

1. **M.N. Saubanov, I.O. Leushin.** Theoretical and technological foundations of the manufacture of molds for titanium shaped castings

**Annotation.** The article presents the results of study of various refractory periclase powders for molds and cores used for the production of titanium castings. The action of firing temperature on physical and mechanical properties of periclase molds has been specified. The analysis of chemical processes occurring during heating and baking of rammed periclase mixtures has been carried out. The tailored grain size and chemical composition of molding periclase has been chosen for the production of high-quality titanium castings.

**Keywords:** high-temperature magnesite calcination, hydration of periclase mixture, silica gel, carbonization of periclase mixture, shrinkage.

2. **V.A. Smolko, A.V. Sulitsin, S.V. Brusnitsyn, V.K. Dubrovin J.W.** Gibbs energy descriptor of quartz synthetic mixtures over time when heated under stochastic conditions

**Annotation.** The article examines the issues of changes in the J.W. Gibbs energy of polymorphic transformations of quartz into cristobalite from the standpoint of the thermodynamics of nonequilibrium nonlinear processes when heated to a temperature of 1673 K. The dependences of the Gibbs energy of the process on time, temperature and fractal dimension under stochastic conditions are presented.

**Keywords:** thermodynamics, quartz, polymorphic transformations, cristobalite, time, temperature.

3. **V.V. Desnitsky, L.V. Desnitskaya, I.A. Matveev.** Mechanical properties of low-alloy steel formed with its various structures

**Abstract.** The model proposed in the work allows us to develop a casting technology that takes into account the impact of operational loads on the cast part. In today's existing production conditions, it is most rational to conduct studies of the dependence of durability on the micro- and macrostructure of cast steel, which subsequently makes it possible to control the casting technology for manufacturing castings with pre-known properties and will allow the design to really influence the reliability and technical resource of the cast part. It is established that the tensile strength and yield strength are weakly dependent on the degree of feeding of the casting metal, and the relative elongation and relative contraction vary significantly depending on the magnitude of the time gradient of solidification. It is determined that the main reasons for the decrease in the mechanical performance properties of the casting are increased porosity and structural heterogeneity.

**Keywords:** structural heterogeneity in steel castings, fracture resistance criterion, critical crack opening, fracture toughness.

4. **S.V. Konovalenko, A.A. Bugrimov, A.A. Chaevsky.** Change of the scheme of lining the steel-pouring ladles with the aim of increasing the durability of the working lining

**Abstract.** The article presents practical experience in eliminating cases of horizontal opening of horizontal seams of the working lining of steel-pouring ladles made of individual products using an alternative scheme of lining in the conditions of electric steelmaking workshops of OJSC «BSW — Management Company of Holding «BMC». The disadvantages of the current scheme and the advantages of the alternative scheme are considered. The technology of implementation and the economic feasibility of using the alternative scheme are described.

**Keywords:** electric steelmaking workshop, lining, refractory products, steel-pouring ladle.

5. **A.V. Chaikin, V.A. Chaikin.** Improving the quality of 110G13L steel for critical railway castings in the conditions of Muromskiy point plan

**Abstract.** This article presents a developed method for improving the technological process of melting 110G13L steel to enhance its mechanical properties, optimize the quality group and reliability of critical railway castings such as turnouts and crossovers, as well as reduce the cost of steel. Using statistical and regression analysis, the potential of a comprehensive impact on the metal in three directions for improving the technological process of melting 110G13L steel was established with the use of innovative materials developed by LLC «Metallurgo» SOAL. These directions include organizing early slag adjustment during the melting of the charge, increasing the efficiency of diffusion-oxidation purification of steel, and finally, out-of-furnace treatment of the melt. The implementation of the developed technology for melting 110G13L steel for critical railway castings, combined with the optimization of the chemical composition of the steel and slag, significantly increased the number of smelting in the first group from 29 to 71 %. The economic effect of implementation amounted to 1768 rubles per ton of melted steel.

**Keywords:** steel, slag, critical castings, technology improvement, statistical analysis, chemical composition.

6. **Sh.M. Chorshanbiev, N.D. Turakhodjaev, N.Kh. Tadjiev, Sh.U. Mardonakulov, K.U. Tashxodjayeva.** Production of high-strength castings from 300X28N2L alloy

**Abstract.** This article presents the results of studies of the effect of modifying the melt of high-chromium white cast iron on its hardness and wear resistance. In the course of the research, the operating conditions of castings made of white cast iron with a high chromium content were analyzed, the alloy structure was investigated, in particular, the effect of the location of carbides in the surface layer on friction parallel to the surface, perpendicular and at an angle was studied. According to the results of the research, the processes of casting from white cast iron were optimized, the alloy composition was calculated and developed using modern software, as well as the melting mode of the alloy in an electric arc furnace was optimized.

**Keywords:** modifier, alloy processing, melt temperature, casting, white cast iron, hardness, wear resistance.

## **Invitation to the exhibition**