Rapid Gas Blow Formability of Fine-Grained AZ31B Mg Alloy Sheet

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Abstract

The gas blow formability of a 0.6 mm-thick, fine-grained AZ31B Mg alloy sheet were investigated with the intention of reducing forming time during gas blow forming. The sheets were successfully deformed into hemispherical domes at 300, 370, and 420 ºC under various pressurization profiles. The results show that the proposed pressurization profiles could achieve the goal of reducing forming time. A stepwise pressurization profile may be a suitable process at lower temperatures, whereas a constant or near constant pressure imposed during forming is a better method at higher temperatures. The pressurization profiles used in this study were not restricted to providing the optimum constant strain rate, which is often used in the traditional superplastic forming. Under the proposed pressurization profiles, The resultant average strain rate in the range of 6.63×103 to 1.56×102 s1 were imposed on the deforming sheet at the apex of the dome. The pressurization profile might not be one of the major factors influencing formability at the same forming temperature but it can significantly affect the forming time.

Keyword：AZ31B Mg alloy, gas blow forming, pressurization profile, free bulging