

Effect of heat treatment on the microstructure and mechanical properties
of the consolidated Mg alloy AZ91D machined chips

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Abstract

Influence of heat treatment on the properties of the consolidated AZ91D Mg alloy chips was performed in this study. The chips were pressed into a die to form a compact with a green density of 1.6 g/cm³. The 50 mm diameter green compact was then extruded into a 20 mm rod at 350C. The extruded rod was solution treated at a temperature of 415C for 24 h; the solution treated specimens were then aged at two temperatures: 170 and 215C. Heat treatments were conducted to explore the microstructure evolution and mechanical properties of the extruded rod. Heat treatments revealed that the age hardening effect was related to the transformation of the microstructure. Over aging during age heat treatment was believed to be caused by the formation of a lamellar structure composed of alternating layers of Mg₁₇Al₁₂ phase and magnesium matrix.

Keyword : AZ91D Mg alloy; solid state recycling; age hardening, lamellar structure