



$$\vec{M}(z=l) = -M_y \hat{y}$$

$$\vec{M}(z=0) = M_y \hat{y}$$

Stress
 $+$ \rightarrow tensile
 $-$ \rightarrow compressive

$$\vec{F}(x, y, l) = -\vec{F}(x, y, 0) = t_0 x \hat{z}$$

vector stress
 (pressure on surface)

$$\vec{M}(z=l) = \int_{-w/2}^{w/2} \int_{-w/2}^{w/2} \hat{r} \times \vec{F}(x, y, l) dy dx$$

$$t_0 (-x^2 \hat{y} + xy \hat{x})$$

$$= \int_{-w/2}^{w/2} \int_{-w/2}^{w/2} (-t_0 x^2 \hat{y}) dy dx = -\frac{1}{12} w t^3 t_0 \hat{y}$$

$$M_y = \frac{w t^3}{12} t_0$$

where

$$\frac{w t^3}{12} = I_y$$

$$\left. \begin{aligned} I_y &= \int x^2 dA \\ I_x &= \int y^2 dA \end{aligned} \right\} \begin{array}{l} 2^{\text{nd}} \\ \text{moments} \\ \text{of} \\ \text{area} \end{array}$$

$$t_0 = \frac{12 M_y}{w t^3}$$

$$t_0 = \frac{M_y}{I_y}$$