AN EFFECT OF WALL CORNER RADIUS OF PUNCH ON THE FEATURES OF THE HEXAGONAL CUP FABRICATED BY THE DEEP DRAWING PROCESS

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ABSTRACT

This work aims to study the effect of different deep drawing process parameters on the distribution of strain and thickness in deep drawing operation, such as wall corner radius of punch, the thickness of the sheet, and drawing speed using experimental and finite element simulation. The deep drawing die was designed and constructed to carry out the experimental work required to produce a hexagonal cup with inner dimensions (41.5 mm by 36 mm), (28 mm) height drawn from a circular flat blank (80 mm diameter), made from low carbon steel (AISI 1008). The analysis program (ANSYS 18.0) to perform the finite element method to perform the analytical side of the search. Four types of wall corner radius of punch (Rc=1, 3, 5,7mm) with constant punch profile radius equal to (Rp = 6mm) and dieprofile radius equal to (Rd=6 mm) were used.

From experimental work and simulation results, it has been found that, the maximum thinning take place at corner of the cup area with a wall corner radius of punch equal to (Rc = 1 mm) and maximum thickening take place at the at cup end with wall corner radius of punch equal to (Rc = 7 mm), the maximum values of strains (radial, hoop, thickness and effective) take place at end of cup with wall corner radius of punch equal to (Rc = 7 mm).

KEYWORDS: Deep Drawing of Hexagonal Cup, Strain Distribution & Wall Corner Radius of Punch

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