Invitation at the XVIII Congress of Foundry Workers of Russia, the International exhibition «Casting — 2024», BRICS Foundry Forum

1. **E.B. Demchenko, E.I. Marukovich.** Horizontal casting cooling beyondthe crystallizer

Annotation. It is shown that devices in the form of a water-cooled metal mold with a graphite lining, which is located on the upper surface of the casting close to the end of the crystallizer, can serve as an alternative to secondary water-air cooling systems in horizontal continuous casting. The effectiveness of the cooling capacity of the molds was evaluated during industrial tests of the devices in the process of casting iron. It has been established that the use of water-cooled molds allows reducing the surface temperature at vulnerable points of the casting by 20—70 °C, increasing the average casting speed for individual billet sizes within 5—8 % almost eliminating shell breakout and eliminating the need for traditional secondary cooling systems.

Keywords: horizontal continuous casting, casting, surface temperature, breakout, secondary cooling, separating device, water-cooled mold.

2. **I.A. Gruzdeva, A.A. Barysheva, E.O. Borovaya.** The appearance of shrinkage processesin the casting of castingsof artistic castings

Abstract. The work is devoted to the analysis of the most common irreparable defects resulting from shrinkage processes. All castings are artistic, have a complex configuration and were obtained using the lost wax casting method. All castings are made from copper-based alloys. The study discusses the reasons for the appearance of such defects as shrinkage porosity, shrinkage looseness and shrinkage cracks. It is noted that obvious factors are not always the cause. More often, the cause of a defect is a combination of factors.

Keywords: artistic castings, investment casting, copper alloys, casting defects.

3. **E.P. Pozdnyakov, I.N. Stepankin.** Infl uence of cementation duration on the structure and properties of structural middle carbon steel 40Cr4, 35CrMnSi4 and 42CrMoS4

Annotation. The influence of increasing the cementation duration from 8 to 12 hours with subsequent quenching and low-temperature tempering on the structure formation and contact fatigue of structural medium-carbon low-alloy steels 35CrMnSi4, 40Cr4, and 42CrMoS4, which are not traditionally cemented, was investigated. It has been confirmed that in steel 35CrMnSi4, the increased silicon content enhances the microhardness of the surface of thermally diffused-hardened layers, reduces the amount of carbon and the thickness of the proeutectoid zone, decreases the volumetric fraction of carbide phase and inclusion sizes compared to similar layers formed on steels 40Cr4 and 42CrMoS4. It was found that the thermally hardened layers of steel 35CrMnSi4 after 12-hour carburizing and steel 40Cr4 after 8-hour carburizing exhibit maximum wear resistance. Their microstructure consists of tempered martensite, 10—15 vol. % of carbides with a size of less than 10 m, and retained austenite — 10 vol. % in steel 35CrMnSi4 and 17 vol. % in steel 40Cr4. It was found that a carbon content of more than 1.8 wt. % on the surface of cemented layers leads to a decrease in wear resistance due to the high content (more than 30 vol. %) of large (more than 10 m) carbides.

Keywords: medium-carbon steels, cementation, wear resistance, austenite, carbides, contact fatigue.

4. **M.A. Ioff e, V.N. Kozlovsky, R.D. Farisov.** Methodology of continuous improvement of foundry production based on the synthesis of organizational and managerial and technical and technological innovations

Annotation. The methodology of continuous improvement of foundry production is proposed, which consists in the synthesis of improving effects of organizational, managerial and technical and

technological types. The structural and logical scheme of scientific and practical methodology is given on the example of continuous improvement of foundry production.

Keywords: foundry production, improvement, methodology, synthesis, lean manufacturing, fast-reacting production, synergy, technological solutions.

5. **A.G. Anisovich.** Artifacts in metallography: stains on the surface of metallographic samples

Annotation. The article discusses stains from water and reagents, as well as false structures that occur on the surface of metal and alloy samples during metallographic sample preparation and etching. The appearance of such artifacts under bright-field illumination and when using optical contrasting techniques such as dark-field and polarized light is demonstrated.

Keywords: metallographic samples, sample preparation, etching, water, dark-field illumination, polarized light.