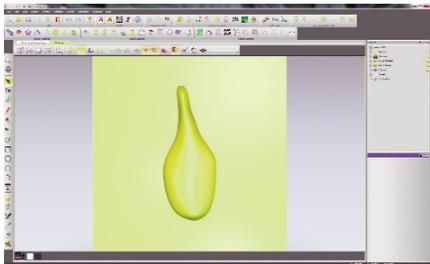


Creating Coins with artistic software, ArtCAM

Delcam Plc, an internationally recognised software development company, provides ArtCAM: a range of artistic design and manufacturing software packages, (www.artcam.com). ArtCAM contains a number of 2D drawing and advanced 3D modelling techniques, which make a significant leap in the way that products such as foil and embossing dies, coins, engraved signs and plaques and trophies amongst others are designed. Because of this, Delcam wanted to really showcase what could be achieved with the new software and how a 3D design could be made and altered to create a range of pieces including a coin. Using ArtCAM Pro, the advanced product in the range, the ArtCAM team wanted to push the boundaries of both design and manufacturing by creating a highly detailed peacock design.

Creating the peacock

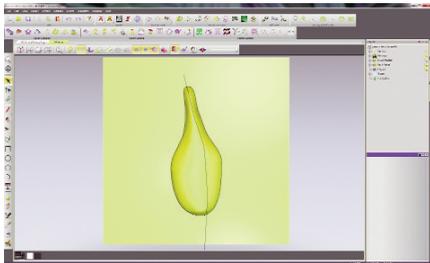
There are multiple approaches to creating a design in ArtCAM so that users can find a way that suits them. For the design, Delcam decided to create the peacock as a number of different parts which were merged into one complete 3D design. Individual parts were modelled for the body, the head, the feet, the back feathers, and a feather, which was used to construct the main plumage. These were each saved in ArtCAM's 'Clipart Library'. This library has over 600 pieces of free relief designs known as 'Relief Clipart' that can be incorporated into customer's designs. It can also be expanded to include a designer's own pieces. The advantage of this is that these pieces can be saved in a high resolution / detail and then scaled down for other design projects.



The first part to be modelled was the body. Using one of ArtCAM's many drawing tools; two lines (vectors) were drawn to represent its sides. Two more vectors were then drawn representing the cross section or 3D shape of the neck and the base of the body. These were used by the 'Two Rail Sweep' tool to swiftly create a 3D shape.

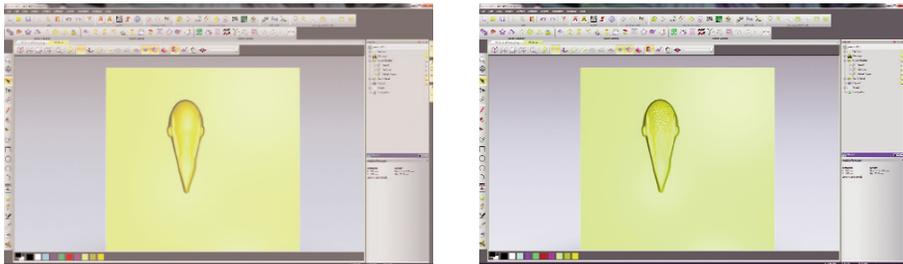
Next feathers were added onto the peacock's body using ArtCAM's introductory 3D modelling tool, the 'Shape Editor' and the new patent pending 'Texture Flow' tool. Unlike other texture creation tools within ArtCAM Pro, 'Texture Flow' has been designed specifically to make organic 2D and 3D shapes and patterns such as hair, fur, scales and feathers.

To create the feathers, a small feather outline was drawn and using the 'Shape Editor' height and shape were added to it. This tool allows the designer to specify a shape, as well as its height, angle and how this interacts with the rest of the relief. We then used ArtCAM's 'Smooth' sculpting tool on the bottom of the feather so it would blend nicely once the design was repeated across the body.



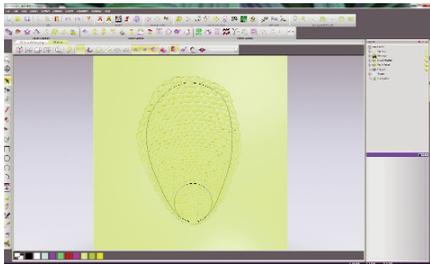
Afterwards, a vector was drawn, which would determine the direction that the feathers would appear on the body using the 'Texture Flow' tool. To create natural looking feathers, the scale of the feather was altered according to its position along the vector, thus making them smaller around the peacock's neck and larger towards to base. The feathers were also

allowed to overlap the edges of the 2D drawing. To find the best texture for the body, ArtCAM's patented relief layering system was utilised. With a similar principle to PhotoShop, this system allows users to create designs on a number of layers, which can be turned on and off, whilst designing. Once happy with the relief artwork, the peacock body was sent directly into ArtCAM's 'Clipart Library'.

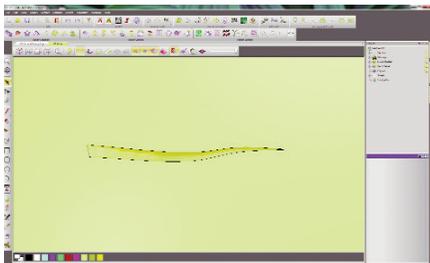


Moving onto the head, a combination of the vector drawing tools and the 'Shape Editor' were used. Feathers for the top of the head were created, again using the ArtCAM's 'Texture Flow' tool, and then smoothed using a sculpting tool to soften the look of the face.

The feet of the peacock were also quickly modelled using the 'Shape Editor' and ArtCAM's digital sculpting tools. ArtCAM Pro has a multitude of sculpting tools whose width and shape can be altered whilst adding material, carving, smudging, smoothing or removing it where necessary. Delcam were able to continually change the pressure, shape and size of their sculpting tool whilst working. An alternative would have been to use a Wacom tablet to replicate the effect/feel that someone gets from sculpting by hand.



For the back feathers, Delcam began by creating a 3D shape of a single feather, which then filled inside a 2D shape using the 'Texture Flow' tool. To create the best result Delcam tried different distances and scales for the feathers. To decide on the best version, different designs were saved on separate relief layers.



To model the bird's plumage, Delcam started with a single feather. To do this a photo of a feather was imported into ArtCAM. (ArtCAM can import most common vector and bitmap image formats including: pdf, bmp, jpeg, tiff, gif and eps amongst others).



Using the image as a guide, the drawing tools were used to create the spine of the feather and the shape of a feather strand. Using the 'Shape Editor' a domed shape was added to the vectors. To make this a more fluid shape, 'Node Editing' was used. This allows designers to add or alter points in the vector to alter its shape. The base of the feather was then smoothed out, so that it would not stand proud of the feather spine when added to it.

To create the rest of the feather one of the key developments of ArtCAM was used, a modelling process called 'Free Relief Modelling'. This allows users to open multiple pieces of clipart, resize them and move them around before they are fixed or pasted down, the 'Clipart' is "free" to move around and manipulate.

Making a copy of the strand it was positioned several times along the length of the feather's spine using the 'Block, Copy, Rotate' feature. For the eye of the feather, Delcam simply created the shape with the vector drawing tools and then used the 'Shape Editor' again to add height.



This feather was then added to ArtCAM's 'Relief Clipart' Library. Opening up a new design file, Delcam quickly began creating the span of feathers thanks to the 'Free Relief Modelling' process. Bringing in the feather from the 'Clipart Library' they shrunk it down to size and then copied and pasted it around a central point. This was then repeated for the remaining feather layers until Delcam were happy with the results. They then pasted down the feathers onto the relief layer. If a mistake was made at any time, thanks to the 'Free Relief Modelling' they could simply draw a vector

around the feather or area that they were not happy with, use the 'Cookie Cutter' tool to "free up the relief" and then move, rotate, rescale and delete as and when required. As with all the other models this was saved into the 'Clipart Library'.



This only left ArtCAM designers to assemble the final peacock design. All the previously created 'Clipart' was dragged in from the 'Clipart Library' into one ArtCAM model. With ArtCAM's 'Free Relief Modelling' process they could all be kept open at the same time to ensure that all the pieces were the correct size and fitted together properly before they were pasted down onto the relief. As with all other models, this was then saved into the 'Clipart Library' for future use.

Creating the ArtCAM Coin – The Obverse

To create the Delcam coin design, the artist began by creating a new ArtCAM model with a resolution of 4000 x 4000 pixels. They then started drawing their 2D design with a circle which would be the outer edge of the coin. To ensure accuracy, users can enter the radius or the diameter of the circle that they wish to create. This vector was then offset multiple times to create the other circular vectors. The 'Shape Editor' was then used to add the domed shape to some of these vectors.

ArtCAM

Before moving onto the text, a new vector layer was made. As with the 'Bitmap' and 'Relief Layers'; this allows users to experiment with complex designs and make alterations with ease. For the text Delcam used ArtCAM's 'Create Vector Text' tool. So that the text would sit neatly in between the circles, the text followed the curvature of one of them using the 'Wrap Text Around A Curve' tool. This gives the user the opportunity to select how far away the text appears from the line, its position on it and the spacing of the letters. Once successfully positioned, using a separate relief layer, the 'Contour Blend' tool was used to add a perfectly smooth domed shape.

To create the dome patterned edging on the obverse side of the coin, a circle was drawn and copied and rotated around the design. Selecting all of these, the 'Shape Editor' converted them into domed shapes.



The peacock was then brought in from the 'Clipart Library', scaled to size and pasted down onto the model. To stop it from overlapping the circular edge, the nearest vector was selected and using the 'Shape Editor', all of the peacock design that passed beyond the selected vector was levelled.

Creating the ArtCAM Coin – The Reverse

For the reverse side of the coin, the designer began modelling on the 'Back Relief'. In the ArtCAM project panel, designers can sculpt and model on both the front and back of a 3D design.

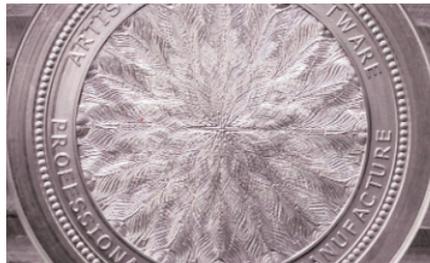
Copying the domed reliefs and circular edging from the obverse side of the coin, they simply altered the 'Vector Text' and used the 'Contour Blend' tool to give it height. Bringing in the feather clipart once again, this was copied and rotated around the central point of coin. This completed the ArtCAM Coin design.



Preparing the Coin Design for Manufacture

With many 3D modelling packages, a great challenge is to find a machining package that will be able to replicate the exact same level of detail that can be created in the 3D design. Delcam's ArtCAM allows you to not only make high resolution designs but to also RP, laser or CNC machine them. For the ArtCAM coin, Delcam wanted to CNC machine the coin dies, which were then used to stamp it.

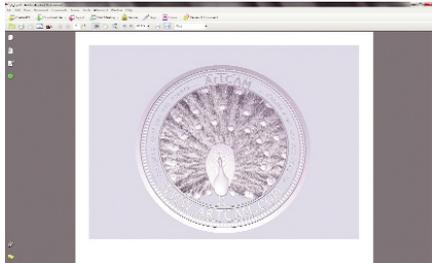
Soliciting the help from specialist engravers, Howard Bros Engravers Ltd, Delcam sent their relief artwork for machining. Howard Bros were able to select from a database of over 300 machine tools, as well as selecting any customised tools that they may have added to the database.



ArtCAM

ArtCAM Pro comes with a range of machining toolpath strategies, all of which have been developed with different industries in mind. One of these is the 'Spiral Machining' strategy, specifically designed for coin manufacture.

Before sending their toolpaths to their machine, the engravers were able to check the accuracy of the machined model by simulating them in the 3D view. This meant that they could alter any calculations prior to machining, saving time and money.



To ensure that Delcam were happy with the result, they sent a rotatable 3D PDF that was created in ArtCAM. After these were approved, toolpaths of both the front design (used to machine one coin die) and the reverse (used for the other) were exported to their machine.

For further enquiries please telephone + 44 (0)121 766 5544 or visit the website at www.artcam.com.
