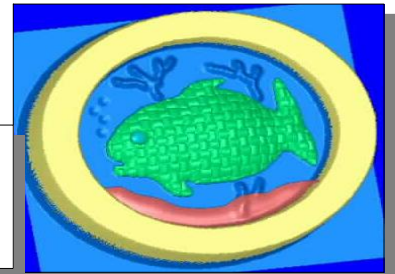


How to make a 3D puzzle with ArtCam for Education



Introduction

ArtCam for Education by Delcam is brilliant for making moulds, picture frames and engraving 3D photographs into acrylic. Today we are going to learn how to use it to design and manufacture a 3D puzzle. You will use a colour linking strategy to make this 3D model.

Resources

If you are thinking about making this project you will need the following resources.

- Closed cell polyurethane foam 120 x 100 x 30 mm
- Opaque polystyrene sheet 1 mm thick
- Crystal polystyrene sheet 0.5 mm thick
- 3D Computer Aided Manufacturing equipment
- Profile cutter
- Paint or permanent markers

Learning

ArtCam for Education

You will learn how to colour link, apply colour attributes, sculpt and put a texture on your model.

If using MiniCam

You will learn how to generate a roughing tool path and a finishing tool path.

If using Computer Aided Manufacture

You will learn how to use a 3D modelling machine, vacuum former and a perhaps a profile cutter.

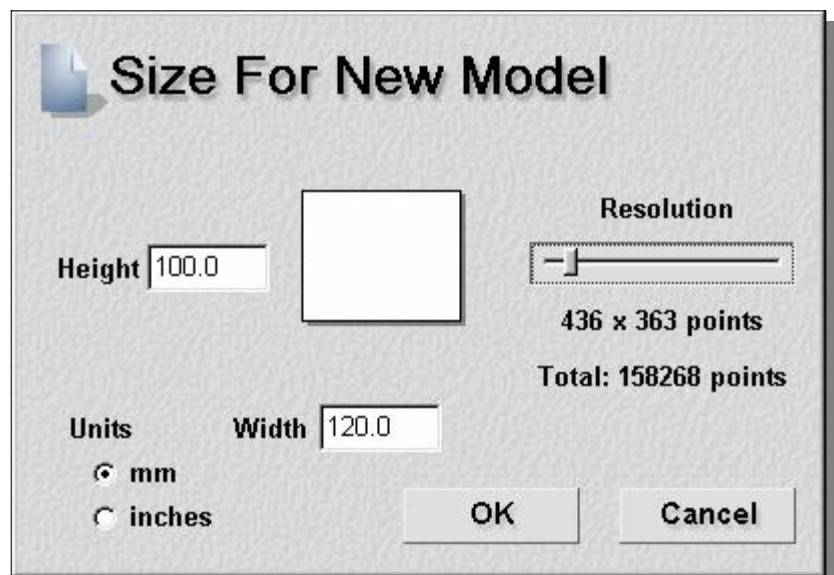
Let's go!

Choose the ***new*** model button on the tool bar.

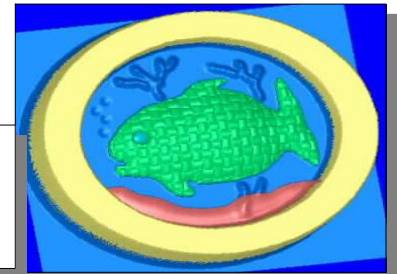
Change the size to 120 x 100 mm.

Handy hint!

Make sure that the resolution has not been altered. It should be similar to the figures shown here. If the resolution is much higher then it will take a lot longer to process each shape.



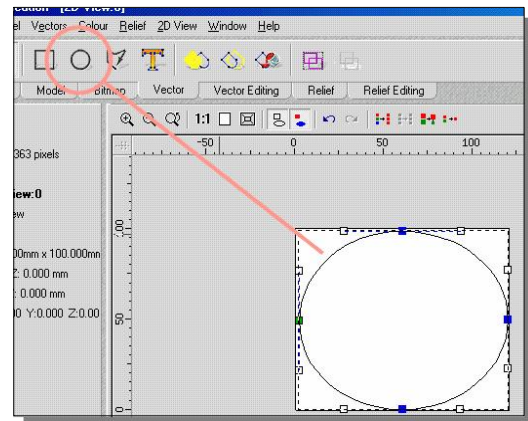
How to make a 3D puzzle with ArtCam for Education



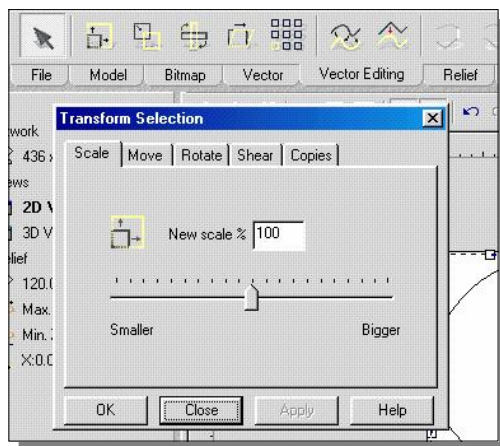
Draw an elliptical frame using vectors

Draw this shape using the **Vector**

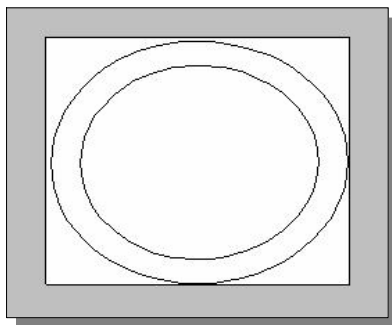
Now copy and paste the ellipse by pressing **Ctrl—C** then **Ctrl—V**.



tool.



Choose the **Vector Editing** tool and **Scale** the copied ellipse to 80% of its original size.



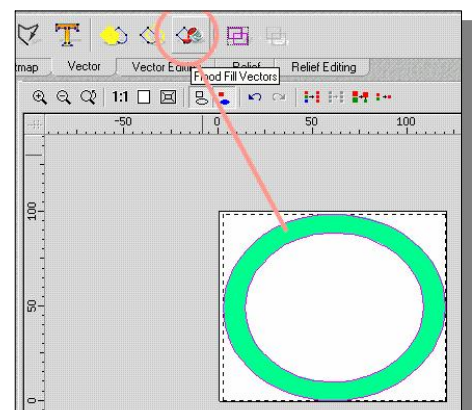
You should now have a pair of ellipses like those shown here.

Get ready to apply a colour to your puzzle border.

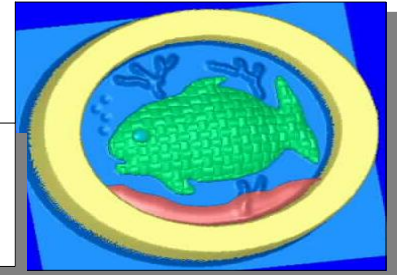
Using the flood fill vector button

Select the outer ellipse then hold **Shift** whilst selecting the inner ellipse. Choose a colour from the palette and press the **Vector Flood Fill** tool.

You should now see a solid elliptical block of colour.



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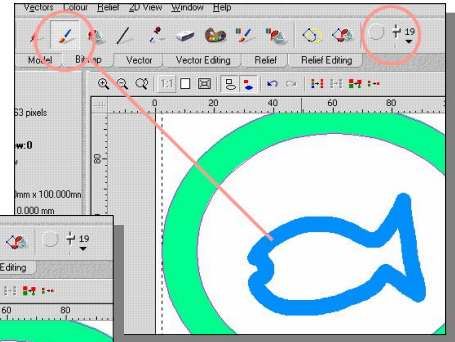
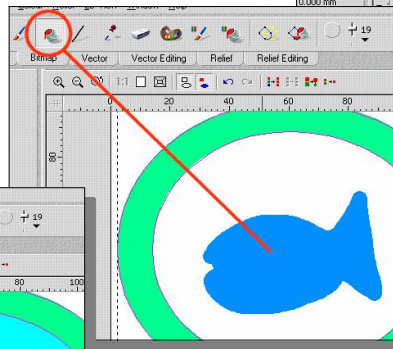
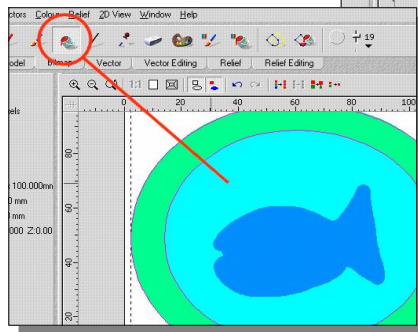


Draw a fish using the bitmap paint tool

Draw this shape using the bitmap brush. Try to alter the size of the brush to 19 as shown in the image.

Now use the **Bitmap Flood Fill** tool to colour in your fish.

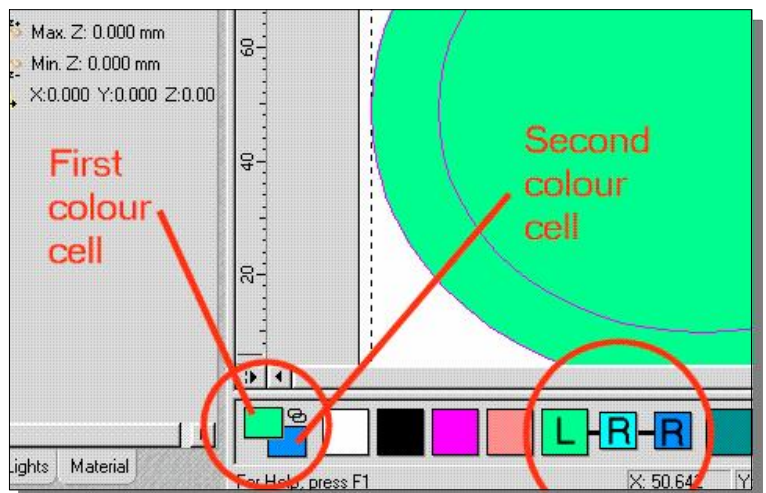
Select another colour and **Flood Fill** around the fish using the bitmap flood fill tool again.



Get ready to colour link

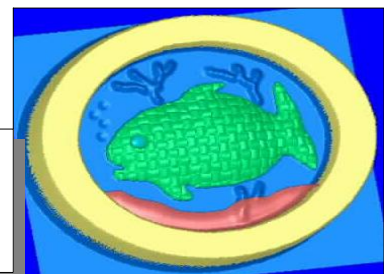
Colour linking allows you to hide different colours to prevent a 'sucked down' effect.

Select the barrier colour with the **left** mouse button then **double click** with the **right** mouse button on the fish colour and the water colour. You should see now a solid block on colour in your 2D window.

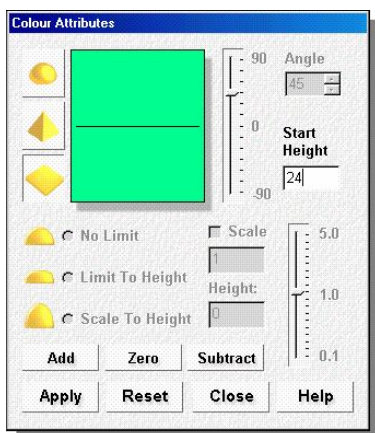


Notice how the first colour cell is shown alongside the palette. Each linked colour is shown with a dash on the palette.

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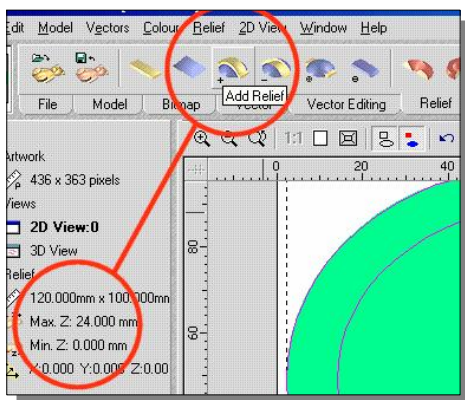


Apply colour attributes to each colour



The border will need a flat top to act as a seal in the vacuum former when clear poly vinyl chloride sheet is used.

Double click on the colour used for the border. Enter the start height for the border top at 24 mm.



Go to the relief tool bar and press **Add Relief**. Check that the model height is now at **24 mm**.

Handy hint!

If you need to delete your work at any point select the **Reset Relief** button.

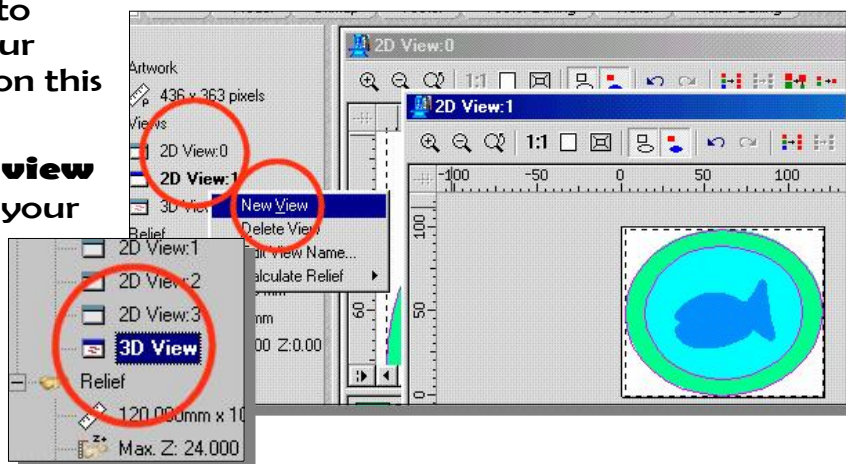


Create a new view

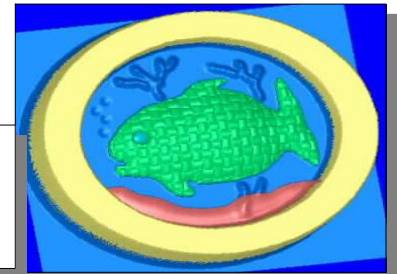
A **New View** is needed each time you want to create a new model feature. Right hand click on **2D View** to create a **New View**.

We are now ready to make the base of our puzzle by working on this new view.

Double click on **3D view** to see a 3D view of your work. You can quickly jump between views using this technique.



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Apply colour attributes to the water colour

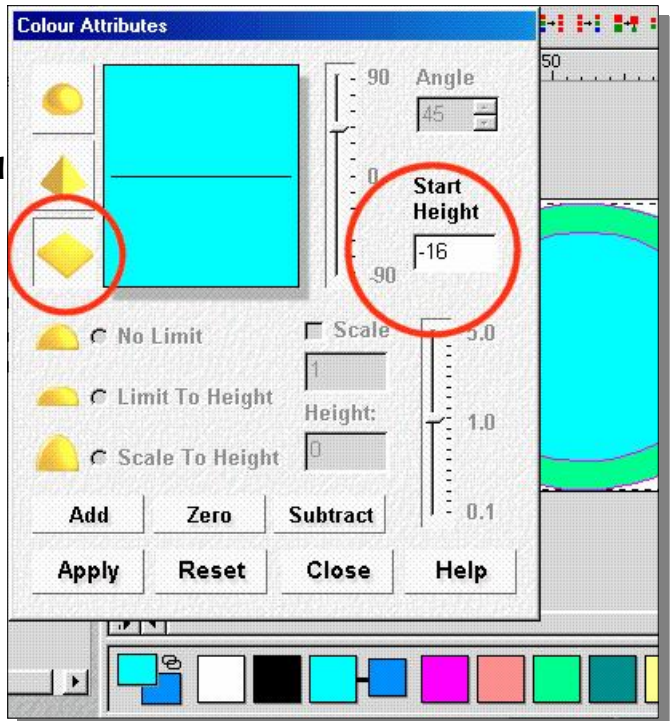
Select the water colour that the fish is in and **Colour Link** the fish colour. Check the third page to remind yourself how to colour link.

Before the height of the border was set to 24 mm. Now we will bring down the inner puzzle area by **16 mm**.

Handy hints!

1 You can press **Add** in this window instead of **Add Relief** from the relief tool bar.

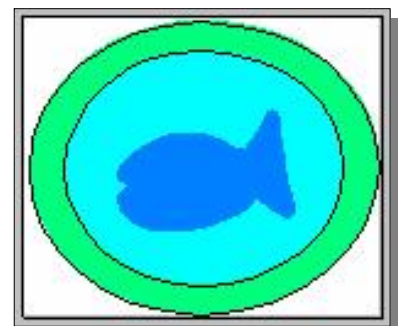
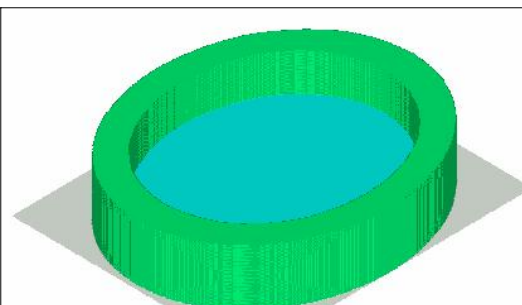
2 If you enter **16** in the start height box then you can press the **Subtract** button instead.



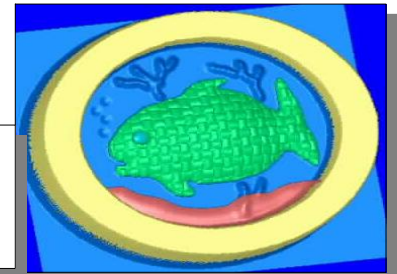
The model so far

Your model will look like this! Now create a new **2D View**.

Remember to **right button click on 2D view** to see a new unlinked version of your drawing.



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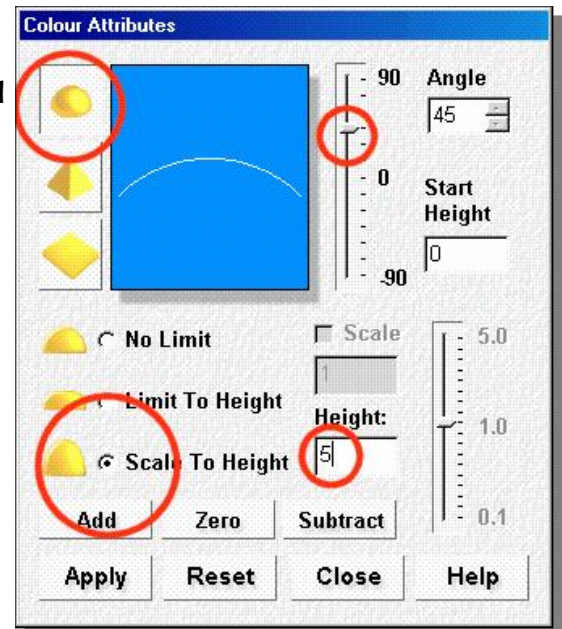
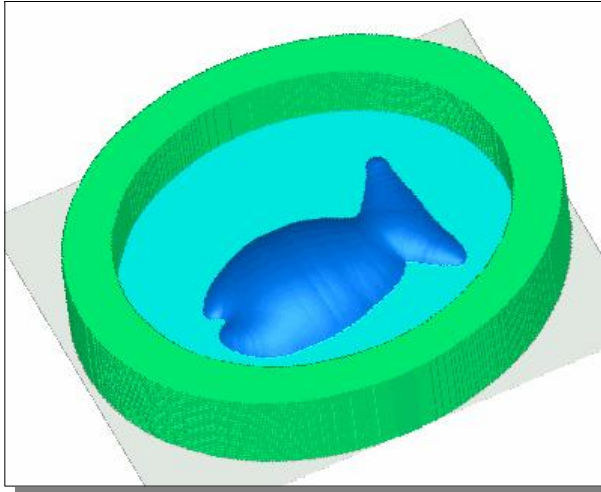


Apply colour attributes to the fish

Simply give a height to the colour used for the fish.

It should have a round form applied and be scaled to a fairly low height. Remember that the ball bearings will need to run over the fish.

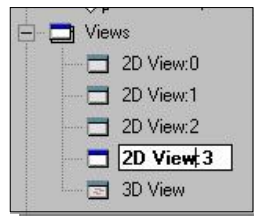
Take a look at your model. Does it



look like this?

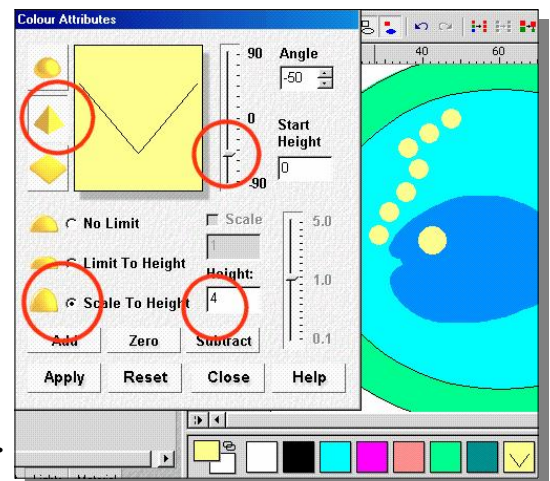
Create the ball bearing pockets

Creating the ball bearing pockets is easy. Simply make a **New 2D View**. You should have **four** 2D views in total that you have worked on.

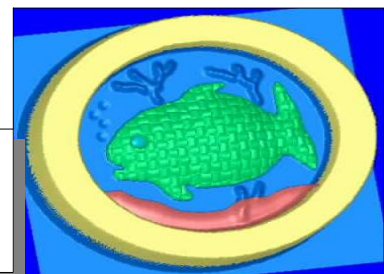


Paint on some pockets using the bitmap **Paint Brush** tool.

Now choose the **Angular** button and pull the slider to invert the shape. Enter a **Scale to Height** of about **4 mm** and press **Add**. The pockets will hold the ball bearings.

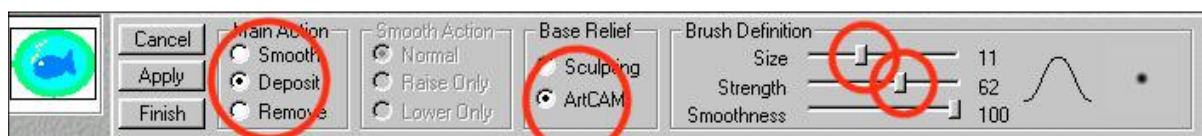


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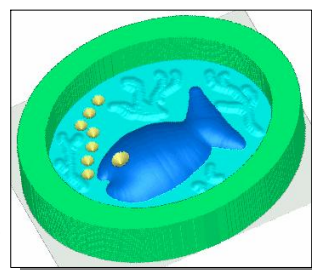


Let's use the sculpting tools

Select the **Sculpting** tool from the **Relief Editing** toolbar. Select **Deposit**, **ArtCam**, **Size** and **Strength**. Use this function to draw on features such as seaweed or starfish. If you make a mistake then press **Cancel** or press **Finish** if you are happy with your model.



Experiment with the **ArtCam** and **Sculpting** button. The **Sculpting** button will continue to add solids to the model whilst the **ArtCam** button will stop adding height no matter how many times you paint over the last solid deposited. You will be able to create some spectacular effects with this feature.



Put a texture on your fish

Select the **Texture Relief** button on the **Relief Editing** toolbar. Make sure that the colour that you have used for the fish has been selected from one of your 2D views.

Apply the textures that you want and press **Add**. Check the texture using the **3D view**. If you do not like the texture press **Subtract**.

Save your model.

Well Done!

