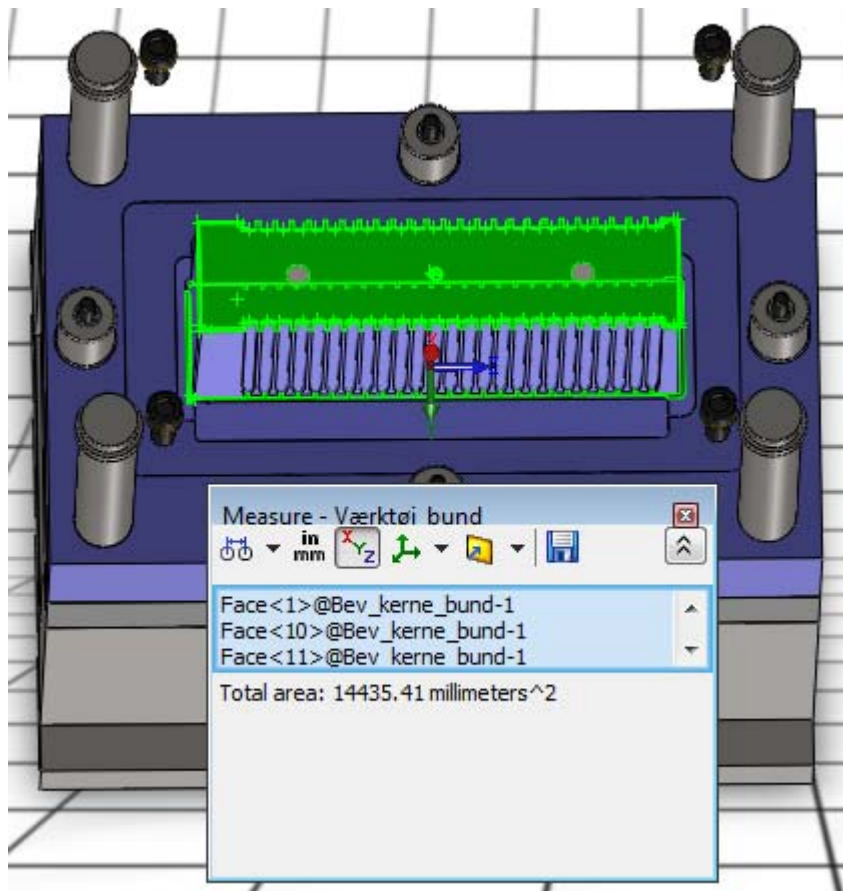


# Designing support pillars



$$A_1 := 14435.4 \text{ mm}^2 \text{ (Projected area of the molding)}$$

$$P_1 := 100 \text{ MPa} \text{ (Injection pressure)}$$

$$F_1 := A_1 \cdot P_1 = 1.444 \times 10^3 \cdot \text{kN}$$

$$F_{\text{ton}} := 350.78 \text{ kN} = 35.77 \text{ tonnef}$$

Two pieces of Ø35 x 140 mm support pillars made from UHB11 is to be used.

$$E_{\text{UHB11}} := 210\text{GPa} \quad (\text{Youngs module of the steel the support pillars are made from})$$

$$A_{\text{pillar}} := \pi \cdot (0.035\text{m})^2 = 3.848 \times 10^{-3} \text{m}^2$$

$$\sigma_{\text{pillar}} := \frac{\frac{F_1}{2}}{A_{\text{pillar}}} = 187.548 \cdot \text{MPa}$$

$$\epsilon_1 := \frac{\sigma_{\text{pillar}}}{E_{\text{UHB11}}} = 0.00089 \text{ (stress)}$$

$$\delta_{\text{compression}} := \epsilon_1 \cdot 140\text{mm} = 0.125 \cdot \text{mm}$$

$$I_{\text{moment}} := \frac{1}{12} \cdot 0.2447\text{m} \cdot (0.18204\text{m})^3 = 1.23 \times 10^{-4} \text{m}^4$$

$$\delta_{\text{bending}} := \frac{F_1 \cdot (0.198\text{m})^3}{48 \cdot 210\text{GPa} \cdot I_{\text{moment}}} = 0.009 \cdot \text{mm}$$

$$\text{Preload} := \delta_{\text{compression}} = 0.125 \text{ mm}$$

$$0.125\text{mm} = 0.00492 \text{ in}$$