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Use of Taguchi method to study a robust design for H-sectioned porous beams during rolling

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Abstract

Commercial DEFORMTM three-dimensional finite element (FE) code is employed to examine the plastic deformation behavior of porous beams at the roll gap during the H-sectioned rolling process. The simulations assume that the rolls are fully rigid and that the change in temperature induced in the beams during rolling can be ignored. The simulations systematically examine the respective effects of the arc radius of the H-section flange region of the upper and lower rolls, the friction factor between the beam and the rolls, the density of the porous beams and the radii of the upper and lower rolls on the filling ratio at the roll gap, the thickness reduction of the rolled beam in the flange region, and the effective stress and strain distribution induced in the rolled product. The Taguchi method is then employed to optimize the processing parameters for the H-sectioned rolling of porous beams. Overall, the simulation results confirm the effectiveness of the Taguchi design methodology as a means of optimizing the H-sectioned rolling process conditions.

Key words: Finite Element (FE); H-Sectioned Beams;
Porous; Taguchi Method