

Worksheet:

A section of magnesium alloy is being tested. It is subjected to a 12 kN compression force. The length is 50 mm. The cross section is 10 mm by 10 mm. The longitudinal strain is 0.0015. Poisson's ratio for the material is 0.35.

- Find the average normal stress at the instant when the load is applied.
- Find $\delta_{Longitudinal}$
- Find the height and width of the cross section after compression.

a)
$$\sigma = \frac{P_A}{A} = \frac{12 \text{ KN}}{(10 \text{ mm})(10 \text{ mm})} = 0.12 \text{ KN/mm}^2 = 120 \text{ MPa} \text{ ANS.}$$

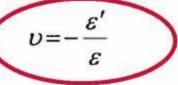


Lateral Strain:

$$\varepsilon' = \frac{\delta_{Lateral}}{w_o}$$

Longitudinal **Longitudinal Strain:**

Poisson's ratio:



c)
$$y = -\frac{\epsilon'}{\epsilon}$$

$$0.35 = -\frac{\epsilon'}{(-0.0015)}$$

$$\mathcal{E}' = 0.000525 = \frac{\mathcal{E}_{LATERAL}}{W_0} = \frac{\mathcal{E}_{LATERAL}}{10 \, \text{mm}} = \frac{0.00525 \, \text{mm}}{ANS}$$

$$\mathcal{E}_{LATERAL} = 0.00525 \, \text{mm} \quad \text{New height} = 10 \, \text{mm} + 0.00525 \, \text{mm} = \frac{10.00525 \, \text{mm}}{ANS}$$