. The surface conductivity of the clays was determined experimentally. It was found that the water-saturated specimen of the Nizhne-Uvelsky refractory clay possesses the lowest surface conductivity while the specimen from the Zyryanovsk deposit, modified with 4.5% sodium carbonate, has the highest values of surface conductivity. There was a tendency to an increase in the surface conductivity of water-clay suspensions regarding the modifying reagents at equal concentrations from carbonate ion to pyrophosphate ion. The zeta potential of the suspensions study was measured and calculated taking into account the surface conductivity of clay minerals.

Key words: bentonite, kaolin, modification, surface conductivity, zeta potential.

5. **I.E. Illarionov, S.V. Sadetdinov, O.V. Moiseeva, I.A. Strelnikov.** Improving the binding and strength properties of technical lignosulfonates.

Presents results of a study on the effect of boric acid, oksietilidendifosfonovoy acid and oxetanemethanol of boron oxide to the binder properties and the strength characteristics of lignosulfonate. Modified lignosulfonate binders with high binding and strength properties were developed.

Key words: lignosulfonate, boric acid, hydroxyethylenediphosphonic acid, oxetanemethanol of boron oxide, the binder composition, the catalyst strength characteristics.

6. **V.E. Haychenko, N.S. Gerasimova, S.D. Ranich.** The production technology of large-size castings from heat resisting alloys by a casting method in the chill mold.

The tested way of receiving from waste of alloys of castings weighing up to 600 kg which are used for production of stamps of hot stamping is offered.

Key words: casting, dies, superalloys

7. **V.E. Khaichenko, N.S. Gerasimova, S.D. Ranich.** Technology for obtaining stainless inserts for welding railway cross trains.

A method is described for obtaining one of the types of railroad switches, which are prefabricated crosses consisting of a core cast from wear-resistant steels of the 110G13L type to which other elements made of standard rails are butt-welded.

Key words: turnout, core, wear-resistant steel