MECHANICAL PROPERTIES OF 7020 ALLOY PRODUCED BY DIRECTIONAL SOLIDIFICATION

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Abstract- The 7020 alloy belongs to the hardenable Al–Zn–Mg-based alloys, which are the group of the high strength aluminium alloys and are used for some structural applications in the aircraft (components in wings and ailerons) and automotive industry (bumper structures). In this study, the effect of solidification rate (V) on the mechanical properties (microhardness and ultimate tensile strength) of 7020 alloy (Al-%4.5Zn-%1.2Mg-%0.15Cr-0.15%Zr wt.%) has been investigated. The 7020 alloy was prepared using metals of 99.99% high purity in the vacuum atmosphere. At a constant temperature (8.3 K/mm), these alloys were directionally solidified upwards under various V (8.3–166 □m/s) using a Bridgman-type furnace. Microhardness and ultimate tensile strength at room temperature were examined. The microhardness increased from 75.88 to 91.71 MPa and the ultimate tensile strength increased from 125.43 to 208.11 MPa with increasing the solidification rate from 8.3 to 166□ □m/s. Exponent values of the V for the microhardness and ultimate tensile strength were calculated as 0.07 and 0.18, respectively.
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Index Terms- 7XXX alloys, directionally solidification, microhardness, tensile strength.