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Change the hardness of aluminum alloys under the action of germanium oxide

Tursunbaev Sarvar[1,2], Turakhodjaev Nodir[1,2], Tashbulatov Sherzod[1,2], Mardonakulov Sharofiddin [1,3], Hudoykulov Shohruh[1,2]

[1]Tashkent State Technical University, University 2, Tashkent, Uzbekistan;

[2]Uzbek-Japan innovation center of youth, Laboratory of mechanical engineering and materials science, Tashkent, Uzbekistan;

[3]Harbin Engineering University, Harbin, P.R.China

It is known that aluminum alloys can improve its properties by introducing other elements into their composition.Leading researchers in the world have conducted studies aimed at increasing its mechanical properties by introducing various unique elements into the composition of aluminum. The paper studied the effect on its hardness by introducing germanium oxide into an aluminium alloy as above.Based on the results, a link graph was developed and the authors' conclusions were given.

Keywords: alloying, mechanical properties,germanium oxide,hardness, aluminum.

In order for the details of the machine to work long and reliably, the materials from which they are made must comply with the necessary operating conditions. Therefore, it is important to control the permissible values of the indicators of their main mechanical properties. Alloys of aluminum with other metals and mirrors (copper, manganese, magnesium, silicon, iron, nickel, titanberyllium, etc.) are widely used as structural materials. In aluminum alloys, along with the good properties of pure aluminum, the high strength properties of the reinforcing joints are embodied. For example, iron, nickel, titanium increase the fire resistance of aluminum alloys. Provides an appropriate thermal treatment for copper, manganese, magnesium, aluminum alloys. As a result of polishing and thermal processing, the strength of aluminum alloys increases from σv 100 to 500 MPa, and the hardness increases from HPA 20 to 150.

This research was carried out in the laboratories of the Tashkent State Technical University and the Uzbekistan-Japan Innovation Center. The experiments were carried out on aluminum alloys of the AK7 and D16 brand, which are now widely used in the industry. The mass of shikhta for samples was 100 grams. The samples were liquefied in a resistance oven and poured into sand-clay molds. The alloys were liquefied with the resistance furnace tuned to a temperature of 750°C. Germanium oxide was included in the composition of shikhta as a legitimizing element. In this, a compound of germanium oxide was added in an amount of 1%, 2%, 3%, compared to the total mass of shikhta. From the samples taken, samples with a diameter of 30 mm and a thickness of 5 mm were cut off on a mallet machine. The isolated samples were prepared by grinding the surface, which was measured in rivets (figure 1). The flattened samples were measured at the Brinell press 3 times a sample in sequence.

Figure 1- Polished samples.

Based on the results obtained, a dependency graph was developed (Figure 2). In this case, a graph has been developed based on the relationship between the hardness of the samples and the amount of germanium oxide in the alloy.

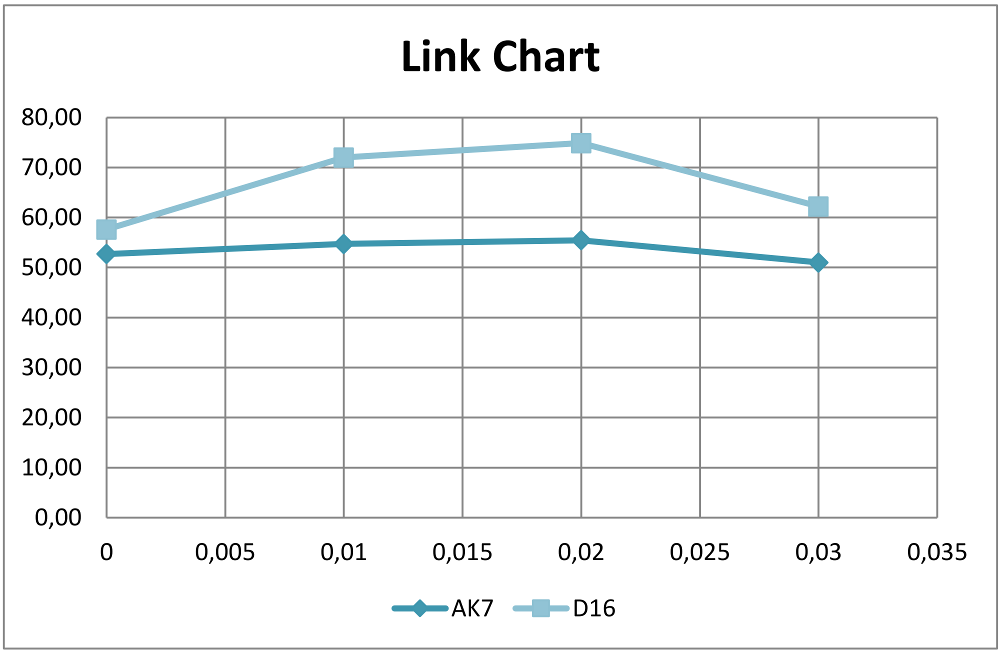

Figure 2- Dependency graph.

Experiments based on the application of aluminum alloys with germanium oxide as a alloying element show that when aluminum alloys with brands AK7 and D16 were injected with a germanium oxide compound of 1% to 3% of the mass of starch, the hardness of the alloys increased significantly, and but when it exceeded 3%, the hardness of germanium oxide decreased.. When we applied the germanium oxide compound as flux, the hardness of germanium oxide compound compared to non-added aluminum alloys increased to 10-16% for the AK7 brand alloy, and 15-31% for the D16 brand alloy. Hardness began to decrease when a 3% quantity was added.

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