

ABSTRACT

The trend of miniaturized products increased in the last years, which leads to increasing the demands on micro formed parts. Micro forming technology represents a promising method to produce micro parts because it has many advantages such as high productivity, overall low cost and formed parts have a good accuracy. On other hand, flexible forming is a novel method for sheet metal forming which requires only one rigid part as the other part is replaced by rubber pad. This action leads to improving the formability of sheet metal and reducing time and cost of parts fabrication. Accordingly, the process of micro forming requires more investigation and development.

This study introduces a new technique of forming micro cups by utilizing a floating ring for flexible micro deep drawing process of stainless steel 304. The floating ring with a specified geometrical parameters is adopted between the flexible die and the blank. There are many different parameters that have a significant effects on the forming process adopted to investigate during this study involving oblique surface of floating ring, thickness of floating ring, the inner diameter of floating ring and the initial blank diameter. The finite element simulation was done by using Abaqus/standard software. The results obtained from the simulation showed that the punch load is decreased by increasing the angle of oblique surface of forming tools. Also, by increasing the floating ring thickness, the punch load decreased dramatically. The results obtained from simulation models are validated experimentally by using a special set up of micro deep drawing device. The results of validation showed a good agreement with that predicted by simulation models as thickness distributions and punch load.