

**Analysing the rolling of H-profiled beams containing voids using the rigid-plastic finite element method**

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Abstract

This study uses the finite element code DEFORMTM 3D to examine the plastic deformation behaviour of H-profiled beams containing internal voids at the roll gap during shape rolling. The finite element code adopts a rigid-plastic model. The rolls are assumed to be rigid bodies and the temperature change induced during rolling is ignored. The analytical model is employed to systematically examine the filling ratio at the roll gap, the rolling force and torque exerted by the rolls, the damage caused to the H-profiled beams, the mean stress, the effective strain and the variation of the void dimension at the exit of the rolled product for various  $H_w/H_g$  roll profile ratios, roll radii, and thickness reduction ratios. The numerical results verify the suitability of the developed simulation model as an investigative tool for analyzing the rolling of H-profiled beams containing internal voids..

Key words: Finite element; H-profiled beam;Void