

Comparison of FEM Simulations for the Incremental Forming Process

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Abstract. Incremental forming is an innovative and highly flexible sheet metal forming technology for small batch production and prototyping that does not require any adapted dies or punches to form a complex shape. The purpose of this article is to perform FEM simulations of the forming of a cone with a 50-degree wall angle by incremental forming and to investigate the influence of some crucial computational parameters on the simulation. The influence of several parameters will be discussed: the FEM code used (Abaqus or Lagamine, a code developed at the University of Liège), the mesh size, the potential simplification due to the symmetry of the part and the friction coefficient. The output is given in terms of final geometry (which depends on the springback), strain history and distribution during the deformation, as well as reaction forces. It will be shown that the deformation is localized around the tool and that the deformations constantly remain close to a plane strain state for this geometry. Moreover, the tool reaction clearly depends on the way the contact is taken into account.