1. The shaft shown rotates at 240 rpm. Determine the power input to the system at the middle gear. If the shaft is solid with a diameter of 1.2 inches, determine the torsional shear stress at C and at D.

Power Calculations:

\[ HP = \frac{T \cdot n}{63025} = \]

Polar Moment of Inertia:

\[ J = \frac{\pi D^4}{32} = \frac{\pi (1.2")^4}{32} = \text{in}^4 \]

If the distance between gear E and the middle gear is 12 inches, find the angle of twist between the two gears. The shaft is steel and \( G = 11.5 \times 10^6 \) psi.
2. The triangular shaft has a 1500 inch-pound torque applied as shown. Determine the maximum shear stress in the shaft and the angle of twist of the free end with respect to the fixed end.

Section Properties:

\[ Q = 0.050a^3 \quad \text{and} \quad K = 0.0217a^4 \]
3. The elliptical aluminum tube is subjected to the torque shown. Dimension $b$ is 1 inch and the wall thickness is .10 inches. Find the angle of twist in a 48 inch length of the tube.
4. Determine the stresses acting at points A and B shown. Show the stresses on stress elements.

Section Properties from Statics:

\[ I_x = 7486226 \text{ mm}^4 \]

Reactions at Cut:

\[ \bar{y} = 99.08 \text{ mm} \]

\[ 3.6 \text{ kN} \]

\[ 4.8 \text{ kN} \]

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