

A NUMERICAL STUDY OF MICROFORMABILITY AND SUPERPLASTICTY OF AL5083 ALLOY

Md. Abu Mowazzem Hossain¹, Sung-Tae Hong¹, Kyu-Yeol Park^{1*}, Young-Sang Na²

¹School of Mechanical Engineering, University of Ulsan, Ulsan, 680-749, Republic of Korea

²Korea Institute of Materials Science, 531 Changwondaero, Changwon, 641-831, Republic of Korea

mowazzemme02@yahoo.com, sthong@ulsan.ac.kr, kypark@ulsan.ac.kr^{*}, nys1664@kims.re.kr

***Abstract-** Microformability and superplasticity of Al5083 superplastic alloy during microforming process is investigated by finite element analysis. A micro V-groove die is modeled to analyze the effects of forming time, load, and temperature on the microformability of the Al5083 alloy. First, the microformability of the Al5083 alloy is estimated using a microformability index. The simulation results suggest that the microformability increases as the forming load, time, and temperature increase. Superplasticity of the Al5083 alloy during microforming using the V-groove die is also investigated in terms of the effective strain rate. The effective strain rates of two material points during two representative microforming processes, one under the constant punch load and the other under the constant punch speed, are tracked as a function of the forming time. The results show that the superplasticity of the Al5083 alloy occurs in a specific part of the material for a specific period during microforming process, depending on the forming conditions and the microformability index.*

Keywords: Microforming, Microformability, Superplasticity, Al5083 alloy