

Development of technology for increasing endurance when crushing the working parts of shredders (crushers) in conditions of increased friction

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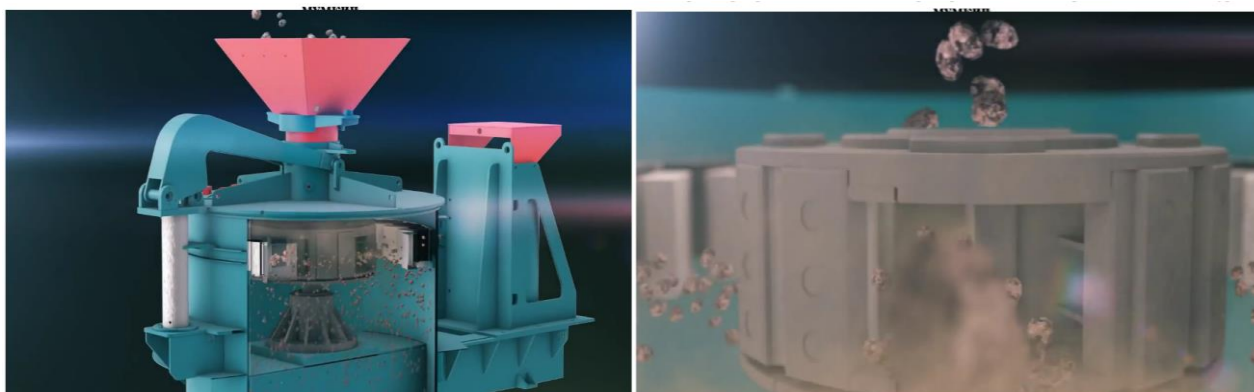
Annotation: The issues of developing the chemical composition of the charge for the production of white cast iron with a stable structure based on alloying elements and obtaining CEMCO and BARMAK dropper rotors operating under conditions of increased friction based on used parts and centrifugal forces of pumps that are resistant to corrosion in the production conditions of the charge are considered.

The analysis showed that in the conditions of the NMZ enterprise of Navoi MMC, it was proposed to use special methods of heat treatment to increase the processing life of products obtained by the pouring method.

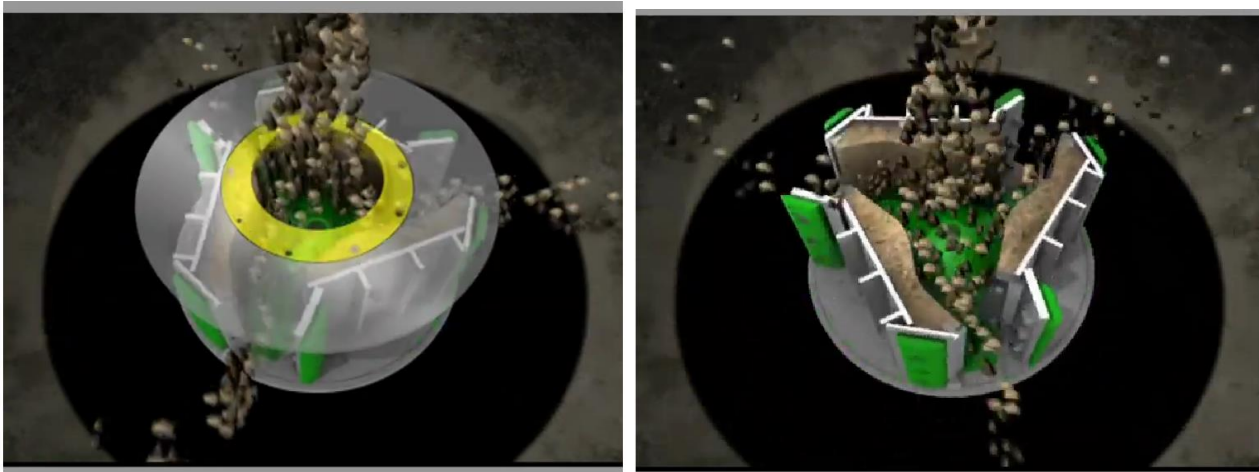
Keywords: crunchiness, shredder, Rotor, pump, friction, heat treatment, temperature, pitch, alloy, white cast iron.

Currently, ore grinders (crushers) are widely used in metallurgical plants operating in the Republic of Uzbekistan, including at the enterprises of NMMC, "AGMK" factory and Uzmetkombinat factory, which operate on the basis of centrifugal force in the field of aggregates.

In the process of preparing the rotors of exhaust parts and grinders (crusher), the pumps that are anti-corrosion make changes to their technological route, that is, in the process of preparing the rotors of exhaust parts and grinders (crusher), which are obtained from alloyed white castings, are subject to bending and the parts of CEMCO and finger grinders (crusher), which operate according to modern design and heat treatment with enrichment., extensive scientific research is conducted on the use of effective methods.



«Figure-1. The process of operation of the rotor of the shredder (crusher), working under the action of the centrifugal force of CEMCO»



«Figure-2. The process of operation of the rotor of the crusher (crusher), which operates under the action of the centrifugal force of the BARMAK»

In this regard, we will consider the effect of Cr, Ni, and other regulatory elements on the alloy. Legalized white cast iron has high performance properties, from which it is possible to obtain high-quality castings. As a result of the legalization of castings with various alloying elements, including chromium, its molding properties are increased without reference to the amount of chromium. In addition, the corrosion resistance of legalized cast iron is very sensitive to the formation of microstructures in it, that is, when obtaining legalized white cast iron, it is necessary to form a structure that ensures not only the quality of the casting, but also the porosity of white cast iron.

The corrosion resistance of cast iron is mainly provided by carbides having a structure of $9,5 \text{ C} (\text{Cr}, \text{Fe})_{15}$, $7 \text{ C}_3 (\text{Cr}, \text{Fe})_3$, $30 \text{ C} (\text{Cr}, \text{Fe})$ or $23 \text{ C}_6 (\text{Cr}, \text{Fe})$ when the amount of Cr in the composition is 6%. The reason is that this carbide is 1,5-2,0 times harder than cementite carbide. One of the more complexities associated with this (Cr, Fe) is that 7 C_3 , $(\text{Cr}, \text{Fe})_3 \text{ C}$, $(\text{Cr}, \text{Fe})_{23} \text{ C}_6$ is formed in the range of 9,5 to 30% of the amount of chromium in legalized white cast iron, which has 3% S to form carbides in the system.

White cast iron with silicon iron in its composition forms silicides (FeSi , Fe_3SiO_2), contributing to the graphite decomposition of uglerod. Therefore, in legalized white cast iron, which is determined when obtaining quality castings, the amount of silicon is in the range of 0,8 - 4,6%.

Manganese in cast iron increases the stability of iron carbide (Fe_3C), resists the decomposition of carbon graphite. At the same time, it recovers the sulfur contained in the cast iron from the FeS compound, passing it into the slag in the same way, slightly cleaning the cast iron from harmful sulfur. Therefore, when obtaining high-quality castings, it is recommended to specify 0.5-1.5% of the amount of manganese in legalized white castings.

In addition, it is important to increase the strength of legalized white cast iron based on thermal characteristics, since their mechanical properties can be changed over a wide range during heat treatment. The purpose of heat treatment of alloys is to

bring the physical properties of mechanical raw materials to the required level by changing their internal structure (structure).

To ensure the strength of the rotors of pumps and crushers under the influence of strong stresses obtained from white cast iron, the chemical composition of the charge material for the production of stable structural wear-resistant alloy cast iron was increased by 3-4 times. % in terms of alloying elements. Preliminary results have shown that research in this area can produce the expected results.

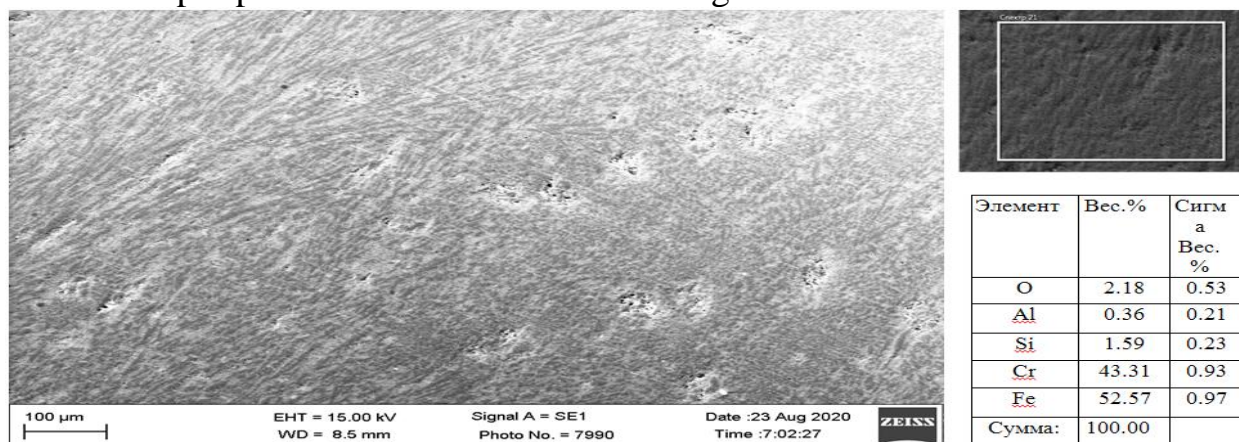
For the production of stable structural alloyed white cast iron in the laboratory conditions of the Tashkent State Technical University, the modes of extracting liquid metal from the furnace and crystallization in the crystallizer have been developed.

Modern effective methods of heat treatment have been applied to improve the internal structure (structure), physical and mechanical properties of cast alloys.

Scanning Electron Microscopes (SEM) An Empyrean Malvern Panalytical diffractometer and Carl Zeiss EVO-MA-10 complex scanning electron microscopes were used to determine the properties and chemical composition of the samples.

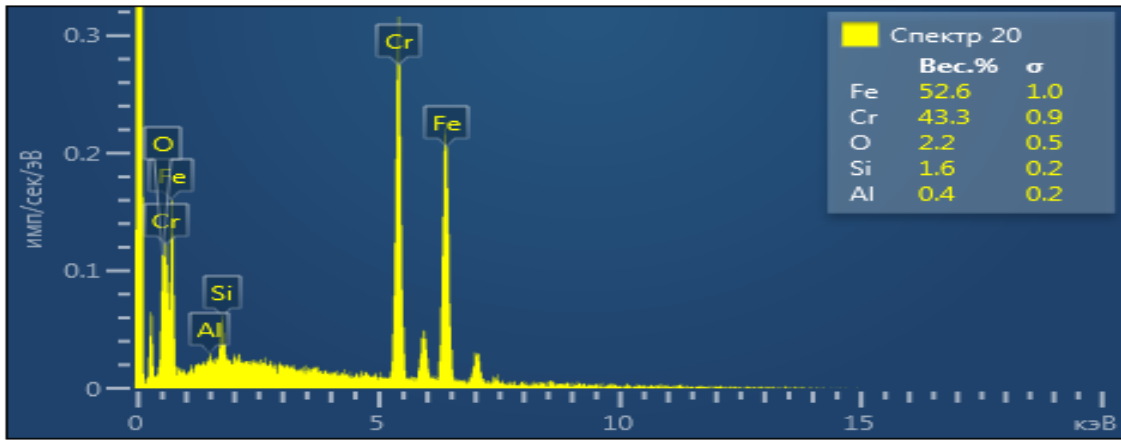
Cast white irons are mainly used to develop technology for increasing the ductility of alloyed white iron products in order to increase the service life of high-strength high-strength rotors of CEMCO and BARMAK pump parts and centrifugal pumps. crushers The chemical composition of the material is enriched with alloying elements.

Before and after heat treatment of samples, the length of the projection of geometric distances in the horizontal plane, i.e. the distances between the corresponding points on the flat and horizontally oriented surface of the object were determined using an electron microscope viewing the image of the object. elemental analysis. Electron beams constantly examine the surface of an object, part of its image is formed by a microscope. In addition, each point on the object's surface was indicated by a corresponding point in the image created in the field of view of the microscope. When the electron beams hit the surface of an object, multiple responses were generated at the same time. Depending on which signal detector was introduced, the microscopes produced one or more clear images.

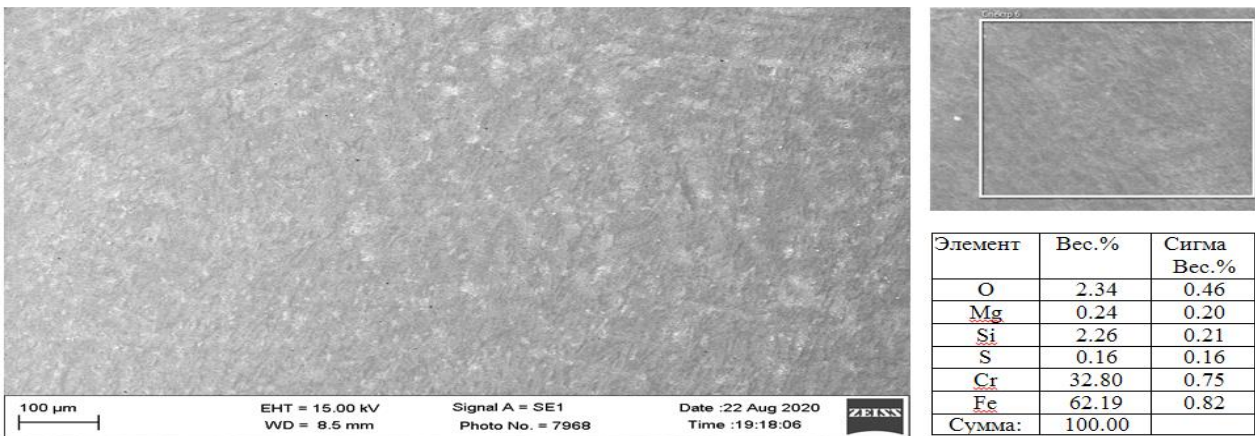


«Figure 3. Before heat treatment of 300X32H2M2TL alloyed white cast iron, CEM Zeiss EVO MA 10 scanning electron microscope was viewed 100x»

Element analysis

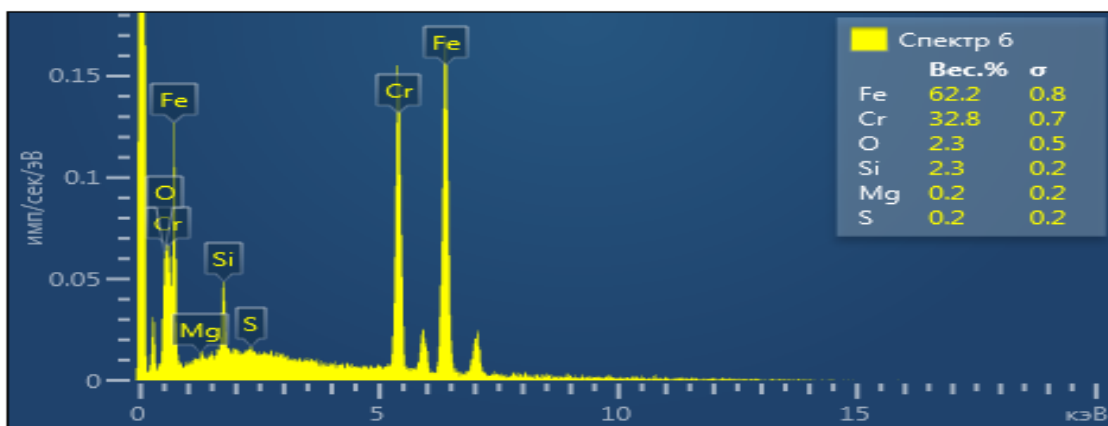


«Figure 4. Analysis of elements before heat treatment in an electron microscope scanning alloyed white cast iron brand 300X32H2M2TL»



«Figure 5. After heat treatment of 300X32H2M2TL alloyed white cast iron, CEM Zeiss EVO MA 10 scanning electron microscope was viewed 100x»

Element analysis.



«Figure 6. Analysis of elements after heat treatment in an electron microscope scanning alloyed white cast iron brand 300X32H2M2TL»

Based on the above, a technology has been developed to increase the service life of high-friction rotors of CEMCO and BARMAK crushers, which are made of corrosion-resistant alloyed white cast iron, mainly by pump spare parts and

centrifugal force. Based on the analysis of the initial results, the following conclusions were made:

- There is an opportunity to increase the operating resource by 1.3-1.5 times and develop resource-saving technology in the production of pump spare parts and rotors of crushers;

- Increasing the service life of working surfaces for corrosion on the basis of providing directed crystallization serves to increase resource savings by 6-8%;

- For the production of white cast iron with a stable structure, enrichment of the chemical composition of the slag with alloying elements before loading into the furnace serves to increase economic efficiency;

- Improving the modes of heat treatment of castings serves to increase the service life of the product;

- Heating the shaft at the expense of the temperature of the combustion products leaving the furnace in the casting method of pump spare parts and rotors of crushers allows to increase energy savings by 10-12%.

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