

Analysis of Stress and Strain Based Formability Diagrams of Inconel 600 Alloy hemispherical Cups Drawn by Incremental Deep Drawing Using ABAQUS Software

C. Shashank

M. Tech (AMS), Roll No.:12011P0301, Department of Mechanical Engineering, JNTUH College of Engineering, Hyderabad



Under the Guidance of Dr. A. Chennakesava Reddy, Professor & Director, DUFRR, JNT University Hyderabad

ABSTRACT

The present project work was aimed at assessment of the formability of Inconel 600 alloy to manufacture hemi-spherical cups using single point incremental forming (SPIF) process. The finite element analysis has been carried out to model the single point incremental forming process using ABAQUS software code. The process variables of SPIF were sheet thickness, step depth, tool radius and coefficient of friction. The process variables have been optimized using Taguchi techniques. The major process variables influencing the SPIF of hemispherical cups were tool step depth and coefficient of friction.

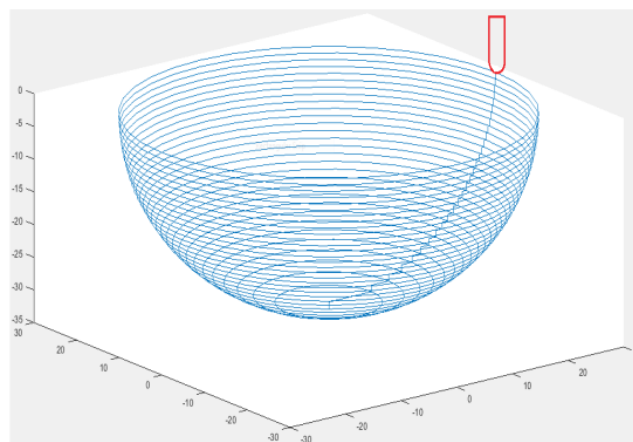


Figure 1: Tool path generation.

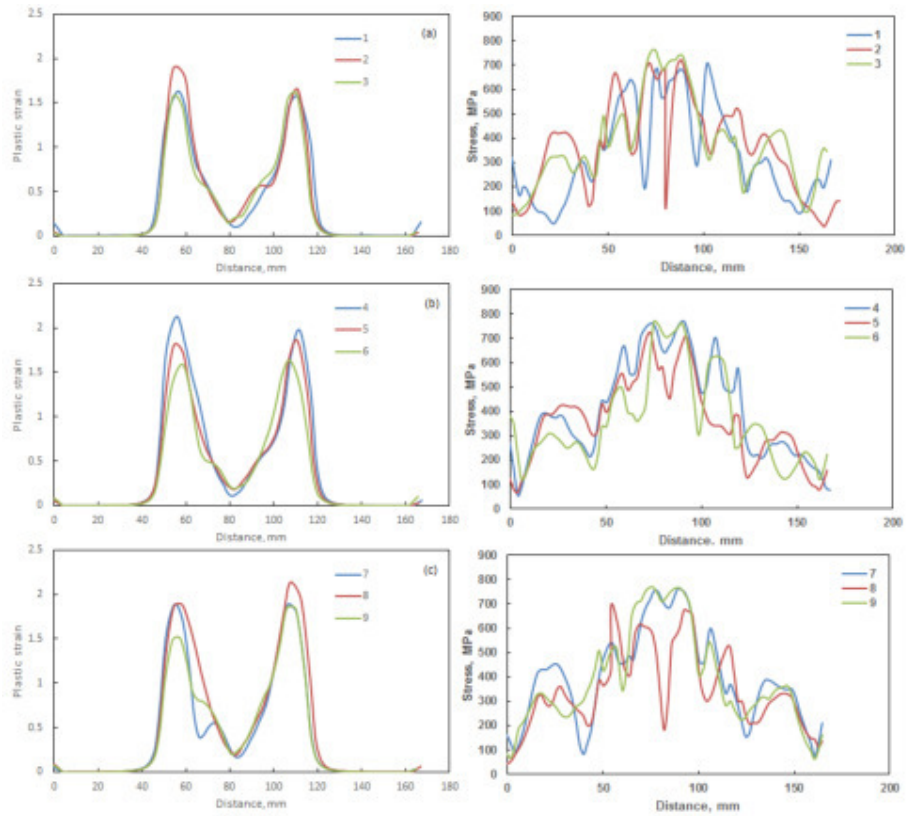


Figure 2 Variation of equivalent plastic strain and von Mises stress along a path from flange to bottom of cup: (a) 1.0mm, (b) 1.2 mm and (c) 1.5 mm sheet thickness.

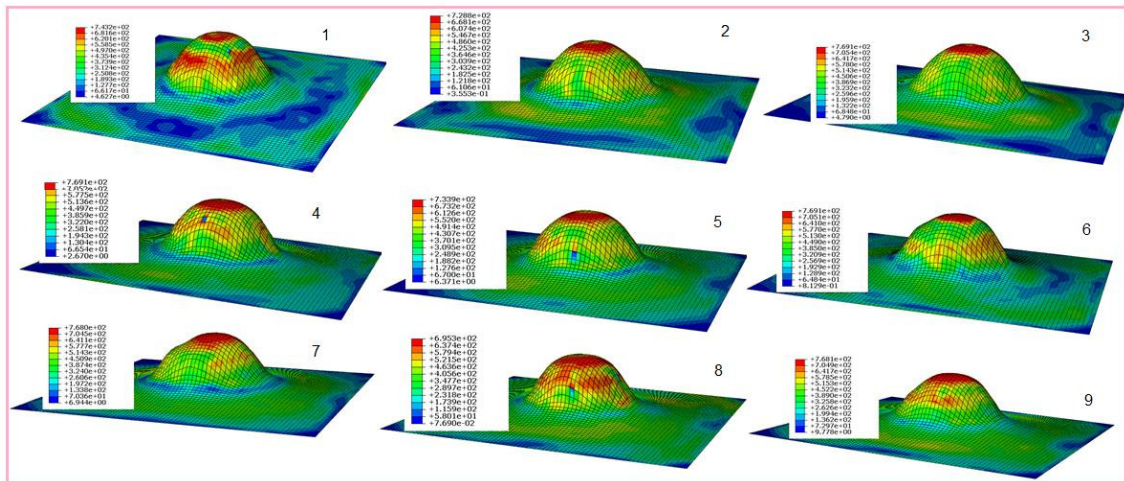


Figure 3: The von Mises stress induced in the hemispherical cups of all trial runs.

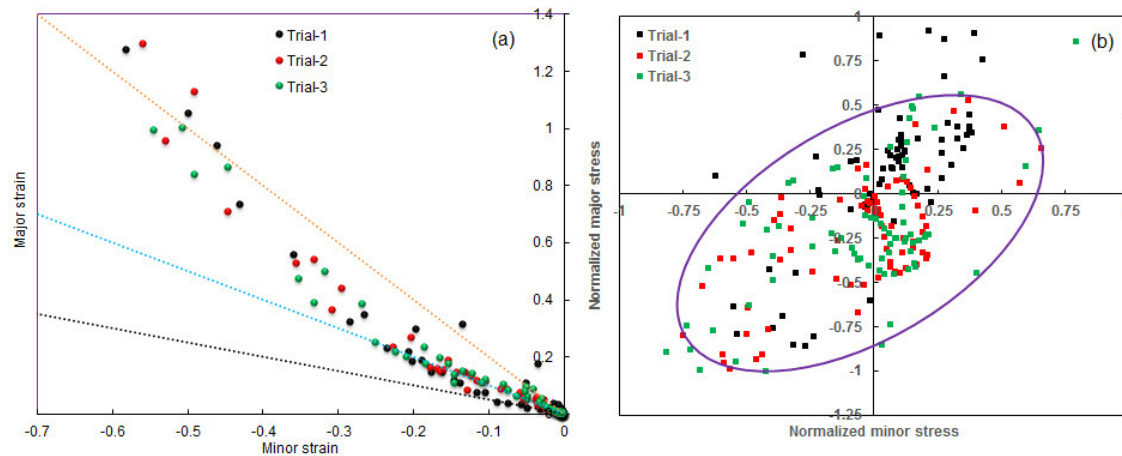


Figure 4: Forming limit diagrams for trials 1, 2, 3: Strain-based, and (b) Stress-based.

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