

The wire-pulley system shown supports block B of weight W . The diameters of the double-sided pulley pins C and D are d_C and d_D , respectively. The diameter of the wire is d_w . The pulley pins and wire are manufactured from the same grade of steel having a tensile yield strength of σ_Y and a shear strength in yielding of τ_Y . The minimum design factors of safety for the pins and the wire are FS_{pin} , and FS_{cable} , respectively. The weight of the wire can be neglected compared to that of the block. The pulleys are to be considered to be ideal.

- Determine the diameters of the pulley pins that satisfy their design factor of safety.
- Determine the diameter of the wire that satisfies its design factor of safety.

Use the following parameter values in your analysis: $\phi = 36.87^\circ$, $W = 2 \text{ kN}$, $\sigma_Y = 220 \text{ MPa}$, $\tau_Y = 0.5\sigma_Y$, $FS_{pin} = 4$ and $FS_{wire} = 3$. Please substitute in these numerical values in the last step of your work.

