



$T_b$  - bending torque

$F_s$  - shear force

$$\sum F_{ix} = 0 \quad R_{Ax} = 0$$

$$\sum F_{iy} = 0 \quad R_{Ay} + R_B - P = 0$$

$$\sum T_{iA} = 0 \quad -M - R_B \cdot 2l + P \cdot 3l = 0$$

$$R_B \cdot 2l = P \cdot 3l - M$$

$$2R_B \cdot l = 3P \cdot l - 0.5P \cdot l \quad | : l$$

$$2R_B = 3P - 0.5P$$

$$2R_B = 2.5P \quad | : 2$$

$$R_B = 1.25P$$

$$R_{Ay} = P - R_B$$

$$R_{Ay} = P - 1.25P = -0.25P$$

$$R_{Ay} = -0.25P$$

$0 < x < l$

$$F_s = R_{Ay}$$

$$T_b = R_{Ay} \cdot x$$

for  $x=0$

$$T_b = 0$$

for  $x=l$

$$T_b = -0.25P \cdot l$$

$x=0$   
 $x=l$  }  $F_s = 0.25P$

$l < x < 2l$

$$F_s = R_{Ay}$$

$$T_b = R_{Ay} \cdot x - M$$

for  $x=l$

$$T_b = -0.25P \cdot l - 0.5P \cdot l$$

$$T_b = -0.75P \cdot l$$

for  $x=2l$

$$T_b = -0.25P \cdot 2l - 0.5P \cdot l$$

$$T_b = -0.5P \cdot l - 0.5P \cdot l$$

$$T_b = -P \cdot l$$

$x=l$   
 $x=2l$  }  $F_s = -0.25P$

$2l < x < 3l$

$$F_s = R_{Ay} + R_B$$

$$T_b = R_{Ay} \cdot x - M + R_B(x - 2l)$$

for  $x=2l$

$$T_b = -0.25P \cdot 2l - 0.5P \cdot l + 0$$

$$T_b = -P \cdot l$$

for  $x=3l$

$$T_b = -0.25P \cdot 3l - 0.5P \cdot l + 1.25P \cdot l$$

$$T_b = -0.75P \cdot l - 0.5P \cdot l + 1.25P \cdot l$$

$$T_b = 0$$

$x=2l$   
 $x=3l$  }  $F_s = -0.25P + 1.25P$

$$F_s = P$$

$$\sigma = \frac{T_{b,max}}{I_z} \cdot y_{max} \leq k_g \quad \text{db } \begin{matrix} \text{trgo} \\ \text{pokoju} \end{matrix}$$

$$\frac{P \cdot l}{53147 \cdot a^4} \cdot k_g \leq k_g \quad \Rightarrow \quad \frac{4 \cdot P \cdot l}{53147 \cdot k_g} \cdot a \geq \sqrt[3]{\frac{4 \cdot P \cdot l}{53147 \cdot k_g}}$$