多孔性異形材輥軋加工之剛塑性有限元素分析

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摘要

本文使用三維有限元素模擬軟體 DEFORMTM 3D 分析輥軋加工時多孔性 V 型與 T 型異形材於輥隙內之變形過程，分析方法採用剛塑性模式，並假設輥軋時輥輪為剛體，且不考慮輥軋過程的溫度變化。本研究進行一系列的模擬分析，其模擬輥軋條件包含 V 型異形材的凹槽角度、上下輥輪半徑和多孔性板材壓下率等，預測輥軋過程中異形材的填充率、板寬擴張率、輥軋負荷、最大主應變、平均應力和多孔性密度變化等。模擬結果希望能對多孔性異形材輥軋製程之研究有幫助。

關鍵字: 有限元素;多孔性異形材;輥軋

Finite Element Analysis of the Shape Rolling of Porous Sectioned Sheet

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Abstract

A three dimensional finite element code DEFORMTM 3D has been proposed in the work to examine the plastic deformation behavior of the porous sheet at the roll gap during shape rolling of V-sectioned and T-sectioned sheet. The rigid-plastic model was used in the finite element code. The rolls are assumed to be rigid body and the change of temperate during rolling is ignored. The analytical model is also employed to systematically examine the filling ratio at the roll gap, the spread ratio of the sheet, rolling force, max principal strain, mean stress and variation of density at exit of the rolled product, which are both affected by various rolling conditions such as the inclination of the roll profile, rolling radius, the thickness reduction of porous sheet, etc. Simulative results were made to use the study for porous shape sheet during rolling.

Key words: Finite element;Porous shape sheet;Rolling