

**ASSESSMENT OF CORNER FAILURE DEPTHS  
IN THE DEEP DRAWING OF 3D PANELS USING SIMPLIFIED  
2D NUMERICAL AND ANALYTICAL MODELS**

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*Methodologies of rapidly assessing maximum possible forming heights are needed for three-dimensional (3D) sheet metal forming processes at the preliminary design stage. In our previous work, we proposed to use an axisymmetric finite element model with an enlarged tooling and blank size to calculate the corner failure height in a 3D part forming. The amount of enlargement is called center offset, which provides a powerful means to using 2D models for the prediction of 3D forming behaviors. In this work, an analytical beam model to calculate the center offset is developed. Starting from the study of a square cup forming, a simple analytical model is proposed and later generalized to problems with corners of an arbitrary geometry. The 2D axisymmetric models incorporated with calculated center offsets were compared to 3D finite element simulations for various cases. Good assessments of failure height were obtained.*

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