

Radial Strain Calculation

Knowns:

- Interference radius (r) = 1.6 in
- Interference height (h) = 0.800 in
- Interference Volume (V) = 0.106 in³

Strain Relation

$$\varepsilon = \Delta r / r_0 \quad (1)$$

And by circumference identity

$$\Delta r = \frac{V}{2\pi r_0 h} \quad (2)$$

Therefore

$$\varepsilon = \frac{V}{2\pi(r_0)^2 h} \quad (3)$$

$$\varepsilon = \frac{.106 \text{ in}^3}{2\pi(1.6 \text{ in})^2(0.800 \text{ in})} = 0.0082 \quad (4)$$

Upper Bound Stress Calculation

- E = Elastic modulus (MPa) = 1.47 GPa
- σ_y = Yield Strength = 55.3 MPa
- ε_e = Strain at elastic limit = 0.0082

$$\sigma = E \varepsilon \quad (5)$$

$$\sigma = (1.47 \text{ GPa})(0.0082) = 12.1 \text{ MPa} \quad (6)$$

$$12.1 \text{ MPa} < 55.3 \text{ MPa} \quad (7)$$