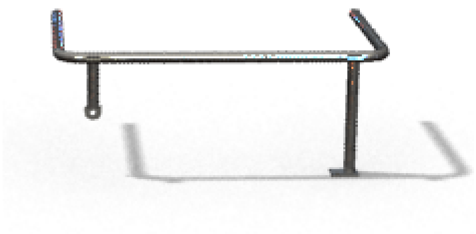
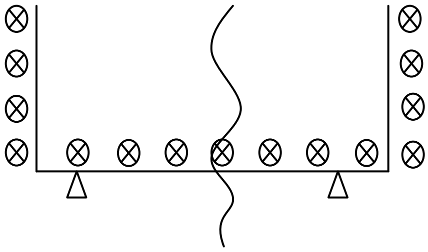
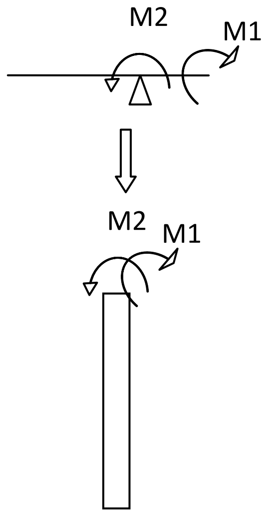
The current chair base is a symmetrical problem:





This problem can be simplified to a beam that subjected to bending moments in two directions:



Relevant equations for the problem:

$$M1 = \int_0^{l1} l \cdot q dl = \frac{q l_1^2}{2}$$

$$M2 = \int_0^{\frac{l2}{2}} l \cdot q dl = \frac{q l_2^2}{4}$$

$$\sigma = \frac{M1 \cdot c}{I} + \frac{M2 \cdot c}{I}$$

$$I = \frac{\pi \cdot (D^4 - d^4)}{64} = 12771[mm^4]$$

$$\sigma_y = \frac{q l_1^2 \cdot c}{2I} + \frac{q l_2^2 \cdot c}{4I}$$

$$q_{max} = \frac{4\sigma_y \cdot I}{c \cdot (2 l_1^2 + l_2^2)} = 1.666[\frac{N}{mm}]$$

Total length= 1625[mm]

W= Total length *q_max=2700 [N]

Geometrical dimensions:

$l_1 \ = 450[mm]$

$l_2 \ = 575[mm]$

$c = 12.5[mm]$

$D = 25[mm]$

$d = 19[mm]$

$\sigma_{y_{high\_steel}} = 300[MPa]$