Precipitation hardening of magnesium alloys is achieved in most cases in the result of aging, based on homogenization and hardening from the area of solid solution and subsequent high-temperature leave, which leads to the decomposition of a supersaturated solid solution with the separation of particles that block slip dislocations and increase the yield point.

Improvement of mechanical and special properties of magnesium alloy castings due to optimal application of charge materials and rational technologies of high-quality casting can significantly expand the application of these alloys in the field of medicine providing the possibility of manufacturing more reliable structures of more complex forms.

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THE INFLUENCE OF SN AND PB ON STRUCTURE FORMATION AND MECHANICAL PROPERTIES OF Mg-Al-Zn ALLOY

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Cast magnesium alloys are one of the lightest structural materials. It allows them to be used extensively in aviation engineering. The march of technological and scientific progress leads to complication of the design and the number of structural elements of engines and aggregates, which leads to an increase in their mass. Currently, the efforts of the global aviation industry are aimed at expanding the use of parts made of magnesium alloys for units and aggregates, instead of existing aluminum and steel castings, to reduce their mass. At the same time, the requirements imposed on them are constantly increasing. Therefore, increasing the physical and mechanical properties of magnesium alloys, which do not contain scarce and expensive components, is an urgent task.

The effect of alloying magnesium alloy ML5 with fusible metals of the 4th group of the Mandeleev's periodic system (Sn and Pb) is poorly studied. These metals have favorable factors in relation to magnesium (minimal difference in atomic diameters and electronegativity) and, consequently, can form solid solutions, strengthening the metal matrix. An analysis of the state diagrams of Mg-Sn and Mg-Pb showed that they are eutectic type diagrams with limited solubility of these elements in solid magnesium and form supersaturated solid solutions. All these factors lead topositive effect of Sn and Pbon the properties of magnesium alloys.

In this work, we have studied the influence of Sn and Pb on the structure and properties of castings of magnesium alloy ML5.

Macro-fractographic study of the failure surface of the samples showed that with increasing the concentration of Sn and Pb in the alloy, macrostructure was grinded, its pattern varied from large-grained to matte fine-grained.

The microstructure of the heat treated alloy ML5, cast without the alloying with Sn and Pb, was a δ-solid solution with the presence of δ + γ(Mg_4Al_3) eutectics, γ(Mg_4Al_3) intermetallic compounds and fine manganese phase particles. The injection ofSn and Pb to the alloy under studygrinded the micrograin and reduced the distance between the secondary dendrite branches.

With an increase in the concentration of Sn and Pb in the alloy, the size of the δ + γ(Mg_4Al_3) eutectic decreased significantly, and the number of intermetallic emissions increased due to the formation of a certain amount of intermetallic phase. Additives of the alloying elements up to 1,0% each reduced the grain size by ~ 1,5...1,8 times and increased the microhardness of the matrix compared to the original alloy.

In the structure of the ML5 alloy, there were non-metallic inclusions of two types: blue-gray color of an undefined shape and pink, which are globular. The first are located at the borders, the second are in the center of grains. The injection of Sn and Pbinto the alloy in the amount of 1,0% noticeably grinded non-metallic inclusions, which generallyacquired a globular form.

The growing additives of Sn and Pb increased the strength of the alloy and practically did not affect its plasticity. The value of the long-term strength of the alloy at elevated temperatures decreased with an increase in the content of Sn and Pb, and, for Pb, the decline in this indicator was more severe. Thus, alloying of magnesium alloy with Sn and Pbcan be recommended for the strengthening of magnesium alloys, which are used at temperatures up to 150 °C.

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КЕРУВАННЯ СТРУКТУРОЮ ПОКРИТТІВ УМОВАМИ ВЕДЕННЯ ЕЛЕКТРОЛІЗУ У ВОЛЬФРАМАТНО-МОЛІБДАТНИХ РОЗПЛАВАХ

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Експерименти проводили в герметичному металевому електролізері. Електролітами служили розплавлені суміші Na_2WO_4 – 3 мол. % MoO_3, Na_2WO_4 – 5 мол. % WO_3, Na_2WO_4 – Li_2WO_4 – 10 мол. % WO_3.

Вивчення впливу катодної густини струму і тривалості електролізу, підбір параметрів реверсного режиму осадження здійснювали для електролітів KCl–NaCl–2,5 мол. % Na_2WO_4–0,35 мол. % $NaPO_3$, NaCl–Na_3AlF_6–7,5 мол. % Na_2WO_4, Na_2WO_4–5 мол. % $NaPO_3$ і Na_2WO_4– 5 мол.