

8th International Conference on Physical and Numerical Simulation of Materials Processing (ICPNS)

14–17 October 2016

Seattle, Washington | Hosted by Purdue University

SESSION 1: MODELS AND METHODS, SALON A

Co-Chairs: Wei Xiong, University of Pittsburgh; Lingti Kong, Shanghai Jiao Tong University; Jiawei Mi, Lars-Erik Lindgren, Lulea University of Technology

SATURDAY, OCTOBER 15, 2016

Fine element simulation of a modified fine-blanking process to eliminate the die-roll size

Lin Hua; Bo Tang; Yanxiong Liu; Huajie Mao, Wuhan University of Technology

ABSTRACT

Fine blanking is known as an effective sheet metal forming process to obtain precisely blanked parts with smooth cutting surface. However, the die-roll occurred in the sharp area is an inevitable problem in this process. In order to reduce the die-roll size, a modified fine-blanking process is proposed. Compared with the traditional fine-blanking method, an extra extrusion process is adopted after the initial shape of the die-roll taking place in which the punch and counterpunch move reversely to eliminate the die-roll. Meanwhile, the stress condition in the shearing zone keeps the state of compressive hydrostatic stress. Then, the suspended fine-blanking process will be completed in the former way. A finite element model of spur gear is created to verify the validity of this modified process. The effects of parameters, such as the force on the punch, the stroke of the counterpunch, and so on, on the die-roll size in the extra extrusion process are studied specifically. The research shows this forming process can greatly reduce the die-roll size, which is meaningful to improve the fine-blanking process.

KEYWORDS: fine-blanking, die-roll size, finite element modeling