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Finite element analysis and die design of non-specific engineering structure of aluminum alloy during extrusion

Chen, Dyi-Cheng; Lu, Yi-Yu

Abstract

Aluminum extension applies to industrial structure, light load, framework rolls and conveyer system platform. Many factors must be controlled in processing the non-specific engineering structure (hollow shape) of the aluminum alloy during extrusion, to obtain the required plastic strain and desired tolerance values. The major factors include the forming angle of the die and temperature of billet and various materials. This paper employs rigid-plastic finite element (FE) DEFORM™ 3D software to investigate the plastic deformation behavior of an aluminum alloy (A6061, A5052, A3003) workpiece during extrusion for the engineering structure of the aluminum alloy. This work analyzes effective strain, effective stress, damage and die radius load distribution of the billet under various conditions. The analytical results confirm the suitability of the current finite element software for the non-specific engineering structure of aluminum alloy extrusion.

Key words: Extrusion; Aluminium alloys; Finite element analysis; Plastic deformation