

DRAGON

A Tutorial for Creating a 3D Dragon in EnRoute 6



Dragon

Introduction

This document provides instructions for the creation of a dragon design using EnRoute 4. This particular design was created primarily as a demonstration of a number of design techniques in EnRoute. These techniques may be used with sign designs, or decorative woodworking pieces, or any other decorative 3D application.

Step by step instructions:

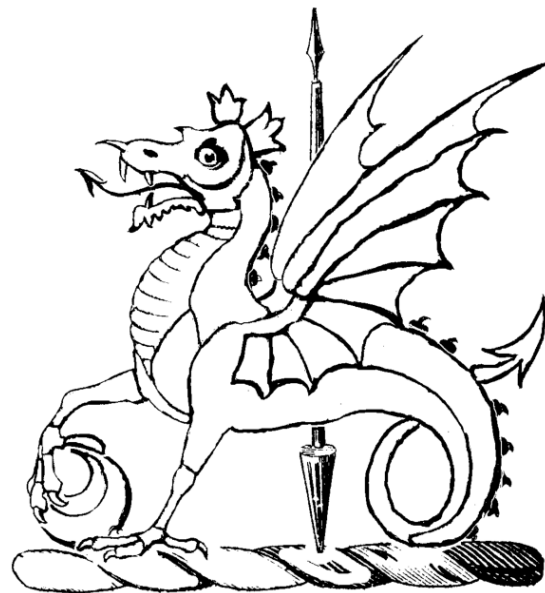
Artwork

The drawing for this artwork came from a Dover Electronic Clip Art book. A CD containing the BMP image is included with the book.




Cleanup

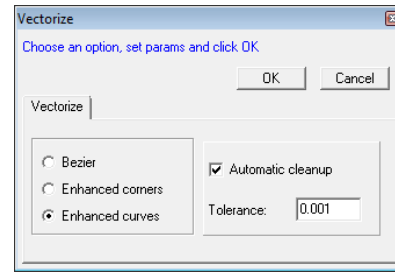
The bitmap image was imported into Corel Photo Paint and the paint tools were used to clean up the image. The drawing was saved as a Bitmap.



Import the Bitmap to EnRoute

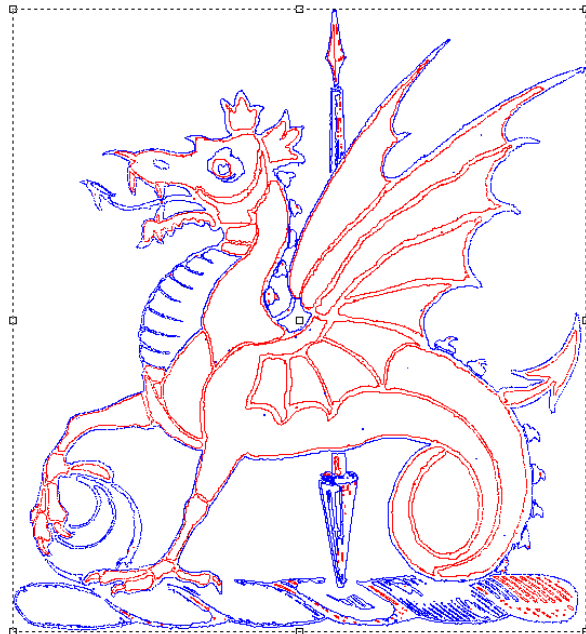
Open a new file in EnRoute and Import the bitmap to the file. Once you have imported the image, use the vectorization tool to convert the bitmap to vectors.

1. Select the bitmap.
2. Select the Vectorization tool. 
3. Set the parameters: Enhanced curves; check Automatic cleanup and set a tolerance. In this example the tolerance was set at .001
4. Click OK.




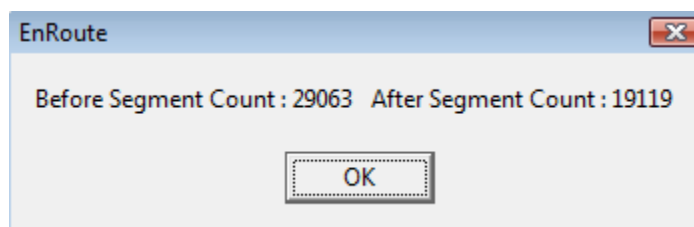
EnRoute will display a dialog which shows the progress of the vectorization.

This is an image of the vectorized bitmap.





After the vectorization, there may still be a lot of cleanup work to do. EnRoute can make the cleanup process an easy task.


1. Select the image and click on the cleanup tool icon. 
2. Enter the cleanup tolerance and press OK. Set the tolerance to the size of the smallest features you want the software to keep. This may take a little bit of experimentation to determine what tolerance would be best for the image.
3. EnRoute will display a dialog showing the before and after segment counts. This tells you how much the drawing was simplified by the cleanup.

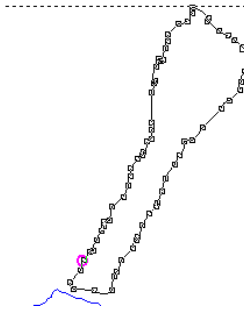


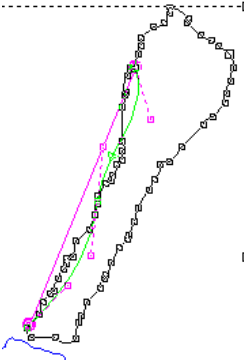
Using the Edit Contours tools

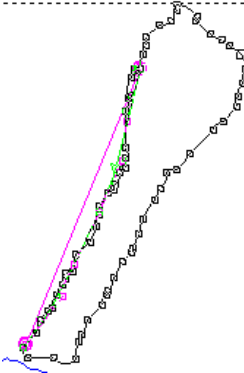
EnRoute has a selection of point edit tools available. In this design, the smooth approximation tool was used to reduce the points used in the drawing. Use the following methods to go through all of the contours of the image to clean it up to the desired effect.

1. Click and hold the Edit Points icon.  This will open the Edit Contours flyout menu. 

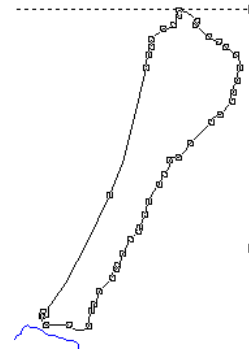
2. Using the Smooth Approximation tool, go through the contours and simplify as needed. 

3. **Using the Smooth Approximation Tool:**
 - A. Left click on the contour to start the tool. 

 - B. Left click a second point on the contour. 

 - C. Click and drag on the curve handles to adjust the curve. The green line indicates the path of the contour. 

- D. Press the Enter button to complete the task.
Repeat this process with each of the contours in order to smooth them out and simplify the contours.



After you have completed the cleanup process you are ready to start building the dragon surface.



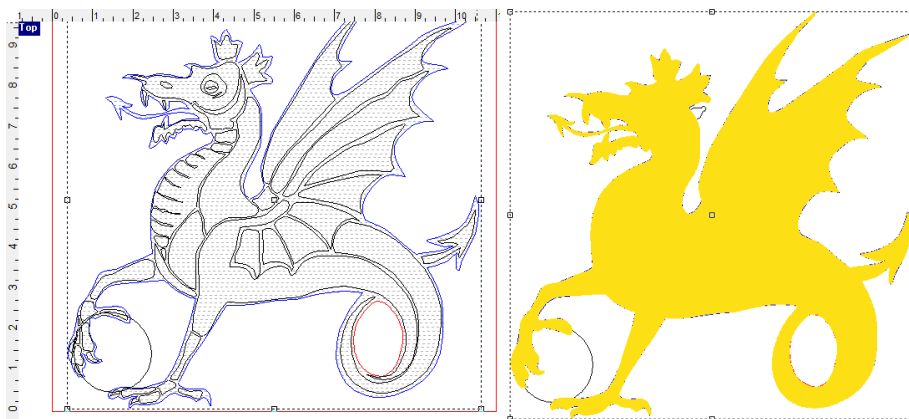
Create Flat Relief

Select the outline contour of the design and create a flat relief to build on.

1. Select outline contour.


2. Click the Add Relief Icon. 

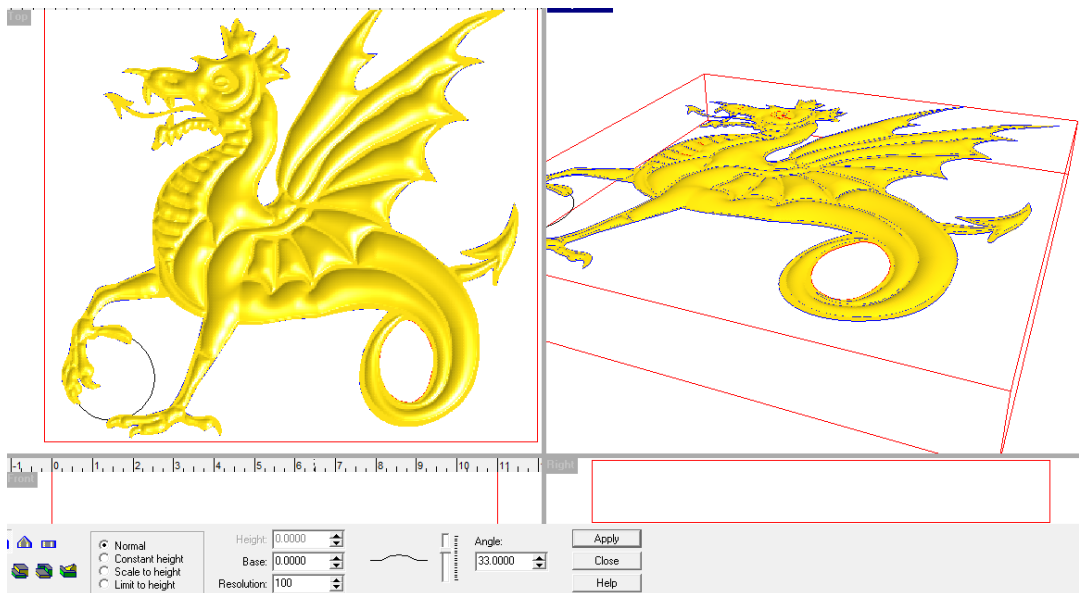
3. Set the parameters: Add, Flat, Normal, Height= 00. This provides the base surface of the design.



Add Rounded Relief to the base relief.

Now we want to start adding some dimension to the design.


1. Select the flat relief. Hold down the shift key and select the other inside contours.
2. Click on the Add Relief Icon. 
3. Set the parameters to Add, Rounded, Normal, and Angle = 33.
4. Click Apply.

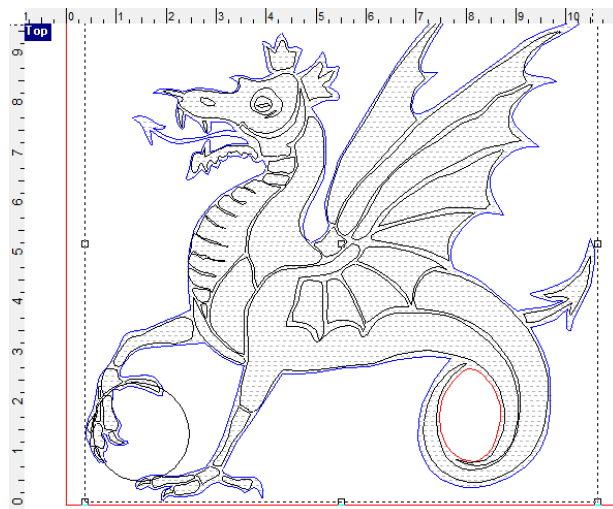


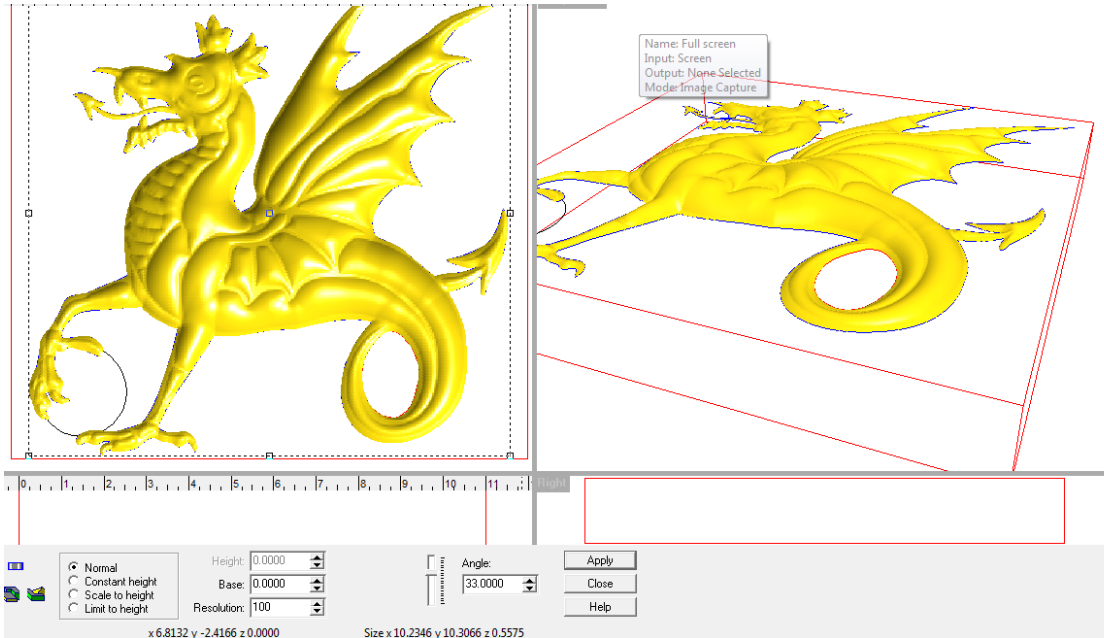
By using EnRoute's 4 view, you can see the dimension of the relief as you build it. You can build the dimension of the relief a little at a time or experiment with the angle to get the look that you want.

Add Dimension to the Relief

The relief seems a bit flat at this point so use the Add Relief tool to add more of a rounded look to the relief.

1. Select the relief only. Do not select the inside contours.
2. Click on the Add Relief Icon. 
3. Choose the settings, Add, Rounded, Normal and Angle = 33.






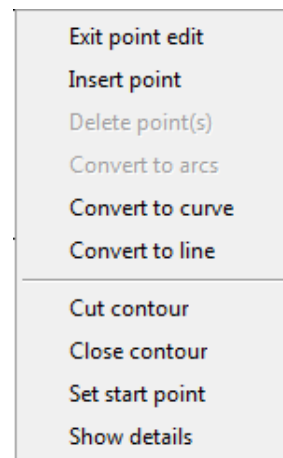


This makes the overall relief a little rounder.

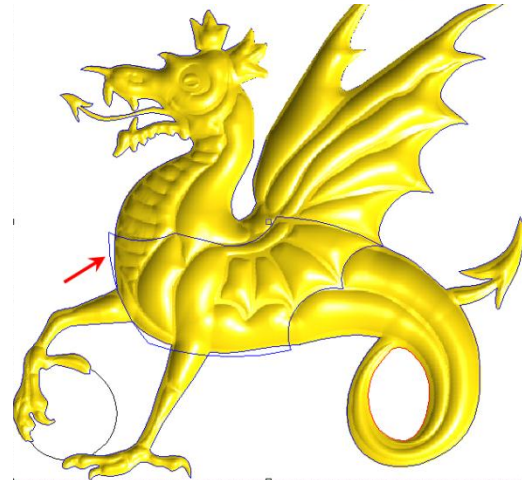
Add Dimension to a portion of the relief

To add a bit of dimension to just the chest portion of the relief, create a mask contour that outlines the area of the relief that you want to build up.

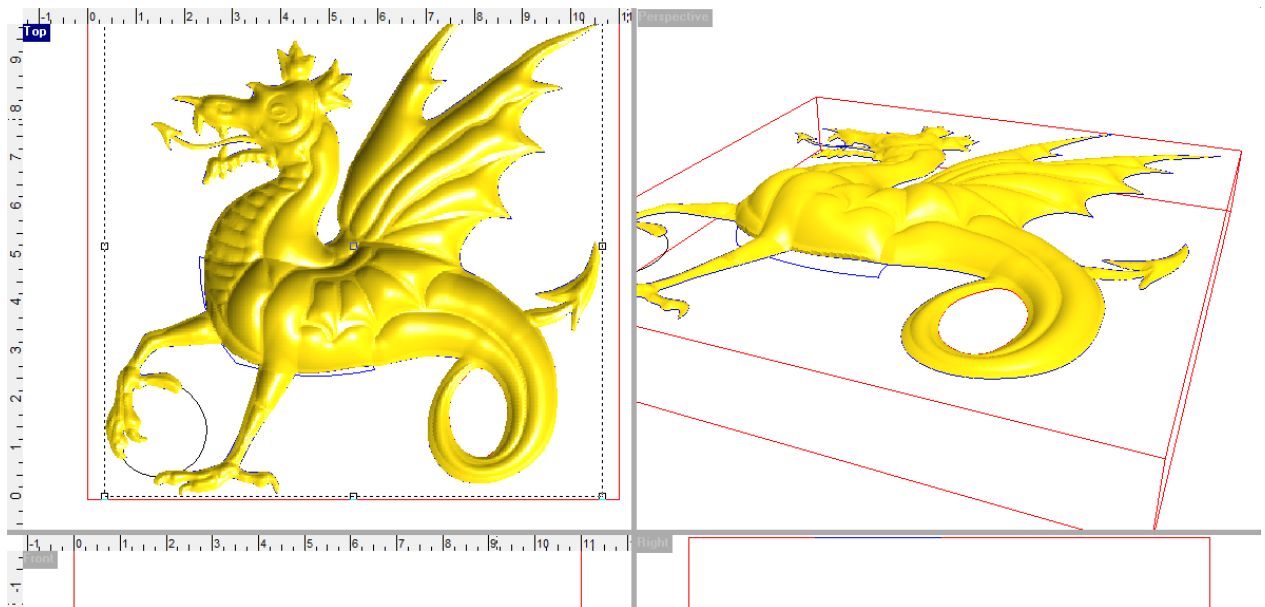
1. Use the Line tool to create a mask of the area that you wish to adjust.
 - a. Click on the Polyarc Icon  and select the line tool. 
 - b. With the relief rendered, it is easier to see the path for the mask.
 - c. Use the edit points tools to adjust the lines to fit the area of the relief that you wish to change.
 - i. Click on the Edit points tool. 
 - ii. Click on the mask contour. This will show the points of the contour.
 - iii. Click and drag the points to move them or click and drag the segments between the points to put an arc in the segment.
 - iv. Right click on the contour will open a dialog with several choices to edit the contour.



2. After you have edited the mask contour to the desired shape, select the relief and select the mask contour.
3. Click on the Add Relief Icon. Select settings: Add Rounded, Normal and Angle = 33.




This will add dimension to only the area of the dragon that is within the mask area. Using the 4 view helps you to see the changes in the relief as you build.



Add Texture to the Tail.

The relief is starting to take shape. Adding a bit of texture to the tail and wing area would give this even more dimension.

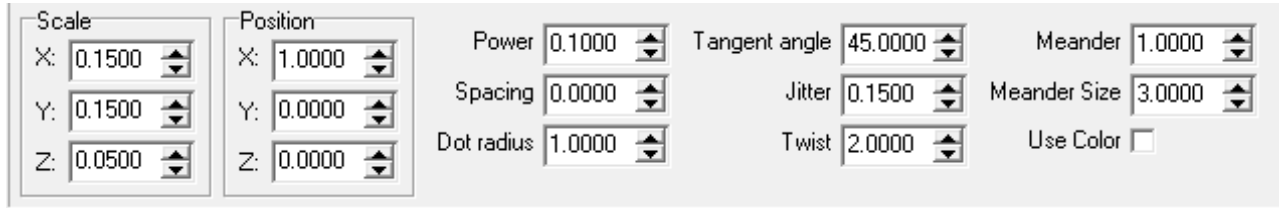
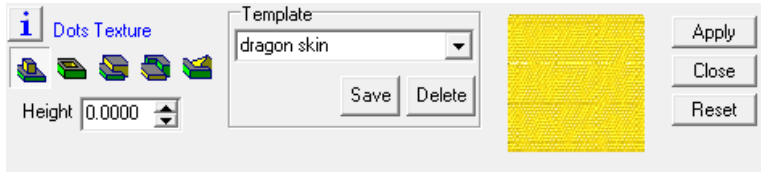
1. Select the relief.
2. Select the inside contour for the tail section. This will serve as a mask for where the texture will be added.
3. Click and hold the Texture Icon.  This will open the flyout menu for the textures. Select the Dots Texture.



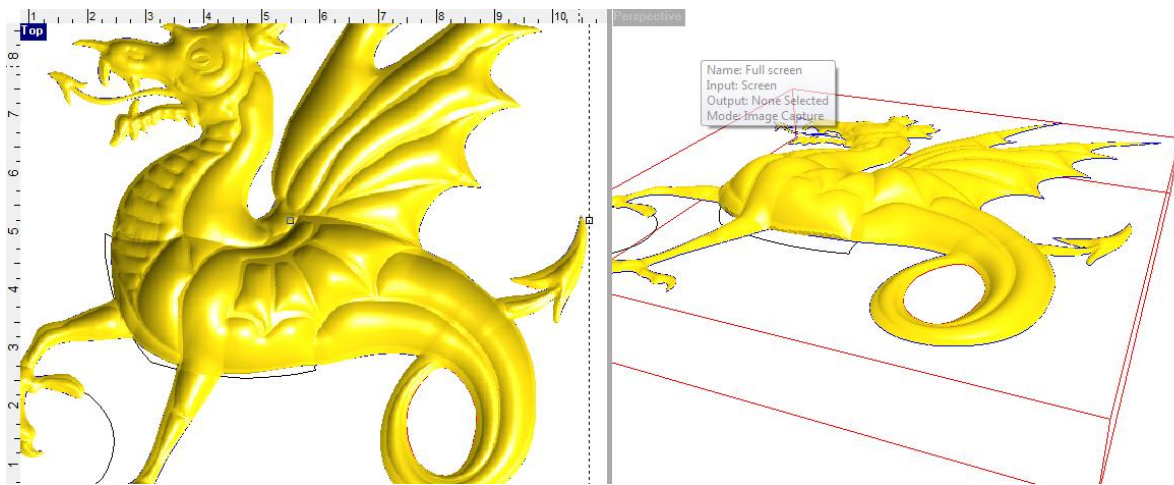
4. Set the parameters for the tail texture as shown below.
5. Once you have entered the parameters, click Apply.

Set the parameters for the texture.

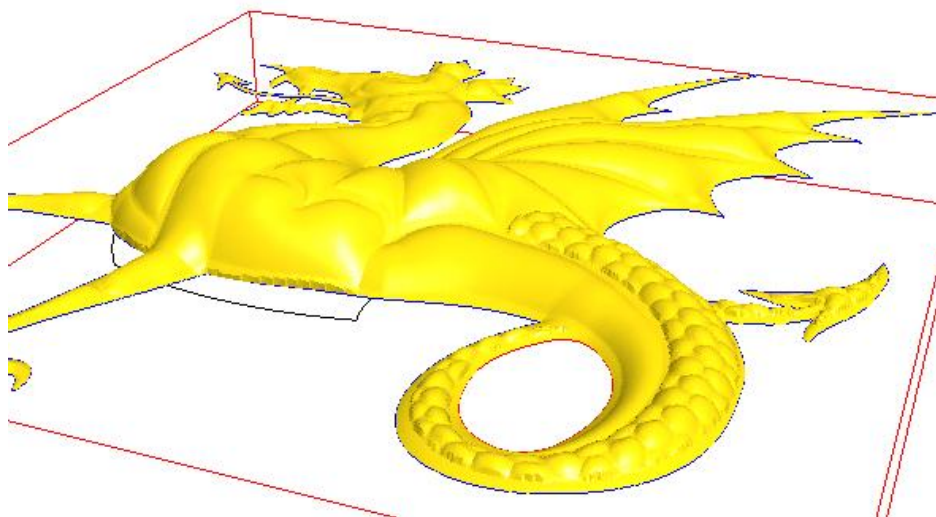
Here are the parameters we used:



Top View before texture



Perspective View after a texture has been added to the tail.

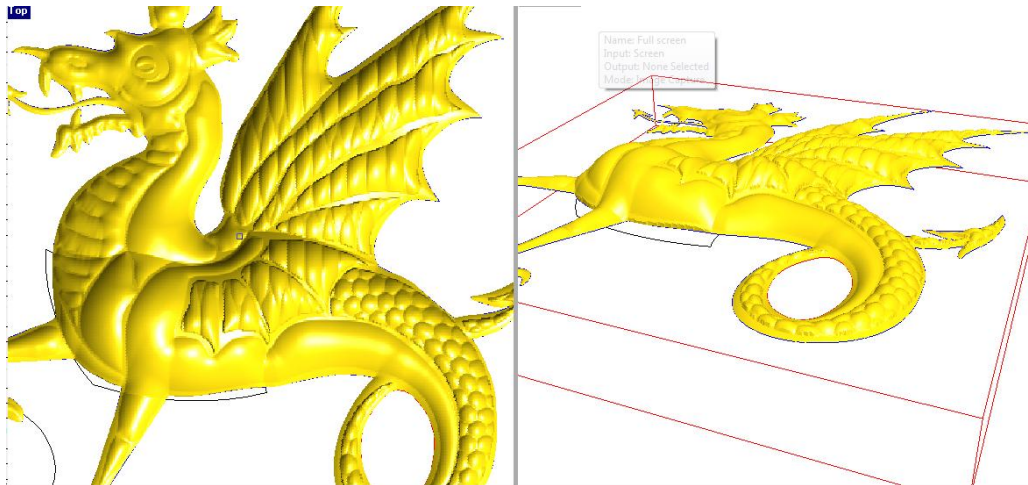
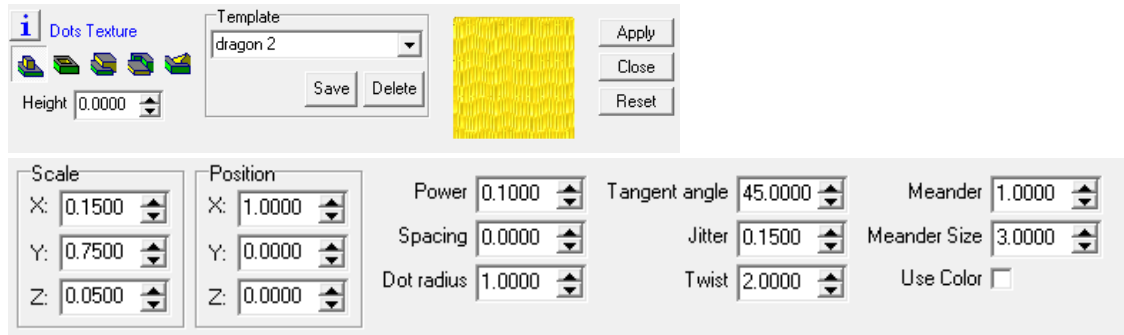


Add texture to the wings

1. Select the relief and the inside wings contours.
2. Click and hold the Texture Icon. Select the Dots Texture.
3. Set the parameters for the wing texture as listed below.
4. Click Apply.

Set Parameters for wings texture.

Here are the parameters we used:



Create the rope

In this example, the rope along the bottom of the design was assembled in this manner.

1. From the original drawing, an outline of the rope was created using the Line tool and the Point Edit tools.
2. The Line tool was used to draw several divisions in the outline to show the effect of the twist.
3. The Jigsaw tool was used to create the separate contours to represent each of the twists.
 - a. Click and hold the Weld Join Icon.

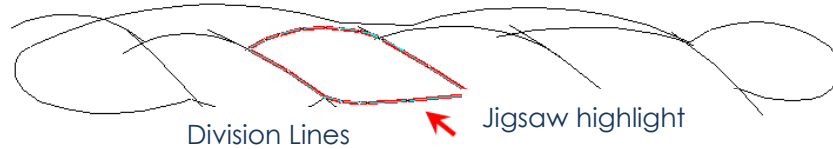
This will open the flyout dialog.



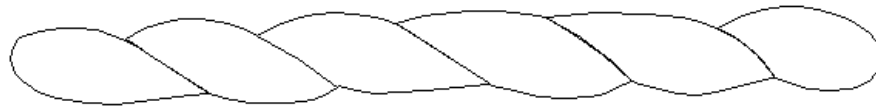
Click the Jigsaw icon.

Click the Jigsaw tool over each section to create the closed contour.

The area is highlighted in red.



b. The division lines were then deleted.

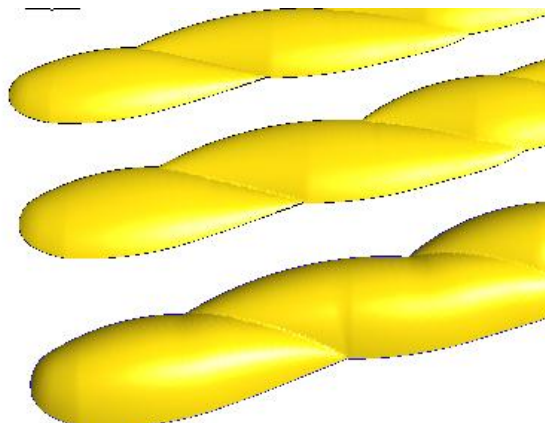


4. The sections of the rope were then stretched to overlap each other. The reason for this is so it looks more realistic when it is merged together.
 - a. Click on one of the contours. Click and drag the handles of the selection box to stretch the contour. Do this for each of the contours.
5. Select the contours for the rope and add a rounded relief.
 - a. Select all of the rope contours.

b. Click on the Add Relief Icon.





c. Enter parameters: Add, Rounded, Normal Angle of 45. Viewing this in the perspective view will help you decide if this angle is the one that you want.



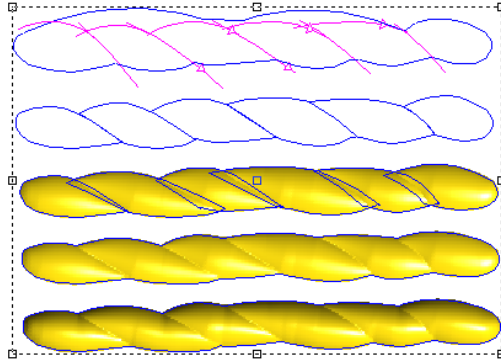
6. Select all of the individual reliefs and combine them together using the Combine Selected Reliefs tool.



a. Select each relief or draw a selection box around all of the reliefs to select them.

- b. Click and hold the Merge reliefs icon  to open the flyout menu.
Click on the Combine Selected Reliefs icon. 

Here is a review of the previous steps along with a few illustrations:

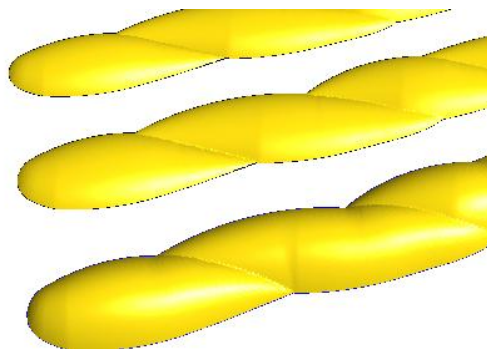


Create dividing lines for the rope sections.

Use Jigsaw tool to Create individual closed contours.

Overlap the contours and add Rounded Relief.

Combine Reliefs using the weld reliefs tool.




Viewing the relief in perspective view, you can determine if you want to make further adjustments to the relief.

You can add more dimensions to the combined relief by using the Add Relief tool. Add Rounded and experiment with the degree of angle.



Adjusting the rope relief to have a flat bottom

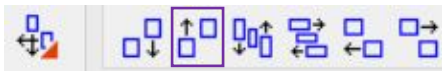
As you can see, the relief for the rope is rounded at the bottom. To create a flat surface, follow the steps below.

1. Select the relief. Create a copy by holding down the Ctrl key while you left click and drag the relief.
2. Delete the relief from the copy you just made. 
3. Create a straight flat bottom on the contour by holding down the shift key


while using the Cut by Line tool. 

- a. Click on the Cut by Line tool.
- b. Click at the first point toward the bottom of the rope.
- c. Hold down the shift key and click the second point at the bottom of the rope. By holding the shift key, the line will be drawn horizontal or vertical from the first point.

4. Add a flat relief to the new contour.
 - a. Click on the contour.
 - b. Click on the Add Relief icon. 
 - c. Select parameters: Add, Flat, Normal and Height = 00.
 - d. Click Apply.
5. Align the reliefs. Use the Align Tool to position the reliefs on top of one another.
 - a. Select both of the reliefs.
 - b. Click and hold the Align Reliefs Icon.  This will open the flyout dialog for the alignment tools.



Select the Align top option.


6. Use the Merge Reliefs tool to merge the rope relief to the flat relief. 
 - a. Click on the Merge Relief Icon. This will open the dialog to merge the reliefs.
 - b. Select the Add parameter.
 - c. Click on the flat relief as the Base relief. Click on the forward arrow.
 - d. Next, click on the rope relief. Click the green arrow to merge the two reliefs.
 - e. Select the original rope relief and move it away from the new relief that you have created.

Review:




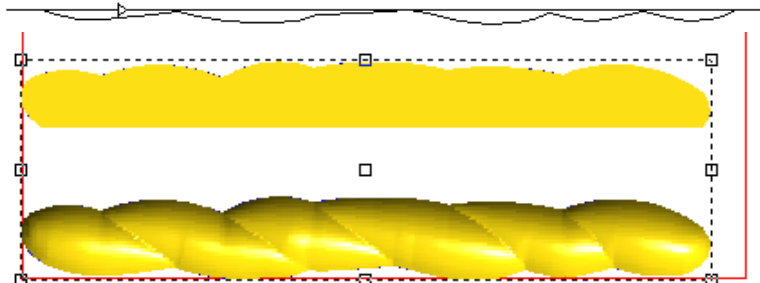
Relief




Create a copy and delete the relief. 

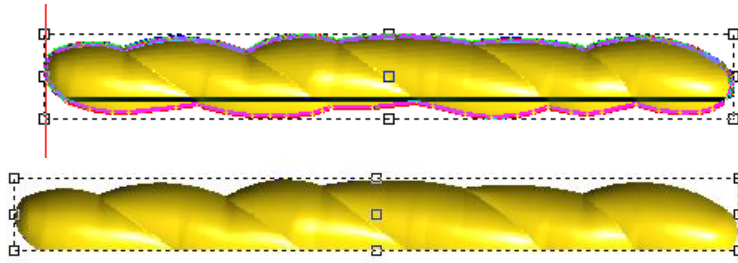


Use Cut by Line tool to create a flat bottom. 



Add a flat relief to the new contour. 

Align the two reliefs. 



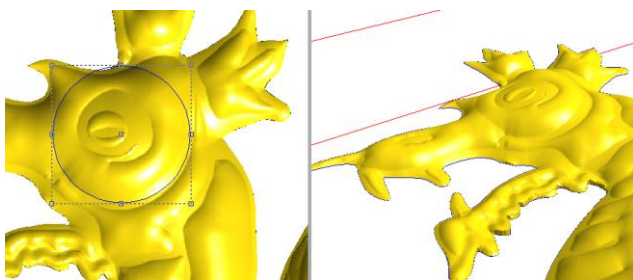
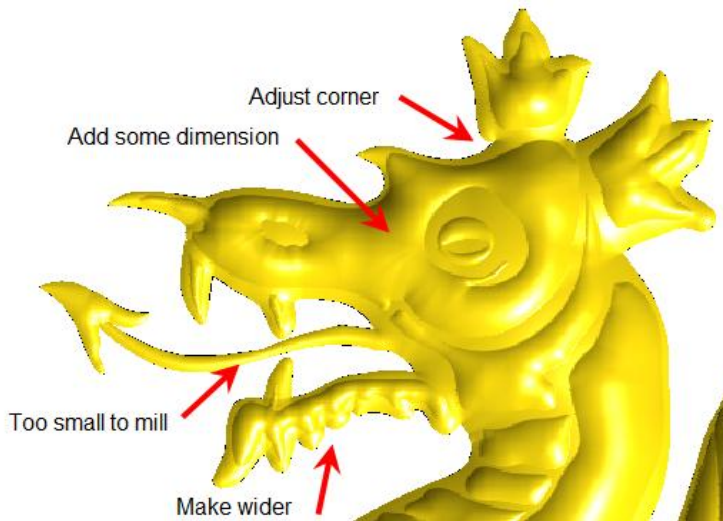
Use the Merge relief tool to merge the two reliefs.



This is the merged relief.

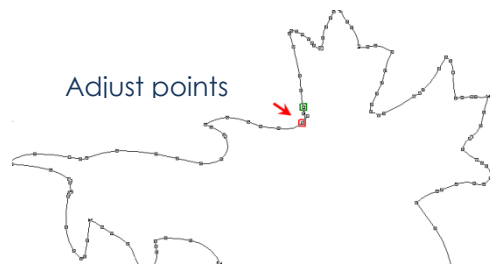
Making Adjustment to the Dragon Relief

After the relief for the dragon was created, we noticed that some of the areas were a bit too small and may not mill well. So the following adjustments to the original relief were made. These are details that we maybe should have noticed when we were editing the contours, but they really didn't jump out at us until the relief had been created.

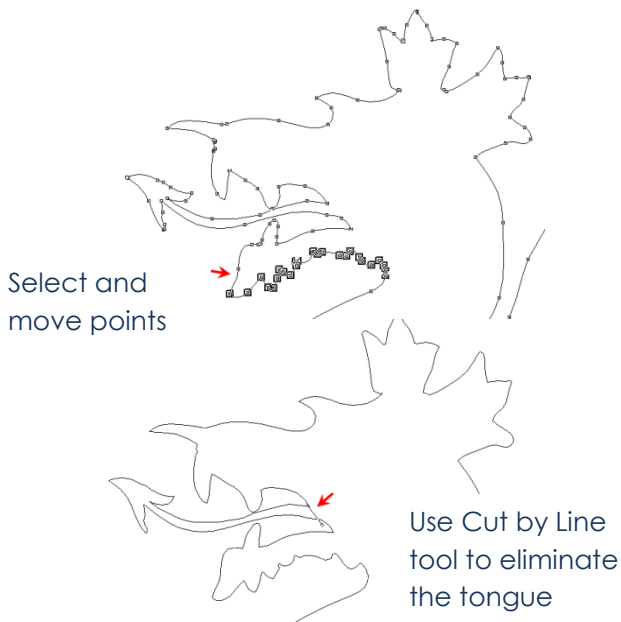


A mask was used to puff up the area around the cheeks and eye.

Create a circle mask around the area you want to adjust. Select the relief and the mask and use the Add Relief tool to add dimension to the area around the eyes and cheek.



Adjust the corner so that it does not indent. To do this, copy and drag the relief to a new location. Delete the relief so that you can make adjustments to the outline contour of the design.



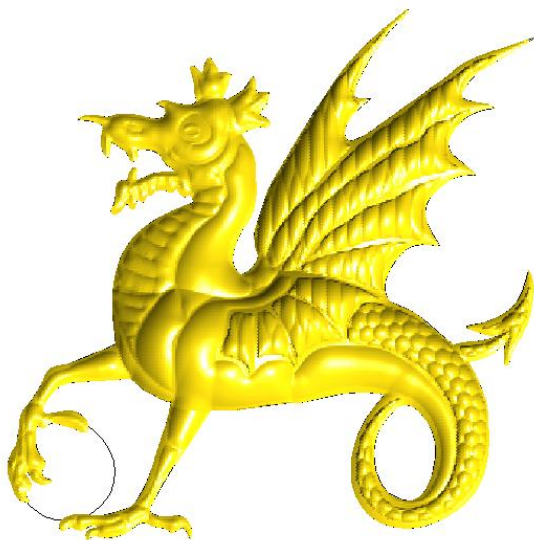
Select the points that make up the bottom of the jaw. Using the Edit Points tool, move them down to allow for a wider jaw line so that it won't be too delicate.

After creating the relief, it was decided that the tongue would most likely be too delicate to mill. So the Cut by line tool is used to remove it from the contour.

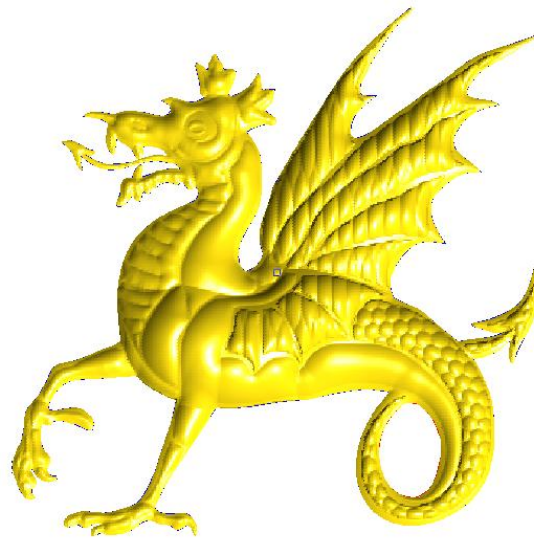
When you have finished making these adjustments, use the same method as we did for the rope to add the original relief to the new contour.

1. Create a flat relief using the contour that you have made the adjustments to.
2. Align the Flat relief with the original relief.
3. Merge the two reliefs using the flat relief as the base relief.
4. Move the original relief to a new location once you have merged it to the flat relief.

New Relief





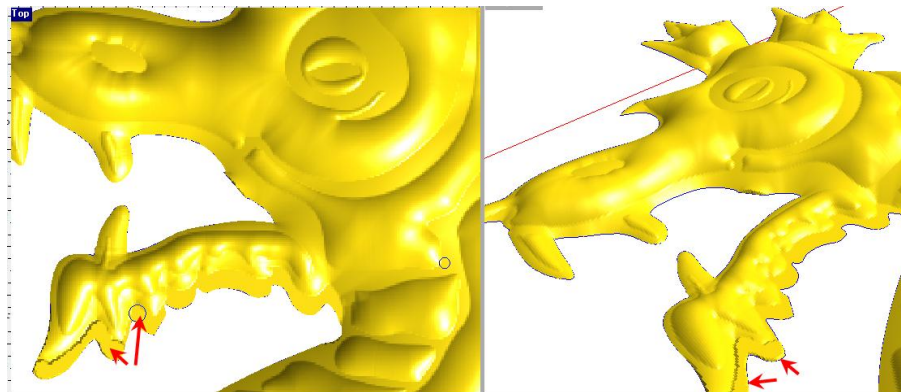
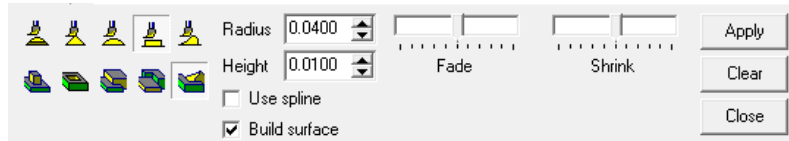
Old Relief




Using the Relief Edit Tools

After the jaw was widened and merged to a flat relief, we need to add dimension to that portion of the relief. Using the relief editing tools we are able to make adjustments to the relief.

1. Select the relief.
2. Click on the Edit Relief Icon.  This will open the Relief Edit Dialog. This tool is wonderful for making adjustments to an existing relief without too much effort.
3. Using the Flat Relief tool  add height to the new flat portion of the relief. Simply move the cursor over the portion of the relief that you wish to add the height to. Adjust the parameters of the tools to fit the area of the relief that you are working on.
You will need to experiment with this tool to find the proper settings for your specific relief.

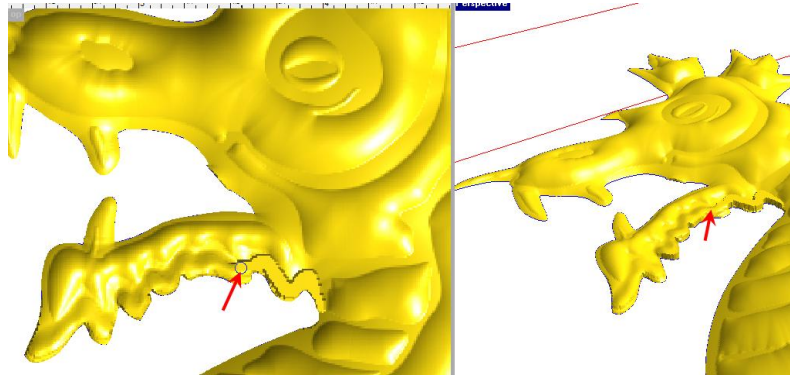


4. After adding to the relief, use the Blending Relief Edit tool  to smooth the new areas added to the existing areas.

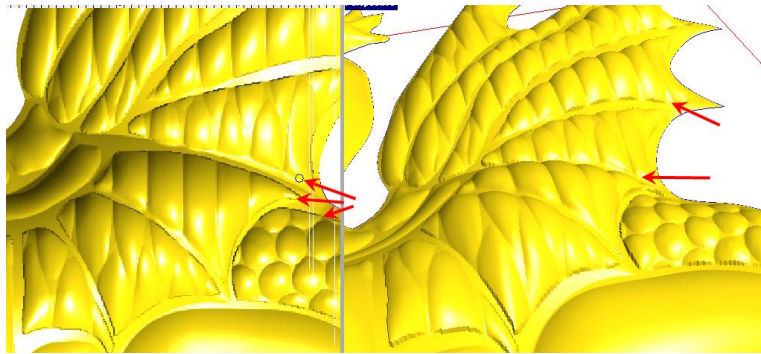


5. Left click on the mouse and move the cursor over the area that you wish to smooth. Activating the perspective view helps you to see your progress as you go. You will need to Ctrl R or move the perspective view for it to update the drawing changes that you are making. Remember that you must have the relief selected in order to make any changes to the relief. Once you are

happy with the changes that you have made, click on Apply to make them permanent.




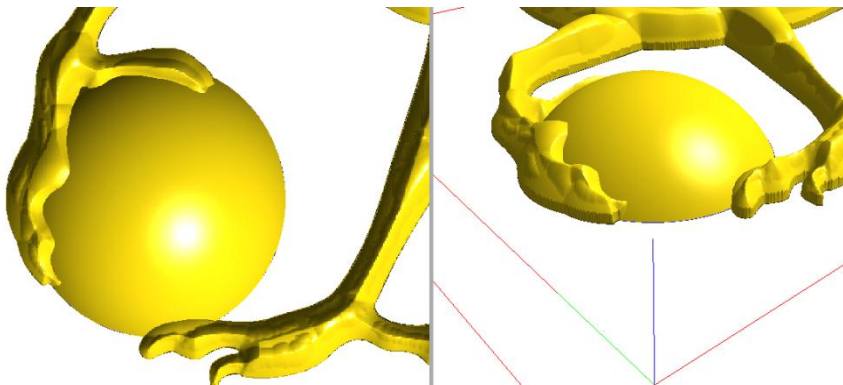
Use the smooth tool along the edges of the wings and tail also.




Add a Relief to the ball

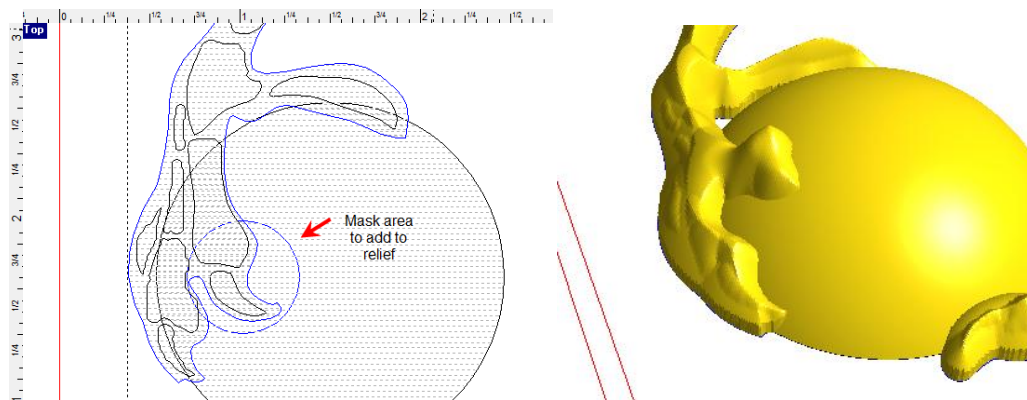
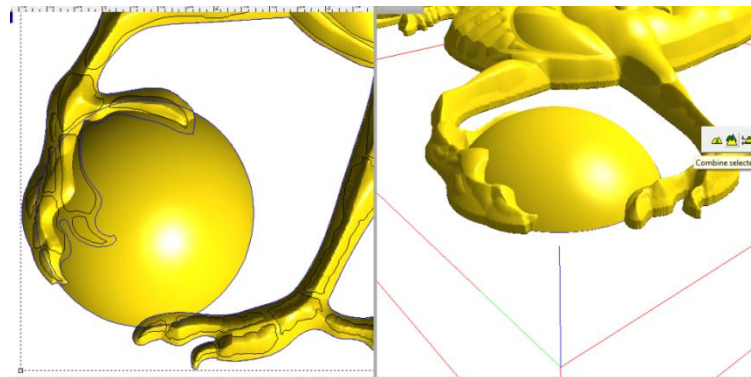
Using the Add Relief tool add a rounded relief to the ball. You can use the parameters and the perspective view to create the relief that you like.

1. Click on the contour.
2. Click the Add Relief Icon. 
3. Select the parameters for the relief. Add, Rounded, Normal the Angle is about 70.
4. Click apply.



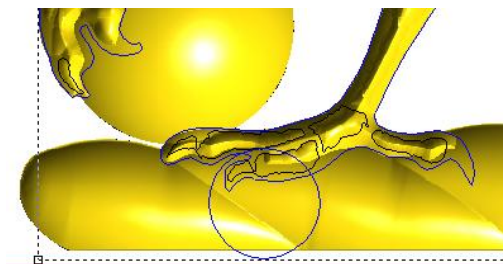
Notice that the ball covers up part of the toe of the dragon. You can adjust the toe by masking an area around the toe and adding to the relief.

1. Create a circle for the area around the toe.
2. Select the relief and the mask contour.
3. Click on the Add Relief Icon. 
4. Select Add, Rounded Normal and start with a small angle of about 20 and work with the angle until you get the desired results.





Make the changes to the toe before you combine the dragon and the ball. This way, the changes will affect only the area of the toe that you have masked.

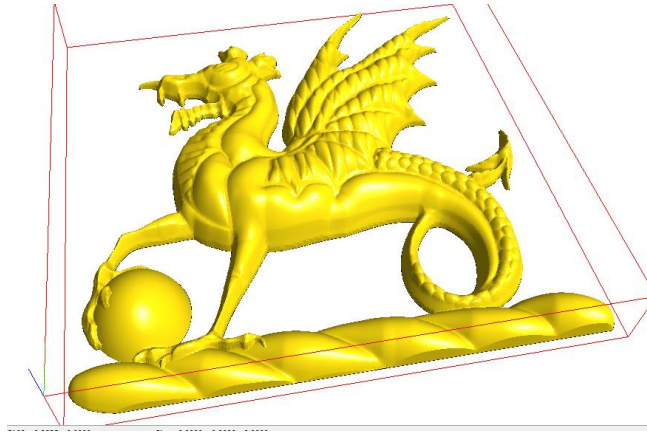
Move the rope into place and use the same methods to adjust the toe near the rope.



Combine all of the reliefs.



Once you have each of the reliefs looking the way that you like them, you can combine the reliefs.

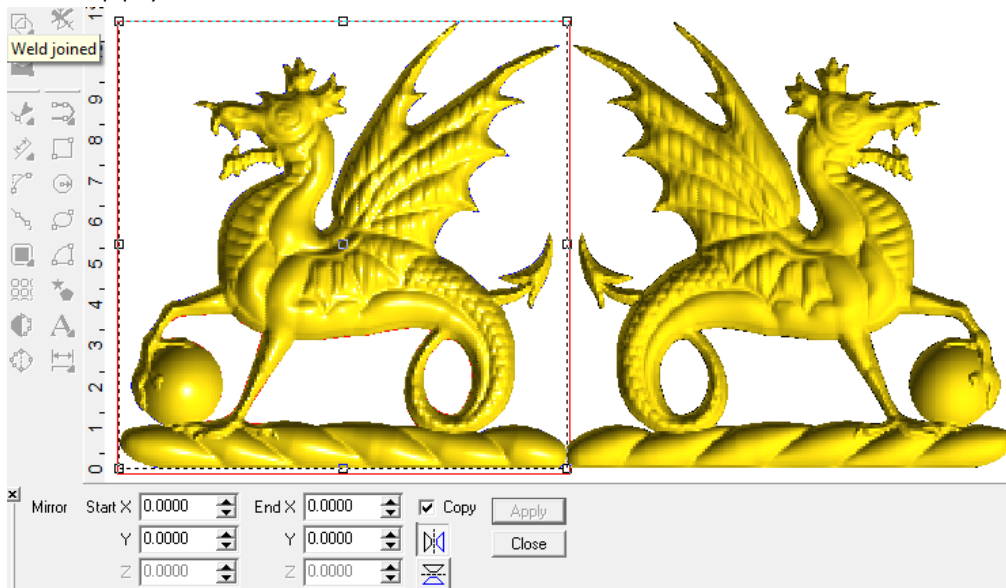
1. Select all of the reliefs
2. Click and Hold the Merge relief icon.  Select the Combine Reliefs tool from the flyout menu.  This will combine all of the reliefs to make one.



Mirror Relief

Once you have finished the dragon, the next step is to mirror the relief so that you can cut the opposite image so it can then be assemble together to create a full 3D object.


1. Select the Relief.
2. Click on the Mirror Icon. 
3. Select: Mirror Horizontal. 
4. Check Copy.
5. Click Apply.

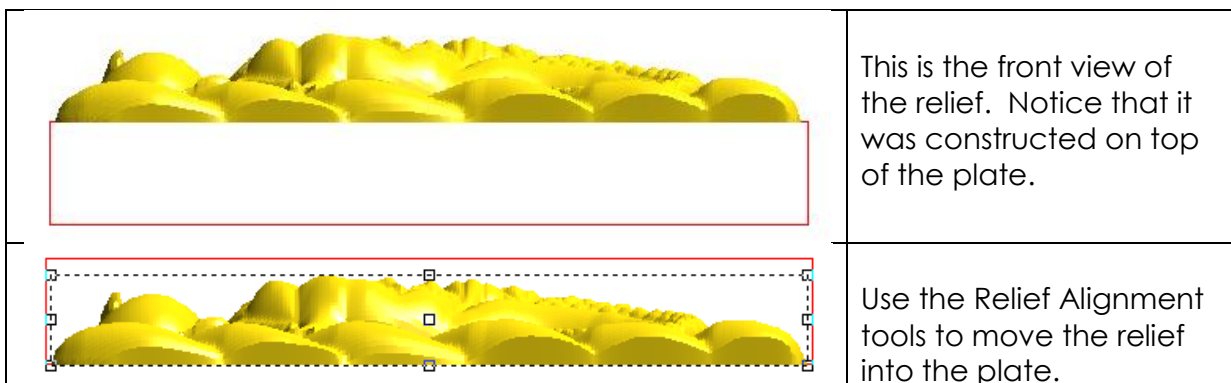


At this point the new relief was moved to another file and the file is named to reflect the image. (Ex: Dragon right or Dragon Left) You may choose to use the layers feature also. Create a new layer and move the image to that layer.

Move the relief into the Plate

Before applying the toolpaths, move the relief into the plate. The images below show the front view of the relief. Notice that it is sitting on top of the plate. Use the Relief Alignment tool to move it into the relief.


1. Select the relief.
2. Click on the Align Reliefs to Bottom of the Plate.  This will move the relief to the bottom of the plate. Click and hold the Align Icon, this will open the flyout toolbar that offers several different one click alignments of the relief.



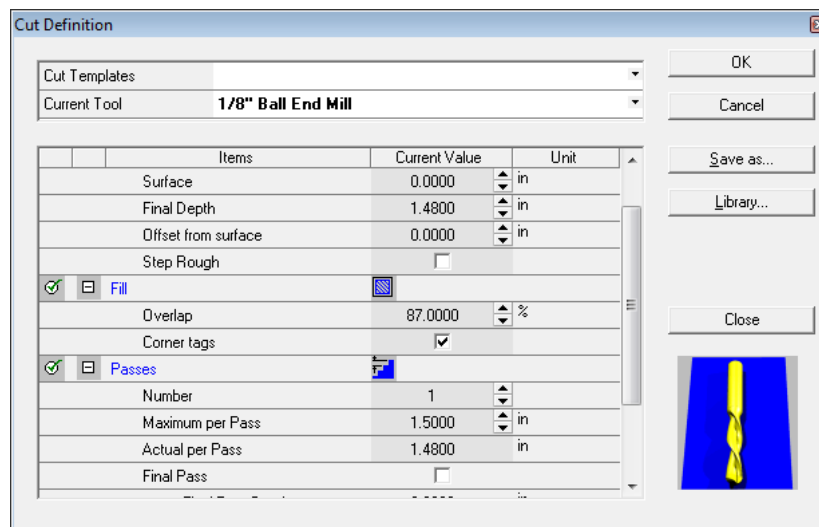
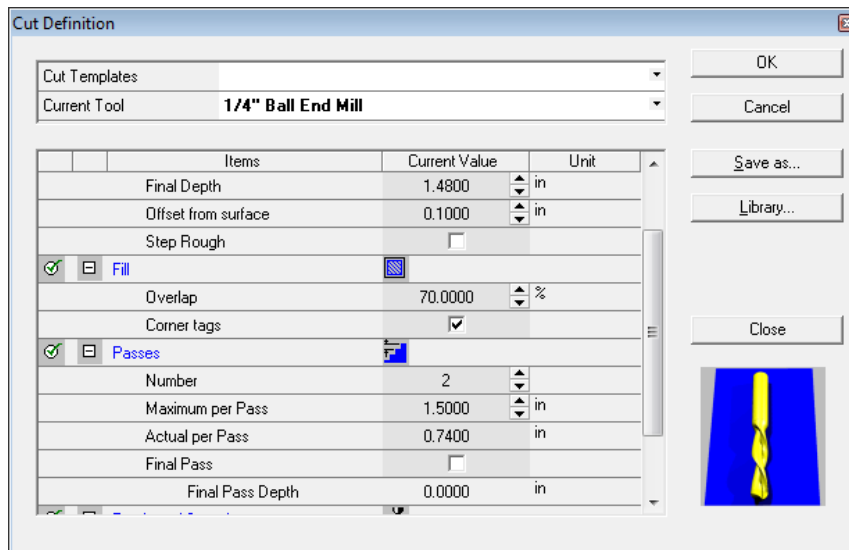
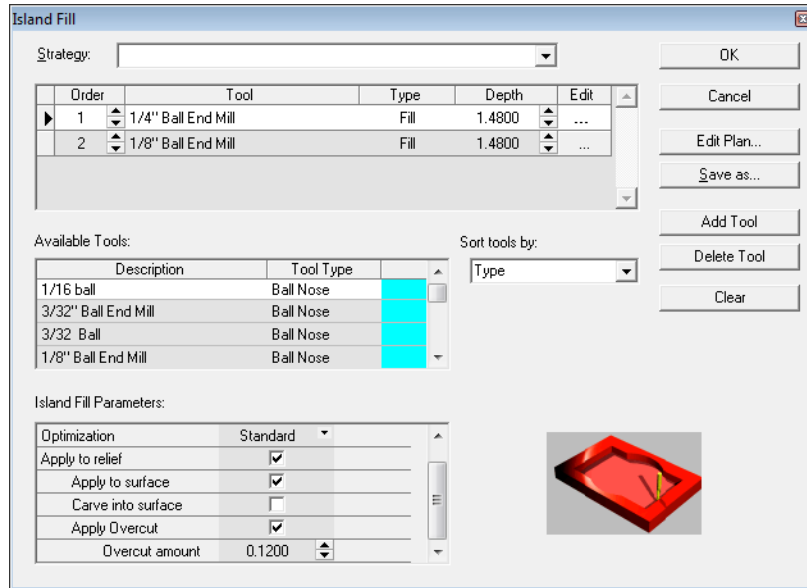
Toolpaths

The next step is to apply the toolpaths so we can cut out the design.

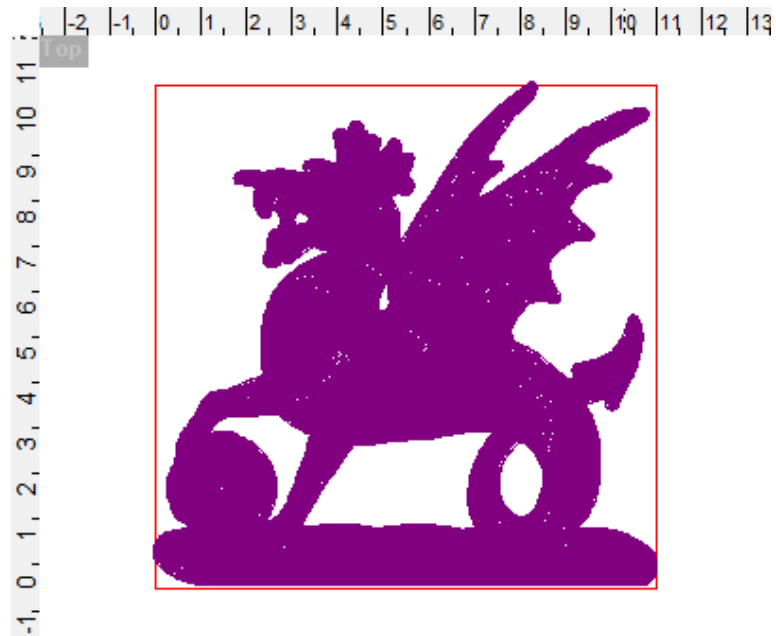
Island Fill Toolpaths were applied in this example.

1. Select the relief.
2. Click the Island Fill Icon. 
3. The 1/4" Ball End Mill was used as a rough tool and a 1/8" Ball End Mill was used for the finish tool.
4. Below are images of the Island Fill Dialog and the Cut parameter dialogs for each of the tools. Because the 1/4- inch tool is just removing material the offset from surface is set .1 and the overlap is set at 70%.
5. The 1/8 - inch tool is set with an overlap of 87%. This will give the piece a nice smooth finish.
6. To cut the piece out, a 1/8- inch End Mill tool was used with the Routing Offset toolpath.

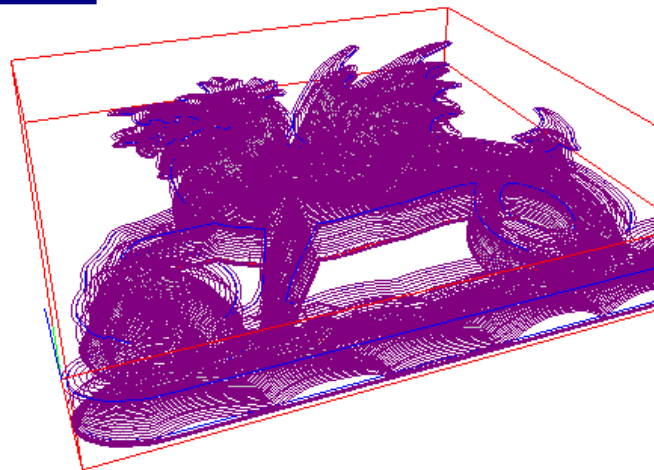
These are the parameters for the surface milling:



The following images are a top view and a perspective view of the toolpaths that have been applied.




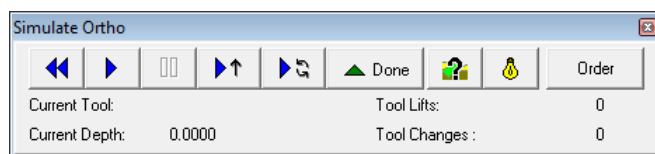
Perspective



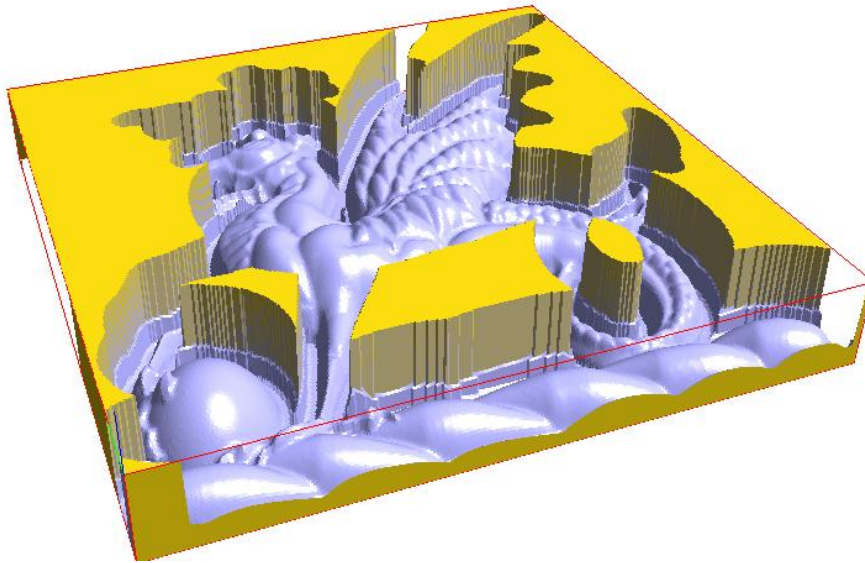
Simulate 3D

Use the Create Render view of toolpaths to get a 3D view of the toolpaths.

1. Click on this icon to preview.  This will open the 3D simulation Dialog.
2. There are several options to choose to view the toolpaths that have been applied. Information about each of these commands is available in the help section under Simulate Ortho. The single arrow will simulate all of the toolpaths.



This is the rendered view of the simulation.



Cutting the mirrored image

This object was built using the mirror image. The two sides, once cut are glued together to create the 3D object.

1. Go to the file that you placed the mirror image in.
2. Apply the toolpaths in the same manner.
3. Cut the object.
4. Glue the two pieces together to create the 3D object.



This is a photo of the dragon after it has been cut and glued together and the primer coat was applied. Several clamps were used to hold the two sides together until the glue was set. The dragon will need some cleanup. Do some sanding along the seams to remove extra glue. A small knife was used to create some contours along the seam lines. Just use your imagination and go for it! Once you have the dragon cleaned up you will prime and paint it.

Sophisticated Finishes were used to paint the project. The Pewter Metallic Surfacer for the base with the black Tinting Solution over the top to add dimension.

