1. Four 10-mm-diameter steel bolts are used to connect a steel plate tension member (7 mm by 70 mm) to a support as shown. For the steel plate tension member, the yield strength is $\sigma_y = 345$ MPa. For the bolts, the ultimate shear strength is $\tau_{\text{ult}} = 240$ MPa. A factor of safety of 2.5 is to be used for both the normal and shear stress considerations. Determine the allowable load $P$ that can be carried by the connection. (10 points)
2. For the device shown in the illustration, compute the tensile stress in the 0.5-inch-diameter aluminum tie rods and the compressive stress in the plastic bar. (10 points)
3. Rigid bar ABC is supported by a pin at A and by a small steel wire (d = 0.125 in) at B. The modulus of elasticity of the steel wire (1) is $E = 29,000,000$ psi and the coefficient of thermal expansion is $\alpha = 6.5 \times 10^{-6}$ in/in/°F. After weight $W$ is applied to the rigid bar at C and the temperature of the apparatus is increased by $\Delta T = +120$°F, the downward deflection of the rigid bar at C is measured as $\Delta_c = 0.14$ in ↓. Determine the magnitude of weight $W$. (20 points)