

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

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

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

$$R = \left[ \frac{(5560 \text{ N})(45 \times 10^{-3} \text{ m})}{(105 \times 10^6 \text{ N/m}^2)(\pi)} \right]^{1/3}$$

$$= 9.1 \times 10^{-3} \text{ m} = 9.1 \text{ mm} \text{ (0.36 in.)}$$