عنوان مقاله:

Using the artificial neural network to investigate the effect of parameters in square cup deep drawing of aluminum-steel laminated sheets

محل انتشار:

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خلاصه مقاله:

In this study, the effective parameters involved in the deep drawing of double-layer metal sheets in a die ofsquare cross-section were investigated through artificial neural network (ANN) modeling. For this purpose,first, the deep drawing of double-layer (Al۱۲۰۰ / ST۱۴) sheets was carried out experimentally. Also, the finiteelement simulation of the process was performed, and the results validated through experimental tests. A setof ۴۶ different experimental data were employed in this paper. The ANN was trained by using a mean squareerror of ۱۰-۴. The input parameters, i.e., punch radius, die radius, blank holder force, clearance, and the permutationlayers were set to the network. The surface response method (RSM); was employed to evaluate theresults of the ANN model, and the input parameters of the deep drawing process on the thinning of Al۱۲۰۰and ST۱۴ composite layers were analyzed. The obtained results indicate that the punch edge radius has themost significant influence on the thinning of the Al۱۲۰۰ layer. Increasing the gap between the punch and dieto ۱/۴ of the sheet thickness, increased the cup wall layers thickness of the Al۱۲۰۰ and ST۱۴ respectively by۳.۳۸% and ۰.۵%. The performance of the ANN model demonstrates that it can estimate the amount of thinningin the composite layers with satisfactory accuracy.

کلمات کلیدی:

Square cup deep drawing, Aluminum, Steel, Composite, Artificial neural network