

Analysis of Process Parameters of Parabolic Cups of NI201 Fabricated by Single Point Incremental Sheet Forming Process Using ABAQUS Software

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ABSTRACT

Numerical simulation of single point incremental forming process (SPIF) for Ni 201 sheet material was carried out using finite element analysis software and Taguchi experimental techniques. Reduction in thickness during SPIF process of the parabolic cups was estimated. Formability diagrams were drawn based on minor and major strains, and normalized major and minor stresses. The significant process parameters were identified using analysis of variance (ANOVA). Local thinning along the walls of the parabolic cups were also estimated. It has been found that the maximum thinning ranges from 58% to 61% in the parabolic cups drawn from Ni201 using single point incremental forming process.

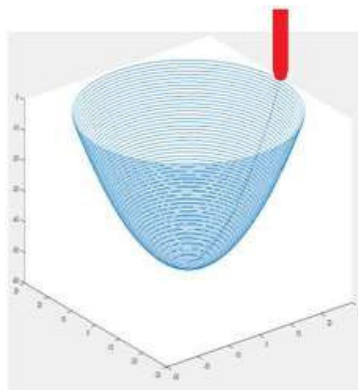


Figure 1: Tool path generation.

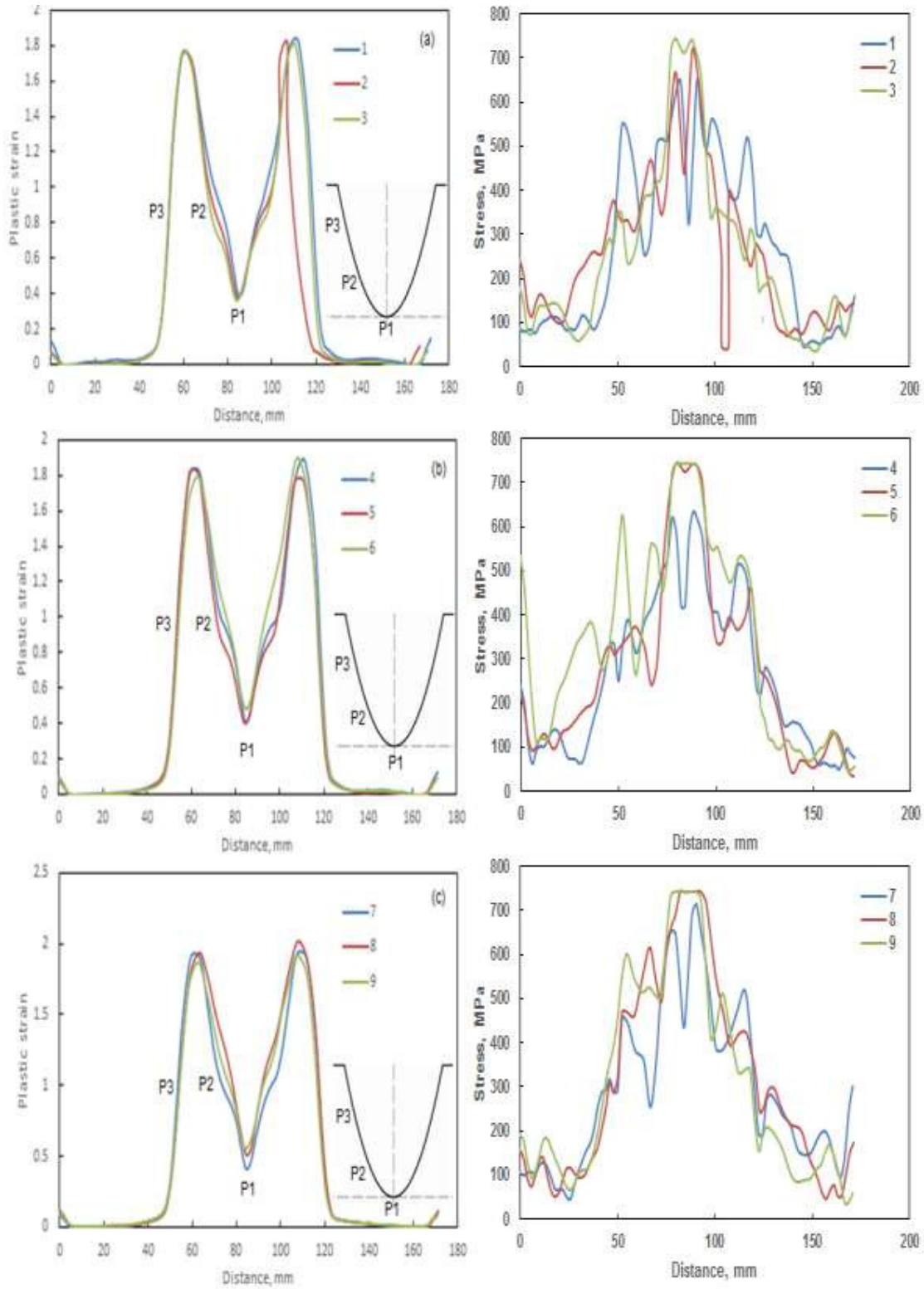


Figure 2: Variation of equivalent plastic strain and von Mises stress along a path from flange to bottom of cup: (a) 1.0mm, (b) 1.2 mm and (c) 1.5 mm sheet thickness.

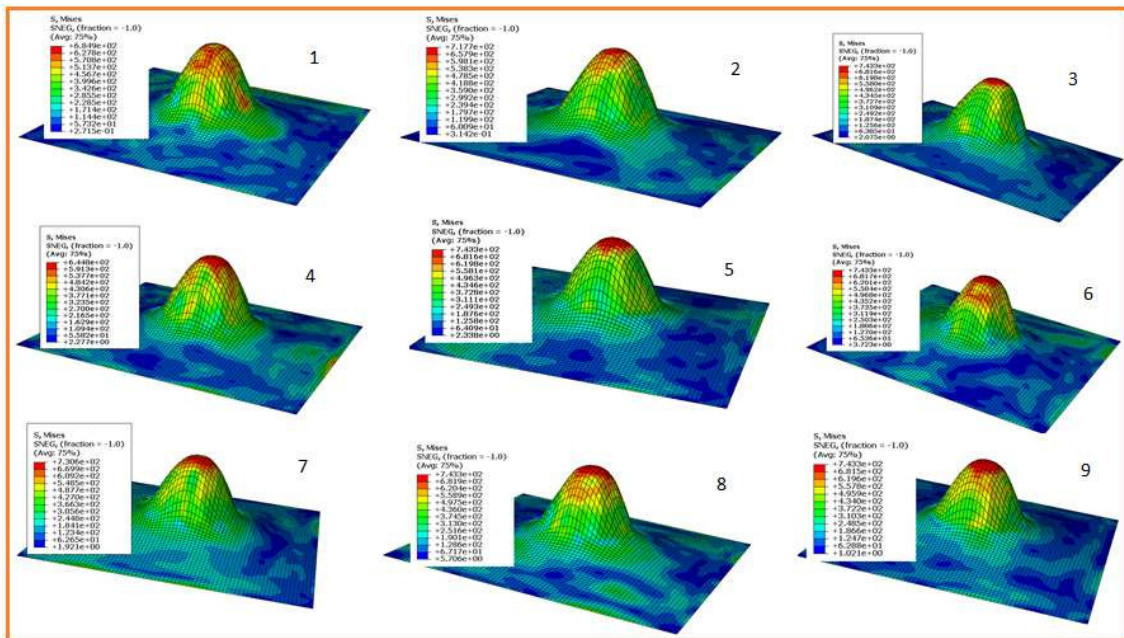


Figure 3: The von Mises stress induced in the parabolic cups of all trial runs.

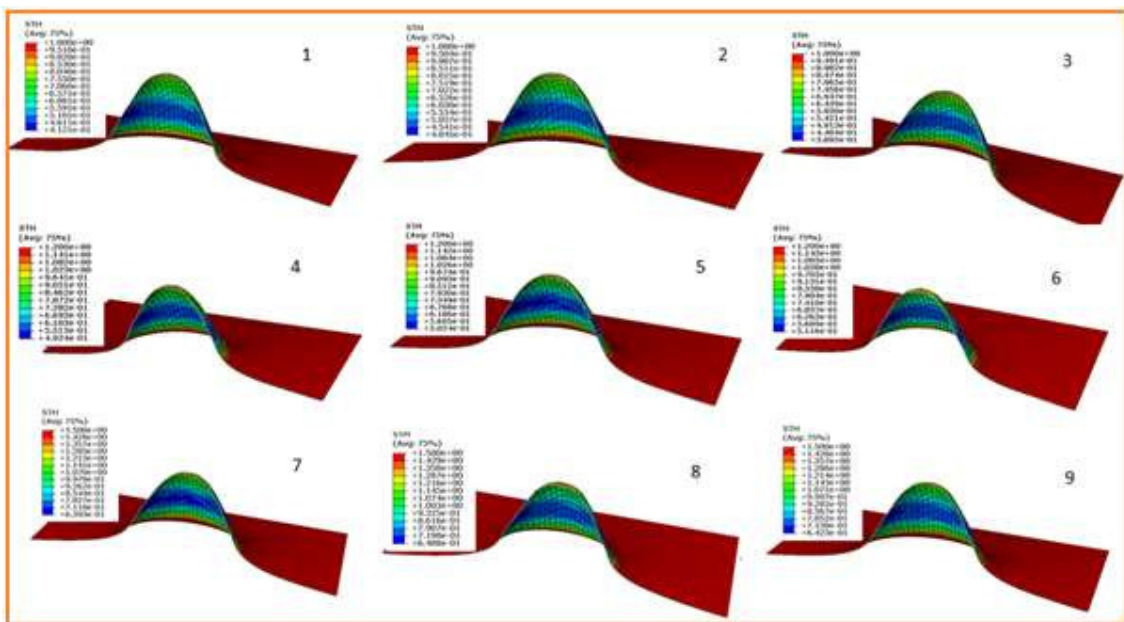


Figure 4: The reduction in thickness of the parabolic cups for all trial runs.

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