

Plastic anisotropy and strain-hardening behavior of Mg6%Li1%Zn alloy thin sheet at elevated temperatures

吳泓瑜, 周耿中

Mechanical Engineering

Engineering

ncuwu@chu.edu.tw

Abstract

An MgLiZn (designated as LZ61) alloy containing about 6 wt% of Li has been prepared by melting and solidification in a carbon steel crucible, and extruded at a billet preheating temperature of 200 °C. The extruded plate was then cold-rolled to a final thickness of 0.6 mm with a total reduction of approximately 82 %. Tensile tests were carried out in the rolling and transverse directions and at various temperatures to explore the effects of anisotropy and temperature on mechanical properties and strain-hardening behavior. Kocks - Mecking type plots were used to illustrate different stages of strain-hardening. Anisotropic behavior of LZ61 sheet were observed in the mechanical properties at all test temperatures due to the development of texture in α phase during cold-rolling and a low content of BCC β phase. The cold-rolled LZ61 alloy sheet showed stage II and stage III strain-hardening behavior at test temperatures of room temperature and 100 °C. The specimens tested at 200 °C did not show stage II strain-hardening. Higher initial strain-hardening rates were observed in the transverse direction as a result of the cold-rolled fibrous structure providing more strong barriers to the dislocation movement.

Keyword : Magnesium-lithium alloy; Anisotropy; Strain-hardening