

**ANALYSIS OF THE ADDITION OF MAGNESIUM ELEMENTS
TOWARDS HARDNESS AND BENDING STRENGTH IN
ALUMINIUM 6061 CASTING**

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ABSTRACT

This study aims to determine the effect of adding magnesium elements on the mechanical properties of aluminum 6061, especially on the hardness and bending strength values of the casting results. The variations of specimens used include pure aluminum 6061 (V1) and a mixture with magnesium of 4% (V2), 8% (V3), and 12% (V4). The mixing process was carried out using the sand casting method, and mechanical property testing was carried out using the Brinell method for hardness and three-point bending for bending strength, according to ASTM standards. The test results showed that pure aluminum 6061 had the highest hardness value of 49,05 BHN. The gradual addition of magnesium actually reduced the hardness value, with results of 35,25 BHN (4%), 34,31 BHN (8%), and 32,82 BHN (12%), respectively. Similar things happen in the bending strength test, where the highest value is obtained in pure aluminum of 910,88 MPa, and decreases drastically in the variation of the mixture with magnesium. The conclusion of this study is that the addition of magnesium without heat treatment and homogeneous mixing does not improve the mechanical properties of aluminum 6061. On the contrary, the addition of magnesium under these conditions tends to reduce the hardness and bending strength of the material. Optimization of the melting process and further treatment is needed to obtain better results.

Keywords: Aluminum 6061, Magnesium, Brinell Hardness, Bending Strength, Sand Casting.