ArtCAM Pro

Jewellery Edition

By Delcam plc

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Overview

ArtCAM Pro Jewellery Edition

ArtCAM Pro Jewellery Edition is ideal for designers and manufacturers of all jewellery, whether it is bespoke or mass-produced. It allows you to achieve improved productivity and quality levels, whilst significantly reducing lead times. With its powerful and intuitive modelling tools, you have the freedom to create artistic and elegant designs. These designs can be sent directly to your CNC or rapid prototyping machine to produce castings, findings or finished items of jewellery, whether gem-set or not, with a superior finish.

The Jewellery Edition module is available to all users of ArtCAM Pro 5.510 and above. Previous versions of ArtCAM Pro do not support the Jewellery Edition module.

What Jewellery Can I Create?

ArtCAM Pro Jewellery Edition can be used to produce any kind of jewellery, but it is particularly useful for the design and manufacture of rings. If you are not familiar with the design and creation of rings, this item of jewellery frequently comprises of two parts: a Shank and a Head. ArtCAM Pro Jewellery Edition is structured to allow you to create these parts separately, and then merge them together if necessary.

A Shank is the part of the ring, which encircles the finger. Shoulders join the Shank with the Head of the ring, and these may be set with smaller gemstones which complement the main gemstone(s) in the ring's Head.

A Head is the part of the ring setting which holds a principal gemstone in place. There are several styles of setting, including Bezel, also referred to as a Rubover or Collet setting, Claw and Pave.

Using ArtCAM Pro Jewellery Edition, you can design any style of Shank or Head. The Shank and Head are created as separate ArtCAM model files, but they can also be saved as separate triangle models or combined to form a single triangle model.

How Can I Manufacture My Jewellery Designs?

It is easy to manufacture models that you have created in ArtCAM Pro Jewellery Edition. They can be machined as a relief using a toolpath file sent to either a rotary axis or three-axis CNC machining tool. Alternatively, you can export your ArtCAM models as separate or merged triangle models to be used in a rapid prototyping system.

Rapid Prototyping

Rapid Prototyping technology automates the production of a prototype part from a three-dimensional CAD drawing. This process can fall into three categories: subtractive, additive and compressive. In a subtractive process, a block of material is carved out to produce the desired shape. An additive process builds an object by joining particles or layers of raw material. A compressive process forces a semi-solid or liquid material into the desired shape, which is then induced to harden or solidify.

Rotary Axis Machining

A rotary axis CNC machining tool allows the user to rotate one axis and machine a cylindrical part at the same time. Rotary machining cycles are simulated around the axis allowing pockets and holes to be cut around the part. In ArtCAM Pro Jewellery Edition, settings can be compensated for the distortion that occurs when using a rotary axis CNC machining tool.

Three Axis Machining

A three-axis tabletop CNC machining tool allows the user to machine a block of material secured to an X, Y table. The vertical spindle in the machining tool controls the Z-axis. A three-axis CNC machining tool has the flexibility to machine both above and beneath the block of material.

Working with Ring Projects

Getting Started

When you start ArtCAM Pro Jewellery Edition and click on the **Rings** tab, there are four buttons shown on the **Ring Project** page. Two of these buttons are commands that enable you to:

- **Create a New Ring Project** – For details, see "Creating a Ring Project" on page 3.
- **Open an Existing Ring Project** – For details, see "Opening an Existing Ring Project" on page 5.

Creating a Ring Project

You can define the dimensions of the ring you want to create, compensate for the distortion of shapes that occurs with rotary axis machining, set the resolution of the ring relief, and the location where your ring projects are saved.

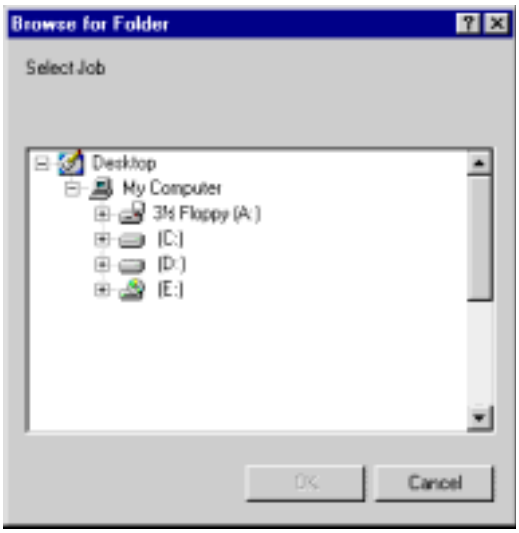
To create a new ring project:

1. Click on the **Rings** tab  to display the **Ring Project** page in the **Assistant** window.
2. Click on the **Create New Job** button  to display the **Ring Setup** page.

Note: If you can only see the **STL Assembler** button  on the **Ring Project** page, click on the  arrow to display all buttons.

3. Type a name for the ring project in the **Job Name** box.
4. Click on the **Standard** list box, and then on the national standard you want to use for the ring.
5. Click on the **Size** list box, and then on the size that you want to use for the ring. The ring's inner diameter automatically appears in the **Ring Diameter (mm)** box.

   If you are creating a **Custom** ring, this list box is greyed-out. Type the ring's inner diameter in the **Ring Diameter (mm)** box.
6. Type the maximum width of the ring's shank in the **Shank Width (mm)** box. This value also sets the **Height** of the ArtCAM models that are created along with the ring project.
7. If you are using a rotary axis machine, type the height at which the ring's detail is concentrated in the **Shank Thickness (mm)** box. This instructs ArtCAM Pro Jewellery Edition to compensate for the distortion of shapes at the specified height caused by rotary axis machining.
8. Define the number of points per millimetre that you want ArtCAM Pro Jewellery Edition to use for the ring reliefs in the **Resolution (points\mm)** box.
9. The current location where your ring projects are saved is shown on the page. If you want to change the directory and/or folder, click on the **Change** button to display the **Browse For Folder** dialog box:



   Click on the directory and/or folder that you want to use, followed by the **OK** button. The new location is shown on the **Ring Project** page.

10. Click on the **Create Job** button to create the ring project. The project information is shown on the **Ring Project** page.

Note: If a ring project with the same name already exists in the directory in which your ring projects are saved, a message box appears. If you want to open the existing ring project, click on the **OK** button. If you want to create a new ring project, click on the **Cancel** button to close the message box, type a new name for the ring project in the **Job Name** box, and then click on the **Create** button.

Every ring project that you create contains a Head and a Shank folder. ArtCAM model files (***.art**) containing the data for each of these components are saved in these folders when you create them.

You can now:

- Create a shank for the ring. For details, see "Creating a Shank" in the Working with Shanks chapter.
- Create a head for the ring. For details, see "Creating a Head" in the Working with Heads chapter.

Opening an Existing Ring Project

You can open a previously defined ring project that you have either manufactured or in which you have made some progress toward creating a three-dimensional model.

To open a ring project that you have already created:

1. Click on the **Rings** tab  to display the **Ring Project** page in the **Assistant** window.
2. Click on the **Open Existing Job** button  to display the **Browse For Folder** dialog box.

Note: If you can only see the **STL Assembler** button  on the **Ring Project** page, click on the  arrow to display them all.

3. Click on the folder containing the ring project that you want to open, and then click on the **OK** button.

   The ring project opens and its project information is shown on the **Ring Project** page.

   You can now:

- Create a shank for the ring. For details, see "Creating a Shank" in the Working with Shanks chapter.
- Open an existing shank. For details, see "Opening an Existing Shank" in the Working with Shanks chapter.
- Create a head for the ring. For details, see "Creating a Head" in the Working with Heads chapter.
- Open an existing head. For details, see "Opening an Existing Head" in the Working with Heads chapter.
- Assemble a triangle model that can be used in the ring manufacturing process. For details, see "Using the STL Assembler" in the Working with Triangle Models chapter.

Closing a Ring Project

To close the current ring project:

1. Click on the **Rings** tab  to display the **Ring Project** page in the **Assistant** window.
2. Click on the **Close Current Job** button  .

Note: If you can only see the **STL Assembler** button  on the **Ring Project** page, click on the  arrow to display them all.

Tutorial - Solitaire Ring

Overview

The following tutorial demonstrates how to create a relief and a triangle model of both a basket setting and a rotary axis shank using the Shank Designer, Head Designer, Vector Editing and Relief Operations tools in ArtCAM Pro Jewellery Edition. These triangle models are then merged to form a Solitaire ring triangle model ready for rapid prototyping.

Solitaire Ring

The stages that you will cover during the course of this tutorial are:

- Preparing the Ring Project.
- Creating the Head.
- Creating the Shank.
- Adding Detail to the Shank Relief.
- Creating a Triangle Model of the Shank.
- Merging the Triangle Models.

We will define bezel and claw dimensions to allow ArtCAM Pro Jewellery Edition to calculate a piece of two-dimensional artwork, from which a three-dimensional basket setting relief and triangle model is generated. Next, we will produce a three-dimensional shank relief using a swept ring profile. Along this relief, we will create bezel settings and grains from vector objects drawn in the model. With the shank relief calculated, we will then create a triangle model of the shank. Finally, we will create a closed triangle model of the Solitaire ring by combining the basket setting and shank triangle models.

Preparing the Ring Project

First, we will set up the ring dimensions needed for this particular job.

1. Click on the **Rings** tab  to display the **Ring Project** page.
2. Click on the **Create New Job** button  to display the **Ring Setup** page.
3. Select the directory in which you want your ring projects to be created, using the **Browse For Folder** dialog box.
4. Type *Solitaire* in the **Job Name** box.
5. Click on the **Standards** list box below, followed by the **British** option to select it.
6. Select the **O** size option from the list box to the right.
7. Type *20* in the **Shank Width (mm)** box.
8. Type *2* in the **Shank Thickness (mm)** box.
9. Type *20* in the **Resolution (Points/mm)** box.
10. Click on the **Create Job** button to display the **Ring Project** page.
11. Click on the  arrow in the **Shank Designer** area of the page to display its options.
12. Click on the **New Rotary Axis Shank** button  to create a shank model file according to the ring dimensions, and display the **Rotary Axis Shank** page.

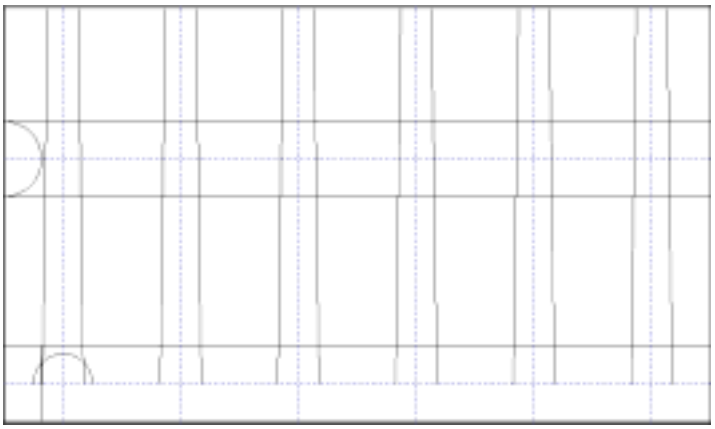
    We must create a shank model file before creating the ring's head, otherwise ArtCAM Pro Jewellery Edition cannot generate the head's preview vector artwork.
13. Click on the **Back** button  to return to the **Ring Project** page.

Creating the Head

Next we will create the head of the Solitaire ring, referred to as a basket setting. A basket setting is made up of bezels and claws.

1. Click on the  arrow in the **Head Designer** area to display its options.

2. Click on the **Basket Setting** button  to display the **Collet Creator** page.
3. Click on the  arrow in the **Collet Parameters** area of the page to display its options.
4. In the **Top Bezel** area:
    - Type *5* in the **Stone Diameter (SD)** box.
    - Type *1.5* in the **Claw Height (H)** box.
    - Type *1* in the **Thickness (T)** box.
    - Set the **Shape** of the top bezel by clicking on the **Round** radio button  .
5. In the **Bottom Bezel** area:
    - Type *3* in the **Diameter (BD)** box.
    - Type *1* in the **Thickness (B)** box.
    - Set the **Shape** of the bottom bezel by clicking on the **Square** radio button  .
    - Type *2* in the **Bezel Spacing (S)** box.
6. In the **Claws** area:
    - Type *6* in the **Number** box.
    - Type *0.8* in the **Thickness** box.
    - Set the **Shape** of the claws by clicking on the **Round** radio button  .
7. Click on the  arrow in the **3D Model** area of the page to display its options.
8. Type *100* in the **Resolution** box.
9. Type *4* in the **Border** box.
10. Click on the **Create Model** button to create the artwork needed for the basket setting in the **2D View** window:

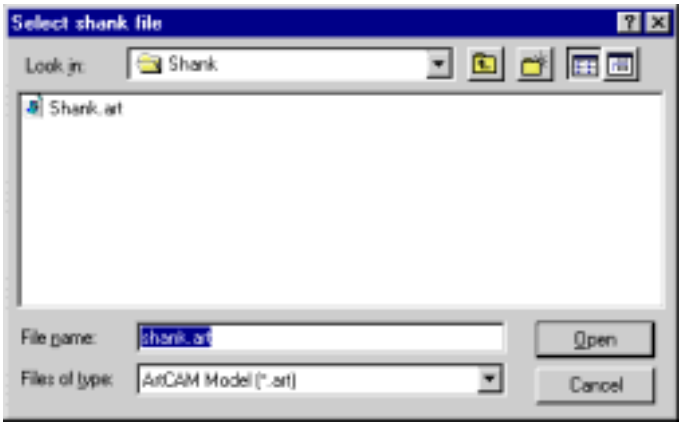


ArtCAM Pro Jewellery Edition saves the artwork as an .art file, and generates a relief from it. Next, a triangle model of the relief is created and saved as *Head.stl* in the Head folder within the Solitaire ring project directory.

A progress bar appears beneath the **2D View** window indicating the progress ArtCAM Pro Jewellery Edition is making in creating the triangle model:

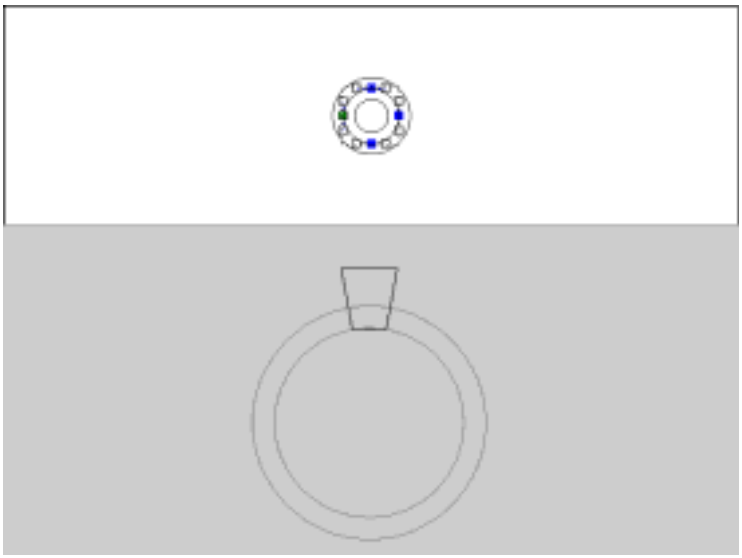
11. Press the **F3** key on your keyboard to display an isometric view of the basket setting triangle model in the **3D View** window:

12. Click on the **Add Preview To Shank** button to close the head model file and display the **Select Shank File** dialog box:



13. Click on the **Open** button to open the shank model file.

    The basket setting preview vectors are drawn on the reference silhouette and in the model area of the shank model's **2D View** window, as shown below:



Creating the Shank

Now that we have a relief and a triangle model of the basket setting, we are ready to create the shank relief. We will create the shank relief using a swept ring profile.

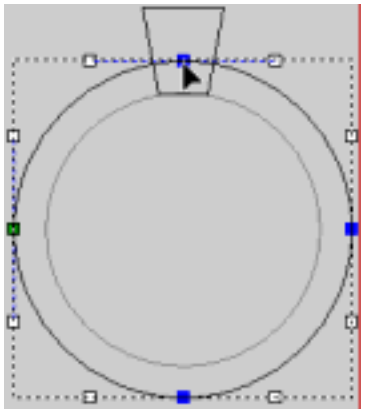
Creating the Ring Profile

First, we will create a ring profile for the Solitaire ring's shank using the reference silhouette and basket setting preview vectors.

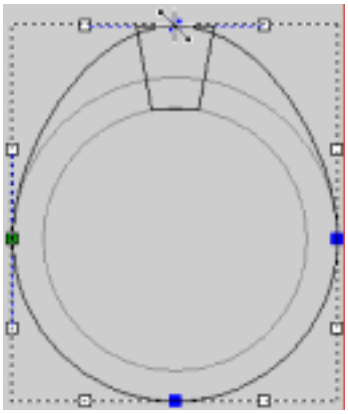
1. Click on the outer circle of the reference silhouette to select it.

2. Press the **Ctrl** + **C** key on your keyboard to place a duplicate of the reference silhouette on the ArtCAM clipboard.
3. Press the **Ctrl** + **V** key to paste a copy of the reference silhouette overlaying the original.
4. Click and drag the point (node) at the top of the circle and align it with the point at the top of the basket setting vector.

Before…

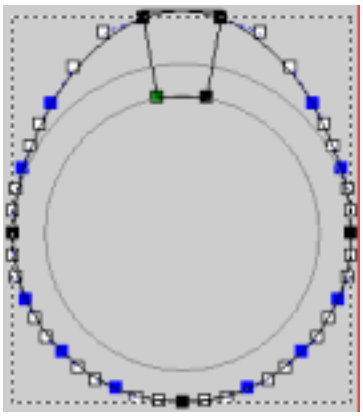


After…

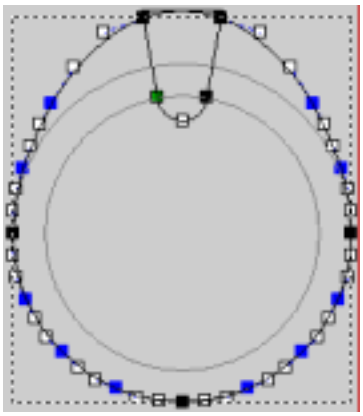


5. Hold the **Shift** key down, and then click on the basket setting vector. Both the vector objects turn magenta.
6. Click on the **Vector Merging** tab 

in the Main toolbar to display the **Vector Merging** toolbar.
7. Click on the **Trim Vectors** button  to merge the selected vector objects, so all that remains is the area that is not overlapping. The new vector object represents the ring profile.
8. Click anywhere in the shank model (the white area) to deselect the selected vector objects.
9. Click on vector object representing the outside edge of the shank to select it:



10. Move the cursor over the basket setting's bottom span, and then press the **A** key to convert the linear span to an arc.
11. Click on the control point in the arc and drag downwards, so that the arc is mirrored as shown:



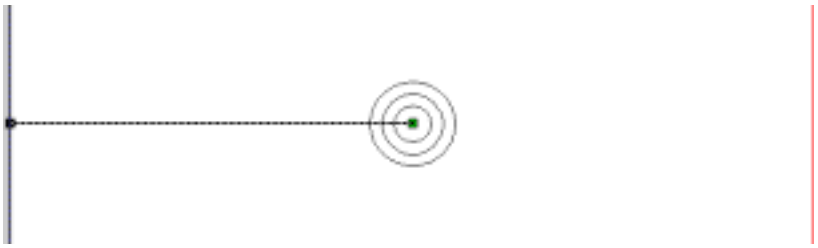
This vector object represents the ring profile.

Creating the Drive Rails

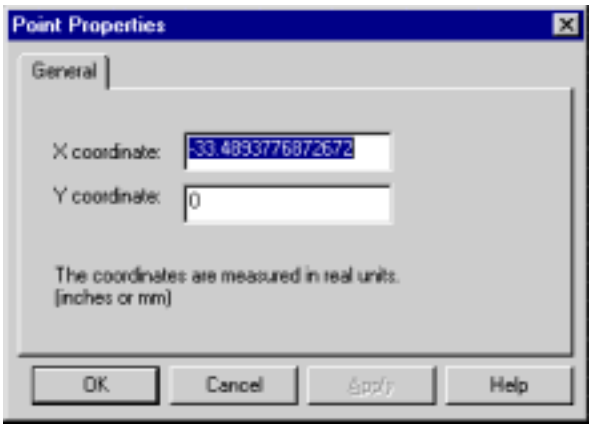
Next we will draw a polyline, which will then be edited and mirrored to produce two drive rails.

1. Click on the **Vector** tab  to display the **Vector** toolbar.
2. Click on the **Create Polyline** button  to display the **Polyline Creation** page.
3. Move the cursor over the smallest circle for the basket setting in the model area (the white area). When it snaps to the circle's centre  , click to create the polyline's Start Point.

4. Make sure that you can see the left edge of the model area clearly. Use the zooming tools in the **3D View** toolbar to adjust the view.
5. Move the cursor over the left edge of the model area until it snaps to the mid of the vertical guideline , then right-click to end the polyline and close the **Polyline Creation** page.

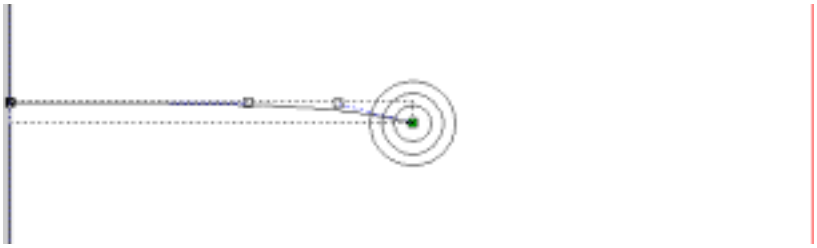


6. Click on the polyline to select it, position the cursor over it, and then press the **B** key to convert it to a bezier curve.
7. Right-click on the end point (blue) in the bezier to display the context menu, then click on the **Properties** option to display the **Point Properties** dialog box:



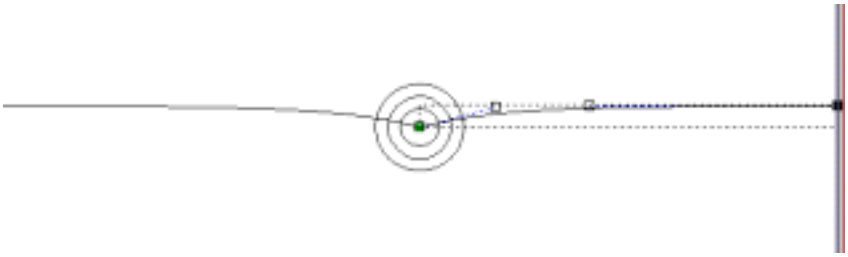
8. Leave the X co-ordinate. Type *1.75* in the **Y coordinate** box.
9. Click on the **OK** button to move the point and close the **Point Properties** dialog box.
10. Right-click on the control point in the bezier nearest to the end point to display the context menu, then click on the **Properties** option to display the **Point Properties** dialog box.
11. Leave the Y co-ordinate. Type *-13.65* in the **X coordinate** box.

12. Click on the **OK** button to move the point and close the **Point Properties** dialog box.
13. Right-click on the control point closest to the Start Point to display the context menu, then click on the **Properties** option to display the **Point Properties** dialog box.
14. Type *-6.15* in the **X coordinate** box and *1.65* in the **Y coordinate** box.
15. Click on the **OK** button to move the point and close the **Point Properties** dialog box. The bezier now looks as shown below:

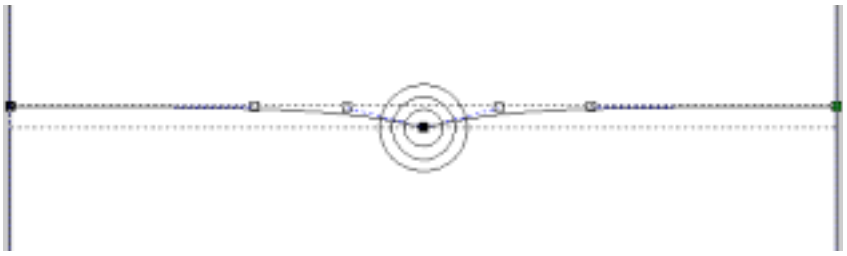


16. Click on the **Vector Editing** tab 

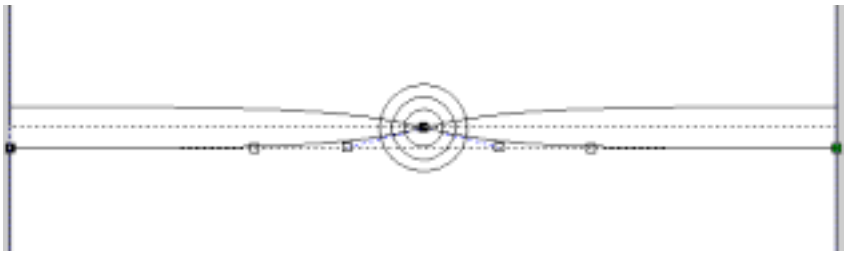
to display the **Vector Editing** toolbar.
17. Click on the **Mirror Vectors** button  to display the **Mirror Vectors** page.
18. Hold the **Ctrl** key down, and then click on the **Right** option to create a mirrored copy of the bezier on the right of the model.



19. Hold the **Shift** key down, and then click to select the bezier on the left of the model. Both the bezier curves turn magenta.
20. Click on the **Vector Merging** tab to display the **Vector Merging** toolbar.
21. Click on the **Join Vectors By Moving Ends** button  to link the Start Points of the two beziers by moving each point to a central position. A bounding box surrounds the bezier.



22. Hold the **Ctrl** key down, and then click on the **Bottom** option to create a mirrored copy of the bezier below itself.



23. Click on the **Close** button to return to the **Assistant**'s Home page.

Creating the Cross-Section

In this section, we will create the cross-section used to define the overall shape of the swept ring profile.

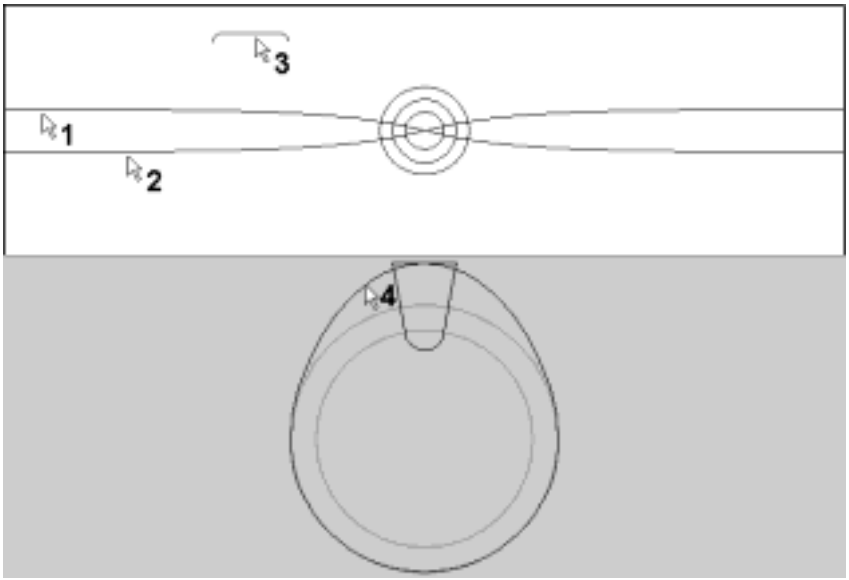
1. Click on the **Vector** tab display the **Vector** toolbar.
2. Click on the **Create Rectangle** button  to display the **Rectangle Creation** page.
3. Type *6* in the **Width** box, *3* in the **Height** box and *0.7* in the **Corner Radii** box.
4. Click on the **Create** button to create the rounded rectangle. It is centred on the model's origin, which is in the centre.
5. Click on the **Close** button.
6. Click and drag on the rounded rectangle and position it in anywhere in the model area (the white area).
7. If the rectangle is not currently selected, click to select it. Move the cursor over the left edge of the rounded rectangle and press the **R** key to delete the span.
8. Repeat the previous step, this time deleting the right edge of the rounded rectangle. Two arc shaped vector objects remain in the model, as shown below:

9. Click on the bottom vector object to select it, and then press the **Delete** key. You are left with the cross-section you will use in creating the shank of the ring.

Creating the Shank Relief

We are now ready to create a swept ring profile using the vector objects we have drawn. To create a swept ring profile we must select two drive rails, a cross-section and a ring profile, in that order.

1. Click on the **Rings** tab  to return to the **Rotary Axis Shank** page.
2. Hold the **Shift** key down, and then click on the vector objects in the **2D View** window in the order shown below:



All of the vector objects turn magenta.

3. Click on the  arrow in the **Profile Designer** area to display its options.
4. Click on the **Sweep Ring Profile** button  to create the shank relief.
5. Press the **F3** key on your keyboard to display an isometric view of the shank relief in the **3D View** window:

Adding Detail to the Shank Relief

In this section, we will add detail to the shank relief, allowing us to set gemstones within it.

Creating the Bezel and Grain Vectors

First, we will create the vector objects that will be used to create the bezel and grain settings in the shank relief.

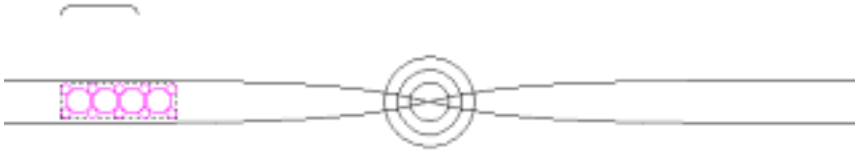
1. Press the **F2** key on your keyboard to return to the **2D View** window.
2. Click on the **Create Circles** button  on the **Vector** toolbar to display the **Circle Creation** page.
3. Type *–27.5* in the **X** box, *0.1* in the **Y** box and *1* in the **Circle Radius** box, then click on the **Create** button to create a circle representing a bezel.
4. Type *–28.54* in the **X** box, *-0.83* in the **Y** box and *0.4* in the **Circle Radius** box, then right click to close the **Circle Creation** page and create a circle representing a grain.

Copying the Bezel and Grain Vectors

We are now ready to create copies of the vector objects representing the bezel and grain settings. This will be used to set a number of gemstones in the shank.

1. Click on the **Vector Editing** tab to display the **Vector Editing** toolbar.
2. Click on the **Block Copy/Rotate** button  to display the **Block and Rotate Copy** page. The **Block Copy** option  is selected by default.

3. Type *2.08* in the **X Offset** box, *2* in the **Number of Columns** box, *1.86* in the **Y Offset** box and *2* in the **Number of Rows** box.
4. Click on the **Apply** button to create three copies of the circle representing a grain.
5. Click and drag to create a bounding box around all five of the circles to select them. The circles turn magenta.
6. Type *4* in the **Number of Columns** box and *1* in the **Number of Rows** box.
7. Click on the **Apply** button to create the bezels and grains.



8. Click on the **Close** button to return to the **Assistant**'s Home page.
9. Click anywhere in the model area (the white area) to deselect the bezel and grain vector objects
10. Click on the **Vector** tab to display the **Vector** toolbar.
11. Hold the **Shift** key down, and then click to select each of the four central circles, which represent a bezel.
12. Click on the **Group** button  to group the bezel circles.
13. Click anywhere in the model area (the white area) to deselect the grouped bezel vector objects.
14. Hold the **Shift** key down, and then click to select each of the smaller circles, which represent a grain.
15. Click on the **Group** button  to group the grain circles.
16. Click anywhere in the model area (the white area) to deselect the grouped grain vector objects

Mirroring the Bezel and Grain Vectors

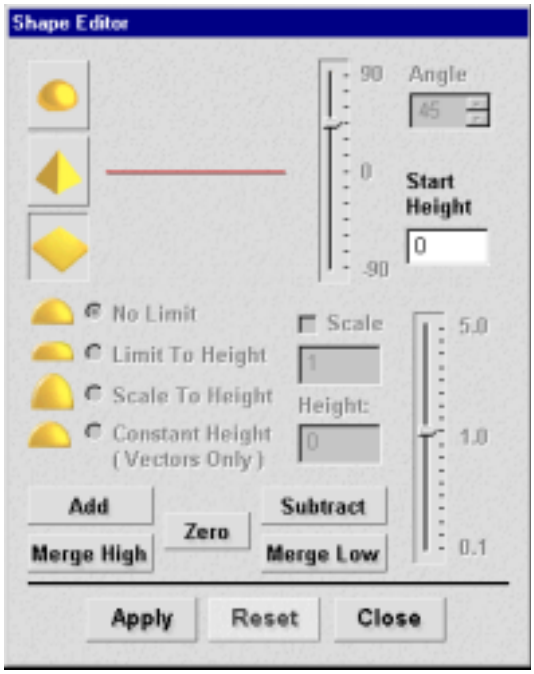
In this section, we will mirror the vector objects representing the bezel and grain settings to allow us to set another four stones in the shank.

1. Click on the **Create Polyline** button  in the **Vector** toolbar to display the **Polyline Creation** page.
2. In the **Next Point** area, type *0* in the **X** box and *10* in the **Y** box.
3. Click on the **Add** button to create the Start Point in the polyline.
4. Type -*20* in the **dy** box, and then click on the **Add** button to create a point (node) in the polyline. This creates a polyline down the middle of the model area (the white area).
5. Click on the **Close** button.
6. Click on the **Vector Editing** tab to display the **Vector Editing** toolbar.
7. Hold the **Shift** key down, and then click on the polyline followed by both groups of circles to select them.
8. Click on the **Mirror Vectors** button  to display the **Mirror Vectors** page.
9. Hold the **Ctrl** key down, and then click on the **About Line** option to create a mirrored copy of the circles on the right of the model.
10. Click on the **Close** button to return to the **Assistant**'s Home page.
11. Click on the central polyline to select it, and then press the **Delete** key.
12. Hold the **Shift** key down, and then click to select both groups of circles representing the bezels.
13. Right-click to display the **Vector Editing** menu, and then click on the **Group Vector(s)** option to group the two sets of bezel circles.
14. Click anywhere in the model area (the white area) to deselect the grouped bezel vector objects
15. Hold the **Shift** key down, and then click to select both groups of circles representing the grains.
16. Right-click to display the **Vector Editing** menu, and then click on the **Group Vector(s)** option to group the two sets of grain circles.

Applying Shapes to the Bezel and Grain Vectors

You are now ready to apply shape attributes to the vector objects representing the bezel and grain settings, and then combine these shapes with the existing shank relief.

1. Double-click on any of the circles representing a bezel to display the **Shape Editor** dialog box.



2. Click on the  button, and then type *75* in the **Angle** box.
3. Click on the **Apply** button to apply these shape attributes to each of the circles representing a bezel.
4. Click on the **Subtract** button to subtract the angled shape from the existing shank relief.
5. Click on the **Close** button to close the **Shape Editor** dialog box.
6. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

You can see that part of each angled shape protrudes over the inside-edge of the shank. We need to remove this part of the shape from the shank relief.

7. Click on the **Relief** tab  to display the **Relief** toolbar.
8. Click on the **Merge High** button  to merge the shape attributes applied to the current Primary Colour (none) with the existing shank relief. The new relief appears as shown below:

9. Press the **F2** key on your keyboard to return to the **2D View** window.
10. Double-click on any of the circles representing a grain to display the **Shape Editor** dialog box.
11. Click on the **Round**  button, and then type *0.4* in the **Start Height** box.
12. Click on the **Apply** button to apply these settings to the circles representing the grains.
13. Click on the **Add** button to add the grain shapes to the existing shank relief.

14. Click on the **Close** button to close the **Shape Editor** dialog box.
15. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

Creating the Shank Triangle Model

You are now ready to create a closed triangle model of the ring's shank.

1. Click on the **Rings** tab  to display the **Rotary Axis Shank** page.
2. Click on the  arrow in the **3D Modelling** area of the page to display its options.
3. Click on the **Create Ring Mesh** button  to display the **Jewellery STL Creator** page.
4. Type *0.01* in the **Tolerance** box to control the number of triangles.
5. Click on the **Close with Flat Plane** radio button  to select it. This instructs ArtCAM Pro Jewellery Edition to close the triangle model with a back face equivalent to a Z height of zero.
6. Click on the **Create Triangles** button to create a triangle model of the shank relief.

   A progress bar appears indicating the progress ArtCAM Pro Jewellery Edition is making in triangulating the shank relief:

   
7. Click on the **Save STL** button to save the triangle model.

The triangle model is saved as *Shank.stl* in the Shank folder within the Solitaire ring project directory.

Combining the Triangle Models

You are now ready to combine the triangle model of the basket setting with that of the shank to produce a triangle model of the finished Solitaire ring.

1. Click on the **Back** button to display the **Rotary Axis Shank** page.
2. Click on the **Back** button. A message box appears warning that the data in the shank model file has changed. Click on the **Yes** button to save the shank model file, close the message box, and then display the **Ring Project** page.
3. Click on the **STL Assembler** button to display the **Ring Assembler** page.

   The triangle models for the ring's head and shank are both shown in the **3D View** window:

4. Click on the arrow in the **Model Loader** area of the page to display a list of the triangle models saved as part of the ring project.
5. Click on the head triangle model listed in the **Model Loader** window to select it.

If you can't see the path and filename, drag the edge of the **Ring Assembler** page to the right.

6. Click on the  arrow in the **Positioning** area of the page to display its options.
7. In the **Move** area, leave the **X** value and type *-2.8* in the **Y** box and *8.5* in the **Z** box.
8. Click on the **Move** button to reposition the head triangle model in the **3D View** window. This lowers the basket setting and slightly improves the alignment of its claws with the shank.
9. Click on the **Merge** button to merge the shank and head triangle models. The name *Merged Models* appears in the **Model Loader** window.
10. Click on the *Merged Models* triangle model in the **Model Loader** window to select it. It is highlighted in blue.
11. Click on the **Save** button to display the **Save STL Model** dialog box.
12. Click on the **Save In** list box and select the directory in which you want to save the STL model. The Shank folder within the Solitaire ring project is selected by default.
13. Type *Solitaire* in the **File Name** box, and then click on the **Save** button to close the dialog box and save the STL model.
14. Click on the **Back** button  to display the **Ring Project** page.

    The STL file containing a triangle model of the finished Solitaire ring can now be used in a rapid prototyping system for production.

Tutorial – Class Ring

Overview

The following tutorial demonstrates how to create a relief and a triangle model of a shank using the Shank Designer, Vector Editing and Relief Operations tools in ArtCAM Pro Jewellery Edition. This triangle model is then merged with another of a ring head to create a triangle model of a complete Class ring ready for machining.

Class Ring

The stages that you will cover during the course of this tutorial are:

- Preparing the Ring Project.
- Creating the Shank Relief.
- Creating a Triangle Model from the Relief.
- Merging the Triangle Models.
- Unwrapping the Merged Triangle Model.

We will produce a three-dimensional shank relief for production on a rotary axis machine by creating a swept ring profile. A flat plane will be cut into the swept ring profile to create the shape for the head of the ring. We will then create the detail by adding imported clipart reliefs and a texture to the existing shank relief.

With the shank relief complete, we will create a closed triangle model from it. We will merge a triangle model of a head with that of the shank to create a triangle model of the whole ring. Finally, we will unwrap the merged triangle model so that it can be machined.

Preparing the Ring Project

First, we will open the ring project, which contains the artwork used to create a head and a shank relief.

1. Click on the **Rings** tab  to display the **Ring Project** page.
2. Click on the **Open Existing Job** button  to display the **Browse For Folder** dialog box.
3. To open the ring project that we want to use, click on ArtCAM Pro 5510\Examples\Class Ring, followed by the **OK** button.

   In the **Job Information** area, you can see that this ring project has been created for a size 5 North American ring, with a diameter of *15.7* mm and shank thickness of *2* mm. You can also see the location of the ring project folder.
4. Click on the  arrow in the **Head Designer** area to display its options.
5. Click on the **Open Existing Head** button  to display the **Select Head File** dialog box. The *Head.art* file is selected by default.
6. Click on the **Open** button to open the head model file.

   The following artwork is shown in the **2D View** window:

   The .art file that you have opened is a model previously created in ArtCAM Pro Jewellery Edition. The model contains bitmap colours and vector objects that have been used to create the Class ring head relief.
7. Press the **F3** key to display an isometric view of the head relief in the **3D View** window.

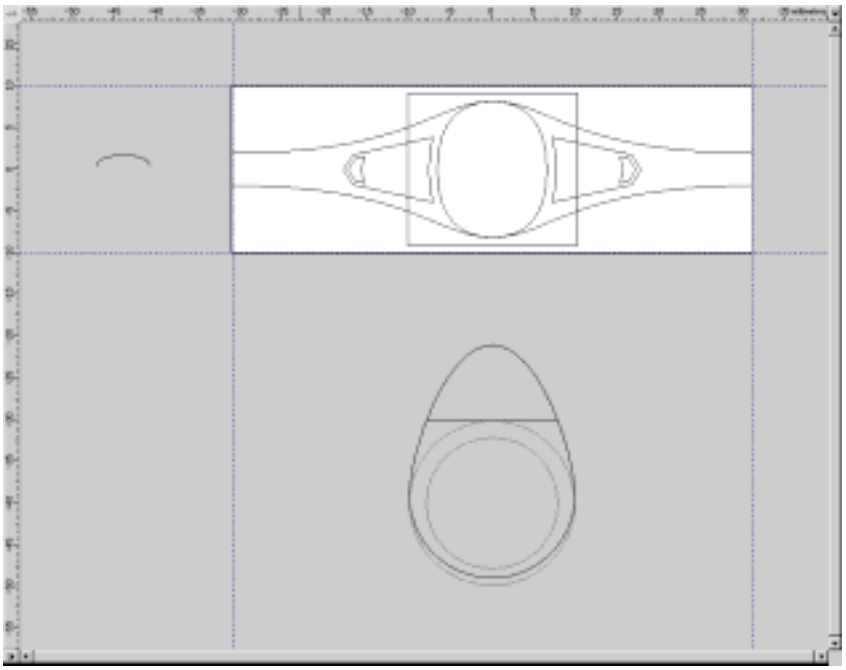
A triangle model of the head relief has also been saved as part of this ring project. This will later be used to produce a triangle model of the finished Class ring.

Creating the Shank Relief

Now that we have seen the head of the ring, we are ready to create the shank relief. We will create a swept ring profile relief using the vector artwork in a previously saved ArtCAM model file. A flat plane will be cut into this relief to create the correct ring shape. We will then import and paste two items of clipart relief into the existing relief and then apply a texture to a selected area within it.

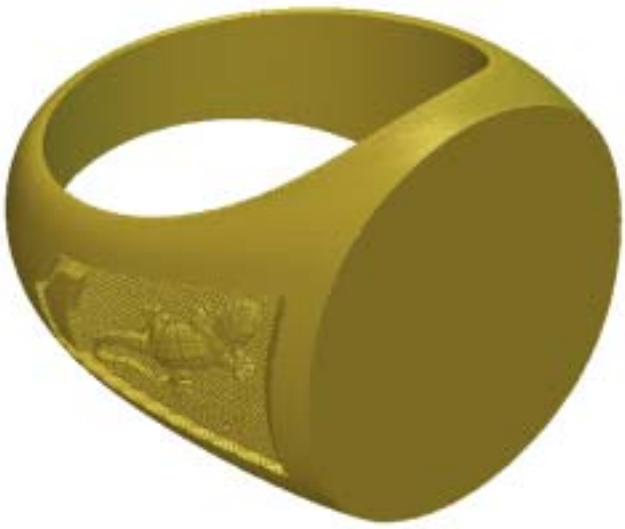
1. Click on the arrow in the **Shank Designer** area to display its options.
2. Click on the **Open Existing Shank** button to display the **Select Shank File** dialog box. The *Shank.art* file is selected by default.
3. Click on the **Open** button to open the shank model file.

   The following artwork is shown in the **2D View** window:



The .art file that you have opened is a model previously created in ArtCAM Pro Jewellery Edition. The model contains vector artwork that we will use to create the Class ring shank relief.

4. Press the **F3** button to display an isometric view of the finished Class ring shank relief.



At the end of this section, we will have created this relief.

5. Click on the **Relief** tab  on the Main toolbar to display the **Relief** toolbar.

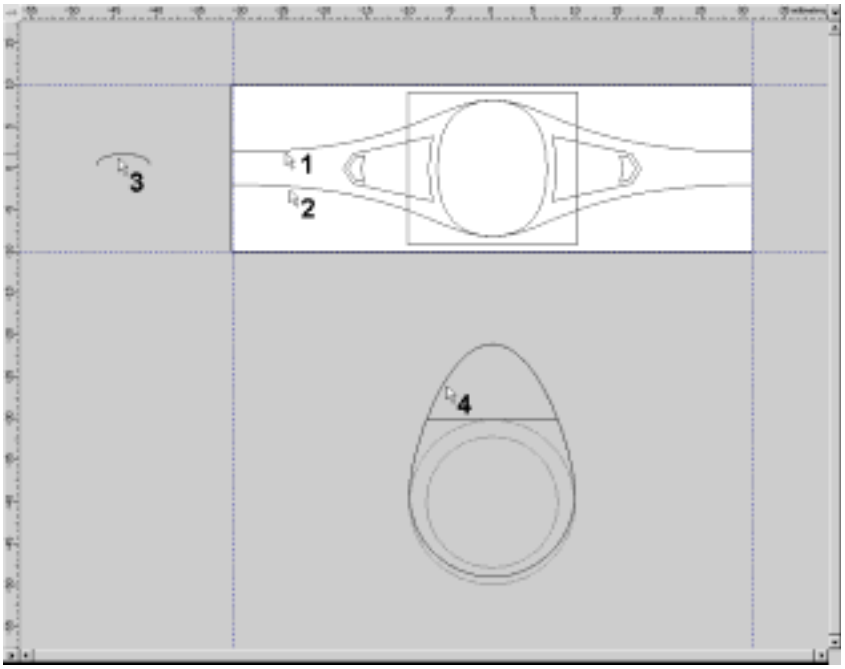
6. Click on the **Reset Relief** button  to delete the existing relief.

7. Press the **F2** key to return to the **2D View** window.

Creating the Swept Ring Profile

We are now ready to create a swept ring profile using the vector artwork in the **2D View** window. To create a swept ring profile we must select two drive rails, a cross-section and a ring profile.

1. Click on the arrow in the **Profile Designer** area to display its options.
2. Hold the **Shift** key down, and then click on the vector objects in the **2D View** window in the order shown:



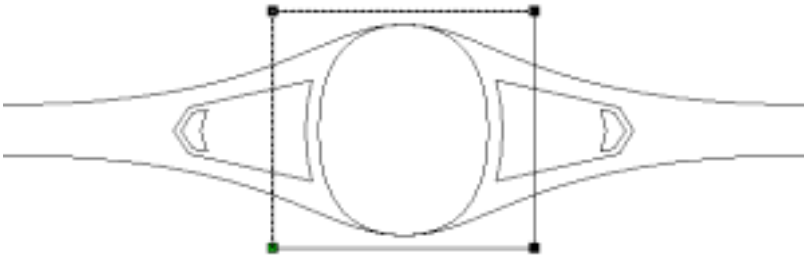
All of the vector objects turn magenta.

3. Click on the **Sweep Ring Profile** button to create the shank relief.
4. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

Cutting a Flat Plane into the Shank Relief

Now that we have calculated the shank relief, we are ready to cut a flat plane into the relief to provide a base for the head of the Class ring.

1. Press the **F2** key to return to the **2D View** window.
2. Click on the rectangular vector object in the shank model to select it. It is surrounded by a bounding box.



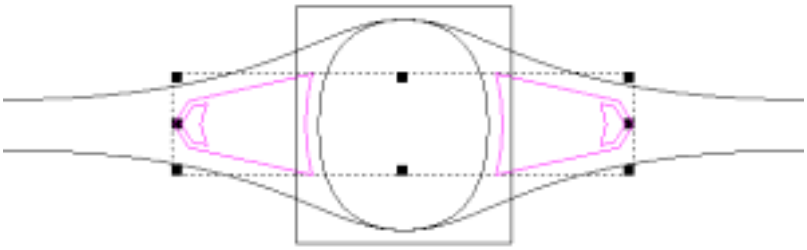
3. Click on the  arrow in the **3D Modelling** area to display its options.
4. In the **Cut Flat Plane** area, type *2* in the **Height** box. This instructs ArtCAM Pro Jewellery Edition to cut the plane at a height of 2 mm in the existing shank relief.
5. Click on the **Cut Flat Plane** button  to cut the plane into the existing shank relief.

   A rectangular vector object appears in the shank model indicating the extents of the plane that has been cut into the relief.
6. Press the **F3** key on your keyboard to display an isometric view of the shank relief in the **3D View** window:

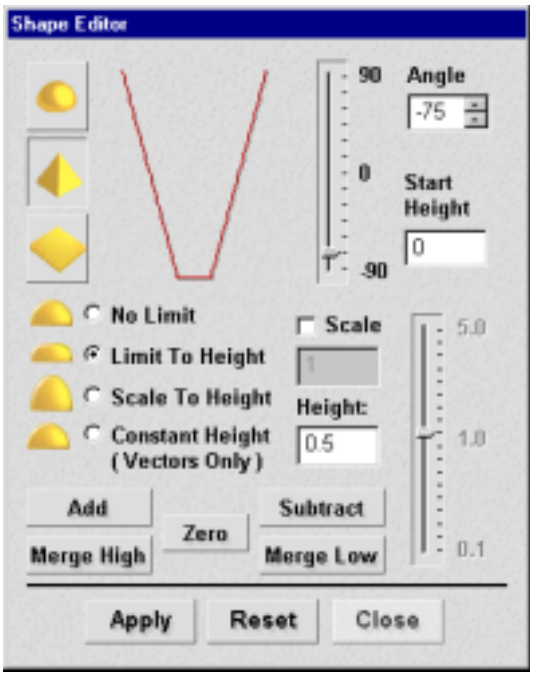
Creating Indentations in the Shank Relief

In this section, we will create indentations in the shoulders of the shank relief on either side of the plane. These act as a base for two items of imported clipart relief.

1. Press the **F2** key to return to the **2D View** window.
2. Click on either of the vector objects on either side of the ring's centre to select the group. The grouped vector objects turn magenta:



3. Double-click on the grouped vector objects to display the **Shape Editor** dialog box:



You can see that a shape with an angle of *-75*° and a height limit of *0.5* mm has been applied to the group of vector objects.

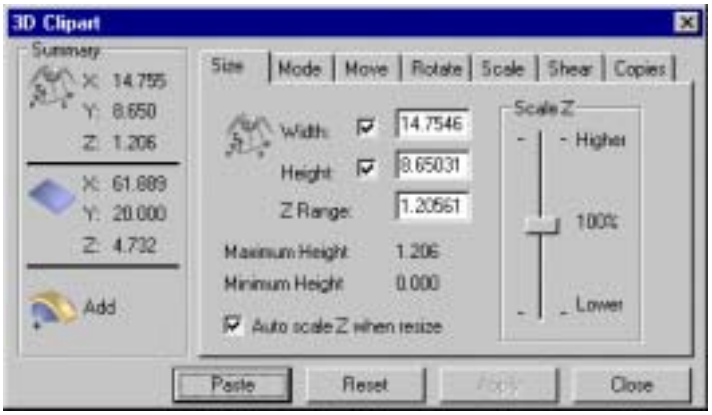
4. Click on the **Add** button to add the shapes to the existing shank relief. Since the shape attributes are applied to the group of vector objects, an indentation is created on either side of the ring's centre.
5. Click on the **Close** button to close the **Shape Editor** dialog box.
6. Press the **F3** key on your keyboard to display an isometric view of the shank relief in the **3D View** window.
7. Click on the **View Along X** button to display the relief from along the X-axis:

Adding Detail to the Shank Relief

Now that we have created the indentations in the shank relief, we are ready to import two items of clipart relief and paste them into these areas.

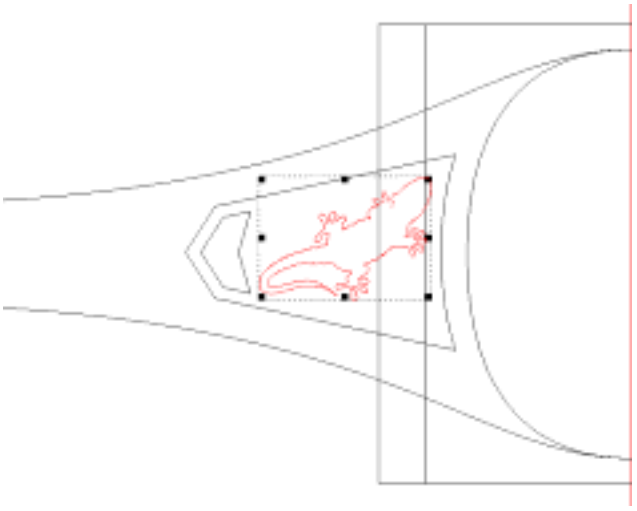
1. Press the **F2** key to return to the **2D View** window.
2. Click on the **Load Relief** button on the **Relief** toolbar to display the **Open** dialog box.
3. Click on the **Up One Level** button to go to the root of the Class Ring directory.
4. Click on the relief file named *Lizard* to select it.
5. Click on the **Open** button to display the **Load Relief** dialog box:

6. Make sure that the **Pasting** option is selected by clicking on its radio button, and then click on the **OK** button to display the **3D Clipart** dialog box:



A red vector outline of the lizard clipart relief also appears in the **2D View** window.

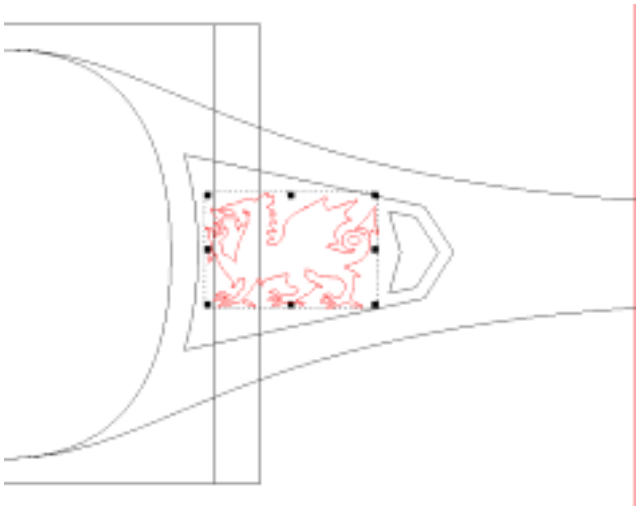
7. In the **3D Clipart** dialog box, click on the **Scale** tab.
8. Type *50* in the **New Scale %** box, and then click on the **Apply** button to scale the lizard clipart relief.
9. Click on the **Rotate** tab.
10. Type *-10* in the **Rotate by angle** box, and then click on the **Apply** button to rotate the lizard clipart relief.
11. Click and drag the red vector outline of the lizard clipart relief to position it amongst the shank artwork as shown:



12. Click on the **Mode** tab.
13. Type *0.2* in the **Start Height** box.
14. Make sure that the **Add** option is selected by clicking on its radio button ⊙.

15. Click on the **Paste** button to add the lizard clipart relief into the existing shank relief, and then click on the **Close** button.
16. Press the **F3** key on your keyboard to display a view of the shank relief along the X-axis in the **3D View** window:

17. Repeat these steps, scaling the dragon clipart relief by *35*% and using a start height of *0.2* mm.
18. Paste the dragon clipart relief file in the position shown below:

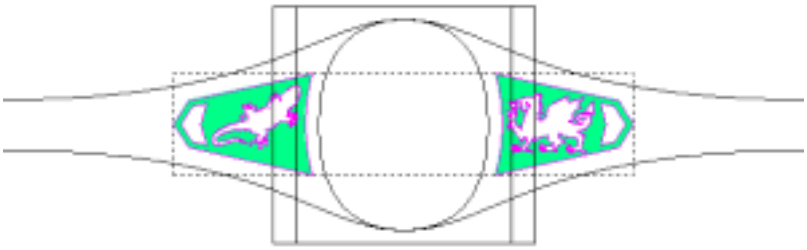


The shank relief appears as shown after the dragon clipart relief has been added to it:

Adding Texture to the Shank Relief

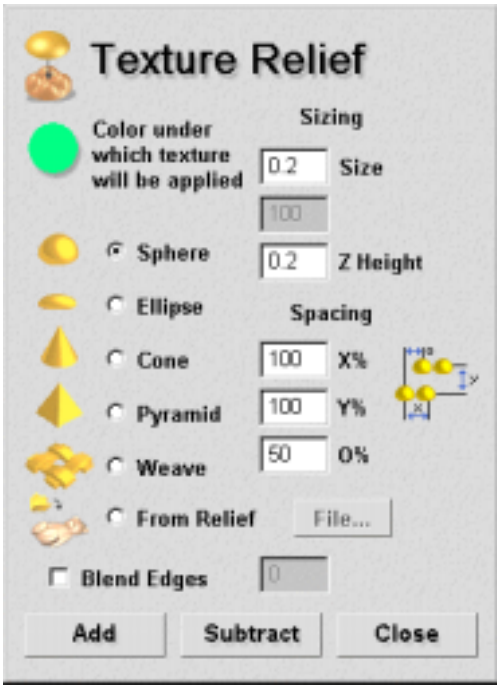
In this section, we will add a texture to a selected area of the relief to complete the shank of the Class ring. Texture can only be applied to areas of the relief marked in the current Primary Colour. When creating the texture, we will select its shape, define the size of the shape, the repeat distance in the X and Y axes, and the overlap distance.

1. Press the **F2** key to return to the **2D View** window.
2. Click on either of the vector objects representing the indentations in the shank to select both of them. The grouped vector objects turn magenta.
3. Hold the **Shift** key down, and then click on the red vector outlines of both the lizard and the dragon to select them. The vector outlines turn magenta.
4. Click on the light-green colour in the Colour Palette beneath the **2D View** window to select it as the Primary Colour.
5. Click on the **Bitmap** tab  to display the **Bitmap** toolbar.
6. Click on the **Flood Fill Vectors** button  to flood-fill the area within the indentation around the lizard and the dragon artwork in the Primary Colour.



7. Click on the **Relief Editing** tab  to display the **Relief Editing** toolbar.

8. Click on the **Texture Relief** button  to display the **Texture Relief** dialog box:



9. Make sure that the options are set to those shown above.

10. Click on the **Add** button to add the texture to the area of the shank relief marked by the Primary Colour.

11. Click on the **Close** button to close the **Texture Relief** dialog box.

12. Press the **F3** key on your keyboard to display a view of the textured shank relief in the **3D View** window:

Creating a Triangle Model from the Relief

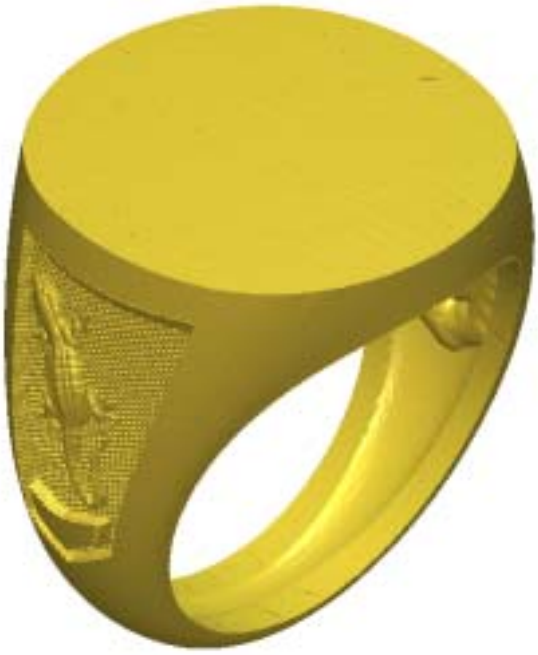
Next, we will create a triangle model from the shank relief. This relief will later be used in creating a triangle model of the complete Class ring.

1. Click on the **Create Ring Mesh** button to display the **Jewellery STL Creator** page.
2. Type *0.01* in the **Tolerance** box.
3. Click on the **Create Offset Back Face** radio button to select this option. This instructs ArtCAM Pro Jewellery Edition to close the triangle model with an offset of the existing shank relief. The result is effectively a hollow shell.
4. Type *1* in the **Thickness** box. This sets the thickness of the offset relief that is used to close the triangle model.
5. Click on the **Create Triangles** button to create a triangle model of the shank relief.

   A progress bar appears, indicating the progress ArtCAM Pro Jewellery Edition is making in triangulating the shank relief:

   The triangle model of the shank appears in the **3D View** window as shown:



6. Click on the **Save STL** button to save the triangle model as *Shank.stl* in the Shank folder within the Class Ring directory.

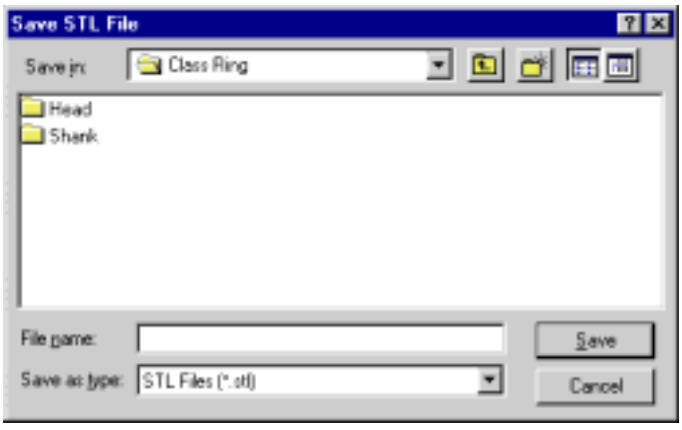
Merging the Triangle Models

Now that we have created a triangle model of the shank relief, we can combine it with the existing triangle model of the head relief. This will create a triangle model of the complete Class ring.

1. Click on the **Back** button to return to the **Rotary Axis Shank** page.
2. Click on the **Back** button to return to the **Ring Project** page.
3. Click on the **STL Assembler** button to display the **Ring Assembler** page.

   ArtCAM Pro Jewellery Edition opens all of the available triangle models in the ring project in the **3D View** window. These are the triangle models of both the ring's shank and its head, as shown:

4. Click on the arrow in the **Model Loader** area of the page to display the list of the triangle models saved as part of the ring project.
5. Click on the **Merge** button to merge the two triangle models. A single triangle model for the whole ring is now shown in the **3D View** window.
6. Click on the *Merged Models* triangle model listed in the **Model Loader** window.
7. Click on the **Save** button to display the **Save STL File** dialog box:



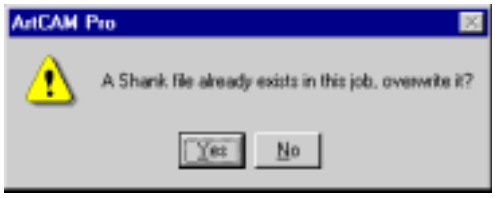
8. Type *ClassRing* in the **File name** box.
9. Click on the **Save** button to close the **Save STL File** dialog box and save the merged triangle models as a single STL file. This file can be sent to your rapid prototyping

system to manufacture a prototype of the complete Class ring.

Unwrapping the Merged Triangle Model

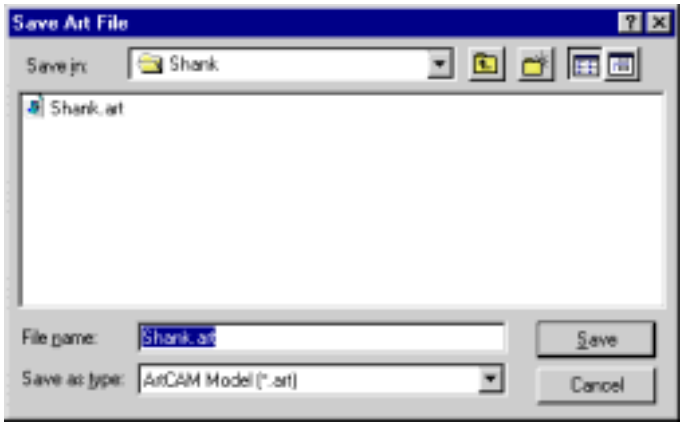
Finally, we will create a new rotary axis shank model file. In this model we will unwrap the merged triangle model file to create a relief of the whole Class ring. The ring can then be machined using a rotary axis machining tool.

1. Click on the **Back** button to return to the **Ring Project** page.
2. Click on the arrow in the **Shank Designer** area to display its options.
3. Click on the **New Rotary Axis Shank** button to create a shank model file. A message box appears warning you that a shank model file already exists in this ring project:



This is because a rotary axis shank has already been created as part of this ring project.

4. Click on the **No** button to close the message box and display the **Save Art File** dialog box:



5. Type *WholeRing* in the **File name** box, and then click on the **Save** button. This closes the **Save Art File** dialog box and creates a new rotary axis shank model file.

6. Click on the arrow in the **3D Modelling** area of the **Rotary Axis Shank** page to display its options.
7. Click on the **Unwrap Ring Mesh** button to display the **Import 3D Model** dialog box.
8. Click on the **Up One Level** button to go to the root of the Class Ring directory.
9. Click on the *ClassRing* STL file to select it, and then click on the **Open** button to unwrap the triangle model into the relief.

   A progress bar appears, indictating the progress made in unwrapping the triangle model.
10. Press the **F3** key to display an isometric view of the merged shank relief in the **3D View** window.
11. Click on the **Toggle View** button to display the unwrapped shank relief in the **3D View** window:

You can use this relief to manufacture the Class ring by:

- Saving this relief. For details, see Working with Reliefs in the ArtCAM Pro Reference Manual.
- Creating a Machine Relief toolpath. For details, see Machining Models in the ArtCAM Pro Reference Manual.
- Saving the toolpath file, and then sending it to your rotary axis machining tool. For details, see Machining Models in the ArtCAM Pro Reference Manual.

Tutorial – Eternity Ring

Overview

The following tutorial demonstrates how to create a relief and a triangle model of a rotary axis shank using the Shank Designer, Vector Editing, Relief and Shape Editor tools in ArtCAM Pro Jewellery Edition. This triangle model forms an Eternity ring model ready for rapid prototyping.

Eternity Ring

The stages that you will cover during the course of this tutorial are:

- Preparing the Ring Project.
- Creating the Bezel Settings.
- Creating the Grains.
- Creating the Shank Relief.
- Creating a Triangle Model of the Shank.

We will draw four circular vector objects, and create copies of them using polylines that we will also draw in our shank model. We will apply three-dimensional shape attributes to the circles in our model, calculate them and combine them to form the shank relief. Finally, we will create a triangle model of the shank relief which can be used to manufacture the Eternity ring.

Preparing the Ring Project

First, we will set up the ring dimensions needed for this particular job.

1. Click on the **Rings** tab  to display the **Ring Project** page.

2. Click on the **Create New Job** button  to display the **Ring Setup** page.
3. Type *Eternity* in the **Job Name** box.
4. Click on the **Standards** list box, followed by the **British** option to select it.
5. Click on the **Size** list box, followed by the **J ½** option to select it.
6. Type *15* in the **Shank Width (mm)** box.
7. Type *2* in the **Shank Thickness (mm)** box.
8. Type *20* in the **Resolution (Points/mm)** box.
9. Make sure that the location shown on the page is where you want this ring project to be created.
10. Click on the **Create Job** button to create the ring project.
11. Click on the  arrow in the **Shank Designer** area of the page to display its options.
12. Click on the **New Rotary Axis Shank** button  to create a shank model file according to the ring dimensions, and display the **Rotary Axis Shank** page.

Creating the Bezel Settings

Bezel settings support the gemstones that are added to the shank after it has been manufactured. We will create the bezel settings by creating vector objects, applying three-dimensional shape attributes to them and then combining them with the shank relief.

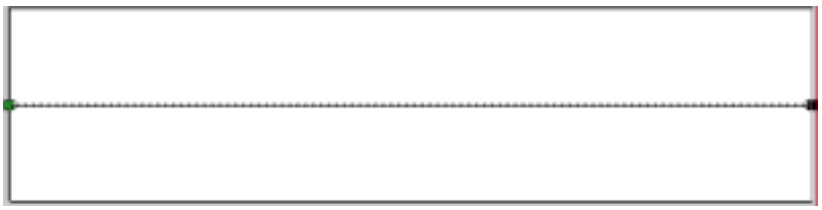
Creating the Polyline

First, we will create the polyline along which copies of vector objects will be pasted.

1. Click on the **Vector** tab  on the Main toolbar to display the **Vector** toolbar.
2. Click on the **Create Polyline** button  to display the **Polyline Creation** page.
3. Move the cursor over the left-edge of the model area (the white area) in the **2D View** window. When the cursor changes to  , click to create the Start Point in the polyline.

4. Move the cursor over the right-edge of the model area. When the cursor changes to , click to create a point (node) in the polyline.
5. Right-click to end the polyline and close the **Polyline Creation** page.

   The polyline appears in the model area of the **2D View** window as shown:

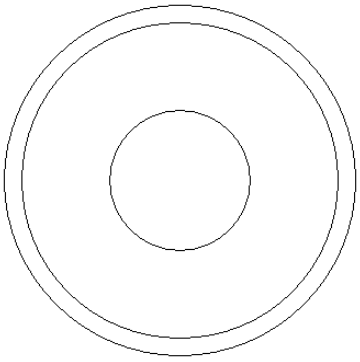


Creating the Circles

Now we are ready to create the circles from which the bezel settings will be created.

1. Click on the **Create Circles** button to display the **Circle Creation** page.
2. Click anywhere in the model area of the **2D View** window and drag until the radius of the preview circle reaches *1* mm. The radius is displayed in the **Circle Radius** box.
3. Right-click to create the circle and close the **Circle Creation** page. The circle is selected by default.
4. Click on the **Offset Vector(s)** button to display the **Offset Vector(s)** page.
5. Type *0.1* in the **Offset Distance** box.
6. Click on the **Inwards/Left** radio button to select the offset direction.
7. Click on the **Offset** button to create the offset circle.
8. Type *0.5* in the **Offset Distance** box.
9. Click on the **Offset** button to create another offset circle within the previous offset circle. There are now three circles drawn in the model.
10. Click on the **Close** button to return to the **Assistant**'s Home page.

If you zoom in on the circles using the **Zoom In Tool** in the **2D View** toolbar, you will see that they are drawn as follows:



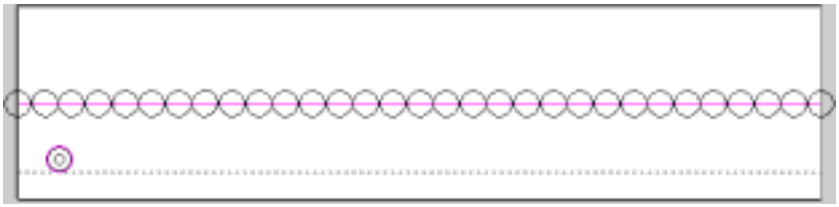
Creating the Copies

Next, we will create copies of each of the three circles along the polyline.

1. Click on the **Vector Editing** tab to display the **Vector Editing** toolbar.
2. Click on the **Paste Along Curve** button to display the **Paste Along a Curve** page.
3. Click on the largest of the circular vector objects to select it. A bounding box surrounds it.

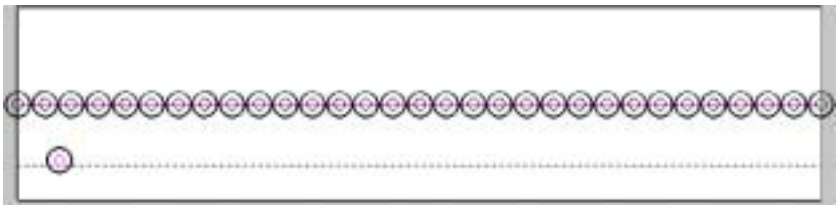
   We will assign different shape attributes to the group of copies created from each of the three circles later. For this reason, you cannot group the three circles before copying and pasting them.
4. Hold the **Shift** key down, and then click on the polyline to select it. The vector objects turn magenta.
5. Type *31* in the **Number of Copies** box.
6. Click on the **Paste** button to create thirty-one copies of the circle along the polyline.

   The circles are pasted along the polyline as shown:



7. Repeat these steps for the two offset circles.

The circles pasted along the polyline now appear as shown:



The copies created from each of the circles are grouped together.

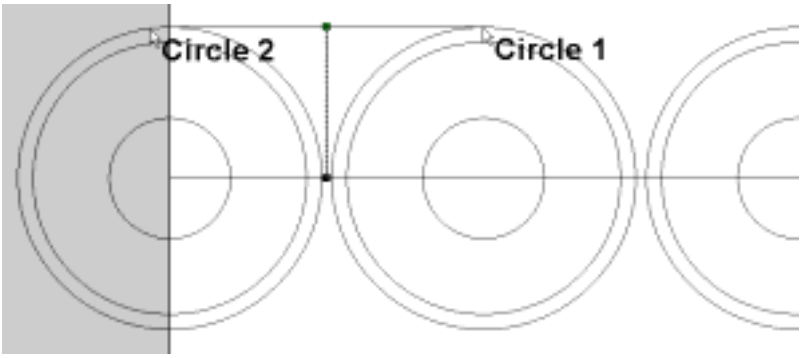
8. Click on the **Close** button to return to the **Assistant**'s Home page.

Creating the Grains

Grains secure the gemstones within a ring's shank. We will create the grains by drawing vector objects, applying three-dimensional shape attributes to them, and then combining them with the shank relief.

Creating the Polylines

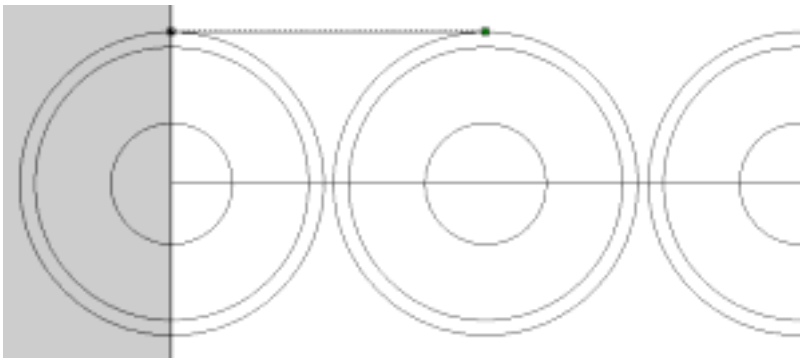
First, we will create two polylines that will allow us to place a circular vector object in the position needed to create the grains, as shown:



1. Click on the **Zoom In Tool** button in the **2D View** toolbar, and then click and drag to create a bounding box around the first two circles on the left-edge of the model area. Release the mouse button to zoom in on these circles.
2. Click on the **Vector** tab Vector to display the **Vector** toolbar.
3. Click on the **Create Polyline** button to display the **Polyline Creation** page.
4. Move the cursor over the first circle. When the cursor changes to , click to create the Start Point in the polyline.

5. Move the cursor over the left-edge of the model area. When the cursor changes to , click to create a point (node) in the polyline.
6. Press the **Space Bar** to create the horizontal polyline and remain in polyline creation mode.

   The polyline appears as shown:



7. Move the cursor back along the polyline you have just created until it changes to , and then click to create the Start Point in a new polyline.
8. Move the cursor downwards until it is level with the polyline drawn through the middle of the model, and then click to create a point (node) in the polyline.
9. Right-click to end the vertical polyline and close the **Polyline Creation** page.

Creating the Circles

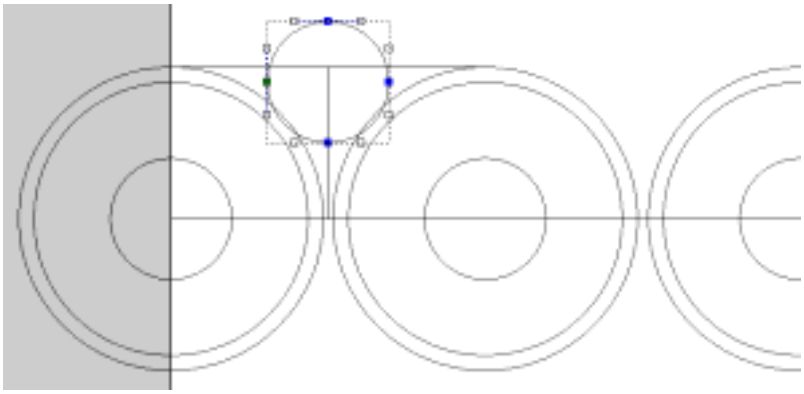
Now we are ready to create the circles for the grains. We will use the polylines to create the circles and position them correctly.

1. Click on the **Create Circles** button to display the **Circle Creation** page.
2. Click anywhere in the model area of the **2D View** window and drag until the radius of the preview circle reaches *0.4* mm. The radius is displayed in the **Circle Radius** box.
3. Right-click to create the circle and close the **Circle Creation** page. The circle is selected by default.
4. Move the cursor near to the bottom point in the circle. When it chages to , click and drag it over the vertical polyline until the cursor changes to .

You must position the cursor next to the bottom point, as ArtCAM Pro Jewellery Edition snaps the circle into place using the bottom point's position.

5. Release the mouse button to set the circle's position.

   The circle appears as shown:

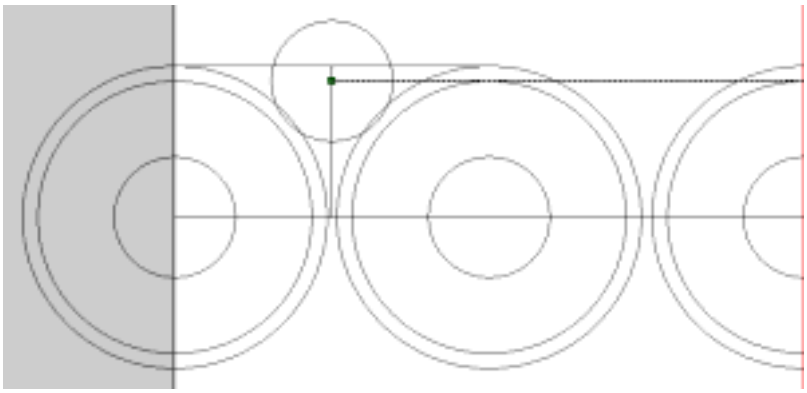


Creating the Copies

Now that we have positioned the circle, we are ready to create another polyline through the middle of the model, along which we will paste copies of the circle along it. These circles represent the top row of grains in the shank relief.

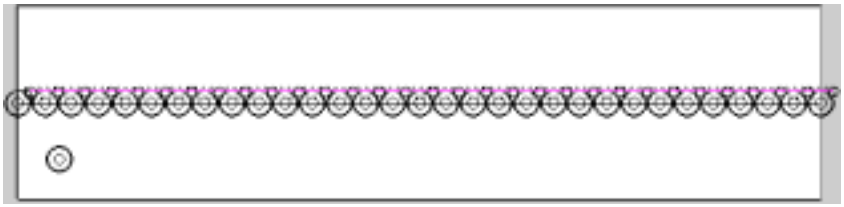
1. Click on the polyline through the middle of the model to select it. A bounding box surrounds it.
2. Hold the **Ctrl** key down, and then move the cursor near to the polyline's Start Point, When it changes to , click and drag it over the centre of the circle until the cursor changes to .
3. Release the mouse button to create a copy of the polyline with its Start Point aligned with the centre of the circle.

   The polyline appears as shown:



4. Click on the **Vector Editing** tab  to display the **Vector Editing** toolbar.
5. Click on the **Paste Along Curve** button  to display the **Paste Along a Curve** page.
6. Click on the circle to select it. A bounding box surrounds it.
7. Hold the **Shift** key down, and then click on the copy of the polyline you have created. The vector objects turn magenta.
8. Type *31* in the **Number of Copies** box.
9. Click on the **Paste** button to create thirty-one copies of the circle along the polyline.

   The circle is pasted along the polyline as shown:



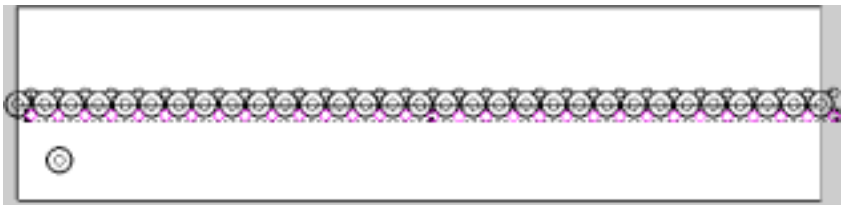
10. Click on the **Close** button to return to the **Assistant**'s Home page.

Mirroring the Copies

Next, we will create a mirrored copy of the group of circles that represent the top row of grains in the shank. This allows us to create a bottom row of grains, and completes the vector artwork needed to create the shank relief.

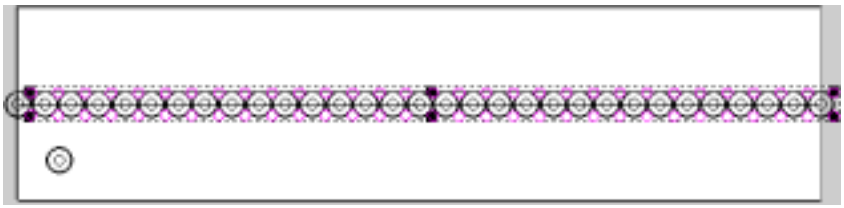
1. Click on the **Mirror Vectors** button  to display the **Mirror Vectors** page.
2. Click on the polyline drawn through the centre of the model to select it. A bounding box surrounds it.
3. Hold the **Shift** key down, and then click on the group of circles that you have created for the top grains. The vector objects turn magenta.
4. Hold the **Ctrl** key down, and then click on the **About Line** option to create a mirrored copy of the group of circles below the polyline.

   The group of circles are mirrored about the polyline as shown:



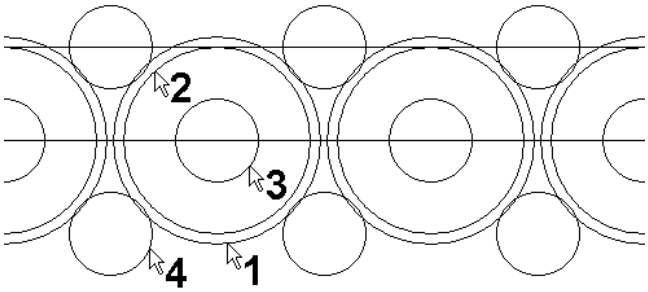
5. Click on the **Close** button to return to the **Assistant**'s Home page.
6. Hold the **Shift** key down, and then click on the top group of circles. Both groups of grain circles turn magenta.
7. Right-click to display the **Vector Editing** menu, and then click on the **Group Vectors** option to group the two selected groups of circles together.

   The group of circles are grouped as shown:



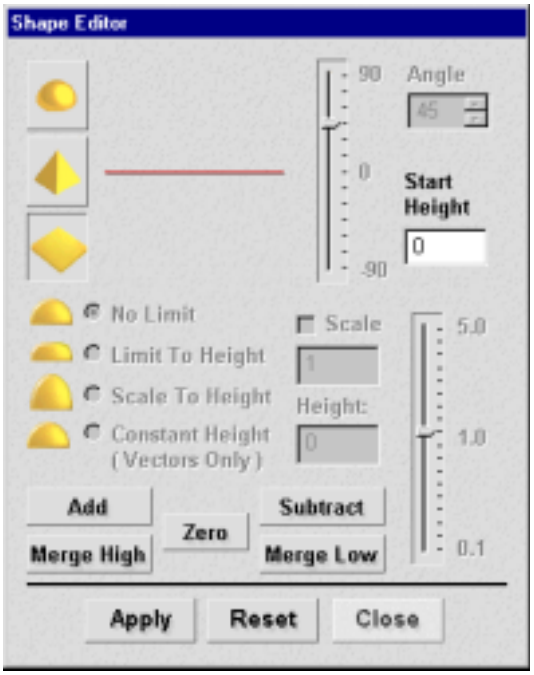
Creating the Shank Relief

We can now apply shape attributes to the circular vector objects. You must select the circles in the following order:



These shapes will be combined to form the shank relief.

1. Double-click on the first circle to display the **Shape Editor** dialog box:



2. Type *2* in the **Start Height** box, and then click on the **Apply** button.
3. Click on the **Add** button to add the shapes to the relief.
4. Click on the second circle to select the group of circles. A bounding box surrounds it.
5. Click on the **Angular** button  , type *–60* in the **Angle** box, and then click on the **Apply** button.
6. Click on the **Merge High** button to merge the highest points in the shape with the existing relief, so that only the highest points of the two remain.

   A progress bar appears beneath the **2D View** window indicating the progress ArtCAM Pro Jewellery Edition is making in calculating the relief:

   
7. Click on the third circle to select the group of circles. A bounding box surrounds them.
8. Click on the **Zero** button to reset the area of the relief defined by the group of circles to zero.
9. Click on the fourth circle to select the grains. A bounding box surrounds them.

10. Click on the **Round** button  , type *90* in the **Angle** box, *2* in the **Start Height** box, and then click on the **Apply** button.
11. Click on the **Merge High** button to merge the highest points in the shape with the existing relief, so that only the highest points of the two remain.

    A progress bar appears beneath the **2D View** window indicating the progress ArtCAM Pro Jewellery Edition is making in calculating the relief.
12. Click on the **Close** button to close the **Shape Editor** dialog box.
13. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

Creating the Triangle Model

Finally, we will create a triangle model of the finished Eternity ring from the shank relief.

1. Click on the **Rings** tab  to display the **Rotary Axis Shank** page.
2. Click on the  arrow in the **3D Modelling** area of the page to display its options.
3. Click on the **Create Ring Mesh** button  to display the **Jewellery STL Creator** page.
4. Type *0.01* in the **Tolerance** box.
5. Click on the **Close With A Flat Plane** radio button  to select this option. This instructs ArtCAM Pro Jewellery

Edition to close the triangle model with a back face equivalent to a Z height of zero.

6. Click on the **Create Triangles** button to create the triangle model.

   A progress bar appears indicating the progress ArtCAM Pro Jewellery Edition is making in triangulating the shank relief:

   The triangle model of the Eternity ring appears in the **3D View** window as shown:

7. Click on the **Save STL** button to save the triangle model.

   The triangle model is saved as *Shank.stl* in the Shank folder within the Eternity ring project directory. This file can be sent to your rapid prototyping system to manufacture a prototype of the complete Eternity ring.

Tutorial – Celtic Ring

Overview

The following tutorial demonstrates how to create a relief and a triangle model of a three-axis shank using the Shank Designer, Vector Editing and Relief Operations tools in ArtCAM Pro Jewellery Edition. Two copies of the triangle model are then merged to form a Celtic ring triangle model ready for rapid prototyping.

Celtic Ring

The stages that you will cover during the course of this tutorial are:

- Preparing the Ring Project.
- Creating and Saving the Shank Base Relief.
- Creating and Saving the Weave Relief.
- Combining and Saving the Existing Reliefs.
- Removing Unwanted Areas in the Relief.
- Saving the Shank Relief.
- Creating and Saving the Inner Relief.
- Creating a Triangle Model of the Shank.
- Combining Triangle Models of the Shank.

First, we will produce a two rail swept shape. We will calculate the shapes for the shank's shoulders and setting using the attributes already applied to vector objects in the artwork. These shapes will be combined with the two-rail swept shape to form a base relief for the shank. Next, we will calculate two shapes and combine them to form a weaved relief. After saving this relief, we will combine it with the previously saved relief. After editing selected areas of this relief, we save it as the finished shank relief. We will then reset the relief, and

then calculate two shapes and combine them to form an inner relief which we will save and use when creating a triangle model of the finshed shank.

With the finshed shank relief calculated, we will create a triangle model from it. The triangle model will be closed using the saved inner relief. Finally, we will combine two copies of the triangle model to create a single triangle model of the Celtic ring.

Preparing the Ring Project

First, we will open the ring project, which contains the artwork used to create a head and a shank relief.

1. Click on the **Rings** tab 

to display the **Ring Project** page.

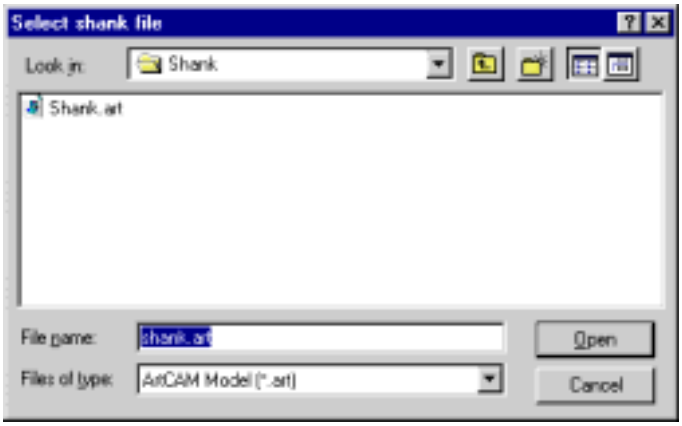
2. Click on the **Opening Existing Job** button  to display the **Browse For Folder** dialog box:

3. To open the ring project that we want to use, click on ArtCAM Pro 5510\Examples\Celtic Ring, followed by the **OK** button.

   In the **Job Information** area, you can see that this ring project has been created for a size P British ring, with a diameter of *17.73* mm and shank thickness of *2* mm. You can also see the location of the ring project folder.

4. Click on the  arrow in the **Shank Designer** area to display its options.

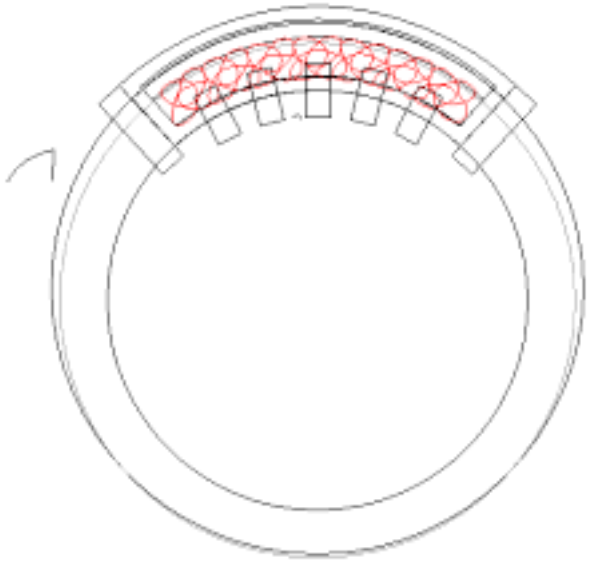
5. Click on the **Open Existing Shank** button  to display the **Select Shank File** dialog box:



The *Shank.art* model file is selected by default.

6. Click on the **Open** button to open the shank model file.

   The following vector artwork is shown in the **2D View** window:



   The .art file that you have opened is a model previously created in ArtCAM Pro Jewellery Edition. The model contains vector artwork that will be used to create the Celtic ring shank relief.

7. Press the **F3** key to display an isometric view of the finished shank relief in the **3D View** window.

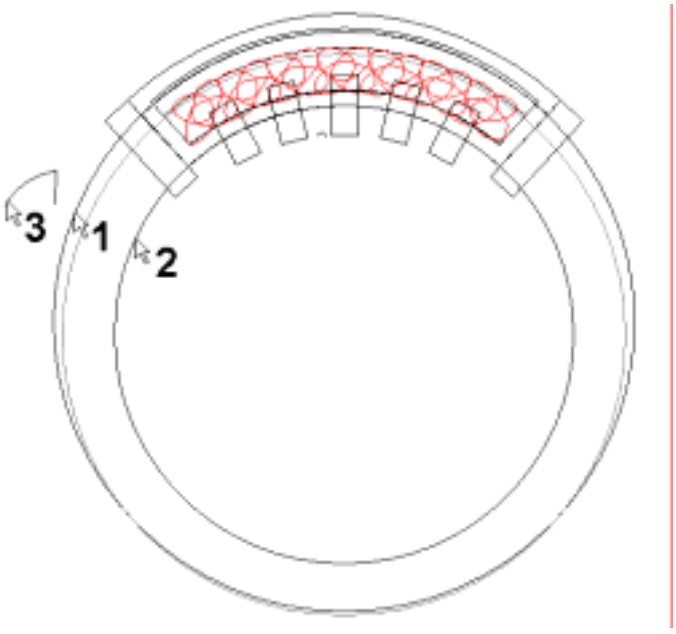
Creating and Saving the Shank Relief

We are now ready to reset the existing relief, and then create the shank relief using the vector artwork in the **2D View** window.

Resetting the Relief and Creating the Two Rail Sweep

First, we will reset the existing relief. We will then create a two rail swept shape, which will be used as the basis of the shank relief.

1. Click on the **Relief** tab  on the Mian toolbar to display the **Relief** toolbar.
2. Click on the **Reset Relief** button  to delete the existing relief.
3. Press the **F2** key to display the **2D View** window.
4. Click on the **Two Rail Sweep** button  to display the **Two Rail Sweep** page.
5. Hold the **Shift** key down, and then click on the vector objects in the **2D View** window in the order shown:



The two drive rails turn red and the cross-section turns magenta. In the **Status** area, the **First Drive Rail**, **Second Drive Rail** and **Cross Section 1** options are indicated as valid.

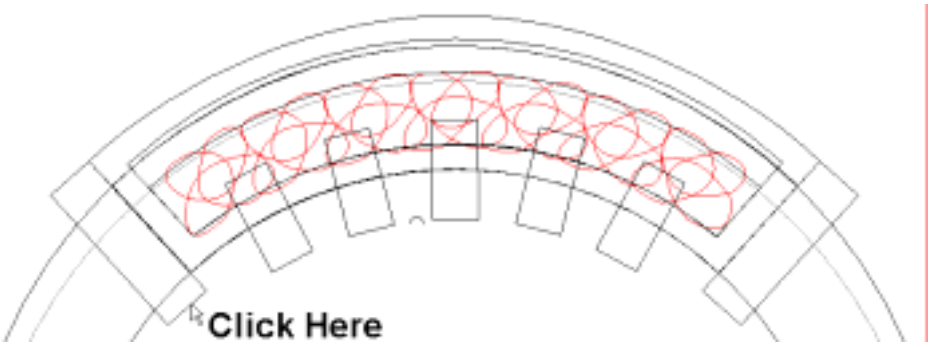
6. Click on the **Calculate** button to add the two-rail swept shape to the relief.
7. Click on the **Close** button to return to the **Assistant**'s Home page.

8. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

Creating the Shoulders

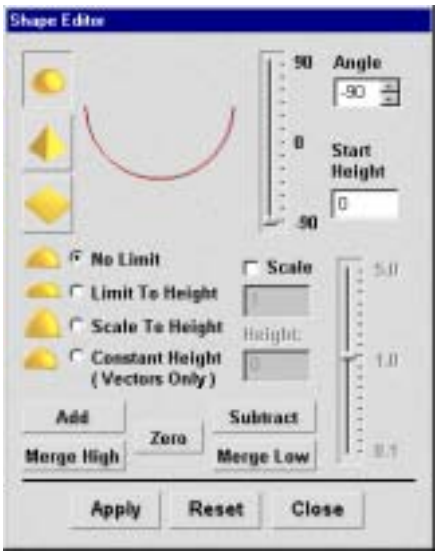
We will now create the shoulders in the shank by calculating shapes from the attributes applied to the vector artwork in the model, and combining them with the existing relief.

1. Press the **F2** key to display the **2D View** window.
2. Click on the vector object shown below to select the group:



The grouped vector objects turn magenta.

3. Double-click on either of the vector objects in the group to display the **Shape Editor** dialog box:



You can see that a round shape with an angle of *-90°* of has been applied to the group of vector objects.

4. Click on the **Add** button to add the points in the shape to the shank relief.
5. Click on the **Close** button to close the **Shape Editor** dialog box.
6. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

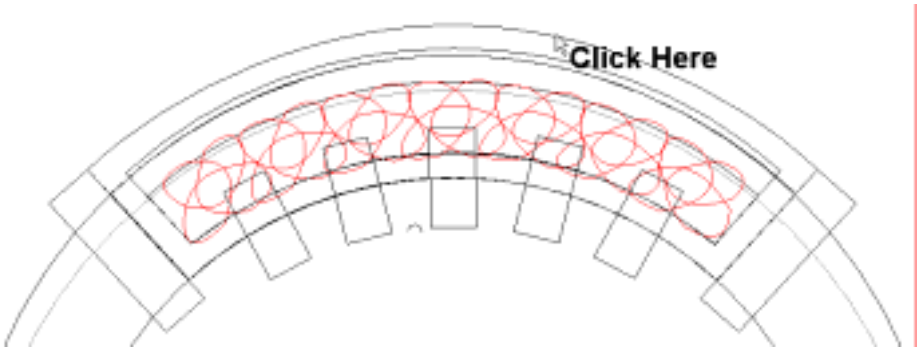
7. Press the **F2** key to display the **2D View** window.
8. Double-click on the white colour in the Colour Palette beneath the **2D View** window to display the **Shape Editor** dialog box.
9. Click on the **Merge High** button to merge the highest points in the shape attributed to the colour (none) with the shank relief. This removes the unwanted material from the shank relief.

10. Click on the **Close** button to close the **Shape Editor** dialog box.
11. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

Creating the Setting

In this section, we will remove an area of the shank relief and then add a shape to the empty area to create the shank's base relief.

1. Press the **F2** key to display the **2D View** window.
2. Click on the vector object shown below to select it:



   A bounding box surrounds it.
3. Double-click on the vector object to display the **Shape Editor** dialog box.

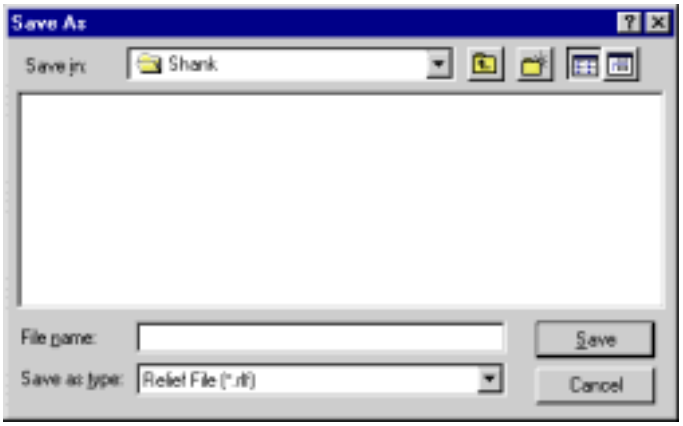
   You can see that a plane with a start height of *1.818* mm has been applied to the vector object. This is equal to the current Z height of the relief.
4. Click on the **Zero** button to reset the area of the shank relief defined by the vector object to zero.
5. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

6. Press the **F2** key to display the **2D View** window.
7. Click on the **Merge High** button to create the shape and merge it with the existing shank relief.
8. Click on the **Close** button to close the **Shape Editor** dialog box.
9. Press the **F3** key to display an isometric view of the shank relief in the **3D View** window:

Saving the Relief

Now that we have created a base relief for the finished shank, we are ready to save it. This relief will be combined with other shapes to create the finished shank relief.

1. Click on the **Save Relief** button  to display the **Save As** dialog box:

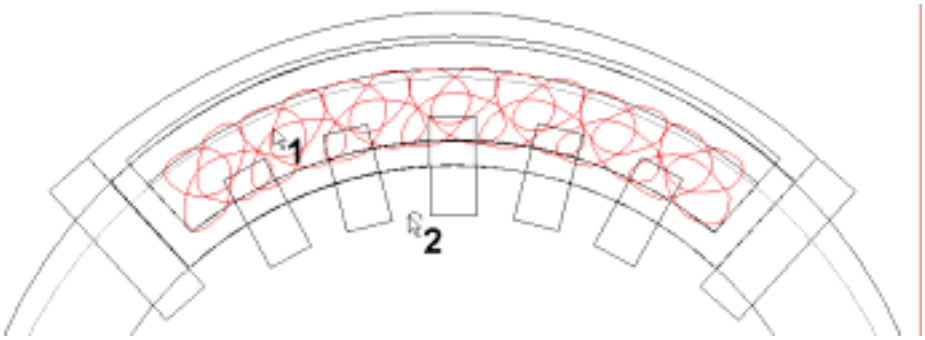


2. Type *ShankBase* in the **File Name** box.
3. Click on the **Save** button to save the relief and close the dialog box.

Creating and Saving the Weave Relief

Next, we will create a weaved shape from the vector artwork drawn in the shank model and then combine this with the shank base relief.

1. Click on the **Reset Relief** button  to delete the existing shank relief.
2. Press the **F2** key to display the **2D View** window.
3. Click anywhere in the shank model (the white area) to deselect the selected vector object.
4. Hold the **Shift** key down, and then click on the vector objects shown below:



The first group of vector objects represents the weave pattern in the shank. The group is red as it is made up of overlapping spans. A bounding box surrounds it.

The second vector object selected is used as the cross-section for the weave shape. The vector objects turn magenta.

5. Click on the **Weave Wizard** button  on the **Relief** toolbar to display the **Weave Wizard** dialog box:

6. Click on the **OK** button to accept the default values, create the weave shape and close the **Weave Wizard** dialog box.
7. Press the **F3** key to display an isometric view of the weave pattern relief in the **3D View** window:

8. Press the **F2** key to display the **2D View** window.
9. Click anywhere in the shank model (the white area) to deselect the selected vector objects.
10. Click on the vector object shown below to select the group:

The grouped vector objects turn magenta.

11. Double-click on either of the vector objects in the group to display the **Shape Editor** dialog box.

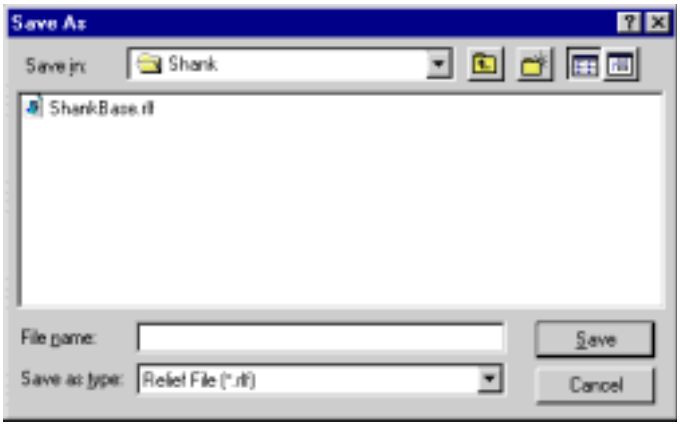
    You can see that a round shape with an angle of *80*° and a srat height of *0.1* mm has been applied to the group of vector objects.

12. Click on the **Merge High** button to merge the highest points in the shape with the weave relief, so that only the highest points of the two remain.
13. Click on the **Close** button to close the **Shape Editor** dialog box.
14. Press the **F3** key to display an isometric view of the finished weave relief in the **3D View** window:

Saving the Relief

We are now ready to save the finished weave relief, before combining it with the shank base relief.

1. Click on the **Save Relief** button  to display the **Save As** dialog box:

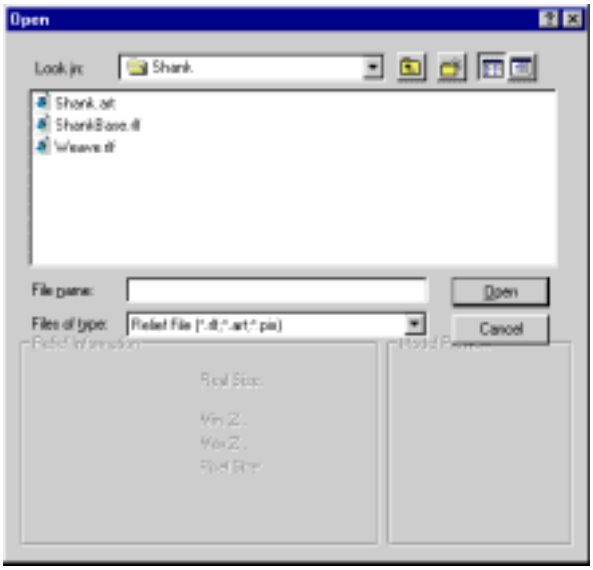


2. Type *Weave* in the **File Name** box.
3. Click on the **Save** button to save the relief and close the dialog box.

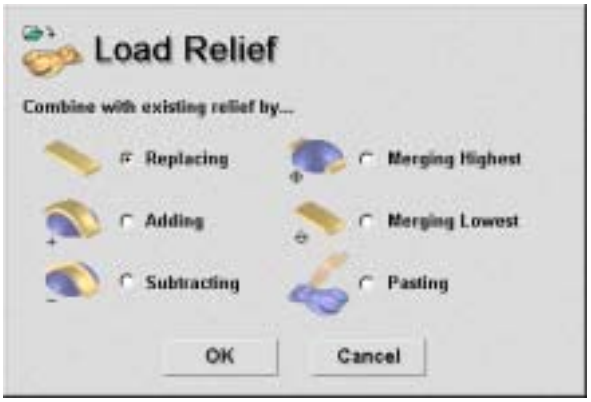
Combining the Existing Reliefs

We are now ready to combine the shank base relief with the finished weave relief.

1. Click on the **Load Relief** button  to display the **Open** dialog box:



2. Click on the *ShankBase.rlf* file to select it, and then the **Open** button to display the **Load Relief** dialog box:

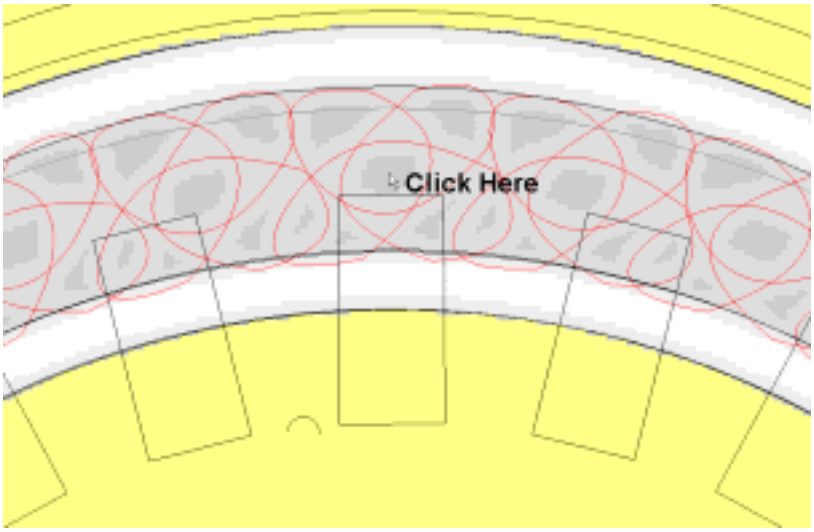


3. Click on the **Adding** radio button  to select it. This option instructs ArtCAM Pro Jewellery Edition to add the shank base relief to the finished weave relief.
4. Click on the **OK** button to combine the two reliefs. The shank relief appears in the **3D View** window as shown:

Removing Unwanted Areas in the Relief

Next, we will reset part of the shank relief to zero. This will remove the areas in the relief to restore the gaps in the weave pattern.

1. Press the **F2** key to display the **2D View** window.
2. Click on the **Model** tab  to display the **Model** toolbar.
3. Click on the **Grayscale From Relief** button  to create a greyscale image of the existing shank relief in the **2D View** window.
4. Click on the **Zoom In Tool** button  in the **2D View** toolbar.
5. Click and drag to form a bounding box around the weave pattern in the **2D View** window. Release the mouse button to zoom in on this area of the shank model.
6. Double-click on the dark-grey colour in-between the weave pattern, as shown, to display the **Shape Editor** dialog box:

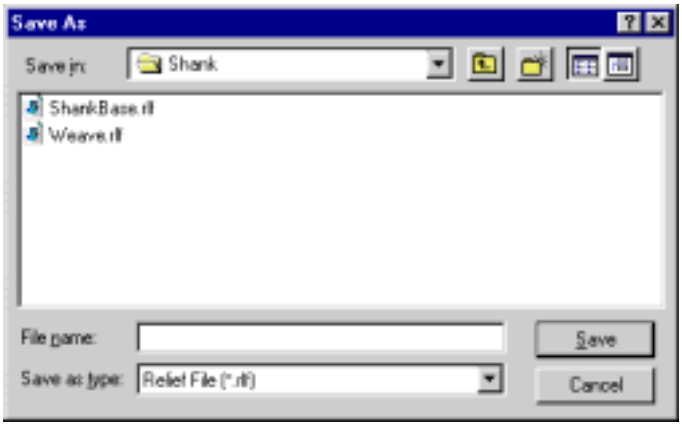


7. Click on the **Zero** button to reset the areas of the shank relief under the dark-grey colour to zero.
8. Click on the **Close** button to close the **Shape Editor** dialog box.
9. Press the **F3** key to display an isometric view of the finished shank relief in the **3D View** window:

Saving the Shank Relief

We are now ready to save the finished shank relief, from which we will create a triangle model.

1. Click on the **Relief** tab  to display the **Relief** toolbar.
2. Click on the **Save Relief** button  to display the **Save As** dialog box:



3. Type *Shank* in the **File Name** box.
4. Click on the **Save** button to save the relief and close the dialog box.

Creating and Saving the Inner Relief

In this section, we will create the shape that will be used to close the triangle model of the shank relief.

1. Click on the **Reset Relief** button  to delete the existing shank relief.
2. Press the **F2** key to display the **2D View** window.
3. Click on the **Window Fit** button  in the **2D View** toolbar to view the whole shank model.
4. Click on the **Bitmap On/Off** button  in the **2D View** toolbar to hide the greyscale image.
5. Click on the vector object shown below to select it:

A bounding box surrounds it.

6. Double-click on the vector object to display the **Shape Editor** dialog box.

You can see that a plane with a start height of *1* mm of has been applied to the vector object.

7. Click on the **Add** button to add the shape to the relief.
8. Click on the **Close** button to close the **Shape Editor** dialog box.
9. Click anywhere in the shank model (the white area) to deselect the selected vector object.
10. Click on the vector object shown below to select the group:

The grouped vector objects turn magenta.

11. Double-click on any of the vector objects in the group to display the **Shape Editor** dialog box.

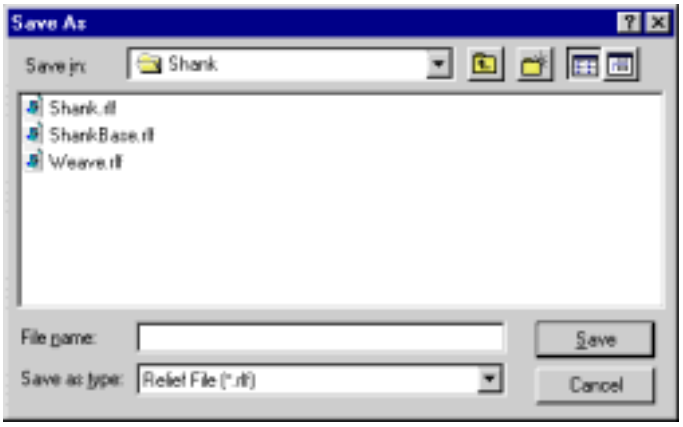
    You can see that a round shape with an angle of *90*° and a start height of *0.1* mm of has been applied to the group of vector objects.

12. Click on the **Merge High** button to merge the highest points in the shapes with the existing relief, so that only the highest points of the two remain.
13. Click on the **Close** button to close the **Shape Editor** dialog box.
14. Press the **F3** key to display an isometric view of the relief in the **3D View** window:

Saving the Inner Relief

We are now ready to save the relief, which we will use to close the triangle model of the finished shank relief.

1. Click on the **Save Relief** button  to display the **Save As** dialog box:

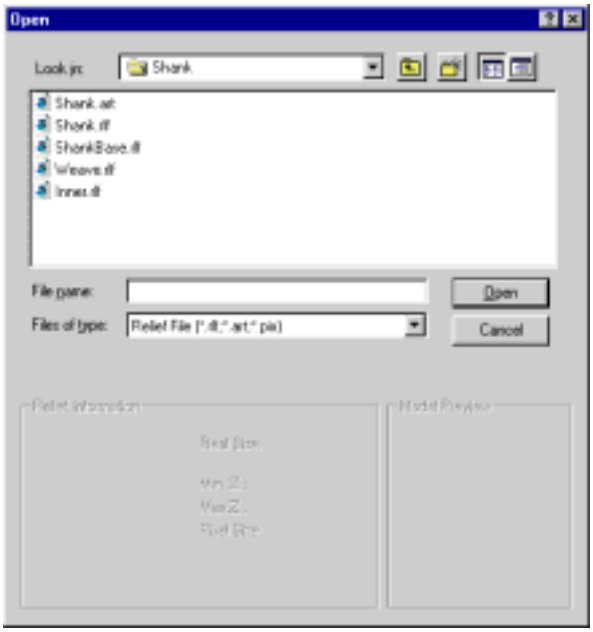


2. Type *Inner* in the **File Name** box.
3. Click on the **Save** button to save the relief and close the dialog box.

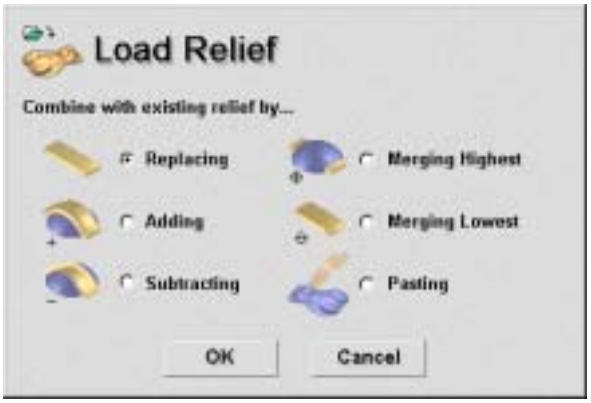
Creating a Triangle Model of the Shank

We are now ready to create a closed triangle model of the shank relief.

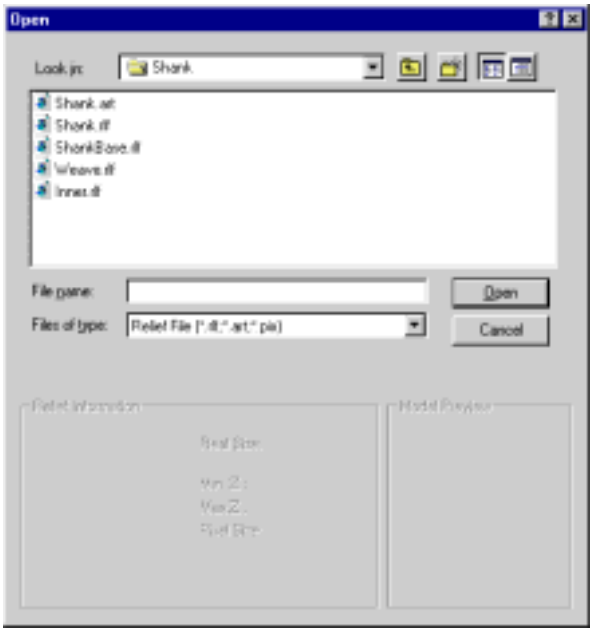
1. Click on the **Load Relief** button  to display the **Open** dialog box:



2. Click on the *Shank.rlf* file to select it, followed by the **Open** button to display the **Load Relief** dialog box.



3. Make sure that the **Replacing** option is selected by clicking on its radio button .
4. Click on the **OK** button to replace the inner relief shown in the **3D View** window with the finished shank relief.
5. Click on the **Rings** tab Rings to display the **Ring Project** page.
6. Click on the arrow in the **3D Model** area to display its options.
7. Click on the **Create STL Mesh** button to display the **Jewellery STL Creator** page.
8. Type *0.01* in the **Tolerance** box.
9. Click on the **Use Relief From File** radio button . This option instructs ArtCAM Pro Jewellery Edition to create a back face for the triangle model from a relief file, providing that it is the same size and resolution as the existing relief.
10. Click on the **Load** button to display the **Open** dialog box:



11. Click on the *Inner.rlf* file to select it, followed by the **Open** button to load the relief.
12. Click on the **Create Triangles** button to create the triangle model.

    A progress bar appears indicating the progress ArtCAM Pro Jewellery Edition is making in triangulating the shank relief:

    The triangle model of the finished shank appears in the **3D View** window as shown:

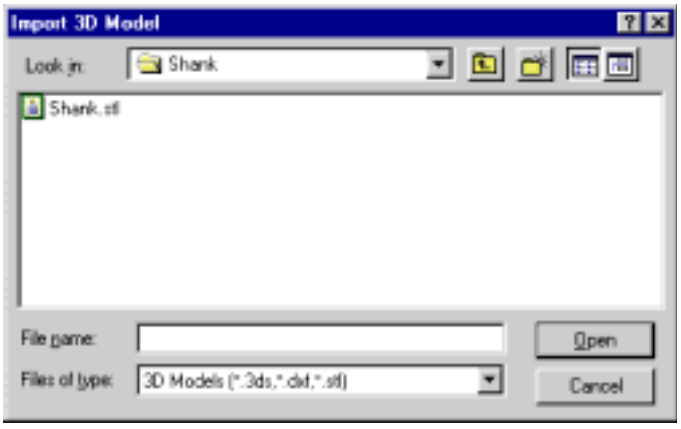
    The triangle model is saved by default as *Shank.stl* in the Shank folder within the Celtic Ring directory.

Combining Triangle Models of the Shank

Finally, we will load a copy of the shank triangle model, move and rotate it into position, and then combine it with the original shank triangle model. This will create a single three-dimensional triangle model of the finished Celtic ring.

1. Click on the **Back** button to return to the **Three Axis Shank** page.
2. Click on the **Back** button to return to the **Ring Project** page. A message box is displayed, warning that the data has changed in the shank model.
3. Click on the **Yes** button to confirm that you want to save the changes in the shank model file.
4. Click on the **STL Assembler** button to display the **Ring Assembler** page.

   ArtCAM Pro Jewellery Edition opens all of the available triangle models in the ring project in the **3D View** window. This is the triangle model of the ring's shank.
5. Click on the arrow in the **Model Loader** area of the page to display its options.
6. Click on the **Load** button to display the **Import 3D Model** dialog box:



7. Click on the *Shank.stl* file to select it, followed by the **Open** button to import the triangle model of the shank and display it in the **Model Loader** window.
8. Click on the *Shank* triangle model listed in the **Model Loader** window to select it.

9. Click on the arrow in the **Positioning** area of the page to display its options.
10. In the **Move** area, type *0* in the **Y** box, and then click on the **Move** button. The triangle model is moved as shown:

11. In the **Rotate** area, type *180* in the **Z** box, and then click on the **Rotate** button. The triangle model is rotated as shown:

12. Click on the **Merge** button to merge the two triangle models. A single triangle model for the finished Celtic ring is now shown in the **3D View** window.

13. Click on the *Merged Models* triangle model listed in the **Model Loader** window.
14. Click on the **Save** button to display the **Save STL File** dialog box.
15. Type *CelticRing* in the **File name** box.
16. Click on the **Save** button. This closes the **Save STL File** dialog box and saves the merged triangle models as a single STL file. This file can be sent to your rapid prototyping system to manufacture a prototype of the complete Celtic ring.

Working with Shanks

Designing a Shank

A ring project is either made up of just a shank, or a combination of a shank and a head, based on a common ring size. A shank is the part of a ring that encircles the finger.

The **Shank Designer** area of the **Ring Project** page allows you to:

- Create one of two types of shank for your ring design. For details, see "Creating a Shank" on page 79.
- Open an existing shank that you have already saved as part of a ring project. For details, see "Opening an Existing Shank" on page 93.

The **Shank Designer** area is displayed on the **Ring Project** page only when a ring project is open. For details, see "Creating a Ring Project" or "Opening an Existing Ring Project" in the Working with Ring Projects chapter.

Creating a Shank

You can create two different types of shank, depending on how you want to machine it:

- **Rotary Axis Shank** – A rotary axis shank is designed for production using a rotary axis CNC machining tool.
- **3-Axis Shank** – A three-axis shank is designed for production using a three axis CNC machining tool.

To create the shank in your ring design:

1. Click on the arrow in the **Shank Designer** area of the **Ring Project** page to display its options, and then click on the button for the type of shank you want to create:

   - Click on the **New Rotary Axis Shank** button to create an ArtCAM model file for a rotary axis shank and display the **Rotary Axis Shank** page. For further information, see "Creating a Rotary Axis Shank" on page 81.

   - Click on the **New 3-Axis Shank** button to create an ArtCAM model file for a three axis shank and display the **Three Axis Shank** page. For further information, see "Creating a Three Axis Shank" on page 91.

Note: If you have already created a shank as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing shank, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save Art File** dialog box, where you can save the shank using a different name and/or folder.

ArtCAM Pro Jewellery Edition displays the shank model in the **2D View** window. If you are creating a rotary axis shank, the model area (the white area) is shown in the top-half of the window, and the reference silhouette used for designing the ring profile is shown in the bottom-half.

If you are creating a three-axis shank, both the model area and the reference silhouette appear in the centre of the **2D View** window.

The reference silhouette is made up of two circular vector objects:

The distance between the inner and outer circle in the reference silhouette is equal to the shank width defined on the **Ring Project** page. For details, see "Creating a Ring Project" in the Working with Ring Projects chapter.

Guidelines are shown in the **2D View** window by default for either shank model. For details on using guidelines, see the ArtCAM Pro Layout chapter in the ArtCAM Pro Reference Manual.

Depending on the type of machining tool you are using, follow the instructions in "Creating a Rotary Axis Shank" on page 81 or "Creating a Three Axis Shank" on page 91.

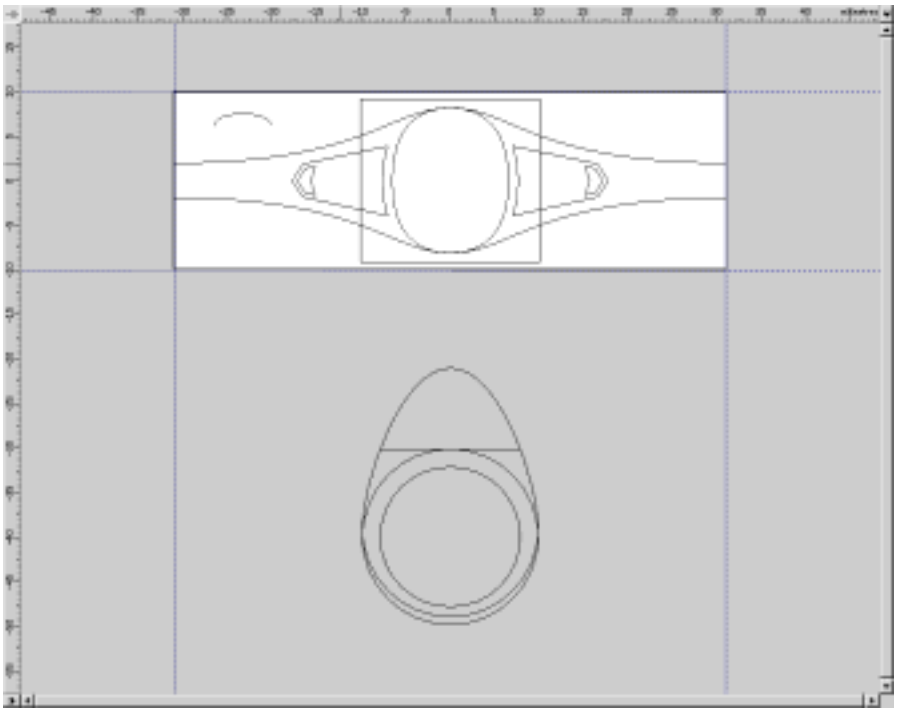
Creating a Rotary Axis Shank

When creating a rotary axis shank, first you must create the artwork that represents the shank design. You can then use the vector artwork to create three-dimensional shapes that, when combined, form the basis of the shank. Finally, you can add shapes to, or remove sections from, the relief to produce a shank relief suitable for manufacturing.

Designing the Shank

You can design the shank's shape and detail using the **Vector Editing** and **Bitmap Editing** tools available in ArtCAM Pro Jewellery Edition. For details, see the Working with Vectors and the Working with Bitmaps chapter in the ArtCAM Pro Reference Manual.

You can draw your shank design both on and around the reference silhouette, and in the model area of the **2D View** window. For example, the vector artwork used for creating a Class ring is shown as follows:



You can edit your design to provide an alternative means of creating the three-dimensional shapes that form the shank relief, and to counter the problem of distortion often found in rotary axis machining:

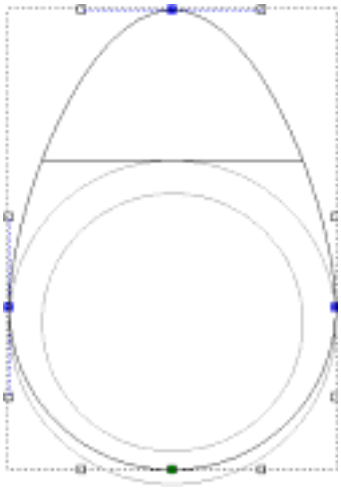
- Create a ring profile vector. See "Creating a Ring Profile Vector" on page 82.
- Create copies of vector objects, in which the contour is adjusted to compensate for any distortion that would occur during machining. See "Creating Unwrapped Vector Copies" on page 83.

When you have completed the shank design, you can:

- Create the shank relief. See "Creating the Shank Relief" on page 85.
- Click on the **Back** button  to return to the **Ring Project** page, where you can either continue working on another part of the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Creating a Ring Profile Vector

The vector object that you have drawn on or around the reference silhouette to represent the overall shape of the ring is referred to as the ring profile. In our example, the ring profile is shown as follows:



This vector object can be unwrapped, and then used as a z-modulation vector or cross-section when you are creating a standard two-rail swept shape. For details, see the Working with Reliefs chapter in the ArtCAM Pro Reference Manual. In our example, the ring profile vector would look as follows:

You can edit the shape of the ring profile vector, as you would any other polyline. For further information, see the Working with Vectors chapter in the ArtCAM Pro Reference Manual.

To create a ring profile vector:

1. Click on the ring profile in the **2D View** window to select it. A bounding box surrounds it.
2. Click on the  arrow in the **Profile Designer** area of the page to display its options.
3. Click on the **Unwrap Ring Profile Vector** button  to create the ring profile vector in the model area.

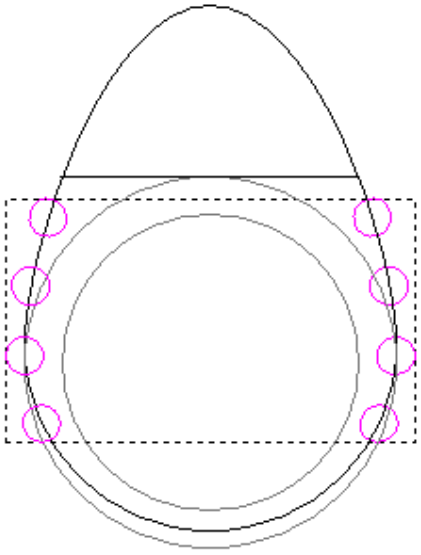
Creating Unwrapped Vector Copies

In rotary axis machining, when a shank is bent into place, particular shapes that make up its detail can be distorted. By unwrapping the vector objects that make up the detail in the shank design, you can create copies of them in which the contour has been adjusted to compensate for the distortion in shape that would normally occur during the manufacturing process.

To create unwrapped copies of vector objects:

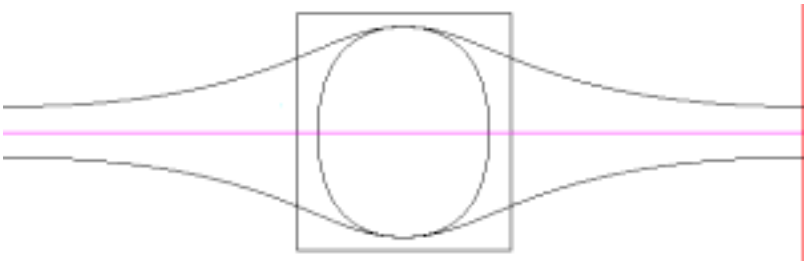
1. Hold the **Shift** key down, and then click on the vector objects drawn on or around the reference silhouette that you want to correct for any distortion. The selected vector objects turn magenta.

   In our example, the vector artwork used to create eight holes in the shank relief would look something like this:



2. Still holding the **Shift** key down, click on the vector object along which you want the corrected copies to be pasted. The selected vector object turns magenta.

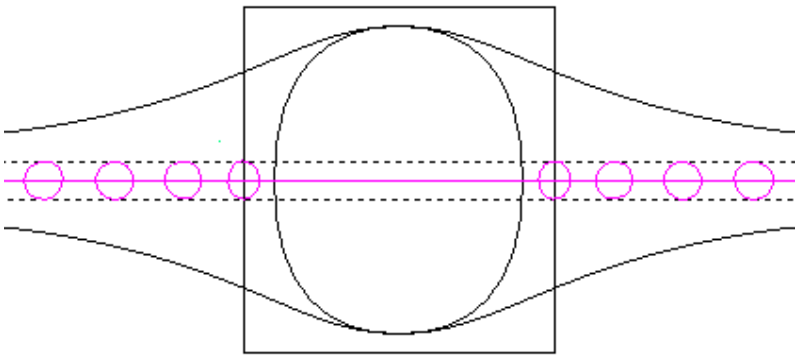
   In our example, a polyline drawn in the model area through the middle of the shank design is selected:



3. Click on the  arrow in the **Profile Designer** area of the page to display its options.

4. Click on the **Unwrap Selection** button  to unwrap the selected vector objects. The corrected vector objects are unwrapped to the model area (the white area) of the **2D View** window.

   In our example, the corrected vector objects are shown as follows:



You can see that each of the circles have been adjusted to allow perfect circles/holes to be created in the shank during the manufacturing process.

Creating the Shank Relief

When you have created the shank design in the **2D View** window, you can create the shank relief. You can also edit the vector artwork to compensate for the distortion in their shape that would normally occur during rotary axis machining.

Using the vector artwork in the shank design, you can:

- Create a swept ring profile. See "Creating a Swept Ring Profile" on page 85.
- Wrap three-dimensional shapes onto the shank relief. See "Wrapping Shapes onto the Shank Relief" on page 87.
- Add a three-dimensional shape with a plane to the shank relief. See "Creating a Plane" on page 88.

When you have created the shank relief, you can:

- Edit the shank relief. See "Editing the Shank Relief" on page 89.
- Click on the **Back** button  to return to the **Ring Project** page, where you can either continue working on another part of the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Creating a Swept Ring Profile

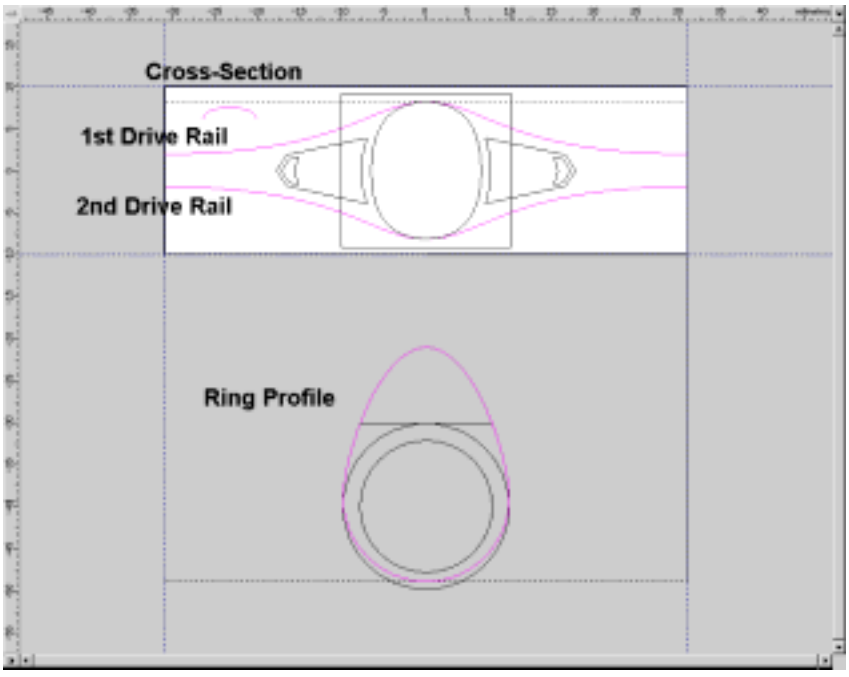
A swept ring profile is a three-dimensional shape. You can create a swept ring profile using the vector objects that make up your shank

design. To create the swept ring profile you need to select four vector objects: two drive rails, a cross-section and a ring profile.

To create a swept ring profile:

1. Click on the vector object in the **2D View** window along which you want the cross-section of the ring to be swept to select it. This is referred to as the first drive rail. A bounding box surrounds it.
2. Hold the **Shift** key down, and then click on the second vector object in the **2D View** window that you want to use as the second drive rail. The selected vector objects turn magenta.
3. Hold the **Shift** key down, and then click on the open vector object in the **2D View** window that you want to use as the cross-section of the ring. The selected vector object turns magenta.
4. Hold the **Shift** key down, and then click on the vector object drawn on or around the reference silhouette in the **2D View** window that you want to use as the ring profile. The selected vector object turns magenta.

   In our example, the vector objects used to create the swept ring profile appear as shown when selected:



5. Click on the  arrow in the **Profile Designer** area of the page to display its options.

6. Click on the **Sweep Ring Profile** button to create the swept ring profile.
7. Click on the **3D View** button in the **2D View** toolbar to display an isometric view of the swept ring profile in the **3D View** window.

   In our example, the swept ring profile appears as shown below. This forms the basis of the class ring shank relief:

Wrapping Shapes onto the Shank Relief

You can select how and where three-dimensional shapes that you have applied to the vector artwork in your shank design are wrapped onto the shank relief. You can also compensate for any distortion in their contour that occurs during the wrapping process.

To wrap a shape onto the shank relief:

1. Apply the shape attributes to the vector object representing the outline of the shape that you want to wrap onto the shank relief. For further information, see the Working with Reliefs chapter in the ArtCAM Pro Reference manual.
2. Hold the **Shift** key down, and then click on the vector object representing the shape that you want to wrap to select it.
3. Select how you want to wrap the shape:
   - To wrap the shape from its centre point, make sure that neither the **Wrap From Start Node** or **Radial Wrap** options are selected ☐.
   - To maintain the position of the Start Point in the shape and wrap the rest of its contour from this point,

click on the **Wrap From Start Node** option to select it ☑.

- To wrap the shape radially, correcting for underlying curvature in both the X and Y-axes, click on the **Radial Wrap** option to select it ☑.

4. Relief pixels are effectively square at only one particular height above the base of the shank relief. By default, this height is equal to the average **Shank Thickness** defined when a ring project is created. If you want to wrap the shape onto the shank relief above or below this height:

   - Type the height at which you want to wrap the shape in the **Height** box.
   - Click on the **Correct Vector For Height** button  to compensate for the asymmetric pixels in the shank relief at the specified height.

   For further information, see "Creating a Ring Project" in the Working with Ring Projects chapter.

5. Click on the **Wrap Vector To Relief** button  to wrap the shape onto the shank relief.

6. Click on the **3D View** button  in the **2D View** toolbar to display an isometric view of the shank relief in the **3D View** window.

Creating a Plane

You can add a three-dimensional shape with a plane to the existing shank relief.

To add a shape with a plane to the existing shank relief:

1. Click on the vector object in the shank design from which you want to create a plane. A bounding box surrounds it.
2. Click on the  arrow in the **3D Modelling** area of the page to display its options.
3. Type a value in the **Height** box to set the height of the plane at the centre of the shape.

   If you want to set the height of the plane from its outside-edge:

   - Click on the **Height at Edge** option to select it ☑.

- Type the height of the plane at the edge of the shape in the **Height** box

4. If you want to set the sides of the shape as vertical, click on the **Vertical Sides** option to select it ☑.
5. Click on the **Create Flat Plane** button  to add the shape with a plane to the shank relief.

Editing the Shank Relief

You can edit the shank relief in the following ways:

- Toggle the view in the **3D View** window, to show either a wrapped or an unwrapped shank relief. See "Changing the 3D View" on page 89.
- Cut a plane into the existing shank relief. See "Cutting a Plane into the Relief" on page 90.
- Close any gaps in the shank relief. See "Closing Gaps in the Relief" on page 91.
- Create a triangle mesh from the shank relief. See "Creating a Triangle Mesh" in the Working with Triangle Models Chapter.
- Merge a triangle model with the shank relief, providing that it has been created with the same ring project settings. See "Unwrapping a Triangle Model into a Relief" in the Working with Triangle Models chapter.

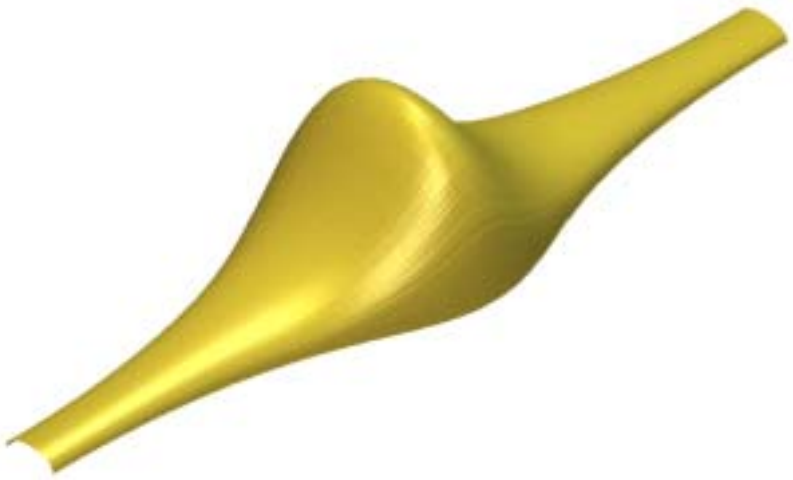
Changing the 3D View

You can choose to display a wrapped or an unwrapped view of the shank relief in the **3D View** window. The wrapped view is shown by default.

To change the view of the shank relief:

1. Click on the  arrow in the **3D Modelling** area of the page to display its options.
2. Click on the **3D View** button  in the **2D View** toolbar to display the **3D View** window.
3. Click on the **Toggle View** button  to display the unwrapped view of the shank relief. Click on the button again to restore the view of the wrapped shank relief.

In our example, the Class ring shank relief appears as shown below when unwrapped:



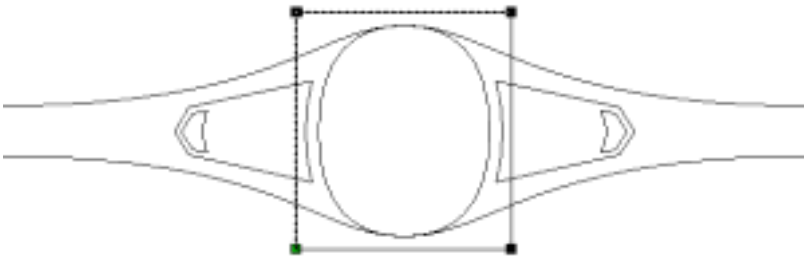
Cutting a Plane into the Relief

You can cut a plane into the existing shank relief.

To cut a plane into the existing shank relief:

1. Click on the vector object you want to use to define the area of the cut plane. A bounding box surrounds it.

   In our example, the vector object used for the plane is shown below:



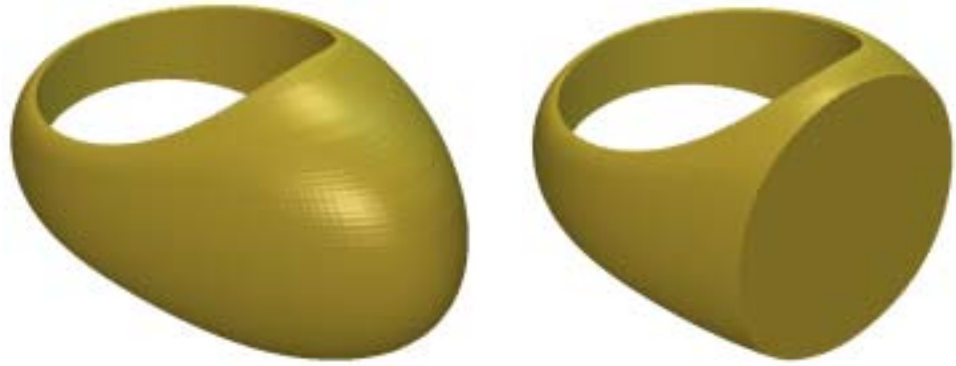
2. Click on the arrow in the **3D Modelling** area of the page to display its options.
3. Set the height at which you want to cut the plane into the shank relief. You can either:
   - Type the height of the plane in the **Height** box.
   - Click on the **Find Height Automatically** option to turn it on ☑. This instructs ArtCAM Pro Jewellery Edition to find the highest point under the contour of the selected vector object. This is often the height needed to create a plane.

In our example, the plane is cut into the Class ring shank relief at a height of *2* mm.

4. Click on the **Cut Flat Plane** button to cut the plane into the shank relief.

   In our example, the relief appears as shown below before and after the plane is cut into it:

Before… *After…*



Closing Gaps in the Relief

When creating a relief using the vector artwork in the shank model, ArtCAM Jewellery Edition calculates its shape to the nearest pixel. If the resolution in your shank model is low, it can result in small gaps appearing in the relief. You can reduce the probability of gaps forming in the relief by increasing the resolution used in the current ring project. For details, see "Creating a Ring Project" in the Working with Ring Projects chapter. Alternatively, you can close any gaps in the relief immediately after it has been calculated.

To close any gaps at the extreme ends of the shank relief:

1. Click on the arrow in the **3D Modelling** area of the page to display its options.

2. Click on the **Close Ring Ends** button to close the gaps in the shank relief.

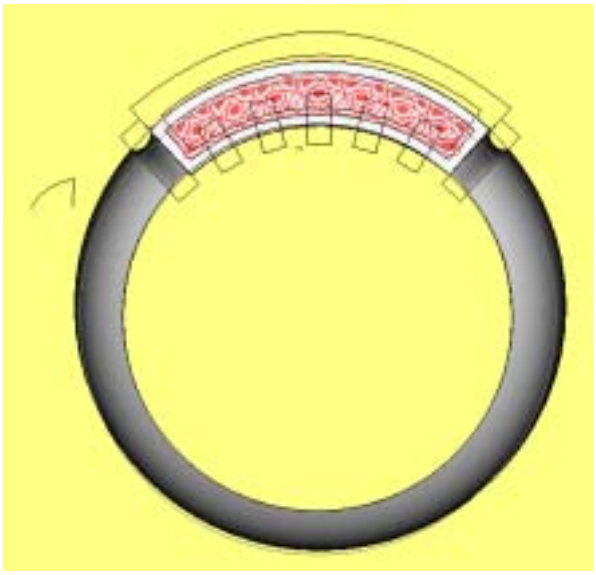
Creating a Three Axis Shank

When creating a three axis shank, first you must create the artwork that represents the shank design. You can then use the vector objects and bitmap colours within the artwork to create three-dimensional shapes that, when combined, form the basis of the shank. Finally, you

can add shapes to, or remove sections from, the shank relief to form a relief of the shank design that you want to manufacture.

Designing the Shank

You can design the shank's shape and detail using the reference silhouette, along with the **Vector Editing** and **Bitmap Editing** tools available in ArtCAM Pro Jewellery Edition. For details, see the Working with Vectors and the Working with Bitmaps chapter in the ArtCAM Pro Reference Manual. For example, the artwork shown below is used to create a Celtic ring relief:



Creating the Relief

When you have created the artwork for the shank design, you can use the vector objects and bitmap colours, along with the **Shape Editor**, **Relief Operations** and **Vector Based Relief Creation** tools available in ArtCAM Pro Jewellery Edition, to create the three axis shank relief. For further information, see the Working with Reliefs chapter in the ArtCAM Pro Reference Manual.

In our example, the shank relief is shown as follows:

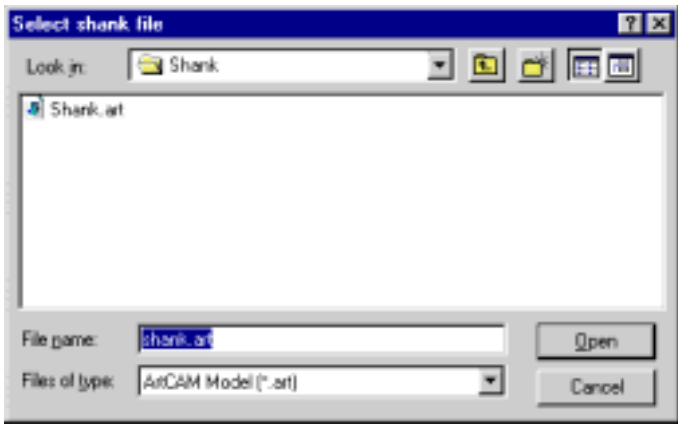
When you have created the shank relief, you can:

- Create a triangle model of the shank. For details, see "Creating a Triangle Mesh" in the Working with Triangle Models Chapter.
- Click on the **Back** button to return to the **Ring Project** page, where you can either continue working on the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Opening an Existing Shank

To open a shank that you have already created as part of the current ring project:

1. Click on the arrow in the **Shank Designer** area of the **Ring Project** page to display its options.
2. Click on the **Open Existing Shank** button to display the **Select Shank File** dialog box:



The *Shank.art* model file is selected by default.

Note: If you have not created a shank as part of the current ring project, a message box appears. Click on the **OK** button to close the message box, and then create a shank. For details, see "Creating a Shank" on page 79.

3. If you have created more than one shank model in your ring project, click on the file that you want to open.
4. Click on the **Open** button to open the selected shank model.

Working with Heads

Designing a Head

A basic ring project is either made up of just a shank, or a combination of a shank and a head, based on a common ring size. The head is the part of the ring that holds a principal gemstone, and sometimes side stones, in place. There are several styles of head settings, including Bezel, Collet, Claw and Pave.

The **Head Designer** area of the **Ring Project** page allows you to:

- Create three types of head for your ring design. For details, see "Creating a Head" on page 95.
- Open an existing head that you have already saved as part of a ring project. For details, see "Opening an Existing Head" on page 112.

The **Head Designer** area is displayed on the **Ring Project** page when a ring project is open. For details, see "Creating a Ring Project" or "Opening an Existing Ring Project" in the Working with Ring Projects chapter.

Creating a Head

You can create three different types of head in your ring projects, depending on how you want to set gemstones within it. These are as follows:

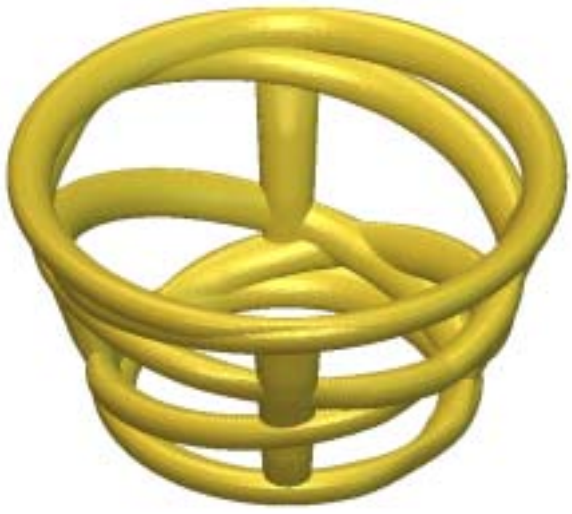
- **Round Setting** – A round setting or 'rubover', is a style of setting in which a gemstone is mounted within a collar of metal, the upper edge of which has been bent or 'rubbed' over the edge of the gemstone. For details, see "Creating a Round Setting" on page 96.

- **Basket Setting** – A basket setting is made up of bezels and claws. A bezel is a style of setting in which the gemstone is held in place by a fine layer of metal, which just overlaps its girdle to hold it in place. This metal rim can protect the gemstone from damage without preventing light from entering it. A claw is a style of setting in which a gemstone is held in place by a series of prongs, or 'claws', which overlap its surface. For details, see "Creating a Basket Setting" on page 101.
- **Cluster** – In a cluster, a series of smaller gemstones are set either to the sides of, or around the principal gemstone in the ring. Like a basket setting, a cluster is also made up of bezel and claw settings. For details, see "Creating a Cluster" on page 106.

Creating a Round Setting

When creating a round setting, you must first define its parameters. Using these parameters, ArtCAM Pro Jewellery Edition creates an ArtCAM model file containing vector artwork and a base relief. You can then add to the vector artwork, generate three-dimensional shapes from it and then combine the shapes with the base relief to form the setting's detail.

When you have created the round setting relief, you can save it as it is or when inverted, and then create a closed triangle model from it. For example, a closed triangle model of a round setting is created using its inverted back relief, as shown:



To create a round setting as the head in your ring design:

1. Click on the arrow in the **Head Designer** area of the **Ring Project** page to display its options.
2. Click on the **Round Setting** button to display the **Plane Collet** page.
3. Click on the arrow in the **Collet Parameters** area to display the parameter settings.
4. Type the diameter of the area of the round setting supporting the crown of the gemstone in the **Top Diameter** box.
5. Type the diameter of the area of the round setting supporting the pavilion of the gemstone in the **Bottom Diameter** box.
6. Type the overall height of the round setting in the **Collet Height** box.
7. Click on the arrow in the **3D Model** area of the page to display its options.
8. Click on the **Create Collet Model** button to create an ArtCAM model according to the defined parameters .

   A preview vector of the round setting is generated in the **2D View** window and it is selected. A base relief of the round setting is also generated in the **3D View** window.

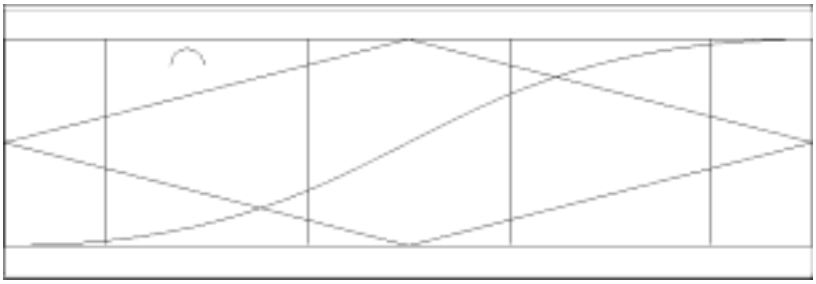
   In our example, the base relief for a round setting with a top diameter of *5* mm, a bottom diameter of *3* mm and a height of *3* mm appears as shown:

Note: If you have already created a head as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing head, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save Art File** dialog box, where you can save the head using a different name and/or folder.

Note: Click the **Toggle Collet Relief** button  to add and remove the base relief to/from the **3D View** window.

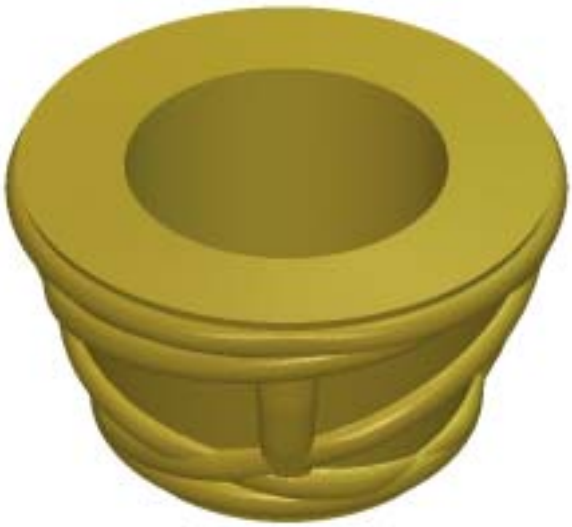
9. In the **2D View** window, draw the vector objects representing the round settings' detail using the **Vector Editing** tools available in ArtCAM Pro. For further information, see the Working with Vectors chapter in the ArtCAM Pro Reference Manual.

   In our example, the vector objects used to create the detail are shown below:

10. Create the three-dimensional shapes that form the relief detail using the **Relief Operations** and **Vector Based Relief Creation** tools available in ArtCAM Pro. For further information, see the Working with Reliefs chapter in the ArtCAM Pro Reference Manual.

    In our example, the detail is created using the **Weave Wizard** tool. Once the detail has been added to the base relief, it appears as shown:



11. Click on the **Toggle Collet Relief** button  to remove the base relief.

    In our example, the round setting relief now appears as shown below:

    The relief no longer has a tapered shape, since the base relief has been removed. Its tapered shape is restored once a triangle model of the relief has been created. To create a triangle model, see "Creating a Triangle Mesh" in the Working with Triangle Models chapter.

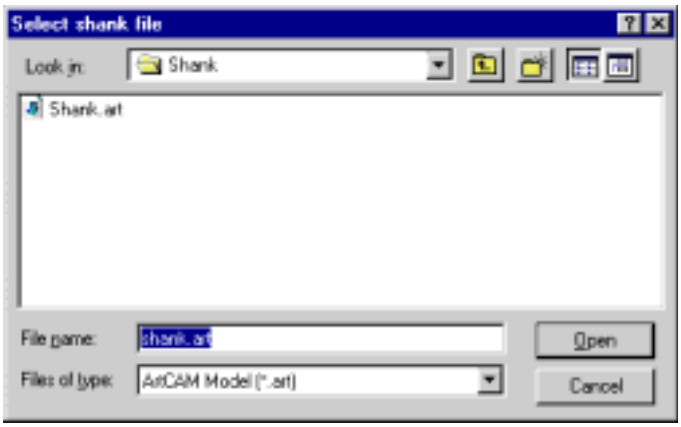
12. Now that you have created the round setting relief, you can:

    - Save the relief. For details, see "Saving the Relief" on page 101.

- Create a triangle model of the relief. For details, see "Creating a Triangle Mesh" in the Working with Triangle Models chapter.

13. If you want ArtCAM Pro Jewellery Edition to create preview vector artwork representing the round setting in a shank model file:

    - Click on the **Add Preview To Shank** button to display the **Select Shank File** dialog box:



    The *Shank.art* model file is selected by default.

    - If you have created more than one shank model in your ring project, click on the file in which you want ArtCAM Pro Jewellery Edition to create the preview vector artwork.

Note: If you have not yet created a shank model file, you must do so before you can create a preview of the round setting head. For details, see "Creating a Shank" in the Working with Shanks chapter.

    - Click on the **Open** button to close the round setting model, and then open the selected shank model. Vector artwork representing the round setting is drawn in the **2D View** window. This represents the overall shape of the ring's head.

    - Use the vector artwork to create the shank design. For details, see "Creating a Shank" in the Working with Shanks chapter.

    If you do not want to create preview vector artwork representing the round setting in a shank model file:

- Click on the **Back** button  to return to the **Ring Project** page, where you can either continue working on the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Saving the Relief

A relief file can be used when creating a closed triangle model of a round setting. For details, see "Creating a Triangle Mesh" in the Working with Triangle Models chapter. The relief can also be machined using a Machine Relief toolpath. For details, see the Machining Models chapter in the ArtCAM Pro Reference Manual.

You can save a round setting relief in two different ways:

- Click on the **Save Back Relief** button  to save a plane back relief of the round setting.
- Click on the **Save Inverted Back Relief** button  to save an inverted back relief of the round setting.

The relief file (**.rlf**) is saved to the Head folder within the current ring project by default.

Creating a Basket Setting

When creating a basket setting, you only need to define its parameters. Using these parameters, ArtCAM Pro Jewellery Edition generates an ArtCAM model file and the vector artwork needed to calculate the basket setting relief. Finally, a closed triangle model of the basket setting is generated from the relief. For example, the triangle model of the basket setting may look something like this:

To create a basket setting as the head of your ring design:

1. Click on the arrow in the **Head Designer** area of the **Ring Project** page to display its options.
2. Click on the **Basket Setting** button to display the **Collet Creator** page.
3. Click on the arrow in the **Collet Parameters** area of the page to display the parameter settings.
4. In the **Top Bezel** area:
    - Type the diameter of the gemstone that you want to mount in the **Stone Diameter (SD)** box.
    - Type the height of the claws in the **Claw Height (H)** box.
    - Type the thickness of the bezel setting supporting the girdle of the gemstone in the **Thickness (T)** box.
    - Click on one of the **Shape** radio buttons to define the shape of the bezel setting supporting the girdle of the gemstone, either **Round** or **Square**.

    In our example, the top bezel setting is round, featuring claws with a height of *1.5* mm and a thickness of *1* mm, designed to contain a gemstone with a diameter of *5* mm.
5. In the **Bottom Bezel** area:
    - Type the diameter of the bezel setting supporting the culet of the gemstone in the **Diameter (BD)** box.

- Type the thickness of the bezel supporting the culet of the gemstone in the **Thickness (B)** box.
- Click on one of the **Shape** radio buttons to define the shape of the bezel setting supporting the culet of the gemstone, either **Round** or **Square**.
- Type the distance between each of the bezels supporting the girdle and the culet of the gemstone in the **Bezel Spacing (S)** box.

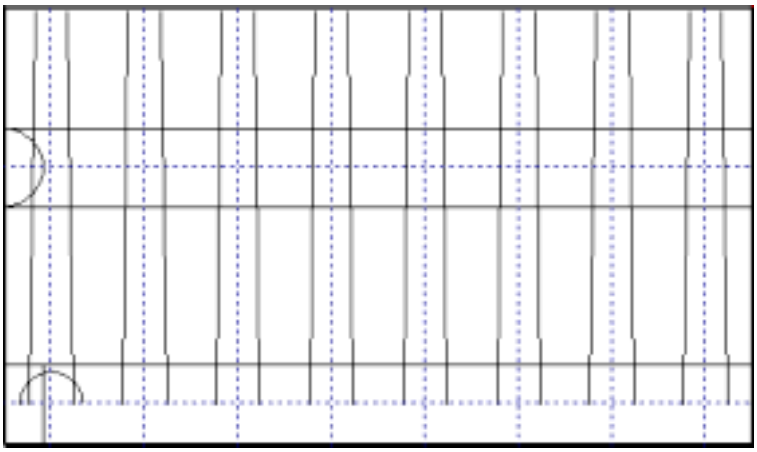
In our example, the bottom bezel setting is square, with a diameter of *3* mm, a thickness of *1* mm and a distance of *2* mm from the top bezel.

6. In the **Claws** area:
   - Type the number of claws in the basket setting in the **Number** box.
   - Type the diameter of each claw in the **Thickness** box.
   - Click on one of the **Shape** radio buttons to define the shape of the claws, either **Round** or **Square**.

   In our example, eight round claws are used, each with a diameter of *0.8* mm.
7. Click on the arrow in the **3D Model** area of the page to display its options.
8. Type the resolution you want to use for the relief in the **Resolution** box.
9. Type the border you want to use for the relief in the **Border** box.

   In our example, a resolution of *11* points/mm and a border of *4* points are used.
10. Click on the **Create Model** button to create an ArtCAM model according to the basket setting dimensions.

    In the **2D View** window, ArtCAM Pro Jewellery Edition generates the vector artwork needed to create the basket setting relief. In our example, the vector artwork appears as shown:



Using this vector artwork, ArtCAM Pro Jewellery Edition calculates the relief. Finally, a triangle model of the relief is created and saved in the Head folder of the Ring Project directory. For further information, see "Creating a Ring Project" in the Working with Ring Projects chapter.

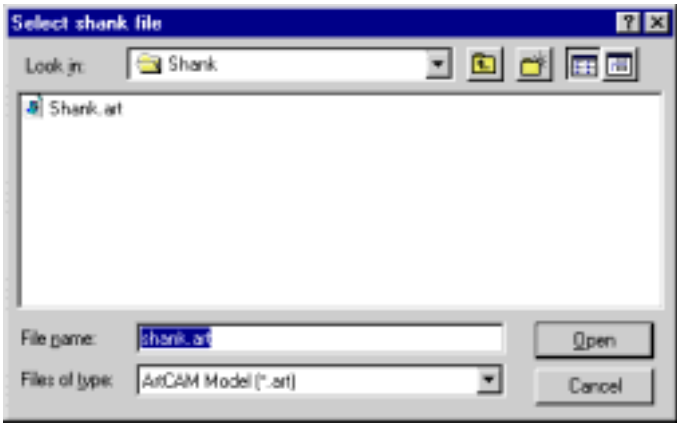
Note: If you have already created a triangle model of a ring head as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing triangle model, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save STL File** dialog box, where you can save the triangle model using a different name and/or folder.

Note: If you have already created a head as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing head, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save Art File** dialog box, where you can save the head using a different name and/or folder.

11. Click on the **3D View** button 3D to display a triangle model of the basket setting in the **3D View** window.
12. Now that a relief and a triangle model of the basket setting has been created, you can:
    - Save the relief. For details, see "Saving the Relief" on page 101.
    - Export a triangle model of the relief. For details, see "Exporting a Triangle Model" in the Working with Triangle Models chapter.

13. If you want ArtCAM Pro Jewellery Edition to create preview vector artwork representing the basket setting in a shank model file:

    - Click on the **Add Preview To Shank** button to display the **Select Shank File** dialog box:



      The *Shank.art* model file is selected by default.

    - If you have created more than one shank model in your ring project, click on the file in which you want ArtCAM Pro Jewellery Edition to create the preview vector artwork.

Note: If you have not yet created a shank model file, you must do so before you can create a preview of the basket setting head. For details, see "Creating a Shank" in the Working with Shanks chapter.

    - Click on the **Open** button to close the basket setting model, and then open the selected shank model. Vector artwork representing the basket setting is drawn in the **2D View** window. This represents the overall shape of the ring's head.

    - Use the vector artwork to create the shank design. For details, see "Creating a Shank" in the Working with Shanks chapter.

    If you do not want to create preview vector artwork representing the basket setting in a shank model file:

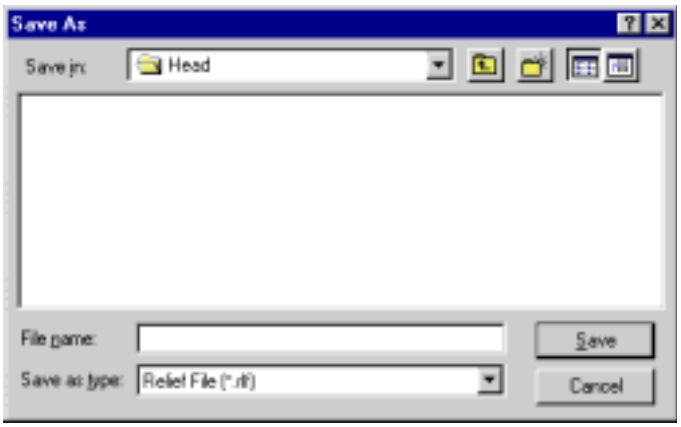
    - Click on the **Back** button  to return to the **Ring Project** page, where you can either continue working on the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Saving the Relief

A relief file can be used when creating a closed triangle model. For details, see "Creating a Triangle Mesh" in the Working with Triangle Models chapter. A relief can also be machined using a Machine Relief toolpath. For details, see the Machining Models chapter in the ArtCAM Pro Reference Manual.

To save the basket setting relief:

- Click on the **Save Back Relief** button to display the **Save As** dialog box:



- Type the name of the back relief in the **File Name** box, and then click on the **Save** button to save the relief file (**.rlf**) in the Head folder of your ring project.

Creating a Cluster

When creating a cluster, you only need to define its parameters. Using these parameters, ArtCAM Pro Jewellery Edition generates an ArtCAM model file and the vector artwork needed to calculate the three-dimensional shapes that make up the cluster's components. Next, ArtCAM Pro Jewellery Edition creates a closed triangle model of the whole cluster, and for each of its components from the three-dimensional shapes. For example, the triangle model of the whole cluster may look something like this:

Topside of Cluster Head… *Underside of Cluster Head…*

To create a cluster as the head of your ring design:

1. Click on the arrow in the **Head Designer** area of the **Ring Project** page to display its options.
2. Click on the **Cluster Creator** button to display the **Cluster Creator** page.
3. Type the diameter of the cluster's principal gemstone in the **Centre Stone Dia** box.

   In our example, the principal gemstone has a diameter of *5* mm.
4. Click on the **Stones In First Row** list box, and then on the number of side stones you want in the first row around the principal gemstone.

   In our example, eight side stones are positioned around the principal gemstone in the cluster.
5. Click on the **Claws On Outer Row** list box, and then on the number of claws you want to position around the cluster.

   In our example, four claws are required to support each of the gemstones used in the cluster. This means that a total of 24 claws are created.
6. In the **Head** area:
   - Type the thickness of the cluster head in the **Thickness** box.
   - Type the height of the tier beneath the principal gemstone in the **Tier Height** box.

- Type the height of the dome, which supports the bezel settings in the **Dome Height** box.

In our example, the cluster head has both a thickness and tier height of *1* mm, and a dome height of *0.5* mm.

7. In the **Bezel** area, type the width of the bezel setting in the **Width** box.

   In our example, the bezel setting has a width of *0.7* mm.

8. In the **Claws** area:
   - Type the diameter of each claw in the **Dia** box.
   - Type the height of each claw in the **Height** box.

   In our example, each claw has a diameter of *0.7* mm and a height of *1.2* mm.

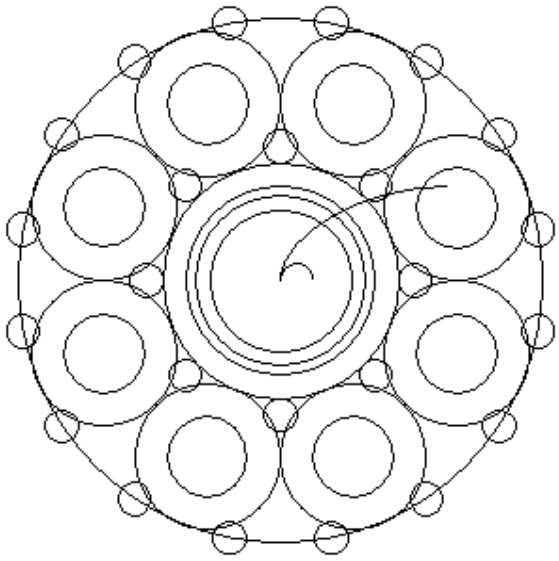
9. In the **Under Bezel** area:
   - Type the distance between the head and the centre of the under-bezel in the **Gallery Spacing** area.
   - Type the diameter of the under-bezel in the **Diameter** box.
   - Type the height of the under-bezel in the **Height** box.
   - Type the width of the under-bezel in the **Width** box.

   In our example, the under-bezel setting has a gallery spacing of *2* mm, a diameter of *4* mm, a height of *1.5* mm and a width of *1* mm.

10. Click on the **Create Model** button to create an ArtCAM model according to the cluster dimensions.

Note: If you have already created a head as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing head, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save Art File** dialog box, where you can save the head using a different name and/or folder.

In the **2D View** window, ArtCAM Pro Jewellery Edition generates the vector artwork needed to create the whole cluster relief. In our example, the vector artwork appears as shown:



11. Click on the **Create 3D Shapes** button to instruct ArtCAM Pro Jewellery Edition to generate each of the three-dimensional shapes that represent each of the cluster's components.

    The topside of the cluster is made up of two three-dimensional shapes. The underside is also made up of two three-dimensional shapes. ArtCAM Pro Jewellery Edition combines all of these shapes to make up the whole cluster relief.

    The **Working** dialog box appears whilst ArtCAM Pro Jewellery Edition calculates each of the three-dimensional shapes:

    You can stop this process at any time by clicking on the **Cancel** button. Each of the four shapes are saved as a separate relief files (**.rlf**) in the Head folder within the Ring Project directory.

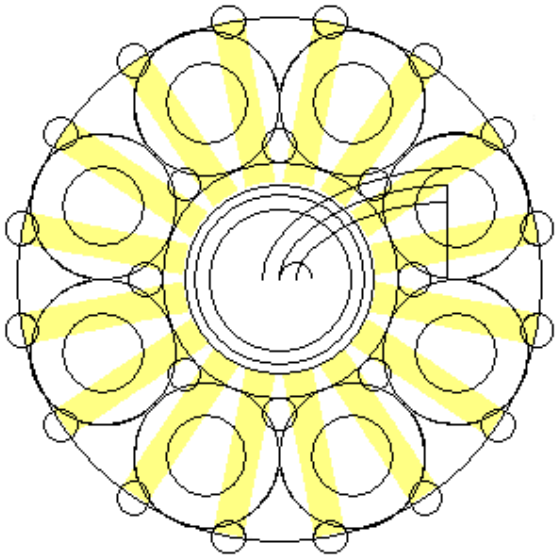
    ArtCAM Pro Jewellery Edition next creates a triangle model of both the topside and underside of the cluster, and then of the whole cluster using the three-dimensional shapes of the

cluster components. The triangle models (**.stl**) are also saved in the Head folder within the Ring Project directory.

A progress bar appears beneath the **2D View** window indicating the progress ArtCAM Pro Jewellery Edition is making in creating the triangle models:

By clicking on the **Cancel** button  , you can stop this process at any time.

The yellow areas that appear in the **2D View** window show the position of the claws that join the topside of the cluster with its underside. In our example, the claws are positioned as shown:



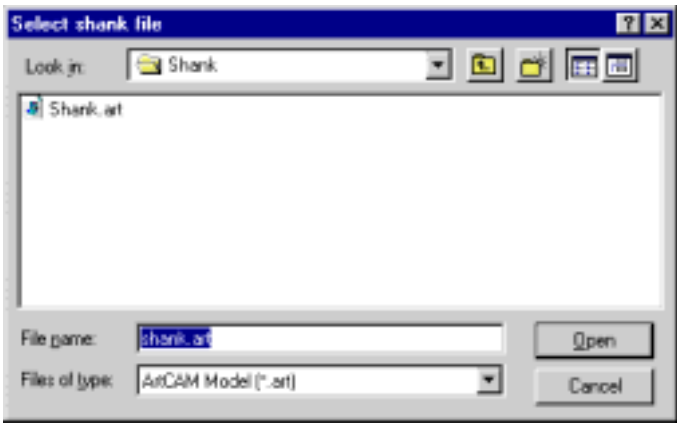
Note: If you have already created a triangle model of a ring head as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing triangle model, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save STL File** dialog box, where you can save the triangle model using a different name and/or folder.

12. Click on the **3D View** button  to display the whole cluster relief in the **3D View** window.
13. Now that the reliefs and the triangle models that make up the cluster have been created, you can:

- Export a triangle model of the whole cluster relief. For details, see "Exporting a Triangle Model" in the Working with Triangle Models chapter.

14. If you want ArtCAM Pro Jewellery Edition to create preview vector artwork representing the cluster in a shank model file:

    - Click on the **Add Preview To Shank** button to display the **Select Shank File** dialog box:



    The *Shank.art* model file is selected by default.

    - If you have created more than one shank model in your ring project, click on the file in which you want ArtCAM Pro Jewellery Edition to create the preview vector artwork.

Note: If you have not yet created a shank model file, you must do so before you can create a preview of the cluster head. For details, see "Creating a Shank" in the Working with Shanks chapter.

    - Click on the **Open** button to close the cluster model, and then open the selected shank model. Vector artwork representing the cluster is drawn in the **2D View** window. This represents the overall shape of the ring's head.

    - Use the vector artwork to create the shank design. For details, see "Creating a Shank" in the Working with Shanks chapter.

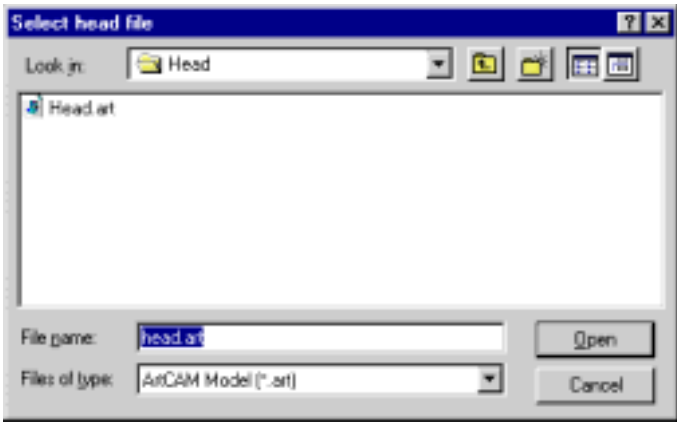
    If you do not want to create preview vector artwork representing the cluster in a shank model file:

- Click on the **Back** button  to return to the **Ring Project** page, where you can either continue working on the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Opening an Existing Head

To open a head that you have already created as part of the current ring project:

1. Click on the  arrow in the **Head Designer** area of the **Ring Project** page to display its options.
2. Click on the **Open Existing Head** button  to display the **Select Head File** dialog box:



The *Head.art* model file is selected by default.

Note: If you have not created a head as part of the current ring project, a message box appears. Click on the **OK** button to close the message box, and then create a head. For details, see "Creating a Head" on page 95.

3. If you have created more than one head model in your ring project, click on the file that you want to open.
4. Click on the **Open** button to open the selected head model.

Working with Triangle Models

Creating and Manipulating Triangle Models

A triangle model is made up of triangle facets that represent a closed three-dimensional shape. This method of representing three-dimensional shapes is commonly used by other CAD packages and for rapid prototyping.

ArtCAM Pro Jewellery Edition allows you to create and manipulate triangle models of finished rings and ring components. You can:

- Create a triangle model from a Head or Shank relief. For details, see "Creating a Triangle Mesh" on page 114.
- Export a triangle model. For details, see "Exporting a Triangle Model" on page 116.
- Unwrap a triangle model into a relief. For details, see "Unwrapping a Triangle Model into a Relief" on page 117.
- Set the size, position and scale of a triangle model. For details, see "Using the STL Assembler" on page 118.
- Merge triangle models. For details, see "Using the STL Assembler" on page 118.

Creating a Triangle Mesh

You can create a triangle mesh from a three-axis shank relief, a rotary axis shank relief, and/or a round setting head relief within a ring project.

For basket setting or cluster heads, ArtCAM Pro Jewellery Edition generates a triangle model as part of the creation process. For details, see "Creating a Basket Setting" and "Creating a Cluster" in the Working with Heads chapter.

To create a triangle mesh:

1. Create or open the ring component from which you want to create a triangle mesh. For details, see "Creating a Shank" or "Opening an Existing Shank", in the Working with Shanks chapter, and "Creating a Round Setting" or "Opening an Existing Head" in the Working with Heads chapter.
2. Click on the arrow in the **3D Modelling** area to display its options.
3. Click on the **Create STL Mesh** button to display the **Jewellery STL Creator** page.
4. In the **Triangulation Parameters** area, type a value in the **Tolerance** box to control the number of triangles generated.
5. In the **Back Face** area, click on one of the radio buttons to select the type of shape that you want to use to close the triangle mesh:
    - **None (Open Triangulation)** – To leave the shape open, click on this radio button.
    - **Close With A Flat Plane** – To create a back face equivalent to a Z height of zero, click on this radio button.
    - **Close With Inverted Front** – To create a back face that is the inverted shape of the relief surface, click on this radio button.
    - **Use Relief From File** – To create the back face from a relief file (***.rlf**, ***.art**, or ***.pix**), providing that it has been created using the same settings as those in the current ring project, click on this radio button.

If you select this option, click on the **Load** button to display the **Open** dialog box.

Click on the **Look in** list box and select the directory where the relief file is stored.

Click on the relief file that you want to load to select it. The file name appears in the **File name** box. The relief dimensions appear in the **Relief Information** area of the **Open** dialog box.

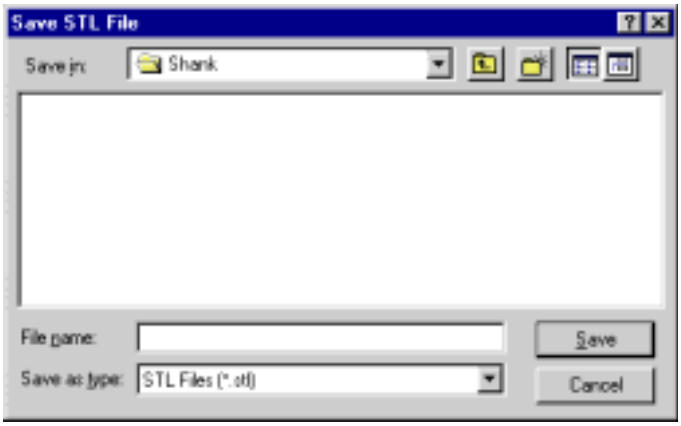
Click on the **Open** button to load the relief.

- **Create Offset Back Face** – To create a shape from an offset of the relief surface, click on this radio button .

  If you select this option, type a value in the **Thickness** box to set the thickness of the offset.

6. Click on the **Create Triangles** button to create the triangle mesh. The volume of the triangle mesh and the number of triangles created are shown in the **Result** area.
7. If you want to calculate the approximate weight of the ring component after the casting process, type a percentage in the **Shrinkage** box and then click on the **Update** button.
8. Click on the **Weight** list box, and from the list displayed click on the metal that you want to use for the cast of the ring component.
9. In the **Triangle Drawing** area, select how you want to view the triangle model in the **3D View** window, either **Shaded** or **Wireframe**.
10. You are now ready to save the triangle model. If you want to save a triangle mesh of the ring component as part of the current ring project:

    - Click on the **Save STL** button to open the **Save STL File** dialog box:



- Type the file name you want to use for the STL model in the **File Name** box, and then click on the **Save** button.

Note: If you have already created a triangle model of the ring component as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing triangle model, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save STL File** dialog box, where you can save the triangle model using a different name and/or folder.

If you want to save the triangle mesh to any other location, see "Exporting a Triangle Model" on page 116.

11. Click on the **Back** button to return to the **Ring Project** page, where you can either continue working on another part of the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

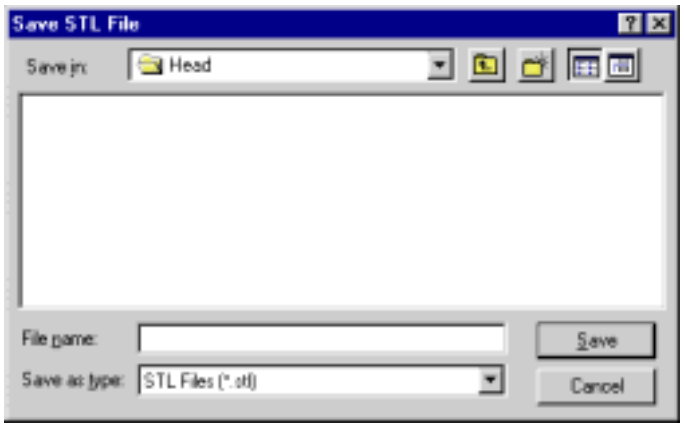
Exporting a Triangle Model

You can export a triangle model as an STL file for transfer to a rapid prototyping or other compatible CAD/CAM system:

- After a relief and a triangle model has been generated during the basket setting or cluster creation process. For further information, see "Creating a Head" in the Working with Heads chapter.
- After creating a triangle mesh using the **Jewellery STL Creator** page. For details, see "Creating a Triangle Mesh" on page 114.

To export a triangle model as an STL file:

1. Click on the **Export STL…** button to display the **Save STL File** dialog box:



Note: If you have already created a triangle model of the ring component as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing triangle model, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save STL File** dialog box, where you can save the triangle model using a different name and/or folder.

2. Type the file name you want to use for the triangle model in the **File Name** box.
3. Click on the **Save** button to save the triangle model and close the **Save STL File** dialog box.

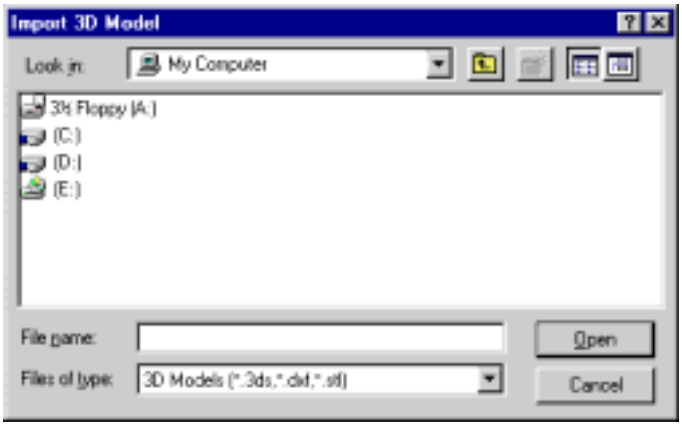
Unwrapping a Triangle Model into a Relief

If you have a triangle model that you want to machine as a relief, you can unwrap it into a rotary axis shank model file, providing that it has been created using the same settings as those in the current ring project. You cannot unwrap a triangle model into any other ring component's model file.

To unwrap a triangle model into a rotary axis shank model:

1. Create or open a rotary axis shank model. For details, see "Creating a Rotary Axis Shank" and "Opening an Existing Shank" in the Working with Shanks chapter.
2. Click on the arrow in the **3D Modelling** area of the **Rotary Axis Shank** page to display its options.

3. Click on the **Unwrap Ring Mesh** button  to display the **Import 3D Model** dialog box:



4. Click on the **Look in** list box and select the directory containing the triangle model.
5. Click on the triangle model file that you want to unwrap to select it, and then on the **Open** button. The **Import 3D Model** dialog box closes and ArtCAM Pro Jewellery Edition unwraps the triangle model into the shank model as a relief.

Using the STL Assembler

You can combine the triangle models of ring components that you have created as part of a ring project, or those you want to import into ArtCAM Pro Jewellery Edition. You can also alter the position of any of the triangle models before merging them.

To combine triangle models of ring components:

1. Open the ring project. For details, see "Opening an Existing Ring Project" in the Working with Ring Projects chapter.
2. Click on the **STL Assembler** button  to display the **Ring Assembler** page.

   The triangle models that have been created as part of the current ring project are shown in the **3D View** window.
3. Click on the  arrow in the **Model Loader** area of the page to display a list of the triangle models in the current ring project.
4. Use the four buttons in the **Model Loader** area to manage the triangle models used in the **Ring Assembler**. You can:

- Import a model. See "Importing a Triangle Model" on page 119.
- Merge models. See "Merging Triangle Models" on page 120.
- Save a model. See "Saving a Triangle Model" on page 120.
- Remove a model from the list. See "Removing a Triangle Model from the Ring Assembler" on page 121.

5. If any of the triangle models shown in the **3D View** window are positioned incorrectly, use the boxes in the **Positioning** area to adjust their position.

Note: The **X**, **Y** and **Z** boxes are colour co-ordinated to match those used for the origin in the **3D View** window. To hide/show the origin, click on the **Origin** button  in the **3D View** toolbar.

You can:

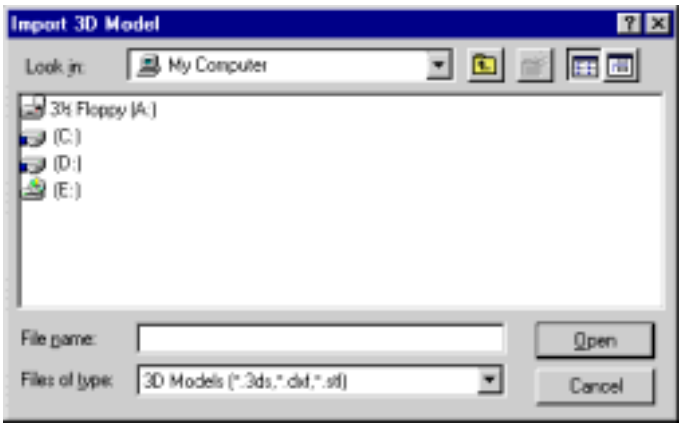
- Move a model. See "Moving a Model" on page 121.
- Rotate a model. See "Rotating a Model" on page 122.
- Scale a model. See "Scaling a Model" on page 122.
- Position a model around the ring's centre. See "Positioning a Model around the Ring's Centre" on page 123.

6. Click on the **Back** button  to return to the **Ring Project** page, where you can either continue working on another part of the current ring project or close it. For details, see "Getting Started" and "Closing a Ring Project" in the Working with Ring Projects chapter.

Importing a Triangle Model

To import a triangle model (*.**3ds**, *.**dxf** or *.**stl**):

1. Click on the **Load** button to display the **Import 3D Model** dialog box:



2. Click on the **Look in** list box and select the directory containing the triangle model.
3. Click on the triangle model that you want to load to select it, and then on the **Open** button. The **Import 3D Model** dialog box closes and the model file is listed on the **Ring Assembler** page.

Merging Triangle Models

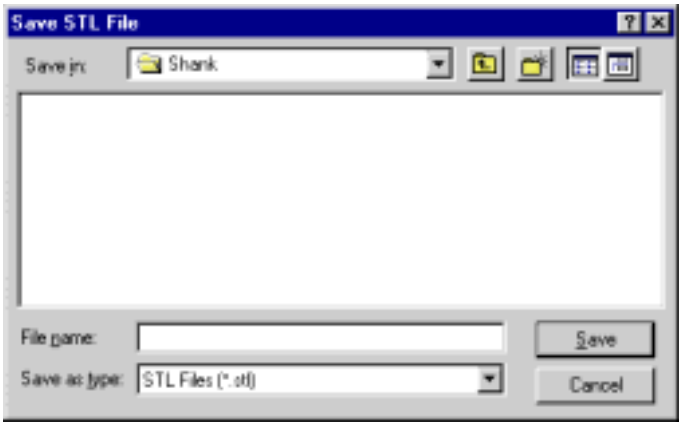
To merge a selection of triangle models into one:

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the arrow to display it.
2. Make sure that only the triangle models that you want to merge together are listed on the **Ring Assembler** page. For details, see "Importing a Triangle Model" on page 119 and "Removing a Triangle Model from the Ring Assembler" on page 121.
3. Click on the **Merge** button. A single triangle model remains in the window named *Merged Models*.

Saving a Triangle Model

To save a triangle model (***.stl**):

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the arrow to display it.
2. Click on the triangle model in the list that you want to save to select it.
3. Click on the **Save** button to display the **Save STL File** dialog box:



Note: If you have already created a triangle model of the ring component as part of the current ring project, a message box appears warning you of this. If you want to overwrite the existing triangle model, click on the **Yes** button. Otherwise, click on the **No** button to display the **Save STL File** dialog box, where you can save the triangle model using a different name and/or folder.

4. Type the file name you want to use for the triangle model in the **File Name** box.
5. Click on the **Save** button to save the triangle model and close the **Save STL File** dialog box.

Removing a Triangle Model from the Ring Assembler

You can remove a triangle model from the list in the **Model Loader** area of the page, thereby deleting it from the **3D View** window.

To remove a triangle model from the **Ring Assembler** page:

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the arrow to display it.
2. Select the triangle model from the list that you want to remove by clicking on it.
3. Click on the **Remove** button.

Moving a Model

You can move a triangle model in any of the three axes.

To move a model:

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the  arrow to display it.
2. Select the triangle model from the list that you want to move by clicking on it.
3. Click on the  arrow in the **Positioning** area of the page to display its options.
4. Type the co-ordinates of the position to where you want to the model moved in the **X**, **Y** and/or **Z** boxes.
5. Click on the **Move** button. The triangle model shown in the **3D View** window is moved to its new position.

Rotating a Model

You can rotate a triangle model in any of the three axes.

To rotate a model:

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the  arrow to display it.
2. Select the triangle model from the list that you want to rotate by clicking on it.
3. Click on the  arrow in the **Positioning** area of the page to display its options.
4. Type the angle by which you want to rotate the triangle model in the **X**, **Y** and/or **Z** boxes.
5. Click on the **Rotate** button. The triangle model shown in the **3D View** window is rotated by the specified angles.

Scaling a Model

You can scale a triangle model in any of the three axes.

To scale a model:

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the  arrow to display it.
2. Select the triangle model from the list that you want to rotate by clicking on it.
3. Click on the  arrow in the **Positioning** area of the page to display its options.

4. Type the percentage of its original size to which you want to scale the triangle model in the **X**, **Y** and/or **Z** boxes
5. Click on the **Scale** button. The triangle model shown in the **3D View** window is scaled to its new size.

Positioning a Model around the Ring's Centre

You can rotate a triangle model around the ring's centre.

To rotate a triangle model around the centre of the ring:

1. If a list of triangle models in the current ring project is not shown in the **Model Loader** area of the page, click on the  arrow to display it.
2. Select the triangle model from the list that you want to rotate by clicking on it.
3. Click on the  arrow in the **Positioning** area of the page to display its options.
4. Type the angle by which you want to rotate the triangle model in the **Degrees** box
5. Click on the **Rotate** button. The triangle model in the **3D View** is rotated around the ring's centre by the specified angle.

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