Simulation of the forming process of the Metal-Plastic-Metal sheets

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Abstract

Metal-Plastic-Metal (MPM) sheets consists of two metal sheets bonded together by a thin polymer layer. Modelling this sheet structure with a single shell element gives a too stiff response. The large shear deformation in the polymer layer can not be represented correctly.

A method is presented on how to simmulate the forming process of MPM-sheets by which the two metal sheets are modelled with two layers of shell elements. The bonding polymer is not modelled as elements. Instead its effect on the structure is implemented as a Tie-Break contact algorithm. The shell thickness is necessarily accounted for in this contact interface such that the midsurfaces of the metal plates are possitioned correctly with respect to each other.

Results from simulations and experiments are examined and forming criteria such as wrinkling, necking and failure are discussed.