

**VLADIMIR LEONIDOVICH KROKHOTIN**  
**(for the 90th anniversary of his birth)**



January 18, 2023 marked the 90th anniversary of the birth of a well-known in wide circles of foundry workers, an authoritative and respected friend and colleague, an honorary caster of Russia, laureate of the USSR Council of Ministers Award, knight of the Order of the Badge of Honor, Honored Metallurgist of the Russian Federation, Honored Inventor of the Russian Federation Vladimir Leonidovich Krohotin.

Today Vladimir Leonidovich is on a well-deserved rest. However, his in-depth developments in the field of cast iron melting technology in induction furnaces, the production of large castings from high-strength cast iron with a spherical graphite shape for metallurgical production will be in demand by more than one generation of foundry workers.

The Russian Association of Foundry Workers, the editorial board of the magazine "Foundry of Russia", foundry workers all over Russia, numerous friends and colleagues cordially congratulate Vladimir Leonidovich on his Anniversary and wish him good health, active well-deserved rest, happiness and well-being in everyday life for many years of life.

The conference: «Foundry Production today and tomorrow», St. Petersburg, June 22—24, 2023

1. **Yu.A. Ivanov.** SLT: experience of import substitution even when supplying equipment from other countries
2. **S.L. Arapov, S.V. Belyaev, A.A. Kosovich, E.G. Partyko, A.G. Khokhlov, M.A. Matyushina.** Development of a digital model of the foundry process for manufacturing parts of mining and processing equipment.

**Abstract.** The operating conditions of mining and processing equipment are extremely aggressive, which imposes increased requirements on the reliability of cast components. This work is devoted to the development of a rational technology for casting the main elements of crushing equipment. The reliability of the developed technology is based on the use of modern specialized software and hardware. This approach to creating a digital prototype of the casting process, based on accurate calculated data, made it possible to ensure stable operation of cast products at peak loads.

**Keywords:** high-manganese steel; casting; digital model; finite element method.

3. **V.S. Miroshnichenko, Yu.I. Gutko, A.N. Golofaev.** Digital and additive technologies in foundry

**Abstract.** This article discusses the development and research of technological parameters of casting on gasified shell models in vacuumized molds. Research has been carried out and an experimental model has been created using CAD, CAE and CAM systems, followed by its transfer to a shell 3D model using a 3D printer, made of ABS and HIPs plastics. Experiments were carried out on models printed on a 3D printer using FDM technology, followed by molding these models into sand evacuated molds and pouring using TsAM 4—1 alloy.

**Keywords:** CAD, CAE, CAM, 3D printer, casting, experimental model, modeling, gasified shell models.

4. **P.L. Kokovin, T.V. Maltseva, B.V. Ovsyannikov. Mastering the technology of casting large-sized slabs ingots from a new generation aluminum-lithium alloy.**

**Abstract.** Lithium is the lightest element among the components used for alloying industrial aluminum strained alloys. In addition to low density and increased rigidity, aluminum-lithium alloys have high strength characteristics and resistance to weariness loads. The need to use large-sized rolled or rolled semi-finished products appeared with the development of aviation. Specialists of OJSC «KUMZ» carried out a series of works on the development of a technology for casting a new Al-Cu-Mg-Li-alloy and obtaining large-sized flat slabs from it. The developed alloy has significantly higher properties than traditional alloys. Products from this alloy are an ideal structural material for use in the aircraft industry.

**Keywords:** aluminum-lithium alloys; large-sized slabs; casting technology; macrostructure; microstructure; mechanical properties.

5. **A.G. Tsydenov, A.A. Sokorev. Import-substituting technology of plasma-electrolytic oxidation of aluminum alloy parts.**

**Abstract.** At present, the issues of import substitution and reverse engineering of equipment and spare parts are more relevant than ever. At the aluminum alloy plant (JSC ZAS) the method of high-voltage and high-frequency plasma-electrolytic oxidation (PEO) is being introduced and constantly improved, in the event of the appearance of special alloys, the properties of the PEO shell are corrected. In view of the existing cases of products, the PEO Laboratories of ZAS JSC undergo simultaneous pilot tests and small risks of emergency shutdown of treatment facilities.

**Keywords:** flame-electrolytic oxidation, PEO, coating, import substitution, reverse engineering, ceramics, wear resistance, corrosion resistance, corundum, mullite, mechanical seal.

6. **O.V. Yushkova (Belonogova), A.I. Bezrukikh, V.P. Zhereb, M.P. Zhukov, A.S. Saporova. Modification of aluminum by alloys Al-Ti-Nb systems.**

**Annotation.** The modifying ability of Al-Ti-Nb master alloys has been studied. Using scanning electron microscopy and X-ray microanalysis, Al<sub>3</sub>Nb particles were found. The modifiers currently used for aluminum, for example, Al-Ti-B, with all their undoubted advantages, have significant limitations, in particular, poorly predictable consequences of the accumulation of titanium diboride in the melt during its industrial use in foundry silumins; silicon poisoning. Promising aluminum alloys containing Ti and Nb have high mechanical strength and are promising high-temperature materials for aerospace and ground power engineering, as well as for use as structural materials and coatings. The modification effect was studied on A85 grade aluminum, which is the basis for most industrial alloys. A mechanical mixture of Al, Nb shavings, and spongy Ti was alloyed in a K-240 induction furnace and poured into a heated mold. To control the microstructure and properties of such alloys, Al-Ti-Nb alloys containing low concentrations

of high-temperature intermetallic particles in the molten state can be used. When implementing chip technologies, in many respects, technological approaches developed and repeatedly tested in the field of powder metallurgy can be used. However, the features of the geometry and structure of the chips, as a raw material for the production of products, in comparison with powders, require the development of a number of theoretical provisions and new approaches to the organization of production technology. According to the results of the Alcan test, the optimal composition of the master alloy for A85 aluminum was proposed.

**Keywords:** Al-Ti-Nb system alloys, A85 aluminum microstructure master alloy, Al<sub>3</sub>Nb intermetallic compound shavings, intermetallic compounds.

7. **S.L. Arapov, S.V. Belyaev, A.A. Kosovich, E.G. Partyko, R.P. Kaldarumidi, V.F. Potridenny.** Development of a digital model of the influence of casting modes on the formation of steel microstructure.

**Abstract.** Casting temperature regimes are a fundamental factor in the formation of the cast microstructure of castings. In high-manganese austenitic steels, this technological factor plays a key role and is the main tool for regulating and obtaining a fine-grained structure. The present study is devoted to the development of a digital model of the influence of temperature regimes of high-manganese austenitic steel casting with subsequent verification of the results obtained.

**Keywords:** high-manganese steel; digital model; casting mode; structure.

8. **S.S. Tkachenko, A.V. Yankovsky, M.A. Ioffe, R.D. Farisov.** The cost of resources — the impulse (function) of development mechatronic — modular production of machine tools.

**Annotation.** The annual and prospective increase in the cost of resources (material and energy carriers) leads to an increase in the cost of cast blanks, the cost of machine tools and a decrease in their competitiveness. The directions of thrift of basic and auxiliary materials, reduction of machine tool manufacturing time due to a revolutionary approach to the principles of design and creation of basic parts from unified modular cast blanks are proposed.

**Keywords:** cost of resources, thrift, complexity of basic castings (large) in machine tool construction, unification of castings, modular machine tool construction.

**MASALOV ANATOLY KARPOVICH**

**(09.05.1953—15.12.2022)**

