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Finite element analysis of composite porous billet extrusion processing

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Abstract

Clad composite materials are composed of two or more materials joined at their interfacial surfaces. A major advantage of clad composites is that the combination of different materials can result in a new material with enhanced mechanical properties and improved electrical characteristics. This study employs commercial rigid-plastic finite element (FE) DEFORMTM 2D software to investigate the plastic deformation behavior of CuZn37-A6061 composite porous billets during their axisymmetric extrusion through conical dies. The FE analyses assume the container and die to be rigid bodies and ignore the deformation-induced temperature rise which occurs during practical extrusion processes. The numerical analyses investigate the respective influences of the initial density of the inner porous billet, the semi-angle of the conical die and the friction factors on the magnitude of the Y-load at the die exit and the distributions of the density, effective strain and effective stress, respectively, within the extruded billet. The analytical results confirm the suitability of the current finite element software for modeling the two-dimensional extrusion of composite porous billets.