

عنوان مقاله:

Analysis of deep drawing process to predict the forming severity considering inverse finite element and extended strain-based forming limit diagram

محل انتشار:

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خلاصه مقاله:

An enhanced unfolding Inverse Finite Element Method (IFEM) has been used together with an extended strain-based forming limit diagram (EFLD) to develop a fast and reliable approach to predict the feasibility of the deep drawing process of a part and determining where the failure or defects can occur. In the developed unfolding IFEM, the meshed part is properly fold out on the flat sheet and treated as a 2D problem to reduce the computation time. The large deformation relations, nonlinear material behavior and friction conditions in the blank holder zone have also been considered to improve the accuracy and capability of the proposed IFEM. The extended strain-based forming limit diagram based on the Marciniak and Kuczynski (M-K) model has been computed and used to predict the onset of necking during sheet processing. The EFLD is built based on equivalent plastic strains and material flow direction at the end of forming. This new forming limit diagram is much less strain path dependent than the conventional forming limit diagram. Furthermore, the use and interpretation of this new diagram are easier than the stress-based forming limit diagram. Finally, two applied examples have been presented to demonstrate the capability of the proposed approach.

کلمات کلیدی:

Sheet metal forming, Inverse finite element method, Strain path, Blank shape, Nonlinear deformation, Extended strain-based forming limit diagram

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