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Finally I get this ebook, thanks for all these I can get now!

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Cool! I'am really happy

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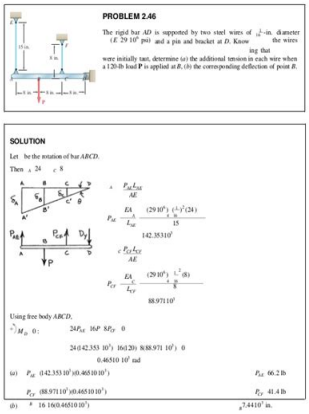
so many fake sites. this is the first one which worked! Many thanks


PROBLEM 2.46

The rigid bar AD is supported by two steel wires of $\frac{1}{16}$-in. diameter ($E = 29 \times 10^6$ psi) and a pin and bracket at D. Knowing that the wires were initially taut, determine (a) the additional tension in each wire when a 120-lb load $\mathbf{P}$ is applied at B, (b) the corresponding deflection of point B.

SOLUTION

Let θ be the rotation of bar $ABCD$.

Then $a = 24$ in., $c = 8$ in.

$$\delta_A = a\theta, \quad \delta_B = b\theta, \quad \delta_C = c\theta$$

$$P_{AE} = \frac{EA}{L_{AE}}\delta_A = \frac{(29 \times 10^6)\left(\frac{\pi}{4}\right)\left(\frac{1}{16}\right)^2}{15}(24\theta) = 142.353 \times 10^3\,\theta$$

$$P_{CF} = \frac{EA}{L_{CF}}\delta_C = \frac{(29 \times 10^6)\left(\frac{\pi}{4}\right)\left(\frac{1}{16}\right)^2}{8}(8\theta) = 88.971 \times 10^3\,\theta$$

Using free body $ABCD$:

$$+\circlearrowleft \sum M_B = 0: \quad 24P_{AE} - 16P - 8P_{CF} = 0$$

$$24(142.353 \times 10^3)\theta - 16(120) - 8(88.971 \times 10^3)\theta = 0$$

$$\theta = 0.46510 \times 10^{-3}\ \text{rad}$$

(a) $P_{AE} = (142.353 \times 10^3)(0.46510 \times 10^{-3})$ $\qquad P_{AE} = 66.2$ lb

$P_{CF} = (88.971 \times 10^3)(0.46510 \times 10^{-3})$ $\qquad P_{CF} = 41.4$ lb

(b) $\delta_B = 16\theta = 16(0.46510 \times 10^{-3})$ $\qquad \delta_B = 7.4410 \times 10^{-3}$ in.

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