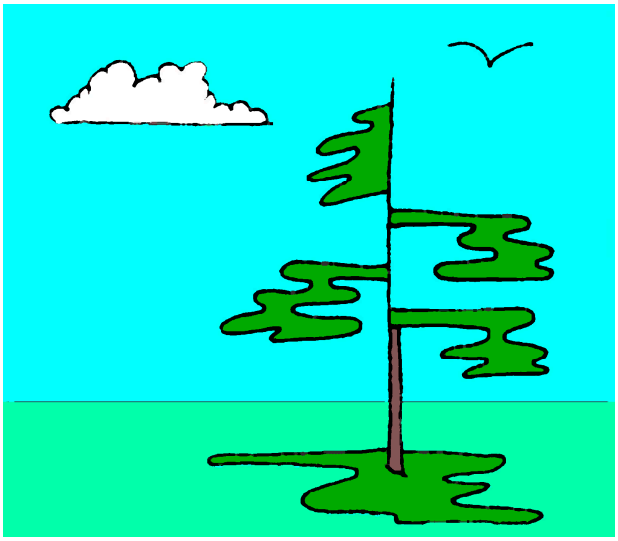
NorthWoods Software



Program Name: Moment_of_Inertia_Plated_Column

Project Name: -

Project Number: -

Project Description: -

Project Designer: Dik

Last Revised (yy-mm-dd): 20-12-18

Reference: NBCC

Created using SMath Studio, a MathCAD workalike from https://en.smath.info/view/SMathStudio
The User is responsible to verify output data using an alternative method

Menu:

..... Input Data ..... Important Output ..... Logical Constructs **Blue** **Units**

..... Sum / For **Red** **Important Note**

Defined Units:

$K := kip$ Force

$K\_ft := K\ ft$ $kN\_m := kN\ m$ $K\_in := K\ in$ $kN\_mm := kN\ mm$ $lb\_in := lbf\ in$ Moment

$pcf := \frac{lbf}{ft^3}$ $kNpcm := \frac{kN}{m^3}$ $kgpcm := \frac{kg}{m^3}$ Density

$Klf := \frac{K}{ft}$ $plf := \frac{lbf}{ft}$ $kNpm := \frac{kN}{m}$ $Kpi := \frac{K}{in}$ $kNpmm := \frac{kN}{mm}$ Force/Unit Length

$psf := \frac{lbf}{ft^2}$ $Ksf := \frac{K}{ft^2}$ $Ksi := \frac{K}{in^2}$ $kNpsm := \frac{kN}{m^2}$ $psi := \frac{lbf}{in^2}$ Pressure

$pci := \frac{lbf}{in^3}$ Subgrade Modulus

$psfpf := \frac{psf}{ft}$ $kPapm := \frac{kPa}{m}$ Pressure per Depth

$pmcf := \frac{lb}{ft^3}$ $lb := lbf$ Force

$mph := \frac{mi}{hr}$ $kph := \frac{km}{hr}$ Velocity

User Defined Functions:

c

```
Check(arg):=if arg = 1
              Check := "...OK"
            else
              Check := "...NG"
```

b

$Check(2 = 3) = "...NG"$

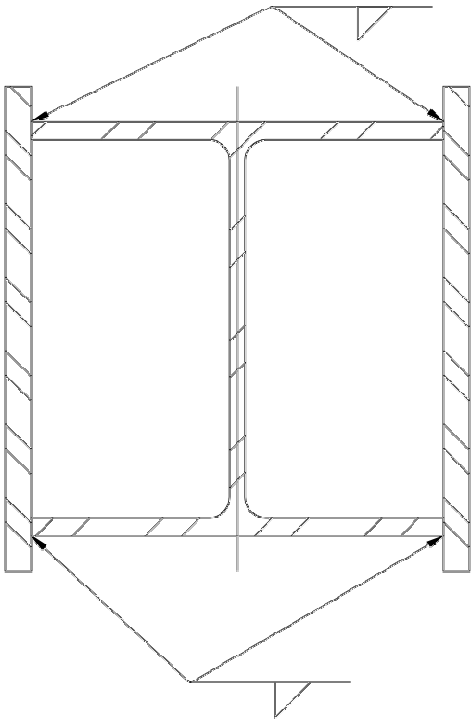
$Check(2 \neq 3) = "...OK"$

a

$Check(2 \leq 3) = "...OK"$

$Check(3 \geq 2) = "...OK"$

Input Data:



$b := 6.00\ in$

$d := 5.995\ in$

$t := .269\ in$

$w := .235\ in$

$d_1 := 7\ in$

$t_1 := 0.375\ in$

Section Properties:

$A := 2 \cdot b \cdot t + (d - 2 \cdot t) \cdot w$ $\quad A = 4.51\ in^2$

$Ix := \frac{1}{12} \cdot \left(b \cdot d^3 - (b - w) \cdot (d - 2 \cdot t)^3 \right)$ $\quad Ix = 29.66\ in^4$

$Sx := \frac{1}{6 \cdot d} \cdot \left(b \cdot d^3 - (b - w) \cdot (d - 2 \cdot t)^3 \right)$ $\quad Sx = 9.90\ in^3$

$rx := \sqrt{\frac{Ix}{A}}$ $\quad rx = 2.56\ in$

$Zx := \frac{1}{4} \cdot \left(b \cdot d^2 - (b - w) \cdot (d - 2 \cdot t)^2 \right)$ $\quad Zx = 10.99\ in^3$

$Zy := \frac{1}{4} \cdot \left(2 \cdot t \cdot \left(b^2 - w^2 \right) + d \cdot w^2 \right)$ $\quad Zy = 4.92\ in^3$

$Iy := \frac{1}{12} \cdot \left(2 \cdot t \cdot b^3 + (d - 2 \cdot t) \cdot w^3 \right)$ $\quad Iy = 9.69\ in^4$

$ry := \sqrt{\frac{Iy}{A}}$ $\quad ry = 1.47\ in$

$Sy := \frac{1}{6 \cdot b} \cdot \left(2 \cdot t \cdot b^3 + (d - 2 \cdot t) \cdot w^3 \right)$ $\quad Sy = 3.23\ in^3$

Reinforced Properties:

$A' := A + 2 \cdot d_1 \cdot t_1$ $\quad A' = 9.76\ in^2$

$Ix' := Ix + \frac{2 \cdot t_1 \cdot d_1^3}{12}$ $\quad Ix' = 51.10\ in^4$

$Iy' := Iy + \frac{2 \cdot d_1 \cdot t_1^3}{12} + 2 \cdot d_1 \cdot t_1 \cdot \left(\frac{b + t_1}{2} \right)^2$ $\quad Iy' = 63.09\ in^4$

$Sx' := \frac{Ix' \cdot 2}{d_1}$ $Sx' = 14.60\ in^3$

$rx' := \sqrt{\frac{Ix'}{A'}}$ $rx' = 2.29\ in$

$Zx' := Zx \cdot \frac{Sx'}{Sx}$ $Zx' = 16.22\ in^3$

$ry' := \sqrt{\frac{Iy'}{A'}}$ $ry' = 2.54\ in$

$Sy' := \frac{Iy' \cdot 2}{b + 2 \cdot t_1}$ $Sy' = 18.69\ in^3$

$Zy' := Zy \cdot \frac{Sy'}{Sy}$ $Zy' = 28.46\ in^3$

Summary:

$d = 6.00\ in$	$d = 5.995\ in$
$b = 6.00\ in$	$b = 6\ in$
$t = 0.27\ in$	$t = 0.269\ in$
$w = 0.24\ in$	$w = 0.235\ in$
$A = 4.51\ in^2$	$A' = 9.7604\ in^2$
$Sx = 9.90\ in^3$	$Sx' = 14.5996\ in^3$
$Zx = 10.99\ in^3$	$Zx' = 16.2167\ in^3$
$Ix = 29.66\ in^4$	$Ix' = 51.0985\ in^4$
$rx = 2.56\ in$	$rx' = 2.2881\ in$
$Sy = 3.23\ in^3$	$Sy' = 18.694\ in^3$
$Zy = 4.9173\ in^3$	$Zy' = 28.46\ in^3$
$Iy = 9.6899\ in^4$	$Iy' = 63.0922\ in^4$
$ry = 1.4657\ in$	$ry' = 2.5425\ in$

Summary: