

## 缺陷空孔桿件於擠製加工之研究

### **An Investigation of Void Defect in Rod Extrusion**

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#### 摘要

本文使用剛塑性有限元素模擬軟體 DEFORM 2D 研究單層桿穿過圓錐形模具之軸對稱擠製加工。本研究進行一系列的模擬分析，其模擬擠製條件包含模具入口半模角、缺陷孔直徑大小、摩擦因子等，預測擠製過程中缺陷單層桿之破壞因子分布、空孔尺寸變化和平均垂直應力分布等。模擬分析結果希望能確認有限元素軟體對缺陷單層桿擠製過程之適用性。

This paper employs rigid-plastic finite element DEFORM 2D software to investigate the plastic deformation behavior of a single rod during its axisymmetric extrusion through a conical die. Under various extrusion conditions, the present numerical analysis investigates the damage factor distributions, the variation of the void dimension at the exit, the deformation mechanisms, and the mean stress distributions around the defective void. The relative influences of the semi-angle of the die, the diameter of the initial void, and the friction factors, respectively, are systematically examined. Additionally, the correlations between the before and after extrusion for defective void and a series of damage factors are explored. The simulation results verify the suitability of the current finite element software for modeling the extrusion of single rods containing internal voids.

Key words: Finite element; Axisymmetric extrusion; Defective void