中国有色金属学报
中国有色金属学报(英文版)
中国科学技术协会 主管
中国有色金属学会 主办

论文摘要

中国有色金属学报
ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO
第18卷 第12期 (总第117期) 2008年12月

[PDF全文下载] [全文在线阅读]

文章编号：1004-0609(2008)12-2178-07

数值模拟外转角半径及背压对纯钛ECAP变形的影响

李继忠，丁 桦，赵文娟，陈彦博

(东北大学 材料与冶金学院，沈阳 110004)

摘 要： 使用DEFORM-3D软件模拟等通道转角挤压过程中外转角半径及背压对纯钛应力和应变分布的影响，探讨不同 *R*值对材料流动的影响规律。结果显示：当*R* = 6 mm时，工件上下表面应力状况较为平衡，从而得到均匀的等效应变分布；当*R*<6 mm时，在外转角形成的死区使材料之间相互搓动，导致工件底部区域出现剧烈畸变，工件不同区域之间的等效应变量差别较大；当*R*>6 mm时，工件上表面与模具内转角之间的相互作用力增加，使工件顶部变形加剧并导致工件等效应变量不均匀；施加背压(p_b)后，能有效提高等效应变量；适当的*R*值与p_b匹配可使工件得到均匀的应变分布。

关键字： 等通道转角挤压；外转角半径；数值模拟；背压；纯钛

Simulations of influence of outer angular radius and back pressure on ECAP of pure titanium

LI Ji-zhong, DING Hua, ZHAO Wen-juan, CHEN Yan-bo

（School of Materials and Metallurgy, Northeastern University, Shanyang 110004, China）

Abstract: The strain and stress distributions of pure Ti during equal channel angular pressing (ECAP) were simulated by using software of DEFORM-3D with different angular radii and black pressures. The simulated results indicate that the friction forces in the upper and bottom regions can be balanced and the homogeneous equivalent strain distribution can be obtained when *R*=6 mm. When *R*＜6 mm, the equivalent strain is non-uniform at the bottom of the workpiece, because the death zone makes the materials interact each other, thus induces the bottom of workpiece acutely distorted and makes the value of equivalent strain vary obviously in different regions of workpiece. At *R*＞6 mm, the friction force interacts between the upper face of workpiece and inner corner angular of die, which makes the upper of the workpiece deform remarkably and induces non-uniform equivalent strain distribution. The back pressure can increase the value of equivalent strain. Besides, uniform strain distribution can also be obtained by adopting reasonable back pressure and outer angular radius.

Key words: equal channel angular pressing; outer angular radius; numerical simulation; back pressure; pure titanium

地 址：湖南省长沙市岳麓山中南大学内　邮编： 410083

电 话： 0731-8876765，8877197, 8830410　传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn