Mechanical properties of Al-Cu-Li based alloys after ageing

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Aluminum alloys with the addition of Li have been studied for several decades. The addition of 1 wt.% Li causes, on average, a 3 % increase of elastic modulus and a 6 % decrease of total density of the alloy [1,2]. However, formation of a binary Al_3Li hardening precipitate also leads to deterioration of certain properties. Newer generations of Al-Li based alloys contain a significant addition of Cu for Li to precipitate in the form of more beneficial ternary precipitates [3]. The AA2195 aluminum alloy is a third generation Al-Li alloy. It has found use in the aerospace industry due to good mechanical properties and low density. The alloy is traditionally direct chill (DC) cast, and processing of the alloy required to reach peak mechanical properties is well researched. However, certain disadvantages connected with DC casting, such as anisotropy of certain properties due to a strong texture, can never be eliminated by processing. Continuous casting methods such as twin-roll casting (TRC) could be used to manufacture a AA2195 alloy with even better mechanical properties as the textural component is reduced and the rapid solidification connected with TRC leads to a formation of a more homogeneous, finer grained structure. However, TRC of the alloy is an unresearched topic and optimal processing of the material must be found through optimization of hardening phase composition after ageing. Results of testing of TRC AA2195 alloys after different thermomechanical processing steps and ageing treatments are presented in the presented study.

Keywords: Al-Cu-Li alloys, twin-roll casting, precipitation hardening, ageing,

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