



**AM.CO.ZA FABRICAM Sheet Metal
Fabrication CAD/CAM Software User Manual**

FABRICAM

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1.1) Create and Position Holes.



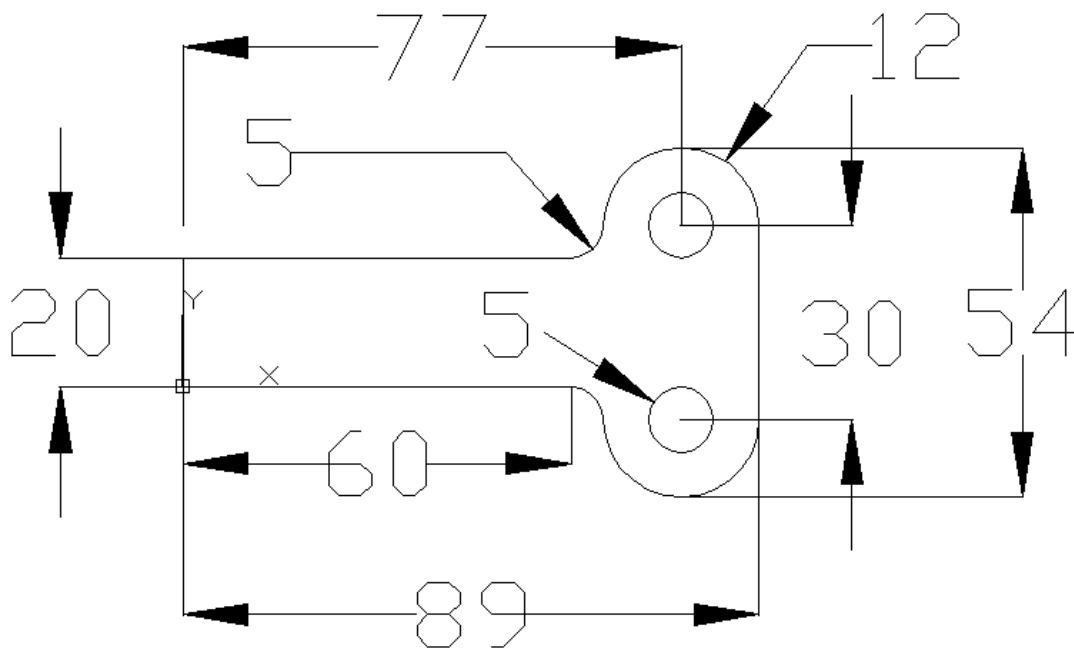
Used to create Rectangle, Circle, Oblong and Triangle entities.



After creating Rectangle, Circle, Oblong or Triangle entities, it

allows you to position it in Single, Linear, Matrix or Circular position.

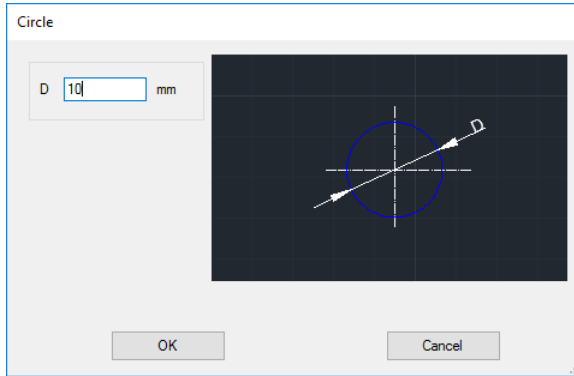
Example:



Add two circular holes.

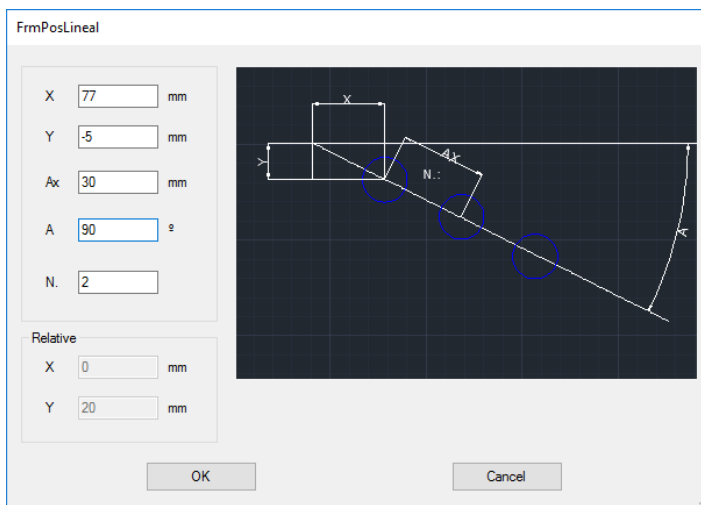


- 1) Click on the Circular hole. Value:D=10

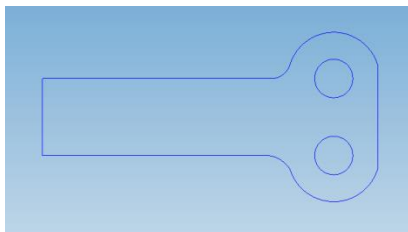


- 2) Click on the OK button.

- 3) Click on Linear Positioning. Values:X=77;Y=-5;Ax=30;A=90;N=2



- 4) The final part with two holes is:



1.2) Create Lines/Polylines/Arcs.



Used to create Line, Polyline and Arc entities.

1) First click on the **Line** button.



2) Click on the screen.

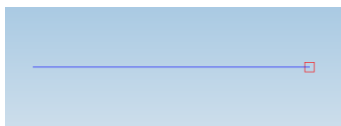
3) Values: X1=0;Y1=0;X2=60;Y2=0

A dialog box titled "Line" with four input fields for coordinates: X1 (0 mm), Y1 (0 mm), X2 (60 mm), and Y2 (0 mm). The X2 field is highlighted with a blue border. At the bottom are "OK" and "Cancel" buttons.

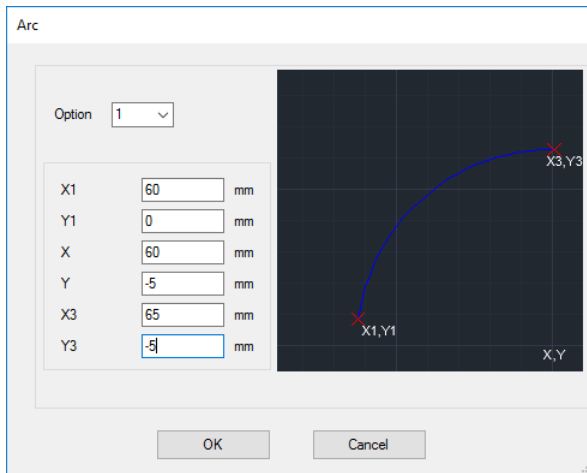
4) Click on the Arc button.



5) Click on the right end of the Line entity.



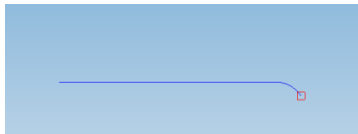
6) Values: X1=60;Y1=0;X=60;Y=-5;X3=65;Y3=-5



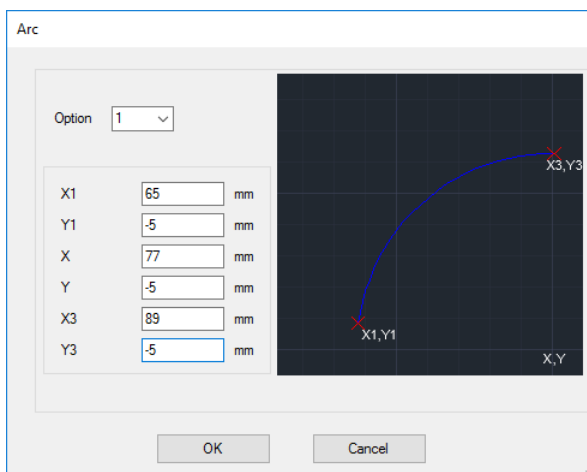
Click on the **Arc** button.



7) Click on the end of the arc entity.



8) Values: X1=65;Y1=-5;X=77;Y=-5;X3=89;Y3=-5



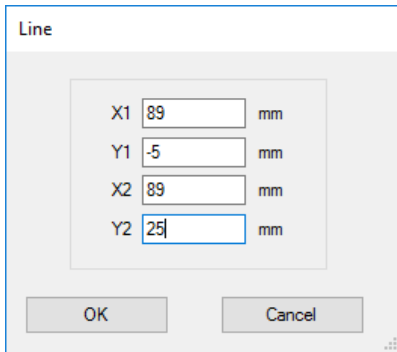
9) Click on the **Line** button.



10) Click on the end of the arc entity.



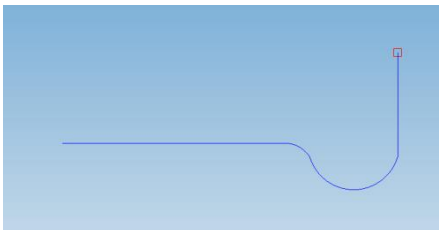
11) Values: X1=89;Y1=-5;X2=89;Y2=25



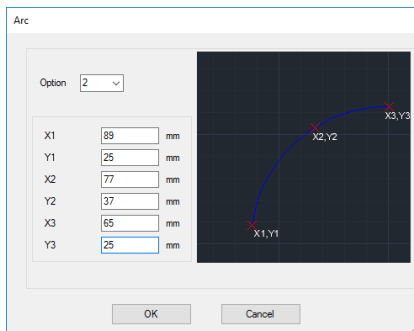
12) Click on the **Arc** button.



13) Click on the end of the line entity.



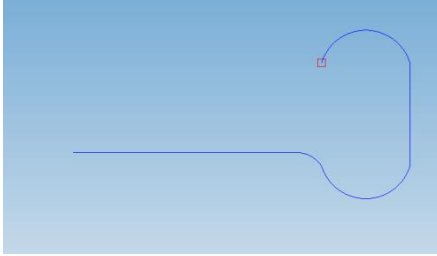
14) Values: Option 2. X1=89;Y1=25;X=77;Y=37;X3=65;Y3=25



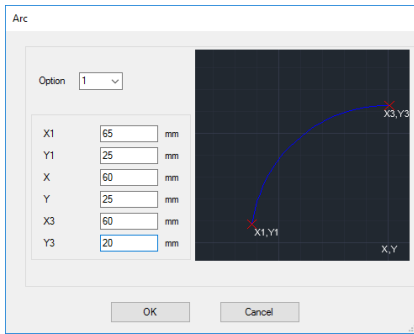
15) Click on the **Arc** button.



16) Click on the end of the arc entity.



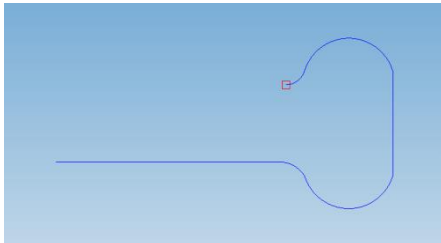
17) Values: X1=65;Y1=25;X=60;Y=25;X3=60;Y3=20



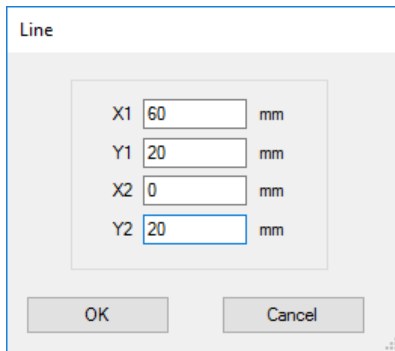
18) Click on the **Line** button.



19) Click on the end of the arc entity.

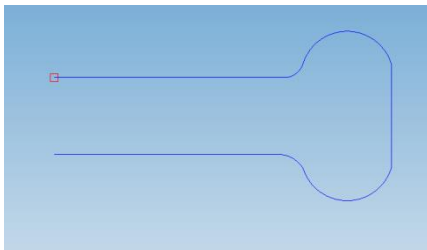


20) Values: X1=59.78;Y1=20;X2=0;Y2=20

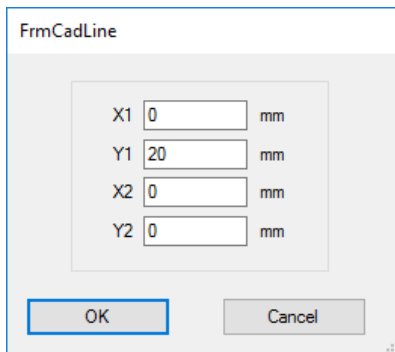


A dialog box titled "Line" with four input fields for coordinates in millimeters. The values are: X1: 60, Y1: 20, X2: 0, Y2: 20. There are "OK" and "Cancel" buttons at the bottom.

21) Click on the end of the line entity.

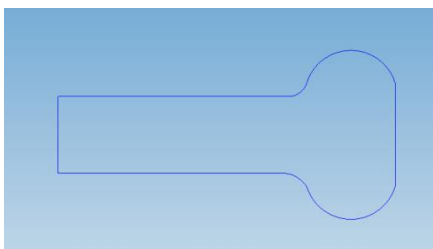


22) Values: X1=0;Y1=20;X2=0;Y2=0



A dialog box titled "FrmCadLine" with four input fields for coordinates in millimeters. The values are: X1: 0, Y1: 20, X2: 0, Y2: 0. There are "OK" and "Cancel" buttons at the bottom.

The resulting part is:



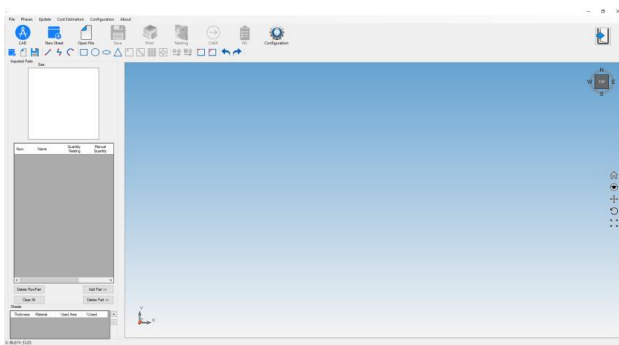
1.3) Create/Open/Save Part.



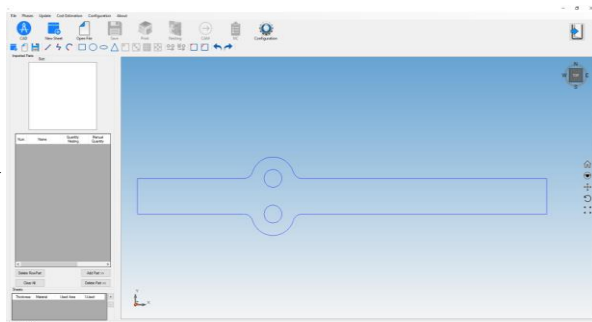
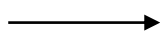
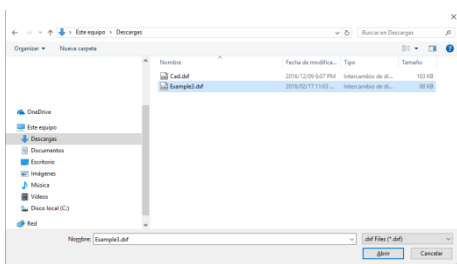
Click on the **CAD** button.



Used to create a new Empty Cad.



Allows a .dxf file to be opened.



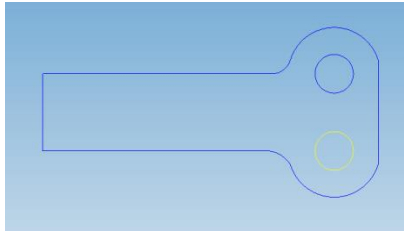
Allows a .dxf file to be saved.

1.4) Cut/Copy/Paste.



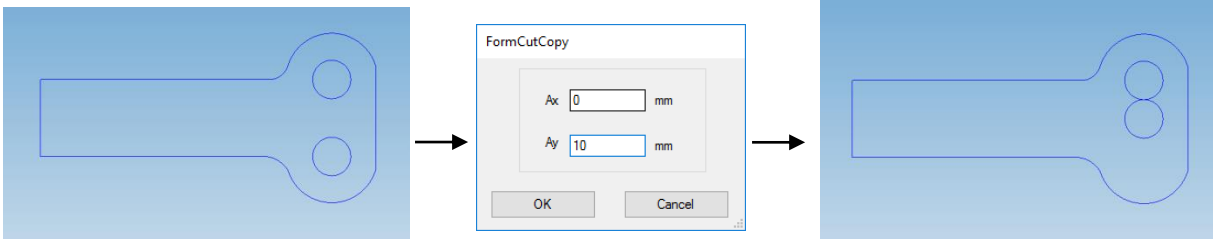
Copy/Paste and Cut/Paste buttons:

Click on the entity:

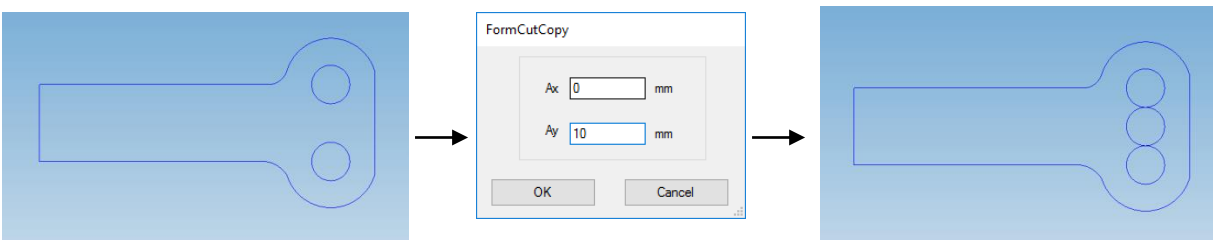


Click on the **Copy/Paste** or **Cut/Paste** button.

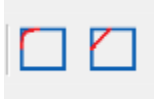
Cut



Copy



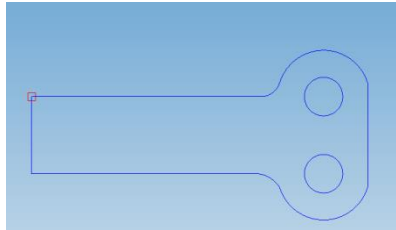
1.5) Rounding/Chanfering.



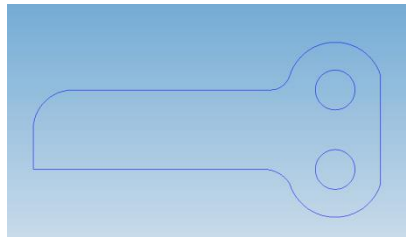
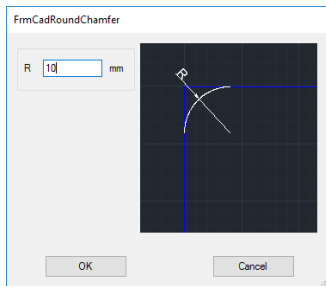
Rounding/Chanfering buttons:

Click on the **Rounding/Chanfering** button.

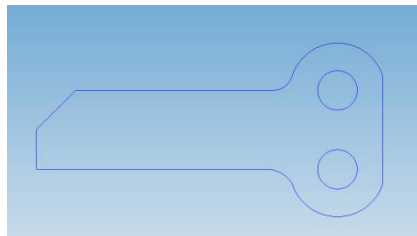
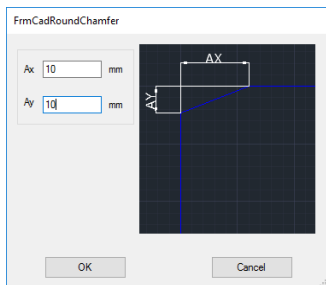
Click on the selected vertex



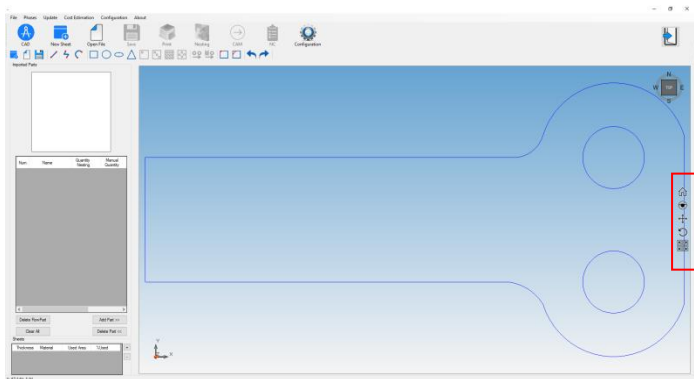
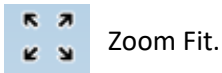
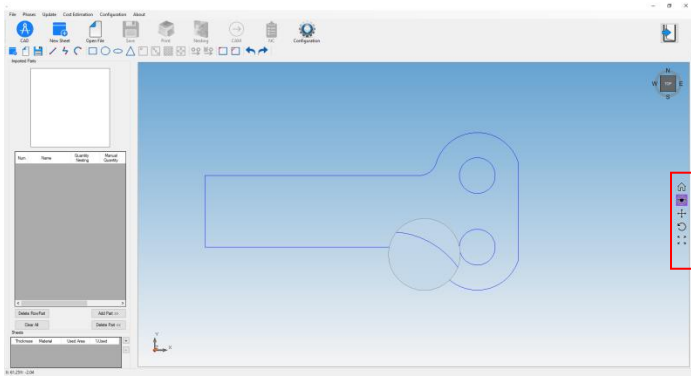
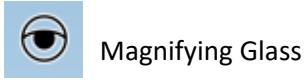
Rounding



Chamfering



1.6) Screen: Zoom/Magnifying Glass.



1.7) Undo/Redo.



Undo/Redo buttons:

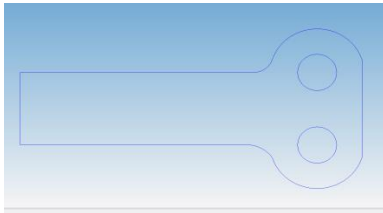
Undo

Undo



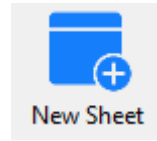
Redo

Redo



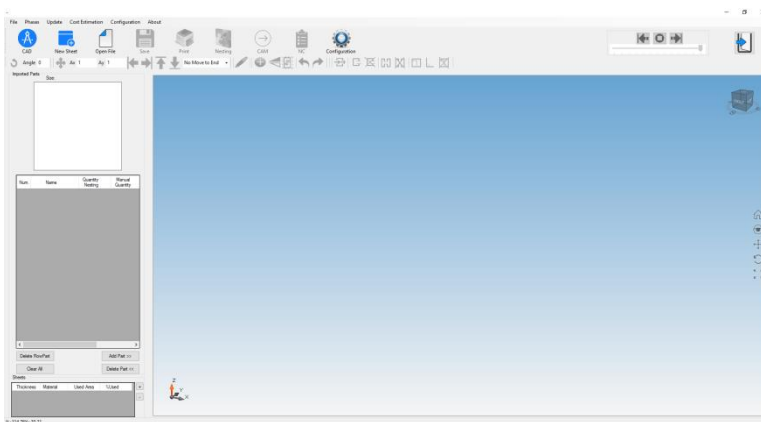
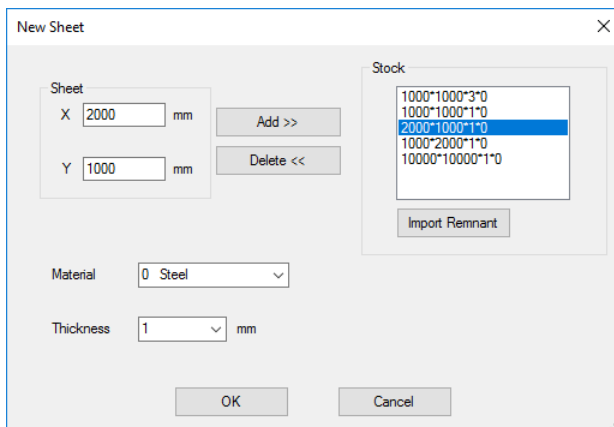
2.1) Add Parts Automatically (Nesting).

Add a new Sheet by clicking on the **New Sheet** button.

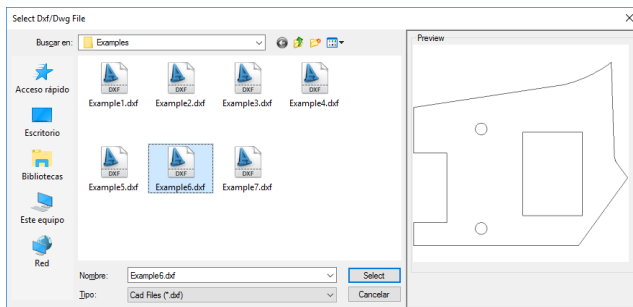


Select a Sheet in the Stock listbox or insert values on X,Y, select Material and Thickness and click on the **OK** button.

The Stock list can also be managed by adding or deleting a new Sheet, clicking on the **Add>>** and **Delete<<** buttons.

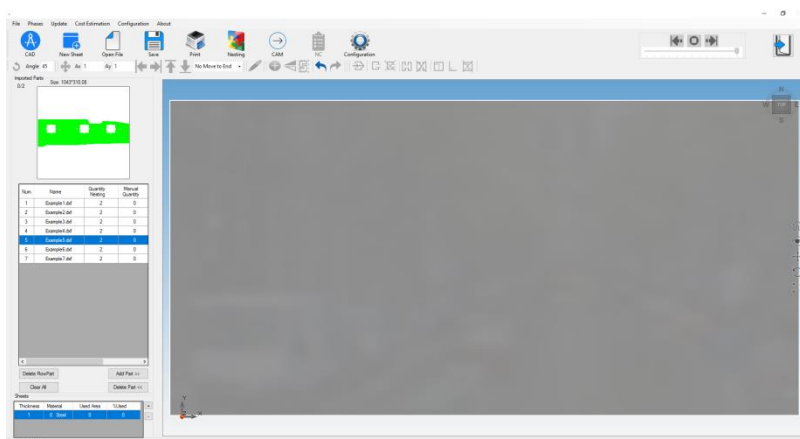
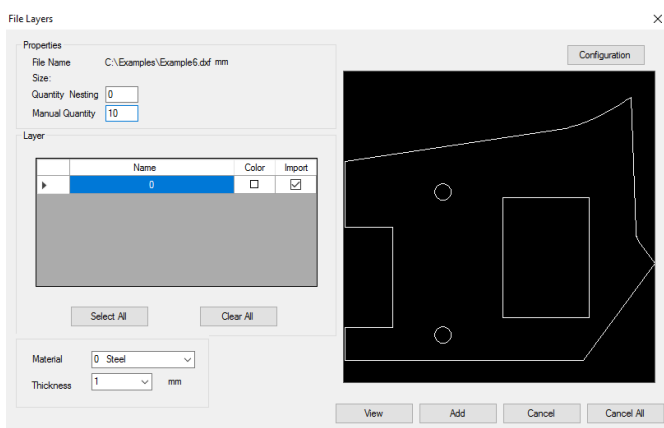


Click on the **Open File** button and select the parts you want to import, clicking on the **Select** button.

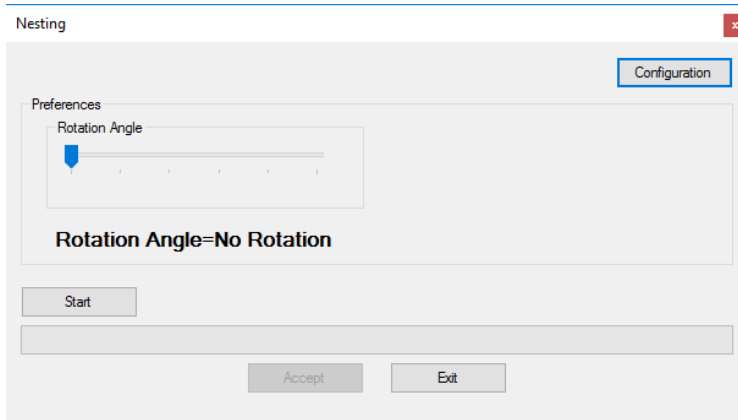
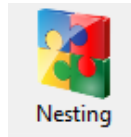


Add the value in the **Nesting Quantity** text box and click on the **Add** button.

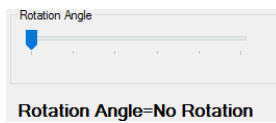
Information on the kind and number of entities of the part is available by clicking on the **View** button.



Click on the **Nesting** button.



Clicking on the **Rotation Angle** trackbar we get values: **No Rotation Angle, 180°, 90°, 45°, 22.5°, 1°.**



No Rotation Angle: Parts will be placed in the best way possible without rotation.



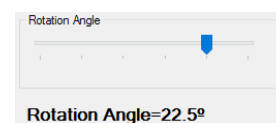
180°: Parts will be placed in the best way possible, taking into account 180° rotation.



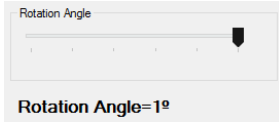
90°: Parts will be placed in the best way possible, taking into account 90° rotation.



45°: Parts will be placed in the best way possible, taking into account 45° rotation.

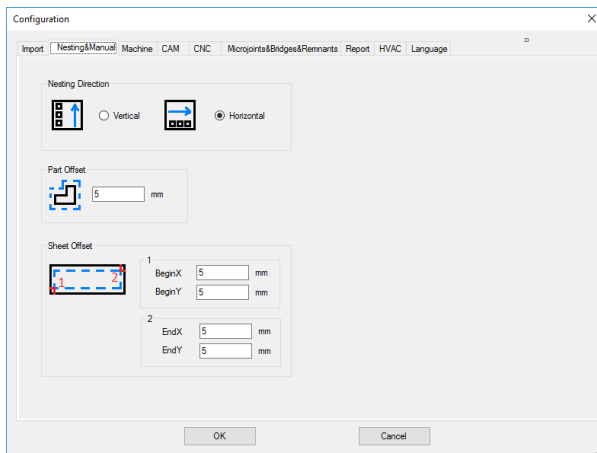
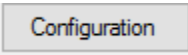


22.5°: Parts will be placed in the best way possible, taking into account 22.5° rotation.



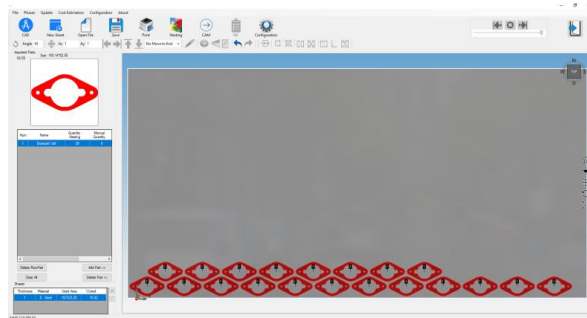
1°: Parts will be placed in the best way possible, taking into account 1° rotation.

Click on the **Configuration** button.

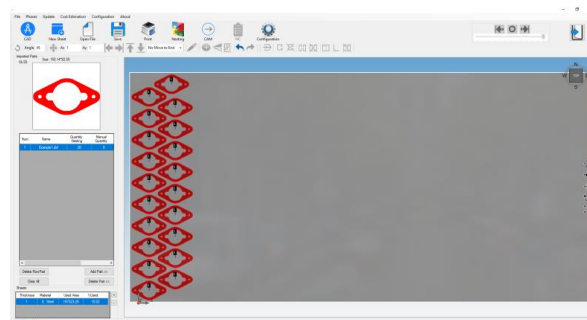


Nesting Direction: Vertical or Horizontal.

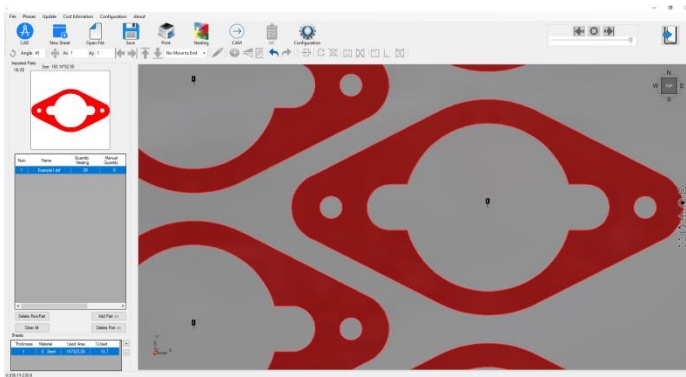
Horizontal →



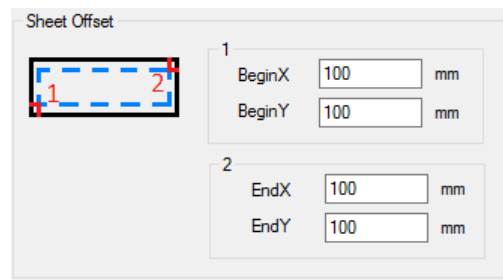
Vertical →



Part Offset: The offset of each part.

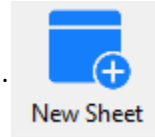


Sheet Offset: Begin and End Offset of the sheet.



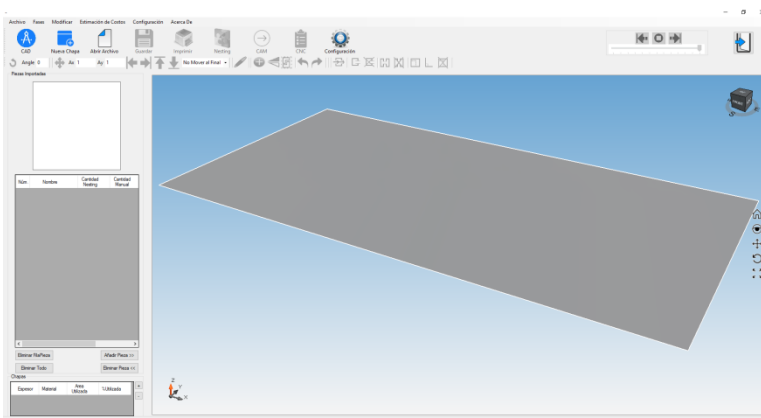
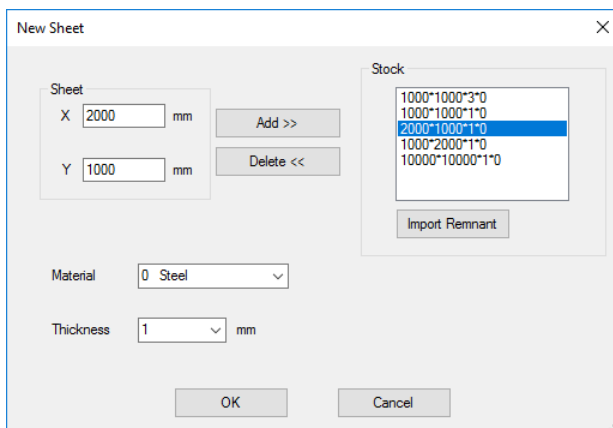
2.2) Add/Delete Part Manually.

Add a new sheet by clicking on the **New Sheet** button.

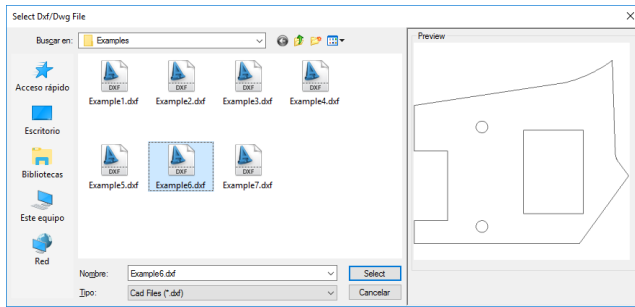


Select a sheet in the **Stock List** or insert values on X,Y, select **Material** and **Thickness** and click on the **OK** button.

The **Stock List** can also be managed by adding or deleting a new Sheet, clicking on the **Add>>** and **Delete<<** buttons.

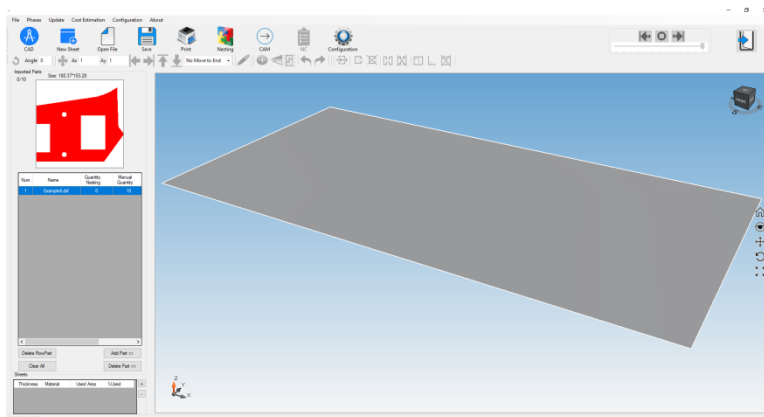
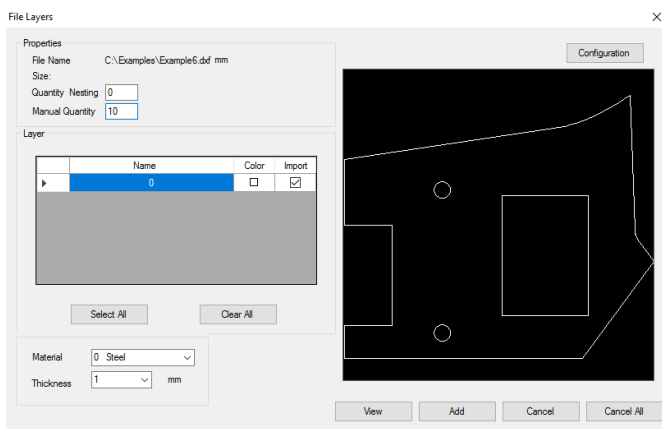


Click on the **Open File** button and select the parts you want to import, clicking on the **Select** button.



Add the value in the **Manual Quantity** text box and click on the **Add** button.

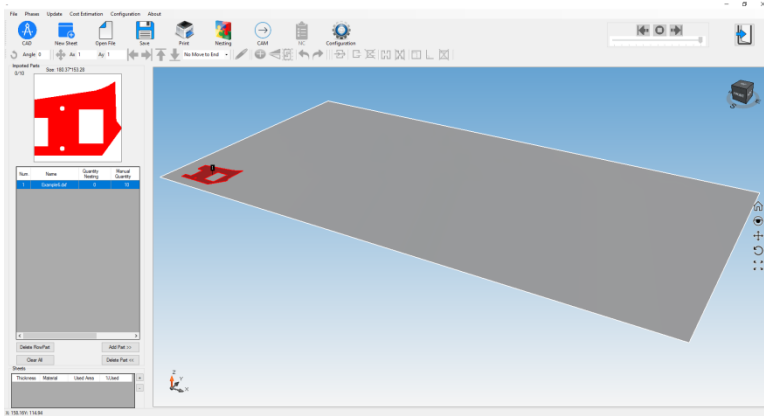
Information of the kind of entities, number and size of the part is available by clicking on the **View** button.



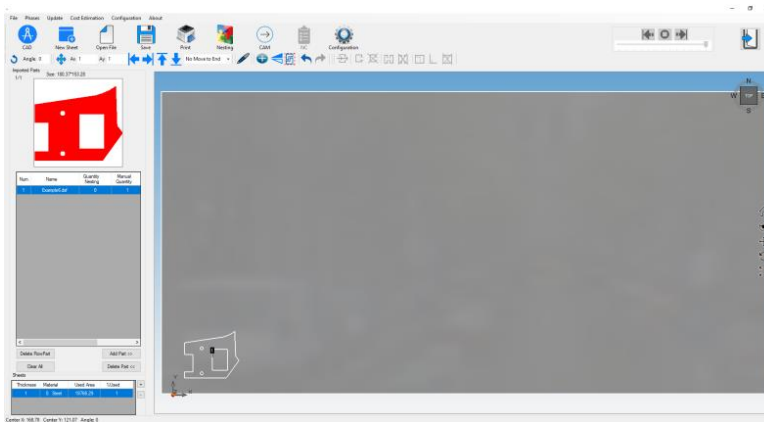
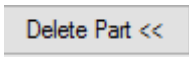
Click on the **Add Part** button.



Hover the mouse on the sheet and left-click to position the part.

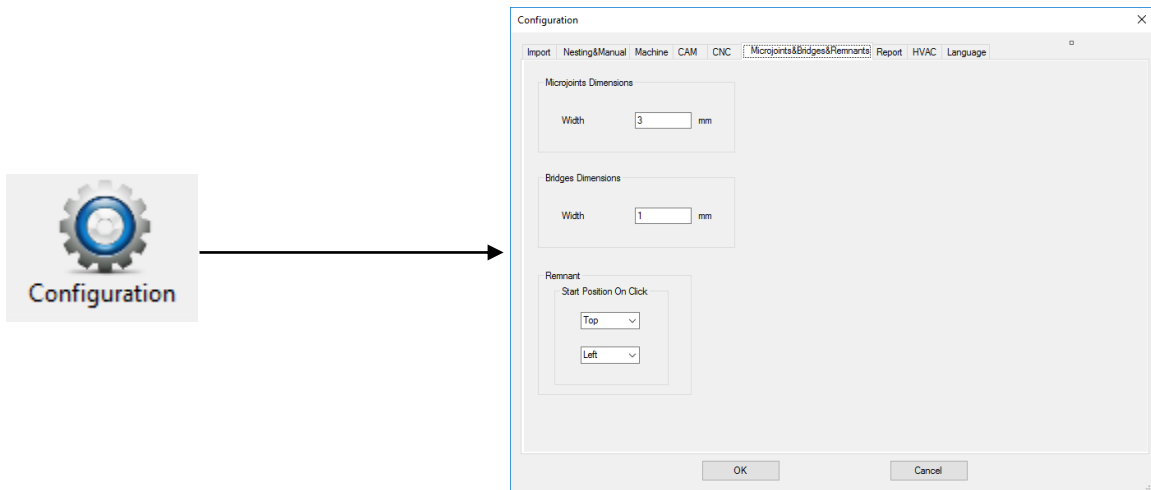


To **Delete** the part, choose it and click on the **Delete Part** button.



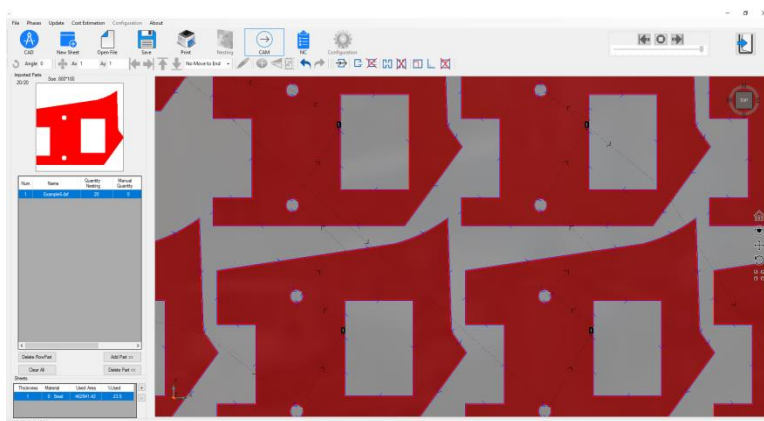
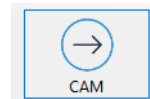
2.3) Bridges.

Update **Bridge Width** by going to **Configuration->Microjoints&Bridges&Remnants->Width**.



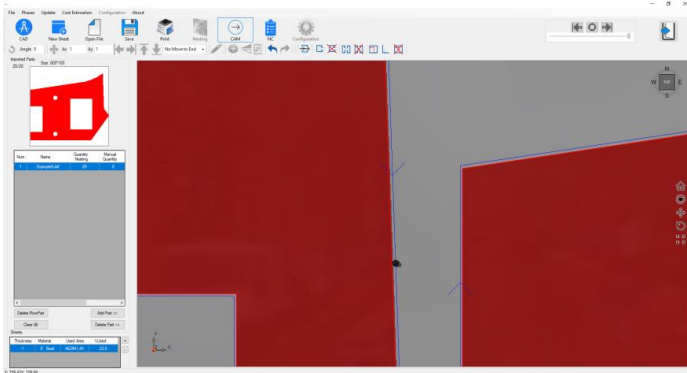
Add Bridge:

Import parts into the programme and click on the **CAM** button.

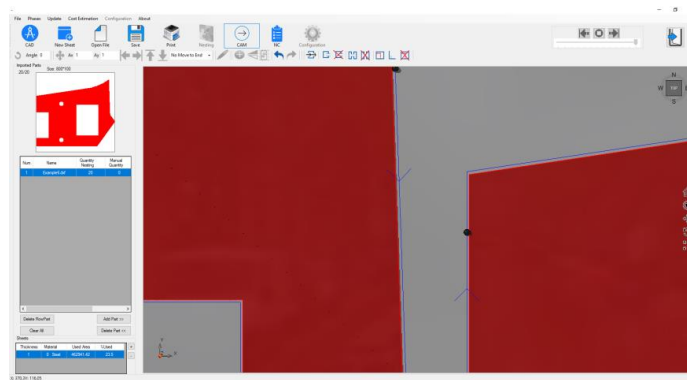


Click on the **Add Bridge** button. 

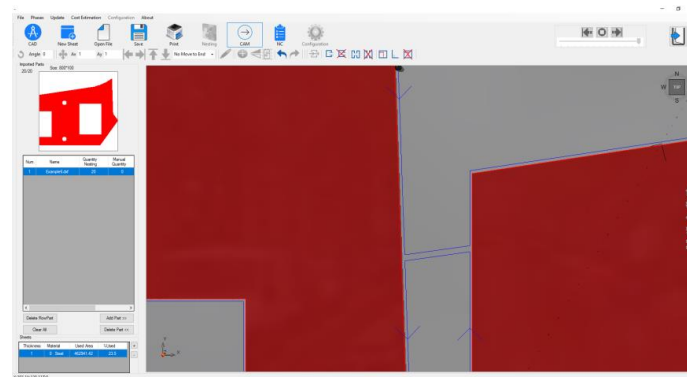
Select end of first part.



Select end of next part.



Result:

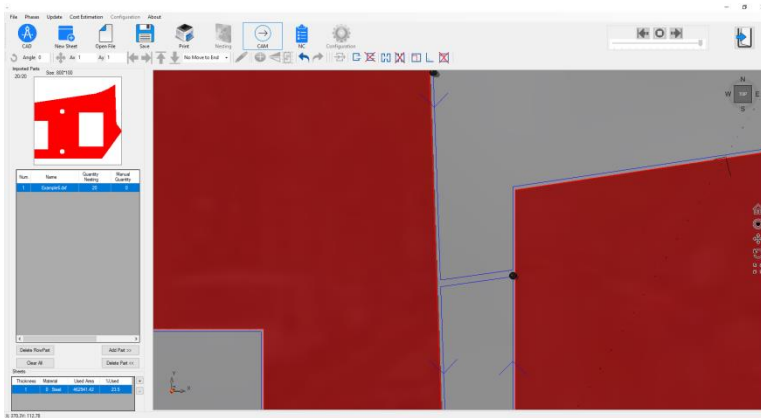


Delete Bridge:

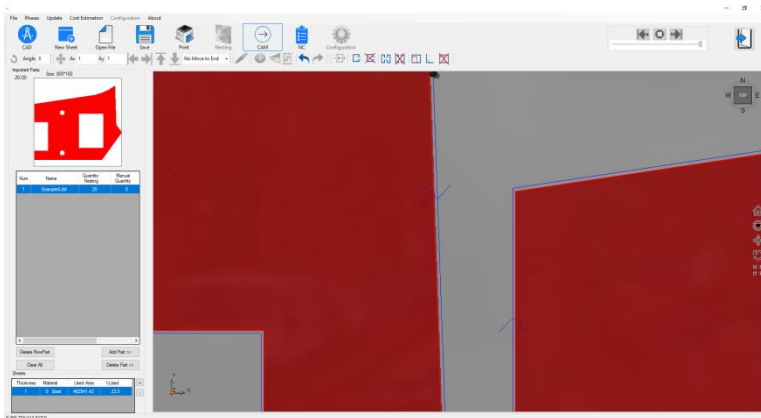
Click on the **Delete Bridge** button.



Select the bridge.

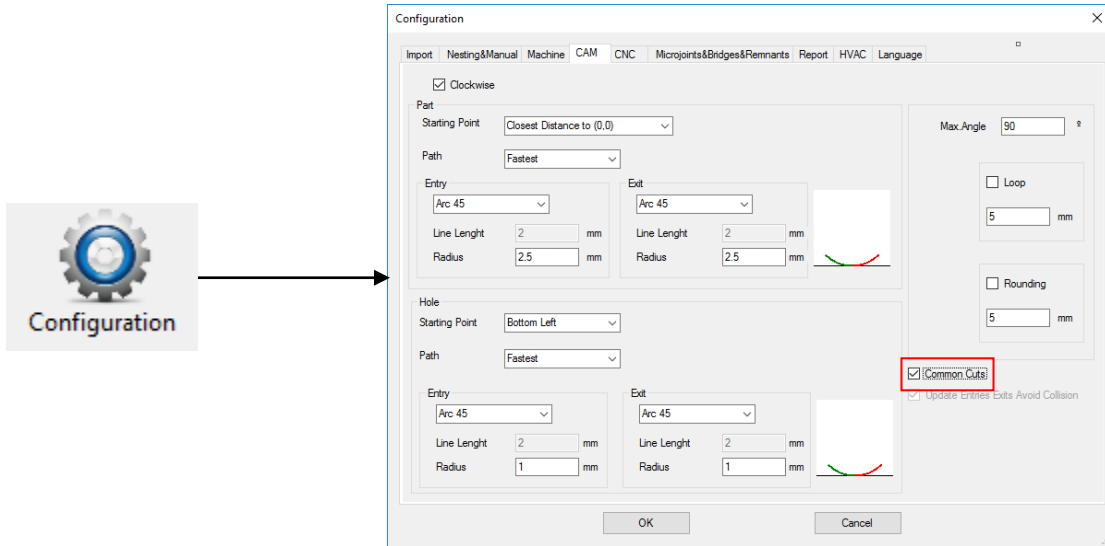


Result:

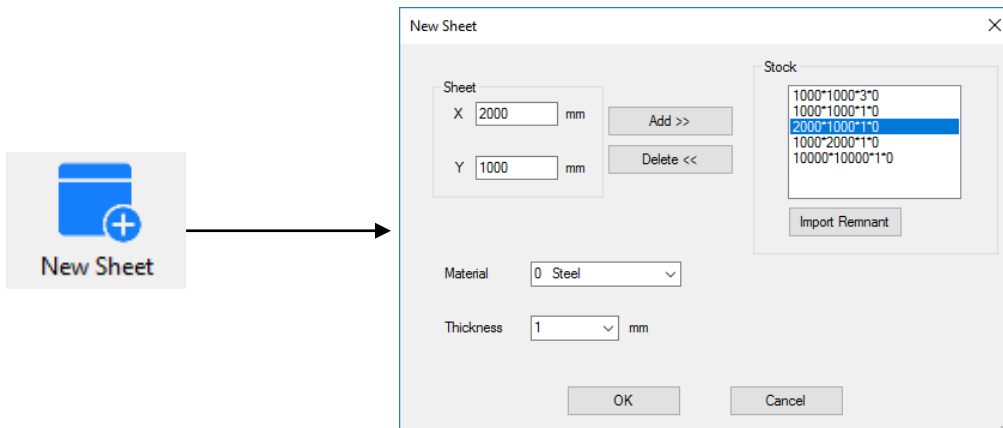


2.4) Common Cuts.

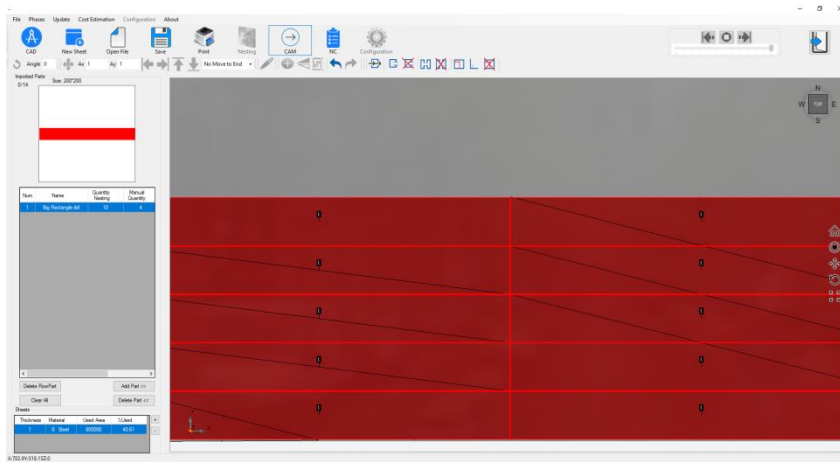
Click on Configuration->CAM->Common Cuts.



Add a new Sheet:

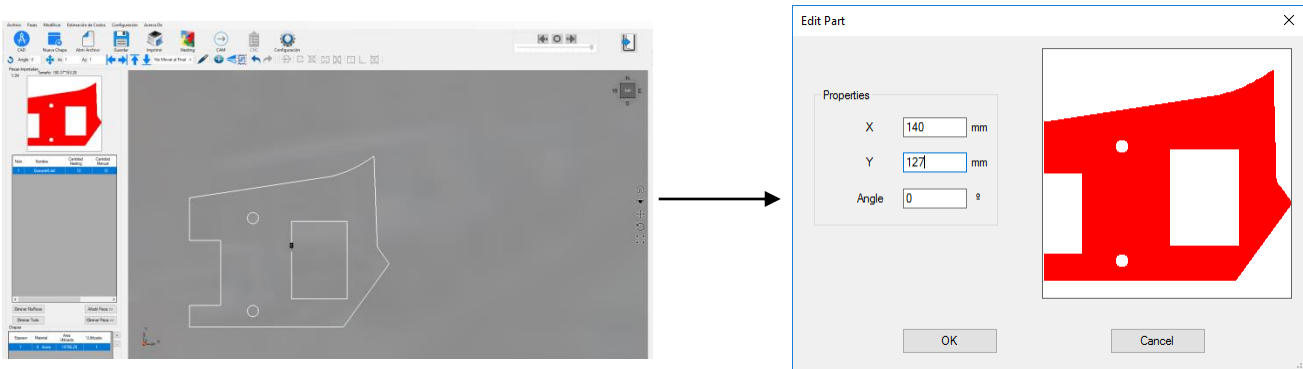


Add Parts: Manually or by Nesting.



2.5) Edit Part.

Select the positioned part and click on the **Edit Part** button.

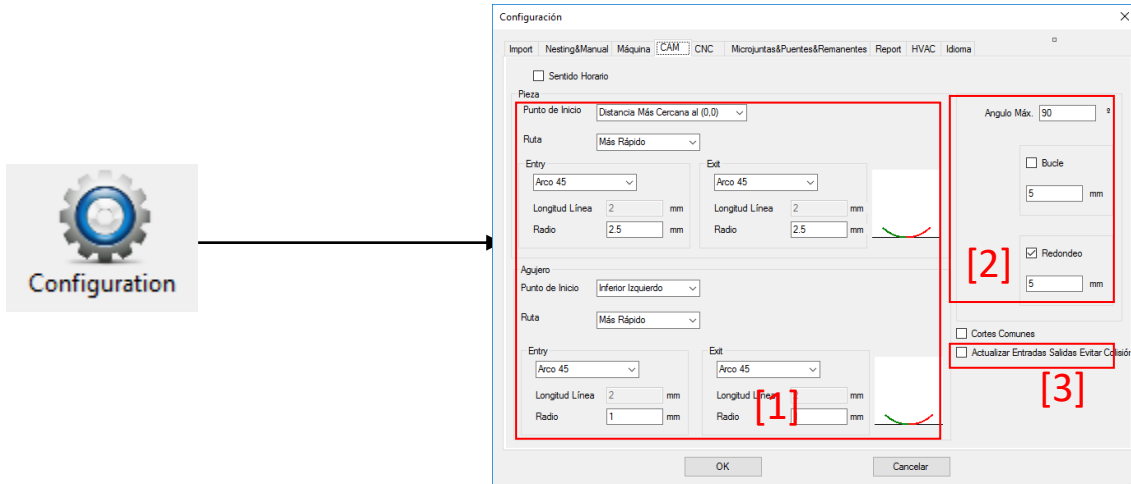


Position it in the required location, updating the **X,Y** and **Angle** values.

Click on the **OK** button.

2.6 Entries/Exits.

Configuration->CAM.



- 1) Allows the Starting Point, Path and Geometry of the Entries and Exits of the beam to be managed.

1.1) Starting Point:

1.1.1) Bottom Left-> The first Part/Hole will be the one that is placed in **Bottom Left** position.

1.1.2) Bottom Right-> The first Part/Hole will be the one that is placed in **Bottom Left** position.

1.1.3) Top Left-> The first Part/Hole will be the one that is placed in **Top Left** position.

1.1.4) Top Right-> The first Part/Hole will be the one that is placed in **Top Right** position.

1.1.5) Closest Distance (0,0)-> The first Part will be the one that is placed at the **Closest Distance (0,0)**.

1.2) Path:

1.2.1) Fastest-> Path calculation will be based on minimum displacement.

1.2.2) X Direction-> Path calculation will be based on minimum Y displacement.

1.2.3) Y Direction-> Path calculation will be based on minimum X displacement.

2.3) Entry/Exit:

2.3.1) Line 45: The Entry/Exit of the Part/Hole will be a **Line of 45 degrees** inclination.

2.3.2) Line 90: The Entry/Exit of the Part/Hole will be a **Line of 90 degrees** inclination.

2.3.3) Line Tangent: The Entry/Exit of the Part/Hole will be a **Line Tangent**.

2.3.4) Arc 45: The Entry/Exit of the Part/Hole will be an **Arc of 45 degrees** inclination.

2.3.5) Arc 90: The Entry/Exit of the Part/Hole will be an **Arc of 90 degrees** inclination.

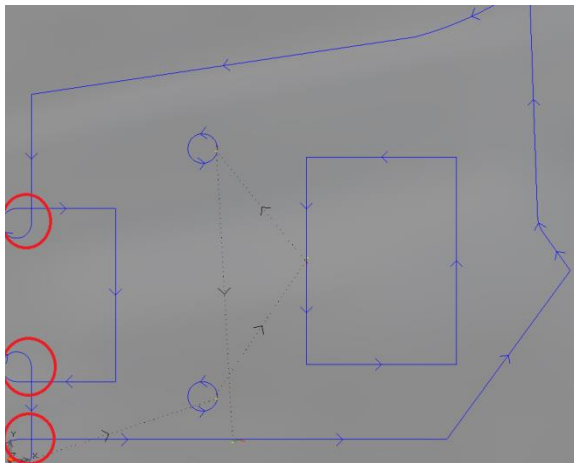
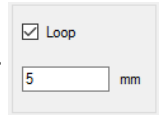
2.3.6) Arc 180: The Entry/Exit of the Part/Hole will be an **Arc of 180 degrees** inclination.

2.3.7) Line + Arc 90: The Entry/Exit of the Part/Hole will be a **Line of 90 degrees** inclination + arc of 90 degrees inclination.

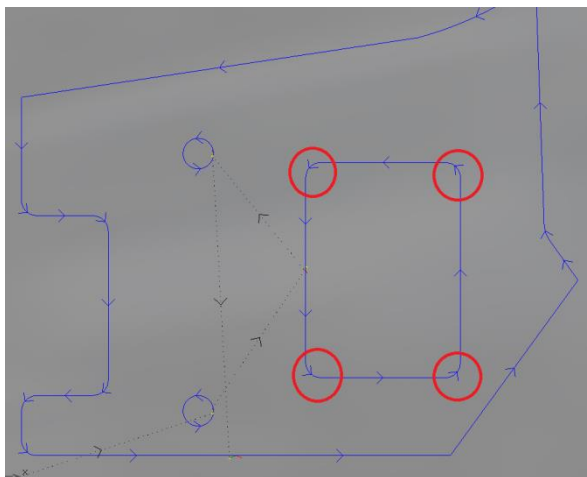
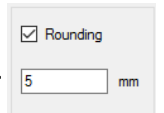
2) Allows corners of the parts and holes to be managed.

2.1) Max. Angle:Round and Loop all hole and part corners below this value.

2.2) Loop: If checked, it will Loop all the corners of the parts with the added radius.



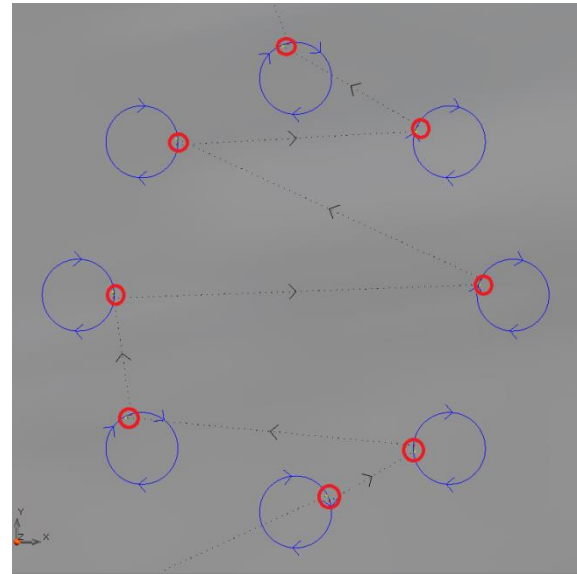
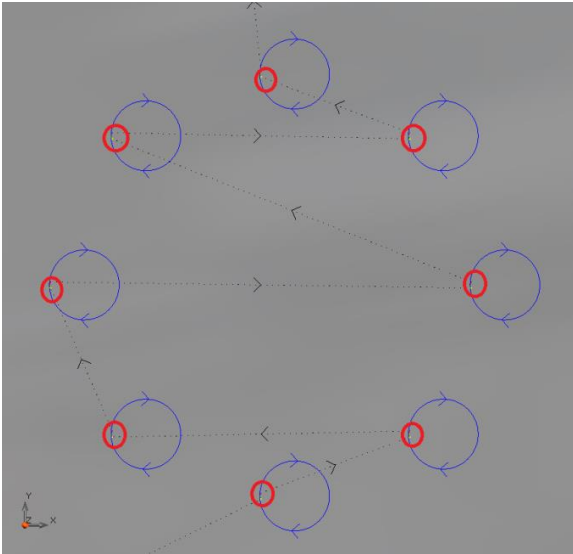
2.3) Round: If checked, it will Round all the corners of the holes with the added radius.



3) Update Entries Exits Avoid Collision.

If checked: All **Entries** and **Exits** are recalculated to prevent collision with the torch.

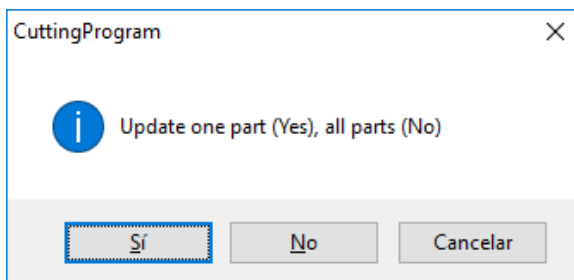
If unchecked: **Entries** and **Exits** are not recalculated.



4) The programme allows these Entries and Exits to be moved.

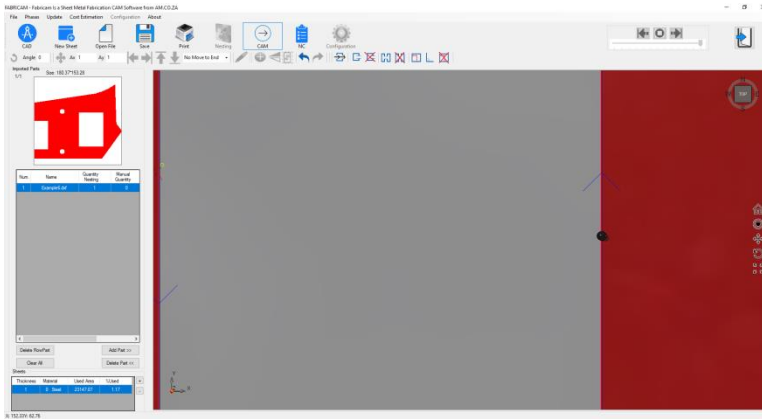


If the **Update Entries Exits Avoid Collision** option is unchecked, it will ask to move only one part or all parts.

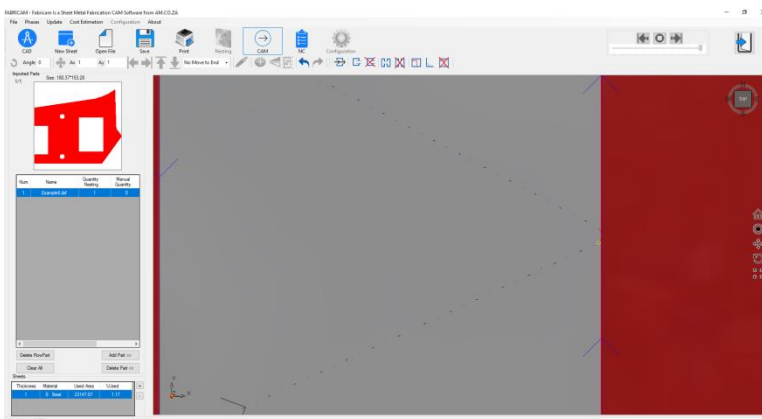


Click on the **Move Entries/Exits** button. 

Select the destination position with the mouse and left-click:

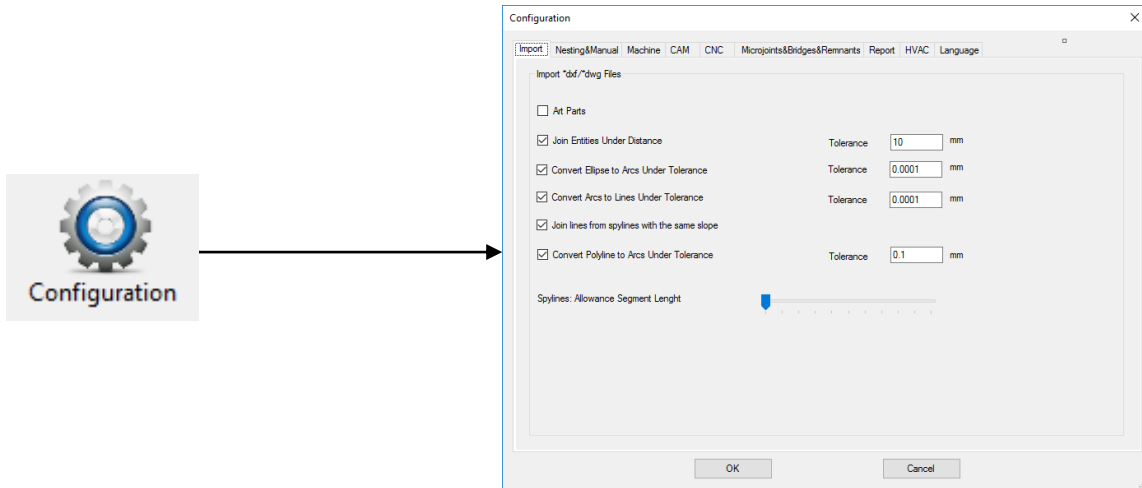


Result:

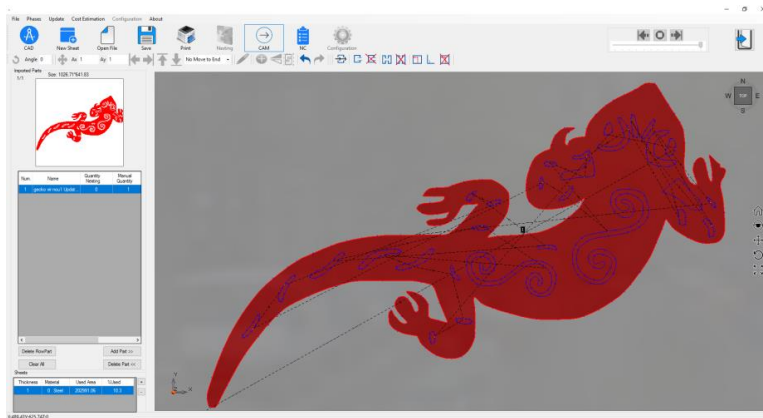


2.7 Filter Import.

Click on Configuration->Import.

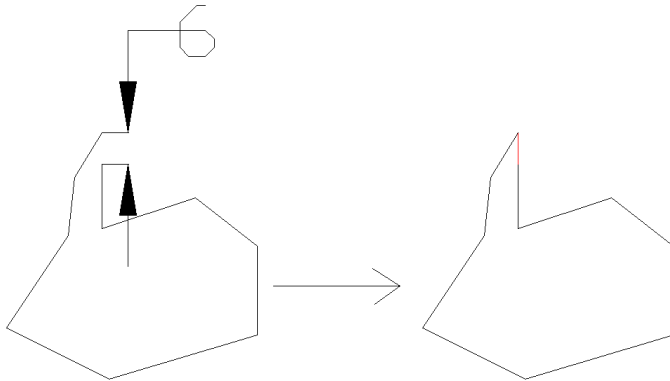


Art Parts: If checked, it allows **Art Parts** to be imported.

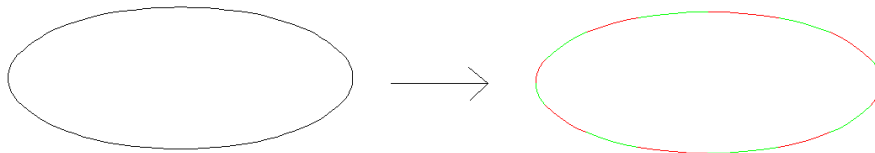


IMPORTANT: Uncheck if the part is not an **Art Part**.

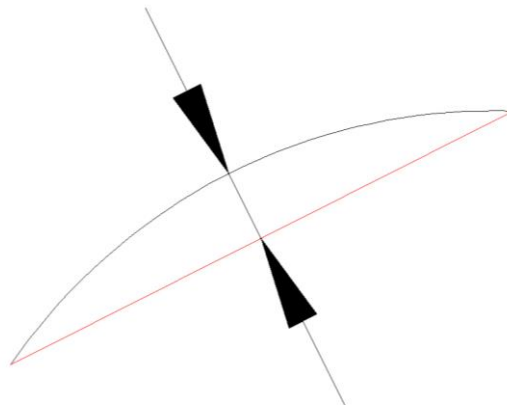
Join Entities Under Distance: Joins all Entities which have less distance between them than the value entered.



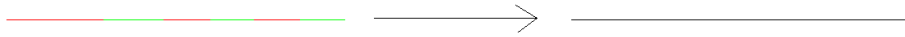
Convert Ellipse to Arcs Under Tolerance: Converts ellipse entities into arcs, taking into account the tolerance.



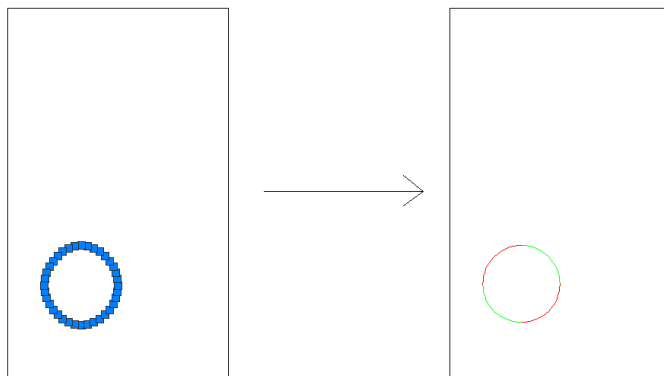
Convert Arcs to Line Under Tolerance: Converts Arc entities into lines, taking into account the tolerance.



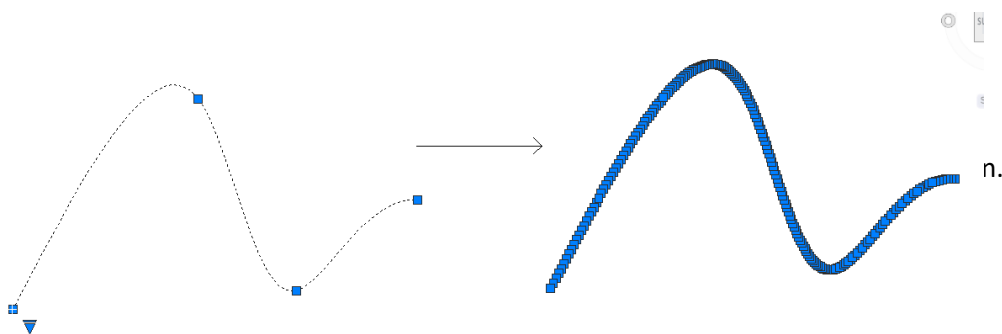
Join Lines from Splines with the Same Scope: Joins all the lines with the same scope belonging to the Spline, taking into account the tolerance.

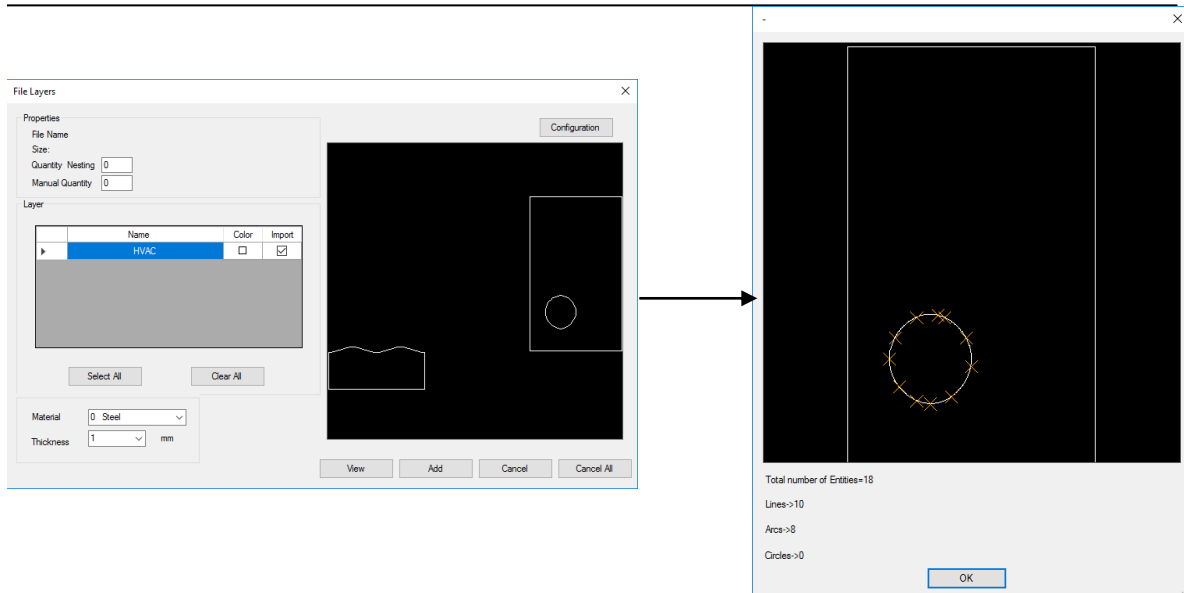


Convert Polyline To Arc Under Tolerance: Converts polylines into arcs, taking into account the tolerance.



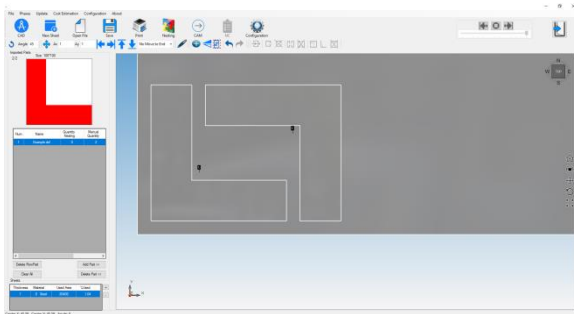
Splines: Segment Length Allowance: Converts splines into polylines, taking into account the tolerance.



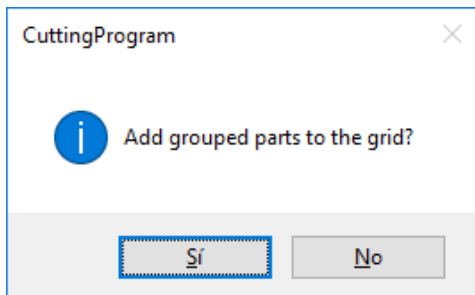


2.8) Group Parts.

Select the parts to be grouped and click on the **Group** button.



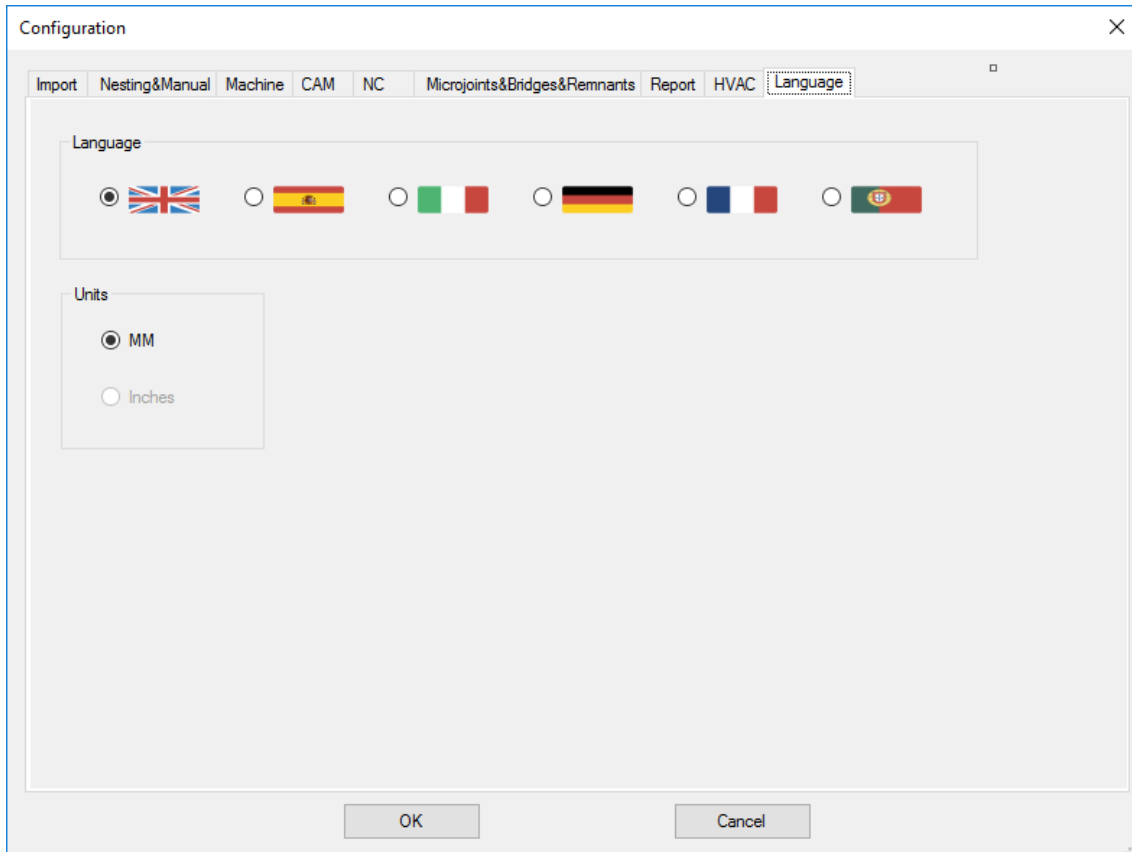
The message **Add grouped parts to the grid** is displayed.



If we click on Yes, grouped parts will be added in the left-hand grid.

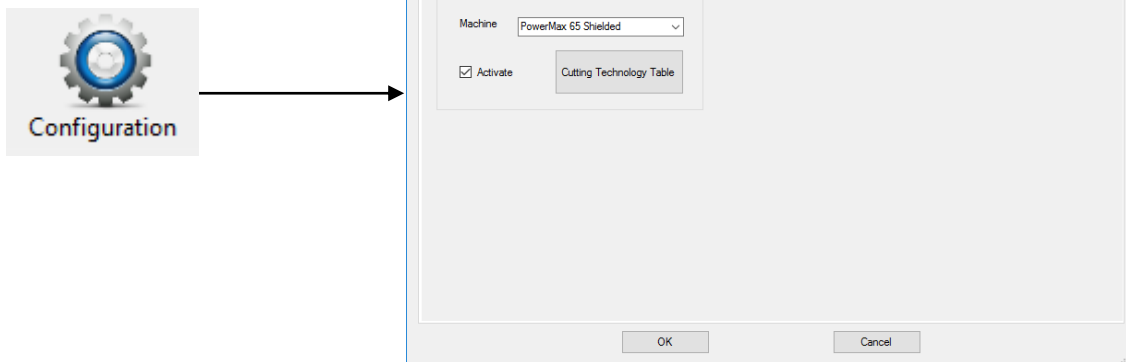
2.9) Language and Units.

Click on **Configuration->Language**.



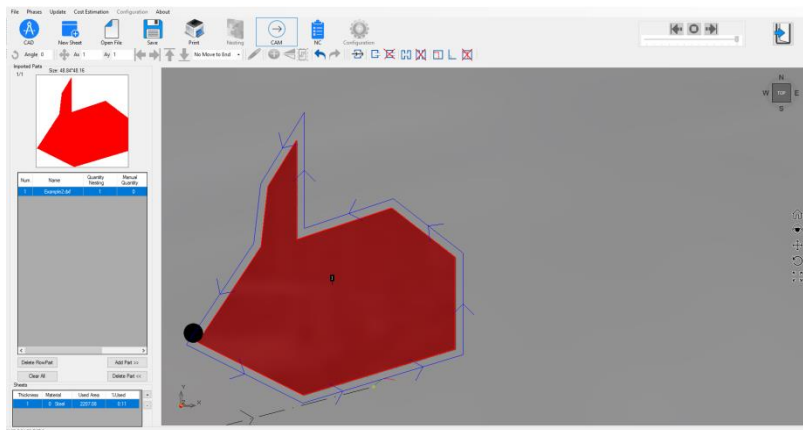
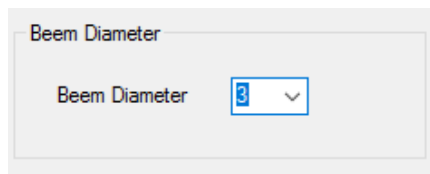
2.10) Machine Parameters.

Click on Configuration->Machine.



Beam Diameter:

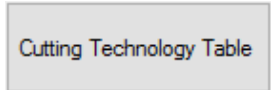
Select **Beam Diameter** in the listbox.



Cutting Technology Table:

Select **Cutting Technology Table** in the listbox. Machine

It can be filtered by **Material** by clicking on the **Cutting Technology Table** button.



Choose **Best Quality** or **Production**.



G00 Speed, Power and **ZTime** can be updated.

New rows can be **Added** or **Deleted**.



Cutting Technology Table

G00 Speed mm/min Power Kw Z Time Sec

Machine Save

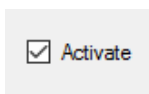
Material

Configuration
 Best Quality
 Production

	Thickness	Initial Pierce Height	Torch Work Distance	Amperage	Cut Speed Best	Voltage Best	Cut Speed Production	Voltage Production	Pierce Delay Time
▶	0.5	3.8	1.5	40	8250	78	8250	78	0
	0.6	3.8	1.5	40	8250	78	8250	78	0
	0.8	3.8	1.5	40	8250	78	8250	78	0.1
	1	3.8	1.5	45	8250	78	8250	78	0.2
	1.5	3.8	1.5	45	6400	78	6400	78	0.4
	2	3.8	1.5	45	5250	82	5250	82	0.4
	3	3.8	1.5	45	2750	83	2750	83	0.5
	4	3.8	1.5	45	1900	84	1900	84	0.6

OK Cancel

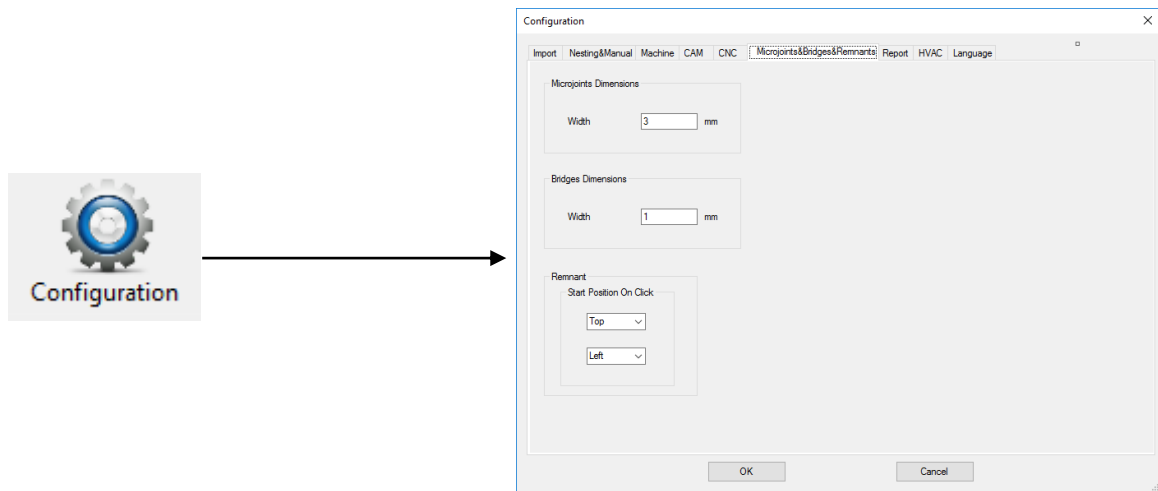
Activate:



Cutting Technology Table values will be applied in the NC if it is checked.

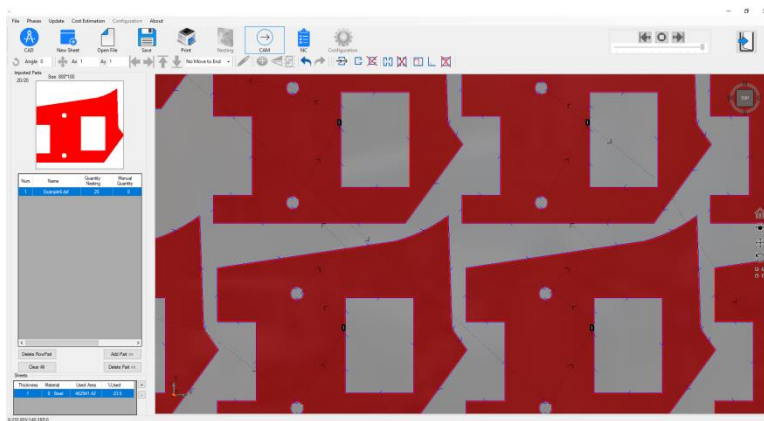
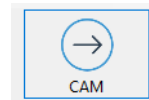
2.11) Microjoints.

Update **Microjoints Width** by going to **Configuration->Microjoints&Bridges&Remnants->Width**.



Add Microjoint:

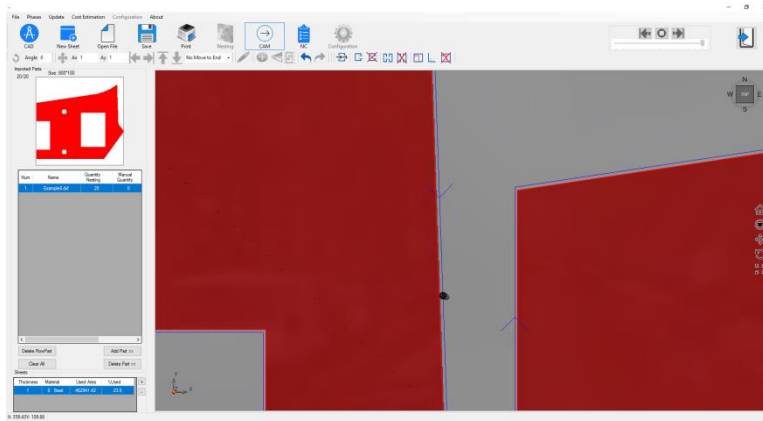
Import parts into the programme and click on the **CAM** button.



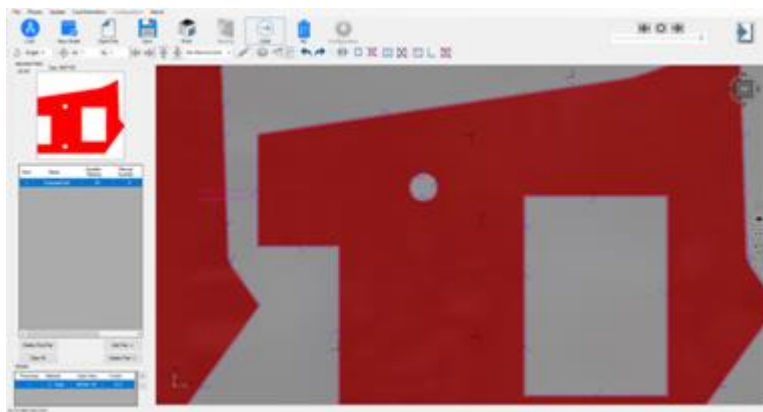
Click on the **Add Microjoint** button.



Select the position where it is to be inserted.



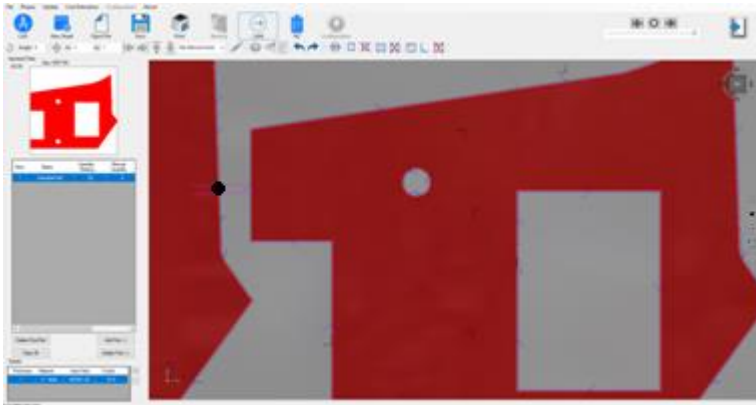
Result:



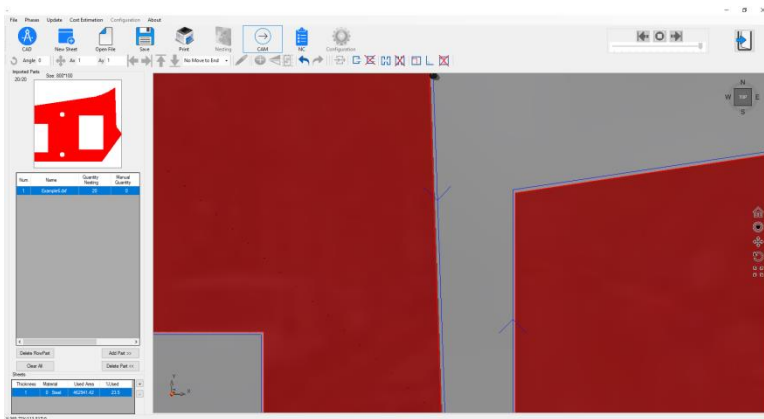
Delete Microjoint:

Click on the **Delete Microjoint** button. 

Select the microjoint.



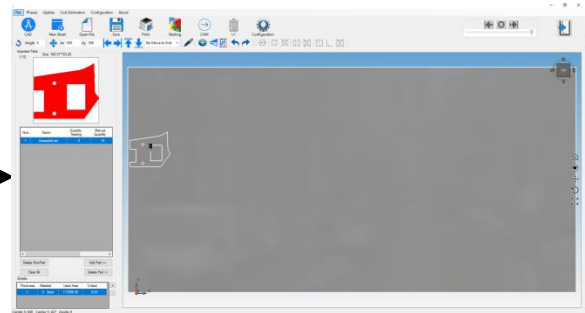
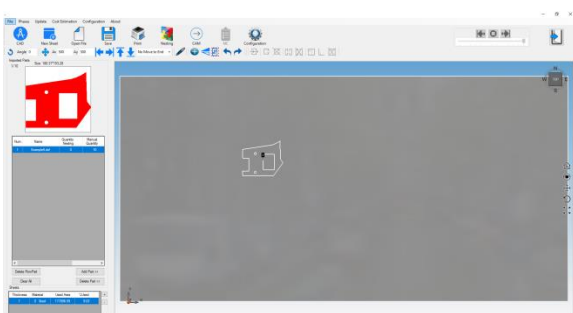
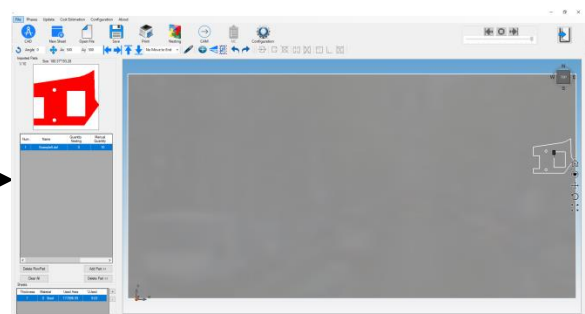
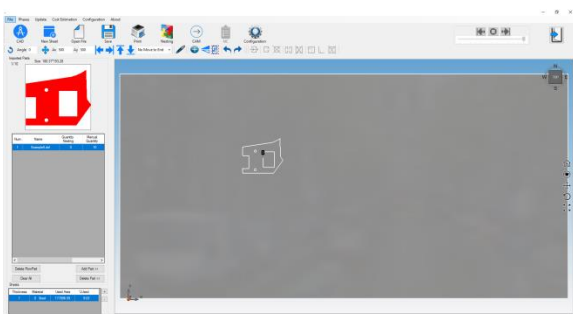
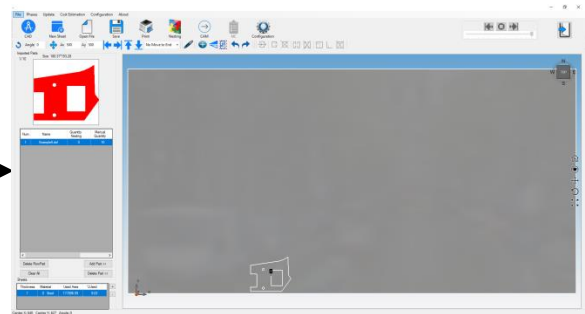
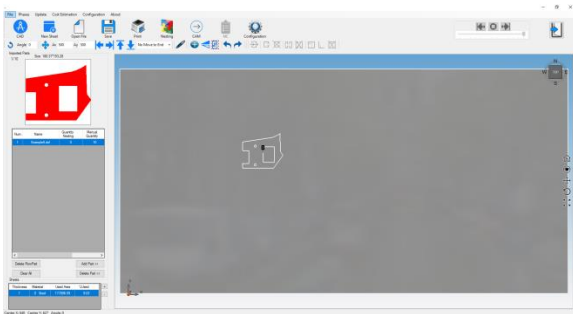
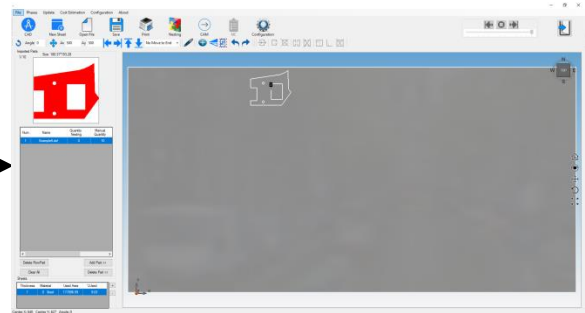
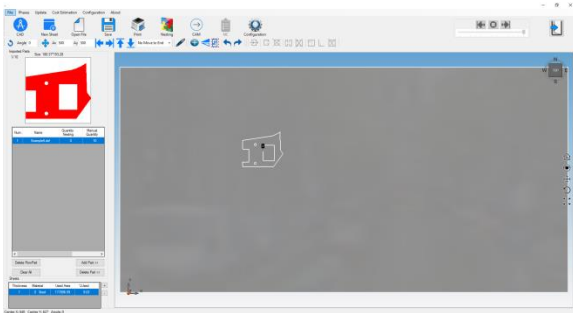
Result:



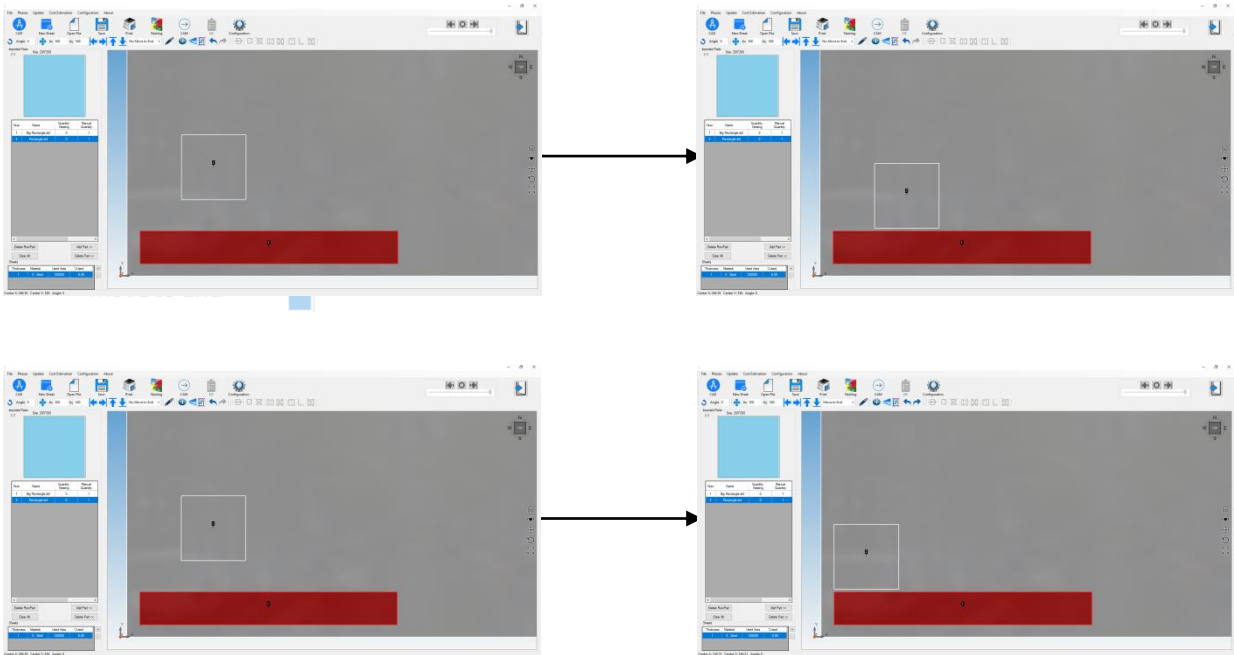
2.12) Move Parts.

Move the Part(s) to the Left, Right, Top or Down

Select the part and click on one of the four options.

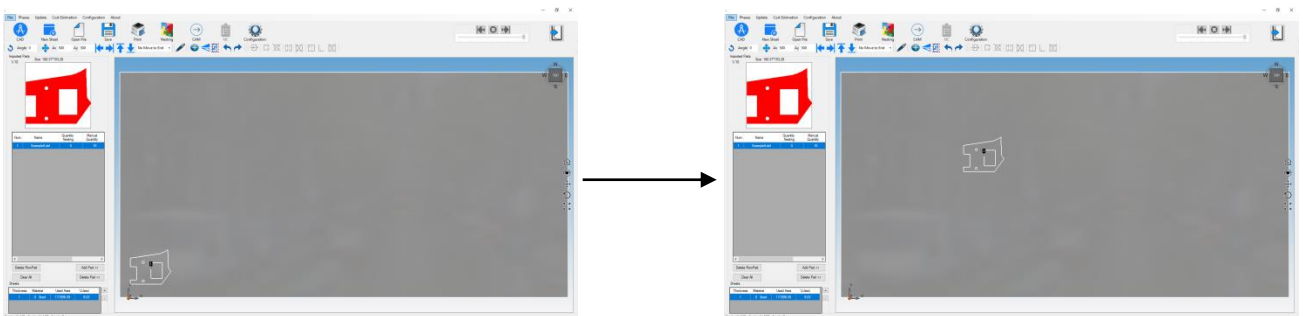
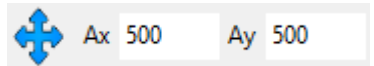


No Move to End and Move to End.



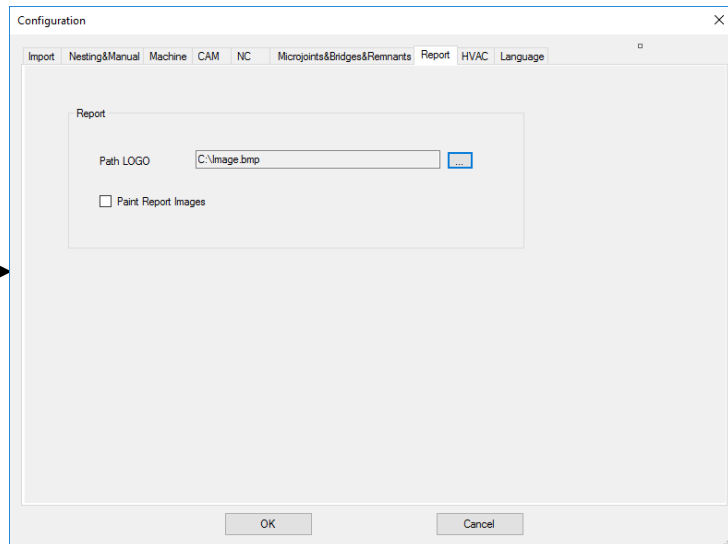
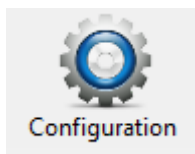
Move in Ax and Ay


Select the part, update the values of **Ax** and **Ay** and click on the **Move** button.



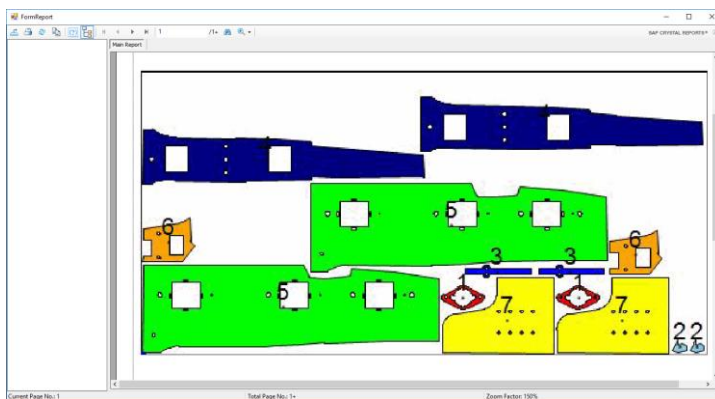
2.13) Print

Click on Configuration->Report.

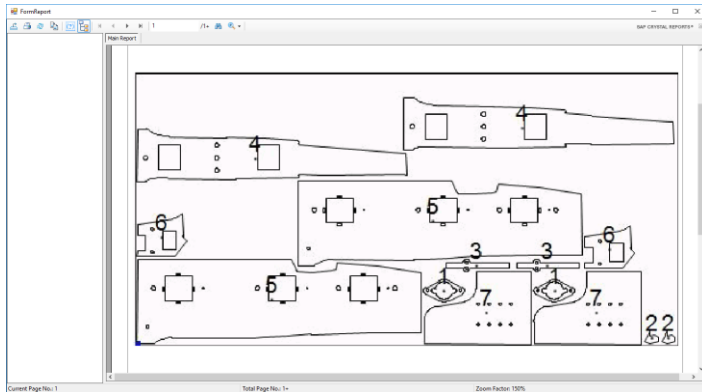


The **Logo** can be added by clicking on the **Path LOGO** button. 

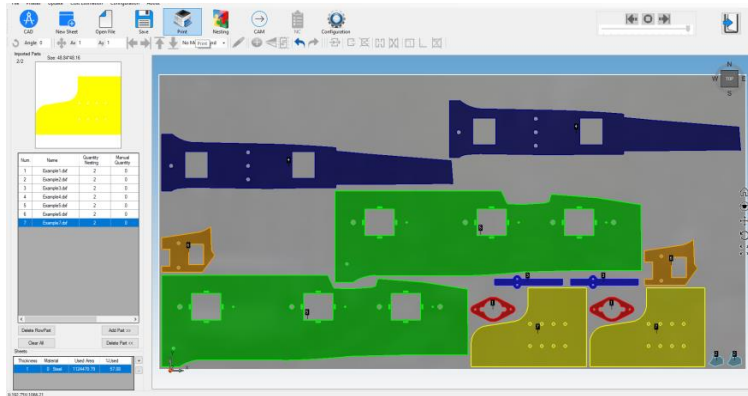
Paint Report Images: If checked, parts will be painted in colour in the Report.



If unchecked, parts will be painted in black and white in the Report.



Parts need to be placed on the sheet before printing the document.



Click on the **Print** button.



Report ✕

F.O.:

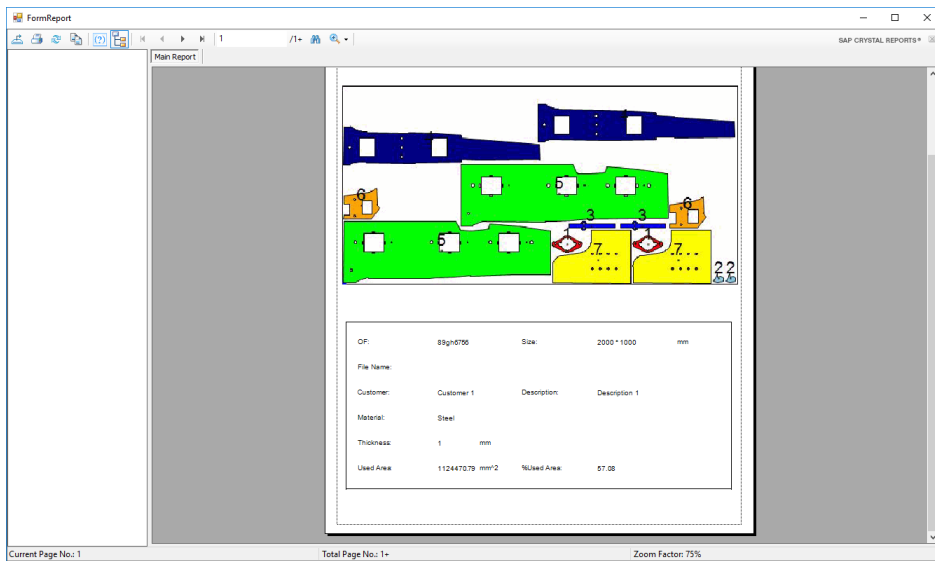
Customer:

Description:

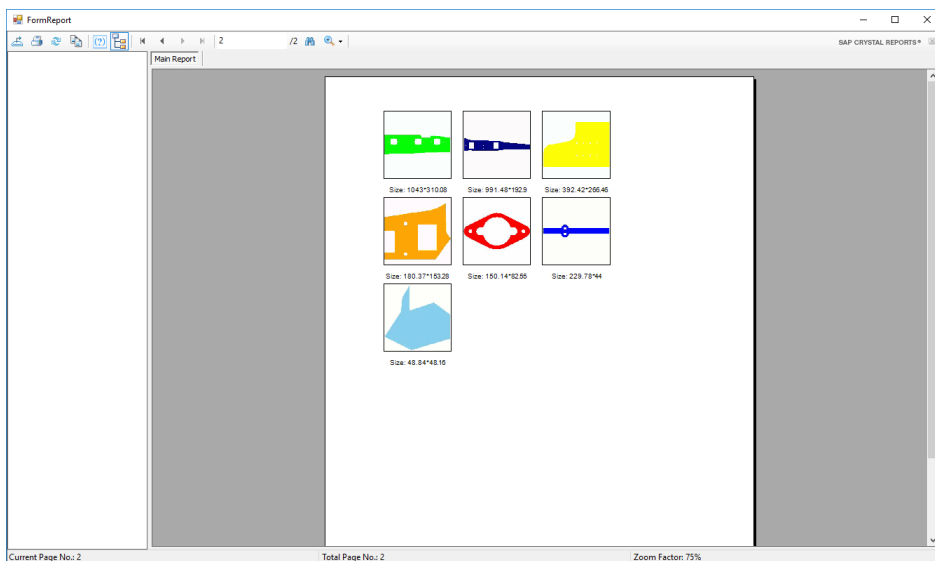
Fabrication Order, Customer and Description values can be introduced.

Click on the **OK** button.

On the first page we will see general information such as **Size of the Sheet, Used Area, %Used Area** and the image with how the sheet and parts are positioned.

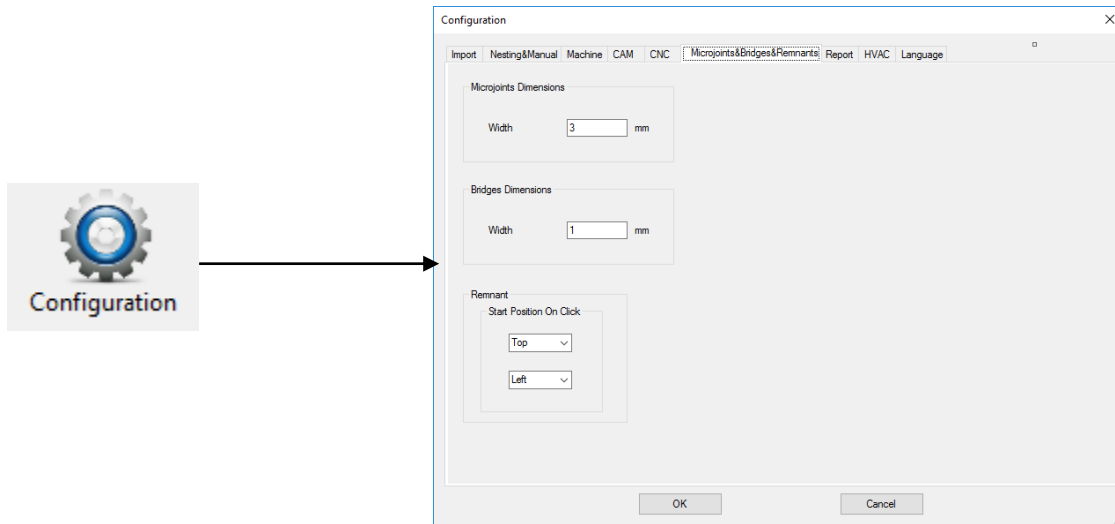


Later on we will see images of the parts and their size.

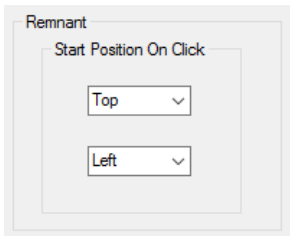


2.14) Remnant.

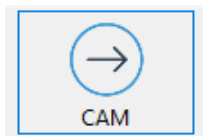
Click on Configuration->Microjoints&Bridges&Remnants.



In the Remnant frame we can choose where the start of the Remnant will be.



Click on the CAM button.



This can **Add/Update Remnant**, **Add the Remnant Line Orthogonally** and **Delete Remnant**.



Add/Update Remnant.



Add Orthogonal Remnant line.



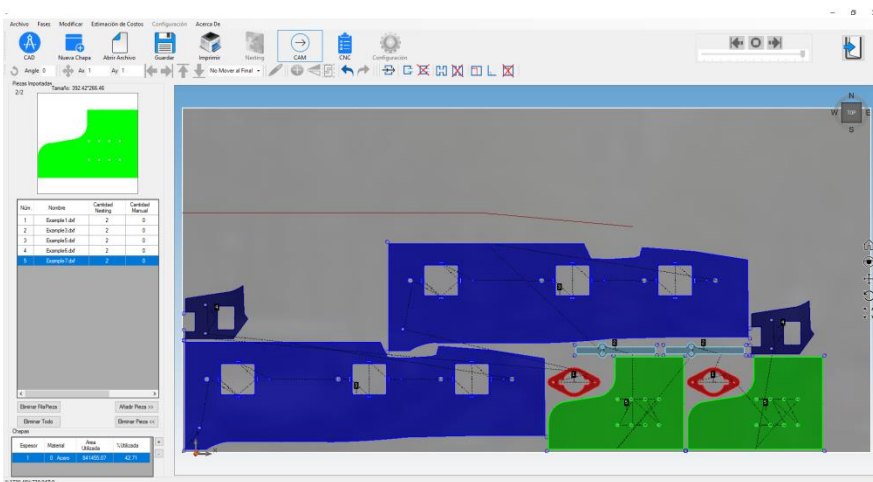
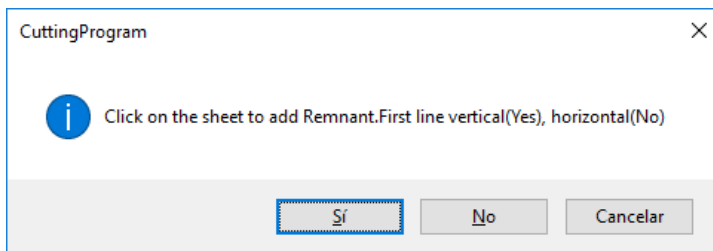
Delete Remnant.

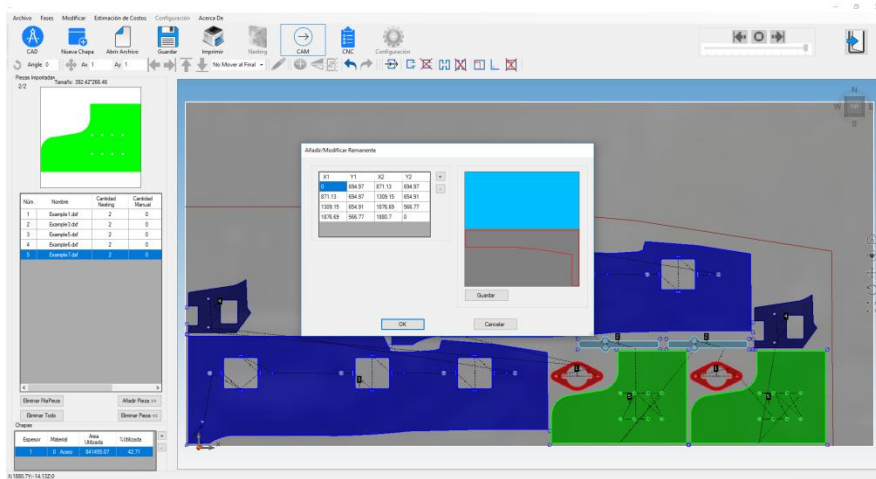


Add/Update Remnant.

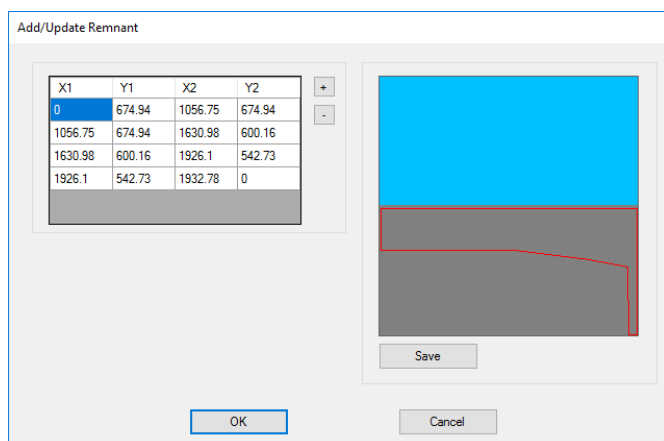


Clicking on this button will display the following message: **Click on the Sheet to add Remnant. First line vertical (Yes), horizontal (No).**

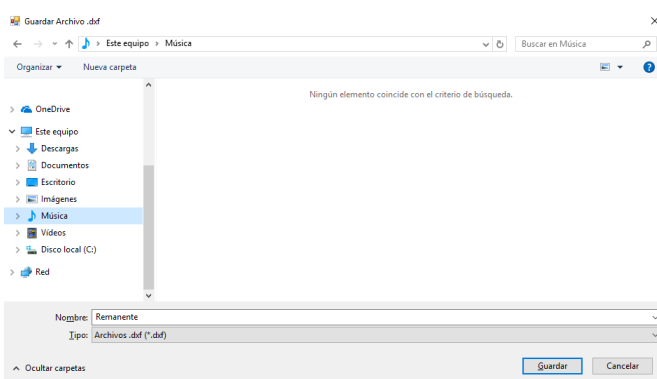
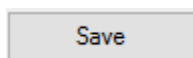




X1,Y1,X2 and Y2 can be updated manually from the grid.



Click on **Save**.

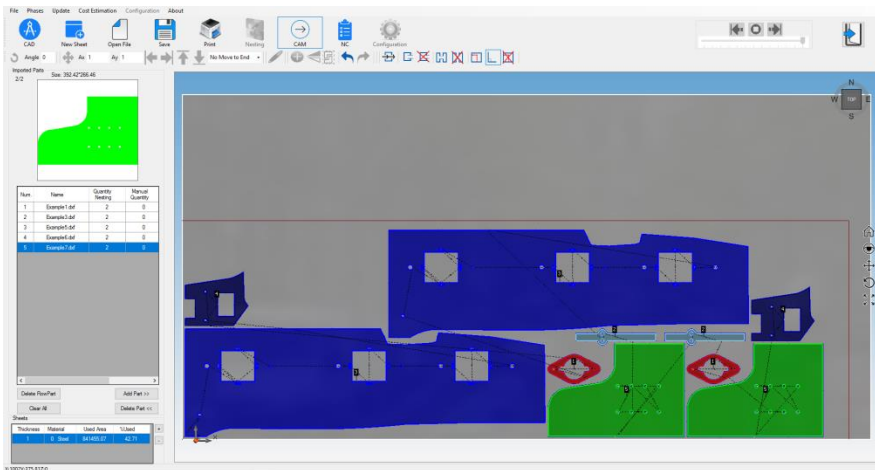


It allows the **Remnant** to be saved in a .dxf extension file.

Add Orthogonal Remnant line.



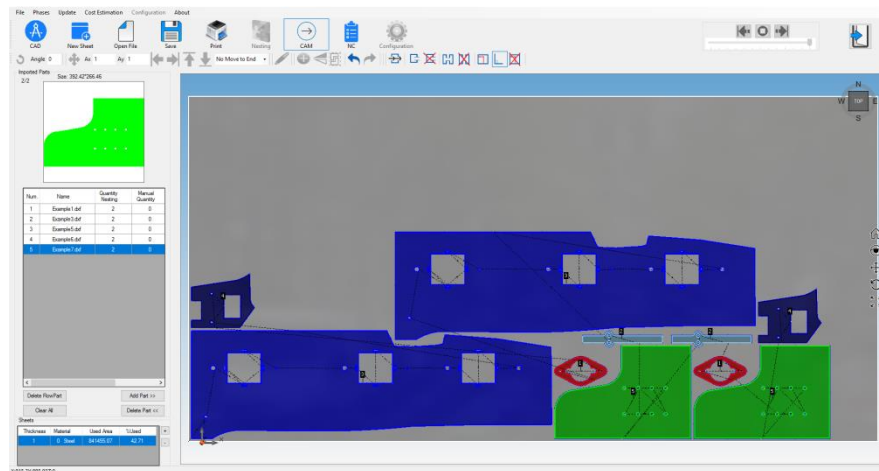
Each time we add the line it will be **Orthogonal** to the previous line.



Delete Remnant.

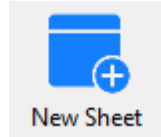


Deletes the **Remnant** introduced.

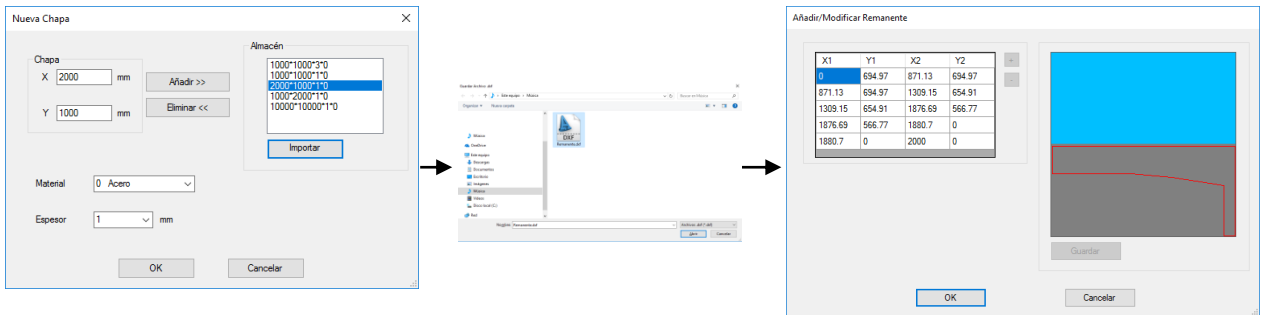


To open the saved **Remnant**.

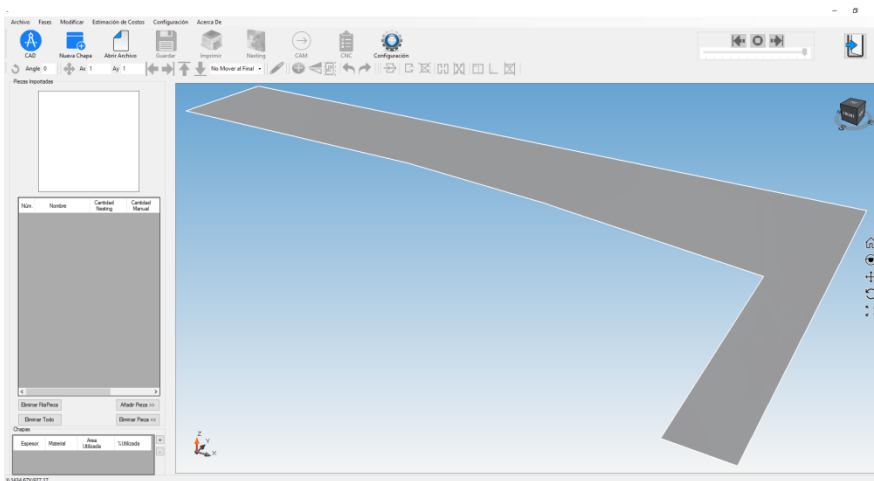
Click on **New Sheet**.



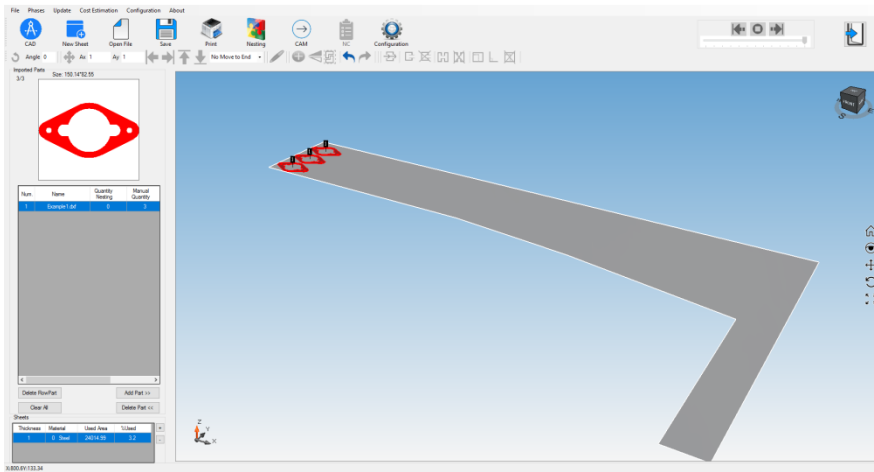
Select a sheet, click on **Import**, select the **Remnant** to import and click on **OK** in the **Remnant** form and on **OK** in the **New Sheet** form.



Result:

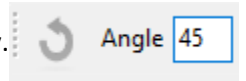


We will add the parts manually:



2.15) Rotate Parts.

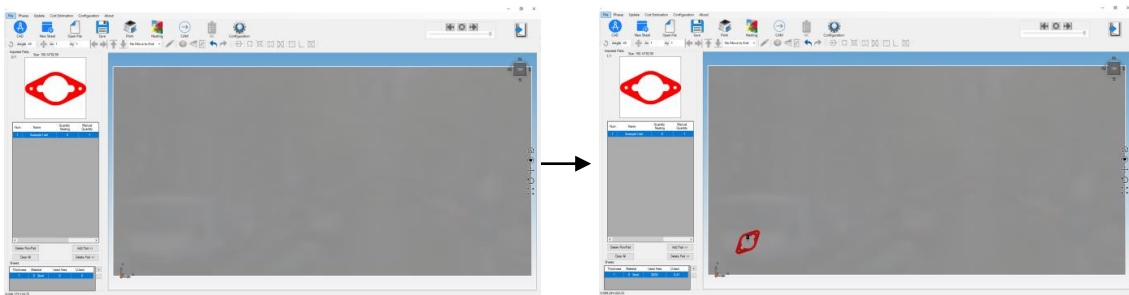
1) The part can be **Rotated**, updating the **Angle** value before inserting the part manually.



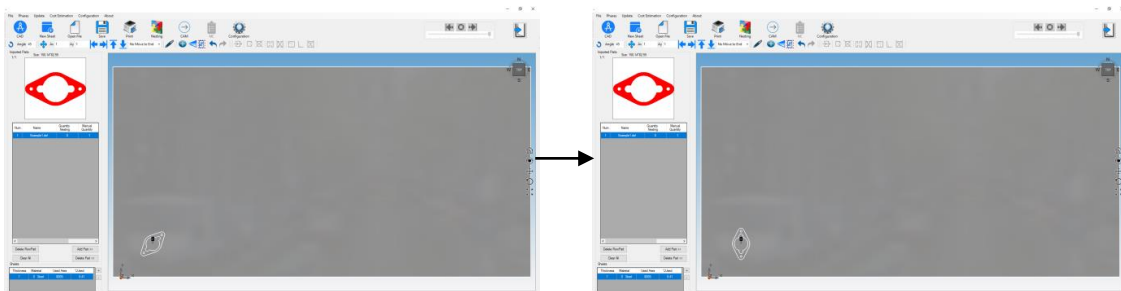
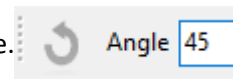
Click on the Add Part button.



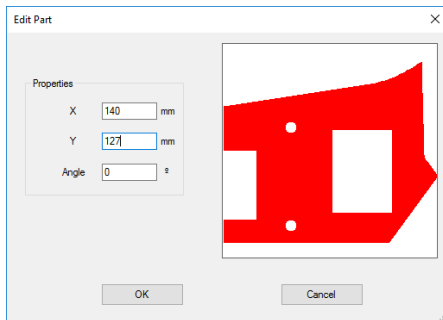
Hover the mouse on the sheet and left-click.



2) The part can be **Rotated by** selecting it and updating the **Angle** value.



3) The part can be **Rotated by** selecting it and clicking on the **Edit** button.



Position it in the required location updating the **X,Y** and **Angle** values.

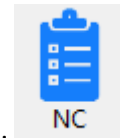
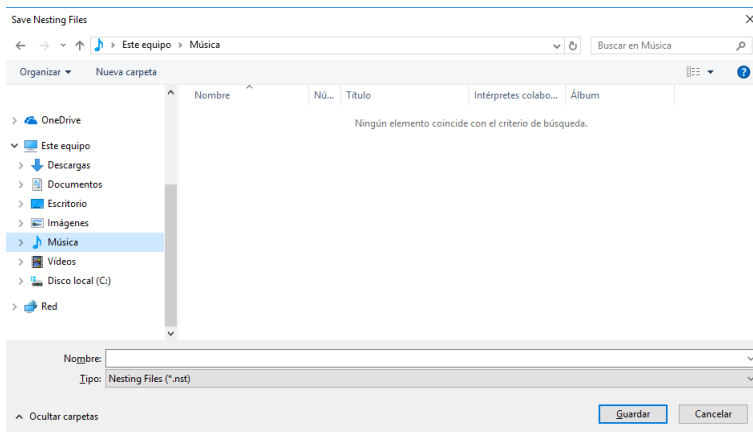
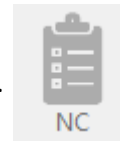
Click on the **OK** button.

2.16) Save CAM and NC

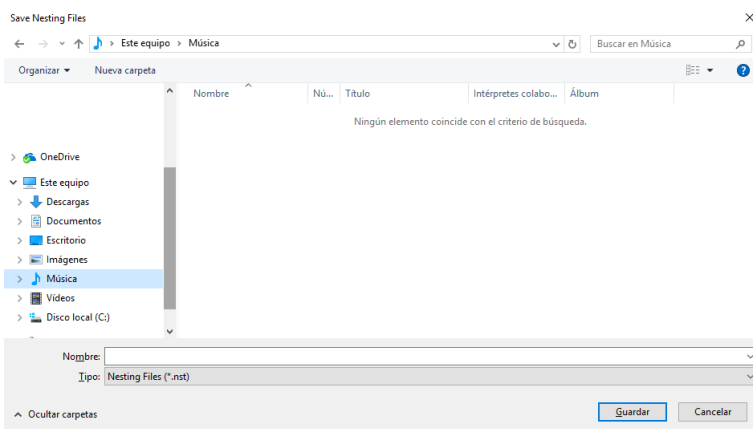
Clicking on the **Save** button allows **CAM Parts (.nst extension file)** or **NC PostProcessor (.nc extension file)** to be saved.



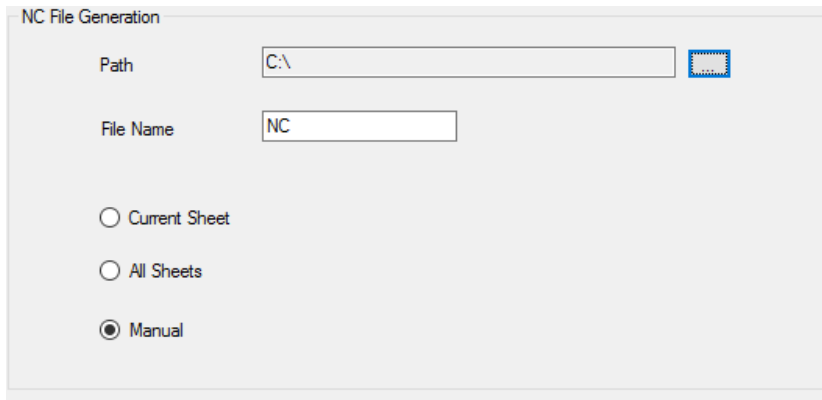
If the **NC** button is unchecked, it is saved it as **CAM Parts (.nst extension files)**.



If the **NC** button is checked, it is saved as **NC PostProcessor (.nc extension file)**.



.nc extension files can be saved **Automatically** or **Manually**: Click on **Configuration->NC**.



The screenshot shows a dialog box titled "NC File Generation". It contains the following elements:

- A "Path" text box containing "C:\", with a folder selection icon to its right.
- A "File Name" text box containing "NC".
- Three radio button options:
 - Current Sheet
 - All Sheets
 - Manual

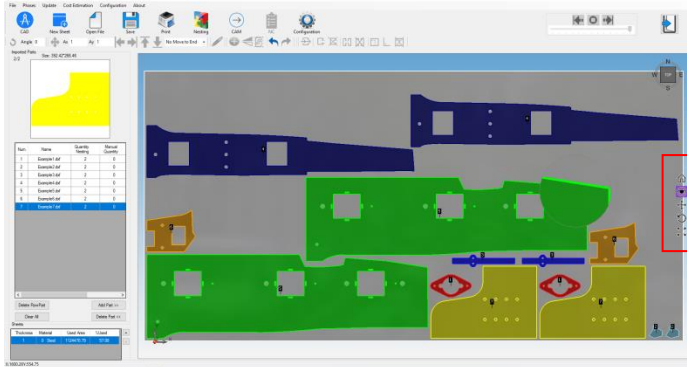
If **Current Sheet** or **All Sheets** is checked, the part will be saved **Automatically** taking into account values from **File Name and Path**.

If **Manual** is checked, the part will be saved **Manually** each time the **Save** button is clicked.

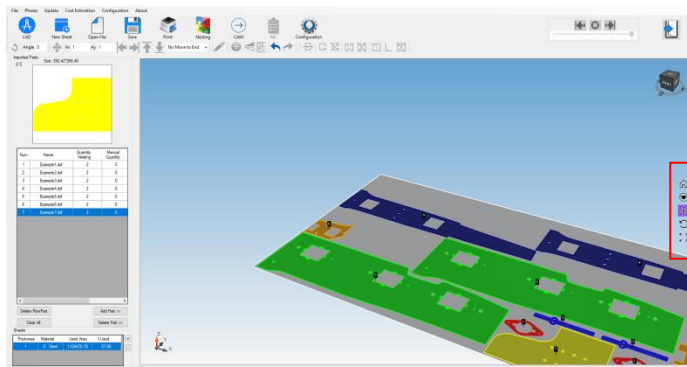
2.17) Screen: Magnifying Glass/Move/Rotate.



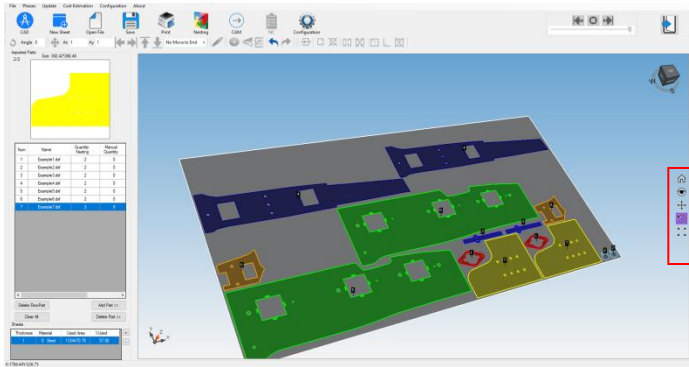
Magnifying Glass.



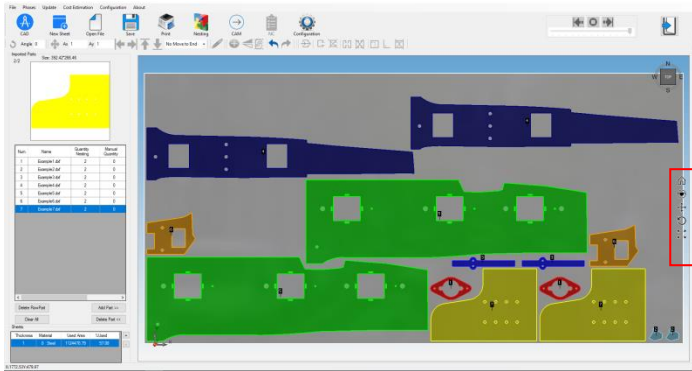
Move.



 Rotate.

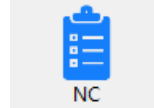


 Zoom.



2.18) Simulation.

Click on the **NC** button to manage the **Simulation**.



Simulation:



Simulation Speed:

There are thirteen different speed levels.



Back to Top:



Returns to the **Starting** position.

Go to End:



Returns to the **End** position.

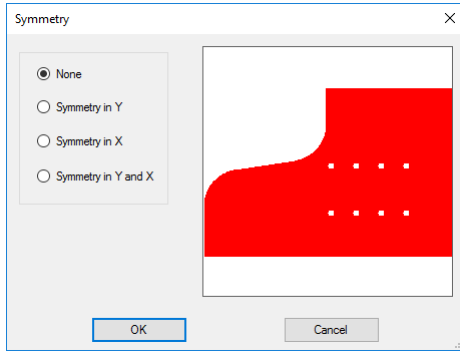
Stop:



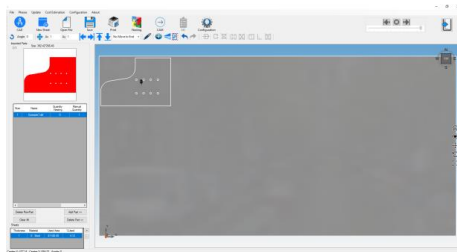
Stops the Simulation.

2.19) Symmetry of Parts.

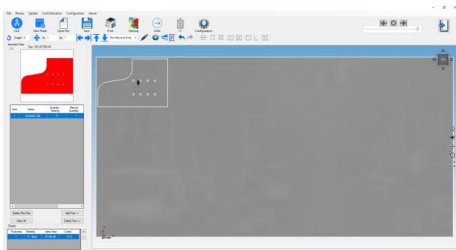
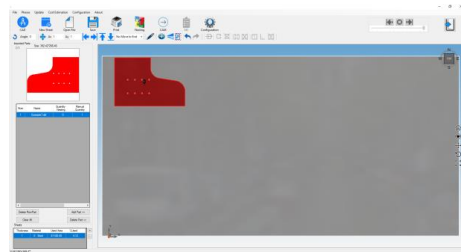
Select the part and click on the **Symmetry** button.



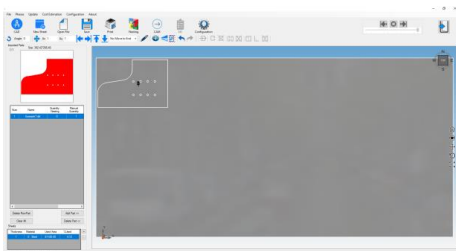
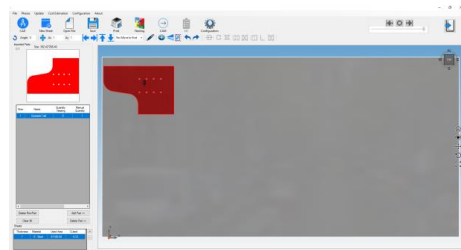
Select one of the options: None, Symmetry in Y, Symmetry in X or Symmetry in Y and X.



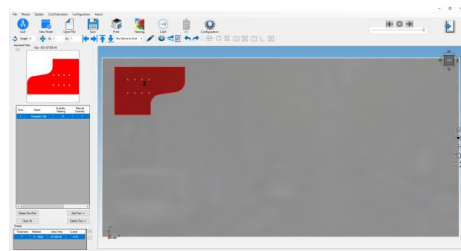
Symmetry
in Y



Symmetry
in X



Symmetry
in Y and X



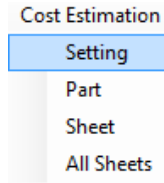
2.20) Undo Redo Operations.

To **Undo** and **Redo** operations, click on the buttons.



3.1) Cost Estimation.

Click on **Cost Estimation->Setting.**



Costs Estimation Setting

Material Cost		Steel	Aluminium	Stainless
Density	gr/cm ³	7.8	2.7	8.03
Price	Kg	0.7	2.9	2.1

Machine Costs	
Machine Price/Hr	40

Preparation Costs Per Part			
Engineering Price/Hr	50		
Default Engineering Time	Hour: 1	Min: 0	Sec: 0
Programing Price/Hr	45		
Default Programming Time	Hour: 0	Min: 1	Sec: 0
SetUp Price/Hr	45		
Default SetUp Time	Hour: 0	Min: 1	Sec: 0

Other Machines Costs Per Part			
Bending Price/Hr	45		
Default Bending Time	Hour: 0	Min: 5	Sec: 0
Grinding Price/Hr	45		
Default Grinding Time	Hour: 0	Min: 2	Sec: 0

Global Costs			
Cost per Pierce	0.1		
Electricity Price (KWh)	0.17		

Gas Costs		Price per m ³
Type1	4.86	<input checked="" type="radio"/>
Type2	0	<input type="radio"/>
Type3	0	<input type="radio"/>
Type4	0	<input type="radio"/>
Type5	0	<input type="radio"/>
Type6	0	<input type="radio"/>
Type7	0	<input type="radio"/>
Type8	0	<input type="radio"/>

Drilling Price/Hr			
Drilling Price/Hr	45		
Default Drilling Time	Hour: 0	Min: 2	Sec: 0

Tapping Price/Hr			
Tapping Price/Hr	45		
Default Tapping Time	Hour: 0	Min: 1	Sec: 0

OK Cancel

Update the values necessary:

- Steel Price/Kg.
- Aluminium Price/Kg.
- Stainless Steel Price/Kg.
- Machine Price/Hr.
- Engineering Price/Hr.
- Default Engineering Time.
- Programming Price/Hr.
- Default Programming Time.
- Set-up Price/Hr.
- Default Set-up Time.
- Gas Price per m³.
- Cost Per Piece.
- Electricity Price (KWh).
- Bending Price/Hr.
- Default Bending Time.
- Grinding Price/Hr.
- Default Grinding Time.
- Drilling Price/Hr.
- Default Drilling Time.
- Tapping Price/Hr.
- Default Tapping Time.

Then press the **OK** button

Cost can be calculated by Part:

Select the **Part** in the centre left grid and click on **Cost Estimation->Part**.

The screenshot shows the 'Cost Estimation' dialog box with the following data:

Image	File Name	Quantity	Weight (kg)	Outer Perimeter (mm)	Inner Perimeter (mm)	Outer Area (mm)	Pierces	Material Cost	Gas Costs	Machine Costs	Global Costs	Preparation Costs	Other Machines Costs	Cost/Unit	Total Costs
	Example7.dxf	2	1.27	1455.8	6511.85	162360.9	18	0.89	0.39	1.1	1.81	51.5	6.75	31.22	62.45
TOTAL														9.79	68.52

This will provide the following information:

Image	File Name	Quantity	Weight (kg)	Outer Perimeter (mm)	Inner Perimeter (mm)	Outer Area (mm)	Pierces	Material Cost	Gas Costs	Machine Costs	Global Costs	Preparation Costs	Other Machines Costs	Cost/Unit	Total Costs
	Example7.dxf	2	1.27	1455.8	6511.85	162360.9	18	0.89	0.39	1.1	1.81	51.5	6.75	31.22	62.45

Cost can be calculated by Sheet:

Select the **Sheet** in the bottom left grid and click on **Cost Estimation->Sheet**.

Cost Estimation

- Setting
- Part
- Sheet**
- All Sheets

Cost Estimation

Material Cost

Steel

Outer A (mm²) Thickness (mm) Density gr/cm³ Price Kg Total Costs

18009.99 x 1 x 7.8 x 0.7 = 0.09

Gas Costs

Outer A (mm²) Thickness (mm) Price piece² Total Costs

18009.99 x 1 x 4.86 = 0.04

Machine Costs

Cutting Length (mm) Cutting Time (sec)

1357.4 13.46

Travel Length (mm) Travel Time (sec)

1249.87 18.75

Z Time (sec)

15

Total Time (sec.) Machine Price/Hr Total Costs

43.21 x 45 = 0.54

Global Costs

Pieces Price Total Costs

0 x 0.1 = 0.0

Total Time(Travel+Z) (mm) Total Costs

34.75 Electricity Price (KWH) = 0

Total Time(Cutting) (hr) Total

13.46 = 0.01

Total Costs

0.81

Preparation Costs

Engineering Time (sec.) Hour Min. Sec. Engineering Price/Hr Total Costs

1 0 0 x 50 = 50

Preparing Time (sec.) Hour Min. Sec. Preparing Price/Hr Total Costs

0 0 0 x 45 = 0.75

SetUp Time (sec.) Hour Min. Sec. Setup Price/Hr Total Costs

0 0 0 x 45 = 0.75

Total Costs

51.5

Other Machines Costs

Bending Time (sec.) Hour Min. Sec. Bending Price/Hr Total Costs

0 0 0 x 45 = 3.75

Grinding Time (sec.) Hour Min. Sec. Grinding Price/Hr Total Costs

0 0 0 x 45 = 1.5

Drilling Time (sec.) Hour Min. Sec. Drilling Price/Hr Total Costs

0 0 0 x 45 = 1.5

Tapping Time (sec.) Hour Min. Sec. Tapping Price/Hr Total Costs

0 0 0 x 45 = 0.75

Total Costs

6.75

Image	File Name	Quantity	Weight (kg)	Outer Perimeter (mm)	Inner Perimeter (mm)	Outer Area (mm ²)	Pieces	Material Cost	Gas Costs	Machine Costs	Global Costs	Preparation Costs	Other Machines Costs	Cost/Unit	Total Costs	
	Example6.dfl	2	0.31	653.67	6159.99	39532.58	8	0.22	0.1	0.49	0.81	51.5	6.75	29.93	59.86	
	Example7.dfl	2	1.27	1455.8	6511.85	162360.9	18	0.89	0.39	1.1	1.81	51.5	6.75	31.22	62.45	
														TOTAL	30.96	433.49

Cost can be calculated by All Sheets:

Click on **Cost Estimation->All Sheets**.

Cost Estimation

- Setting
- Part
- Sheet
- All Sheets**

Cost Estimation

Material Cost

Steel

Outer A (mm²) Thickness (mm) Density gr/cm³ Price Kg Total Costs

18009.99 x 1 x 7.8 x 0.7 = 0.09

Gas Costs

Outer A (mm²) Thickness (mm) Price piece² Total Costs

18009.99 x 1 x 4.86 = 0.04

Machine Costs

Cutting Length (mm) Cutting Time (sec)

1357.4 13.46

Travel Length (mm) Travel Time (sec)

1249.87 18.75

Z Time (sec)

15

Total Time (sec.) Machine Price/Hr Total Costs

43.21 x 45 = 0.54

Global Costs

Pieces Price Total Costs

0 x 0.1 = 0.0

Total Time(Travel+Z) (mm) Total Costs

34.75 Electricity Price (KWH) = 0

Total Time(Cutting) (hr) Total

13.46 = 0.01

Total Costs

0.81

Preparation Costs

Engineering Time (sec.) Hour Min. Sec. Engineering Price/Hr Total Costs

1 0 0 x 50 = 50

Preparing Time (sec.) Hour Min. Sec. Preparing Price/Hr Total Costs

0 0 0 x 45 = 0.75

SetUp Time (sec.) Hour Min. Sec. Setup Price/Hr Total Costs

0 0 0 x 45 = 0.75

Total Costs

51.5

Other Machines Costs

Bending Time (sec.) Hour Min. Sec. Bending Price/Hr Total Costs

0 0 0 x 45 = 3.75

Grinding Time (sec.) Hour Min. Sec. Grinding Price/Hr Total Costs

0 0 0 x 45 = 1.5

Drilling Time (sec.) Hour Min. Sec. Drilling Price/Hr Total Costs

0 0 0 x 45 = 1.5

Tapping Time (sec.) Hour Min. Sec. Tapping Price/Hr Total Costs

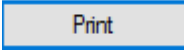
0 0 0 x 45 = 0.75

Total Costs

6.75

Image	File Name	Quantity	Weight (kg)	Outer Perimeter (mm)	Inner Perimeter (mm)	Outer Area (mm ²)	Pieces	Material Cost	Gas Costs	Machine Costs	Global Costs	Preparation Costs	Other Machines Costs	Cost/Unit	Total Costs	
	Example7.dfl	2	1.27	1455.8	6511.85	162360.9	18	0.89	0.39	1.1	1.81	51.5	6.75	31.22	62.45	
														TOTAL	30.96	433.49

Print the document by clicking on the **Print** button.



FormReportCost

SAP CRYSTAL REPORTS*

Main Report

O.F: F.O Material: Steel Description Description
 Customer: Customer Thickness: 1

Image	File Name	Quantity	Weight (Kg)	Outer Perimeter (mm)	Inner Perimeter (mm)	Outer Area (mm)	Pierces	Material Cost	Gas Costs	Machine Costs	Global Costs	Preparation Costs	Other Machines Costs	Cost/Unit	Total Costs	
	Example1.dxf	2	0.12	379.08	557.8	16009.99	8	0.09	0.04	0.54	0.81	51.5	6.75	29.86	59.72	
	Example2.dxf	2	0.02	166.3	557.8	2479.3	2	0.01	0.01	0.14	0.2	51.5	6.75	29.31	58.61	
	Example3.dxf	2	0.08	521.09	645.76	10121.54	6	0.06	0.02	0.29	0.6	51.5	6.75	29.61	59.23	
	Example4.dxf	2	1.99	2286.33	2284.49	255598.99	14	1.4	0.62	1.6	1.43	51.5	6.75	31.65	63.29	
	Example5.dxf	2	4.35	2672.06	5615.74	557854.3	48	3.05	1.36	2.84	4.84	51.5	6.75	35.16	70.33	
	Example6.dxf	2	0.31	653.67	6159.99	39532.58	8	0.22	0.1	0.49	0.81	51.5	6.75	29.93	59.86	
	Example7.dxf	2	1.27	1455.8	6511.85	162360.9	18	0.89	0.39	1.1	1.81	51.5	6.75	31.22	62.45	
														TOTAL	30.96	433.49
														TOTAL	30.96	433.49

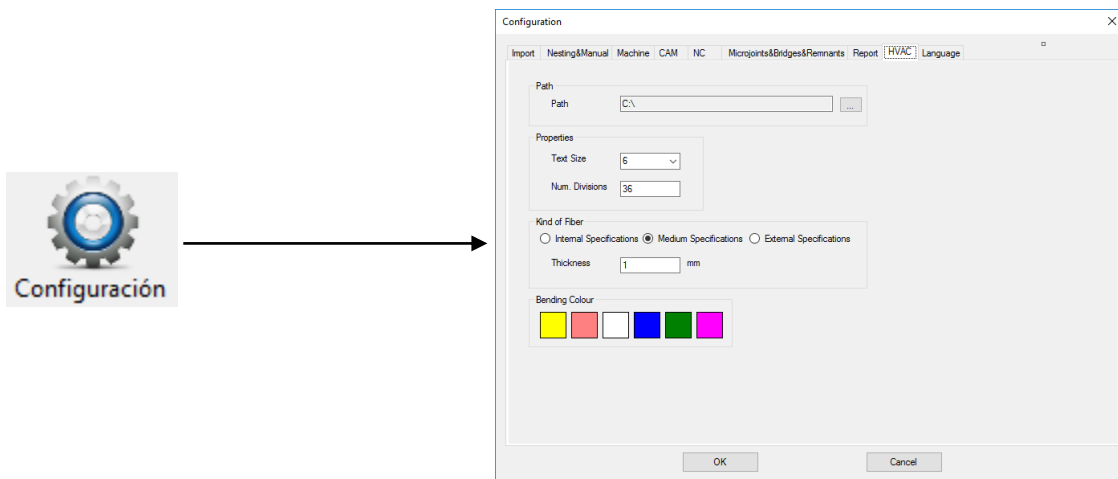
Current Page No.: 1 Total Page No.: 1 Zoom Factor: 100%

4.1) HVAC

Introduction:

HVAC is a visual environment program, whose utility is in the calculation of the standard boiler/sheet metal parts development.

Configuration->HVAC.



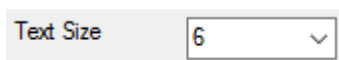
Path:

Path where HVAC part will save.



Properties:

Text Size: Size of the text.

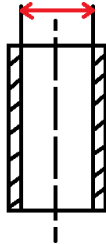


Num. Divisions: Number of divisions to fold.

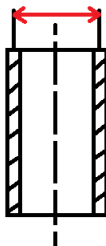
Num. Divisions

Kind of Fiber:

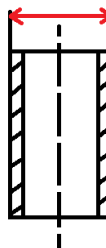
Internal specifications:



Medium specifications:



External specifications:



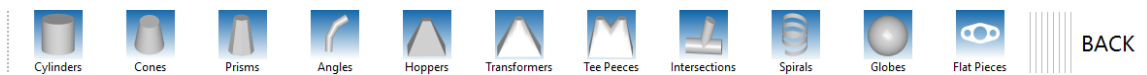
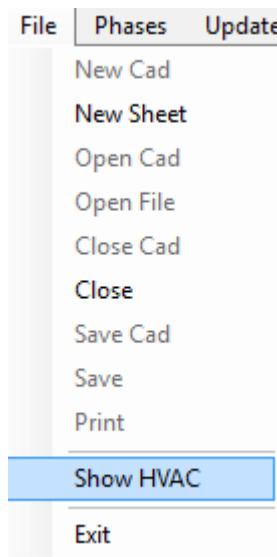
Thickness: Sheet thickness.

It is important that the user has a clear understanding of the configuration window, since the different development results will be incorrect if this window is not properly configured.

Within this window there are several sections: On the one hand, we have the possibility of entering the text size, since the texts might not be displayed when we create a large size development. Likewise, when we create a small size development, the text may be too large, leading to incorrect reading of the information. The number of divisions is used to predetermine a fixed number of divisions, in such a manner that the predetermined divisions are displayed when developing a cone or cylinder. This value can be modified within the cone or cylinder.

When working with the external, internal or medium radius, we have the possibility of configuring it using this window. If the internal or external radius is selected, the thickness of the sheet must be entered, allowing the program to add or remove half of the thickness to or from the development. When selecting the medium radius, nothing is added or removed, for which reason no value can be entered.

To activate it Click on **File->Show HVAC**.



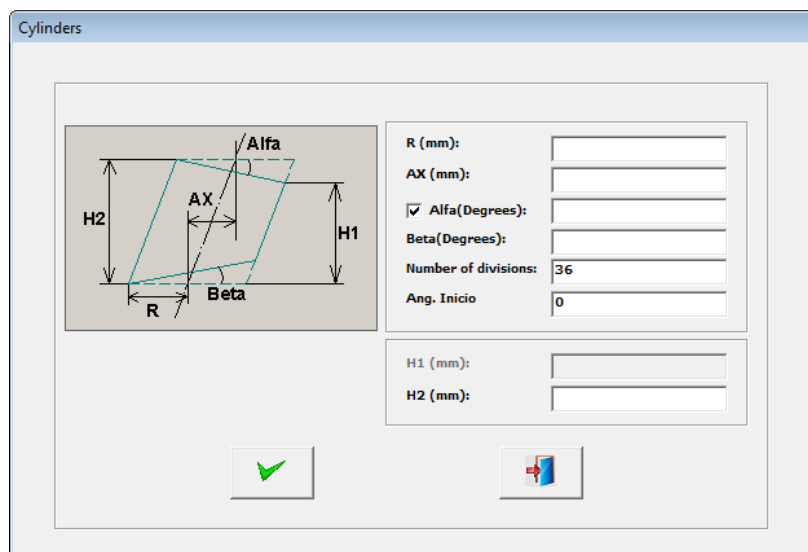
How to use:

There are eleven groups of boiler parts developments composed of different subgroups.

- Cylinders.**
- Cones.**
- Prisms.**
- Angles.**
- Hoppers.**
- Transformers.**
- Intersections.**
- Tee Pieces.**
- Flat Pieces.**
- Globes.**
- Spirals.**

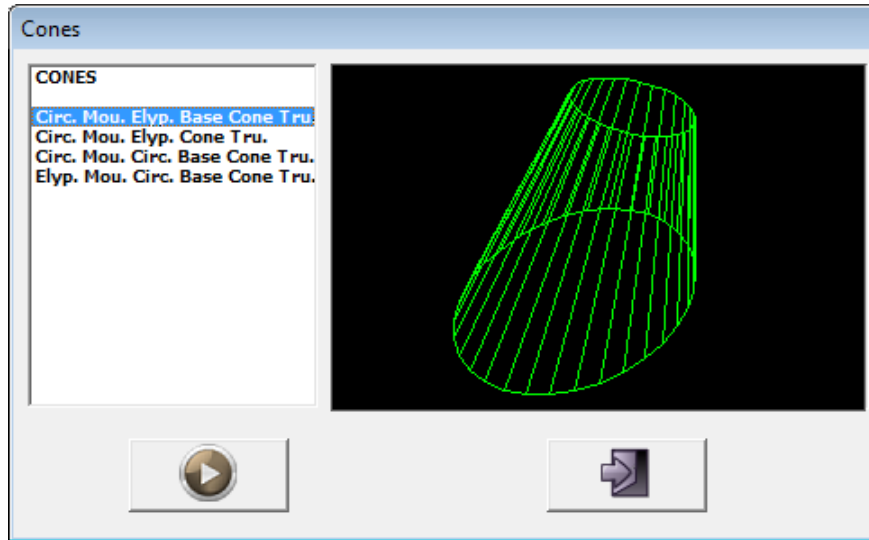
The dynamic management is the same in all groups. When you select the group, will be shown the list of existing parts within the group. After select and click on OK button, the selected part will be drawn in isometric view.

Group of cylinders:



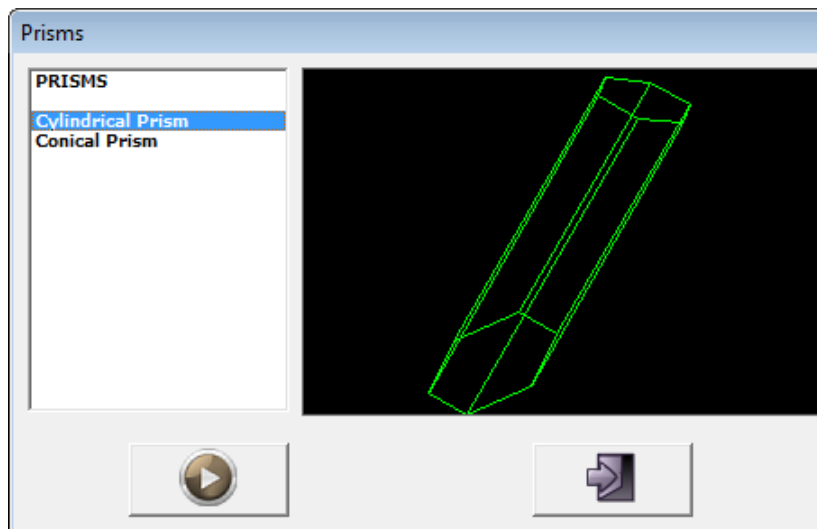
Cones group composed by:

- Circular Base Mouth Circular.
- Elipctical Base Mouth Elipctical.
- Circular Base Mouth Elipctical.
- Elipctical Base Mouth Circular.



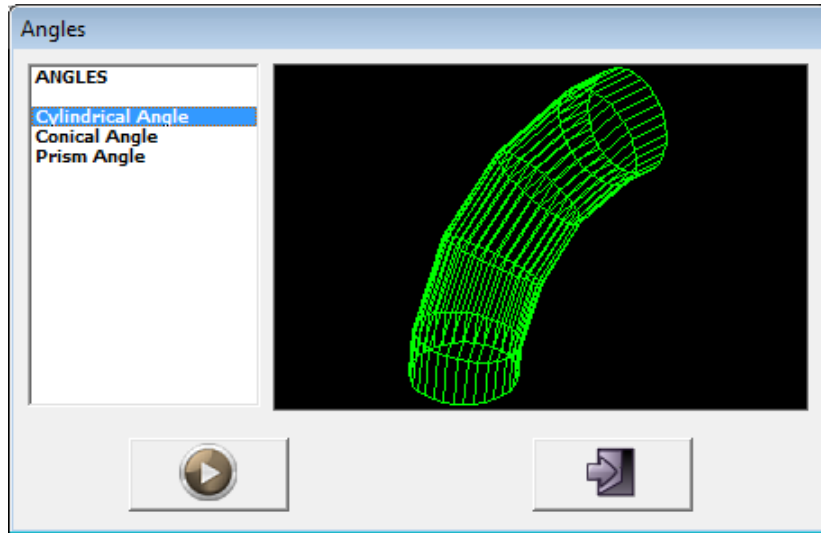
Prisms group composed by:

- Cylindrical Prism.
- Conical Prism.

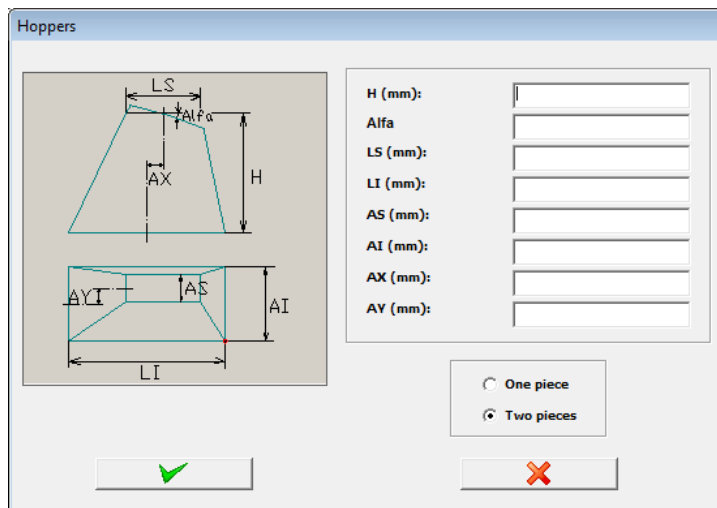


Angles group composed by:

- Cylindrical Angle.
- Conical Angle.
- Prism Angle.

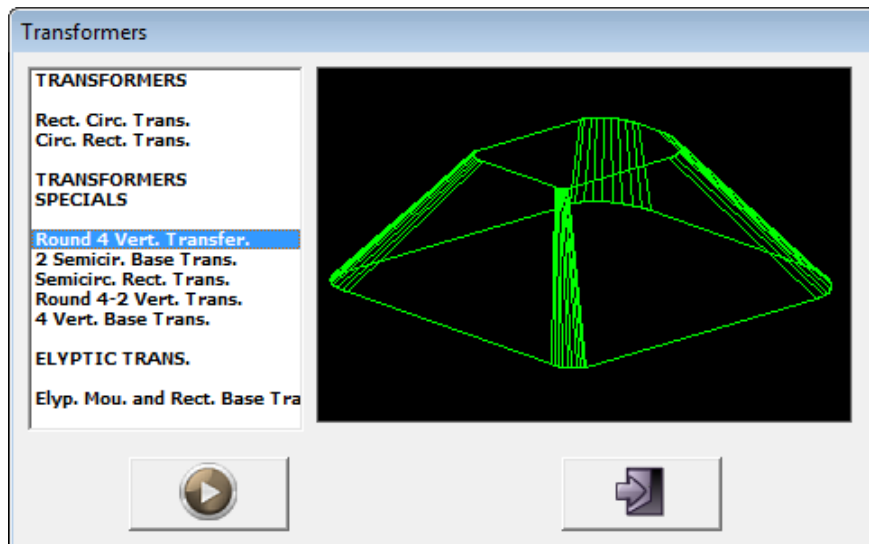


Hoppers group :



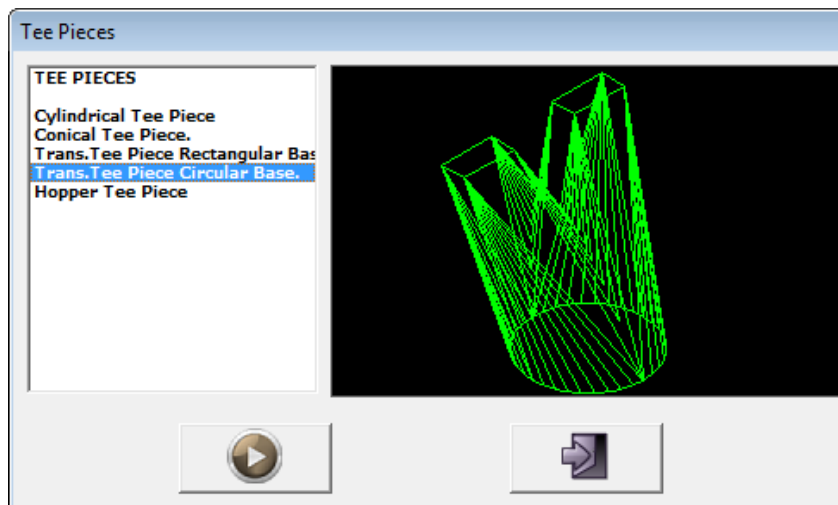
Transformers group composed by:

- Rectangular Base Circular Mouth Transformer.
- Circular Base Rectangular Mouth Transformer.
- 4 Vertex Round Transformer.
- 2 Base SemiCircular Transformer.
- Rectangular Semicircular Base Transformer.
- 4-2 Rounded Vertex Transformer.
- 4 Vertex Transformer.
- Rectangular Base Elliptical Mouth Transformer.



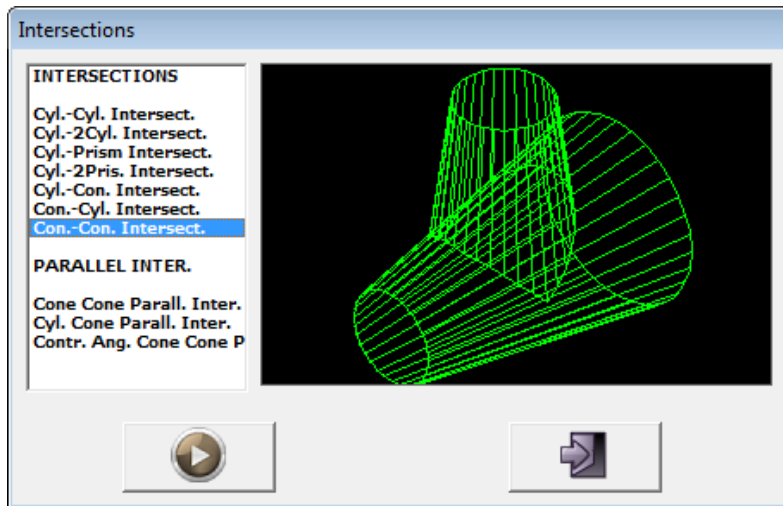
Tee Pieces composed by:

- Cylindrical Tee Piece.
- Conical Tee Piece.
- Rectangular Base Tee Piece.
- Circular Base Tee Piece.
- Hopper Tee Piece.

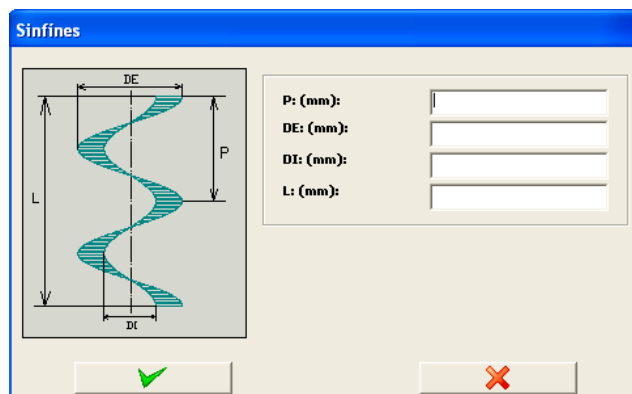


Intersections Group composed by:

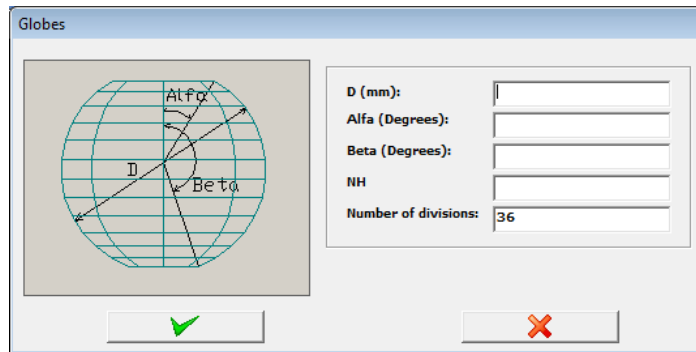
- Cylinder Cylinder Intersection.
- Cylinder 2 Cylinders Intersection.
- Cylinder Prism Intersection.
- Cylinder 2 Prisms Intersections.
- Cylinder Cone Intersection.
- Cone Cylinder Intersection.
- Cone Cone Intersection.
- Parallel Intersection Cone Cone.
- Parallel Intersection Cone Cylinder.
- Parallel Intersection Cone Cylinder Reverse.



Spirals Group:

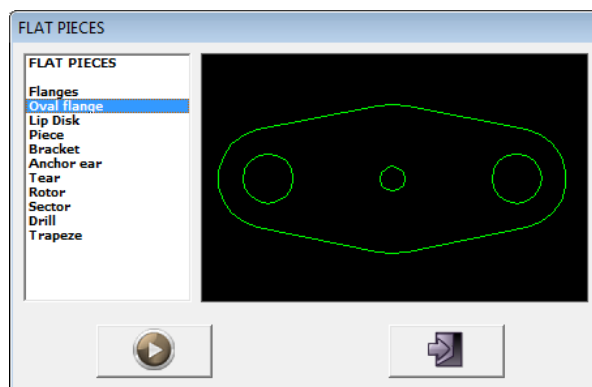


Globes Group:

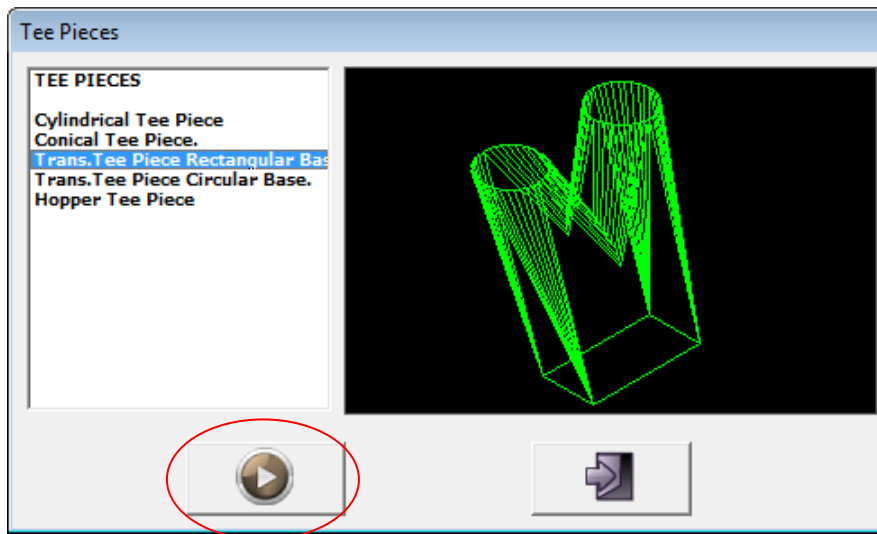


Flat Pieces Group:

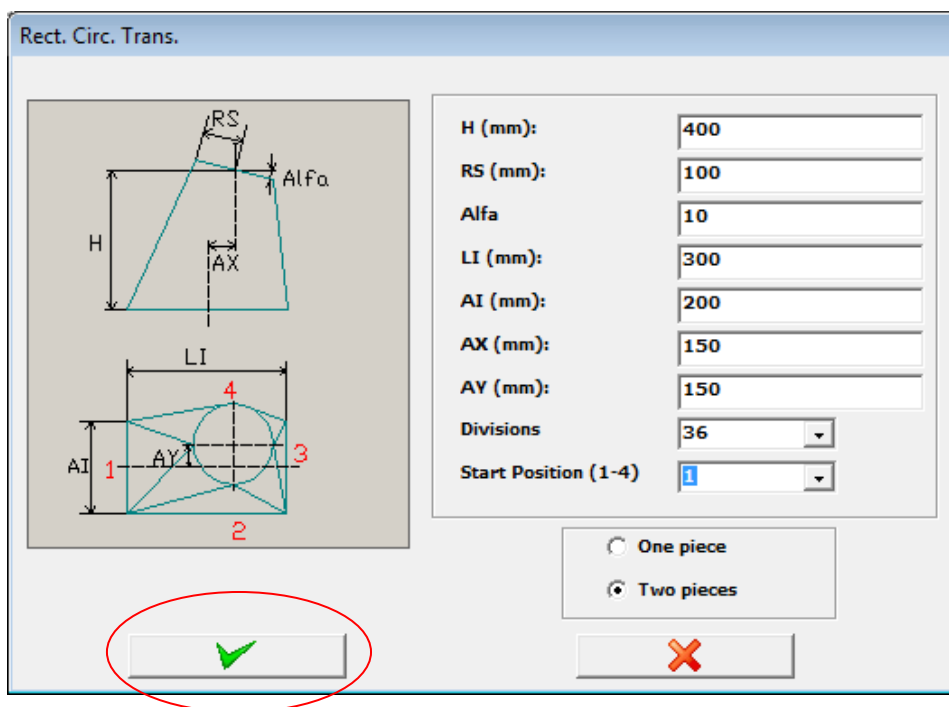
- Flanges.
- Oval flange.
- Lip Disk.
- Piece.
- Bracket.
- Anchor ear.
- Tear.
- Rotor.
- Sector.
- Drill.
- Trapeze .



The operation dynamics are the same in all the groups. When selecting the group, the list of different parts existing within the group will be displayed.

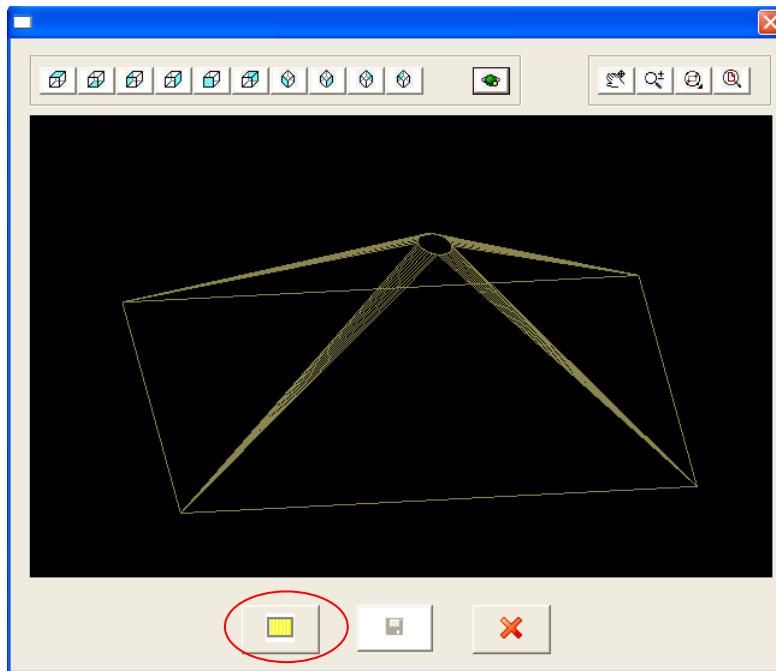


Once within the selected piece, simply enter the different final piece specifications we wish to obtain.

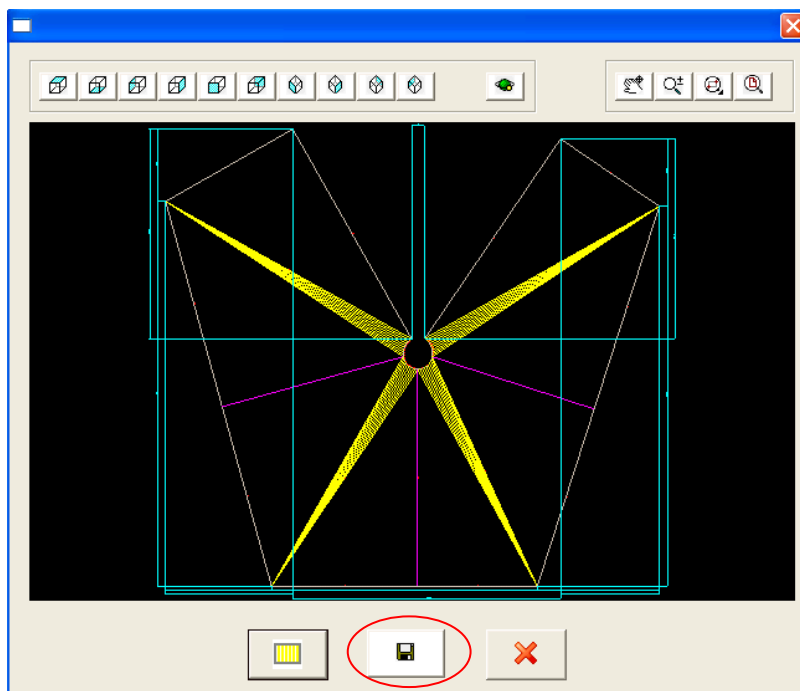


The Hoppers and Transformers groups have the possibility of completing the development in two parts.

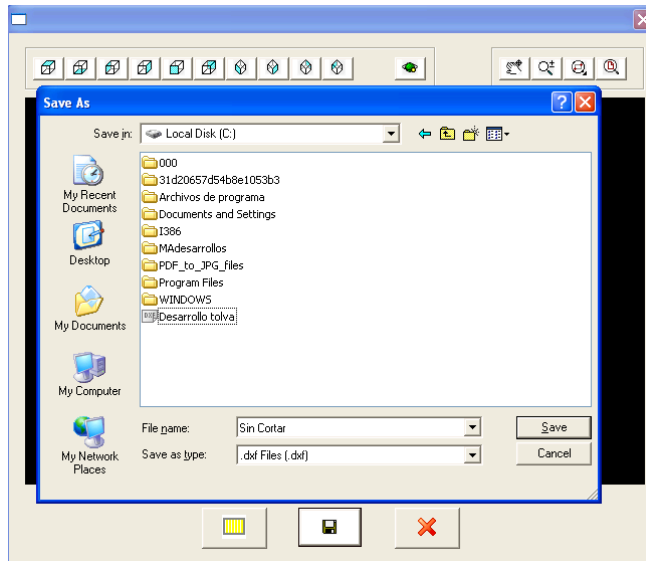
Once all the details have been entered, press the OK button to display the form, where we can select the different piece views now available.



In order to complete the piece development, press the OK button.



Finally, the program will allow us to save the piece displayed in format .dxf in a previously selected path.



Within the worked piece, we can see the following lines of different colours:

White line: Piece contour.

Blue line: Level.

Yellow line: Folding lines.

Purple line: Welding line.