CNC Unit
S2
Earphone winder

Greenfaulds High School

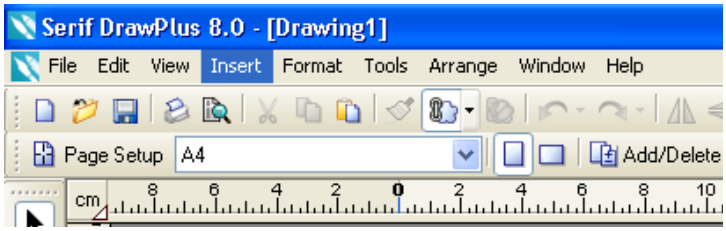
Technical Department

Stage 1 Select Appropriate Image

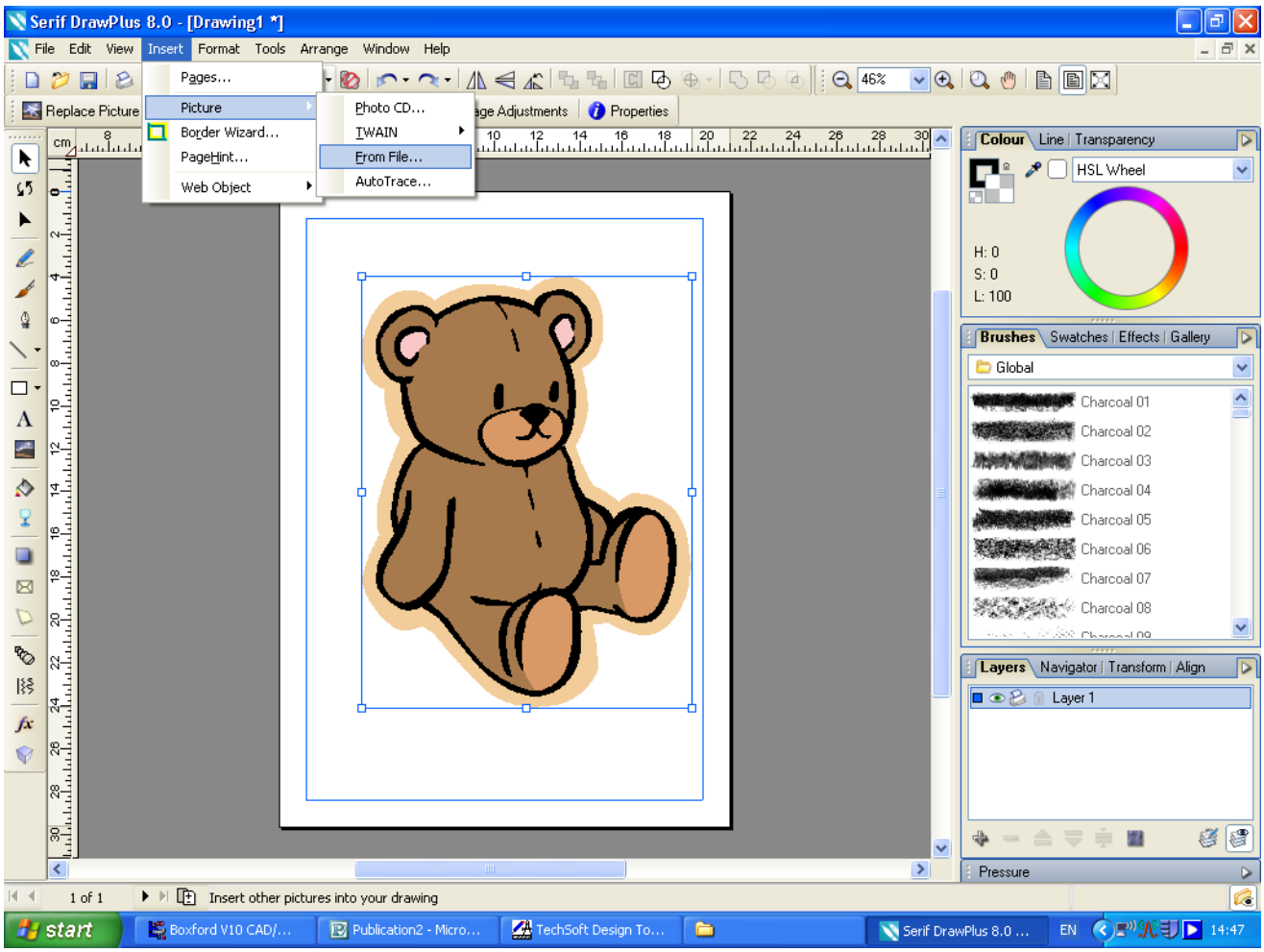
Pick an object with a simple outline to make your earphone winder.

Stage 2 Trace Image on Drawplus

After picking an object you are going to trace this object using a CAG software called Drawplus

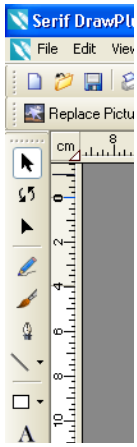


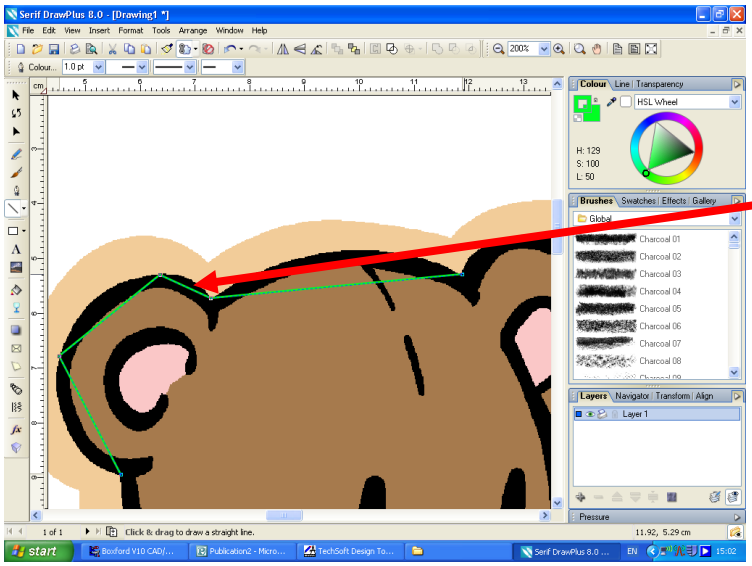
Open up a blank A4 publication and goto **Insert** on the top menu. Pick the image from the file location where you saved it.



For the example I am going to pick the bear, I am not going to worry too much about the scale just now as I can change that at a later date. The next step we are going to do is to trace around the image.

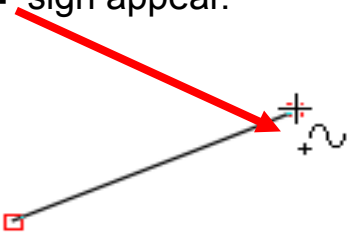
To trace around the bear I am going to use the line tool.



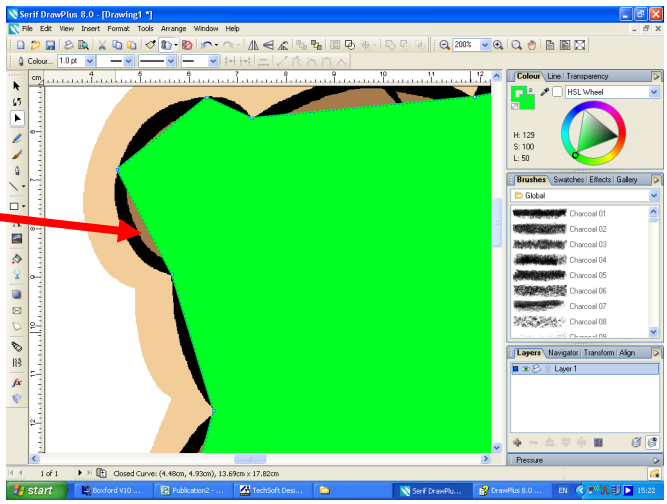


When tracing around the image you do not have to worry about being too accurate as you can see from the image.

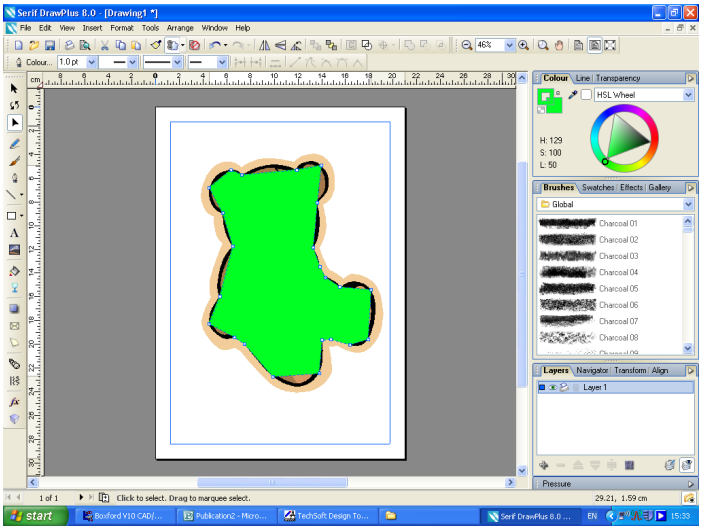
But you must ensure the lines are all joined as the area cannot have any breaks round the edge. When you place your pointer near the end of the line you will see a small + sign appear.



If you have managed to connect all the lines and you have selected a fill colour it will fill in the enclosed area.



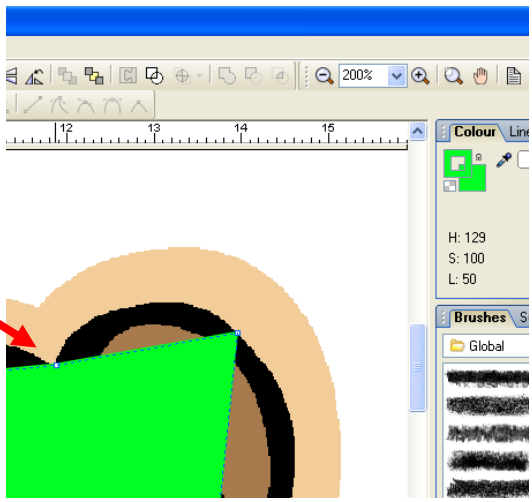
As you connect the end of the line to the start of the line you should see a ▭ instead of the plus sign.



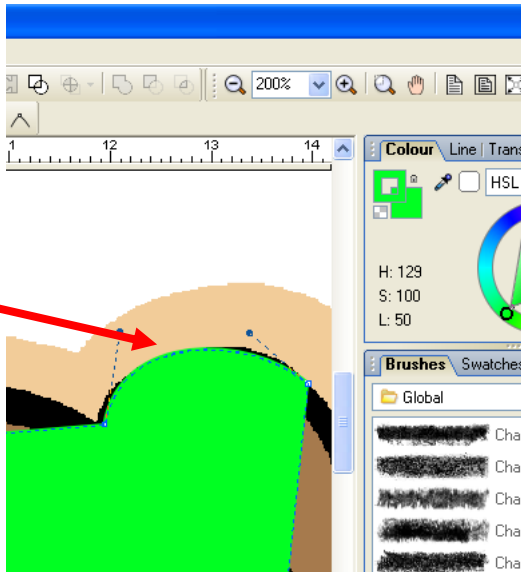
As you can see the tracing of the object is not particularly accurate so we need to edit it to provide a better representation of the image outline.

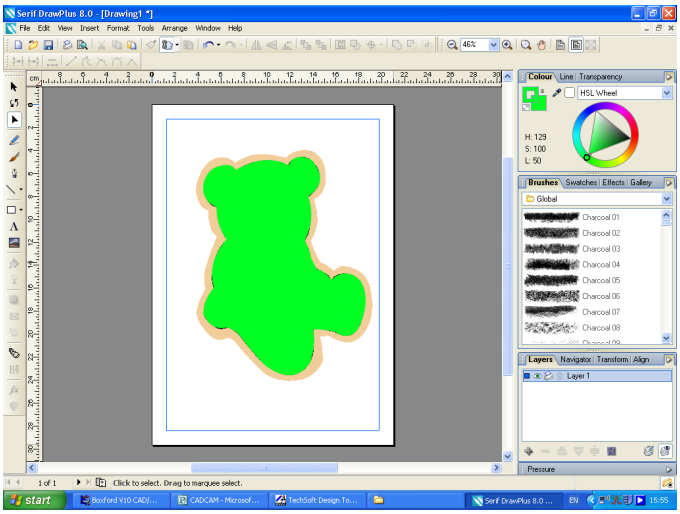
We do this using the **Node Tool**

The **Node Tool** allows you to move the position of the node at the start or end of the line by clicking on the square node



The **Node Tool** also allows you to bend the line by clicking on the line and dragging it to match the shape.



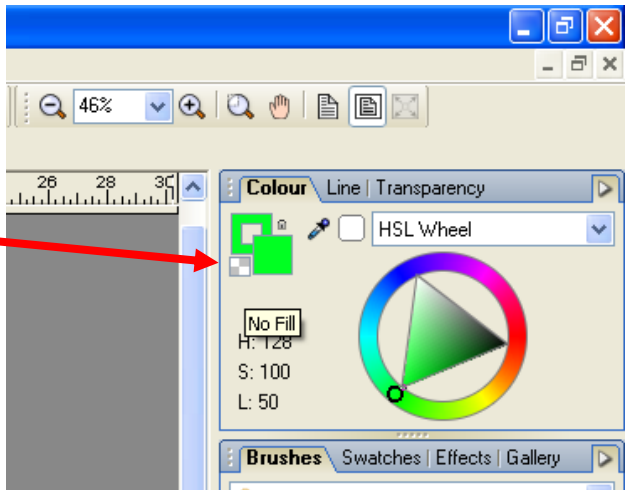


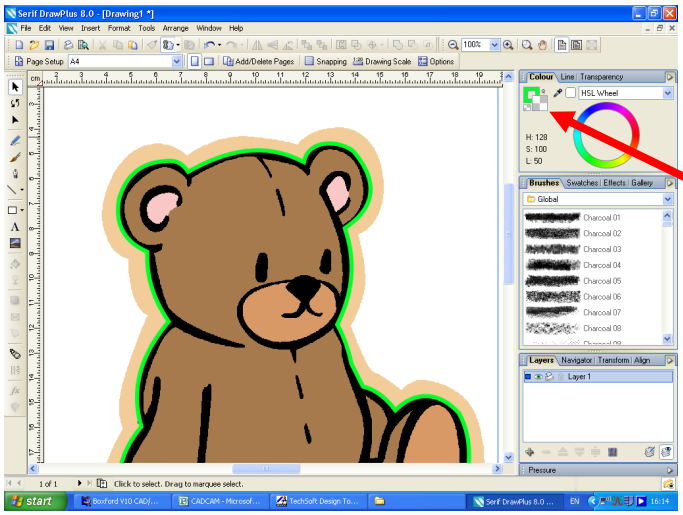
By using this technique you can quickly edit the lines to produce a much more accurate outline.

Remember to use the ZOOM option at the top of the screen to help you edit more accurately.

Now that we have produced a good outline I want to add a bit of detail to our image. To do this I'm going to make the fill colour transparent so we just see the outline.

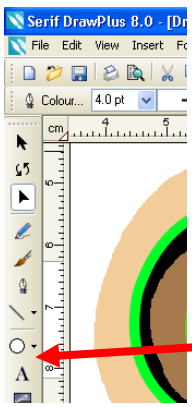
Click on the no fill option to make the fill transparent. Ensure you have clicked on the fill box and not the line box above.





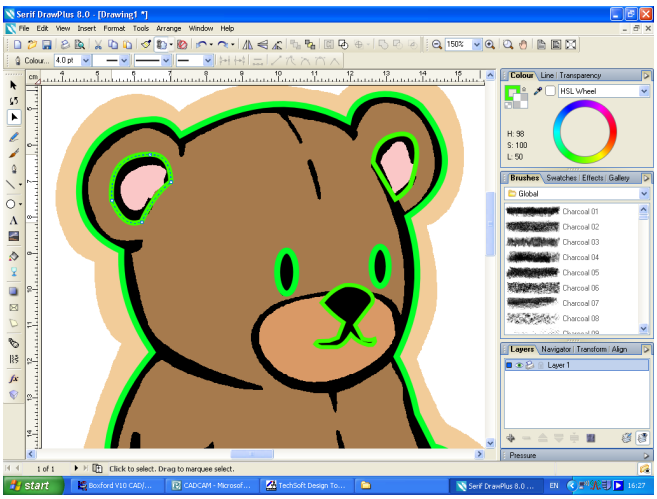
Now that you have made the fill transparent you should only see the outline.

Notice how the fill box now shows as transparent



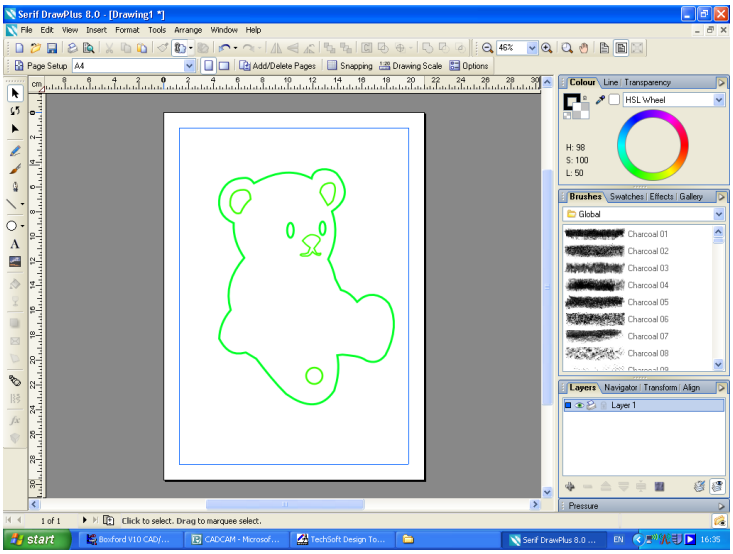
Using the same techniques as previously used for the outline along with the shape tools, in this case an oval for the eyes, we add some detail.

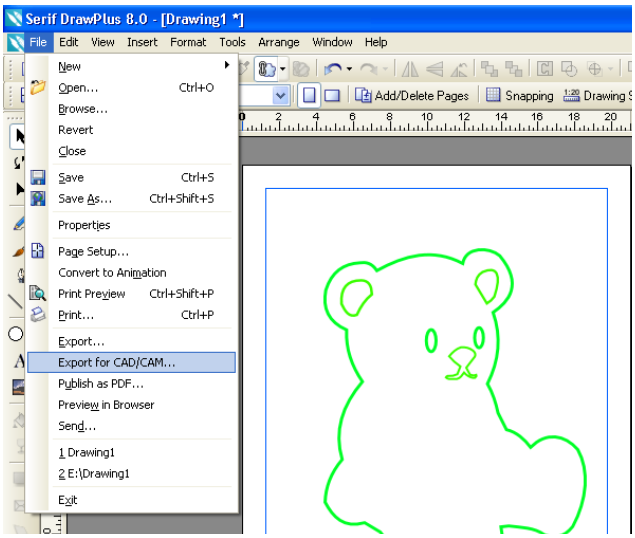
Oval Tool



Stage 3 Export DXF File

Before we export the traced image to our CADCAM software we need to delete the original image to leave us just with the outlines

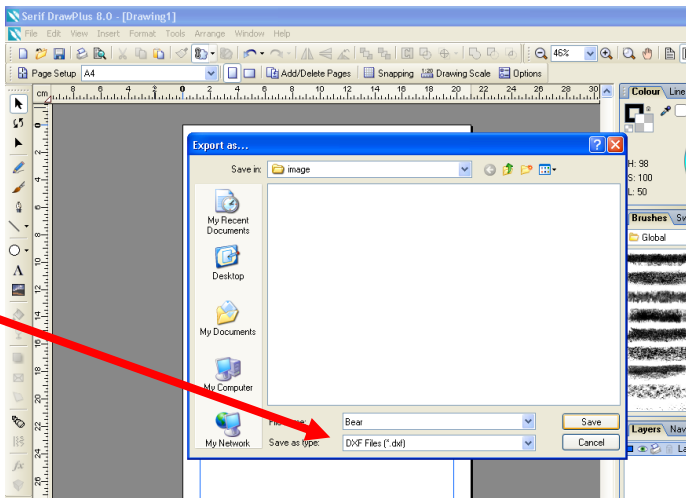


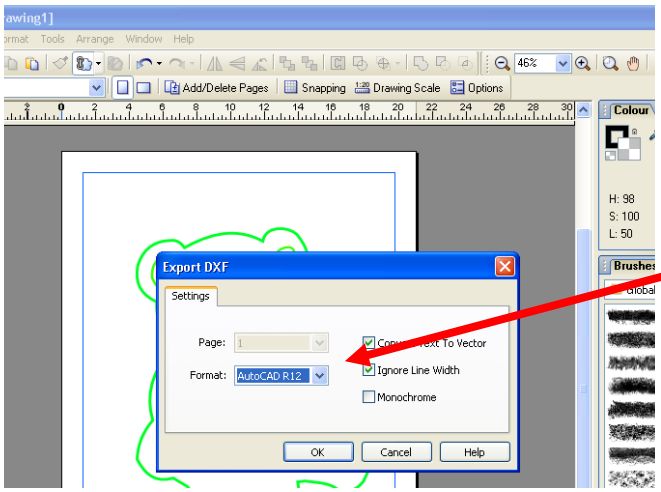


In order for our CADCAM software to recognise the image we have to export it in a compatible format.

We select file from the top menu then select the **Export for CAD/CAM** option in the pull down menu.

The following box will appear, name the file as required and make sure that DXF option is selected is selected as the type.





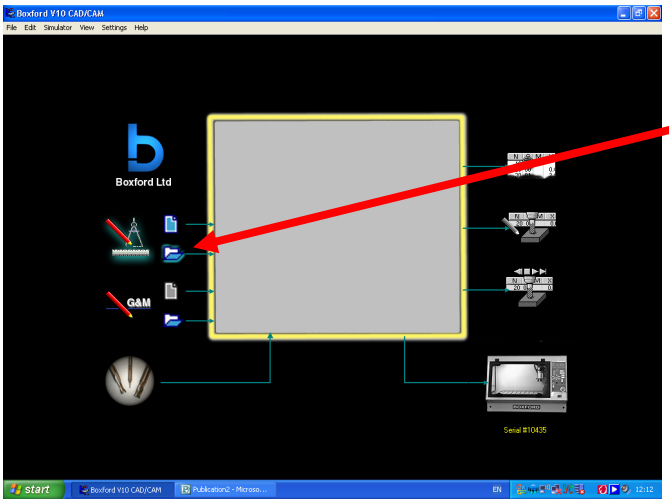
Once you click **Save** the following box will appear.

Ensure you change the format to AutoCADR12 and leave both boxes checked before clicking OK

You are now ready to open up the CADCAM software.

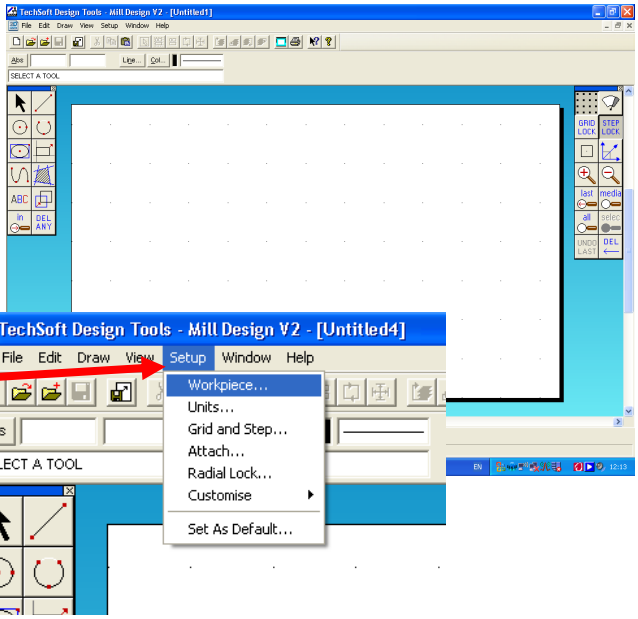
Stage 4 Create CNC Programme

Open the Boxford V10 CAD/CAM software.

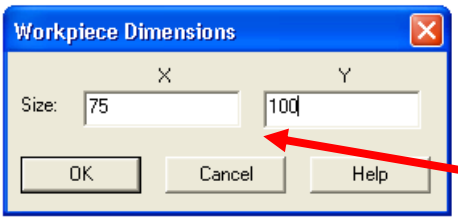


Click on the new file option to open the CAD software to get started.

You should now see this screen appear. Before we import our image we want to change the workpiece to the size to material we are using.

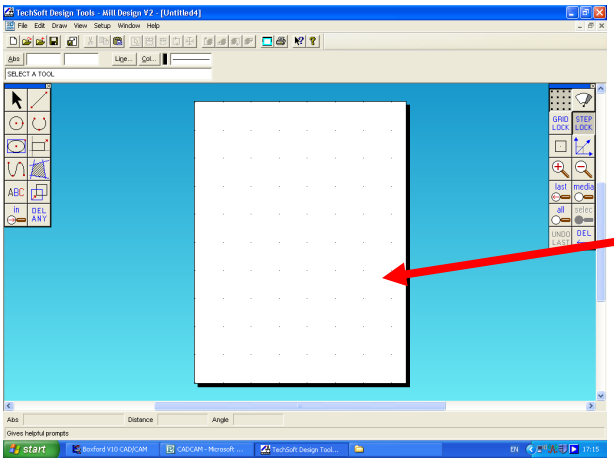


To do this we select Setup from the top menu then Workpiece from the pull down menu.



The workpiece we will be using will be 75mm X 100mm.

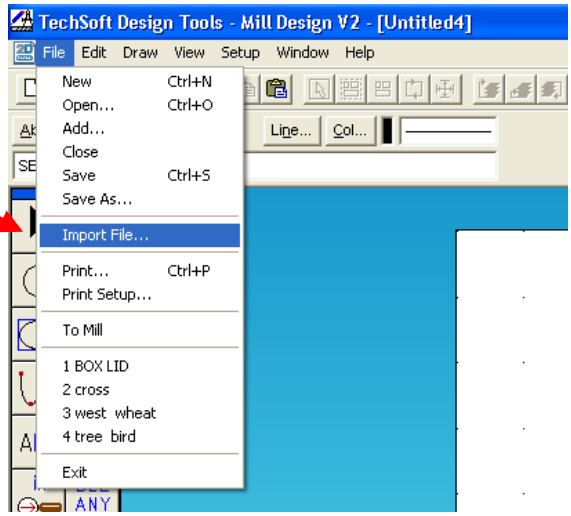
Change the workpiece dimensions to suit these sizes before clicking OK.

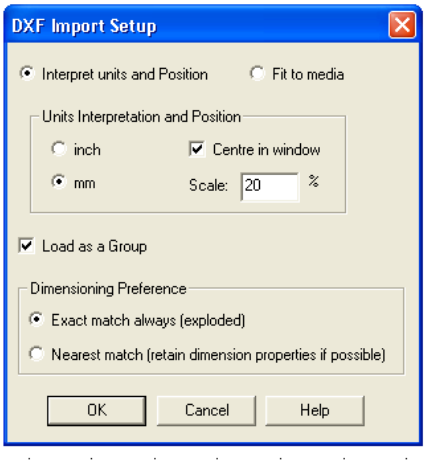


You should see the workpiece size change on the screen.

Click on the file option on the top menu then select Import File from the drop down menu.

You should now be able to select the DXF file you exported from Drawplus.



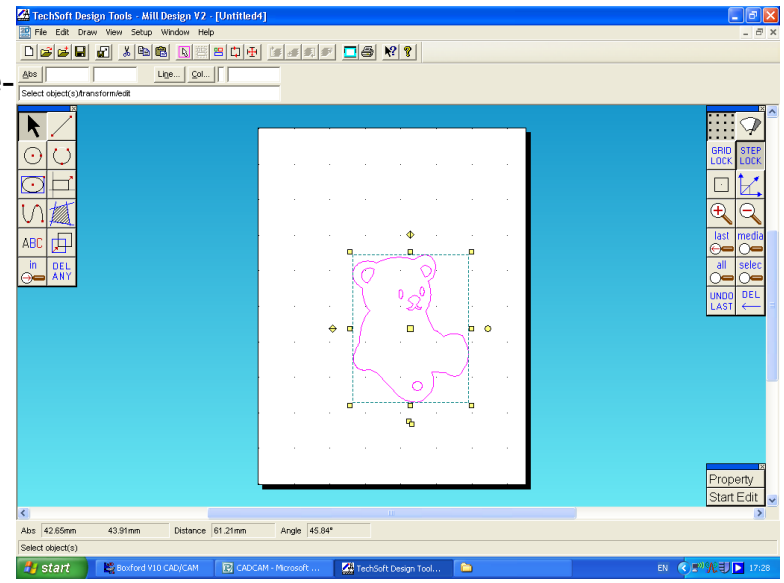


Pick the following options, remember to chose **mm** and not **inch.**

The scale does not really matter as it can be adjusted to suit within the drawing.

Remember it is going to be a keyring or charm therefore is unlikely to be the whole size of the work-piece. You can click on the image and stretch or shrink to suit.

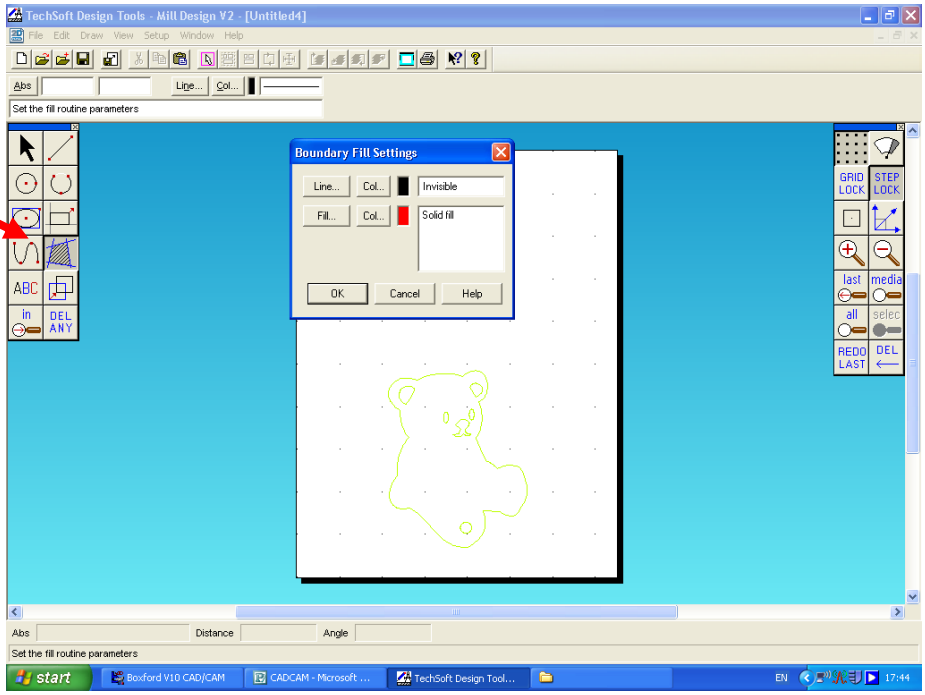
You can also move the object by clicking on the centre of the object. You will require to position the image near the edge of the work-piece.

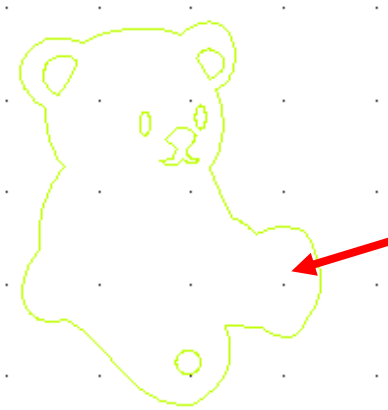


We are now ready to select the area we want to cut out.

We select the Boundary Fill option on the left hand menu. We will leave the colour as red as we are only cutting to one depth.

Click Ok



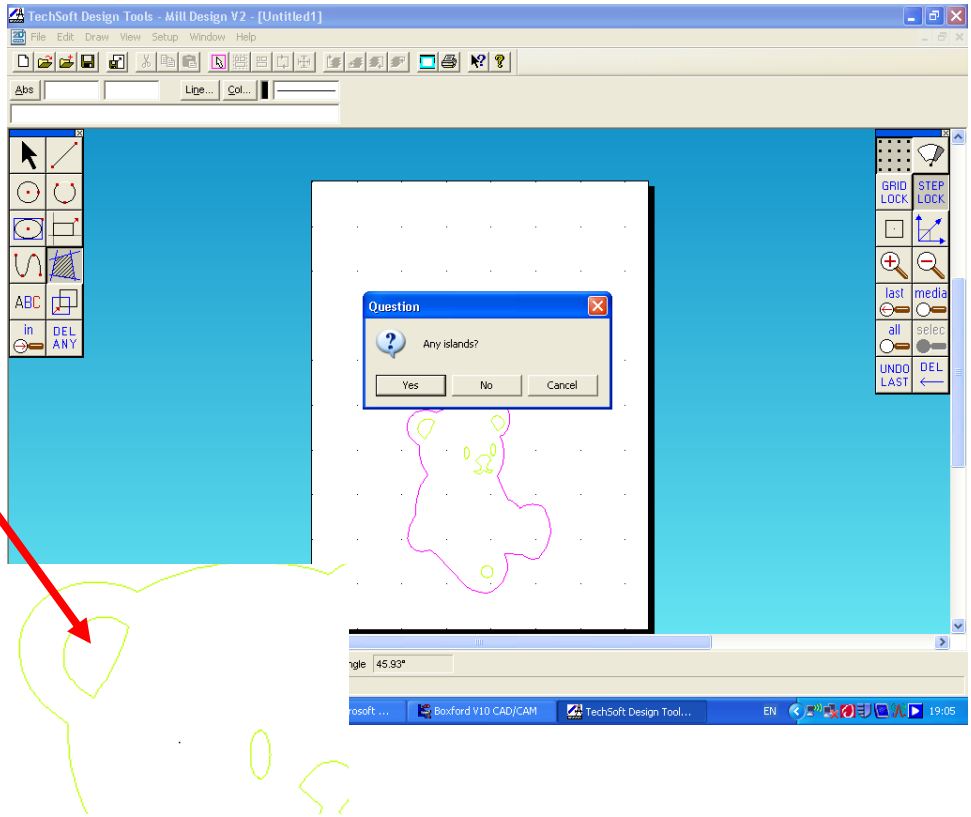


You will see a **Hand** icon pointer Select just inside the image but not on any of the internal detail.

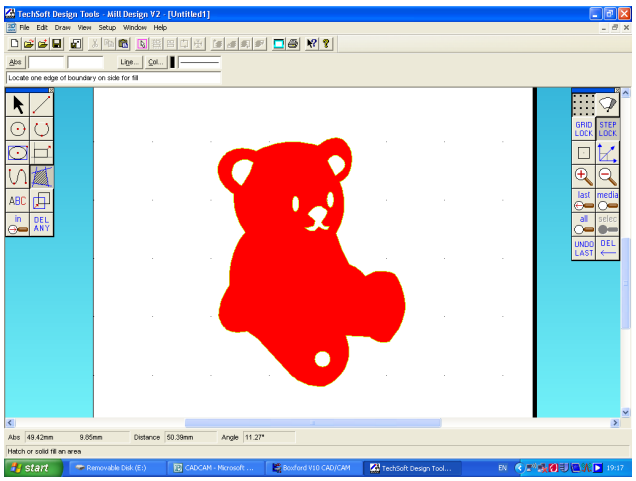
Click Here

After you have clicked on the Inside of the image you will be asked if you have any islands. If there is no internal detail you would click on the no and it would fill the area to be cut out.

If yes as in this case you would click on the inside of the internal detail. It will ask you again after each selection until you have selected all the detail.



Once you have completed selecting all the areas you will see the highlighted areas in red that we are going to cut out.

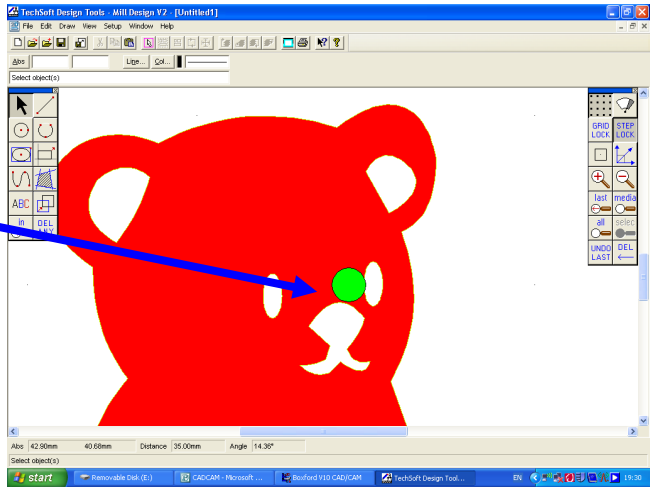


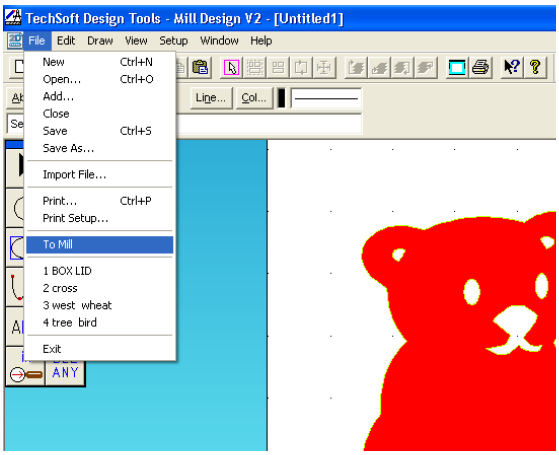
Before entering the depth settings it is worth checking if the cutter you are using is small enough to cut out the detail.

You can do this by drawing a circle the diameter of the cutter and laying over the detail you are cutting.

As we see from the image to the right we can see that the specified cutter would not fit through the 2 closest internal features.

Therefore you would have to either make the image larger, adjust the internal detail or use a smaller cutter.



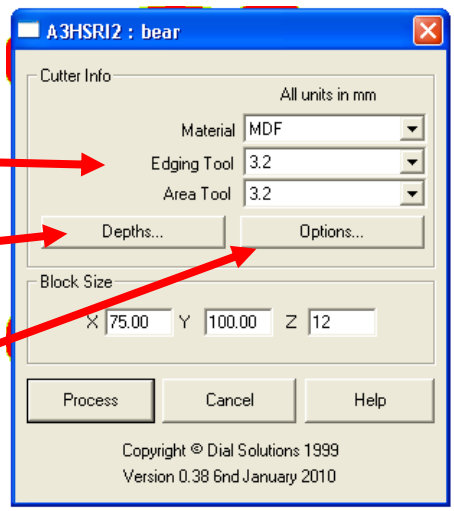


Once you have completed these steps you have to send the detail to the mill. Select from **File** on top menu then **To Mill** from pull down menu.

When you send this image to the mill you will be asked to save file name then update material, tools and block size.

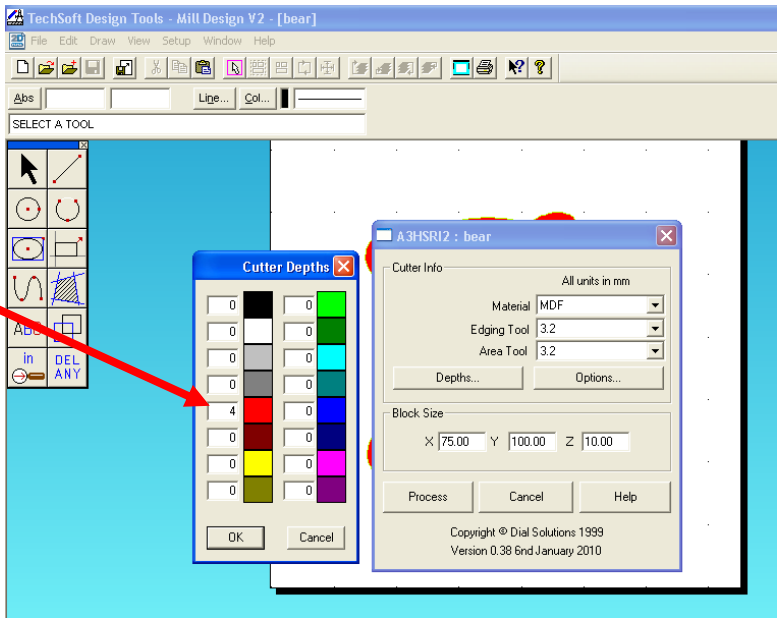
You will have to input the depth settings before processing the programme simulator.

You will also have to input the tool path details in the options box.



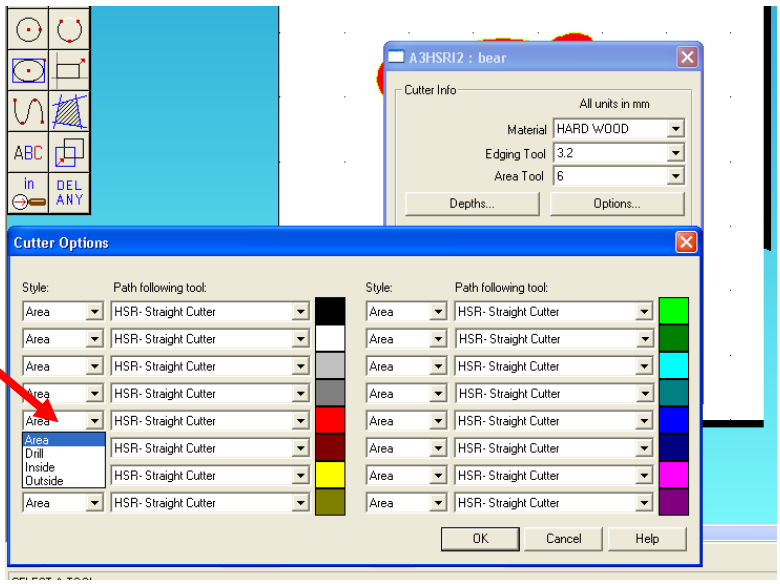
When you click the depth box another box appears.

In this case we have asked that anything coloured red will be cut 4mm deep.



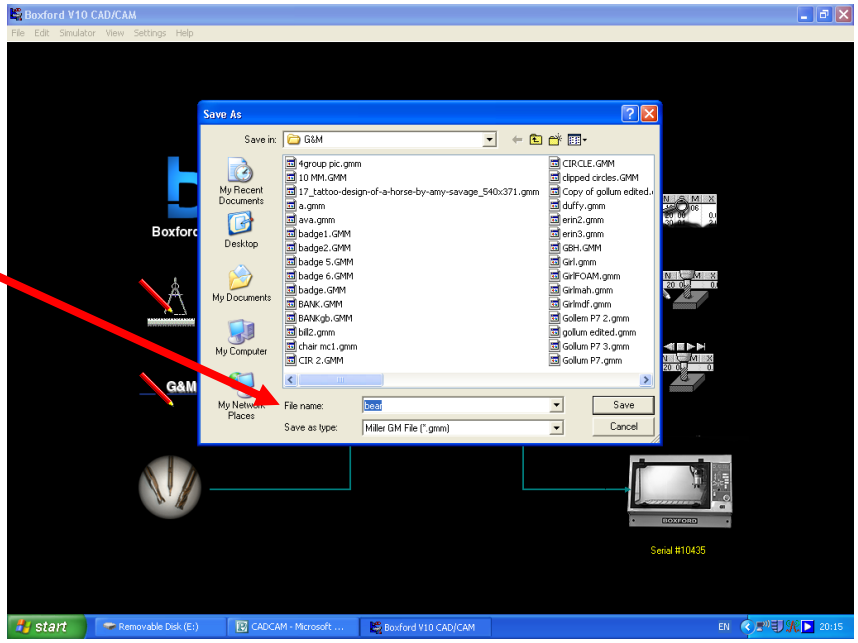
Finally before you process the programme you have to decide the tool path. When you select option you get another box called **<u>Cutter Options</u>** where each colour has a pull down menu. There are 4 options, area, drill a hole, cut inside the line or cut outside the line.

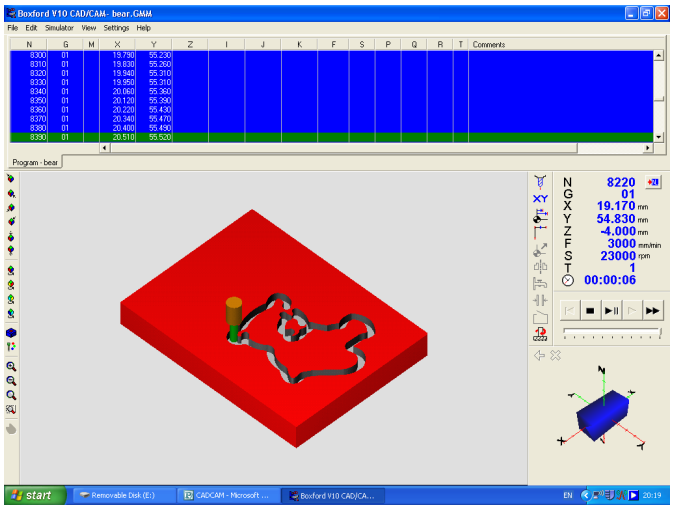
In this example we want to cut out the area so we select area for everything that is red.



Stage 5 Run Programme on Simulator

When you click the process button it asks you to save the GMM file. This is file commands for your CNC programme.





Once you have saved the programme the simulator will run the programme to show you how the CNC will execute the programme.

This gives you the chance to identify any problems and make any alterations before running the programme on the actual machine.

The final outcome is shown on the right handside. The programme is now ready to be run on CNC machine under supervision of your classroom teacher.