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STUDY OF SPRINGBACK FOR HEXAGONAL CLOSE-PACKED SHEET METAL

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Springback, generally defined as the elastically-driven shape deviation that occurs after removing the sheet metal from tooling, is an inevitable factor influencing the forming quality of the cold-bending. Thus, the understanding and accurate prediction of springback is of vital importance to reduce real application development time and cost. In the literature there have been numerous studies about springback and its compensation for many material groups. The accuracy of sheet metal forming and springback simulation depends not only on the forming conditions (contact, friction, tool and binder geometry etc.), but also on the choice of the material constitutive model and its numerical implementation into finite element programs. A phenomenological plasticity model is made up of several ingredients, such as a yield condition, a plastic hardening curve, a hardening law, and a model for the degradation of elastic stiffness due to plastic straining. The main purposes of the present study are to examine the influence of two constitutive ingredients: the yield criterion and the hardening behavior. Four different yield criteria of different complexity are evaluated in the present investigation: Von Mises, the Hill criterion, the Barlat and, lastly, the Cazacu06 criterion. Two hardening laws are considered, one being the classical isotropic hardening, the other taking the separated stress-stress response under tension and compression as the hardening law. The springback of unconstraint cylindrical bending test is calculated for all the materials. From the results of these simulations, some conclusions regarding the influence of the constitutive modeling for springback simulations are drawn.

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