

MC Sec - First Run Worksheet

Step 1 - Check License Status: (No need to do it in every worksheet)

```
license("")="License OK"
license("Serial")="2CAAD30C-229F4FFB-A1FD42D4-C905EDF2"
```

Please note that you need to be connected to the internet when you start running the software to check your license status.

License will be OK when you receive a mail with a file named "MC Sec.lock" and this file is copied to "C:\ProgramData\MC Sec\".

If you are not seeing "License OK" then you can send details about the problem to:
"MSContact@protonmail.com"

Full license is purchased once and includes free updates and, eventually, extra content. Free means free, no matter major or minor releases. Updates will be sent to the registered e-mail as soon as they are available.

Step 2 - Start using "MC Sec" functions directly

There are many sections included in the library. You can check for the one you need with the function `find_sec("searchname")` as in the following:

```
find_sec("UPN140")="UPN140;"
find_sec("IPN")="IPN80;IPN100;IPN120;IPN140;IPN160;IPN180;IPN200;IPN220;IPN240;"
find_sec("UPE2")="UPE200;UPE220;UPE240;UPE270;"
find_sec("B400")="HE400B;HEB400;"
```

When working with functions directly you get unitless values: `h_sec("UPN80")=80`

The units for these values are: `units_sec("h")="mm"`

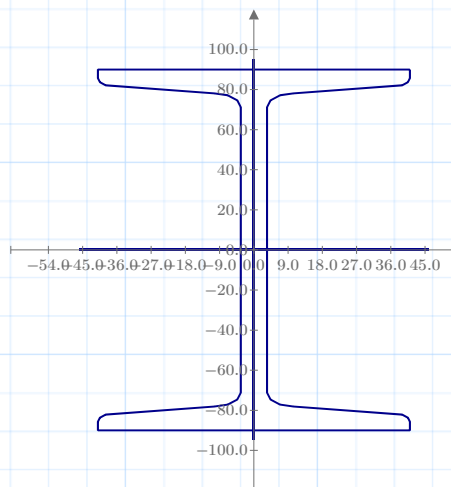
Then you can write more meaningful expressions:

```
mySectionHeight:=h_sec("UPN80")*mm=80 mm
h:=h_sec("IPN300")*mm=300 mm
```

The function `pol_sec(sectionname)` returns a matrix containing an illustrative drawing for the section. The polygon returned is not completely exact, it is a simplified line for illustrative purposes it shall not be used for calculations of any type.

```
S:=pol_sec("IPN180")
```

See that its aspect ratio might not be 1:1 depending on the size of the Plot.



Include << C:\ProgramData\MC Sec\MC Sec.mcdx

Step 3 - Start using values with units by including the file "MC Sec.mcdx"

The file "MC Sec.mcdx" includes functions to access the data in the library with a better format and including the correct units for each value. This is the the recommended way to use the library as it will help produce worksheets that look better and are safer as the risk of units handling is reduced.

There are many sections included in the library. You can check fro the one you need with the function $find_{sec}(\text{"searchname"})$ as in the following:

$$find_{sec}(\text{"UPN140"}) = [\text{"UPN140"}] , find_{sec}(\text{"UPE2"}) = \begin{bmatrix} \text{"UPE200"} \\ \text{"UPE220"} \\ \text{"UPE240"} \\ \text{"UPE270"} \end{bmatrix}$$

When working with "MC Sec.mcdx" functions you get values with units:

$$\begin{aligned} h_{sec}(\text{"UPN80"}) &= 80 \text{ mm} \\ mySectionHeight &:= h_{sec}(\text{"UPN80"}) = 8 \text{ cm} \\ h &:= h_{sec}(\text{"IPN300"}) = 300 \text{ mm} \end{aligned}$$

Some "synonyms" are provided for the most common values. For full details on names, values and functions available, please check "MC Sec.mcdx"

$$\begin{aligned} I &:= I_{sec}(\text{"L80x80x8"}) = 722500 \text{ mm}^4 \\ I &:= I_{y.sec}(\text{"L80x80x8"}) = 722500 \text{ mm}^4 \end{aligned}$$

This is the recommended way to use this library as you get units in you values.

We kindly suggest to play around with all the included documents and cut/paste portions of them as needed.

We also suggest making back-up copies before modifying the documents included with the library.

Step 4 - Alternative data access system.

We finally mention here this alternative data access system as it is available BUT we do not recommend using it as main working routine as it is incomplete (some values are not accessible) and produces a less "natural" document.

See below a comparison for section $s := \text{"IPE200"}$

Normal system:

$$\begin{aligned} I_y &:= I_{y.sec}(s) \text{ cm}^4 = 1943.0 \text{ cm}^4 \\ W_{ply} &:= W_{ply.sec}(s) \cdot \text{cm}^3 = 221.0 \text{ cm}^3 \end{aligned}$$

Alternative data retrieval system:

$$\begin{aligned} \text{units}_{sec}(\text{"Iy"}) &= \text{"cm}^4\text{"} & \text{data}_{sec}(s, \text{"Iy"}) &= 1943.0 \\ I_y &:= \text{data}_{sec}(s, \text{"Iy"}) \cdot \text{cm}^4 = 1943 \text{ cm}^4 \\ \text{units}_{sec}(\text{"Wply"}) &= \text{"cm}^3\text{"} & \text{data}_{sec}(s, \text{"Wply"}) &= 221.0 \\ W_{ply} &:= \text{data}_{sec}(s, \text{"Wply"}) \cdot \text{cm}^3 = 221 \text{ cm}^3 \end{aligned}$$

With the the recommended way to use the library (Including "MC Sec.mcdx")

$$\begin{aligned} I_y &:= I_{y.sec}(s) = 1943 \text{ cm}^4 \\ W_{ply} &:= W_{pl.y.sec}(s) = 221 \text{ cm}^3 \\ \text{units}_{sec}(\text{"Iy"}) &= 1 \text{ cm}^4 \end{aligned}$$

Available data:

"G", "h", "b", "tw", "t", "tf", "r", "r1", "r2", "r3", "A", "hi", "d", "fi", "fiz",
"AL", "AG", "Iy", "Wely", "Wply", "iy", "Avz", "Iz", "Welz", "Wplz", "iz", "ss",
"It", "Iw", "Iu", "iu", "Iv", "iv", "Iyz", "alfa", "zs", "ys", "ym", "v1", "v2",
"v3", "u1", "u2", "u3", "NotProt_3faces", "NotProt_4faces", "Prot_3faces",
"Prot_4faces", "Box_3faces", "Box_4faces"

For American Sections:

"W", "A", "d", "ddet", "Ht", "h", "OD", "bf", "bfdet", "B", "b", "ID", "tw",
"twdet", "twdet/2", "tf", "tfdet", "t", "tnom", "tdes", "kdes", "kdet", "kl", "x",
"y", "eo", "xp", "yp", "bf/2tf", "b/t", "b/tdes", "h/tw", "h/tdes", "D/t", "Ix",
"Zx", "Sx", "rx", "Iy", "Zy", "Sy", "ry", "Iz", "rz", "Sz", "J", "Cw", "C", "Wno",
"Sw1", "Sw2", "Sw3", "Qf", "Qw", "ro", "H", "tan(alfa)", "Qs", "Iw", "zA", "zB",
"zC", "wA", "wB", "wC", "SwA", "SwB", "SwC", "SzA", "SzB", "SzC", "rts", "ho",
"PA", "PB"

Also type functions are provided:

```
type_sec("HEB120")="H"
```

```
type_asc("HSS508x304.8x15.9")="HSS"
```

```
type_astm("HSS508x304.8x15.9")="HSS_RECT"
```