

Study of titanium alloy sheet during H-sectioned rolling forming using the Taguchi method

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Abstract

This study employs commercial DEFORM™ three-dimensional finite element code to investigate the plastic deformation behavior of Ti-6Al-4V titanium alloy sheet during the H-sectioned rolling process. The simulations are based on a rigid-plastic model and assume that the upper and lower rolls are rigid bodies and that the temperature rise induced during rolling is sufficiently small that it can be ignored. The effects of the roll profile, the friction factor between the rolls and the titanium alloy, the rolling temperature and the roll radii on the rolling force, the roll torque and the effective strain induced in the rolled product are examined. The Taguchi method is employed to optimize the H-sectioned rolling process parameters. The results confirm the effectiveness of this robust design methodology in optimizing the H-sectioned rolling process parameters for the current Ti-6Al-4V titanium alloy.