

Steel Design 7th edition Segui Solutions Manual

SKU: 9798214012223-SOLUTIONS

STEEL DESIGN [7TH EDITION]

William T. Segui and Sayed M. Soleimani

CHAPTER 1 – INTRODUCTION

1.5-1

$$(a) A = \pi(0.550)^2/4 = 0.2376 \text{ in.}^2$$

$$F_u = \frac{P_u}{A} = \frac{28,500}{0.2376} = 120,000 \text{ psi} = 120 \text{ ksi}$$

$$\underline{F_u = 120 \text{ ksi (827.4 MPa)}}$$

$$(b) e = \frac{2.300 - 2.030}{2.030} \times 100 = 13.3\%$$

$$\underline{e = 13.3\%}$$

$$(c) A_f = \pi(0.430)^2/4 = 0.1452 \text{ in.}^2$$

$$\text{Change} = \frac{A_f - A_o}{A_o} \times 100 = \frac{0.1452 - 0.2376}{0.2376} \times 100 = -38.9\%$$

$$\underline{\text{Reduction} = 38.9\%}$$

1.5-2

$$A = \pi(0.5)^2/4 = 0.1963 \text{ in.}^2$$

$$f = \frac{P}{A} = \frac{13.5}{0.1963} = 68.77 \text{ ksi}$$

$$\varepsilon = \frac{\Delta L}{L} = \frac{4.66 \times 10^{-3}}{2} = 2.33 \times 10^{-3}$$

$$E = \frac{f}{\varepsilon} = \frac{68.77}{2.33 \times 10^{-3}} = 29,500 \text{ ksi}$$

$$\underline{E = 29,500 \text{ ksi (203.4 GPa)}}$$

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$$A = \pi(0.510)^2/4 = 0.2043 \text{ in.}^2$$

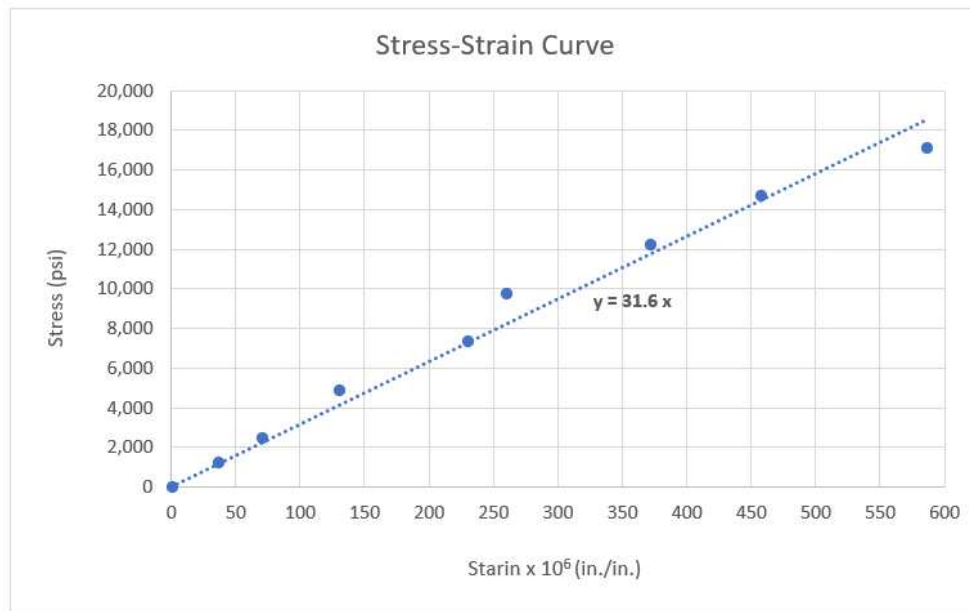
$$\text{For } P = 250 \text{ lb, } f = \frac{P}{A} = \frac{250}{0.2043} = 1224 \text{ psi}$$

Spreadsheet results:

(a)

Load (lb)	Strain $\times 10^6$ (in./in.)	Stress (psi)
0	0	0
250	37.1	1,224
500	70.3	2,448
1,000	129.1	4,895
1,500	230.1	7,343
2,000	259.4	9,790
2,500	372.4	12,238
3,000	457.7	14,686
3,500	586.5	17,133

(b)



(c)

$$\underline{E = \text{slope} = 31,600 \text{ ksi (217.9 GPa)}}$$

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$$A = \pi(0.5)^2/4 = 0.1963 \text{ in.}^2$$

$$E = \frac{f}{\varepsilon} = \frac{P/A}{\Delta L/L} = \frac{P}{\Delta L} \cdot \frac{L}{A} = 1,392(4/0.1963) = 28,400 \text{ ksi}$$

$$\underline{\mathbf{E = 28,400 \text{ ksi (195.8 GPa)}}$$

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$$A = \pi(3/8)^2/4 = 0.1104 \text{ in.}^2$$

$$\text{For } P = 550 \text{ lb, } f = \frac{P}{A} = \frac{550}{0.1104} = 4,982 \text{ psi}$$

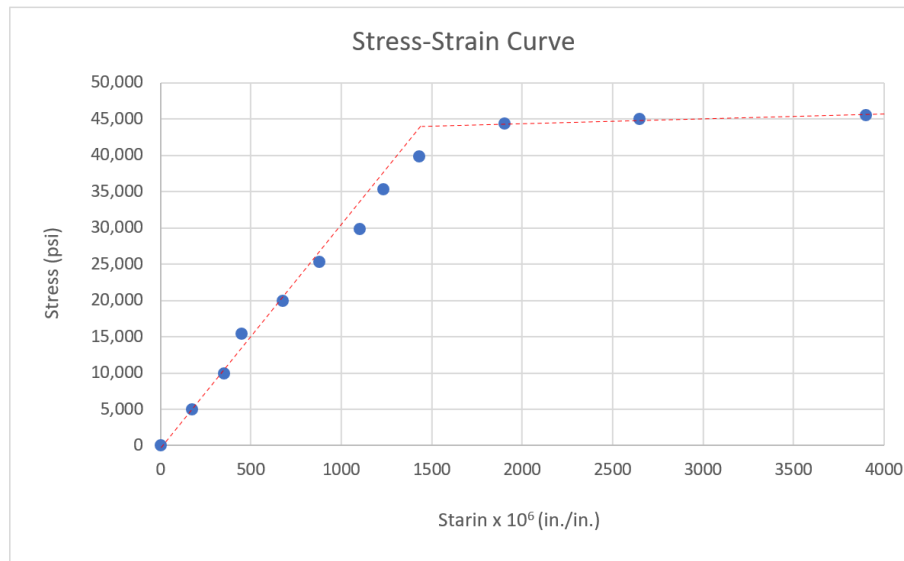
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1,700	900	450	15,399
2,200	1,350	675	19,928
2,800	1,760	880	25,362
3,300	2,200	1,100	29,891
3,900	2,460	1,230	35,326
4,400	2,860	1,430	39,855
4,900	3,800	1,900	44,384
4,970	5,300	2,650	45,018
5,025	7,800	3,900	45,516

(b)



(c) $E = \text{slope} = \frac{15,000}{500 \times 10^{-6}} = 30,000,000 \text{ psi} = 30,000 \text{ ksi}$

$E = 30,000 \text{ ksi (206.8 GPa)}$

(d)

$F_y \approx 44,000 \text{ psi} \approx 44 \text{ ksi } (\approx 303 \text{ MPa})$

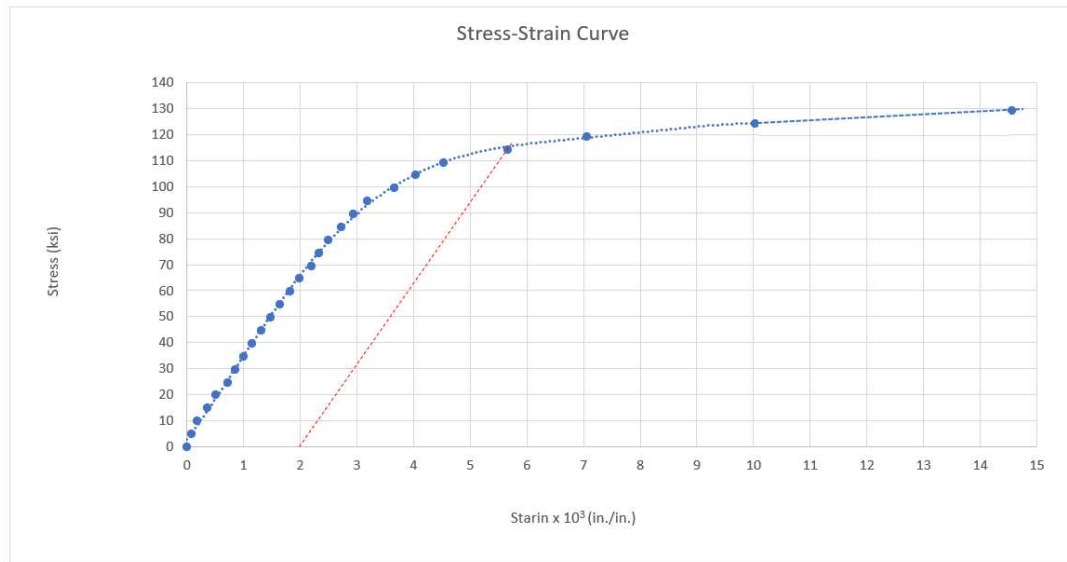
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24	14.120	7.060	119.344
25	20.044	10.022	124.316
26	29.106	14.553	129.289

(b)



(c) $E = \text{slope} = \frac{80-50}{0.0025-0.0015} = 30,000 \text{ ksi}$

$E = 30,000 \text{ ksi } (206.8 \text{ GPa})$

(d)

$F_{pl} \approx 85 \text{ ksi } (\approx 586 \text{ MPa})$

$F_y \approx 116 \text{ ksi } (\approx 800 \text{ MPa})$

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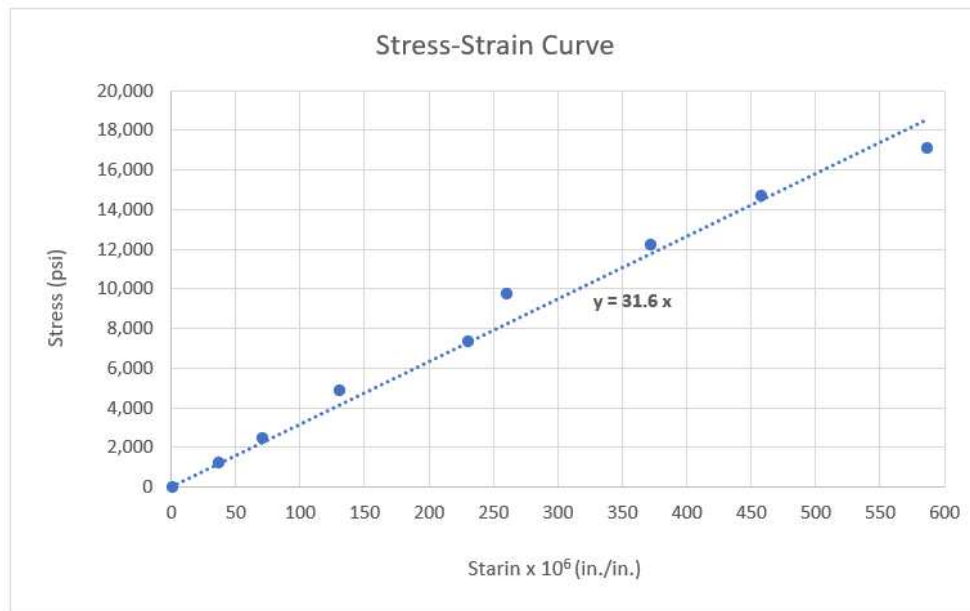
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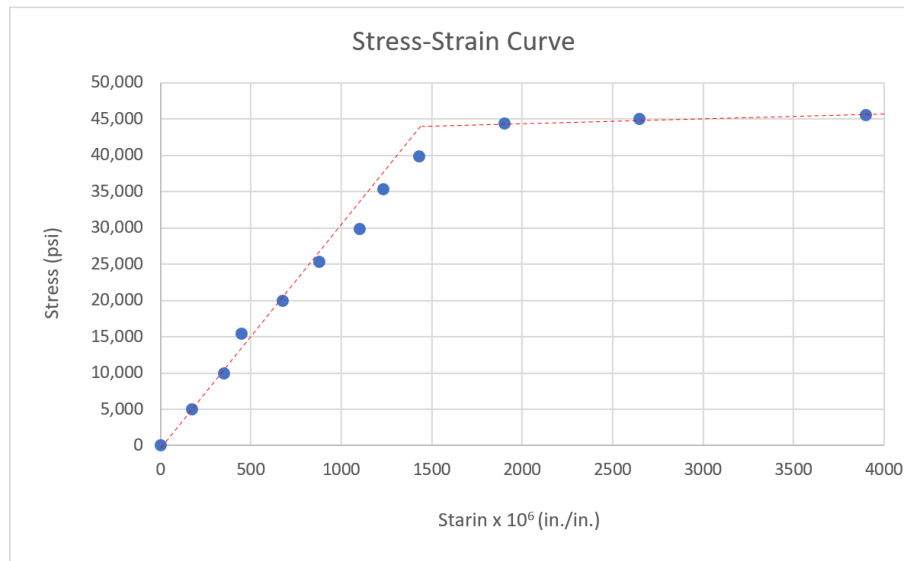
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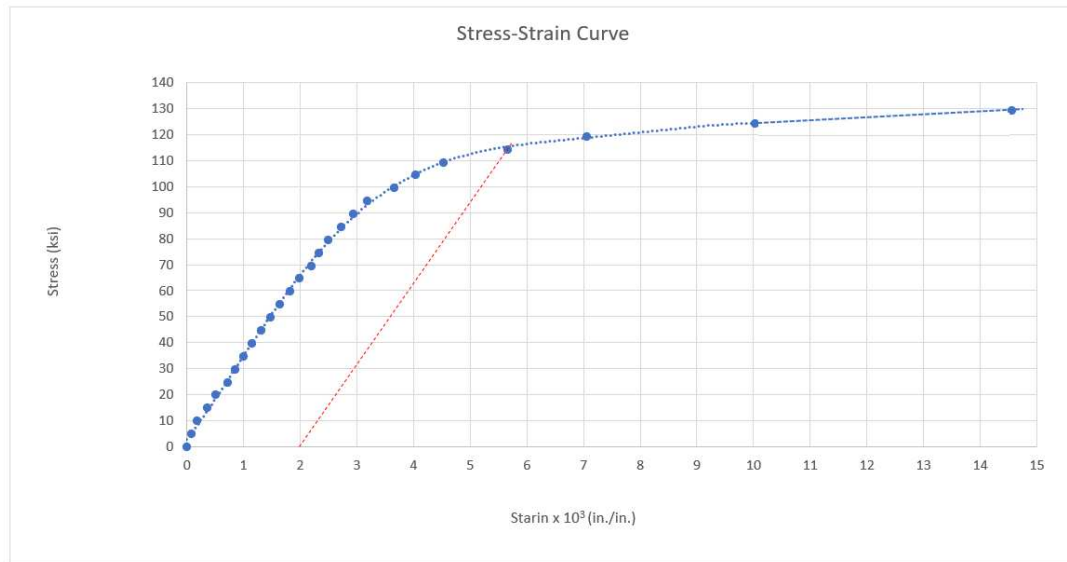
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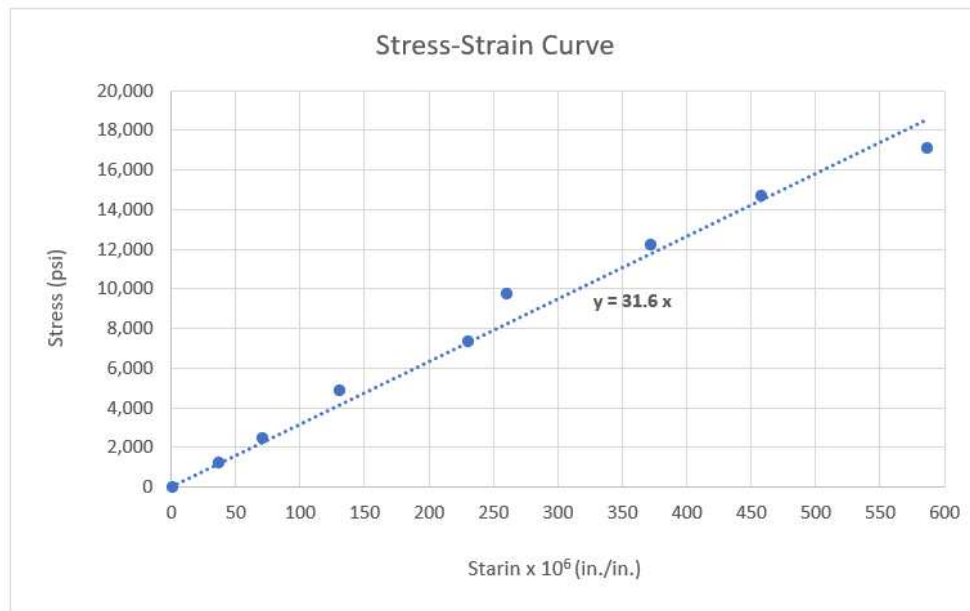
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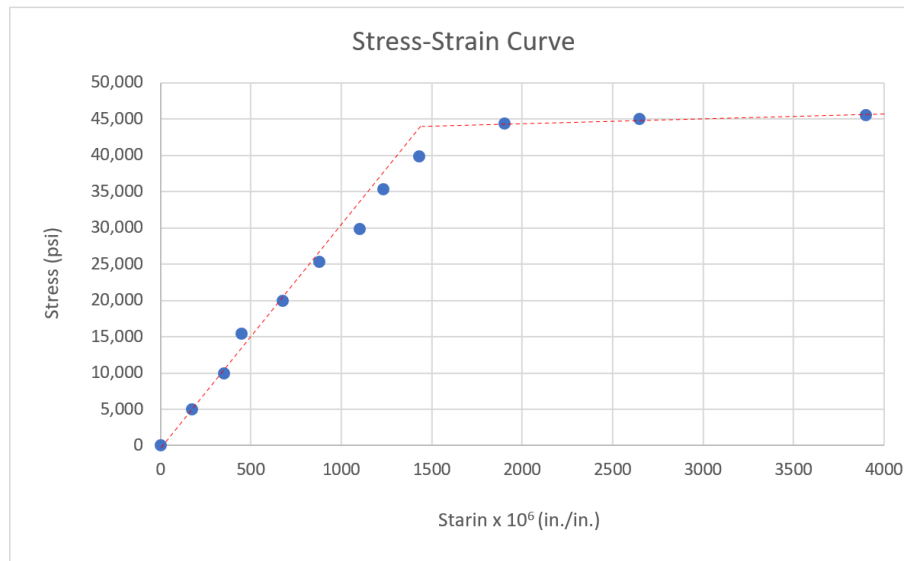
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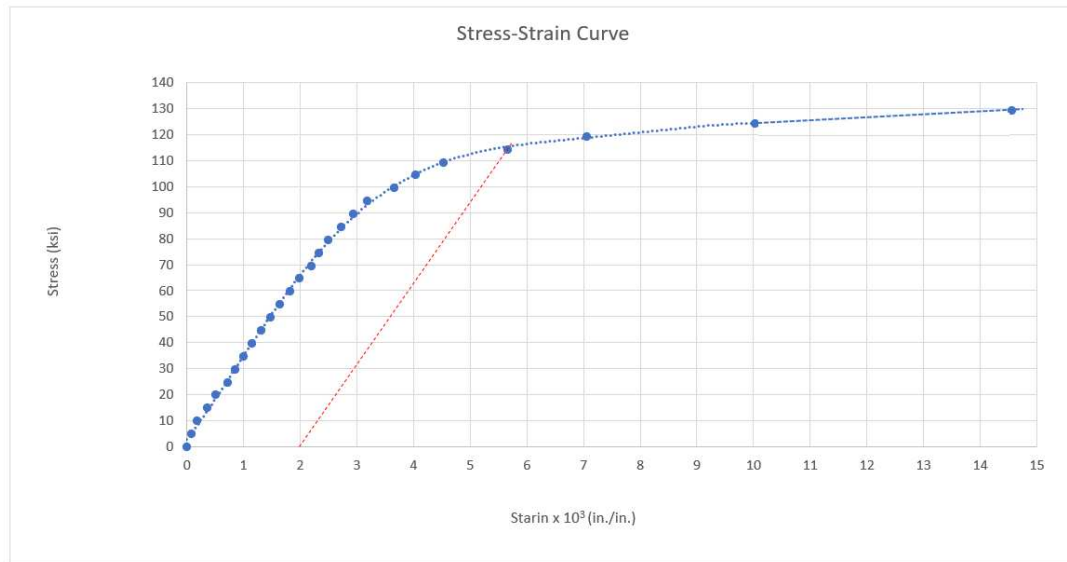
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