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Abstract

The microstructure and mechanical properties of the novel AlSi11CuMn alloy manufactured by selective laser melting were investigated in the as processed state and after heat treatment. A fine eutectic structure formed in the as processed alloy. A duplex size structure formed after solution treatment. The thermal expansion coefficient was $19.1 \cdot 10^{-6} \text{ } ^\circ\text{C}^{-1}$ in the 20-100°C range which is typical for cast Al-Si alloys. Increasing annealing temperature from 190 to 275 °C leads to a sharp decrease in the alloy hardness from 136HV to 119HV after 2.5h. The hardness was significantly reduced from 136HV to 79-82HV after solution treatment at 515 °C. The yield stress, ultimate tensile strength and elongation were 288MPa, 354MPa and 5.4%, respectively after solution treatment at 515°C and aging at 180°C for 8h.

Keywords: SLM; Al-Si alloys; microstructure; hardness; strength; heat treatment.

Introduction

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