Correlation between Microstructure and Mechanical Properties of Al-Si-Cu Alloys Casting

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It is well known that mechanical properties depend on solidification structures. The effects of microstructure on metallic alloys properties has been highlighted in various studies and particularly, the influence of grain size and dendrite arm spacing upon the mechanical properties has been reported [1-3]. The aim of this work is obtain correlations between microstructure and the mechanical properties of Al-10wt%Si-2wt%Cu and Al-10wt%Si-5wt%Cu alloys casting. These alloys were solidified under upward unsteady state heat flow conditions. Heat was directionally extracted only through a water-cooled bottom made of steel (SAE 1020). The results include tip growth rate (V_L), cooling rate (T_R), primary dendrite arm spacing (λ_1), ultimate tensile strength (LRT) and yield strength (LE) as a function of solidification conditions imposed by the metal/mold system**.** In both cases (LRT and LE = 0.2%ε), the finer dendritic arrangement presents superior mechanical properties for the Al-Si-Cu alloys studied**.**

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