Sheet metal hems

FreeCAD sheet metal workbench

Flat hem · Open hem · Rolled hem · Teardrop hem · Rope hem
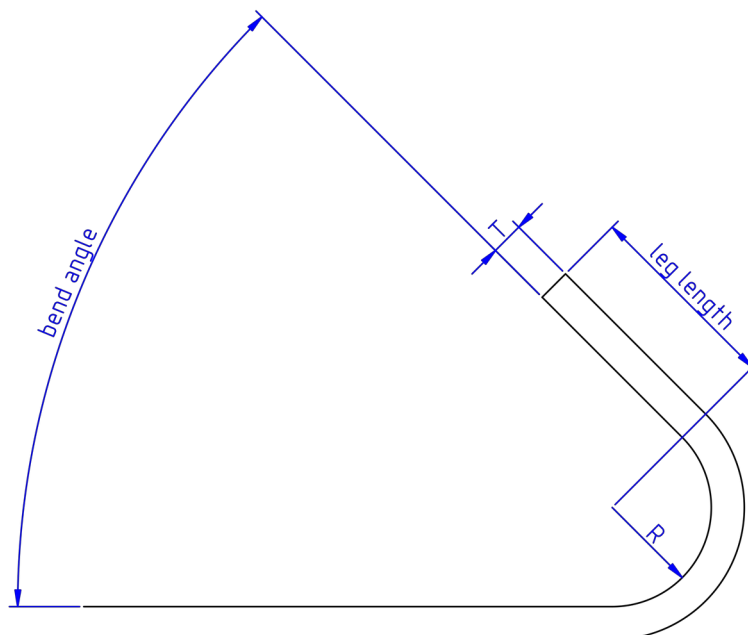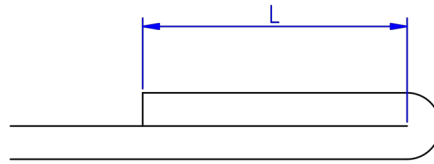
Fractory
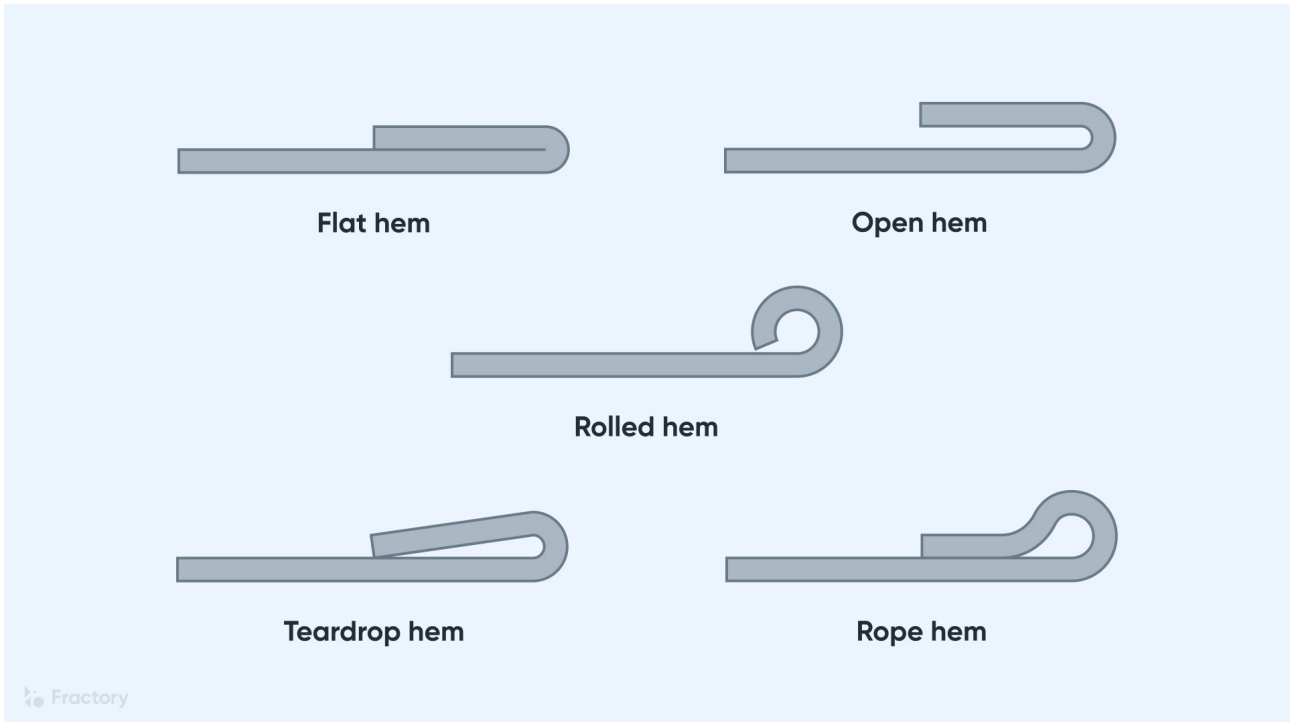
Common values

R is the bend radius

T is the thickness

The bend line can be offset of $R+T$ as an option to keep the hem from adding length to the flange.

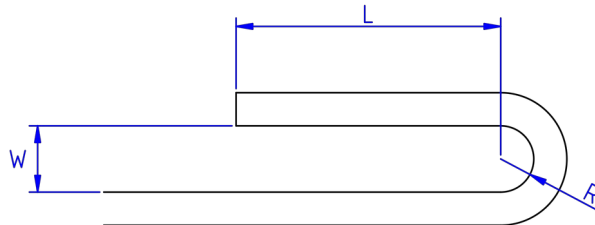# Flat hem

User parameters:

- Hem length L

Create one bend wall with the following parameters :

$R=0$

bend angle $=180°$

leg length $=L$

Open hem

User parameters:

- Hem length L
- Opening width W
- Bend radius R
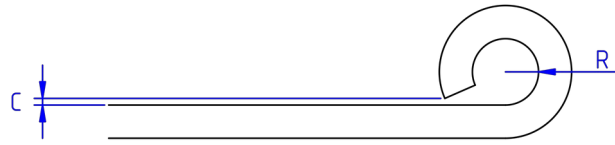
If $W=0$, it is a flat hem.

User choses to set W or R

Create one bend wall with the following parameters:

$R=W/2$ (by default) or user setting

angle $=180°$

leg length $=L$

Rolled hem

User parameters:

- Bend radius R
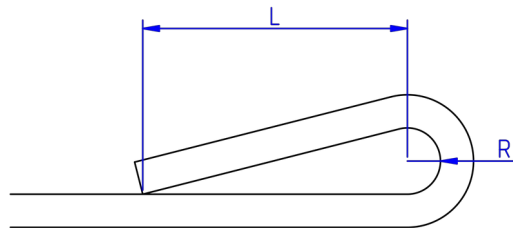- Clearance C

Create one bend wall with the following parameters:

R is the default value or user setting

$C=0$ (by default) or user setting

$$\text{angle}=270°+\arcsin\left(\frac{R-C}{R+T}\right)$$

leg length $=0$ [currently not possible]

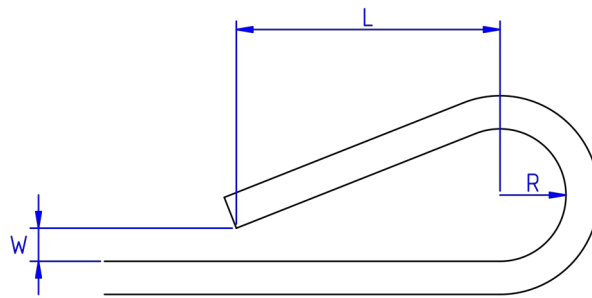# Teardrop hem

Parameters:

- Bend radius R
- Hem length L

Create one bend with the following parameters:

$$\text{bend angle}=180°+\arctan\left(R/L\right)$$

leg length $=L$

Note: The extra length of the hem is $T\sin\left(2\theta\right)$

Open teardrop hem

Parameters:

- Bend radius R
- Opening width W
- Hem length L

If $W = 0$, it is a closed teardrop hem.

Check that $W < 2R$.

Create one bend with the following parameters:

$$\theta = \arctan\left(\frac{L - \sqrt{L^2 - 2RW + W^2}}{W}\right)$$

$$\text{bend angle} = 180° + 2\theta$$

$$\text{leg length} = W \times \frac{\cos(2\theta) - 1}{\sin(2\theta)} + L$$

Note: The extra length of the hem is $T \sin(2\theta)$