

( ) , ( )

\*

( / / : / / : )

*Nastran Solid works*

( )

%

%

:

%

/

(Srivastava et al.,

.1993)

%

.(O'Dogherty, 1989)

.(Bilanski, 1985)

.(Sitkei, 1986)

, ( )

.(Shigley, 1986)

.( ) Solid Works

Anonymous, 2003 & )

Nastran  
.(Anonymous, 2004

:

( )

x x

/  
ASAE  
.(Anon., 1999)

S358.2 DEC93

( )% / /

( )

)

(

Anon., )

.(1998



, ( )

/  
Nastran

$t_1$

(Negi et al, 1987)

( )

(

:( ) ( )

$$v = 200 \text{ cm/min}$$

$$x = 140 \text{ cm}$$

$$t_1 = \frac{x}{v}$$

$$t_1 = 140 \times 60 / 200 = 42 \text{ s}$$

x ( ) v

( )

(% % % )

$$\Sigma t = 42 + 5 + 10 + 21 + 5 = 83 \text{ s}$$

)

(

( ) %

%

$$n = \frac{t_{\text{relax}}}{\Sigma t} = \frac{120}{83} = 1.4 \quad 2$$

n

%

( )

.( )

$$\Sigma t = t_1 + t_2 + t_3 + t_4 + t_5 \quad ($$

$t_1$

$t_2$

)

$t_3$  (

( )

$t_4$  ( )

$t_5$  ( $t_1/$ )

...

:

( )	( $P_{KI}$ )	( $P_x$ )	( )
/	/	/	
/	/	/	
/	/	/	
/	/	/	
/	/	/	

/ ( )

( )  $F_T$   
 ( / )  
 ( / )

$$F_T = 55.5 + 20.1 = 75.6 \text{ kN}$$

Sitkei, )

$$dF_f = 2(a + b)\mu P_s dx$$

:(1986

(  
 $P_s$

$$P_s = \left[ \frac{v}{1-v} \right] P_x = \frac{v}{1-v} P_k e^{-kx} \quad ($$

$$dF_f = 2(a + b)\mu \left[ \frac{v}{1-v} \right] P_k e^{-kx} dx$$

$$= 2(a + b)\mu \left[ \frac{v}{1-v} \right] P_k e^{-kx} dx \Rightarrow$$

$$F_f = 2(a + b)\mu \left[ \frac{v}{1-v} \right] P_k \int_0^{45} e^{-kx} dx = 30066 e^{-0.013x} \Big|_0^{45}$$

$$\Rightarrow F_f = F_{f_0} = 13316 \text{ N} = 13.3 \text{ kN}$$

$F_f$

Nastran

( ) %

( )

(Pinches, 1988)

( )

(Little, 1978)

( )  
 (% )  
 )

(

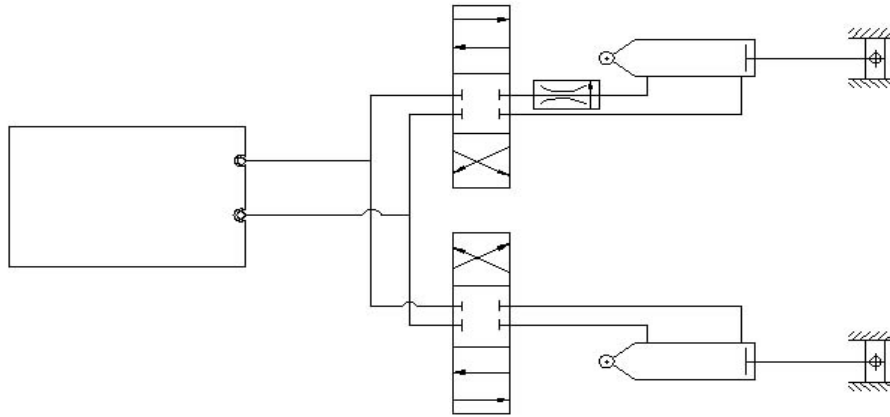
( )

, ( )

%

) )

( ( %



SAS

.( ( )

.(Anon. 2001)

LSD

EXCEL



( )

F	(MS)	(SS)
/ ns	/	/
/ **	/	/
/ **	/	/
/ ns	/	/
	/	/
		/

x

%

\*\*

(P> / )

.ns

%

...

:( ) %

%( )

( )

( )

( )

F	(MS)	(SS)
/ ns	/	/
/ **	/	/
/ **	/	/
/ ns	/	/
	/	/
		/

×

%( ) \*\*

ns (P> / )

%( )

%( )

F	(MS)	(SS)
/ ns	/	/
/ **	/	/
/ **	/	/
/ ns	/	/
	/	/
		/

×

%( ) \*\*

ns (P> / )

( ) %

( )

( )

( )
/ b / b / b
/ a / a / a

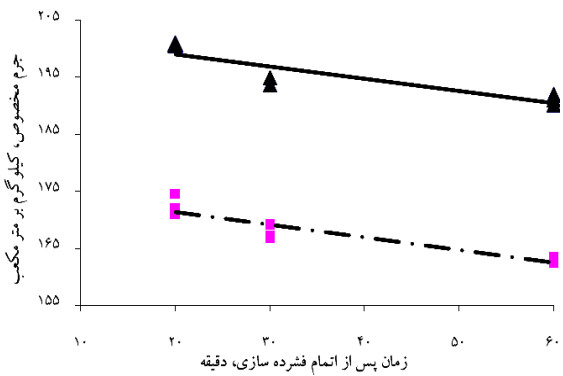
% LSD

( )

( )

( )
/ b / b / b %
/ a / a / b %
/ a / a / a %

% LSD



■ ▲

## REFERENCES

- Anonymous. (1998). *Tractor Operator's Manual*, John Deere 3140 Service Manual, John Deere Pub. Co.
- Anonymous. (1999). ASAE S358.2 DEC93, 1999. *Forage moisture content measurement in ASAE Standards*, 43rd edition; American Society of Agricultural Engineers: St. Joseph, MI.
- Anonymous. (2001). *SAS User's Guide: Statistics*, Version 8.2 Statistical Analysis System, Inc., Raleigh, NC.
- Anonymous. (2003). *Visual Nastran User's Guide & Reference Manual, Finite elements Analysis System, Inc.*
- Anonymous. (2004). *Solid Works User's Guide*, 3D Modeling System, Inc.
- Bilanski, W. K., Graham, V. A. & Hanusiak, J. A. (1985). Mechanics of bulk forage deformation with application to wafering, *American Society of Agricultural Engineers*, 28:697-702.
- Little, T. M. & Hills, F. J. (1978). *Agricultural Experimentation: Design and Analysis*. Wiley, Veterinary Medicine & Agriculture.
- Negi, S. C., Ogilvie, J. R. & Jofriet, J. C. (1987). Some mechanical and rheological properties of silages, *Canadian Agricultural Engineering*. 29: 59-64.
- O'Dogherty, M. J. (1989). A review of the mechanical behavior of straw when compressed to high densities, *J. agric. Engng. Res.* 44: 241-265.
- Pinches, M. J. & Ashby, J. G. (1988). *Power hydraulics*. Prentice Hall International (UK) Ltd.
- Shigley, J. E. (1986). *Mechanical engineering design*. McGraw-Hill.
- Sitkei, G. (1986). *Mechanics of Agricultural Materials*, Elsevier Science Pub. Co.
- Srivastava, A. K., Goering, C. E. & Rohrbach, R. P. (1993). *Engineering Principles of Agricultural Machines*. American Society of Agricultural Engineers: St. Joseph, MI.