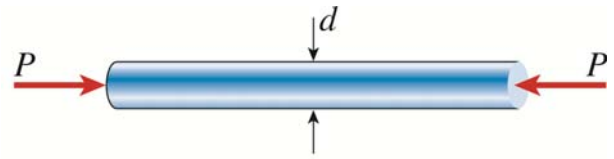


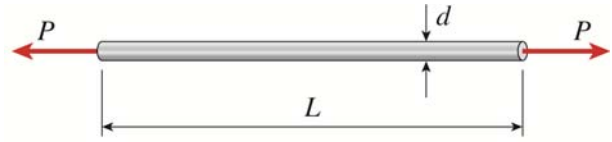
四造二甲材料力學 HW2

1.5-1 A high-strength steel bar used in a large crane has diameter $d = 50$ mm. (see figure). The steel has modulus of elasticity $E = 200$ GPa and Poisson's ratio $\nu = 0.3$. Because of clearance requirements, the diameter of the bar is limited to 50.025 mm when it is compressed by axial forces.



What is the largest compressive load P_{\max} that is permitted?

1.5-4 A prismatic bar with a circular cross section is loaded by tensile forces $P = 65$ kN (see figure). The bar has length $L = 1.75$ m and diameter $d = 32$ mm. It is made of aluminum alloy with modulus of elasticity $E = 75$ GPa and Poisson's ratio $\nu = 1/3$.



Find the increase in length of the bar and the percent decrease in its cross-sectional area.

1.6-9 A joint between two concrete slabs *A* and *B* is filled with a flexible epoxy that bonds securely to the concrete (see figure). The height of the joint is $h = 100$ mm, its length is $L = 1.0$ m, and its thickness is $t = 12$ mm. Under the action of shear forces V , the slabs displace vertically through the distance $d = 0.048$ mm relative to each other.

- (a) What is the average shear strain γ_{aver} in the epoxy?
- (b) What is the magnitude of the forces V if the shear modulus of elasticity G for the epoxy is 960 MPa?

