

*

(/ / : / / :)

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

()% / /

()

)

(

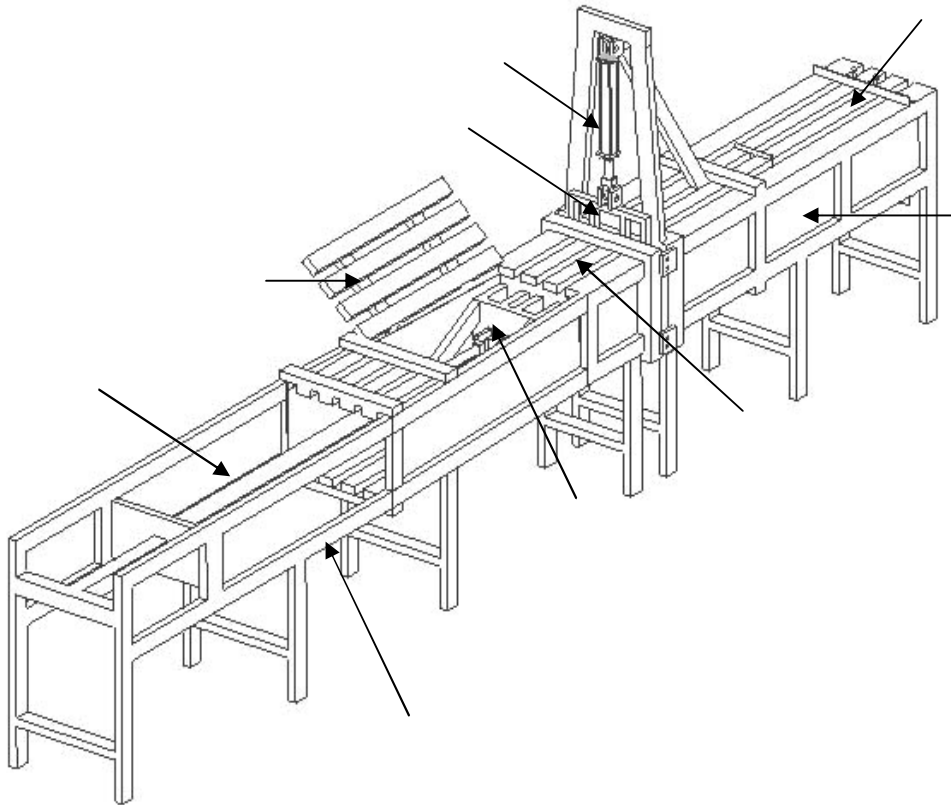
Anon.,)

(1998).

(Sitkei, 1986)

$$P_b = P_k e^{kL}$$

() : P_b
 () L
 () : P_k %
 () : L



() () ()
 () () ()
 () ()
 % :k

(Sitkei, 1986) $(\frac{1}{\text{متر}})$

$$k = \frac{2(a+b)\mu v}{ab(1-v)}$$

$$k = 1.3 \text{ 1/m}$$

$$L = 0.45 \text{ m}$$

$$P_k = \frac{20.1 \times 1.5}{0.35 \times 0.45} = 191.4 \text{ kPa}$$

$$P_L = 106.6 \text{ kPa}$$

$$F_d = P_L \times A = 16.8 \text{ kN}$$

() F_d

k

, ()

/
Nastran

t_1

(Negi et al, 1987)

)

()

(

x

:()

()

)

.()

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

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

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

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

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
 (/)
 (/)

Sitkei,)

:(1986

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

(

P_s

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

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

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

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

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

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

F_f

Nastran

()

%

()

(Pinches, 1988)

()

(Little, 1978)

()

(%)

)

(

()

, ()

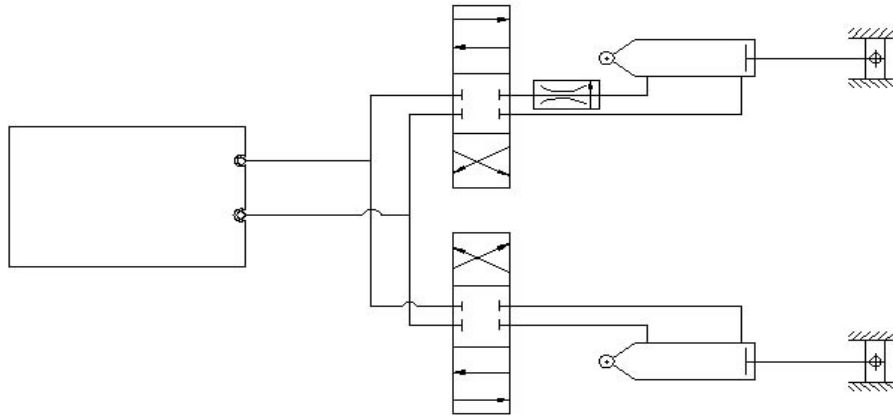
%

))

(

%

(



SAS

.(()

.(Anon. 2001)

LSD

EXCEL



()

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

x

%

**

(P> /)

.ns

%

...

:() %

%()

()

()

()

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

×

%() **

(P> /) ns

%()

%()

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

×

%() **

(P> /) ns

() %

()

()

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

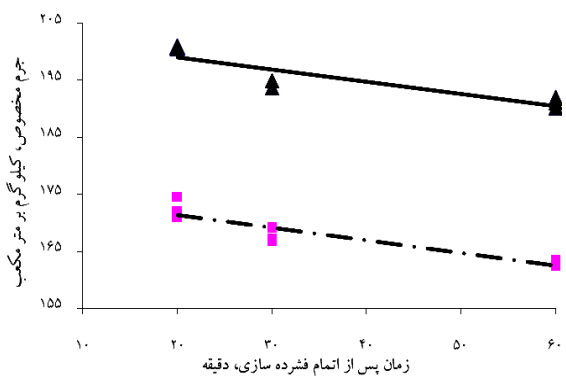
% LSD

()

()

()
/ 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.