

Basics for Calculating the Forces and Moments

Forces (**F**) result if

a mass (**m**) being accelerated (**a**).

a mass (**m**) being accelerated due to gravity (**a**).

This means:

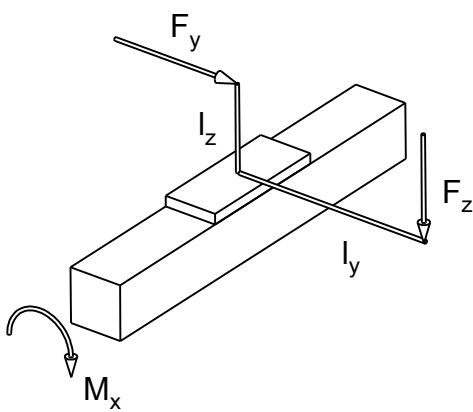
$$F_x, F_y = m \cdot a$$

$$F_z = m \cdot (g + a)$$

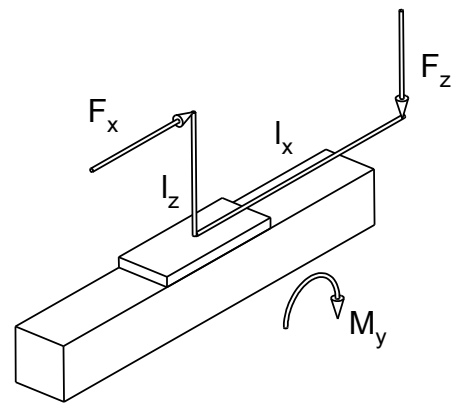
(vertical applications)

A moment is caused by a force (**F**) acting upon a lever arm (**l**).

This means a force is acting off-centre.

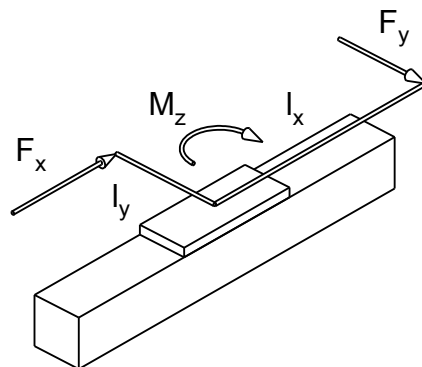


$$M_x = F_y \cdot l_z \text{ or } F_z \cdot l_y$$



$$M_y = F_x \cdot l_z$$

$$M_y = F_z \cdot l_x$$



$$M_z = F_x \cdot l_y$$

$$M_z = F_y \cdot l_x$$

In most of the applications, there are combinations of these forces.

The resulting end forces must always be smaller than the permitted values.

For calculating service life, the actual forces are used.

(See following pages)