

Deformation behavior in superplastic 5083 Al alloy during biaxial gas
pressure forming with lubrication

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Abstract

Effect of lubrication on deformation behavior of a superplastic material has been given little attention, although it is important for industrial application. In this paper, a superplastic 5083 Al alloy under bi-axial deformation was investigated by deforming the sheet into a cylindrical die cavity with and without lubrication. Several interrupted tests were performed to bulge the sheets to various depths for two different strain rates, the formed parts were then utilized to evaluate the effect of lubrication on metal flow, thickness distribution, and cavitation. It was found that reducing the interfacial friction by use of a lubricant improved the metal flow after the deformed sheet had made contact with the bottom surface of die. Changes of the metal flow during forming not only developed a better thickness distribution of the formed part, but also reduced cavitation levels.

Keyword : Superplastic forming; Superplastic 5083 Al alloy; Lubrication; Cavitation