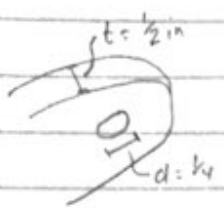


light bar mount analysis



material: PETG Filament (strength = 50 MPa = 7.25 ksi)

hole - $d = 1/4$ in

thickness - $t = 1/2$ in

self tapping screw (strength = 240 MPa = 65 ksi)

diameter - $d = 1/4$ in

length - $l = 1$ in

* screw will shear out of the filament before it fails.

shear filament

$$\tau = \frac{P}{A}$$

$$P = \tau A = 7.25(10^3) \text{ psi} (.3927 \text{ m}^2)$$

$$P = 2847 \text{ lbs}$$

$$\tau = 7.25 \text{ ksi}$$

$$A = \pi r t = \pi (1/2)(1/4) = 0.3927 \text{ m}^2$$

If we desire working force to have a design factor of 3, our working load is:

$$\frac{2847}{3} = 950 \text{ lbs} = 4,225 \text{ N}$$

this is well above the force needed to hold our light bar in place in essentially any condition.