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Prospects for Creating Bearing Details Using Secondary Materials

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Annotation: This article talks about the future prospects of the production of bearings from secondary metal waste and their use in machine building, aviation, and shipbuilding. Bearings made of secondary metals are economically more convenient and have a significant positive impact on the environment.

Keywords: Bearing, secondary metal, bearing ring, induction furnace, ШХ15, ШХ18, chrome steel.

Introduction. The production of rolling and sliding bearings, which ensure the operation of rotating bodies, remains an urgent issue. The operation of rolling bearings under very high pressure accelerates their failure and increases the need for machine repairs. Bearing materials require a complex complex of stresses that occur under operating conditions, high hardness, bending, tolerance, contact resistance, high viscosity and strength, and the details of bearings are resistant to high static and dynamic stresses. Obtaining the above-mentioned properties of the steel used for making the bearing, obtaining metal ingots is the most urgent problem today, and its solution can partially satisfy the problem of importing metal from the outside of the bearing manufacturing enterprises [1, 2, 16].

Material and mathods. The proposed method is prepared by taking the bearing steel in an induction melting furnace, placing it under vacuum and bringing the density and dimensions to the technical requirements in a rotary spreader. For this purpose, steel is melted in an induction furnace and transferred to the ШХ15 furnace, and the steel is melted, and with the help of ferroalloys, the molten metal ШХ15 content is placed in the form of a bushing. Cast iron electric rotary spreaders are dimensioned and require machining [3, 5, 20].

The basis of the calculations is that such boards are not produced in our country. Steel production plants of this brand are quite large, which allows for reasonable production. Because the production volume is very small, if it increases, it is 100 t/month, and those who produce more than that could not supply the network for purchase. Therefore, it can help to start production in small furnaces, it can harm the production program.

The proposed technological process meets the requirements for bearing steels and the quality is adequate [9, 12, 18, 30].

Table 1. Chemical composition of chrome bearings ШХ %

Brand	C	Si	Mn	Cr	S	P	Ni	Cu
					At most			
ШХ15	0,95÷1,05	0,17÷0,37	0,20÷0,40	1,30÷1,65	0,02	0,027	0,30	0,25
ШХ15СГ	0,95÷1,05	0,40÷0,65	0,90÷1,20	1,30÷1,65	0,02	0,027	0,30	0,25
ШХ20СГ	0,90÷1,00	0,55÷0,85	1,40÷1,70	1,40÷1,70	0,02	0,027	0,30	0,25
ШХ4	0,95÷1,05	0,15÷0,30	0,15÷0,30	0,35÷0,50	0,02	0,027	0,30	0,25

Discussion. High carbon chrome steel is used to make balls and inner or outer rings. In addition to having great hardness, these steels also have great contact strength and are resistant to creep. One of the requirements for ball bearing steels is that these steels must not contain any non-metallic inclusions. Carbide should not be unevenly distributed. Therefore, these steels are obtained by electroslag or vacuum method. If the bearing material is obtained by the electroslag method, the letter "Ш" is added to the end of the stamp, if it is obtained by the vacuum arc method, the letter "ВД" is added. (For example ШХ15Ш, ШХ15ВД). Such steels are produced in the form of rods (vig), tubes, tapes. After softening, it consists of fine-grained perlite. Such a structure gives good technological properties, it is easy to cut, it is easy to plastic deformation and good stamping, hardness after softening is HB 170-207 (1720-2070 MPa) [16, 17]. In the production of rolling bearings, the production of bearing balls (grains) with a twisting method allows to extend the service life of the bearing. Steel obtained by this method reduces the coefficient of refraction, that is, the linear paths that appear in the ball due to twisting prevent breakage to a certain extent. According to research, there is a high possibility that rolling bearings, which can be removed by a special way, will be widely used in the future industry, mainly in machine building [24].

Acknowledgement. The main problem is the chemical integrity of the bearing material, the lack of liquefaction, and the issue of increasing the index of impact viscosity. If the bearing steel has the above-mentioned properties, it is possible to solve part of the problem of importing metal from the bearing manufacturing enterprises. The proposed method can be used to make bearing rings by casting steel in induction furnaces and increasing its density by annealing the ingot. In this case, cutting work is left only on the rolling path. The remaining parts are mechanically processed to a minimum. The main point of the problem is that the method of cast soluble models is used as one technology with vacuum casting, and with this method, the need for bearing steels can be met [7, 29].

One of the objectives of the proposed scientific work is to obtain the material for the production of bearing rings from secondary raw materials. In this case, adding additives, or rather calculating the charge, is one of the main technological processes in our material acquisition. In this, of course, it depends on processes such as the mixing quality of the mixture, the exact amounts of the elements that make up the chemical composition, and their types and conditions. In this case, there is a great demand for steel waste alloyed with the necessary elements as clean as possible, and for metals free from excess chemical or, more precisely, harmful elements. As much as possible, the amount of alloyed elements is important [10].

It is known that metal melts differently depending on the type of furnace during remelting and suffers certain losses. These losses can range from 2% to 20%. The order of adding additional elements can be done according to the desired order depending on the melting furnaces and methods. In this regard, losses and additions are definitely taken into account in the calculation [21, 22, 26].

Conclusion. First, the composition of secondary raw materials is studied, and before their remelting, their chemical composition is studied. The necessary calculated elements are added during the melting period. In this order, losses are prevented and necessary additions are added to obtain the necessary material. The melting process takes a certain amount of time depending on the type of furnace and the amount of metal. How fast or how slow the process is depends on the above indicators and the amount of additional elements.

The structure of the steel is mainly influenced by the carbon content, and this remelting process takes into account the carbon content along with the alloying elements. This affects the material of the bearing ring and its mechanical properties.

One of the main tasks of the scientific work is to research bearing ring materials and production methods based on the results of the proposed new local production from secondary raw materials. Obtaining material based on the results of this research will eliminate the problem of oversupply of bearing material in our industry.

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