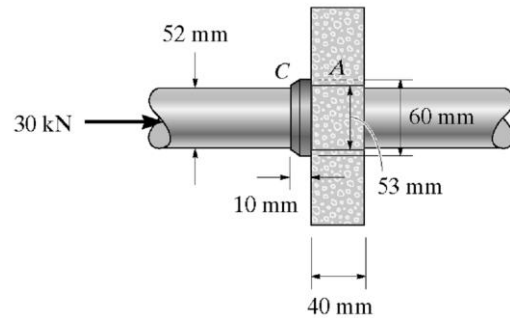1. The shaft is subjected to the axial force of 30 KN. If the shaft passes through the 53-mm diameter hole in the fixed support A, determine the bearing stress acting on the collar C. Also, what is the average shear stress acting along the inside surface of the collar where it is fixed connected to the 52-mm diameter shaft?

52 mm

C A

30 kN →

60 mm

53 mm

10 mm

40 mm

2. The steel tie bar shown is to be designed to carry a tension force of magnitude P = 120 kN when bolted between double brackets at A and B. The bar will be fabricated from 20-mm-thick plate stock. For the grade of steel to be used, the maximum allowable stresses are: $[\sigma]$ = 175 MPa, $[\tau]$ = 100 MPa, $[\sigma_b]$ = 350 MPa. Design the tie bar by determining the required values of (a) the diameter d of the bolt, (b) the dimension b at each end of the bar, (c) the dimension h of the bar.

$t = 20$ mm

h

d

b

A

B
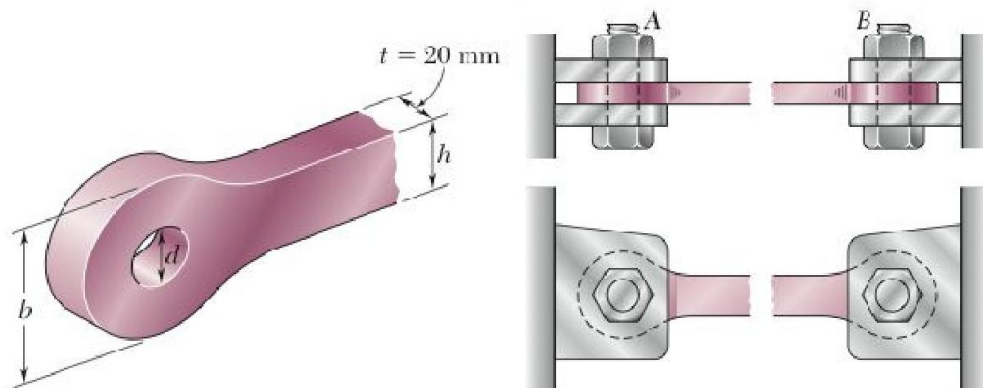
3. In the assembly shown, each of the four vertical links has an 8×36-mm uniform rectangular cross section and each of the four pins has a 16-mm diameter. Determine (a) the average shearing stress in the pin at *B*, (b) the average bearing stress at *B* in link *BD*, (c) the average bearing stress at *B* in member *ABC*, knowing that this member has a $10\times$ 50-mm uniform cross-section.