

Influence of Modification on Fluidity of Investment Cast Al-Si alloys

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ABSTRACT

Aluminum alloys are widely used in automotive industries. The fluidity of Al-Si alloys increases with increasing Si content reaching a maximum at 17-18wt% Si [1]. The fluidity of hypereutectic Al-Si alloys is better than that of hypoeutectic and eutectic compositions. This is due to the high heat of fusion of primary silicon which is 4.5 times higher than the heat of fusion of pure aluminum [2]. Fluidity is a widely accepted measure of the alloy's ability to fill the mold cavity. Because of its importance in casting, the fluidity of casting alloys has been studied extensively over decades [3-5]. Generally, whether a mold cavity can be filled completely or its details can be replicated depends not only on the alloy's characteristics but also on the mold properties, such as its dimensions, geometry, material, temperature, etc, and casting process parameters, such as temperature and pressure.

The objectives of the present work was to study the influence of superheat of liquid metal, content of Si, modification of Al-Si alloy with strontium and preheat temperature of investment shell mould on the fluidity.

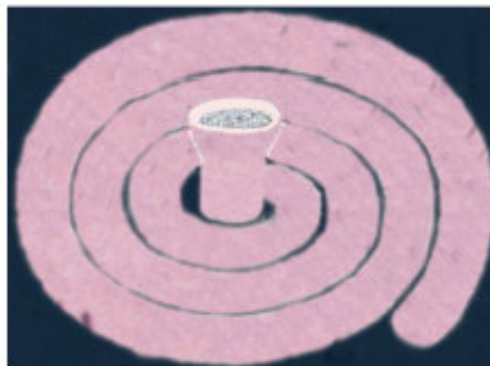


Figure 1: Fluidity spiral.

The fluidity increases with the increase of Si content, super heat and shell mould preheat temperature. The fluidity decreases with Sr modification of Al-Si alloy.

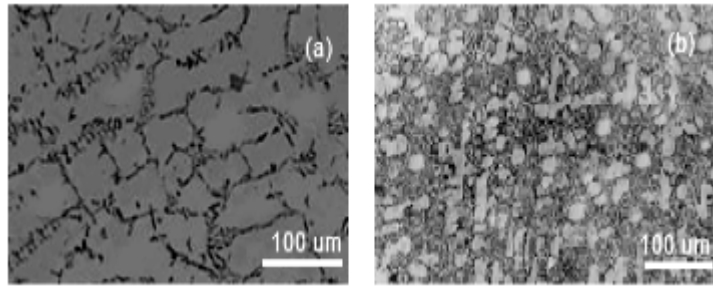


Figure 2: Microstructure of Al-5%Si alloy: (a) and (b) unmodified with Sr.

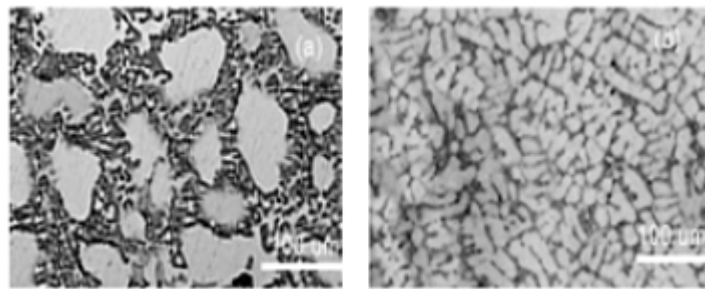


Figure 3: Microstructure of Al-11.3%Si alloy: (a) and (b) modified with Sr and SEM image of eutectic.

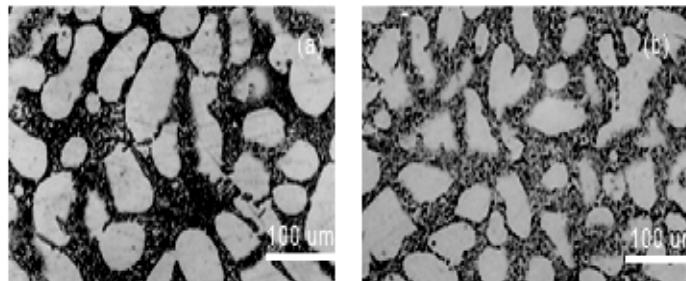


Figure 4: Microstructure of Al-15%Si alloy: (a) and (b) modified with Sr.



Figure 6: Fluid spirals cast in (a) modified and (b) unmodified Al-Si alloys.

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