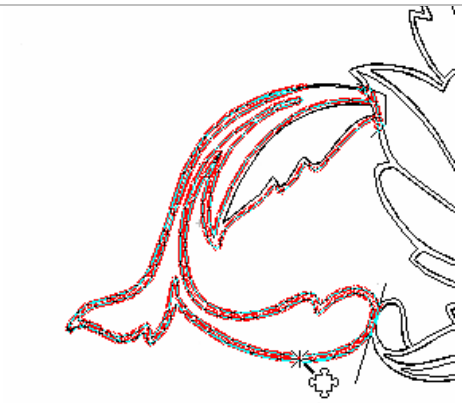
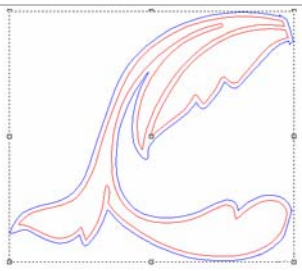
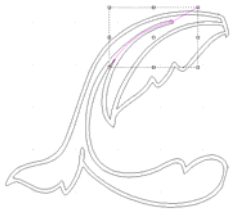
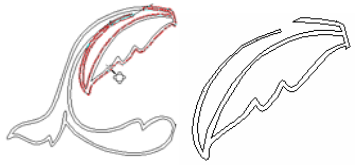
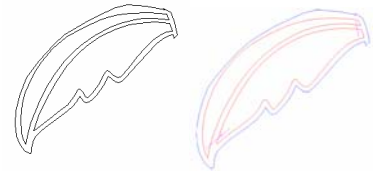
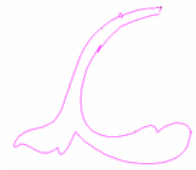
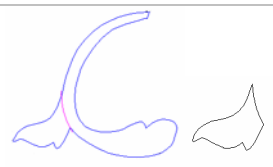
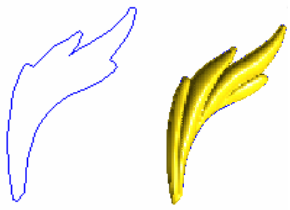
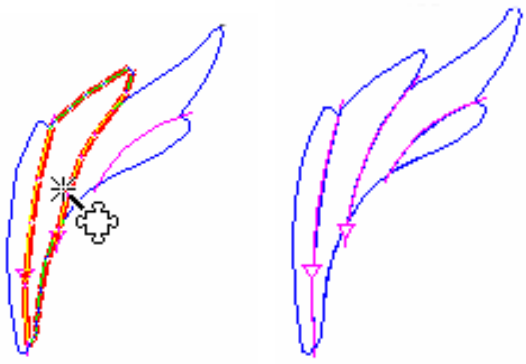
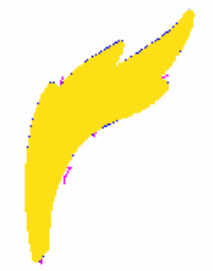
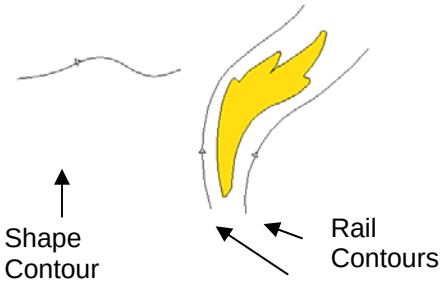
3D Arched Window Insert

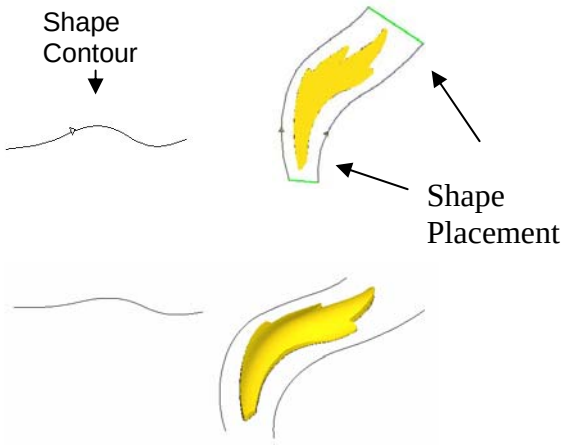
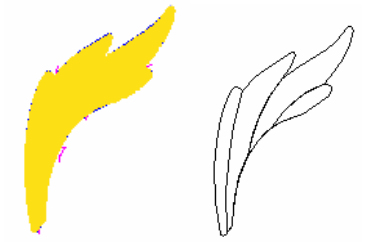
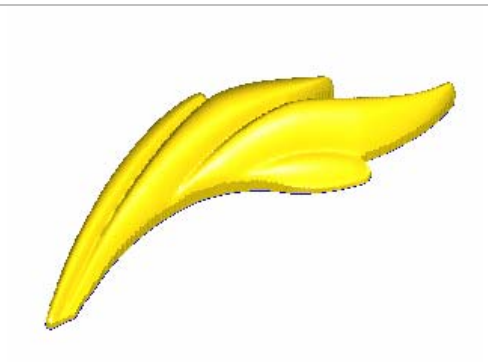
Step by Step Instruction

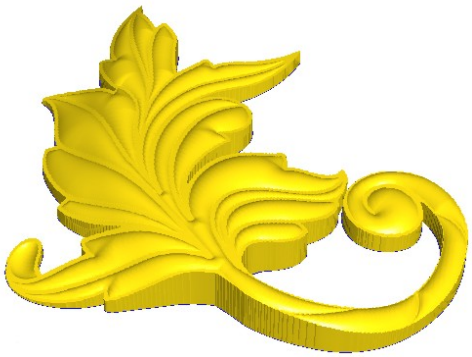
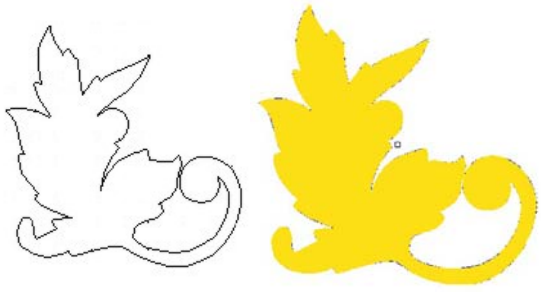
This piece has been created using several EnRoute tools.	
The original artwork is shown here.	
The first step is to break apart the original artwork. This can be easily accomplished using the **Jigsaw** tool and separation lines.	
Determine where you would like to separate the object. Draw a line across the area that you would like to break apart from the rest of the piece. Use the **Jigsaw** tool to extract the contours to form a new object.	
This is the object that was separated from the main piece. Separate this object further into 3 pieces.	

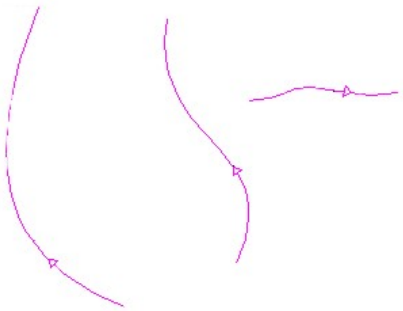
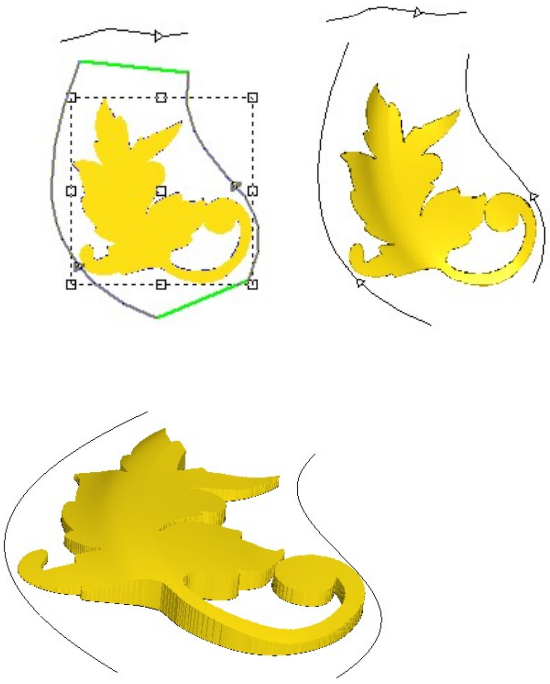
Draw a line and use the **Edit Points** tool to adjust the line so that it gives the finished shape of the leaf.	
Use the **Jigsaw** tool to extract a separate leaf.	
Use the **Edit Points** tool to cut the contours at the break. Join the outside contours to create leaf.	
Draw separation lines to create the inside vein of the leaf.	
Use the **Jigsaw** tool to extract the vein of the leaf.	
Delete the inline and close the contour with either the **Edit Points** or the **Join** tool.	
Once again, draw a line and edit it to follow the curve of the leaf. Use the **Jigsaw** tool to separate the smaller leaf.	

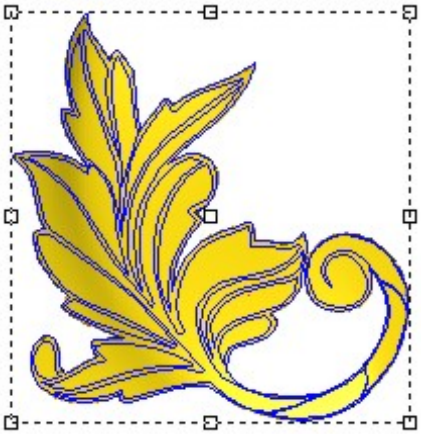
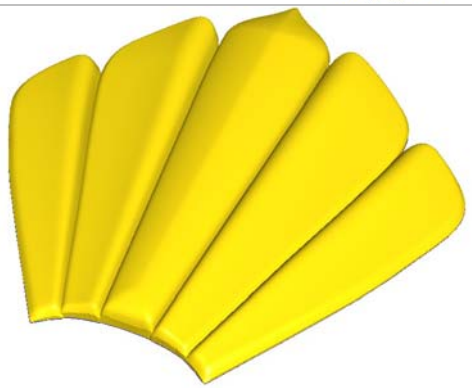
Continue with these procedures until you have the original separated into individual components of the design.	
Since the design is symmetrical, several of the components can be mirrored to complete the design.	
The next step is to create a relief for each object of the design. This is a demonstration to show how you can take the line drawing on the left to the 3D relief on the right. The resolution used to create this design is 100.	
Using the **Line** tool, place lines across the leaf to establish the contours of the leaf. Make sure that the lines overlap the contour of the leaf.	
Use the **Jigsaw** tool to extract the portions of the leaf to create additional contours within the leaf.	

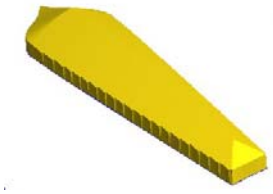
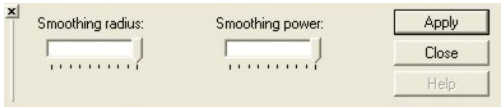
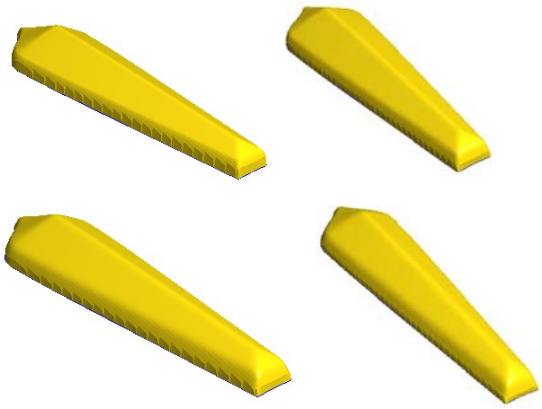
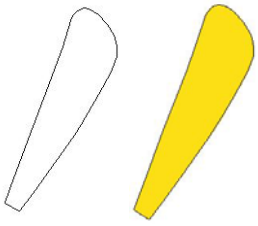
Select the outline contour of the leaf. Click on **Create Relief** icon. Enter: Add, Flat relief, Normal, Height = 0, Base = 0, Resolution = 100 Click **Apply**. This will create a flat relief.	 
Using the **Line** tool, create an open contour that will represent the profile of the leaf, and the rails. Usually, the rail contours will follow the shape of the object.	
Select the relief. Click the **Sweep Two Rails** icon.	
Enter : Add, Normal, Height = 0 Base = 0 The wizard will prompt to select the first rail. Click on the **left rail** contour. Click the **Next Step** icon in the wizard. The wizard will prompt to select the second rail. Click on the **right rail** contour. Click the **Next Step** icon.	 

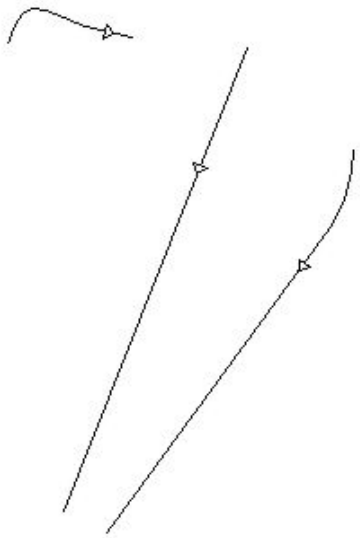
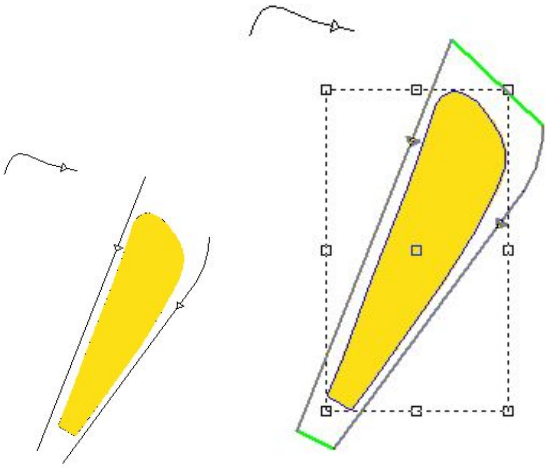
The wizard will prompt to select the shape contour. Click on the **shape contour**. Each time, EnRoute will draw a green line to show where the contour was placed on the rails. Click twice to place the contours at each end of the rails. This has created a relief similar to the one shown.	
To give this relief a little more dimension, the individual sections that we divided out earlier will now be added on to this relief.	
Select the relief. Select the individual contours. Click on the **Create Relief** icon.  Enter: Add. Rounded, Normal, Angle 65. Click **Apply**. By adding the individual contours to the existing relief, it gives the leaf more curves. Use the **Smooth Relief** tool  to "sand" the relief.	

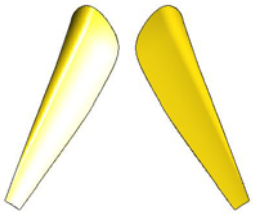
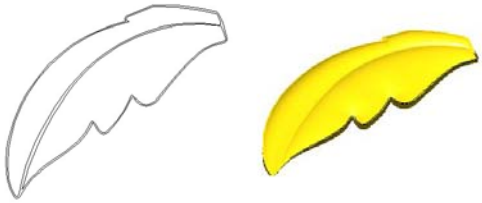
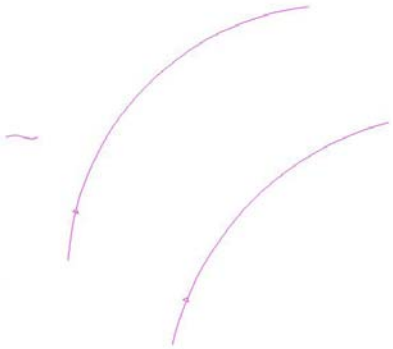
The next object we will work with is the large leaf.	
The Leaf may have looked like the first image when it was first separated from the artwork. Using the Edit Points functions adjustments can be made to inside contours. Refer to Editing Points in the manual for further information on how to do this.	
These are the contours that were used in developing the relief for this leaf.	
Start by adding a flat relief to the contour. Select the **contour** of the leaf. Click on the **Create Relief** icon. Enter: Add, Flat, Normal, Height 0. Click **Apply**.	

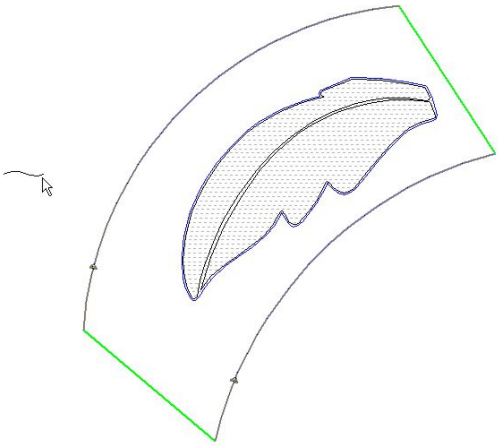
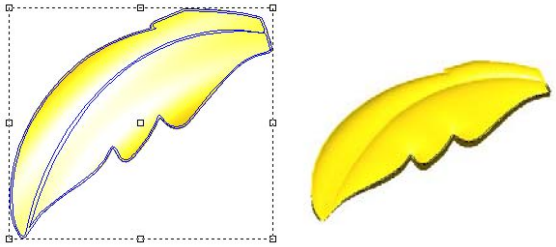
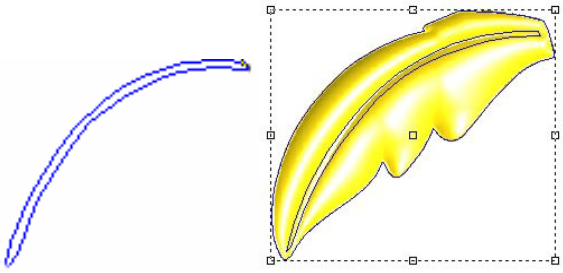
Next, we will be adding a shape to the flat leaf. Use the Sweep Two Rails tool. Create an open contour that will represent the shape of the leaf. Next create the rails for the contour of the shape to follow. Use the Line Tools and the Point Edit tools to create these open contours. When drawing the rails for the contour to follow, keep the rails similar to shape of the leaf.	
Select the flat relief. Click the Sweep Two Rails icon. Enter: Add, Normal. The wizard will prompt you to select the first rail. Click on the **left rail**. Click on the **next** button. The wizard will prompt for the next rail. Click on the **right rail**. Click **next**. The wizard will prompt for the shape of the contour. Click on the **contour** for the shape. In this example, the same shape is used at the beginning and end of the rails. EnRoute will draw a green line between the rails for each section you pick. Often it is easier to see the results in the perspective view.	

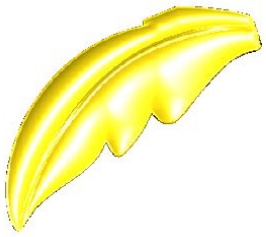
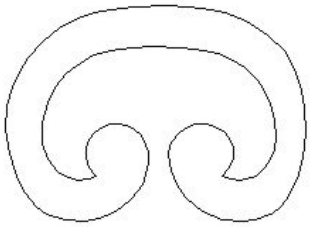
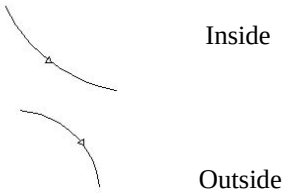
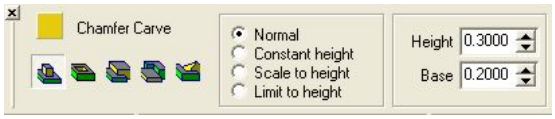
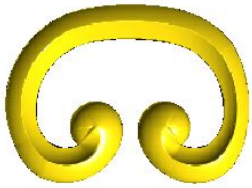
In the next step, more curves are added to the leaf using the contours that make up the interior of the leaf. Select the relief, select the interior contours. Click on the **Create Relief** icon. Enter: Add, Normal, Rounded, Angle 45. Click **Apply**. This is a step that you can try different angles for all or for just some of the contours. Experiment with your options here to achieve the look that you like. In one portion of the relief, the subtract function was used to achieve the look of the leaf bending under.	
Use the **Smooth Relief** tool to "sand" the relief. This takes off some of the sharp looking edges and provides for a smoother relief. Experiment with the options of this tool, the radius and smoothing power.	
This is an image of the next section that we will work on.	

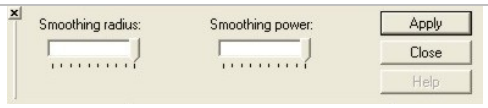
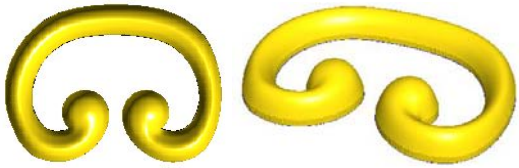
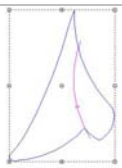
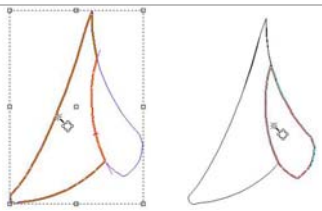
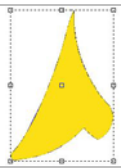
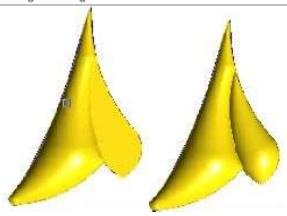
Start with the contour drawing of the center piece. Select the contour. Click the **Create Relief** icon. Enter: Add, Beveled, Base .3, Angle 30. Click **Apply**.	
The next step in creating this object is to apply the Smooth Relief tool. Select the relief. Click on the **Smooth Relief** tool.  Move the Smoothing radius and the Smoothing power to the **highest power.** Click **Apply**.	 
In this example, this process has been repeated 4 times. You can see from the following images the effect that the Smoothing tool has.	
The next step is to create the reliefs for the remaining 4 objects of the center section. Select the contour. Click on **Create Relief**  to add a flat relief to the object. Enter: Add, Flat, Normal. Click **Apply**.	

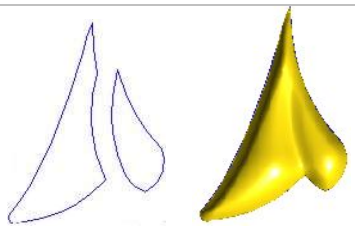
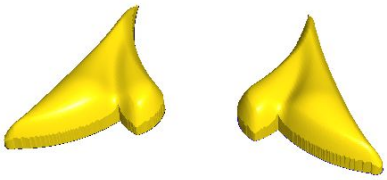
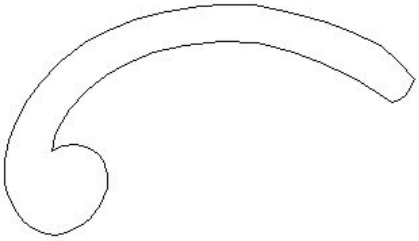
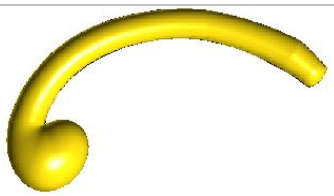
The Sweep Two Rails tool was used to create this shape on the reliefs for the side center pieces. Use the **Line** tools  to create the open contours for the rails and the contour used for the shape of the objects. Use the **Edit Points**  tool to adjust the shapes of the lines to get the desired shapes. The rails closely follow the shape of the object.	
Select the relief. Click the **Sweep Two Rails** icon.  Click on the **left rail**. Click **Next**.  Click on the r**ight rail**. Click **Next**.  Click on the **open contour** for the shape of the design **twice**. This will show as the green line at each end of the rails. Click **Apply**. In this example, we have only used one shape to go the entire length of the rails, in designing other objects, it is also possible to use more than one shape and to add the shapes more that twice along the length of the rails.	
This is an image of the results of these steps. Each of the remaining 3 objects can be created using the same steps.	

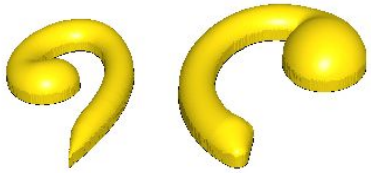
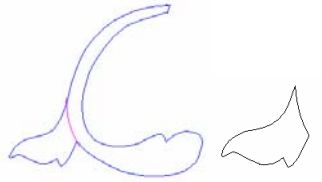
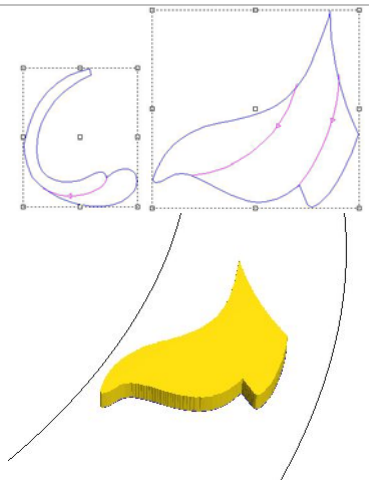
Since the objects are mirror images, the mirror tool can be used. Make a copy of the object to mirror. (Click on the object and drag while holding the shift key.) Select the copy. Select the **Transform Menu**. Click on **Mirror Horizontal**. This will create the mirror image of the object as shown.	
To recap: Create the center relief. Create the two side pieces. Copy the side pieces. Select the copies and mirror them.	
This is the image of the next leave that will be developed.	
The tool used to create this relief was the Sweep Two Rails tool. Use the **Line** tool to create the leaf shape and the shape of the rails. Use the **Point Edit** tool to refine the lines to get the shapes as shown.	

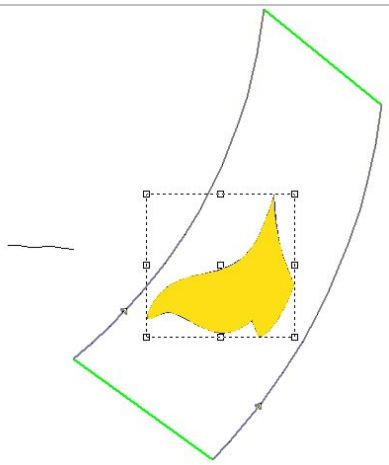
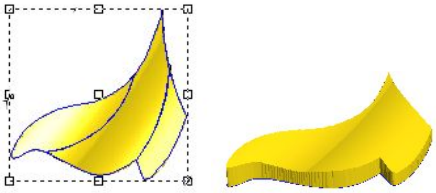
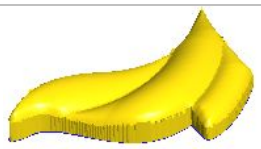
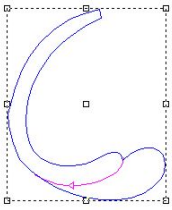
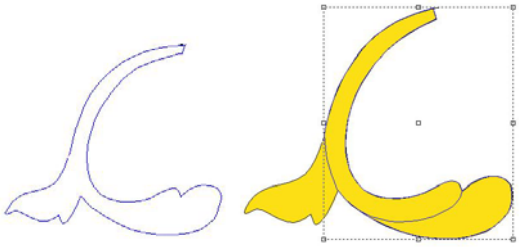
Create a flat relief for the outline of the leaf. Click on the **Create Relief** tool. Enter: Add, Flat Relief, Normal. Select the relief. Click the **Sweep Two Rails** icon. Click on the **left rail**. Click **Next**. Click on the **right rail**. Click **Next**. Click on the contour for the shape of the leaf **twice**. This will place the green line at each end of the rails. Click **Apply**.	
The next step adds a bit of dimension to the formed leaf. Select the relief and the two inside objects of the leaf. Click the **Create Relief** icon. Enter: Add, Rounded, Normal, Angle 30 Click **Apply**. The second image shows the results.	
The next step is to locate the “stem” object that we created when we first separated the leaf from the original artwork. Place the stem contour on the relief and adjust as necessary to follow the leaf contours. Select the relief and the stem contour. Click on the **Create Relief** icon. Enter: Add, Rounded, Normal, Angle 30. Click **Apply**.	

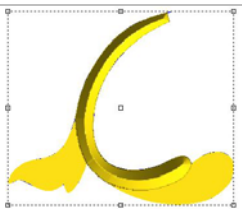
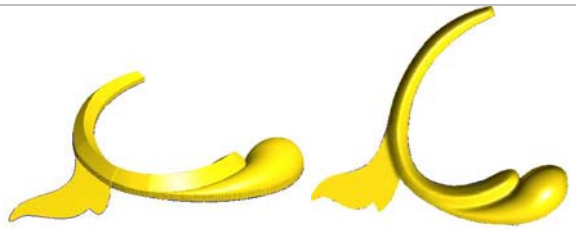
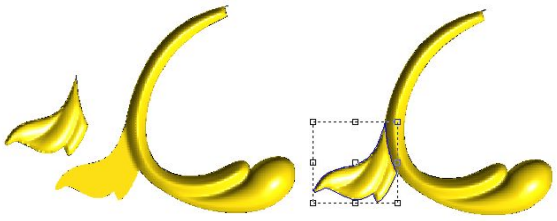
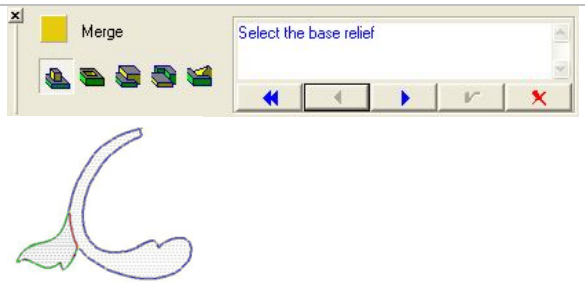
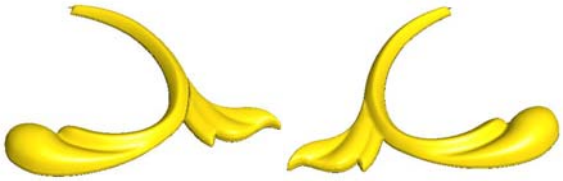
This image shows the end results.	
To create the swirl at the center of the artwork, the **Chamfer Carve Tool** will be used.	
Use the **Line Tool** to draw the open contours that will be used to shape the inside and the outside of the object. Use the **Point Edit** tool to adjust the lines to the shapes desired.	
Select the relief. Click and hold the **Chamfer** icon. This will activate the flyout menu. From this menu select the **Chamfer Carve** tool. Enter: Add, Normal, Height .3, Base .2. Click on the **open contour** used to create the shape of the outside of the object. Click **Next**. Click on the **open contour** used to create the shape of the inside contour of the object. Click **Apply**.	
The results are shown here. Select the relief. Click the Smooth Relief icon. Move the parameters to the highest settings.	

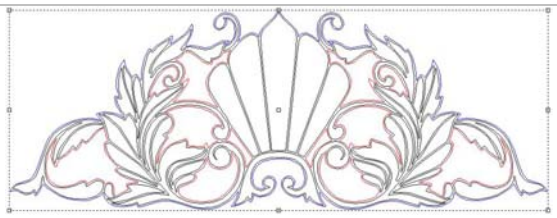
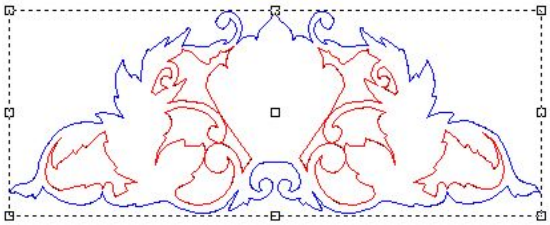
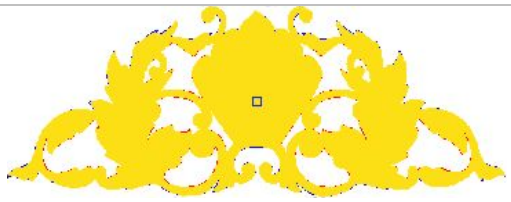
Click **Apply**. Do this twice.	
Shown are the front view and the perspective view of the finished object.	
The leaf part of the swirl is the next section of the demonstration.	
Use the **Line** tools  to create an open contour that will separate the leaf into sections. Use the **Point Edit**  tool to adjust the line to the desired shape.	
Use the Jigsaw tool to extract the inside shapes. Click on the **Jigsaw** icon.  Move the tool to the area you wish to extract and **click**. The area will be drawn in red. Repeat for the second section.	
Select the original contour.	
Select one of the interior contours. Enter: Add, Rounded, Limit Height .2. Click **Apply**. Repeat these steps for the second contour within the leaf.	

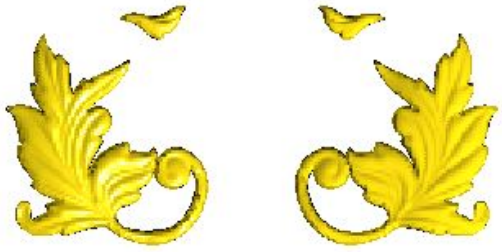
Use the Smooth Relief tool to blend the two sides of the leaf to a more consistent look. Click on only the relief. (It may be easier to move the interior contours at this point). Click on the **Smooth Relief** tool. Change the parameters to high settings. Click **Apply**.	
Use the Mirror Horizontal Tool to create a mirror image of the object you just created. **Copy** the object. Select the copied object. Click on the **Transform Menu**. Click on **Mirror Horizontal**.	
This next section demonstrates the procedure for the remaining “swirls” included in the artwork. This object is the largest of the last 3 swirls to create reliefs for. Because of its position in the artwork, the height is taller than the last two.	
Select the contour. Click the **Create Relief** icon. Enter: Add, Rounded, Normal, Base .2, Angle 85. Click **Apply**.	
Use the Smooth Relief tool to get the rounded look of this relief. Click on the **relief**. Click on the **Smooth Relief Tool**. Change the parameters to the highest settings.	

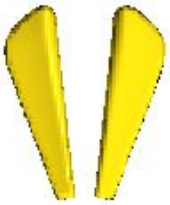
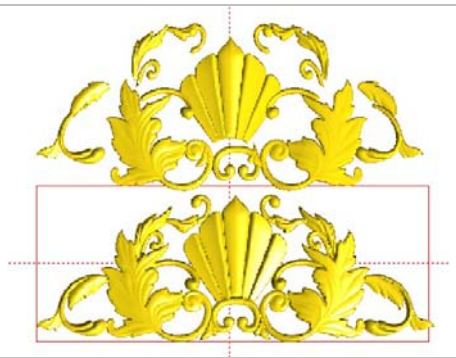
Click **Apply**. Repeat this for a total of 6 applications of the Smooth Tool.	
The remaining two contours used the same parameters to create. Click on the **contours**. Click **Apply Relief** icon. Enter: Add, Rounded, Normal, Base.1, Angle 75. Click **Apply**.	
Select the **reliefs**. Click on the **Smooth Relief** icon. Use middle settings. Click **Apply**.	
As you can see, the same types of procedures have been used to develop the individual components of the artwork.	
Separate the contours to create the “inside contours” of the objects. Use the Line Tools to draw a separation line. Edit this line with the Edit Points Tool to achieve the same desired. Use the Jigsaw Well Tool to extract the “inside contours”. Select the outline of the leaf. Click the **Add Relief** icon. Enter: Add, Flat, Normal Height .2. Click **Apply**.	

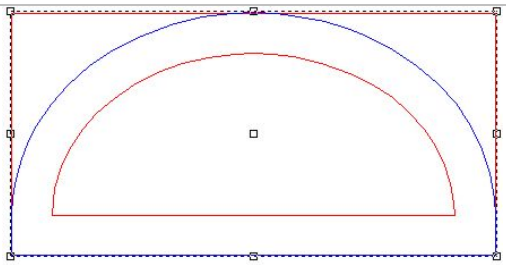
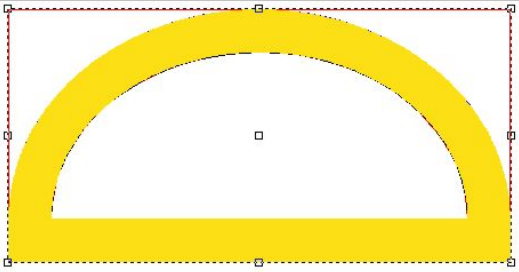
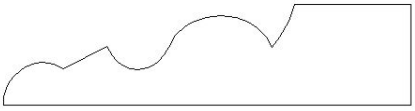
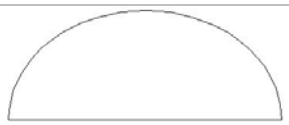
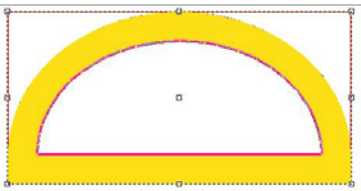
Use the Sweep Two Rails Tool to give the leaf a bit of a curve. First draw the open contour used to form the shape with the Line Tool and edit using the Edit Points Tool. Select the **relief**. Click the Sweep Two Rails icon. Click on the **left rail**. Click on **Next**, Click on the **right rail**. Click **Next**. Click on the **contour shape** twice. Click **Apply**.	
Add the “interior shapes” to the leaf. Select the **relief**. Click on the **Create Relief** icon. Enter: Add, Rounded, Normal, Angle 45. Click **Apply**.	
After applying the “inside contours” to the leaf, use the Smooth Relief Tool to blend the look of the relief. Click on the **relief**. Click on the Smooth Relief icon. Move settings to **medium power**. Click **Apply**.	
Use the Line tools and the Jigsaw Weld tools to extract the interior contours of the rest of the leaf.	
Create a flat relief to build on. Select the contour. Click on the **Create Relief** icon. Enter: Add, Flat, Normal, Height 0. Click **Apply**. Select the **flat relief**.	

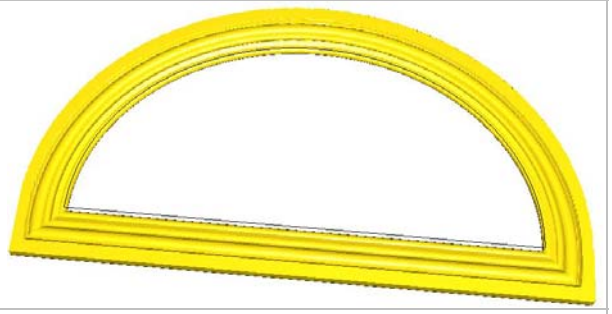
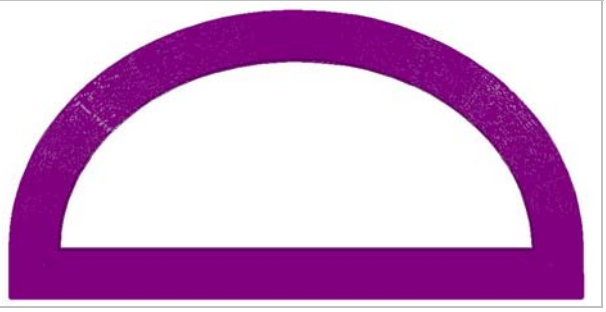
Enter: Add, Bevel, Normal Angle 45, Height .3. Click **Apply**.	
Select the **relief**. Enter: Replace, Rounded, Height .3, Angle 80. Click **Apply**. Use the Smooth Relief Tool to blend the two sections.	
At this point we will merge the two reliefs. Position the small leaf onto the base relief.	
Select the **Merge Relief** icon. Click on the **base relief**. Click **Next**. Click on the **contour** of the leaf to add to the base. Click **Apply**. Use the Smooth Relief Tool to blend the look of the relief.	
Mirror this relief for the other side of the artwork. Copy the relief. (Click and drag while holding the shift key). Select the **relief** to mirror. Select the **Transform menu**. Click the **Mirror Horizontal** icon.	

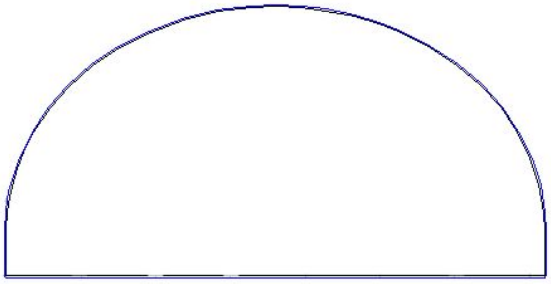
Now that we have all of the “pieces” developed, it is time to assemble. To do this, you must first create a background relief to build on. From the original artwork, extract the outline only. **Ungroup** the artwork. Select all **objects** needed to create the outline. Press and hold the Ctrl key and move the copy of the objects.	
This will become the base to assemble the relief on. Once this has been extracted, group the objects together again.	
Select and create a flat relief.	
Assemble the objects on top of the flat relief. Pay close attention to the placement of each object. Use the arrow keys to move the objects small amounts. (This increment is set in the preferences menu.) Now is the time to look at your “assembled” relief to make sure that you like the way that the objects look together. You can still make adjustments to each individual relief if you feel that any of the objects do not work within the design.	

The individual reliefs will be added in a precise order. This is necessary because when assembling, you may find that some of the objects overlap. The order in which they are merged to the base relief will affect the outcome of the design.	
The next several images show the order in which the individual reliefs where added to the base relief. Using the Merge Relief tool add each of the objects shown in the order of the steps listed. Click on the Merge relief icon. Enter the Add option. (The following steps will require the use of the replace option). Select the **base relief**. Click **Next.** Select the **reliefs** as shown. (Hold the shift key to add more than one relief at a time). Click **Apply**.	Step 1 
Merge the remaining reliefs to the base relief using the replace option.	Step 2 
	Step 3 

	Step 4 
	Step 5 
	Step 6 
	Step 7 
Once the objects have been merged, the original individual object must be move away from the final object before the toolpaths are applied.	
This image represents the finished relief for the artwork.	

The next step shows how the frame of the design was created. The Extrude tool was used to create this.	
The Arc Tool was used to make the arch part of the design. It was then connected to a line to form the closed contour. The Offset Tool was then used to inline the design. The parameters are: Inline, square. 3.00 inches.	
Select the object. Click on the **Create Relief** icon. Enter: Add, Flat, Height 00, Normal. Click **Apply**.	
The next step is to create the contour that will be used for the extrusion. This is the side view of the contour. Use the drawing tools to create a shape similar to this. The contour is the height of the material and width of the object. In this case the height = .75 and the width = 3.00 inches.	
To use the Extrude Tool, there must be a contour which is the path for the shape contour to follow. This is a copy of the inside contour of the arch that we are working on.	
Select the **flat relief**. Click on the **Extrude** icon. The wizard will open. Enter: Add, Normal, Height .75, Base 0, Scale 0, Rotations 0.	

Miter is checked. The position of the shape contour to follow on the path. Select the **outside, bottom left corner**. Click **Apply**.	
This is am image of the results.	
Now, the next step is to apply the toolpaths. The different parts of the finished design have been placed on separate layers. This makes it much easier when assigning toolpaths. The following images show the separate layers with the toolpaths assigned.	
This layer is the design relief that has been created with the steps outlined above. The Island Fill toolpath strategy was used.	
This layer is the background layer. It was created using the outline contour of the base design and the inside contour for the arch design. The toolpaths here were created using an Island Fill.	
This is the extruded arch design with the toolpaths applied.	

This is the outline of the arch. It is used for the toolpaths to cut out the design from the material. The Routing Offset strategy has been applied here.	
This image shows all of the layers turned on so that you may see how they will look together.	
This is a rendered view of the toolpaths for this project.