

Effect of Copper Addition at a Rate of 4% Weight on the Microstructure, Mechanical Characteristics, and Surface Roughness on the Hot Extrusion of Aluminum

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Abstract : Al-4%Cu alloys are now widely used in many engineering applications especially in robotic, aerospace and vibration control area. The main problem arises from the weakness of their mechanical characteristics. Therefore, this study is directed towards enhancing the mechanical properties through severe plastic deformation. In this work, the hot direct extrusion process was chosen to provide the required hot work for this purpose. A direct extrusion die was designed and manufactured to be used in this investigation. The general microstructure, microhardness, surface roughness, and compression tests were performed on specimens from the produced Al-4%Cu alloy both in the as cast and after extrusion conditions. It was found that a pronounced enhancement in the mechanical characteristics of the produced Al-4%Cu after extrusion was achieved. The microhardness increased by 89.3%, the flow stress was decreased by 10% at 0.2 strain and finally the surface roughness was reduced by 81.6%.

Keywords : aluminum, copper, surface roughness, hot extrusion

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