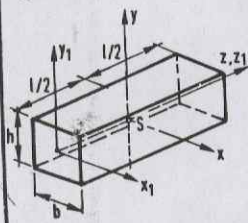


Tafel 4.1

Masse und Massenmomente 2. Ordnung von Starrkörpern

Quader



$$m = \rho bhl$$

$$J_{x_1 x_1} = \frac{1}{12} m h^2 + \frac{1}{3} m l^2$$

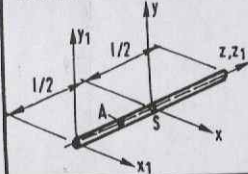
$$J_{y_1 y_1} = \frac{1}{12} m b^2 + \frac{1}{3} m l^2$$

$$J_{z_1 z_1} = J_{zz} = \frac{1}{12} m (b^2 + h^2)$$

$$J_{yy} = \frac{1}{12} m (b^2 + l^2)$$

$$J_{xx} = \frac{1}{12} m (h^2 + l^2)$$

Dünner Stab

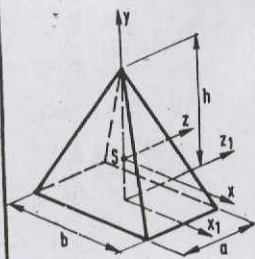


$$m = \rho A l$$

$$J_{x_1 x_1} = J_{y_1 y_1} = \frac{1}{3} m l^2$$

$$J_{xx} = J_{yy} = \frac{1}{12} m l^2$$

Pyramide über Rechteck



$$m = \frac{1}{3} \rho a b h$$

$$\bar{y}_{1s} = \frac{1}{4} h$$

$$J_{x_1 x_1} = \frac{1}{20} m (a^2 + 2h^2)$$

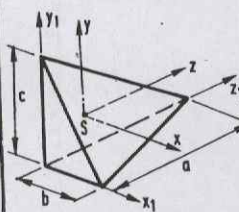
$$J_{y_1 y_1} = J_{yy} = \frac{1}{20} m (a^2 + b^2)$$

$$J_{z_1 z_1} = \frac{1}{20} m (b^2 + 2h^2)$$

$$J_{xx} = \frac{1}{80} m (4a^2 + 3h^2)$$

$$J_{zz} = \frac{1}{80} m (4b^2 + 3h^2)$$

Pyramiden Abschnitt (Prisma)



$$m = \frac{1}{6} \rho a b c$$

$$J_{x_1 x_1} = \frac{1}{10} m (a^2 + c^2)$$

$$J_{y_1 y_1} = \frac{1}{10} m (a^2 + b^2)$$

$$J_{z_1 z_1} = \frac{1}{10} m (b^2 + c^2)$$

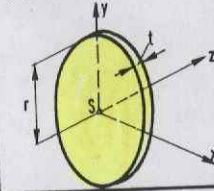
$$J_{xx} = \frac{3}{80} m (a^2 + c^2)$$

$$J_{yy} = \frac{3}{80} m (a^2 + b^2)$$

$$J_{zz} = \frac{3}{80} m (b^2 + c^2)$$

$$\bar{x}_{1s} = \frac{b}{4}, \bar{y}_{1s} = \frac{c}{4}, \bar{z}_{1s} = \frac{a}{4}$$

Kreisscheibe (dünnwandig)

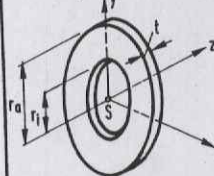
 $t \ll r$ 

$$m = \rho \pi r^2 t$$

$$J_{xx} = J_{yy} = \frac{1}{4} m r^2$$

$$J_{zz} = \frac{1}{2} m r^2$$

Ringkreisscheibe (dünnwandig)

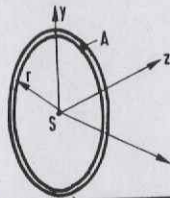
 $t \ll r_a$ 

$$m = \rho \pi t (r_a^2 - r_i^2)$$

$$J_{xx} = J_{yy} = \frac{1}{4} m (r_a^2 + r_i^2)$$

$$J_{zz} = \frac{1}{2} m (r_a^2 + r_i^2)$$

Dünner Ringstab

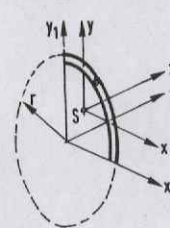


$$m = 2 \rho \pi r A$$

$$J_{xx} = J_{yy} = \frac{1}{2} m r^2$$

$$J_{zz} = m r^2$$

Kreisförmiger Viertelstab



$$m = \frac{1}{2} \rho \pi r A$$

$$\bar{x}_{1s} = \bar{y}_{1s} = \frac{2}{\pi} r$$

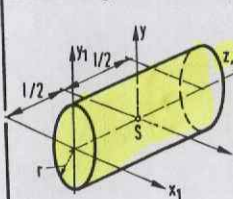
$$J_{x_1 x_1} = J_{y_1 y_1} = \frac{1}{2} m r^2$$

$$J_{z_1 z_1} = m r^2$$

$$J_{xx} = J_{yy} = \frac{1}{2} m r^2 \left[1 - \left(\frac{4}{\pi} \right)^2 \right]$$

$$J_{zz} = \frac{1}{2} m r^2 \left[1 - \frac{8}{\pi^2} \right]$$

Kreisförmiger Vollzylinder



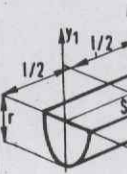
$$m = \rho \pi r^2 l$$

$$J_{x_1 x_1} = J_{y_1 y_1} = \frac{1}{4} m r^2 + \frac{1}{3} m l^2$$

$$J_{z_1 z_1} = J_{zz} = \frac{1}{2} m r^2$$

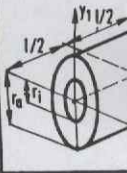
$$J_{xx} = J_{yy} = \frac{1}{4} m r^2 + \frac{1}{12} m l^2$$

Kreisförmiger



$$\bar{y}_{2s} = -\frac{4r}{3\pi}$$

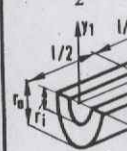
Dickwandiger



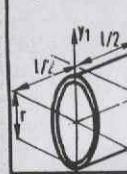
Dickwandiger

Hohlzylinder

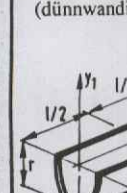
$$m = \frac{1}{2} \rho \pi l (r_a^2 - r_i^2)$$



Zylinderscheibe



Halbzylinder (dünnwandig)



$$\bar{y}_{2s} = -\frac{2r}{\pi}$$