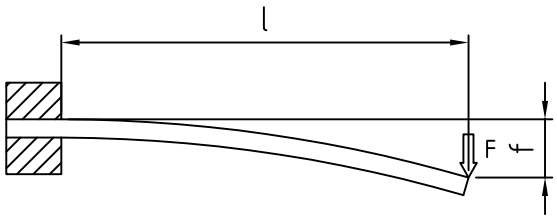
Load case 1 - clamped at one end



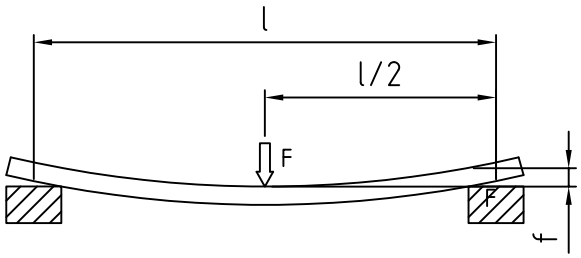
Deflection due to its own dead weight

$$f = \frac{m \cdot g \cdot l^4}{8 \cdot E \cdot I \cdot 10^4}$$

Deflection due to load F

$$f = \frac{F \cdot l^3}{3 \cdot E \cdot I \cdot 10^4}$$

Load case 2 - supported at both ends



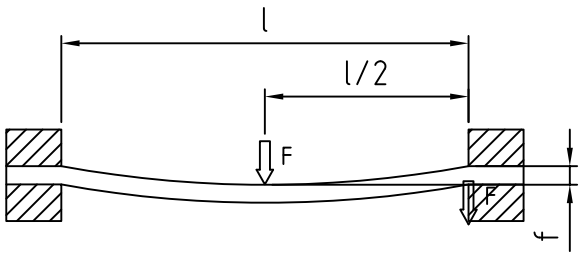
Deflection due to its own dead weight

$$f = \frac{5 \cdot m \cdot g \cdot l^4}{384 \cdot E \cdot I \cdot 10^4}$$

Deflection due to load F

$$f = \frac{F \cdot l^3}{48 \cdot E \cdot I \cdot 10^4}$$

Load case 3 - clamped at both ends



Deflection due to its own dead weight

$$f = \frac{m \cdot g \cdot l^4}{384 \cdot E \cdot I \cdot 10^4}$$

Deflection due to load F

$$f = \frac{F \cdot l^3}{192 \cdot E \cdot I \cdot 10^4}$$

F = load in N
m = weight of profile per metre in kg/m
g = Gravitional acceleration is 9,81 m/s²
l = Length over which load is applied, in mm
I = Geometrical moment of inertia in cm⁴
E = Modulus of inertia in N/mm²
(E = 70000 N/mm²
s = Bending sress N/mm²
s_{zul} = maximum permissible bending stress in N/mm²
M_b = max. bending moment in Nmm
W = Section modulus in cm³
$Rp_{0,2\,Al}$ = 195 N/mm²
S = Safety margin, depending on conditions of use

Checking bending stress

$$s = \frac{M_b}{W \cdot 10^3} \qquad s = \frac{Rp_{0,2\,Al}}{S}$$

!!! The overall strength of a construction is determined by the strength of its joints, not by that of its profiles !!!