

Innovative technology of SibFU scientists will increase casting speed by 85 %

Extensive testing of the innovative technology of stirring the liquid core of the crystallizing ingot — LHMS (Liquid Heart Metal Stirrer) completed at the Siberian Federal University.

The first stage of implementing the LHMS technology, designed for the manufacturers and processors of aluminum and its alloys, included developing of the equipment and delivering it to the plant of the leading European manufacturer (Switzerland) of the end-use products of aluminum alloys for mechanical engineering.

The second stage was to conduct the tests to confirm the capability of the technology to eliminate defects in the ingots and the subsequent defects in the parts produced from them for the AirBus. Tests were conducted in the period from April to November 2015 in Switzerland.

The company Altek-MHD ltd in cooperation with the British company Altek Europe ltd and the SibFU was established to promote the product to the global market.



"The test results revealed that the technology LHMS not only significantly equalizes the chemical composition over the entire section of the ingot, but also accomplishes a number of important indicators. Thus, the cycle time of the casting of the ingot is reduced to 40 %, the casting speed is increased to 85 %," — said **Evgeny Pavlov**, the general director of Altek-MHD ltd, Assistant of the First Vice-Rector of the SibFU for Finance and Development.

Among other effects:

- equalization of the chemical composition over the cross section of the ingot, resulting in reducing the defect ratio during further rolling and processing of ingots by 90 % or its total elimination (depending on the type of alloy), and the elimination of cracks and porosity;
- reducing the cut zones of the bottom of the cast and pipe cavity by 50 %, which would give the economic efficiency of up to 12 million rubles a year per casting machine / one set of equipment (depending on the type of alloy);
- macrosegregation decrease by 55 % and mesosegregation by 50 %, which further eliminates the possibility of defects in the rolling / processing and in end-use products;
- capability to cast new complex multicomponent alloys in the form of large ingots with a thickness of up to 1 meter and alloys AlLi, 2xxx, 5xxx, 7xxx (the content of Zn up to 11 %) which were inaccessible for casting before.

From the point of economic efficiency, the use of LHMS technology gives the total economic impact of up to 3 million euros per year for a single casting machine / one set of equipment (data referred to the casting machine with capacity of 30 thousand tons per year of alloys of AA 7075 type).

Along with the existing technological advantages, LHMS-technology also has a number of distinctive features, among which there are flexibility of settings depending on the type of alloy, a relatively low power consumption, small size, ease of installation and the ability to create more than 150 types of streams (modes).

The unique characteristics of the ingots produced have already caused an active interest in the equipment from the leading foreign companies: Alcoa, Alcan, AlbaBahrain, Chalco, Hydro, BHP Billiton, Dubal, Century Aluminium, Constellium and others. Russian companies Rusal JCS and KUMZ JCS are also interested in the development and are expected to be among the first to take advantage of the new technology.

It is to be recalled that during the implementation of the innovative project the following stages were accomplished:

- developing and patenting of the technology of stirrer of the liquid core of the ingot;
- developing and testing of the physical (laboratory) models of technology;
- as well as its designing, manufacturing and testing of the production prototype of the LHMS equipment.

In addition, the company has implemented a large-scale marketing campaign, during which LHMS technology was presented at the Russian and international exhibitions, conferences and forums. Negotiations with potential customers were organized and conducted. As a result, it is assumed that from 2 to 6 sets of equipment will be produced a year. The company has the appropriate agreement with potential clients. LHMS electromagnetic systems to be installed in the standard vertical casting machines is planned to go into production in 2016.

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