

Optimization of Process Parameters Affecting on Spring-Back in V-Bending Process for High Strength Low Alloy Steel HSLA 420 Using FEA (HyperForm) and Taguchi Technique

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Abstract : In this study, process parameters like punch angle, die opening, grain direction, and pre-bend condition of the strip for deep draw of high strength low alloy steel HSLA 420 are investigated. The finite element method (FEM) in association with the Taguchi and the analysis of variance (ANOVA) techniques are carried out to investigate the degree of importance of process parameters in V-bending process for HSLA 420&ST12 grade material. From results, it is observed that punch angle had a major influence on the spring-back. Die opening also showed very significant role on spring back. On the other hand, it is revealed that grain direction had the least impact on spring back; however, if strip from flat sheet is taken, then it is less prone to spring back as compared to the strip from sheet metal coil. HyperForm software is used for FEM simulation and experiments are designed using Taguchi method. Percentage contribution of the parameters is obtained through the ANOVA techniques.

Keywords : bending, spring-back, v-bending, FEM, Taguchi, HSLA 420 and St12 materials, HyperForm, profile projector

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