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Rigid-plastic finite element analysis of cross wedge rolling

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Abstract

In the cross wedge rolling process, many factors must be controlled to obtain the required plastic strain and desired tolerance values. The major factors include the wedge relative velocity, the forming angle, the spreading angle, and sectional reduction. This paper uses rigid-plastic finite element (FE) DEFORMTM 3D software to investigate the plastic deformation behavior of an aluminum alloy (A7075) workpiece as it is processed for cross wedge rolling. This study analyzes the effective strain, the effective stress, and the X-axial load distribution of the workpiece under various rolling conditions. Furthermore, using simulation software to analyze the changes to the microstructure by the rolling process, this study presents analytical results that confirm the suitability of the current finite element software for cross wedge rolling.

Key words: Cross Wedge Rolling (CWR);Effective Strain, Microstructure;Rigid Plastic Finite Element