

Superplastic deformation behavior of 7075 aluminum alloy

TAHAR SAHRAOUI, Mohamed HADJI, Nacer BACHA, Riad BADJI, r

Abstract: A study has been made to investigate the effect of a prior amount of warm rolling on the superplastic forming behavior of a standard grade 7075 aluminum alloy. The thermomechanical treatment process presented for grain refinement includes furnace cooling from the solution treatment temperature to the overaging temperature, warm rolling from 65–85% deformation, recrystallization, and artificial aging treatment. Increasing the amount of warm rolling beyond 80% deformation does not produce material with higher elongation to failure when the thermomechanical treatment process presented is used. The largest value of elongation to failure was 700%, which was obtained for a specimen having a grain size of 8 μm at a strain rate of $6 \times 10^{-3} \text{ s}^{-1}$. The fracture surface exhibits a granular appearance indicative of an intergranular fracture mode. Dislocation activities within grains were observed, indicating the occurrence of dislocation slip during grain boundary sliding.

Keywords : 7075 aluminum alloy, superplastic deformation, thermo mechanical treatment, warm rolling