MS # 09

Parameter identification of Swift law and Yld2000-2d function using FEMU and an innovative heterogeneous mechanical test

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Keywords: Parameter identification; Heterogeneous specimen; FEMU; DIC; FEM.

Background

The reliability and predictive accuracy of forming simulations depend on both the material constitutive model and its inherent parameters. As opposed to conventional sheet metal material testing, heterogeneous mechanical tests provide more complex strain and stress states. These tests have the potential to enhance the prediction of the material behavior in forming processes while reducing the number of experimental tests required.

Procedure

An optimum-designed interior notched specimen, for uniaxial loading conditions, was used to feed the inverse parameter identification approach. This test was developed in [1] and presents several strain and stress states simultaneously, due to its particular perforation shape. This specimen was obtained using shape optimization based on the evaluation of a heterogeneous criterion. Also, a dog bone test was used in an identification approach, for comparison reasons.

The Swift hardening law and Yld2000-2d parameters of the mild steel analysed in [2] were identified, using the Finite Element Model Updating (FEMU) technique, by iteratively comparing synthetically deformed images with the reference material. During the optimization procedure, both the reference material and the generated solutions were subjected to the DIC filter to calculate the strain fields and have a fair comparison.

Key findings

The results of this investigation are not available and not analyzed yet, though it is expected to:

- Find identification results using the heterogeneous mechanical test that show advantages in comparison with classical homogeneous tests
- Obtain adequate accuracy in the parameter identification with a fewer number of experiments

References

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