ABSTRACT

In this thesis, an axisymmetric Radial Extrusion problem for extruding tubular components is analysed. Theoretical analyses are made to predict the average pressure in Radial Extrusion. Theoretical analyses are done using the upper-bound method and Slab method (Stress-equilibrium method). For the upper-bound analysis parallel velocity field is used. The values of average pressure obtained from the upper-bound analysis and that due to Slab method of analysis are quite close. Experiments are conducted to substantiate the theoretical predictions.

Using a 2^4 Factorial Experiment and the Response Surface Methodology (RSM) mathematical models are postulated to predict the extrusion pressure in Radial Extrusion. The average pressure obtained from the theoretical analyses are compared with those predicted from the mathematical models and are found to be in good agreement. The dependence of the average pressure of radial extrusion on the friction and on the process parameters viz. billet diameter, cup diameter and cup thickness has been observed.

Finite Element Method is used to study the propagation of the plastic region in the deforming billet.

Attempt has also been made to analyse the Conical Extrusion process using upper-bound method. Some experiments are conducted to verify the theoretical results due to the upper-bound analysis.