Numerical determination of the onset of local necking using time dependent evaluation method and dynamic material parameters

The forming limit curve (FLC) is a valid instrument for the evaluation of failure in sheet metal processes. However, its experimental evaluation is challenging, in particular for modern lightweight sheet metals, in which the failure occurs without an evident necking transition. Therefore, the numerical analysis can represent a valid alternative for the investigation of the onset of necking phenomena. Prerequisite for realistic failure prediction are an accurate material characterization for high strain levels and a stable and coherent numerical model. Within this paper, an approach for the determination of forming limits by using the time dependent evaluation method is investigated and an analysis of the material sensitivity on the simulation results is performed. The results are discussed for mild steel DX56 and first suggestions for the improvement of the simulation input data are derived.

Stichworte:
- Strain rate sensitivity
- Hydraulic bulge test
- Tensile test
- Dynamic material parameters
- Material characterisation
- Time dependent evaluation method
- Local necking

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