

Finite Element Analysis of Single Point Incremental Forming Process for Ferritic Stainless Steel Pyramidal Cups using ABAQUS Software

C. Sai Sree, N. Srimukhi, M Sathish Kumar, and A. Anirudh

B. Tech Students, Department of Mechanical Engineering, JNTUH College of Engineering, Hyderabad



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

ABSTRACT

Incremental sheet metal forming, a non-conventional machining process has been investigated which offers higher formability, flexibility in process, low cost of production than the traditional conventional forming process. Tool used in this process consecutively forces the sheet to deform locally and ultimately gives the target profile. Various parameters, such as tool radius, tool path, sheet thickness, coefficient of friction etc. affect the forming process and the formability of final product. In this project, single point incremental forming was simulated using Dassault Systems Abaqus 6.14 software and results obtained are given. Results such as profile on sheet, stresses and strain developed, change in thickness are investigated.

CONCLUSION

The Finite Element Analysis of Single Point Incremental Forming for Pyramidal cups of Ferritic Stainless Steel (Grade 430) with process parameters i.e. sheet thickness of 1 mm, step depth of 1 mm, tool radius of 6.0 mm and coefficient of friction 0.15 has been carried out. It was observed that the maximum stress was developed at the bottom edges portion of the cup.

It was also observed that the sheet thinning has taken place at the middle portion of the wall of the pyramidal cups with negligible thickness reduction in the flange and the center portion and the stresses developed were always below Ultimate tensile strength of the material.

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