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Mastercam® X3 Art Training Tutorials

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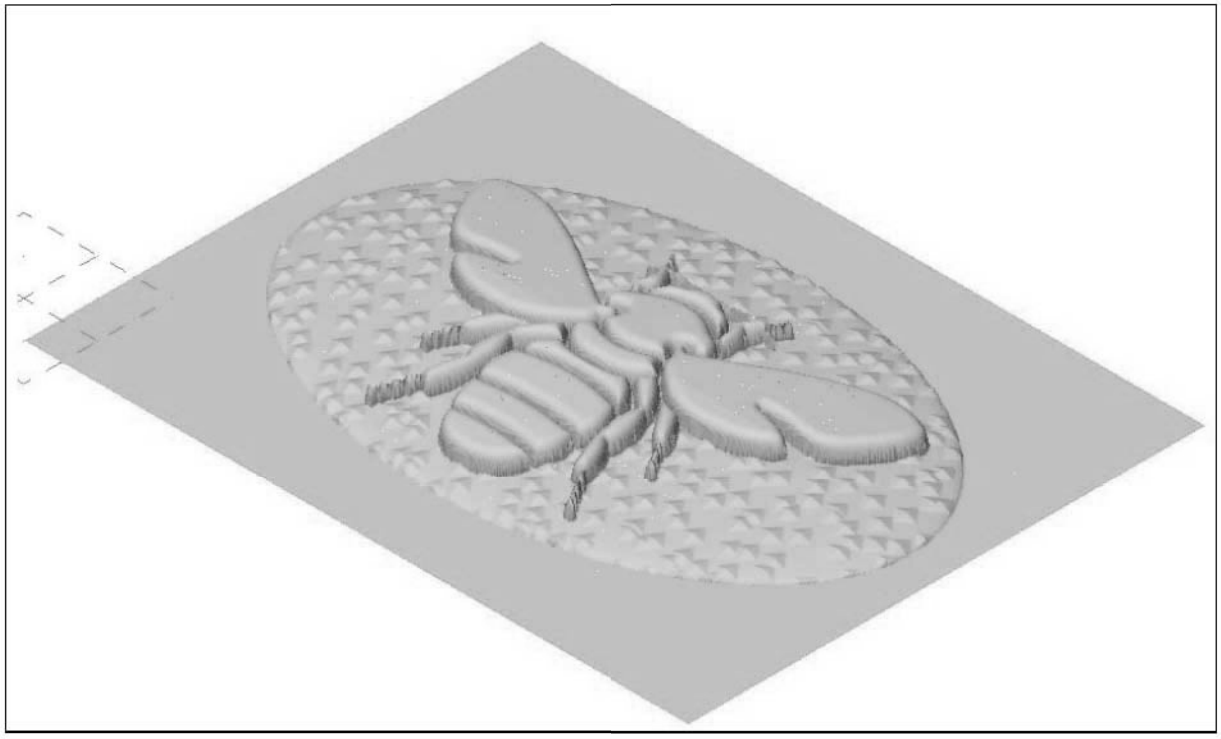
TUTORIAL SERIES FOR

Mastercam X3

TUTORIAL 1



Mastercam Art – Organic & Texture Surfaces; Cut the Part Using Art Base Surface Toolpaths

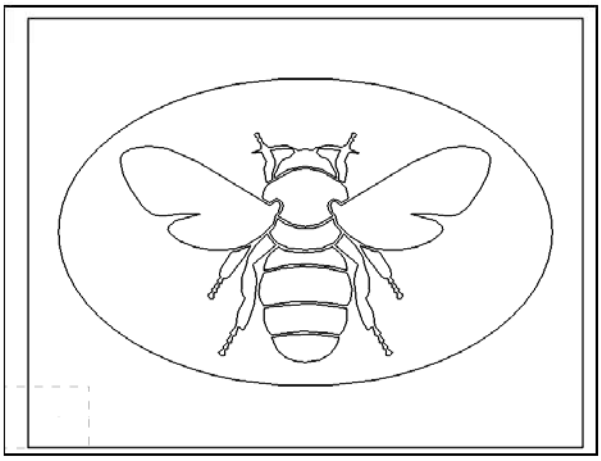
OBJECTIVES:

- Creating a New Art Base Surface Rectangular
- Creating Organic Surfaces
- Using Art Manager
- Create Texture Surface
- Set the Active Art Base Surface Top to the Z plane
- Machine the Active Art Base Surface

GEOMETRY CREATION

STEP 1: CREATE A NEW RELIEF.

Relief based surface is a flat 2D surface from which you will "grow" or "carve" your art.



File

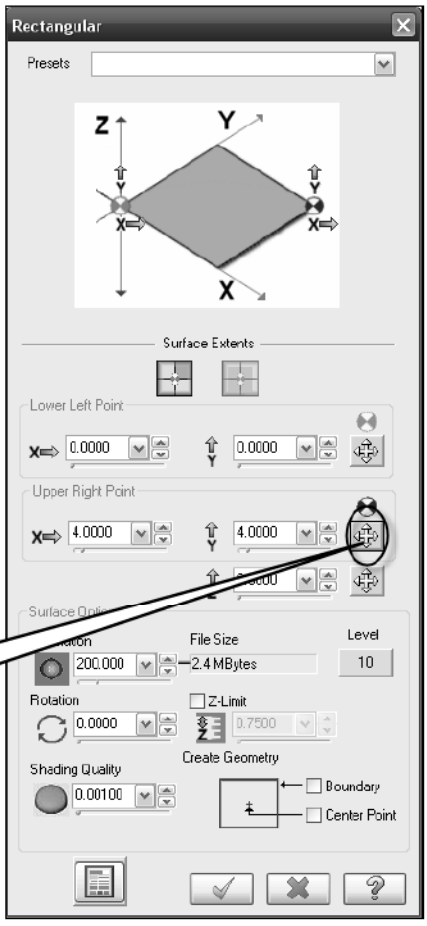
- **Open**
  - Select the bee_geox2.mcx.
    - Please check pages A-1 and A-2 from the Getting Started chapter for the file location.
  - Select the **Open** button.
    - To keep the original file save the file with a different name as shown below.

File

- **Save As**
  - Enter the File Name: bee_surface.mcx
  - Select the **OK** button.
  - Please check pages A-4 and A-5 from the Getting Started chapter to enable the Art toolbar and the Grid.

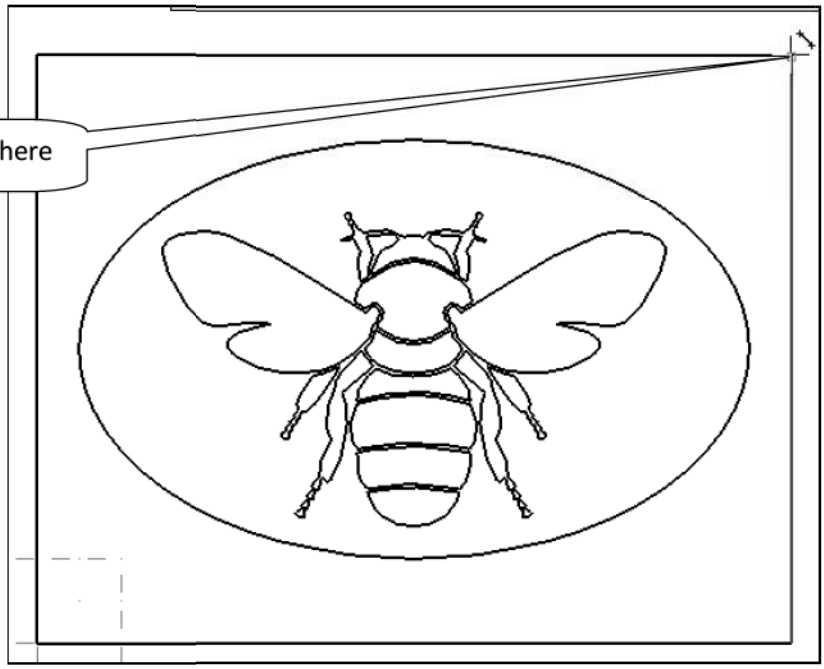
Art

- **New Art Base Surface Rectangular**
  - Make sure that the Lower Left Point is set as shown to the right (X=0; Y=0).
  - Click on the Use Mastercam to pick Upper Right Point button in the Upper Right Point.



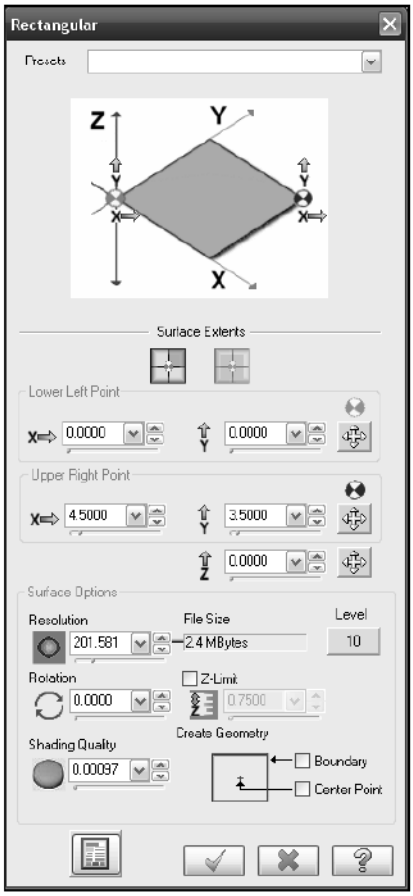
Select Use Mastercam to pick Upper-Right Point

- Select the Top-Right corner of the rectangle as shown below.



- Make sure that the Endpoint cursor appears when selecting the corner.

- The Art Base Surface parameters should look as shown to the right.



- Resolution defines the number of grid points displayed per inch or millimetre. It controls the crispness of the relief model.

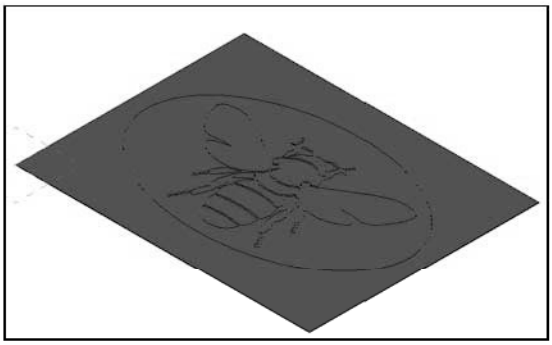
- Select the **OK** button to exit the screen.

- Select **Isometric View.**

- Select the **Fit** icon.

- Enter **Alt+S** to shade/unshade the part.

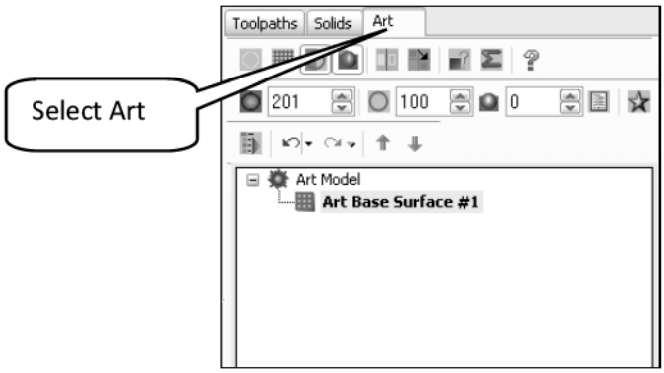
The art base surface should look as shown in the drawing below.



STEP 2: CREATE THE ORGANIC SURFACES.

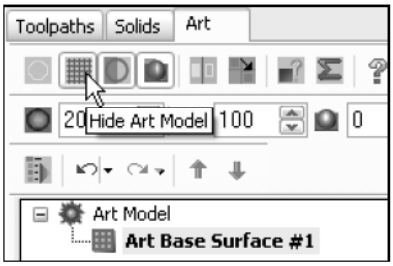
Organic Surface is a relief surface which is defined as a point grid. It will grow and scale in an organic way automatically. The surface requires closed chains on which you apply cross sections

- Enable **Art Manager** by selecting **Art** tab.



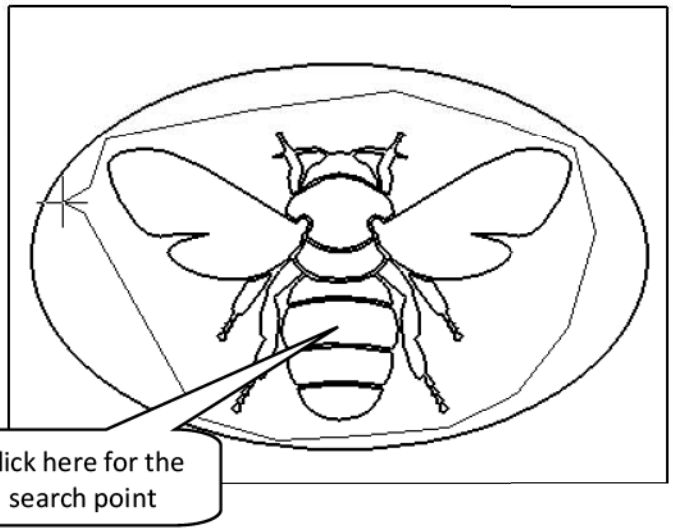
- Select the **Hide Art** button to hide the base surface. You will be able to select the geometry easier.

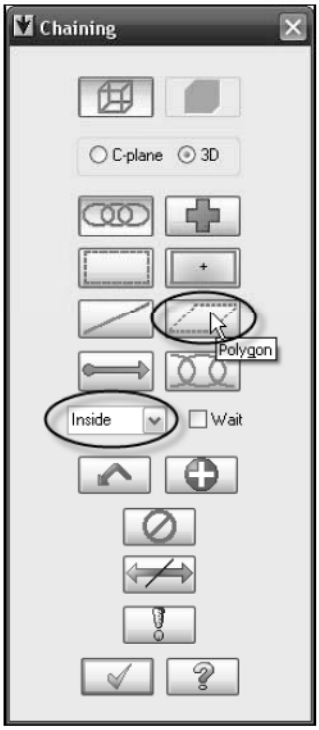
- Select **Top View.**



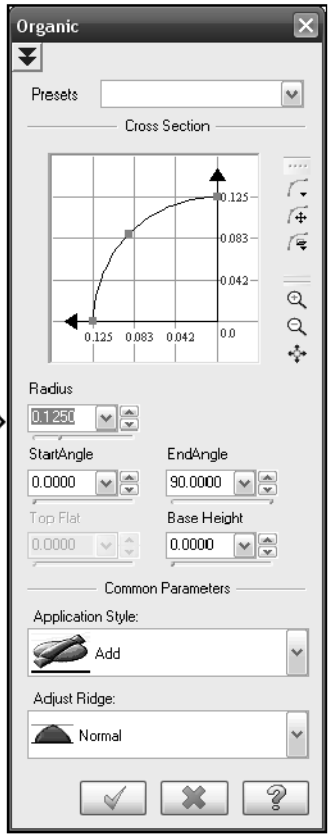
Art

- **Create Organic Art Surface Operation**
  - Enable **Polygon** button and **Inside** in the **Chaining** dialog box.
  - Create a polygon around the bee geometry as shown in the picture below.





- Select **End chain** from the **Chaining** dialog box to close the polygon.
- [Enter search point]: Select a point inside of the polygon as shown in the picture above.
  - Note that the bee geometry is highlighted in the selection color (yellow).
- Select the **OK** button to exit **Chaining** dialog box.
- Make sure that the settings are matching the screenshot to the right.
  - We are using the default cross section: **Convex Arc** with a **Radius** = 0.125.

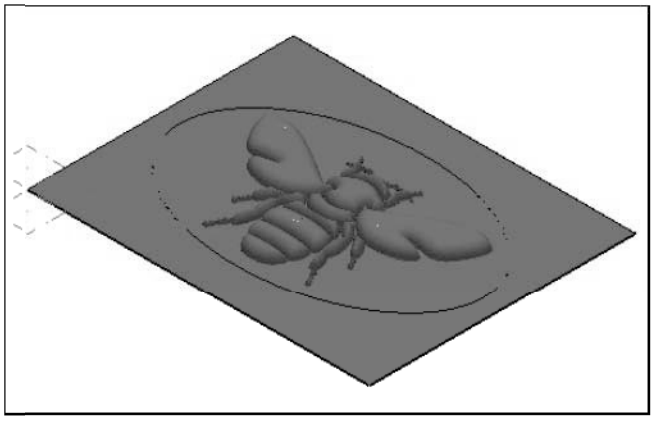


Cross Section allows you to:

1. Select a predefined, parametrizable cross-section.
2. Pick an existing Mastercam geometry as the cross-section.
3. Load or Save cross-sections.
4. Set radius/Height once you select the predefined once.

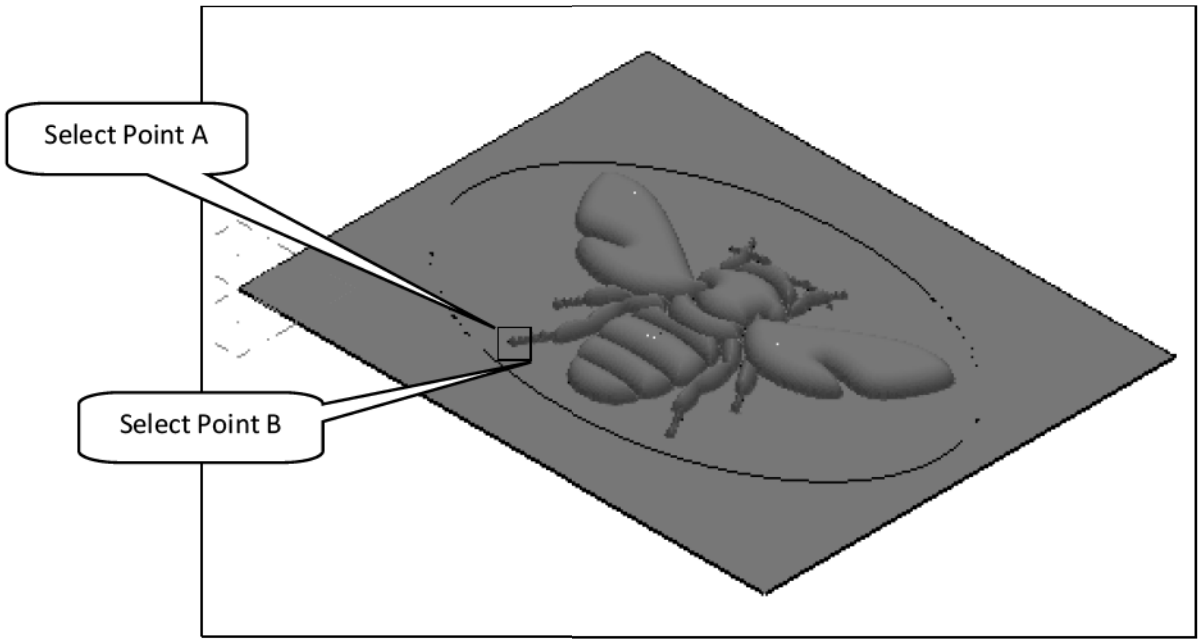
- Select the **OK** button.
- Disable **Hide Art Model**.
- Select **Isometric View.**

The surface should look as shown.

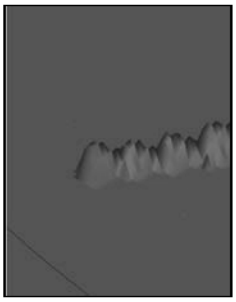


- We will Zoom in to check the bee legs as shown below.
- Select **Zoom-Window** icon.

- [Specify zoom window]: Select Point A.
- [Specify zoom window]: Select Point B.



The surface looks as shown.

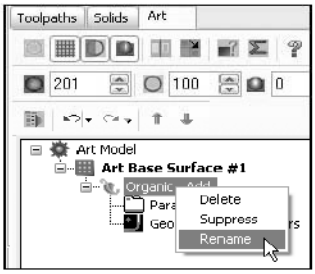


- To soften the ridge we will modify the surface using the **Art Manager.**

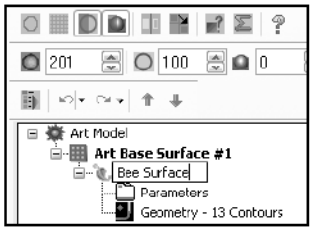
STEP 3: SOFTEN THE RIDGE.

3.1 Rename the Organic Surface.

We will change the name of the surfaces that we created in order to keep track of them and to be able to identify them quickly to edit.

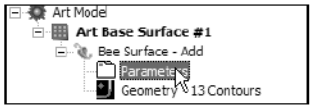


- Right-mouse click on the **Organic Surface** in the **Art Manager** and select **Rename**.

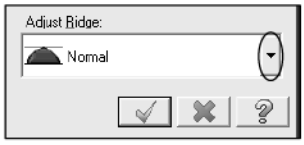


- Enter **Bee Surface**.

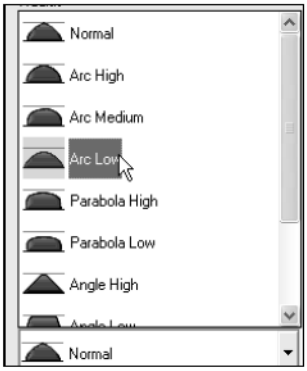
3.2 Adjust the Shape.



- Double click on **Parameters.**



- In the **Adjust ridge** field select the drop-down arrow to select the shape.

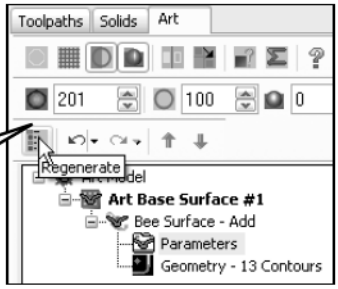


- Select the **Arc Low** shape.

- Select the **OK** button to exit **Organic Surface Parameters** screen.

  - Note that the **Art model** will be "Dirty."

- Select **Regenerate** button to regenerate the surface.



Select Regenerate

The surface looks as shown.

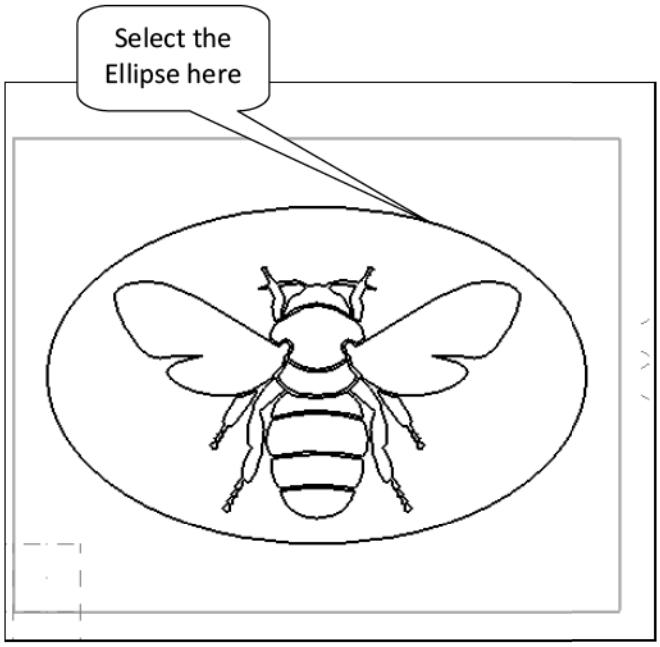
- Select the **Fit** button.
- Select **Top View.**
- Enable **Hide Art Model**.

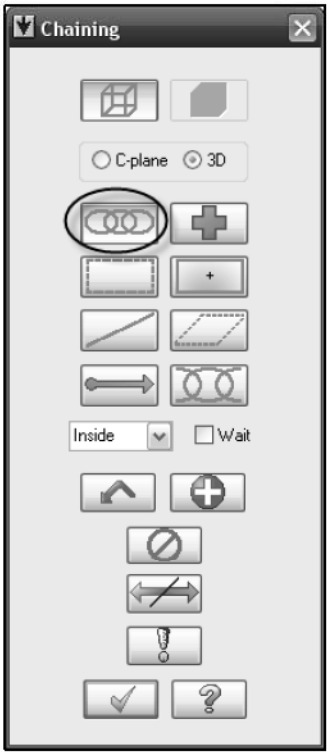
STEP 4: CREATE THE ELLIPSE SURFACE.

4.1 Create the Ellipse Surface.

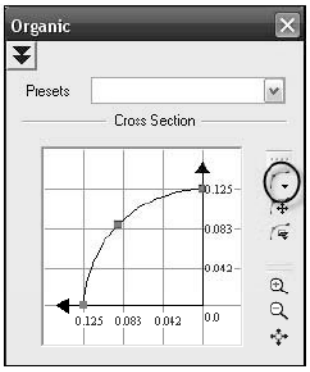
Art

- **Create Organic Art Surface Operation**
  - Enable **Chain** in the **Chaining** dialog box.
  - [Select one or more chains for Contour 1]: Select the Ellipse as shown below.

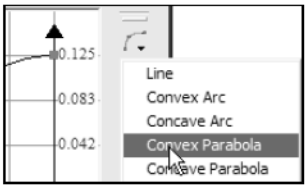




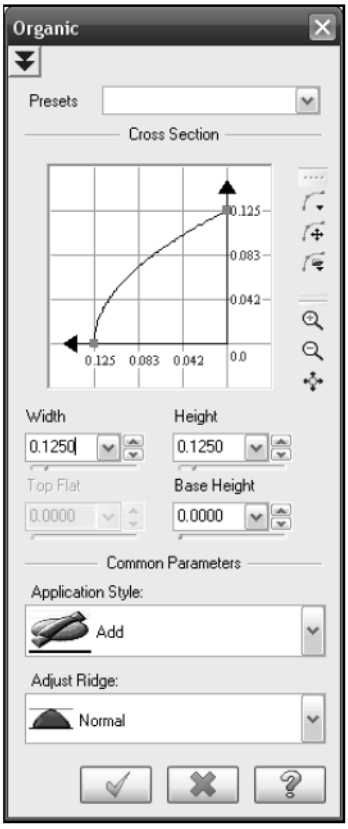
- Select the **OK** buttonto exit **Chaining**.



- Select the **Predefined, parametrizable cross-section** button as shown to the right.



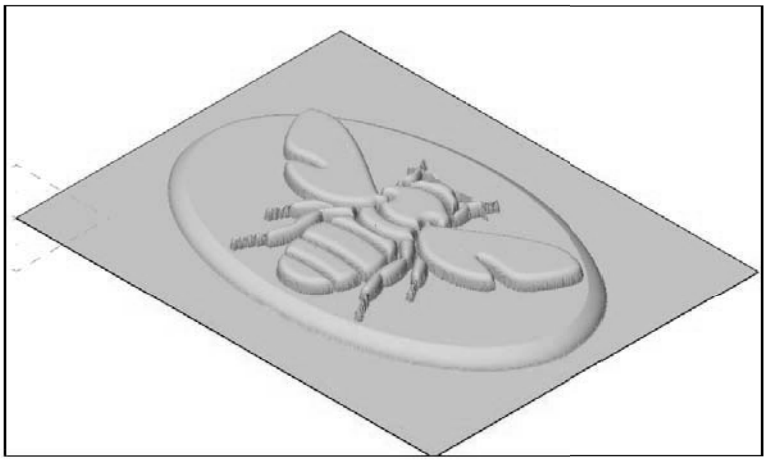
- Select the **Convex Parabola** as shown.



- Make sure that the rest of parameters in the **Organic Surface Parameters** screen are set as shown to the right.
- Select the **OK** button to exit **Organic Surface Parameters** screen.

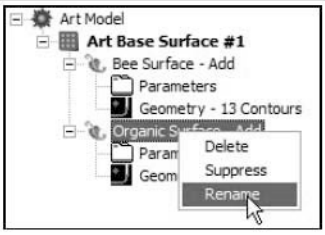
- Disable **Hide Art Model**.
- Select **Isometric View.**

The part should look as shown.



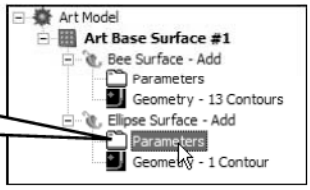
- Note that the elliptical surface looks like a shield.

4.2 Rename the Ellipse Surface.



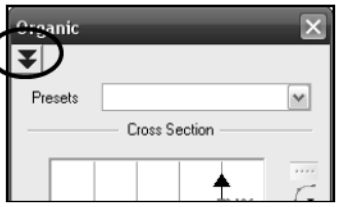
- Right-mouse click on the **Organic Surface** and select **Rename.**
- Enter Ellipse Surface.

4.3 Stretch the Ellipse Surface to look like a dome.

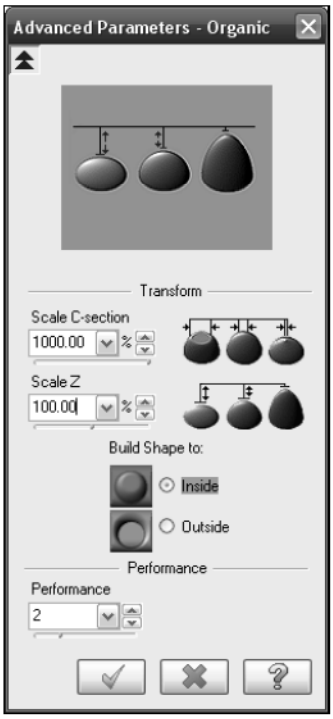


Double-click on the Parameters

- Double-click on the **Ellipse Surface Parameters** as shown**.**

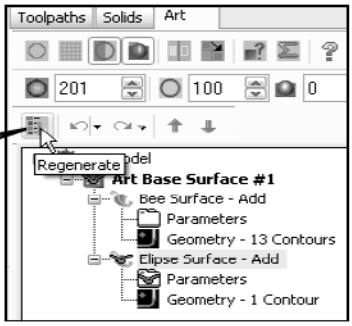


- Select the **Double arrow** to open the **Advanced Parameters**.



- Change the **Scale C-section** to 1000.0 %.
- Select the **OK** button to exit the **Advanced Parameters – Organic** screen.

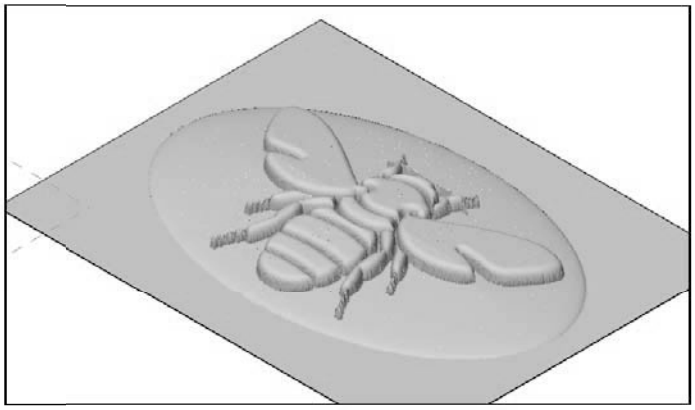
- Select the **OK** button to exit the **Organic Surface Parameters** screen.



- Select **Regenerate** button to regenerate the surface.

Select Regenerate

The geometry should look as shown to the right.

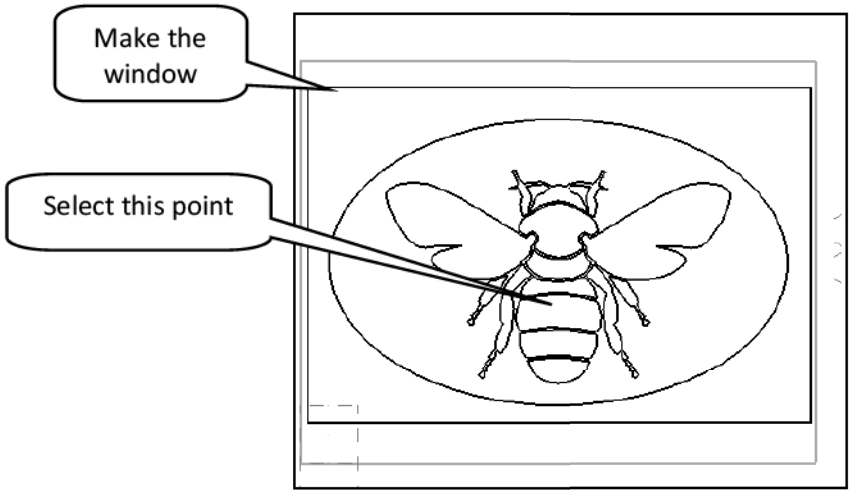


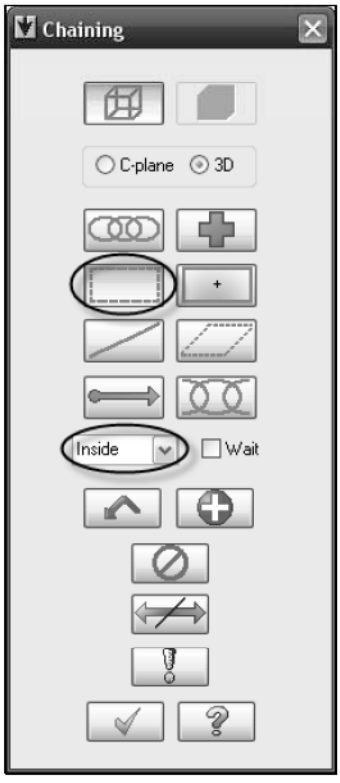
- Select **Top View.**
- Enable **Hide Art Model**.
- Select the **Fit** button if necessary.

STEP 5: CREATE A TEXTURE SURFACE.

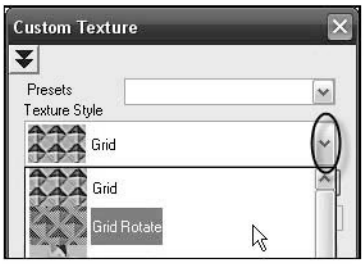
Art

- **Create Texture**
- **Create Textures Custom Art Surface Operation.**
  - Enable **Window** button in the **Chaining** dialog box.
  - Make sure that **Inside** is also enabled.
  - Make the window is as shown in the picture below.
  - Enter the search point]: Select a point in the middle as shown.

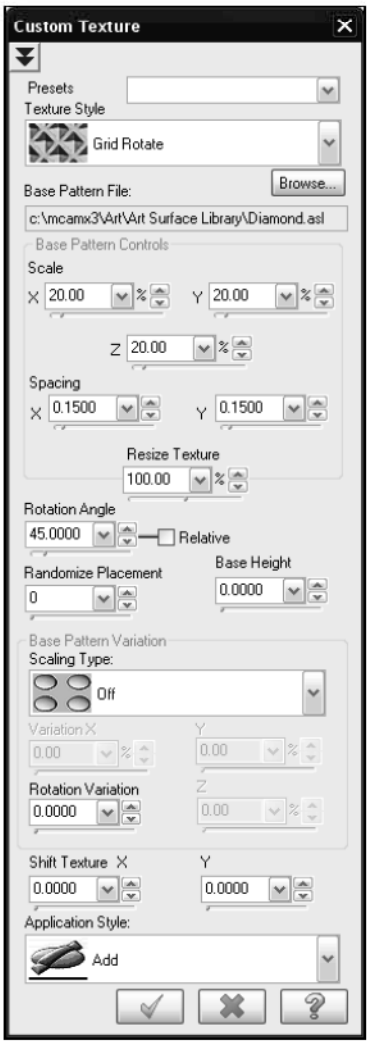




- Select the **OK** button to exit **Chaining** dialog box.



- Select the arrow next to the **Texture Style** field and select **Grid Rotate**.

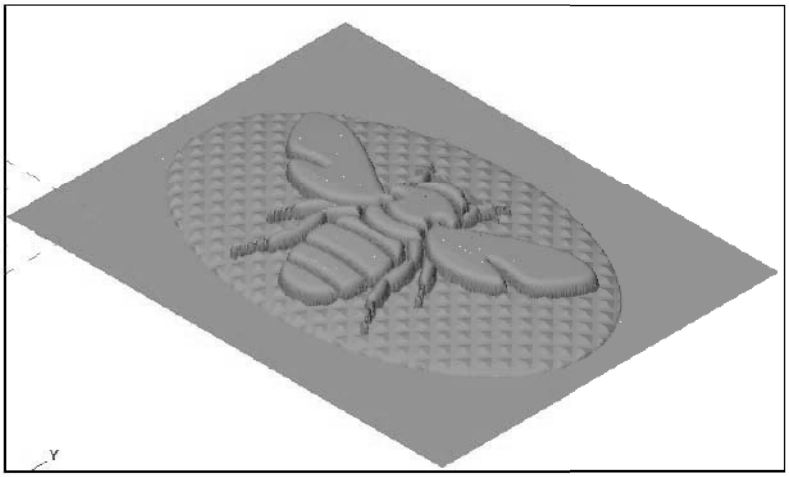


- Make sure that the **Base Pattern File** is **Diamon.asl;** otherwise, click on the **Browse** button to select it.

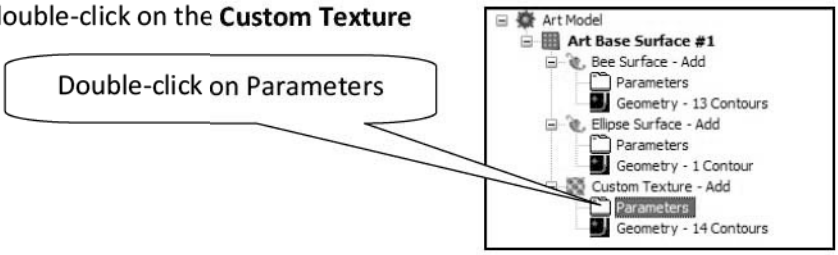
- Leave the default settings as shown and select the **OK** button to exit.

- Disable **Hide Art Model.**
- Select **Isometric View.**

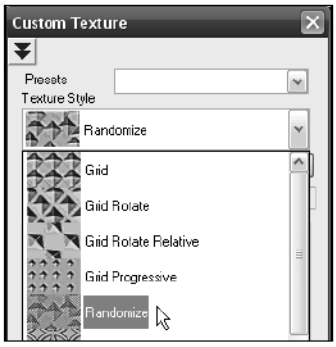
The part should look as shown.



- To modify the pattern select double-click on the **Custom Texture** surface **Parameters.**

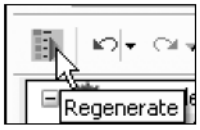


- Change the **Txture Style to Randomize**.

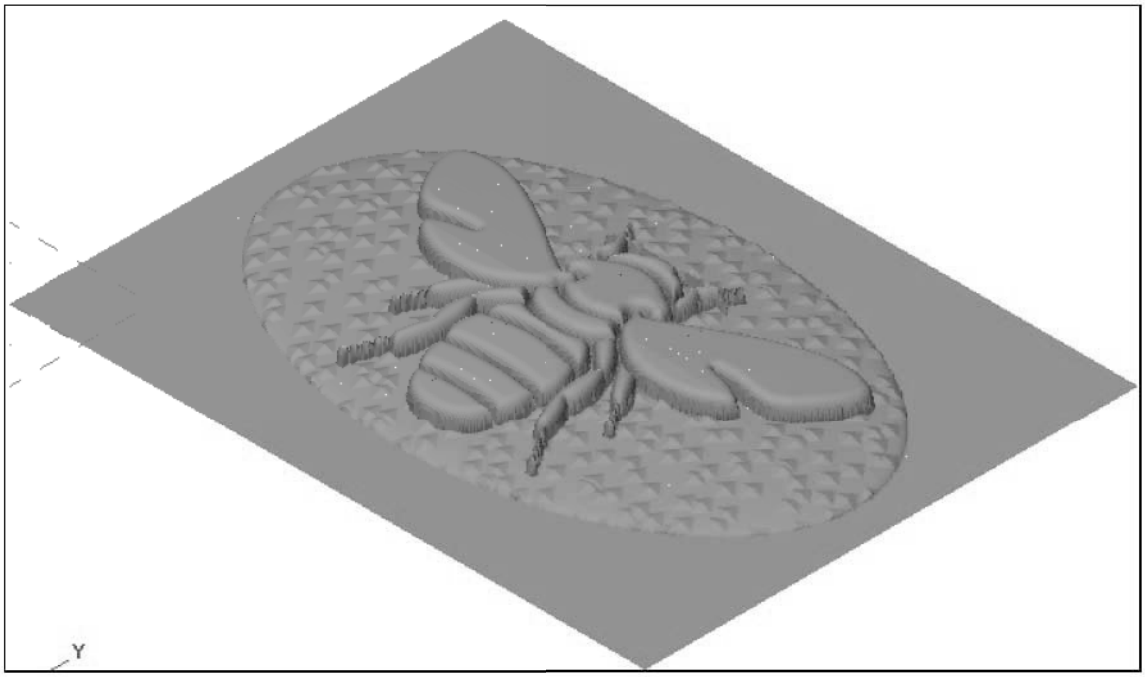


- Select the **OK** button to exit **Custom Texture Parameters**.

- Select the regenerate button in the **Art Manager**.



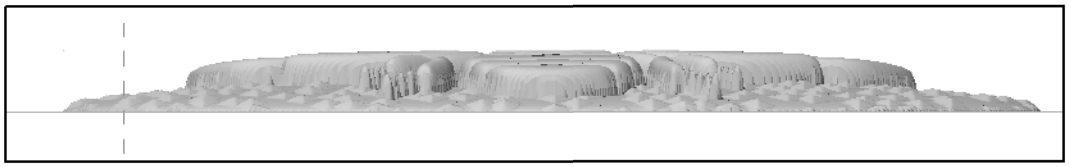
The geometry looks as shown below.



STEP 6: MOVE THE MODEL TO HAVE Z0 AT THE TOP OF THE GEOMETRY.

- Change the **Graphic View** to **Front**.
- Select the **Fit** button.

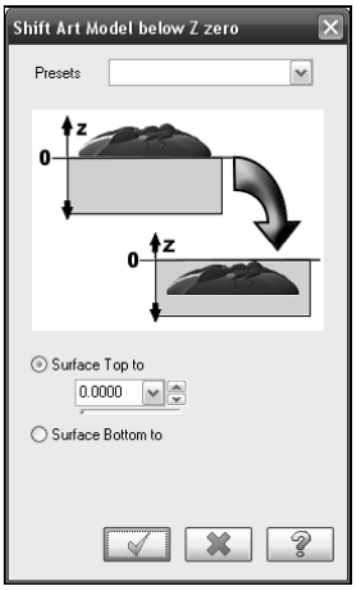
The geometry looks like the diagram shown below.



- Note that the geometry is above Z0. We want to have Z0 at the top of the geometry.

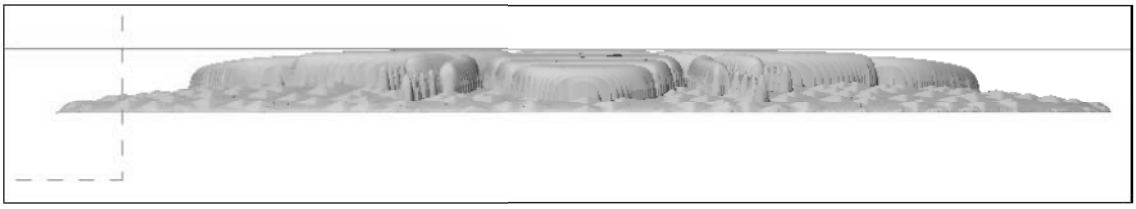
Art

- **Xform**
- **Shift Art Model Below Z Zero**
  - Make sure that **Surface Top to** is enabled.



- Select the **OK** button to exit.

The part will look as shown.



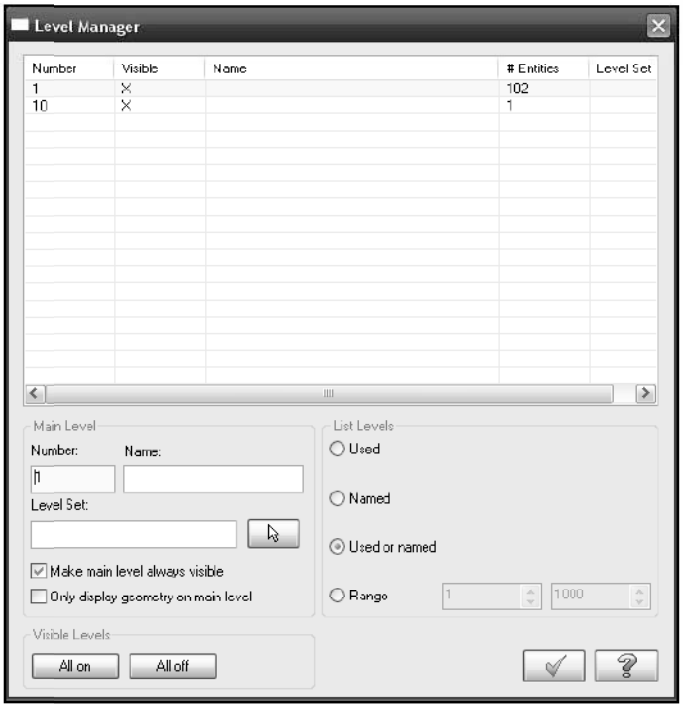
- Change the **Graphic View** to **Isometric**.
- Select the **Screen-Fit** button.

STEP 7: HIDE THE 2D GEOMETRY USING LEVEL MANAGER.

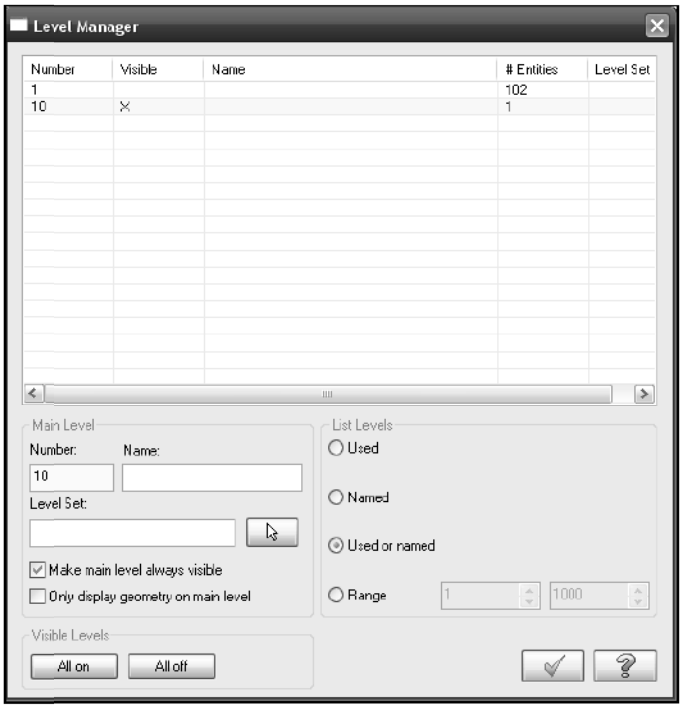
- Select **Level** from the **Status Bar** as shown.

- Enter number 10 in the **Main Level.**

- Select **All off** button.

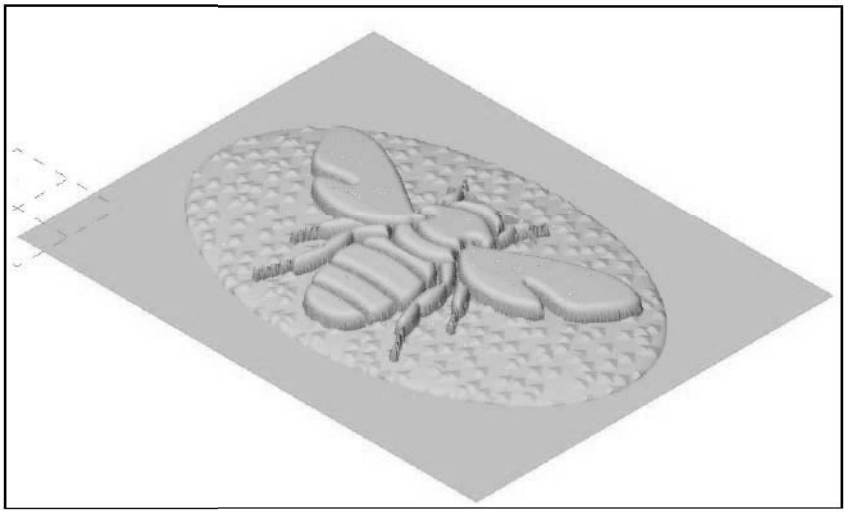


- The **Level Manager** should look as shown to the right.



- Select the **OK** button to exit **Level Manager**.

- Select the **Repaint** button.

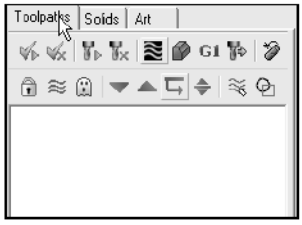


TOOLPATH CREATION

STEP 8: SET UP THE STOCK.

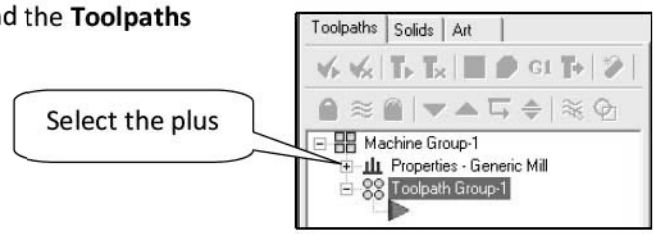
- Select the **Toolpaths Manager** tab.
- If a machine is already selected in the **Toolpaths Manager,** skip the next selection.

- Otherwise;

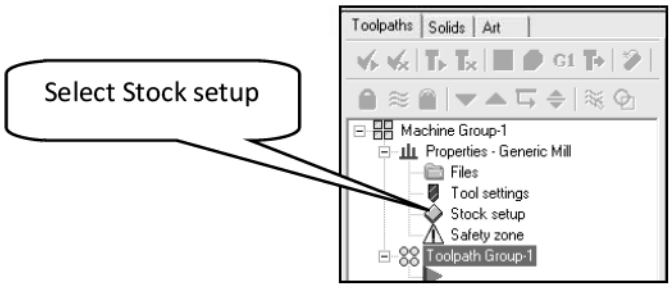


- Machine type
- Mill
- Default

- Select the plus in front of **Properties** to expend the **Toolpaths Group Properties.**

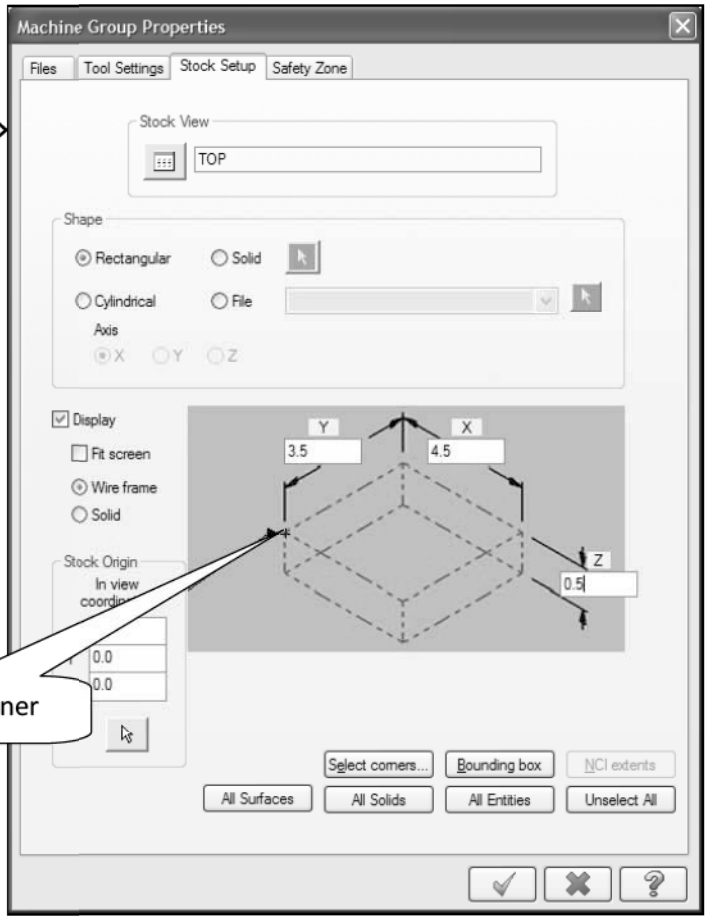


- Select **Stock setup**.



- Change the parameters to match the screenshot to the right.

The **Stock Origin** values adjust the positioning of the stock, ensuring that you have equal amount of extra stock around the finish part.
Display options allows you to set the stock as **Wireframe** and to fit the stock to the screen.(**Fit Screen**)

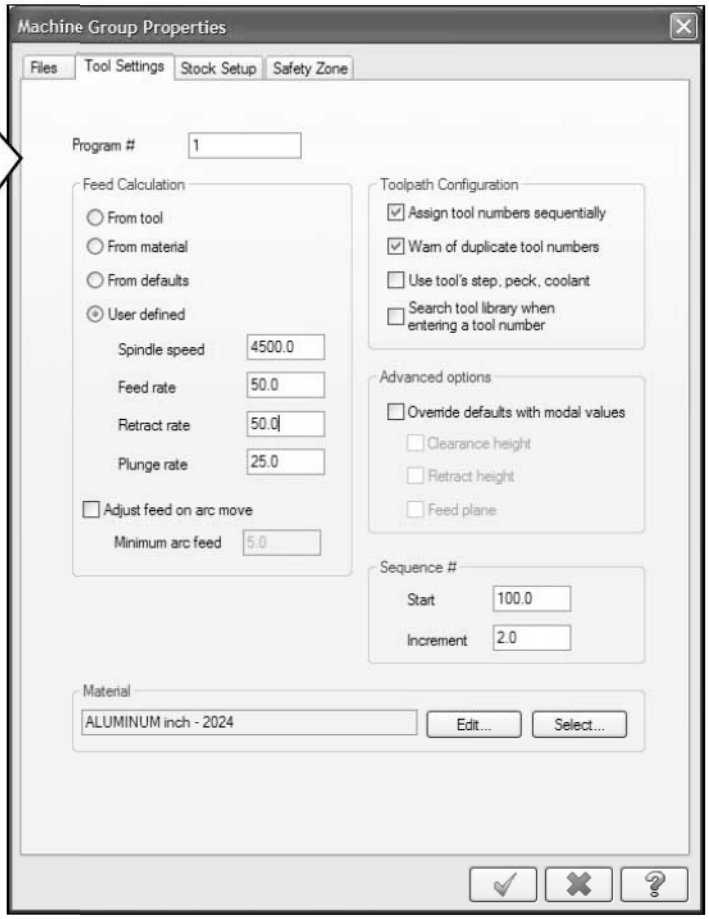


- Select the left corner to move the arrow as shown.

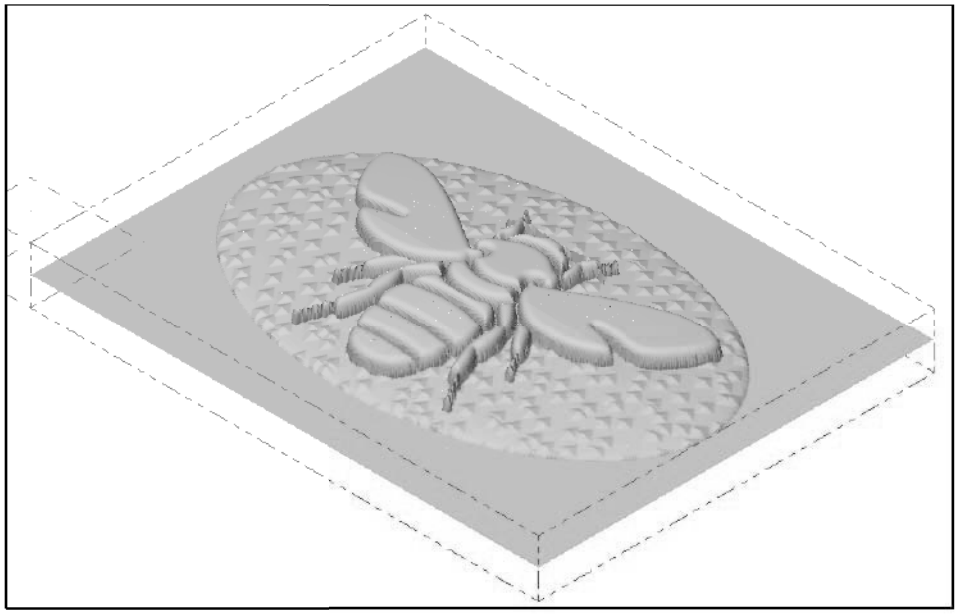
Select this corner

- Select the **Tool Settings** tab to set the tool parameters and the part material.
- Change the parameters to match the screenshot to the right.

Assign tool numbers sequentially allows you to overwrite the tool number from the library with the next available tool number. (First operation →tool number 1; Second operation →tool number 2, etc.)
Feed Calculation set to **User defined** uses feed rate, plunge rate, retract rate and spindle speed that you enter.



- Select the **OK** button to exit **Toolpath Group Properties**.

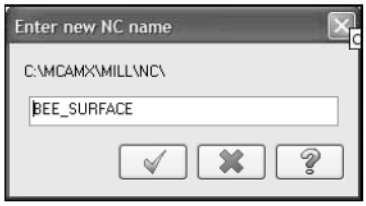


STEP 9: MACHINE THE PART.

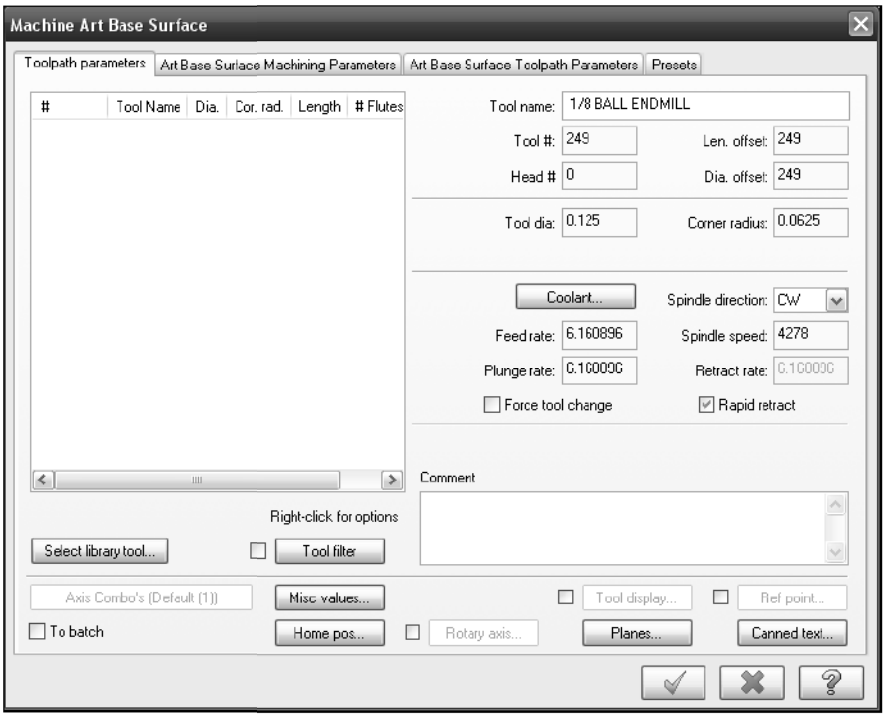
Art

Toolpath Active Art Base Surface

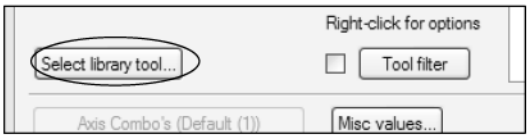
- Note that it will take couple of minutes to open the **Machine Art Base Surface.**



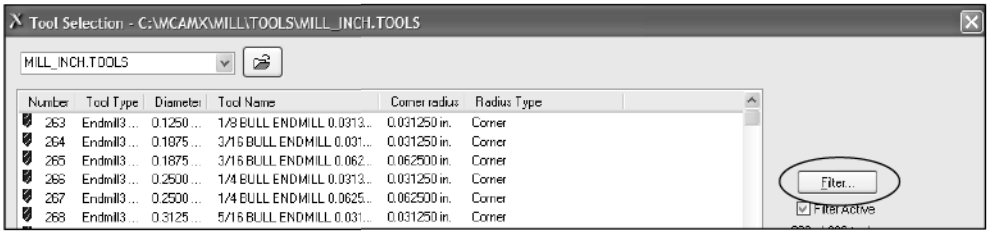
- Select the **OK** button to accept the same name for the **NC** as the geometry.



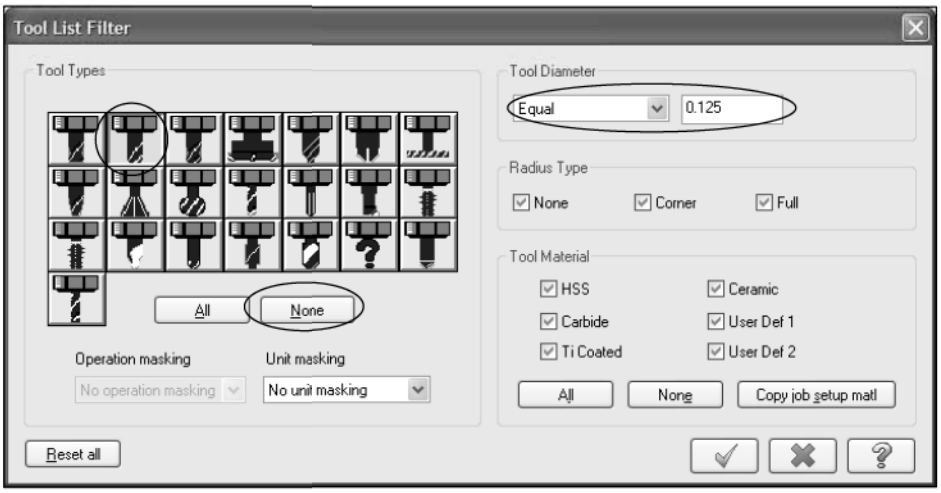
- Select the **Select library tool** button.



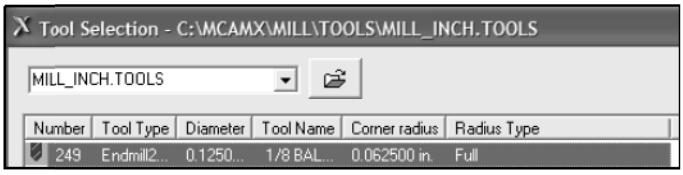
- Select **Filter** button in the **Tool Selection** window.



- To select the 1/8 Ball Endmill follow the next steps.
- Select the **None** button in the **Tool Types**.
- Select the **Endmill Sphere** as the Tool Type.
- Select the drop-down arrow and pick **Equal** in the **Tool Diameter** section.
- Enter 1/8 as the diameter.

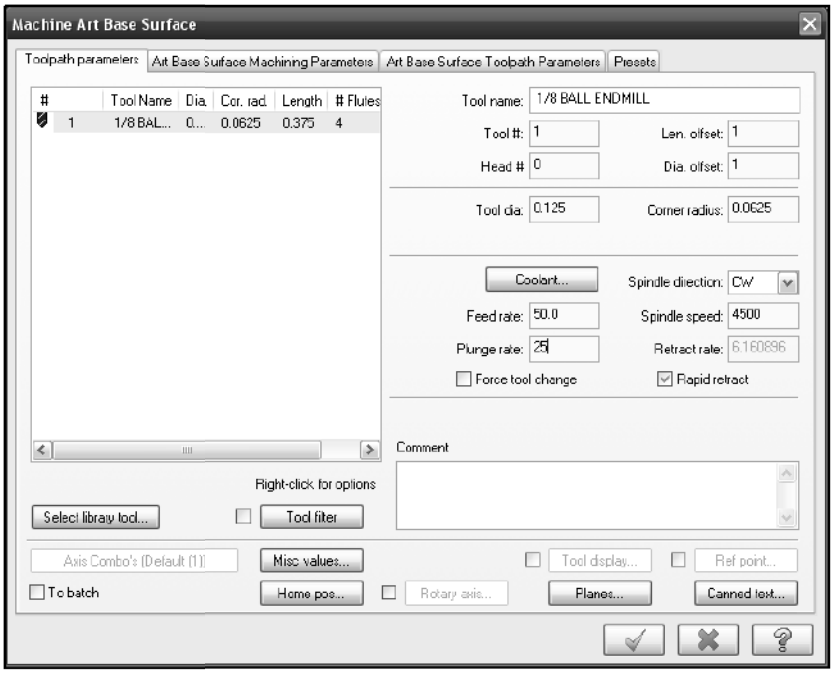


- Select the **OK** button to exit **Tool List Filter**.

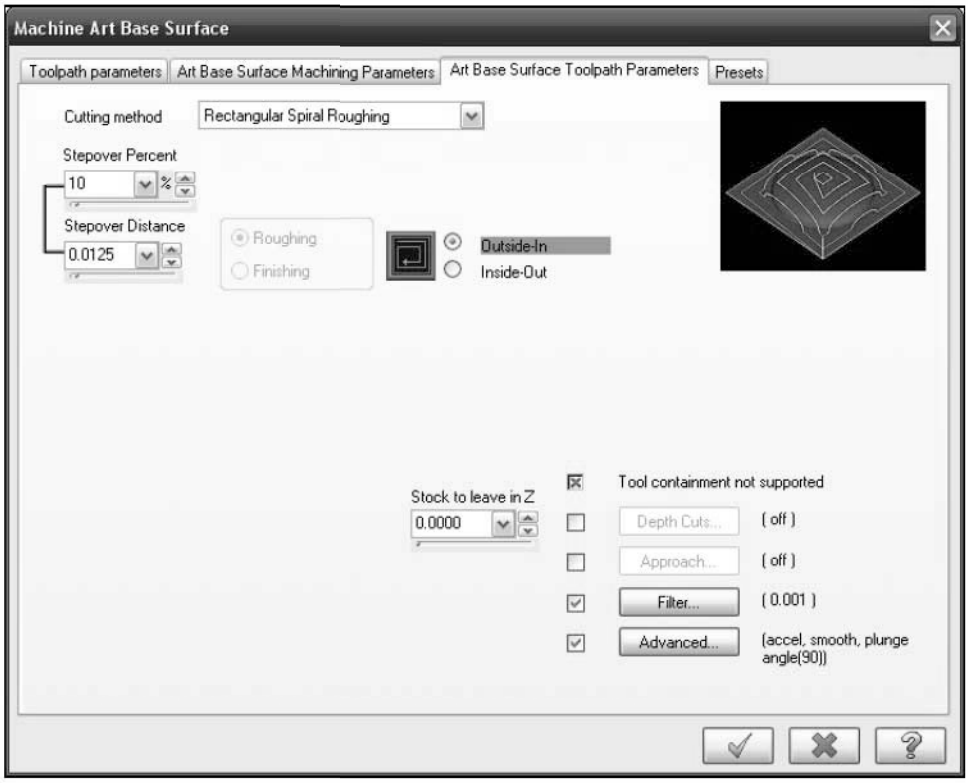


- Select the 1/8 Ball Endmill from the list.
- Select the **OK** button to exit the **Tool Selection** screen.

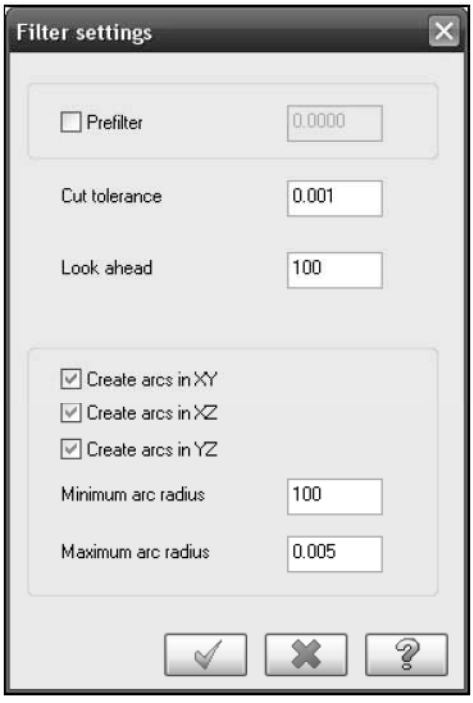
- Make sure that the parameters in the **Tool Parameters** page match the following screenshot.



- Select the **Art Base Surface Toolpath Parameters** tab and change the **Cutting method** and the **Stepover Percent** as shown.



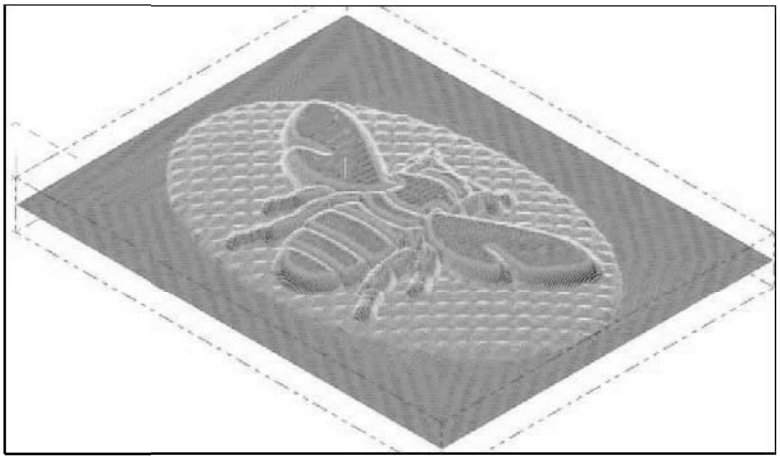
- Select the **Filter** button as shown above and disable **Prefilter.**



- Select the **OK** button to exit **Filter Settings** parameters.

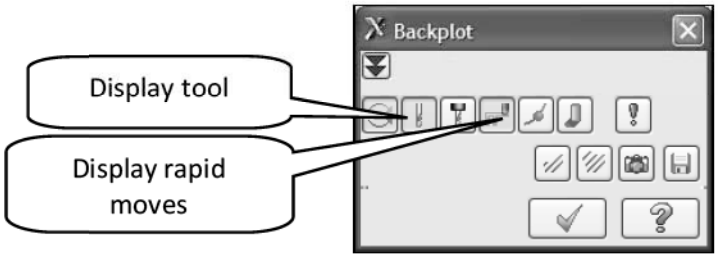
- Select the **OK** button to exit **Machine Art Base Surface** parameters.

- Note it may take a few minutes to generate the toolpath.



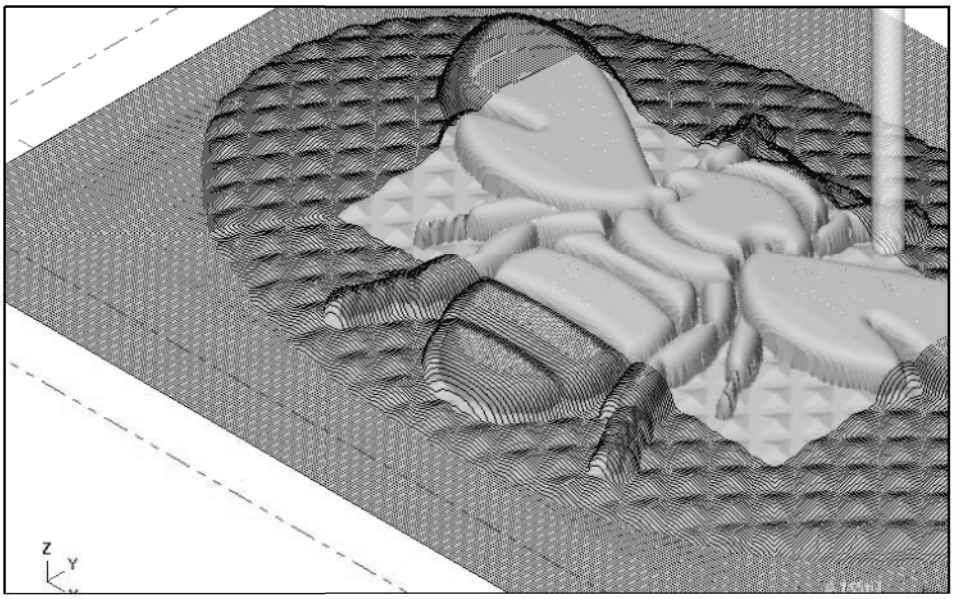
STEP 10: BACKPLOT THE PART.

- Select the **Backplot selected operations** button.
- Make sure that you have the following buttons turned on (they will appear pushed down).



- Select the **Play** button.

- Select the **OK** button to exit **Backplot**.

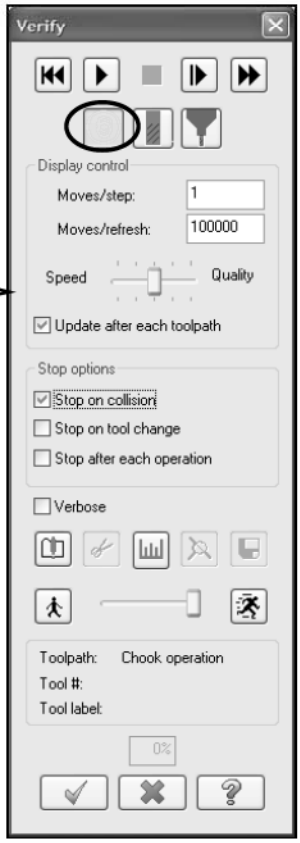


STEP 11: VERIFY THE PART.

- Select the **Verify selected operations** button.

- Enable the **Turbo** button as shown.

Update after each toolpath updates the stock after each operation.
Stop on collision pauses the verification when the tool touches the part with a rapid move.

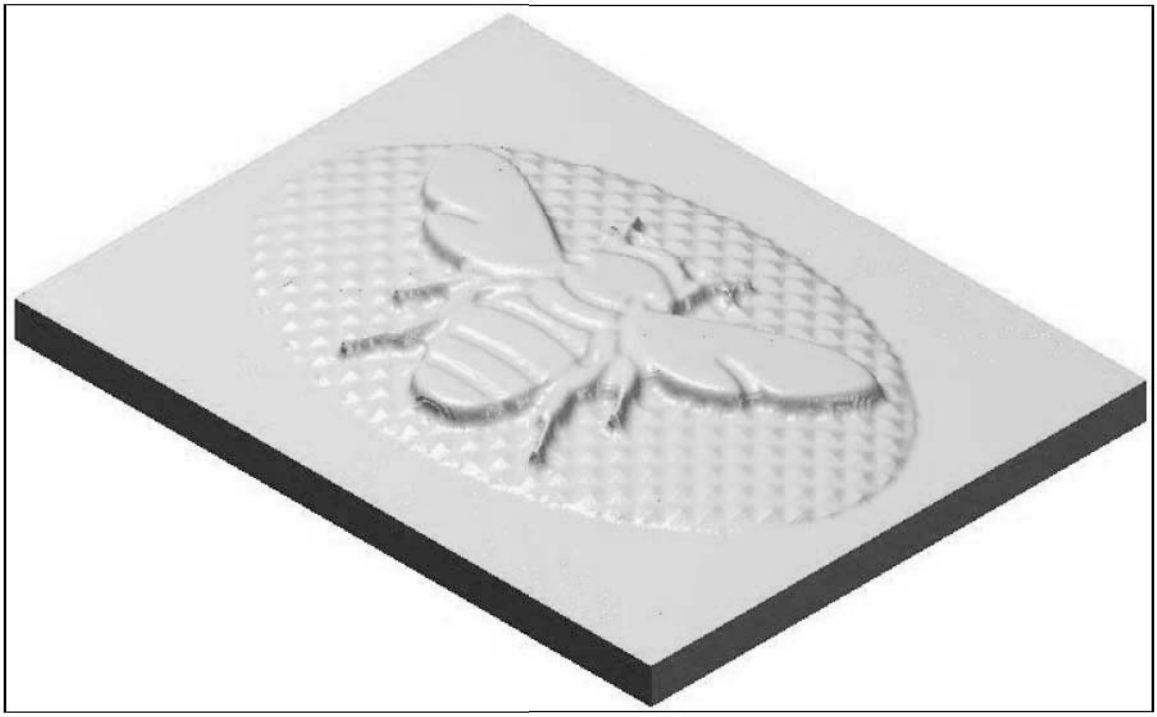


- Set the **Verify speed** by moving the slider bar in the speed control bar.

- Select the **Play** button to start simulation.

- The computer will now simulate the process of the part being machined.

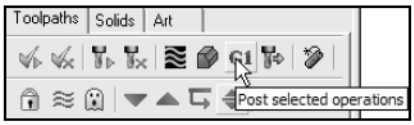
The finished part should appear as shown in the following picture

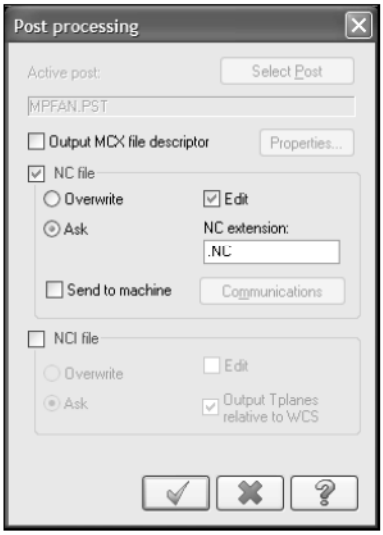


- Select the **Red X** button at the upper right corner to close **Verify**.

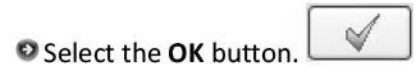
STEP 12: POST PROCESS THE FILE.

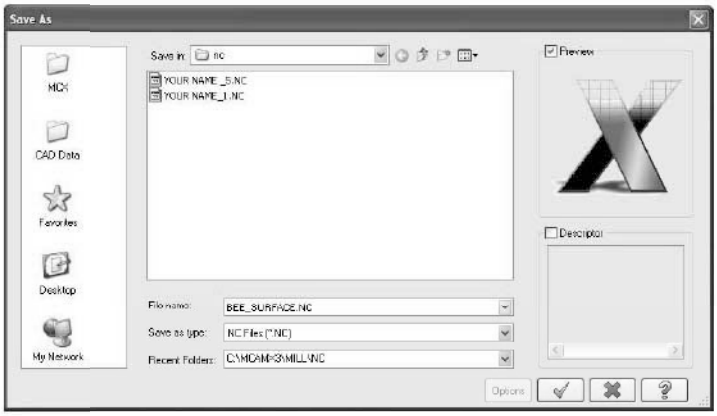
- Select **Post selected operations** button in **Toolpaths Manager**.



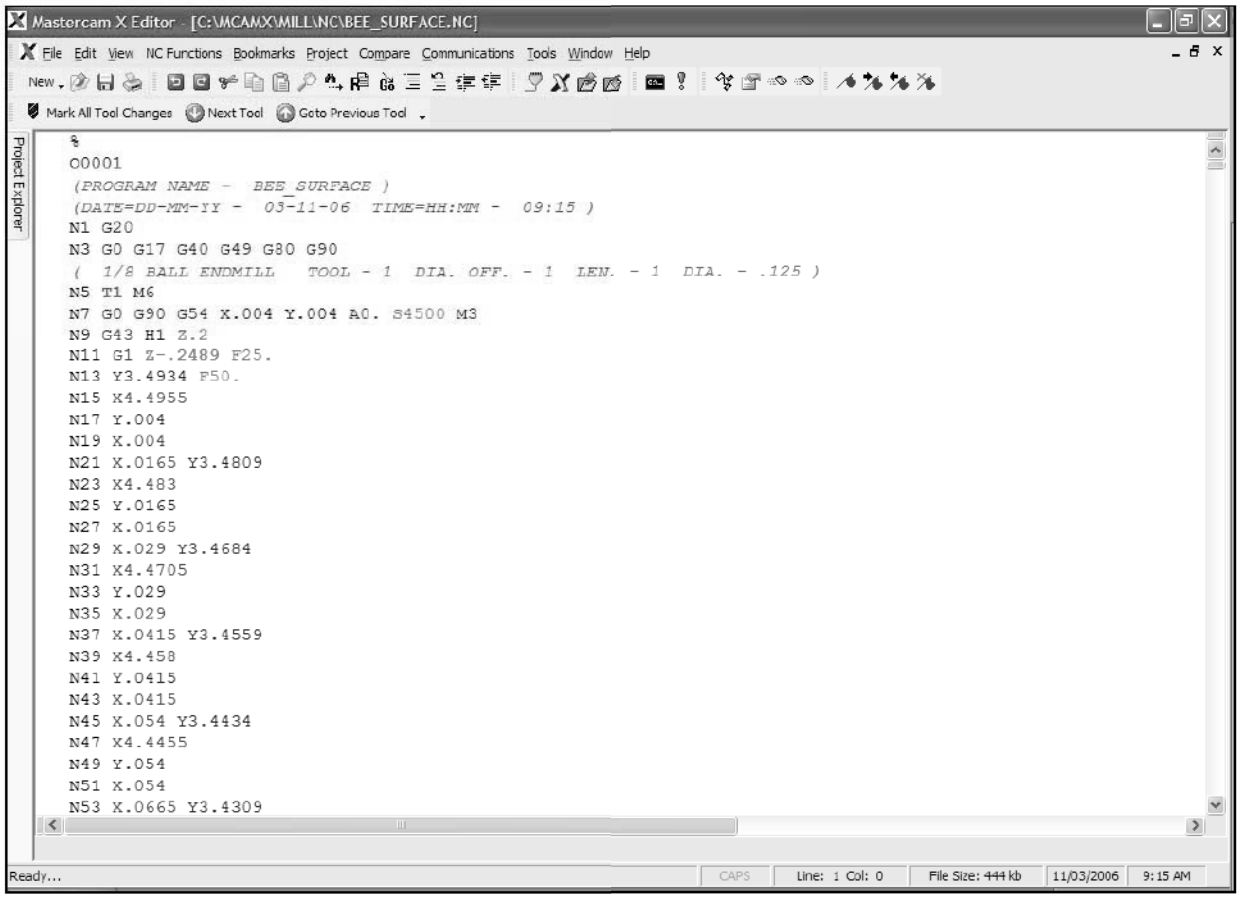


- Select the **OK** button.

Select the **OK** button. 



The following screen will appear.



Select the **Red X** button at the upper right corner to exit the **Editor**.

STEP 13: SAVE THE UPDATED MCX FILE.

File

Save