

$$\frac{\delta_{\text{Total}}}{2} = 6.5 \times 10^{-6} \times 70^{\circ}\text{F} \times L + \frac{30 \times L \times 12}{0.469 \times 29000}$$

$$\frac{0.95778}{2} = 4.55 \times 10^{-4} \times L \times 12 + \frac{360 \times L}{13630}$$

$$0.479 = 5.46 \times 10^{-3} \times L + 0.0264 L$$

$$0.479 = 0.3186 L$$

$$L = \frac{0.479}{0.03186} = 15 \text{ ft}$$

Problem 2

The stress-strain graph for two materials A and B is shown in Figure 2.

- Which material exhibits symmetrical behavior in tension and compression?
- Which material is weaker in compression?
- Which material has a higher modulus of elasticity in tension?
- Which one of the two materials do you recommend for a member that is primarily subject to tension? Explain your answer.

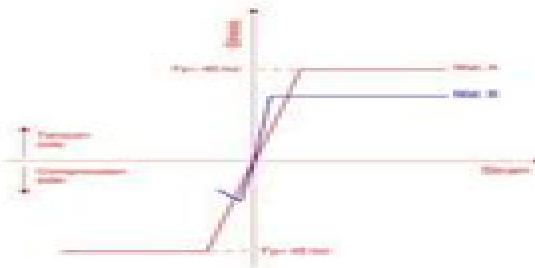


Figure 2

Solution

- The **Mat. A** is exhibiting symmetrical behaviour in tension as well as in compression as shown in the graph. Mat. A has same F_y yield strength in compression as well as in tension.
- The **Mat. B** is weaker in compression because the point where graph is changes and after small strains the material breaks and showed a brittle failure.
- The **Mat. B** showed the higher modulus of elasticity
 - $E = \text{stress} / \text{strain}$
 - $E_A = 45 / 0.05 = 900 \text{ ksi}$
 - $E_A = 35 / 0.03 = 1167 \text{ ksi}$
 - The values of stress for Mat. A is mentions so by taking tentative values rom above graph the calculations are made.
- The **Mat. B** is primarily subjected to tension because

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unless realistic guidelines could be developed to control the manufacturing quality of composite systems **ITJEMAST**
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