Effect of Mo on the High-Temperature Creep Resistance and Machinability of a Recycled Al-Alloy with High Iron Impurity

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ABSTRACT

Reported work focuses on the effect of morphology of the Fe-rich intermetallic phases on the machinability of Al-alloy containing >2wt.% Fe, obtained from automotive scrap. Effect of Mo addition on the microstructure, high-temperature impression creep and thereby the machinability of the Al-recycled alloy were studied. The machinability of the recycled alloy was estimated by investigating the built-up-edge (BUE) and surface roughness (R_a). SEM-EDS and TEM-SADP studies have shown that the crystal structure (BCC) of the Al_8Fe_2Si phase remained unchanged; however, Mo replaced few Fe atoms with little effect on the lattice dimension. It has been found that the addition of Mo to the recycled alloy suppresses the formation of β-phase (Al_5FeSi) by suppressing the peritectic transformation of α (Al_8Fe_2Si) phase. Such suppression is found to improve the high-temperature creep resistance and the machinability with the increase in the Mo addition level.

KEYWORDS: aluminumcasting and solidification; electron; intermetallic; machining; microscopy; optical; metallography; recycling

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