ABSTRACT

Bachelor's thesis: “Influence of physical characteristics of filler on the structure and properties of porous cast aluminum”.

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Specialty: 136 - Metallurgy

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The thesis investigates the peculiarities of forming the porous structure of aluminum by casting using NaCl as a temporary filler (pore forming agent). The aim of the work is to determine the influence of the morphology, size and amount of salt filler on the structural and mechanical characteristics of the final material.

The object of the study is porous cast aluminum made by vacuum impregnation of salt with aluminum melt, followed by leaching of the filler. The subject of the study is the influence of the geometric characteristics of filler salts on the formation of the structure and physical and mechanical properties of the PLA.

In the course of the thesis, a series of porous aluminum castings were produced using fillers of different particle size distribution. The castings were processed, samples were prepared, and a set of experimental studies was carried out, including microstructural analysis, measurement of pore sizes and apertures, determination of Brinell hardness, quantitative X-ray diffraction analysis, and determination of the magnitude of the 1st kind of stresses was carried out using the sin2ψ method. Electron microscopy methods were used to assess the structure of the samples. Mechanical properties were studied according to standard methods.

The results of the work showed that the change in the fractional composition of NaCl is significant in

This diploma work investigates the influence of the physical characteristics of the filler on the formation of the structure and physical and mechanical properties of porous cast aluminum.

Modern methods of manufacturing porous metal materials, in particular, the method of casting using soluble filler (NaCl), were analyzed. The features of the processes of compaction, calcination, pouring, leaching, and thermal drying are considered. The

influence of dispersion, particle shape, on the uniformity of the pore structure and hardness of castings was evaluated.

The experimental studies were performed at the foundry of ELEKOND LLC. A series of melts was carried out on the CAT-0.01/10 furnace, followed by vacuum pouring into a ladle with a pressure gradient. After removing the filler, the microstructure of the material was analyzed, porosity and Brinell hardness were determined.

The results obtained can be used to improve the technology of manufacturing lightweight energy-absorbing structures with a given porosity.

The thesis includes: 81 pages of main text, 31 figures, 17 tables, 24 references.