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Authors: Yong Xiao, Zhiren Han, Zuojun Fan, Zhen Jia

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# A study of asymmetric multi-pass spinning for angled-flange cylinder

Yong Xiao <sup>a</sup>, Zhiren Han <sup>a,b,\*</sup>, Zuojun Fan <sup>b</sup>, Zhen Jia <sup>b</sup>

<sup>a</sup> School of Mechanical Engineering, Northwestern Polytechnical University, Shannxi, 710072, China

<sup>b</sup> Key Lab of Fundamental Science for National Defense of Aeronautical Digital Manufacturing Process, Shenyang Aerospace University, Shenyang, 110136, China

\* Corresponding author: TEL: +8602489723714

E-mail address: hanren888@163.com

**Abstract:** This study investigates the characteristics of asymmetric multi-pass spinning for angled-flange cylinders. The roller movement and the mandrel rotation are controlled by a CNC spinning lathe to form an asymmetric shape. A set of roller passes was designed to achieve the oblique cylindrical shape with a planar flange. The effects of key parameters on the thickness distribution such as equivalent feed ratio  $f$ , clearance between roller and mandrel  $\delta$  and transitional distance  $\Delta\beta$  are investigated. The product has a non-uniform thickness distribution.  $\delta$  has a great influence on the uniformity of wall thickness distribution. A larger  $\Delta\beta$  and a smaller  $f$  can improve the uniformity of wall thickness distribution. Two types of fracture are observed during experiments, fracture on the wall and fracture on the flange. Forming limit experiments with various parameters are carried out. The depth limit achieved in this study is low compared to conventional spinning. The limit of flange inclination angle  $\theta$  achieved in this study is  $21^\circ$ .

**Keywords:** Asymmetric spinning; Roller pass design; Aluminum sheet; Forming

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