Characterization of Plasticity and Fracture Behavior of Aluminum 6061-T4 Sheet for Deep Drawing Simulation

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ABSTRACT

Here, a hybrid experimental-numerical approach to characterize anisotropic plasticity and ductile fracture properties of 1.0 mm thick aluminum 6061-T4 sheet is presented, according to [1]. In our work, the experimental testing program (Fig. 1) consists of different specimen geometries corresponding to different stress states, e.g., uniaxial tension, shear, and plain strain tension. The anisotropic elasto-plastic behavior is then characterized by a Barlat89 model [2, 3] and the ductile fracture behavior by a GISSMO model [4] in combination with the Xue-Wierzbicki model [5, 6].

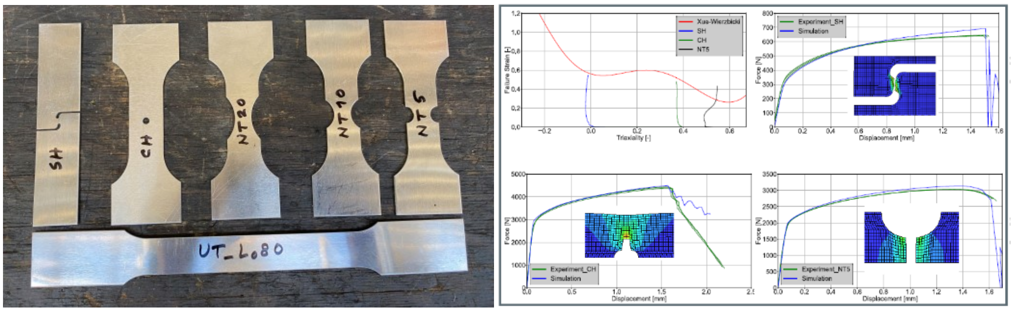

Fig. 1: Left: Examples of the experimental specimens; right: exemplary fracture curves.

We discuss then the validation procedure and the results related to a deep-drawing case where the simulation is carried out in a commercial FE-solver LS-DYNA. The drawing depth at fracture, as an exemplary result, shows a very good agreement between simulation and experiment.

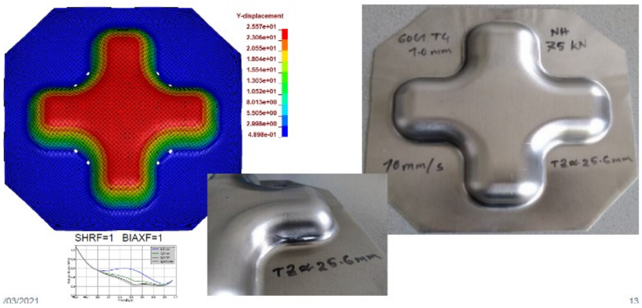

Fig. 2: Exemplary validation result for a deep-drawing case with good agreement between experiment and simulation.

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