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Numerical and Experimental Investigation the Effect of Pulsating Blankholder on Formability of Aluminum Alloy in Deep Drawing Process

R. Dadkhah, A. Mostafapour

ABSTRACT

In this study, the effect of pulsating blankholder by using a new system for improving the formability of aluminum alloy has been investigated. By means of this system, in every pulsating cycle, at first the blankholder force has been removed, metal has been flowed into die and then to prevent excessive metal flow and wrinkles, the blankholder force by springs has been used.

Deep drawing of cylindrical cup has been simulated by using ABAQUS6.7 software. Cup depth, tearing and thickness distribution of the experimental and numerical results have been compared. The results show that cup depth by using the pulsating blankholder system and select a proper frequence and gap, can be increased and thickness distribution can be improved. It has further been observed that simulation and experimental results are in good agreement together.

KEYWORDS : Deep drawing, Pulsating blankholder, Finite element method

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R e

( )   (r+x)

$$x = \sqrt{R^2 - e^2 \sin^2 \theta} - (r + e\cos\theta)$$

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e   R   x

r

.   (A   )   θ

θ   ( )

.   ( )

$\theta = \omega t$

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R3D4   .   ASTM

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160
140
120
100
80
60
40
20
0

Stress (MPa)

0   0.005   0.01   0.015   0.02   0.025   0.03   0.035

strain

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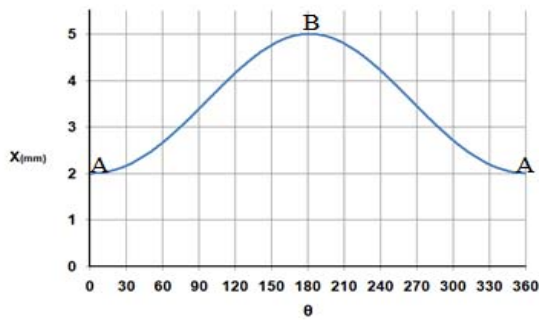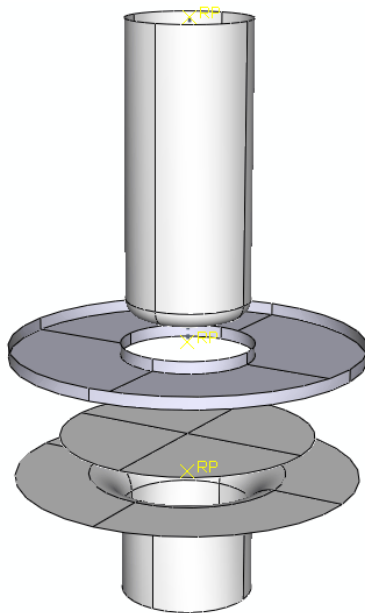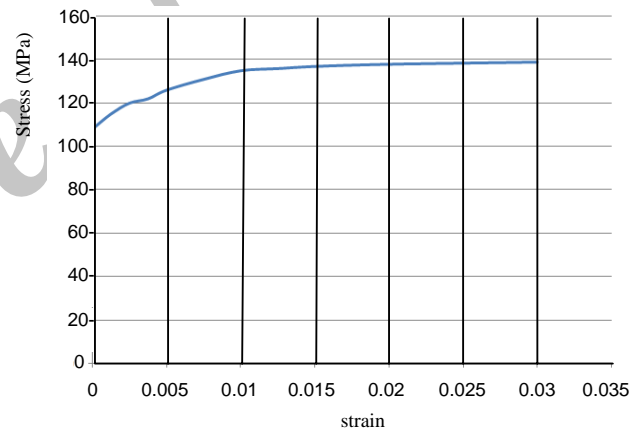
GPa	
/	
MPa	
/ gr/cm^3	
/	(r_0)
/	
	(r_{45})
/	(r_{90})

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(   )   ( )

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$$F(t)_1 = kx = kvt \qquad ( )$$

t v x k

:

/ $$F(t)_2 = k(vt + X(t)) \qquad ( )$$

$X(t)$ t k

( )

:

$$F_{BH} = F(t)_2 - F(t)_1 \quad if \quad X(t) = 0 \quad F(t)_2 = 0 \qquad (۴)$$

F(t)₁

Punch   Holder

Blank   Die

F(t)₂

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B A

A   .   C

(   )   B

C

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C   A

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B .

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فاصله از مرکز ظرف [mm]

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کفشک فوقانی
میله راهنما
فنر
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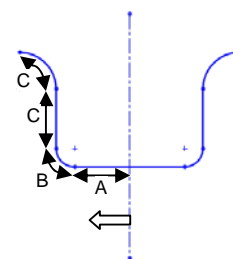
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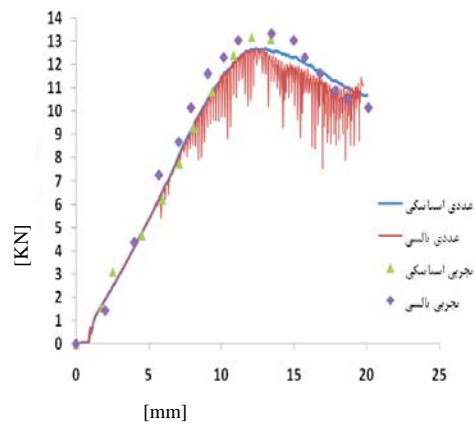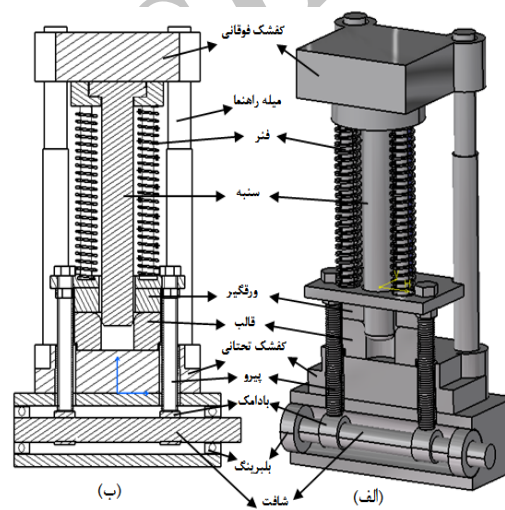
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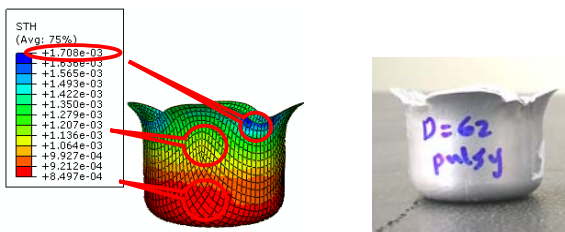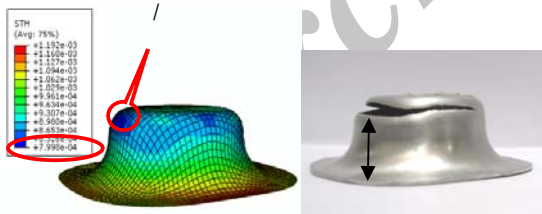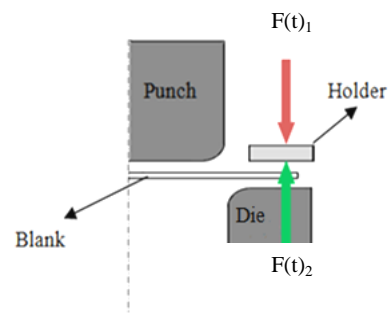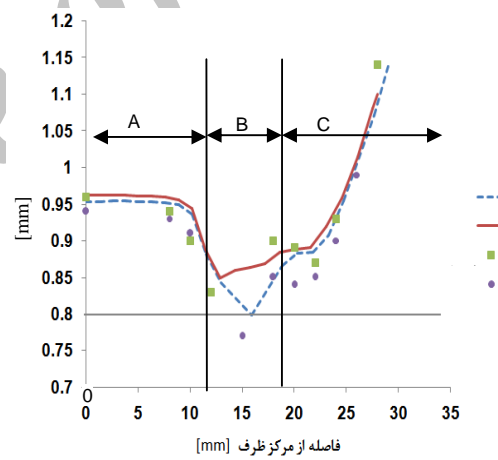
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[1] Abaqus
[2] Inverter
[3] Mass scale
[4] Micro crack