

Analysis of forming forces at SPIF using Taguchi method

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Abstract. Incremental sheet metal forming process has seen one of the highest increases in diversity in the last years. Single point incremental forming (SPIF) has become more attractive due to multiple benefits it possesses over other conventional cold forming processes such as deep-drawing. However, the process has yet to arise in the large-scale industrial implementation because of its drawbacks such as high production time and low accuracy, which lead to prototype production.

A very important aspect for this manufacturing process is the analysis of the forming forces in terms of process energy especially when using industrial robots.

The aim of this paper is to investigate the influence of material and vertical step over the forming forces. Thus, aluminium and steel sheets with a thickness of 0,8 mm were incrementally deformed as a truncated cone with an angle of 50°, respectively 60° at a depth of 30 mm and 40 mm. Experiments were performed using a KUKA KR 210-2 robot which allows to measure the forces using a piezoresistive sensor.

After performing the analysis of the forming forces using the Taguchi method, it can be observed that the material has the highest influence.

Keywords: single point incremental forming, forming forces, Taguchi Method

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