

عنوان مقاله:

Numerical Analysis of Circular Pre-notched U-Channel Section Distortions in Cold Roll-Forming Process

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خلاصه مقاله:

Cold roll forming is a process in which a metal sheet gets a desired section form by passing through a series of rotating rollers. Predicting the amount of the distortion in pre-notched cold formed sections still remains challenging in cold roll forming industry, depending on the shape and position of the holes. This study investigates the influence of variation of the design parameters on the defects of the U-channel sections produced by cold roll forming process with circular pre-notches. To analyze the important parameters in deforming the circular holes during the cold roll forming of U-channel sections, a three-dimensional finite element model has been taken into account. A range of variation for design factors in forming the U-channel sections with pre-notches is set, including radius of circular holes, distance between the holes and the flange edge, hole spacing, sheet thickness, and type of material. Furthermore, using the response surface methodology, a set of tests are designed and modeled employing Finite Element analysis. Afterward, a set of output parameters such as edge buckling, the wave of the holes, the change in hole size, hole spacing, and the distance between the holes and the edge of the flange, are considered. Utilizing Analyses Of Variance (ANOVA), the accuracy of the linear regression models was conducted in this study. The accuracy of the simulated models is examined by comparing the analysis results with the experimental results. Finally, the effect of the important parameters on the defects of the product has been extracted in both the statistical form as well as mathematical functions applying response surface methodology. The results show that as the radius of the hole increases, edge buckling increases. The increase of the hole radius increases the edge wave on the holes. The hole width of the product is bigger and the hole length is smaller than the nominal measuring

کلمات کلیدی:

Cold roll forming, Finite Element, Pre-notched sheet, Response Surface Method, U-channel section

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