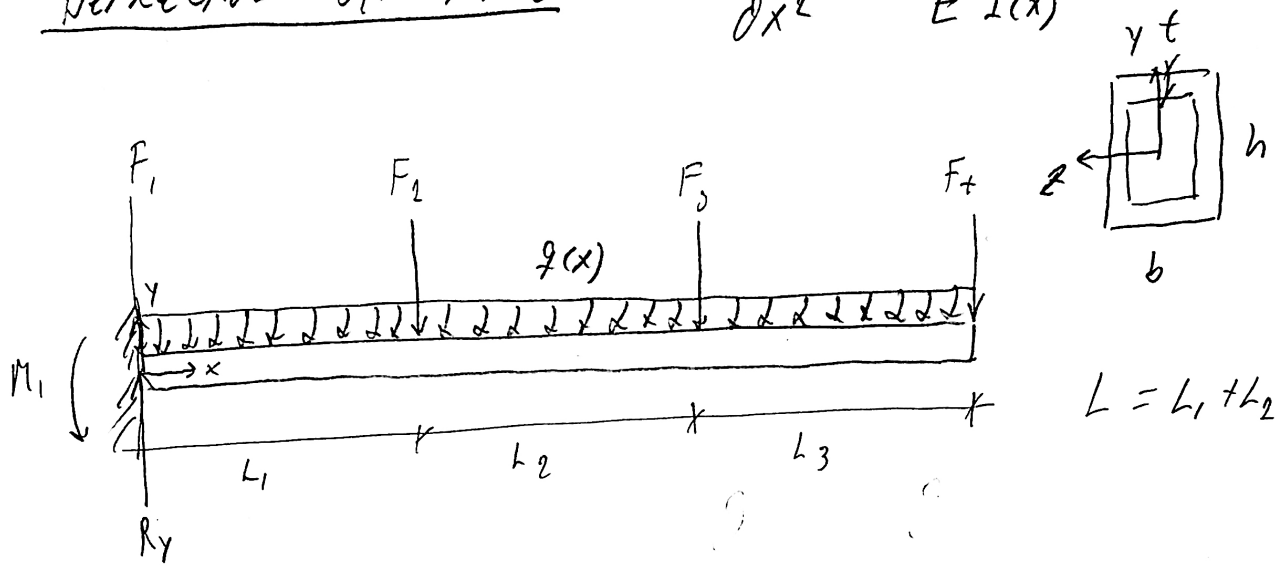
Deflection of Arm

$$\frac{d^2v(x)}{dx^2} = \frac{M(x)}{E\,I(x)}$$



$L = L_1 + L_2 + L_3$

$F_1 = (m_3^{(1)} + m_m^{(1)} + m_j^{(1)})g$ (gear + motor + joint) × gravity

$$q(x) = \frac{m_b g}{L}x = \frac{\overbrace{1\,(bh-(b-2t)(h-2t))\rho_b g}^{V_b}}{L}x = \underbrace{A_b \rho_b g}_{q}$$

q ← Load Intensity

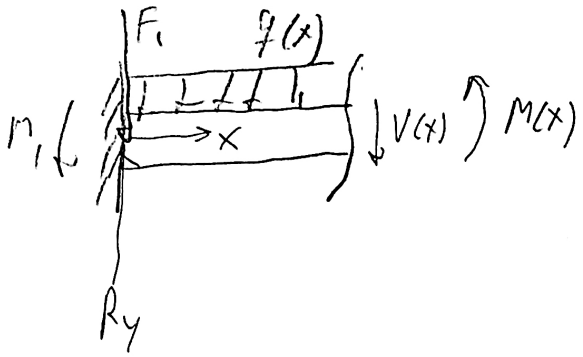
A_b : Beam cross section area

$$\sum F_y = 0 = R_y - F_1 - F_2 - F_3 - F_t - A_b\rho_b L \Rightarrow R_y = F_1 + F_2 + F_3 + F_t + q\,L$$

$$\sum M_z = 0 = M_1 - L_1F_2 - (L_1+L_2)F_3 - LF_t - \frac{L}{2}qL$$

$$\Rightarrow M_1 = L_1F_2 + (L_1+L_2)F_3 + LF_t + \frac{L}{2}qL$$

Snitt 1 $\rightarrow x \in [0, L_1\rangle$



$$V(x) = R_y - F_1 - qx$$

$$M(x) = R_y x - F_1 x - qx\frac{x}{2} - M_1$$

Snitt 2 $x \in [L_1, L_1 + L_2\rangle$

$$V(x) = R_y - F_1 - F_2 - qx$$

$$M(x) = R_y x - F_1 x - F_2(x - L_1) - qx\frac{x}{2} - M_1$$

Snitt 3 $x \in [L_2 + L_2, L]$

$$V(x) = R_y - F_1 - F_2 - F_3 - qx - M_1$$