Dynamic behavior of extruded AZ61 Mg alloy during hot compression

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Abstract

The high-temperature compressive properties of an extruded AZ61 magnesium alloy were examined at different temperatures and strain rates ranging from 523 to 723 K and 1×10－3 to 1 s－1, respectively. Flow behavior analyses and microstructural observations indicated that the softening mechanism at high strain rates (or low temperatures) proceeded via a combination of the dynamic recovery (DRV) and dynamic recrystallization (DRX). The contribution of DRV to the softening effect decreased with decreasing strain rate (or increasing temperature). The stress required for the onset of DRV increased with increasing strain rate (or decreasing temperature). DRX was the dominant softening mechanism at low strain rates (or high temperatures). The constitutive equation relating flow stress, temperature, and strain rate was obtained based on the steady-state stresses. The constitutive analysis suggested that the hot deformation mechanism of the as-extruded AZ61 Mg alloy was dislocation creep controlled by lattice diffusion.

Keyword：AZ61 Mg alloy; Dynamic recovery; Dynamic recrystallization; Flow behavior; Zener－Hollomon parameter