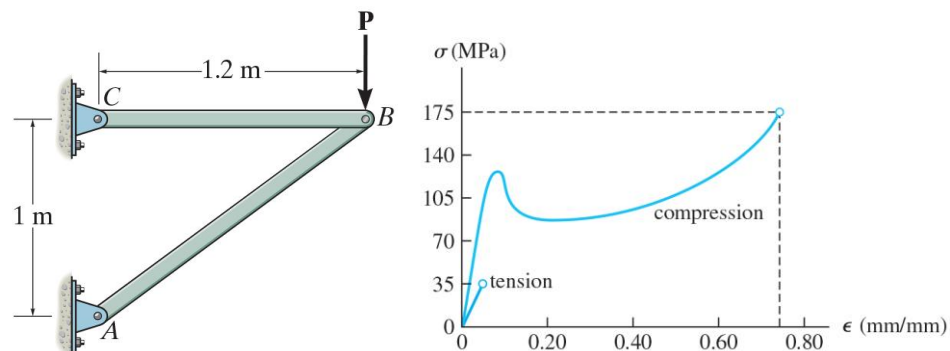
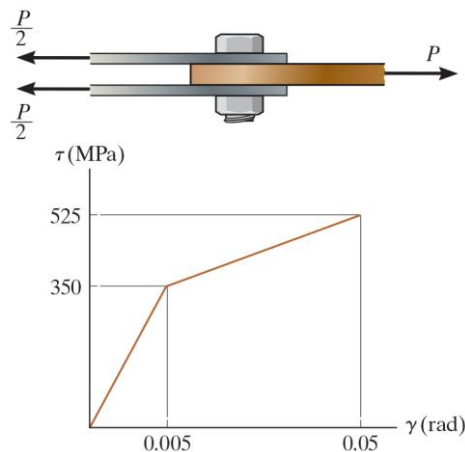


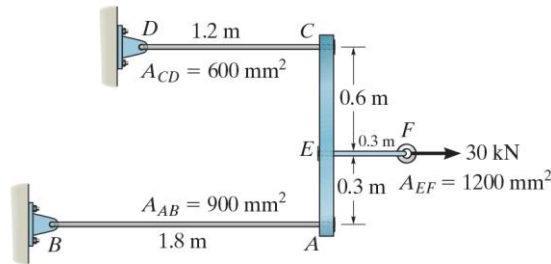
- Please use words or figures to explain the following terms.
(a) Gauge length (gage length) (b) True stress (c) Offset method (d) Necking (e) Poisson's ratio [5% x 5]
- The two bars are made of polystyrene, which has the stress-strain diagram shown. If the cross-sectional area of bar AB is 975 mm^2 and BC is 2600 mm^2 , determine the largest force P that can be supported before any member ruptures (破壞). Assume that buckling does not occur. [15%] Ans: 75.8 kN



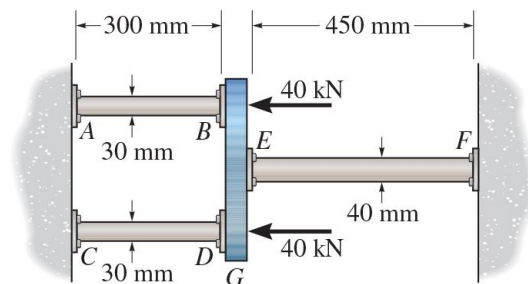
- The lap joint (重疊結合) is connected together using a 30 mm diameter bolt. If the bolt is made from a material having a shear stress-strain diagram that is approximated as shown, determine the permanent shear strain in the shear plane of the bolt when the applied force $P=680 \text{ kN}$ is removed. [15%] Ans: 0.0318 rad



4. The assembly (組合) consists of three titanium (Ti-6Al-4V) rods and a rigid bar AC. The cross-sectional area of each rod is given in the figure. If a force of 30 kN is applied to the ring F, determine the horizontal displacement of point F. $E_{ti} = 120$ GPa. [15%] Ans: 0.340 mm



5. The assembly (組合) consists of two red brass C83400 copper rods AB and CD of diameter 30 mm, a stainless 304 steel alloy rod EF of diameter 40 mm, and a rigid cap (剛體帽) G. If the supports at A, C, and F are rigid, determine the average normal stress developed in the rods. $E_{br} = 101$ GPa, $E_{st} = 193$ GPa. [15%] Ans: 26.5, 33.8 MPa



6. The 50-mm-diameter cylinder is made from Am 1004-T61 magnesium and is placed in the clamp (箝) when the temperature is $T_1 = 20^\circ\text{C}$. If the 304-stainless-steel carriage bolts of the camp each have a diameter of 10 mm, they hold the cylinder snug (鬆緊適合的) with negligible (可忽略的) force against the rigid jaws (顎), determine the force in the cylinder when the temperature rises to $T_2 = 130^\circ\text{C}$. $E_{mg} = 44.7$ GPa, $\alpha_{mg} = 26(10^{-6})/^\circ\text{C}$,

$E_{st} = 193$ GPa, $\alpha_{st} = 17(10^{-6})/^\circ\text{C}$. [15%] Ans: 904 N

