自行車鍛壓齒盤輕量化之改良設計

陳狄成;陳文中

摘要

目前市面上自行車齒盤的形式與製作方法有非常多種,本產學計畫主要是針對工廠需要來設計一套自行車齒盤輕量化的鍛壓模具。首先以有限元素分析軟體 DEFORMTM 3D 進行自行車齒盤設計模擬分析,並以沖壓速度、胚料溫度、摩擦因子等變數進行一連串的解析,希望藉由 DEFORMTM 3D 模擬之結果找出齒盤一體成形並且輕量化的方法,以減少材料成本及加速量產。分析中假設模具為剛體,齒盤鍛壓中溫度保持不變,其材料以業界最常使用之鋁合金做為分析。並利用品質工程田口方法(Taguchi method)來獲得較佳的參數控制,最後配合工廠需要設計自行車齒盤實驗模具來驗證模擬分析結果。

關鍵字: 自行車齒盤;有限元素;田口方法

Light Quantification Improvement and Design of Forging-Press Tooth Plate of Bicycle

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Abstract

There are many different types of forms and manufacturing methods for bicycle chain wheel in the current markets. The purpose of this research is mainly to design a forging-press die of bicycle chain wheel for the company's needs. We first design a die with simulation analysis of bicycle's tooth plate by utilizing a commercial finite element package software DEFORMTM 3D during research process. Moreover, a series of simulation analyses with the variables depended on different press velocity, temperature of billet and friction factor of the die is performed to evaluate the methods of light quantification in the forging press for bicycle's chain wheel. It is assumed that the die is a rigid body in the analyses, and furthermore, let the forging press and temperature are constants. The material used the Aluminum to analyze simulative data. Next, the optimal parameters to control are obtained with Taguchi methods respectively. Finally, we identify the results of simulation analyses with design the experimental forging die to lower deformation behavior of bicycle's chain wheel.

Key words: Bicycle chain wheel;Finite element;Taguchi method