

Comparison of Gurson and Lemaitre model in the context of blanking simulation of high strength steel

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ABSTRACT

The process of blanking results in a short band with high accumulated strain undergoing various stress triaxialities [1]. Thus damage models which consider these states are necessary in the context of blanking. An enhanced Lemaitre model [2,3] and a shear enhanced porous plasticity model [4,5] have been investigated for the application in blanking processes. The studies had different purposes and thus focused on different aspects for validation. In this study both approaches are directly compared for the same blanking setup. Due to the different approach of both models the parameter identification strategy is also different. The Lemaitre parameters are identified completely by an inverse strategy with notched tensile specimen of DP600, while the parameters of the porous plasticity model are partially gained from the void volume fraction measured by scanning electron microscopy (SEM). The models are validated by comparison of force-displacement curves, time point and location of crack initiation, as well as the predicted shape of the cutting surface. Advantages and disadvantages of both approaches are discussed with respect to prediction accuracy and costs of parameter identification. The void volume fraction predicted in the sheared zones by the Gurson-type model agrees very well with the experimental values.

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