

Study of the titanium alloy deformation behavior in equal channel angular extrusion

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Abstract

The shear plastic deformation behavior of a material during equal channel angular (ECA) extrusion is governed primarily by the die geometry, the material properties, and the processing conditions. Using commercial DEFORMTM 2D rigid-plastic finite element code, this study investigates the plastic deformation behavior of Ti-6Al-4V titanium alloy during 1- and 2-turn ECA extrusion processing in dies containing right-angle turns. The simulations investigate the distributions of the billet mesh, effective stress and effective strain under various processing conditions. The respective influences of the channel curvatures in the inner and outer regions of the channel corner are systematically examined. The numerical results provide valuable insights into the shear plastic deformation behavior of Ti-6Al-4V titanium alloy during ECA extrusion.

Key words: Equal Channel Angular Extrusion (ECAE);
Finite Element Analysis Method;TiAl