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## Experimental and Numerical Study of the Earing Defect During Square Deep Drawing Process

**Abstract-** Deep drawing process is a very complex process which controls a lot of parameters and the associated defects. The aims of this research are to discuss the effect of parameters of the process utilized in square deep drawing process such ; material properties, blank size, blank shape on the height and shape of earing defect appear of the drawn cup. Three dimensions model from low carbon steel (AISI 1008) with thickness 0.7mm of square cup (41.4mm by 41.4mm). The finite element software (ANSYS 11) was utilized to carry out the numerical simulation of the deep drawing process, and the experimental work result of earing was compared with numerical of earing shape result. In this work, three types of the radius of die entry of 3, 5, 7mm, three shapes of the blank (circular, octagonal, and square) with various diameters, four types of radius of the punch profile of 3, 5, 6, and 7mm had been selected to form a cup with square sides. The results show that, The circular blank give the best results according to earing defect and useful height of the drawn cup, when square shape of blanks were utilized, excessive earing will show in the square cup, due to non-uniform distribution of blank material around the perimeter of the die cavity, minimum material in the flat side and too much material found in the die corner, while when using octagonal shape of blanks which have a same surface area to the square blank, the earing will reduce in the corner of the cup due to extract of the too much material from the blank corners. The results showed a high agreement between the experimental work and numerical simulation reached to 85 % in terms of the shapes and lengths of the earing appearing in the square cups.

**Key words-** square deep drawing, earing defect, finite element method.

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