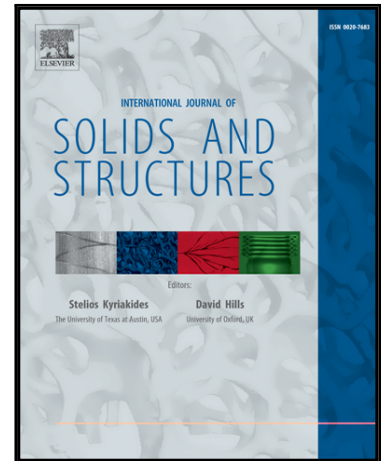


Accepted Manuscript

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PII: S0020-7683(16)30238-4
DOI: [10.1016/j.ijsolstr.2016.08.023](https://doi.org/10.1016/j.ijsolstr.2016.08.023)
Reference: SAS 9283



To appear in: *International Journal of Solids and Structures*

Received date: 1 April 2016
Revised date: 13 July 2016
Accepted date: 26 August 2016

Please cite this article as: D.M. Neto , J. Coër , M.C. Oliveira , J.L. Alves , P.Y. Manach , L.F. Menezes , Numerical analysis on the elastic deformation of the tools in sheet metal forming processes, *International Journal of Solids and Structures* (2016), doi: [10.1016/j.ijsolstr.2016.08.023](https://doi.org/10.1016/j.ijsolstr.2016.08.023)

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Numerical analysis on the elastic deformation of the tools in sheet metal forming processes

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Abstract

The forming tools are commonly assumed as rigid in the finite element simulation of sheet metal forming processes. This assumption allows to simplify the numerical model and, subsequently, reduce the required computational cost. Nevertheless, the elastic deformation of the tools can influence considerably the material flow, specifically the distribution of the blank-holder pressure over the flange area. This study presents the finite element analysis of the reverse deep drawing of a cylindrical cup, where the forming tools are modelled either as rigid or as deformable bodies. Additionally, the numerical results are compared with the experimental ones, in order to assess the accuracy of the proposed finite element model. Considering the elastic deformation of the tools, the numerical results are in better agreement with the experimental measurements, namely the cup wall thickness distribution. On the other hand, the computational time of the simulation increases significantly in comparison with the classical approach (rigid tools).

Keywords: Reverse deep drawing, Tools deformation, Finite element analysis, Material flow, DD3IMP

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