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Finite element analysis of rim ring rolling forming of bicycle aluminum alloy

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Abstract

The bicycle is not only a pollution-free method of transportation, but also has sport and recreation functions. Therefore, the bicycle attracted attention in now society gradually. This study uses the rigid-plastic finite element (FE) DEFORMTM software to investigate the plastic deformation behavior of a 7075 aluminum alloy workpiece as it is formed through a ring rolling die. This study systematically investigates the relative influences of ring rolling velocity, entering velocity, and workpiece temperature under various ring rolling forming conditions. The effective strain, effective stress, and workpiece damage distribution in the ring rolling process are also investigated. Results confirm the suitability of the proposed design process, which allows a ring rolling manufacturer to achieve a perfect design during finite element analysis.

Key words: Effective Strain; Finite Element Analysis (FEA);
Ring Rolling Forming