

潤滑劑對5083超塑性鋁合金成形特性之影響

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摘要

The purpose of this work is to explore the effect of lubrication on the deformation characteristics of a superplastic 5083 Al alloy during superplastic forming. A series of interrupted experiments were performed to bulge the sheet into a die with a rectangular cavity. Deformation rate and lubrication were included in the experimental forming processes to investigate the influence of the forming variables on the thickness distribution, deformation state, variation of strain rate, and cavitation of the formed parts. Experimental results showed that the metal flow moved toward the corner for forming performed without using lubricant. The corner was the thinnest location of the formed parts. The maximum cavity level was also found at the corner. Forming carried out with lubricant altered the metal flow in the later stage of deformation, metal flow moved from the central and die entry region toward the upper region of the side walls. Lubrication improved the thickness variations of the formed parts, the thickness of the corner was thicker than that formed without using lubricant. The cavity levels of the formed parts were reduced due to more uniform distribution in thickness.

關鍵字：superplastic 5083 Al alloy, Lubricant, Metal flow, Cavitation