Analytical and Numerical Approach to Prediction the Fracture and Optimize the Press Formability of Door Hinge

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Abstract: In order to predict the fracture which occurred at the concentrated stress and strain area of doorhinges product, a criterion for ductile fracture followed by Oyane [J. Mech. Work. Technol. 4 (1980), pp. 65-81], is introduced and evaluated from the histories of stress and strain calculated by means of finite element analysis. The resolution of the results of ductile fracture criterion equations is carried out via a VUMAT user material, using ABAQUS/Explicit finite element code. From the comparison with a series of simulative results, the orthogonal array of Taguchis method is proposed to improve the press formability of a door hinge by changing the dimensions of the die and bead punch at the concerned zone. Finally, the resulting optimized solution for robust forming was indicated.

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