

12.42 We are asked to calculate the maximum radius of a circular specimen of MgO that is loaded using three-point bending. Solving for R from Equation 12.7b

$$R = \left[\frac{F_f L}{\sigma_f \pi} \right]^{1/3}$$

which, when substituting the parameters stipulated in the problem statement, yields

$$\begin{aligned} R &= \left[\frac{(5560 \text{ N})(45 \times 10^{-3} \text{ m})}{(105 \times 10^6 \text{ N/m}^2)(\pi)} \right]^{1/3} \\ &= 9.1 \times 10^{-3} \text{ m} = 9.1 \text{ mm} \text{ (0.36 in.)} \end{aligned}$$