1. The control arm is subjected to the loading shown. Determine the minimum diameter of the steel pin at C if the allowable shear stress for the steel is $\tau_{\text{allow}} = 8$ ksi. Note in the figure that the pin is subjected to double shear.
2. The A-36 steel ($E = 200 \text{ GPa}$) pipe has a 6061-T6 aluminum ($E = 69 \text{ GPa}$) core. It is subjected to a tensile force of $200 \text{ kN}$. Determine the normal stress in the aluminum and the steel due to this loading. The pipe has an outer diameter of $80 \text{ mm}$ and an inner diameter of $70 \text{ mm}$.
3. Two bars, each made of a different material, are connected and placed between two walls when the temperature is $T_1 = 15^\circ C$. Determine the force exerted on the (rigid) supports when the temperature becomes $T_2 = 25^\circ C$. The material properties and cross-sectional area of each bar are given in the figure.

Steel
- $E_{st} = 200 \text{ GPa}$
- $\alpha_{st} = 12 \times 10^{-6}/^\circ C$
- $A_{st} = 175 \text{ mm}^2$

Brass
- $E_{br} = 100 \text{ GPa}$
- $\alpha_{br} = 21 \times 10^{-6}/^\circ C$
- $A_{br} = 300 \text{ mm}^2$

[Diagram of the bars with dimensions and labels]
4. The 304 stainless steel (G = 75 GPa) shaft is 3 m long. When it is rotating at 60 rad/s, it transmits 30 kW of power from the engine E to the generator G. Determine the minimum diameter of the shaft if the allowable shear stress is $\tau_{\text{allow}} = 150$ MPa and the shaft is restricted not to twist more than 0.08 rad.