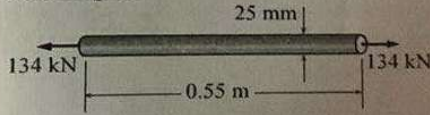


Question 2

A 25 mm diameter steel rod ($E = 200 \text{ GPa}$) must carry a load in tension of 134 kN (see figure). If the initial length of the stressed portion of the rod is 0.55 m, what is its final length?



$$\sigma = E \times \epsilon \quad [\text{Hook's law}]$$

$$\frac{P}{A} = E \times \frac{\Delta L}{L_0}$$

$$\frac{134 \times 10^3 \text{ N}}{\frac{\pi}{4} (0.025 \text{ m})^2} = 200 \times 10^9 \frac{\text{N}}{\text{m}^2} \times \frac{\Delta L}{0.55 \text{ m}}$$

$$\Rightarrow \Delta L = 0.00075 \text{ m}$$

$$L_f = L_0 + \Delta L = 0.55 \text{ m} + 0.00075 \text{ m} = 0.55075 \text{ m}$$

Ans

This problem was solved by Civil Thinking (<https://civilthinking.com>)

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