$d_c := 120\ mm$

$div := 500$

$d_l := 10\ mm$

$R := \frac{d_c}{2}$

$r := \frac{d_l}{2}$

$H := \sqrt{R^2 - r^2} = 59.791\ mm$

$S_{A2x} := \int_0^H y \cdot \left(\sqrt{R^2 - y^2} - r\right) \mathrm{d}y = 63020.811\ mm^3$

$A_2 := \int_0^{R-r} \left(\sqrt{R^2 - y^2} - r\right) \mathrm{d}y = 2471.812\ mm^2$

$y_{G2} := \frac{S_{A2x}}{A_2} = 25.496\ mm$

$h := 6\ mm$

$AI := \frac{1}{4} \cdot \frac{\pi \cdot d_c^2}{4} = \left(2.827 \cdot 10^3\right)\ mm^2$

$AII := \frac{d_l}{2} \cdot h = 30\ mm^2$

$AIII := \frac{1}{2} \cdot \frac{d_l}{2} \cdot \frac{d_l}{2} \cdot \tan(30\ deg) = 7.217\ mm^2$

$A_1 := AI - AII - AIII = 2790.217\ mm^2$

$y_{GI} := \frac{2}{3} \cdot \frac{d_c}{\pi} = 25.465\ mm$

$y_{GII} := \frac{h}{2} = 3\ mm$

$y_{GIII} := h + \frac{d_l}{2} \cdot \tan(30\ deg) \cdot \frac{1}{3} = 6.962\ mm$

$y_{G1} := \frac{y_{GI} \cdot AI - y_{GII} \cdot AII - y_{GIII} \cdot AIII}{A_1} = 25.754\ mm$

$y_{pG} := \frac{A_2 \cdot \left(y_{G1} + y_{G2}\right)}{A_1 + A_2} = 24.074\ mm$

$y_G := y_{G1} - y_{pG} = 1.68\ mm$

$J_{A2n} := 2 \cdot \int_0^{H+y_G} y^2 \cdot \left(\sqrt{R^2 - \left(y - y_G\right)^2} - r\right) \mathrm{d}y = \left(4.81 \cdot 10^6\right)\ mm^4$

$J_{A1pn} := 2 \cdot \int_0^{R-y_G} y^2 \cdot \left(\sqrt{R^2 - \left(y + y_G\right)^2} - r\right) \mathrm{d}y = \left(3.96 \cdot 10^6\right)\ mm^4$

$J_{rn} := \frac{d_l \cdot \left(h - y_G\right)^3}{12} + \left(h - y_G\right) \cdot d_l \cdot \left(\frac{h - y_G}{2}\right)^2 = 268.783\ mm^4$

$J_{Tn} := \frac{d_l \cdot \left(r \cdot \tan(30\ deg)\right)^3}{36} + \frac{d_l \cdot r \cdot \tan(30\ deg)}{2} \cdot \left(\frac{r \cdot \tan(30\ deg)}{3} + \left(h - y_G\right)\right)^2 = 409.452\ mm^4$

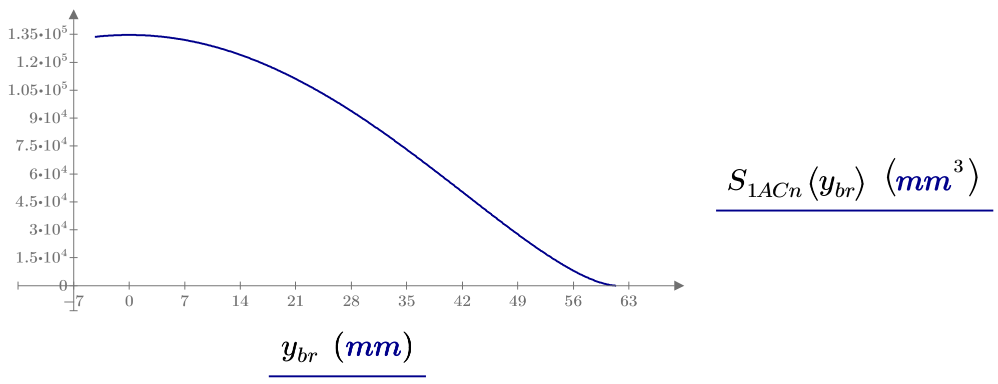
$J_{ACn} := J_{A2n} + J_{A1pn} - J_{rn} - J_{Tn} = \left(8.769 \cdot 10^6\right)\ mm^4$

$$J_{XX} := \frac{\pi \cdot d_c^{\,4}}{64} = \left(1.018 \cdot 10^{7}\right)\ mm^{4}$$

$$p := 100 \cdot \frac{J_{XX} - J_{ACn}}{J_{XX}} = 13.846$$

$$y_{br} := -\left(h - y_G\right), -\left(h - y_G\right) + \frac{H + y_G - \left(h - y_G\right)}{div} .. H + y_G$$

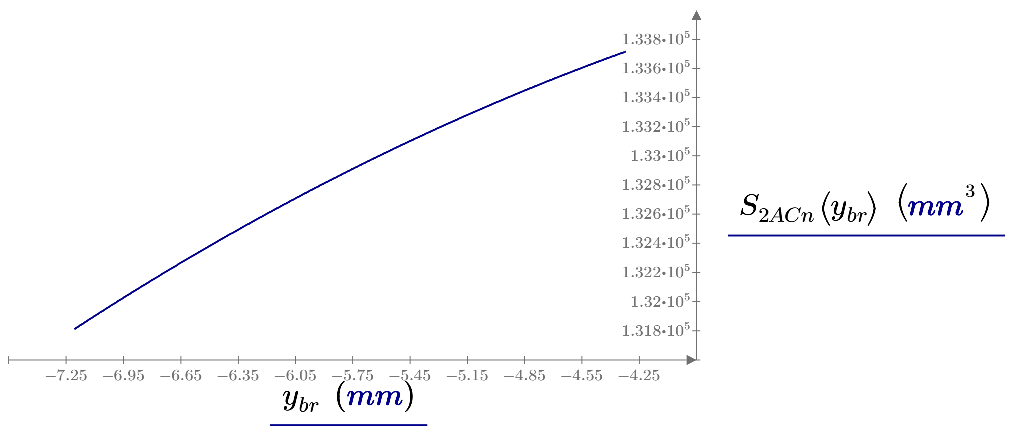
$$S_{1ACn}\left(y_{br}\right) := 2 \cdot \int_{y_{br}}^{H + y_G} y \cdot \left(\sqrt{R^2 - \left(y - y_G\right)^2} - r\right) \mathrm{d}y$$



$$S_{1ACn}(0) = \left(1.347 \cdot 10^{5}\right)\ mm^{3}$$

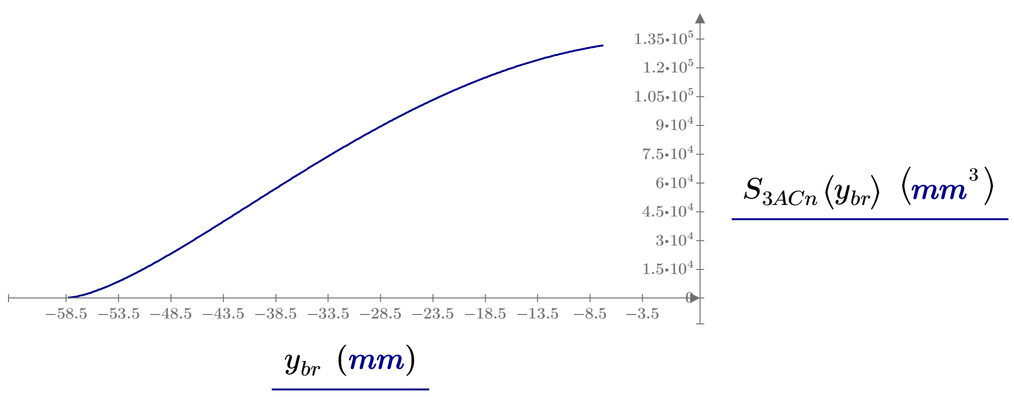
$$y_{br} := -\left(\left(h - y_G\right) + r \cdot \tan(30\ deg)\right), -\left(\left(h - y_G\right) + r \cdot \tan(30\ deg)\right) + \frac{-\left(h - y_G\right) + \left(\left(h - y_G\right) + r \cdot \tan(30\ deg)\right)}{div} .. -\left(h - y_G\right)$$

$$S_{2ACn}\left(y_{br}\right) := 2 \cdot \int_{-\left(h - y_G\right)}^{H + y_G} y \cdot \left(\sqrt{R^2 - \left(y - y_G\right)^2} - r\right) \mathrm{d}y + 2 \cdot \int_{-y_{br}}^{-\left(h - y_G\right)} y \cdot \left(\sqrt{R^2 - \left(|y| + y_G\right)^2} - r + \frac{|y| - \left(h - y_G\right)}{\tan(30\ deg)}\right) \mathrm{d}y$$



$$y_{br} := -\left(R - y_G\right), -\left(R - y_G\right) + \frac{-r \cdot \tan(30\ deg) - \left(h - y_G\right) + \left(R - y_G\right)}{div} .. -r \cdot \tan(30\ deg) - \left(h - y_G\right)$$

$$S_{3ACn}\left(y_{br}\right) := 2 \cdot \int_{-\left(h - y_G\right)}^{H + y_G} y \cdot \left(\sqrt{R^2 - \left(y - y_G\right)^2} - r\right) \mathrm{d}y + 2 \cdot \int_{-\left(\left(h - y_G\right) + r \cdot \tan(30\ deg)\right)}^{-\left(h - y_G\right)} y \cdot \left(\sqrt{R^2 - \left(|y| + y_G\right)^2} - r + \frac{|y| - \left(h - y_G\right)}{\tan(30\ deg)}\right) \mathrm{d}y + 2 \cdot \int_{-y_{br}}^{-\left(\left(h - y_G\right) + r \cdot \tan(30\ deg)\right)} y \cdot \left(\sqrt{R^2 - \left(|y| + y_G\right)^2}\right) \mathrm{d}y$$



$S_{3ACn}(R-y_G)=185.792\ mm^3$

$S_{3ACn}(0)=\left(1.349 \cdot 10^5\right)\ mm^3$

$\dfrac{S_{3ACn}(R-y_G)}{S_{3ACn}(0)} \cdot 100=0.138$

Calcolo del taglio

$G_u:=55000\ kgf$

$G_i:=227\ kgf$

$G_g:=180\ kgf$

$l:=257\ mm$

$l_p:=(84\ mm-13\ mm) \cdot 3=213\ mm$

$q:=\dfrac{G_u+G_i+G_g}{l_p}=260.127\ \dfrac{kgf}{mm}$

$q_S:=\dfrac{G_u+G_i+G_g}{l}=215.591\ \dfrac{kgf}{mm}$

$\dfrac{q-q_S}{q} \cdot 100=17.121$

$a:=70\ mm$

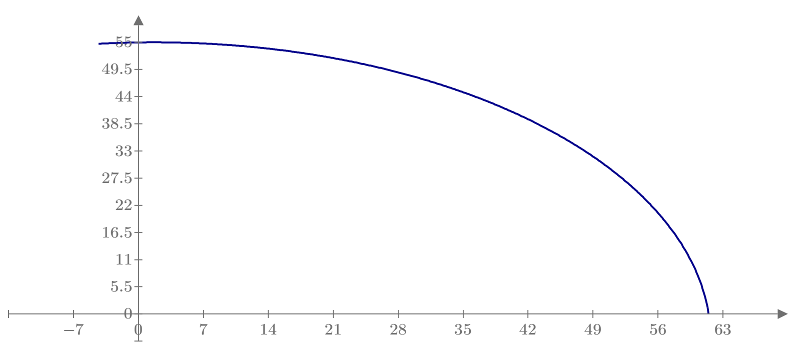
$q_p:=\dfrac{q \cdot l}{2\ a}=477.518\ \dfrac{kgf}{mm}$

$f:=43.25\ mm$

$T_{AA}:=q_p \cdot a-q \cdot f=\left(2.218 \cdot 10^4\right)\ kgf$

$y_{br}:=-(h-y_G),-(h-y_G)+\dfrac{H+y_G+(h-y_G)}{div}..H+y_G$

$b_r(y_{br}):=\sqrt{R^2-(y_{br}-y_G)^2}-r$



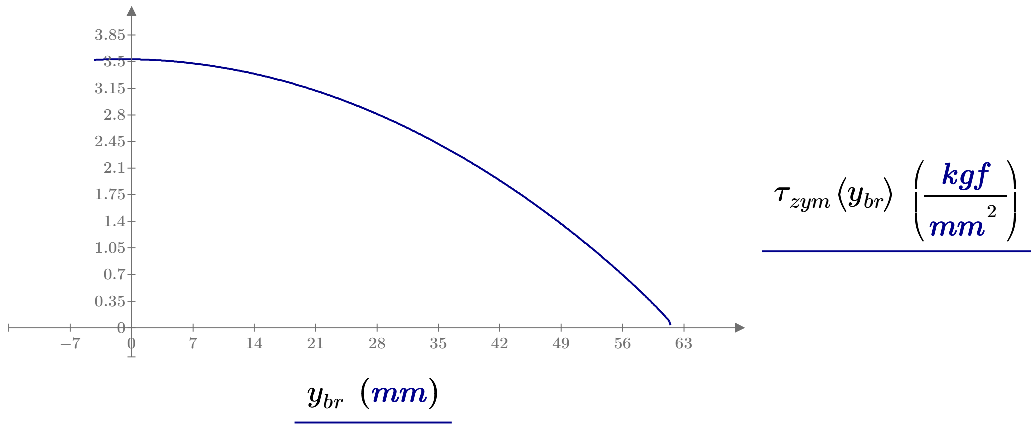
$b_r(y_{br})\ (mm)$

$y_{br}\ (mm)$

$b_r(y_G)=55\ mm$

$S_{1ACn}(y_{br}):=2 \cdot \displaystyle\int_{y_{br}}^{H+y_G} y \cdot \left(\sqrt{R^2-(y-y_G)^2}\right) \mathrm{d}y$

$$\tau_{zym}(y_{br}) := \frac{\frac{T_{AA}}{2}}{\frac{J_{ACn}}{2}} \cdot \frac{S_{1ACn}(y_{br})}{2\ b_r(y_{br})}$$



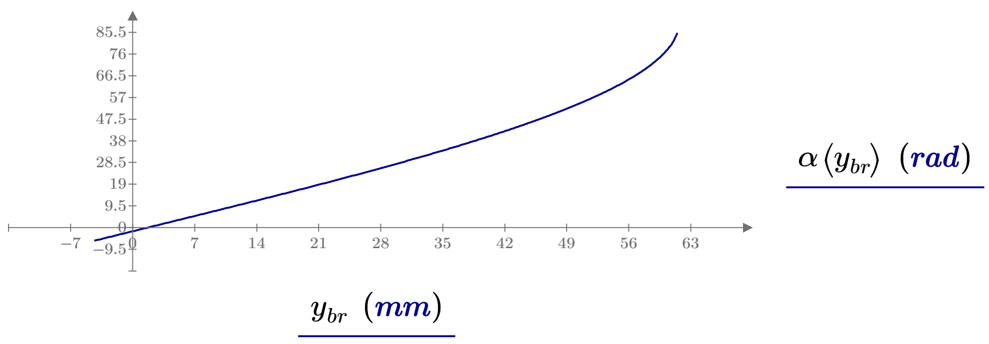
In corrispondenza dell'asse neutro

$$\tau_{zym}(0) = 3.532\ \frac{kgf}{mm^2}$$

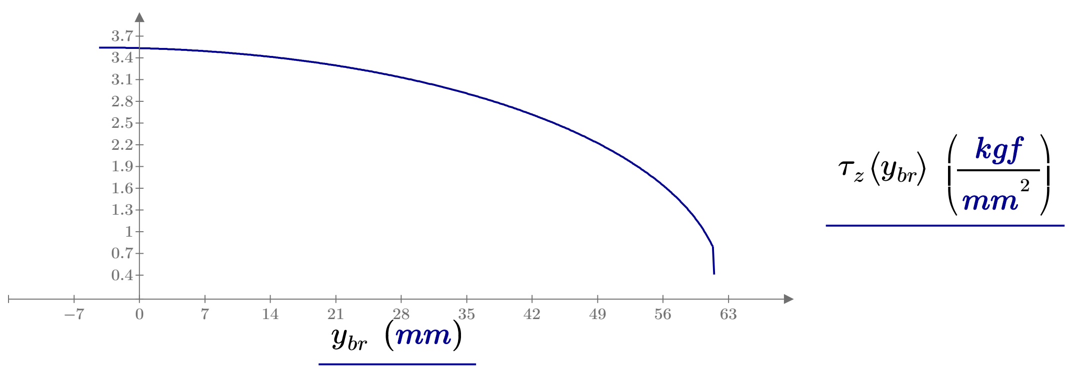
$$\tau_m := \frac{T_{AA}}{2 \cdot (A_1 + A_2)} = 2.107\ \frac{kgf}{mm^2}$$

$$\alpha(y_{br}) := \frac{180}{\pi} \cdot \operatorname{atan}\left(\frac{y_{br} - y_G}{b_r(y_{br}) + r}\right)$$

$$\alpha(y_G) = 0$$



$$\tau_z(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(\alpha(y_{br})\ deg)}$$



$$\tau_z(0) = 3.534\ \frac{kgf}{mm^2} \qquad \tau_z(-(h - y_G)) = 3.542\ \frac{kgf}{mm^2}$$

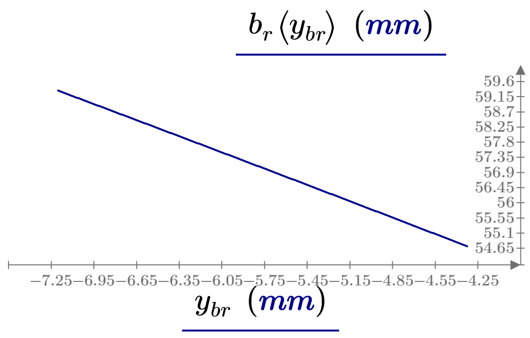
Valuto le tensioni ti taglio nel tratto di generatrice conica

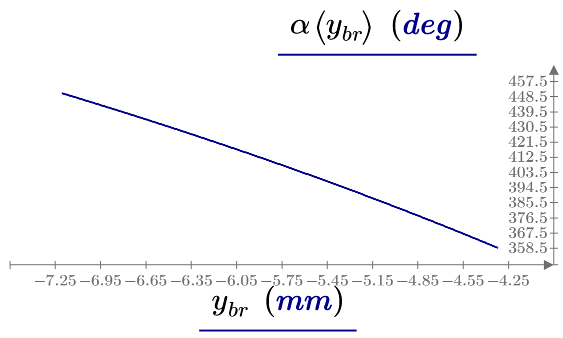
$$y_{br} := -r \cdot \tan(30\ deg) - (h - y_G), -r \cdot \tan(30\ deg) - (h - y_G) + \frac{r \cdot \tan(30\ deg)}{div} .. -(h - y_G)$$

div

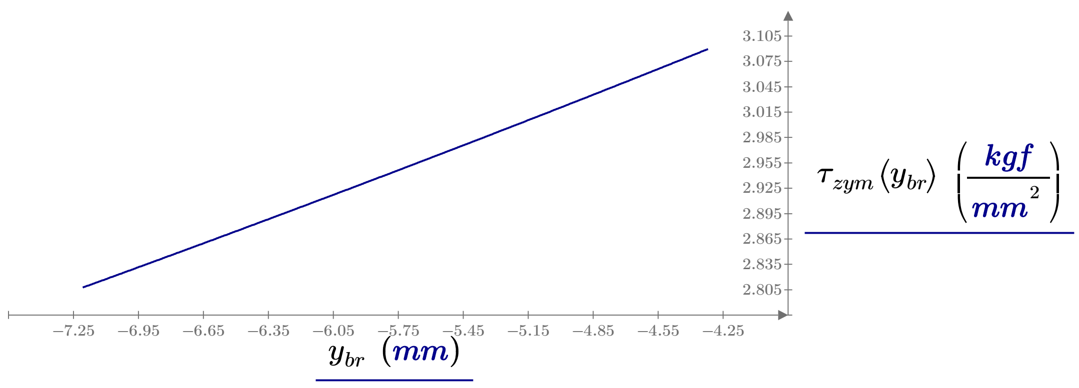
$$S_{2ACn}(y_{br}) := 2 \cdot \int_{-(h-y_G)}^{H+y_G} y \cdot \left(\sqrt{R^2-(y-y_G)^2}-r\right) \mathrm{d}y + 2 \cdot \int_{-y_{br}}^{-(h-y_G)} y \cdot \left(\sqrt{R^2-(|y|+y_G)^2}-r+\frac{|y|-(h-y_G)}{\tan(30\ deg)}\right) \mathrm{d}y$$

$$b_r(y_{br}) := \sqrt{R^2-(|y_{br}|+y_G)^2}-r+\frac{|y_{br}|-(h-y_G)}{\tan(30\ deg)} \qquad \alpha(y_{br}) := \frac{180}{\pi} \cdot \mathrm{atan}\left(\frac{|y_{br}|+y_G}{b_r(y_{br})+\frac{|y_{br}|-(h-y_G)}{\tan(30\ deg)}}\right)$$



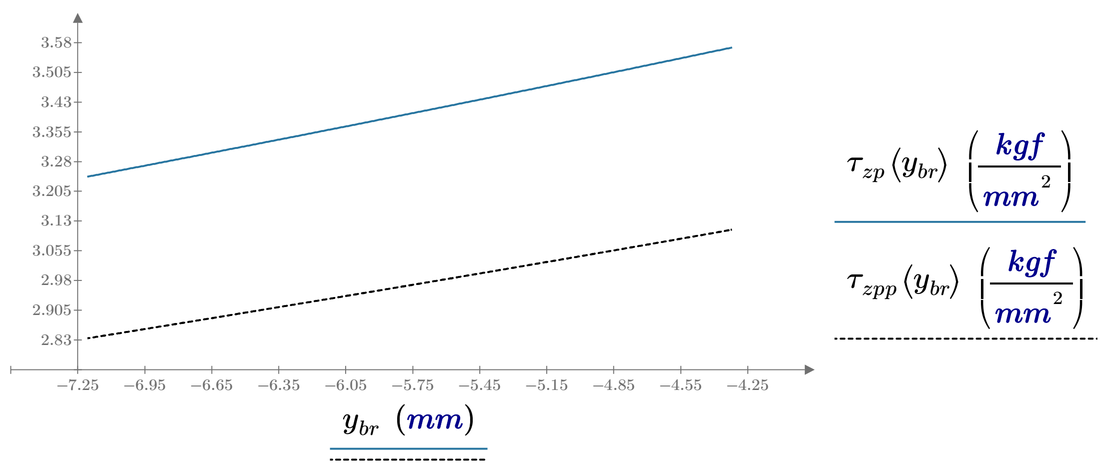


$$\tau_{zym}(y_{br}) := \frac{\frac{T_{AA}}{2}}{\frac{J_{ACn}}{2}} \cdot \frac{S_{2ACn}(y_{br})}{2 \cdot b_r(y_{br})}$$



$$\tau_{zp}(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(30\ deg)}$$

$$\tau_{zpp}(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(\alpha(y_{br})\ deg)}$$



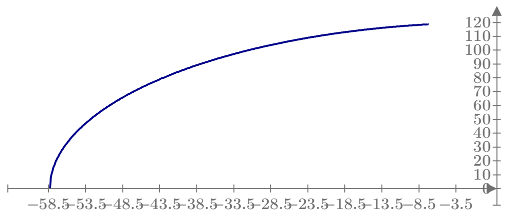
$$\tau_{zp}(-(h-y_G)) = 3.568\ \frac{kgf}{mm^2}$$

$$y_{br} := y_G - R, y_G - R + \frac{R - h - r \cdot \tan(30\ deg)}{div} .. -(h - y_G) - r \cdot \tan(30\ deg)$$

$$b_r(y_{br}) := 2 \cdot \sqrt{R^2 - (|y_{br}| + y_G)^2}$$

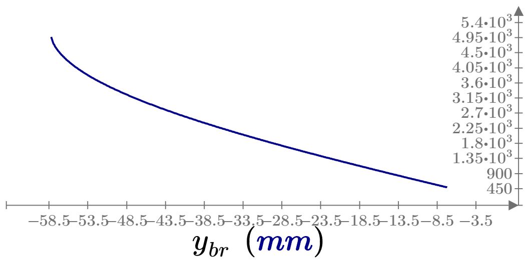
$$\alpha(y_{br}) := \frac{180}{\pi} \operatorname{atan}\left(\frac{|y_{br}| + y_G}{\frac{b_r(y_{br})}{2}}\right)$$

$b_r(y_{br})\ (mm)$



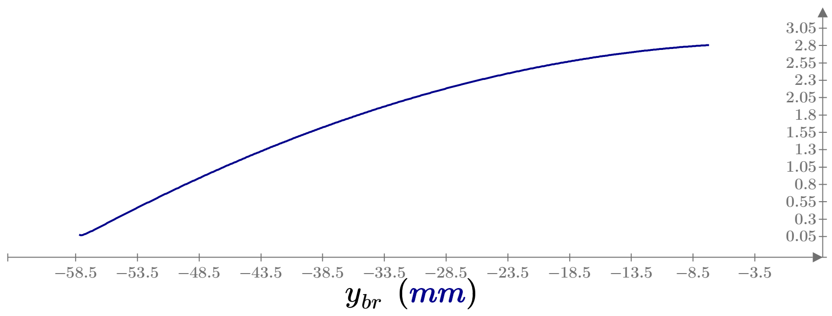
$y_{br}\ (mm)$

$\alpha(y_{br})\ (deg)$



$y_{br}\ (mm)$

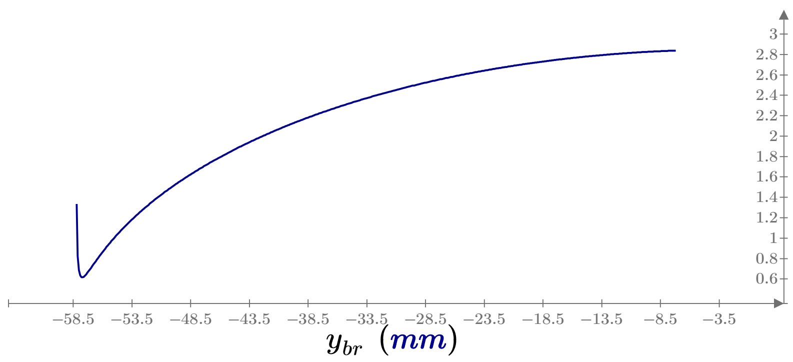
$$\tau_{zym}(y_{br}) := \frac{T_{AA}}{J_{ACn}} \cdot \frac{S_{3ACn}(y_{br})}{b_r(y_{br})}$$



$\tau_{zym}(y_{br})\ \left(\frac{kgf}{mm^2}\right)$

$y_{br}\ (mm)$

$$\tau_z(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(\alpha(y_{br}) \cdot deg)}$$



$\tau_z(y_{br})\ \left(\frac{kgf}{mm^2}\right)$

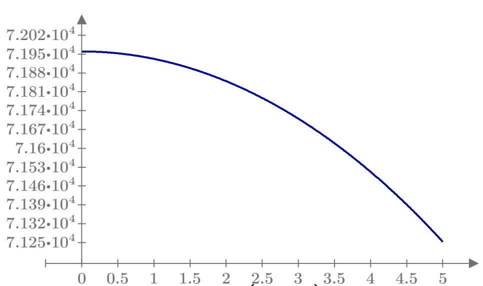
$y_{br}\ (mm)$

$$y_{br} := 0, \frac{r}{div} .. r$$

$$S_{nr1}(y_{br}) := \int_{y_{br}}^{r} y \cdot \left(\sqrt{R^2 - y^2} - \sqrt{r^2 - y^2}\right) \mathrm{d}y + \int_{r}^{R} y \cdot \sqrt{R^2 - y^2}\ \mathrm{d}y$$

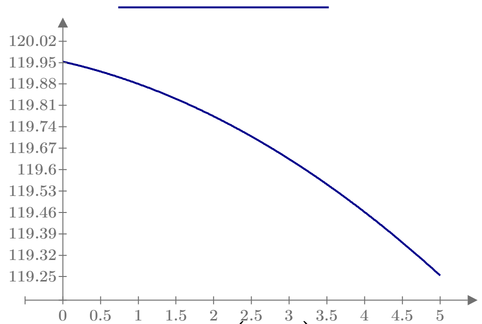
$$b_{r1}(y_{br}) := \sqrt{R^2 - y_{br}^2} - \sqrt{r^2 - y_{br}^2}$$

$S_{nr1}(y_{br})\ (mm^3)$



$y_{br}\ (mm)$

$b_r(y_{br})\ (mm)$



$y_{br}\ (mm)$

$b_{r1}(0\ mm) = 55\ mm \qquad S_{nr1}(0\ mm) = (7.196 \cdot 10^4)\ mm^3$

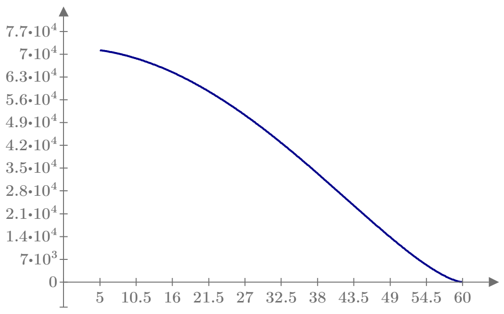
$b_{r1}(r) = 59.791\ mm \qquad S_{nr1}(r) = (7.125 \cdot 10^4)\ mm^3$

$$y_{br} := r, r + \frac{R - r}{div} .. R$$

$$S_{nr2}(y_{br}) := \int_{y_{br}}^{R} y \cdot \sqrt{R^2 - y^2} \, \mathrm{d}y$$

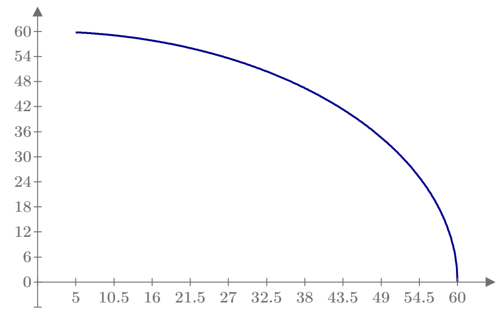
$$b_{r2}(y_{br}) := \sqrt{R^2 - {y_{br}}^2}$$

$S_{nr2}(y_{br})$ (mm^3)



y_{br} (mm)

$b_{r2}(y_{br})$ (mm)



y_{br} (mm)

$b_{r2}(r) = 59.791 \ mm$

$b_{r2}(R) = 0 \ mm$

$d_c = 120 \ mm$

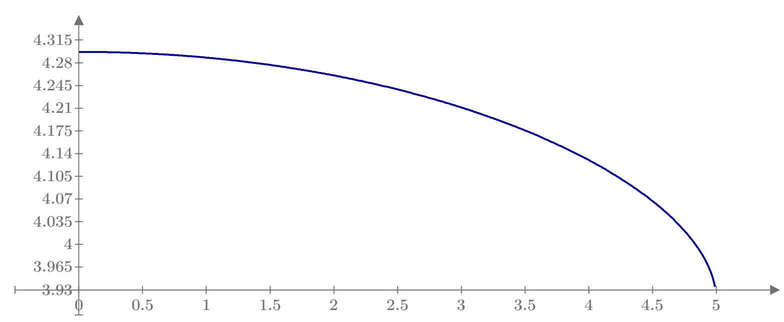
$d_l = 10 \ mm$

$$y_{br} := 0, \frac{r}{div} .. r - \frac{r}{div}$$

$$T_{BB} := q_p \cdot a = (3.343 \cdot 10^4) \ kgf$$

$$J_{Bn} := \frac{\pi}{64} \cdot ({d_c}^4 - {d_l}^4) = (1.018 \cdot 10^7) \ mm^4$$

$$\tau_{zym}(y_{br}) := \frac{\frac{T_{BB}}{2}}{\frac{J_{Bn}}{2}} \cdot \frac{S_{nr1}(y_{br})}{b_{r1}(y_{br})}$$



$\tau_{zym}(y_{br})$ $\left(\frac{kgf}{mm^2}\right)$

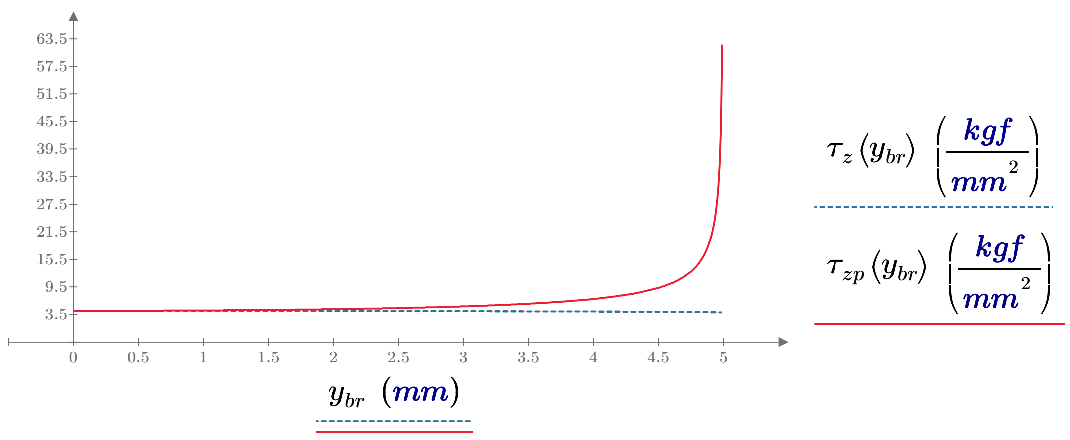
y_{br} (mm)

$$\tau_{zym}(0 \ mm) = 4.297 \ \frac{kgf}{mm^2}$$

$$\tau_{zym}(r) = 3.914 \ \frac{kgf}{mm^2}$$

$$\alpha\left(y_{br}\right):=\operatorname{atan}\left(\frac{y_{br}}{\sqrt{R^2-{y_{br}}^2}}\right) \qquad \alpha_p\left(y_{br}\right):=\operatorname{asin}\left(\frac{y_{br}}{r}\right)$$

$$\tau_z\left(y_{br}\right):=\frac{\frac{T_{BB}}{2}}{\frac{J_{Bn}}{2}}\cdot\frac{S_{nr1}\left(y_{br}\right)}{b_{r1}\left(y_{br}\right)\cdot\cos\left(\alpha\left(y_{br}\right)\right)} \qquad \tau_{zp}\left(y_{br}\right):=\frac{\frac{T_{BB}}{2}}{\frac{J_{Bn}}{2}}\cdot\frac{S_{nr1}\left(y_{br}\right)}{b_{r1}\left(y_{br}\right)\cdot\cos\left(\alpha_p\left(y_{br}\right)\right)}$$



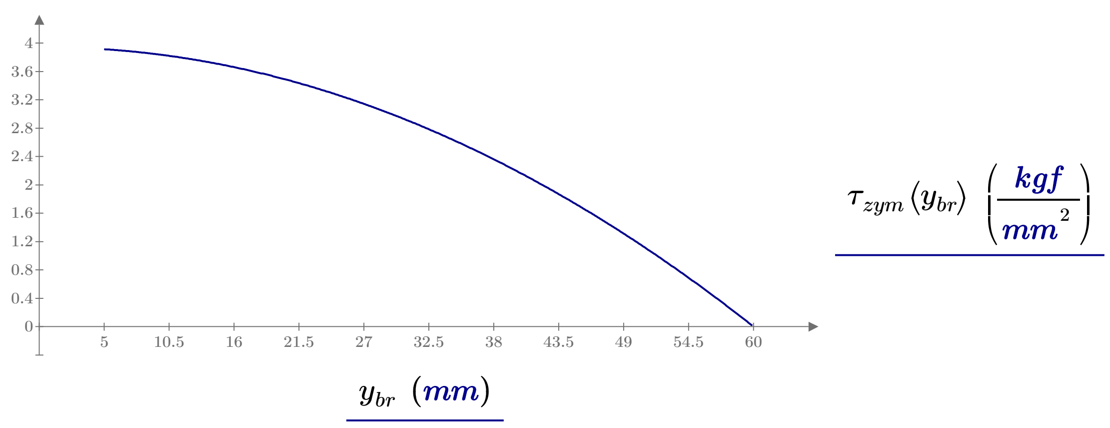
$$\tau_z(0\ mm)=4.297\ \frac{kgf}{mm^2}$$

$$\tau_{zp}(0\ mm)=4.297\ \frac{kgf}{mm^2}$$

$$\tau_z(r)=3.927\ \frac{kgf}{mm^2}$$

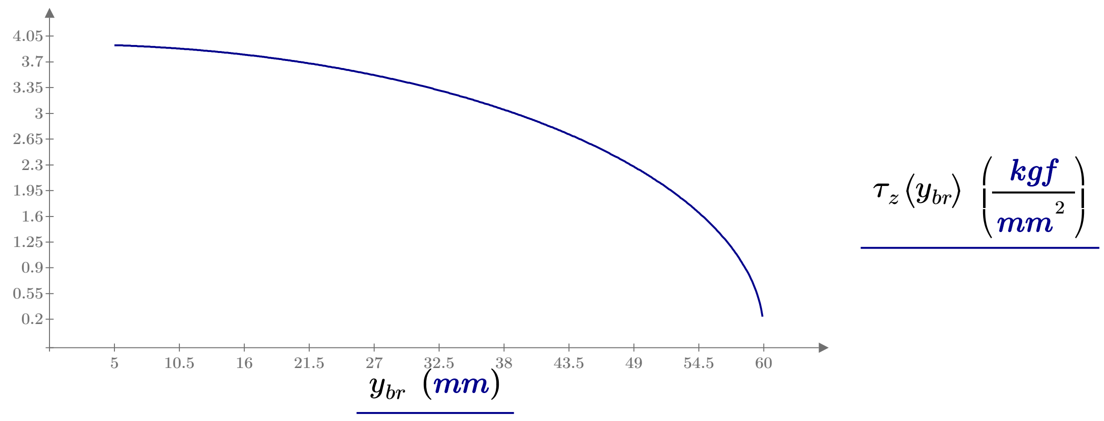
Sezione piena

$$y_{br}:=r,r+\frac{R-r}{div}..R \qquad \tau_{zym}\left(y_{br}\right):=\frac{T_{BB}}{J_{Bn}}\cdot\frac{S_{nr2}\left(y_{br}\right)}{b_{r2}\left(y_{br}\right)}$$



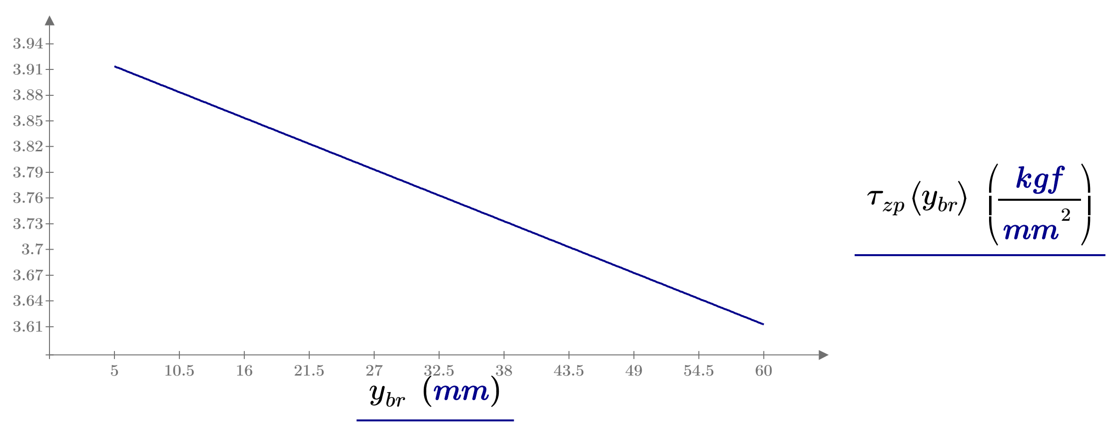
$$\tau_{zym}(r)=3.914\ \frac{kgf}{mm^2} \qquad \tau_{zym}(R-0.001\ mm)=\left(1.314\cdot10^{-4}\right)\ \frac{kgf}{mm^2}$$

$$\tau_z(y_{br}) := \frac{T_{BB}}{J_{Bn}} \cdot \frac{S_{nr2}(y_{br})}{b_{r2}(y_{br}) \cdot \cos(\alpha(y_{br}))}$$



$\tau_z(r) = 3.927 \ \frac{kgf}{mm^2}$ $\qquad \tau_z(R - 0.0001 \ mm) = 0.007 \ \frac{kgf}{mm^2}$

$$\tau_{zp}(y_{br}) := \tau_{zym}(0 \ mm) - \frac{(\tau_{zym}(0 \ mm) - \tau_{zym}(r)) \cdot y_{br}}{r}$$



$\tau_{zym}(0 \ mm) = 3.941 \ \frac{kgf}{mm^2}$ $\qquad \tau_{zp}(0 \ mm) = 3.941 \ \frac{kgf}{mm^2}$

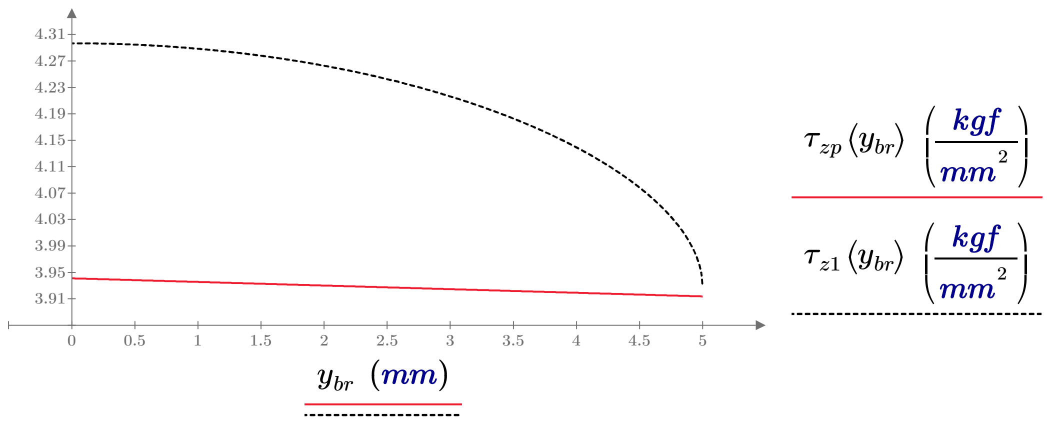
$\tau_{zym}(r) = 3.914 \ \frac{kgf}{mm^2}$ $\qquad \tau_{zp}(r) = 3.914 \ \frac{kgf}{mm^2}$

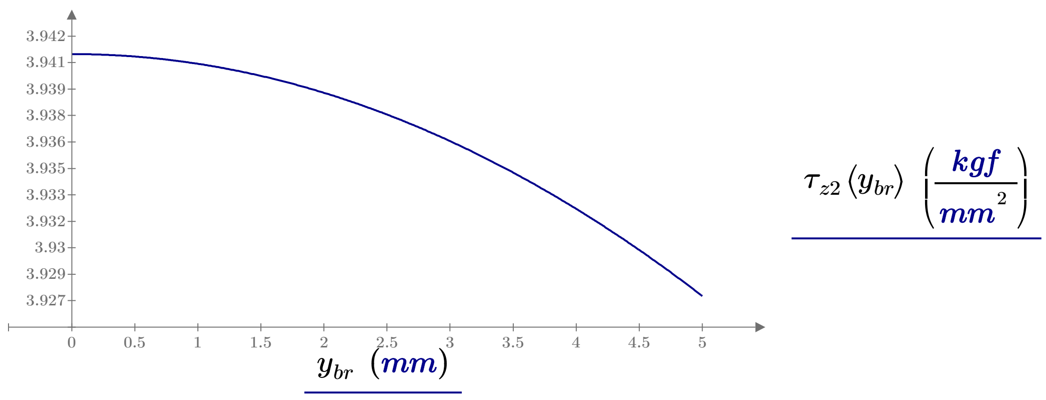
$$y_{br} := 0, \frac{r}{div} .. r$$

$$\alpha\left(y_{br}\right) := \operatorname{atan}\left(\frac{y_{br}}{\sqrt{R^2 - y_{br}^{\ 2}}}\right)$$

$$\tau_{z1}\left(y_{br}\right) := \frac{\dfrac{T_{BB}}{2}}{\dfrac{J_{Bn}}{2}} \cdot \frac{S_{nr1}\left(y_{br}\right)}{b_{r1}\left(y_{br}\right) \cdot \cos\left(\alpha\left(y_{br}\right)\right)}$$

$$\tau_{z2}\left(y_{br}\right) := \frac{T_{BB}}{J_{Bn}} \cdot \frac{S_{nr2}\left(y_{br}\right)}{b_{r2}\left(y_{br}\right) \cdot \cos\left(\alpha\left(y_{br}\right)\right)}$$

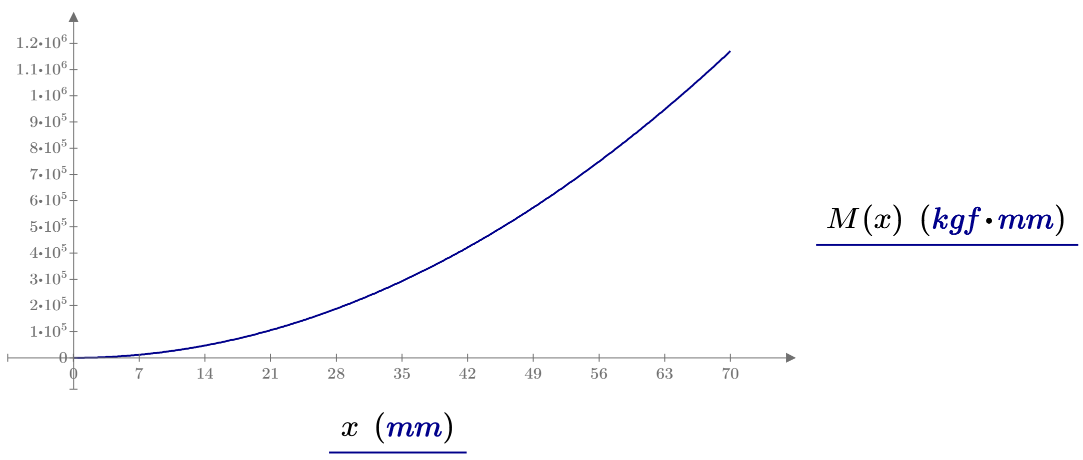




Calcolo dei momenti flettenti

$$x := 0, \frac{a}{div} .. a$$

$$M(x) := q_p \cdot x \cdot \frac{x}{2}$$

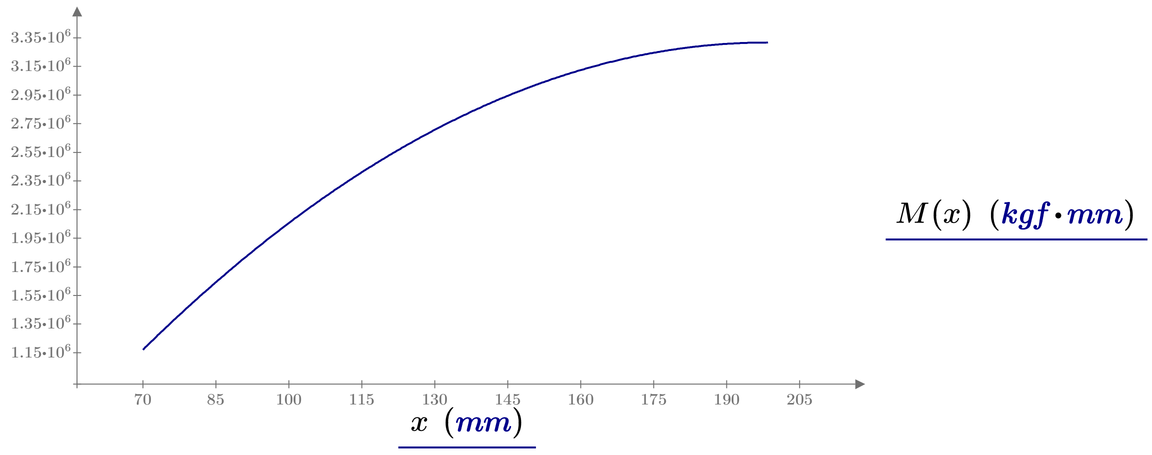


$M(a)=\left(1.17\cdot10^{6}\right)\ kgf\cdot mm$

$x:=a,a+\frac{\frac{l}{2}}{div}..\frac{l}{2}+a$

$M(x):=q_p\cdot a\cdot\left(x-\frac{a}{2}\right)-q\cdot\frac{(x-a)^{2}}{2}$

$M(a)=\left(1.17\cdot10^{6}\right)\ kgf\cdot mm$



$M_{BB}:=M(a)=\left(1.17\cdot10^{6}\right)\ kgf\cdot mm$

$a=70\ mm$
$f=43.25\ mm$

$M_{AA}:=M(a+f)=\left(2.372\cdot10^{6}\right)\ kgf\cdot mm$

$M_{CC}:=M\left(a+\frac{l}{2}\right)=\left(3.318\cdot10^{6}\right)\ kgf\cdot mm$

$\sigma_{AAmax}:=\frac{M_{AA}}{\frac{J_{ACn}}{H+y_G}}=16.629\ \frac{kgf}{mm^{2}}$

$H+y_G=61.471\ mm$

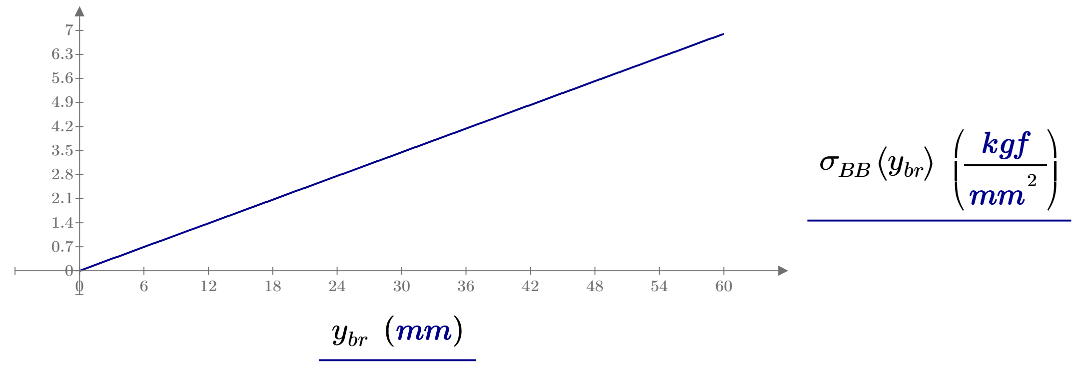
$R-y_G=58.32\ mm$

$\sigma_{BBmax}:=\frac{M_{BB}}{\frac{J_{Bn}}{R}}=6.897\ \frac{kgf}{mm^{2}}$

$\sigma_{CCmax}:=\frac{M_{CC}}{\frac{J_{ACn}}{H+y_G}}=23.255\ \frac{kgf}{mm^{2}}$

$y_{br}:=0,\frac{R}{div}..R$

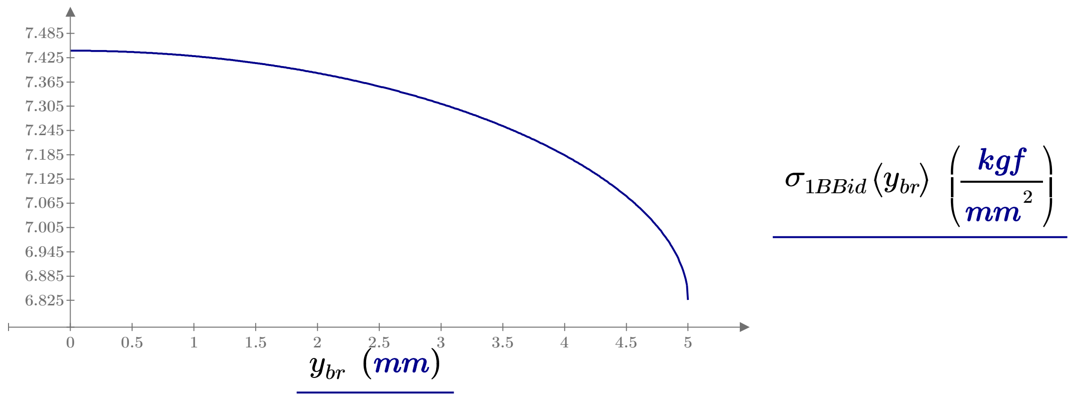
$\sigma_{BB}\left(y_{br}\right):=\frac{M_{BB}\cdot y_{br}}{J_{Bn}}$



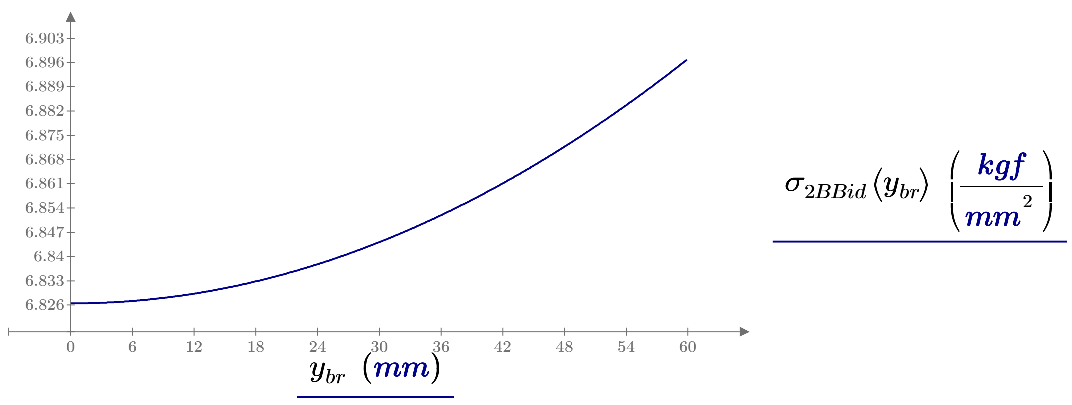
$$\sigma_{1BBid}(y_{br}) := \sqrt{\sigma_{BB}(y_{br})^2 + 3 \cdot \tau_{z1}(y_{br})^2}$$

$$\sigma_{2BBid}(y_{br}) := \sqrt{\sigma_{BB}(y_{br})^2 + 3 \cdot \tau_{z2}(y_{br})^2}$$

$$y_{br} := 0, \frac{r}{div} .. r$$



$$y_{br} := 0, \frac{R}{div} .. R$$



$$\sigma_{1BBid}(0\ mm) = 7.442\ \frac{kgf}{mm^2}$$

$$\sigma_{BB}(0\ mm) = 0\ \frac{kgf}{mm^2}$$

$$\tau_{z1}(0\ mm) = 4.297\ \frac{kgf}{mm^2}$$

$$\sigma_{1BBid}(r) = 6.826\ \frac{kgf}{mm^2}$$

$$\sigma_{BB}(r) = 0.575\ \frac{kgf}{mm^2}$$

$$\tau_{z1}(r) = 3.927\ \frac{kgf}{mm^2}$$

$$\sigma_{2BBid}(R - 0.001\ mm) = 6.897\ \frac{kgf}{mm^2}$$

$$\sigma_{BB}(R) = 6.897\ \frac{kgf}{mm^2}$$

$$\tau_{z2}(R - 0.001\ mm) = 0.023\ \frac{kgf}{mm^2}$$

$$\sigma_{2BBid}(r) = 6.826\ \frac{kgf}{mm^2}$$

$$\sigma_{BB}(r) = 0.575\ \frac{kgf}{mm^2}$$

$$\tau_{z2}(r) = 3.927 \ \frac{kgf}{mm^2}$$

Sollecitazione ideale massima nella sezione A-A

$$y_{br} := 0, \frac{H + y_G}{div} .. H + y_G$$

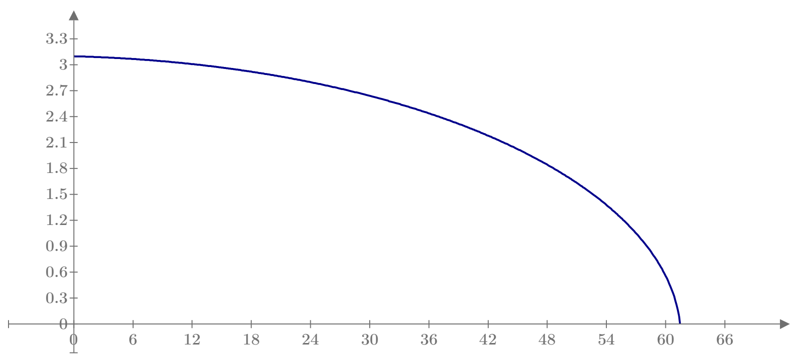
$$b_r(y_{br}) := \sqrt{R^2 - (y_{br} - y_G)^2} - r$$

$$S_{1ACn}(y_{br}) := 2 \cdot \int_{y_{br}}^{H + y_G} y \cdot \left(\sqrt{R^2 - (y - y_G)^2} - r\right) \mathrm{d}y$$

$$\tau_{zym}(y_{br}) := \frac{\frac{T_{AA}}{2}}{\frac{J_{ACn}}{2}} \cdot \frac{S_{1ACn}(y_{br})}{2 \cdot b_r(y_{br})}$$

$$\alpha(y_{br}) := \frac{180}{\pi} \operatorname{atan}\left(\frac{y_{br} - y_G}{b_r(y_{br}) + r}\right)$$

$$\tau_z(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(\alpha(y_{br}) \ deg)}$$



$\tau_z(y_{br}) \ \left(\frac{kgf}{mm^2}\right)$

$y_{br} \ (mm)$

$$\tau_z(0) = 3.099 \ \frac{kgf}{mm^2}$$

$$\sigma_{AA}(y_{br}) := \frac{M_{AA} \cdot y_{br}}{J_{ACn}}$$

$$\sigma_{1AAid}(y_{br}) := \sqrt{\sigma_{AA}(y_{br})^2 + 3 \cdot \tau_z(y_{br})^2}$$

$$\sigma_{1AAid}(H + y_G) = 16.629 \ \frac{kgf}{mm^2}$$

$$\sigma_{AA}(H + y_G) = 16.629 \ \frac{kgf}{mm^2}$$

$$\tau_z(H + y_G) = 0 \ \frac{kgf}{mm^2}$$

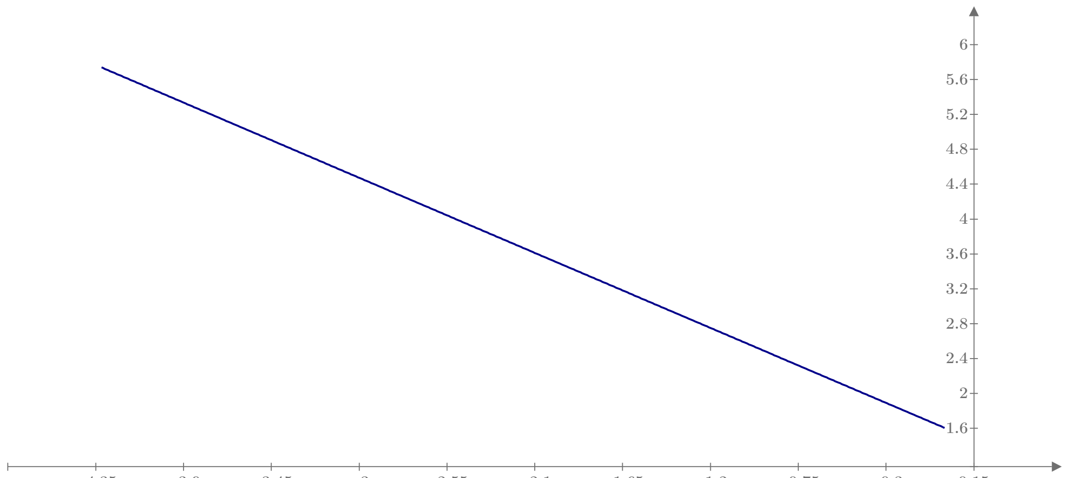
$$y_{br} := -(h - y_G), -(h - y_G) + \frac{h - y_G}{div} .. 0$$

$H + y_G$ $\quad$ $-(h - y_G)$

$$S_{2ACn}\left(y_{br}\right) := 2 \cdot \int_{-\left(h-y_G\right)}^{H+y_G} y \cdot \left(\sqrt{R^2-\left(y-y_G\right)^2}-r\right) \mathrm{d}y + .2 \cdot \int_{-y_{br}}^{-\left(h-y_G\right)} y \cdot \left(\sqrt{R^2-\left(|y|+y_G\right)^2}-r+\frac{|y|-\left(h-y_G\right)}{\tan\left(30\ deg\right)}\right) \mathrm{d}y$$

$$b_r\left(y_{br}\right) := \sqrt{R^2-\left(y_{br}-y_G\right)^2}-r$$

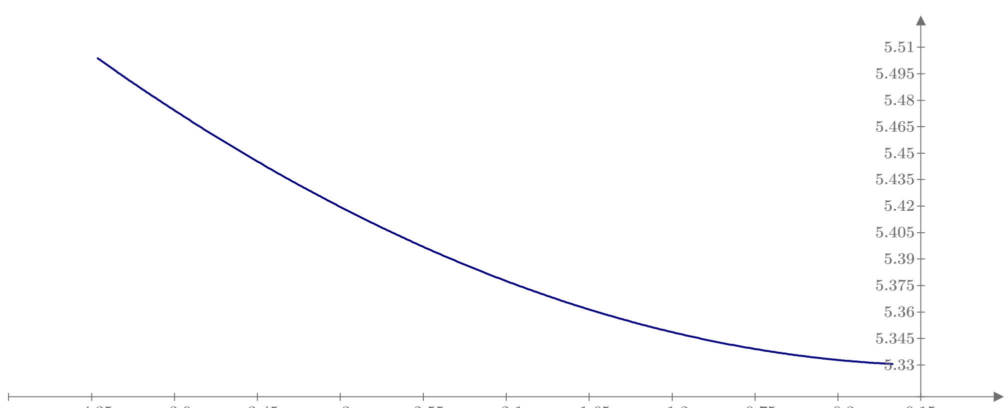
$$\alpha\left(y_{br}\right) := \frac{180}{\pi} \cdot \operatorname{atan}\left(\frac{\left|y_{br}-y_G\right|}{b_r\left(y_{br}\right)+r}\right)$$



$$\tau_{zym}\left(y_{br}\right) := \frac{\frac{T_{AA}}{2}}{\frac{J_{ACn}}{2}} \cdot \frac{S_{2ACn}\left(y_{br}\right)}{2 \cdot b_r\left(y_{br}\right)}$$

$$\tau_z\left(y_{br}\right) := \frac{\tau_{zym}\left(y_{br}\right)}{\cos\left(\alpha\left(y_{br}\right) \cdot deg\right)}$$

$$\sigma_{2AAid}\left(y_{br}\right) := \sqrt{\sigma_{AA}\left(y_{br}\right)^2+3 \cdot \tau_z\left(y_{br}\right)^2}$$



$$\sigma_{2AAid}\left(-\left(h-y_G\right)\right) = 5.504\ \frac{kgf}{mm^2}$$

$$y_{br} := -\left(h-y_G\right), -\left(h-y_G\right)-\frac{r \cdot \tan\left(30\ deg\right)}{div} .. -\left(h-y_G+r \cdot \tan\left(deg\right)\right)$$

$H+y_G$ $\qquad$ $-\left(h-y_G\right)$

$$S_{2ACn}(y_{br}) := 2 \cdot \int_{-(h-y_G)}^{H+y_G} y \cdot \left(\sqrt{R^2-(y-y_G)^2}-r\right) \mathrm{d}y + 2 \cdot \int_{-y_{br}}^{-(h-y_G)} y \cdot \left(\sqrt{R^2-(|y|+y_G)^2}-r+\frac{|y|-(h-y_G)}{\tan(30\ deg)}\right) \mathrm{d}y$$

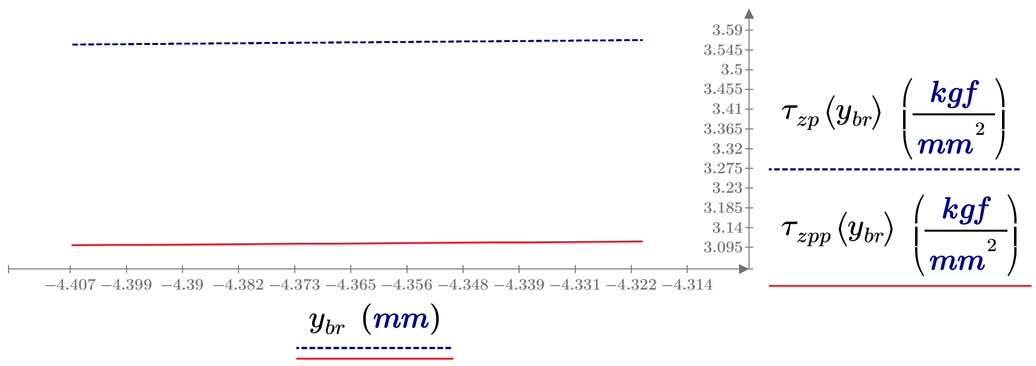
$$b_r(y_{br}) := \sqrt{R^2-(|y_{br}|+y_G)^2}-r+\frac{|y_{br}|-(h-y_G)}{\tan(30\ deg)}$$

$$\alpha(y_{br}) := \frac{180}{\pi} \cdot \operatorname{atan}\left(\frac{|y_{br}|+y_G}{b_r(y_{br})+\dfrac{|y_{br}|-(h-y_G)}{\tan(30\ deg)}}\right)$$

$$\tau_{zym}(y_{br}) := \frac{\dfrac{T_{AA}}{2}}{\dfrac{J_{ACn}}{2}} \cdot \frac{S_{2ACn}(y_{br})}{2 \cdot b_r(y_{br})}$$

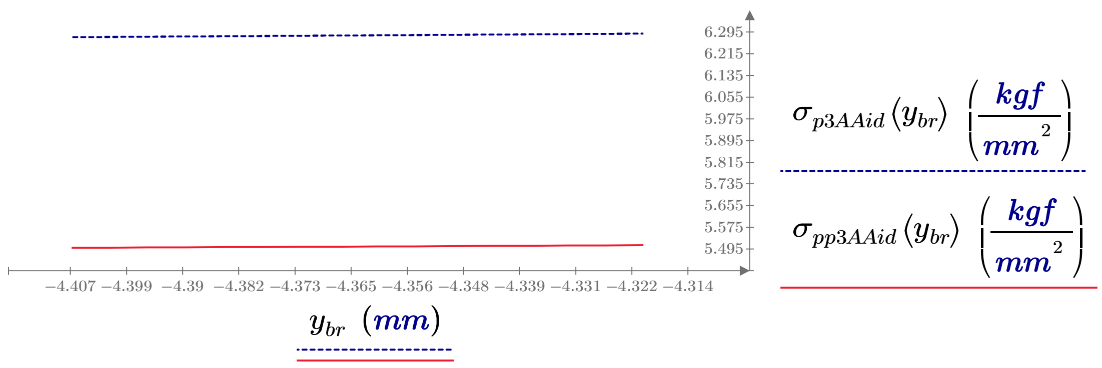
$$\tau_{zp}(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(30\ deg)}$$

$$\tau_{zpp}(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(\alpha(y_{br})\ deg)}$$



$$\sigma_{p3AAid}(y_{br}) := \sqrt{\sigma_{AA}(y_{br})^2+3 \cdot \tau_{zp}(y_{br})^2}$$

$$\sigma_{pp3AAid}(y_{br}) := \sqrt{\sigma_{AA}(y_{br})^2+3 \cdot \tau_{zpp}(y_{br})^2}$$



$$\sigma_{p3AAid}(-(h-y_G)) = 6.289\ \frac{kgf}{mm^2}$$

$$y_{br} := -(R-y_G), -(R-y_G)+\frac{-(h-y_G+r \cdot \tan(30\ deg))+(R-y_G)}{div} .. -(h-y_G+r \cdot \tan(30\ deg))$$

$$b_r(y_{br}) := 2 \cdot \sqrt{R^2-(|y_{br}|+y_G)^2}$$

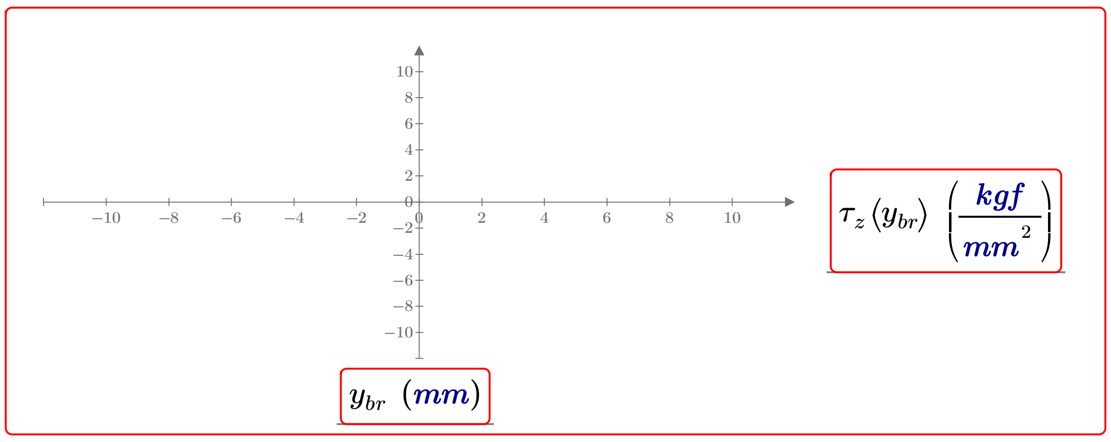
$$\alpha(y_{br}) := \frac{180}{\pi} \cdot \frac{\operatorname{atan}(|y_{br}|+y_G)}{\dfrac{b_r(y_{br})}{2}}$$

$H+y_G$ $\quad$ $-(h-y_G)$ $\quad$ $-((h-y_G)+r \cdot \tan(30\ deg))$

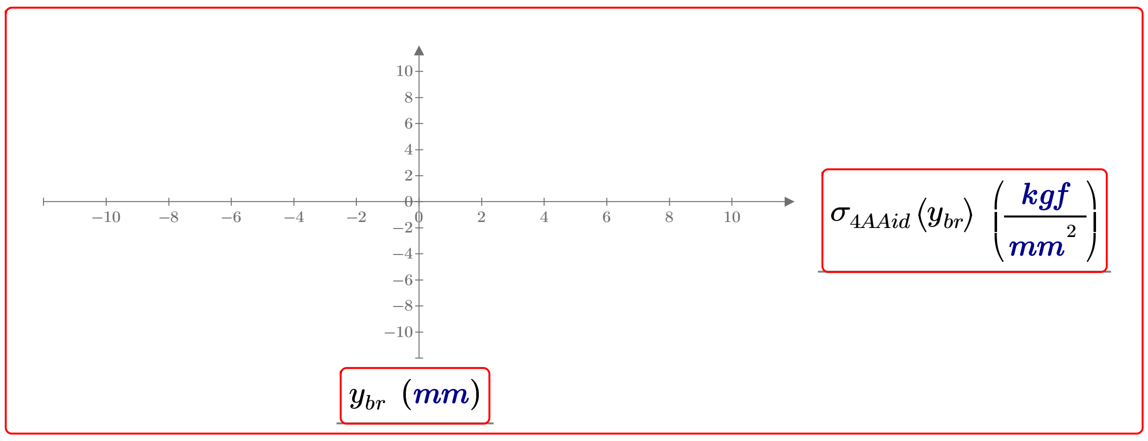
$$S_{3ACn}(y_{br}) := 2 \cdot \int_{-(h-y_G)}^{H+y_G} y \cdot \left(\sqrt{R^2-(y-y_G)^2}-r\right) \mathrm{d}y + 2 \cdot \int_{-((h-y_G)+r \cdot \tan(30\ deg))}^{-(h-y_G)} y \cdot \left(\sqrt{R^2-(|y|+y_G)^2}-r+\frac{|y|-(h-y_G)}{\tan(30\ deg)}\right) \mathrm{d}y + 2 \cdot \int_{-y_{br}}^{-((h-y_G)+r \cdot \tan(30\ deg))} y \cdot \left(\sqrt{R^2-(|y|+y_G)^2}\right) \mathrm{d}y$$

$$\tau_{zym}(y_{br}) := \frac{T_{AA}}{J_{ACn}} \cdot \frac{S_{3ACn}(y_{br})}{b_r(y_{br})}$$

$$\tau_z(y_{br}) := \frac{\tau_{zym}(y_{br})}{\cos(\alpha(y_{br})\ deg)}$$



$$\sigma_{4AAid}(y_{br}) := \sqrt{\sigma_{AA}(y_{br})^2 + 3 \cdot \tau_z(y_{br})^2}$$



$$|\sigma_{AA}(-(R-y_G))| = 15.777\ \frac{kgf}{mm^2}$$

$$\sigma_{1AAid}(H+y_G) = 16.629\ \frac{kgf}{mm^2}$$

$$\sigma_{1BBid}(0\ mm) = 7.442\ \frac{kgf}{mm^2}$$

Sollecitazione ideale massima nella sezione C-C

$$\sigma_{CCmax} = 23.255\ \frac{kgf}{mm^2}$$

$$\sigma_{idCCmax} := \sigma_{CCmax}$$