

# Constructing a Virtual Oblique Anamorph

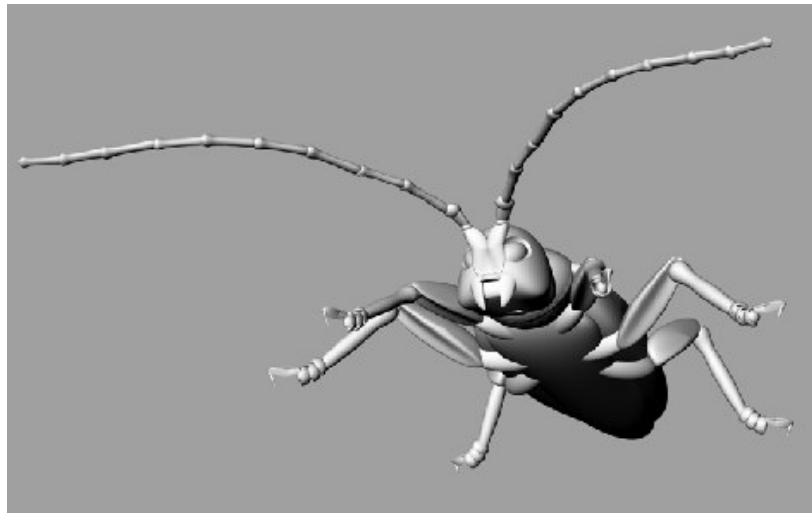
*Programs needed: Anamorph Me and Rhino 3D*  
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This tutorial illustrates the creation of a classic oblique anamorph, a form of reverse perspective practiced in the late Renaissance for symbolic and entertainment purposes. The term anamorph translates into “new form”, as it involves the purposeful distortion of an image. Every anamorph has a visual method for correcting this distortion and returning it to the original image.

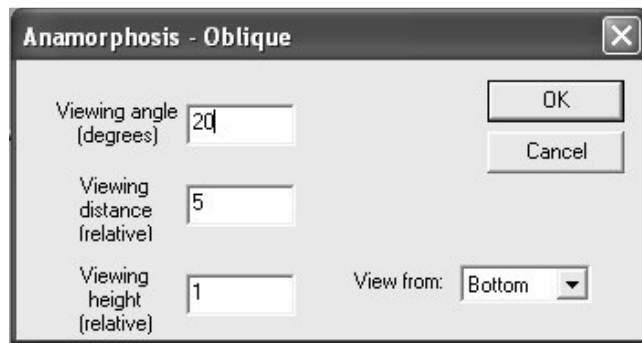
In this case the anamorph is viewed and corrected all within the virtual space of the modeling environment. The camera tool acts as a substitute for the human eye and the correction entails determining the exact position of the camera.

## Part I: Create the Anamorph

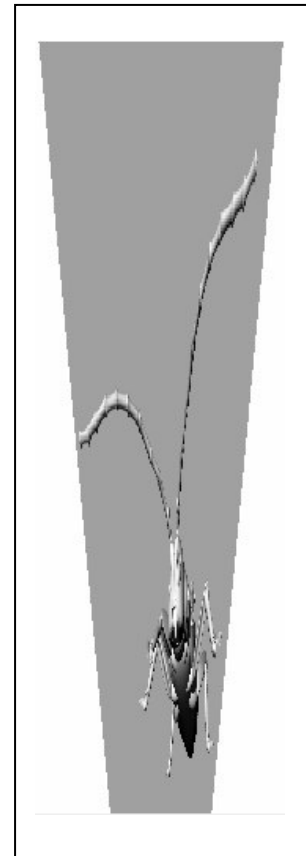
1. Open Anamorph Me and open file. Select image:



2. Click Anamorph, Oblique and play with settings to get a distortion that is not easily recognized, or that is humorous, or has unique qualities:



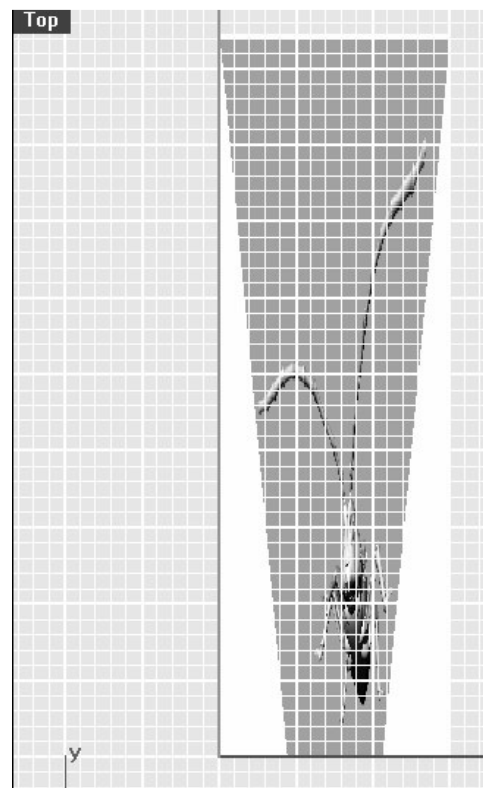
Important: If Anamorph Me crashes, re-open and set the viewing angle higher.

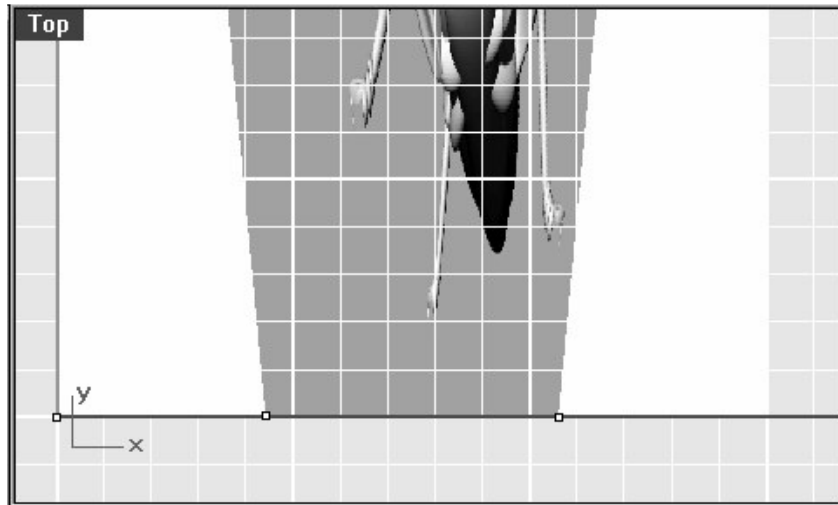


3. Save anamorphic image.

## Part II: Set Up Anamorph in 3D Space

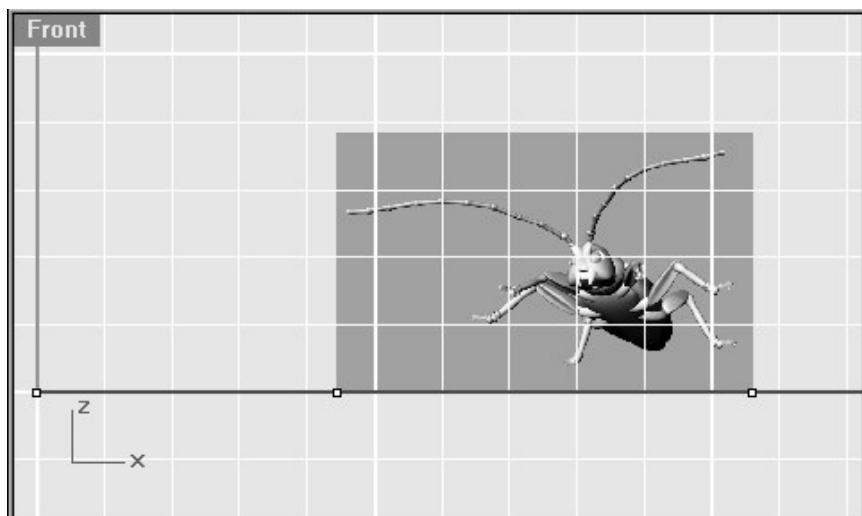
4. Open Rhino and maximize the Top window by double clicking on the word Top in the upper left hand corner. Choose View, Background Bitmap, Place and select the saved anamorph file. With the Snap button activated start at the grid origin and click and drag up and to the right to insert bitmap. The resulting image will automatically insert at the proportions of the image. The anamorph is now horizontal in the 3D model space.



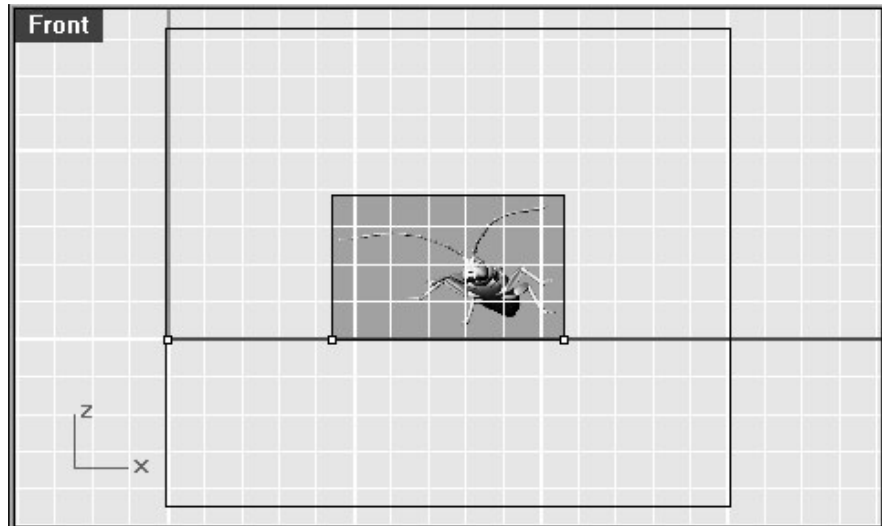


The next set of steps will construct a vertical viewing frame on the front -- narrow end -- of the anamorph:

5. Zoom into the narrow end of the anamorph and place two point-objects at each corner. Be sure to de-activate all snaps. After placing these two point-objects activate the Snap button and place a third point-object at the origin. These are called construction points. They will not be part of the final model, but have been inserted temporarily to help with the construction of the model.
6. Go into the front view and once again insert a background bitmap. This time select the file of the original image. Activate the Point snap in the Object Snap menu and, beginning at the left point-object, click and drag up and to the right until the bottom right corner of the bitmap rectangle touches the right point-object. The insertion of this image will determine the size and position of the opening of the viewing frame.



7. Choose Curve, Rectangle, 3 Points and then click on the point objects on the corner of the bitmap. De-activate all snaps and click on the top of the bitmap to complete the rectangle.



8. Click Curve, Offset and type `t` on the Command line. Hit Enter. Activate Point snap and click on the rectangle. Drag to the point object on the origin. A second rectangle will appear that is offset equally on all sides of the first. This will determine the outside dimensions of the viewing frame.
9. Select both rectangles and click on Surface, From Planar Curves. This produces a surface with a window through it the size of the bitmap.
10. The framing mat is now complete. The next step is to create the surface on which the anamorph is to be mapped.

Maximize the Top view and with the Snap button active click Surface, Rectangle, Corner to Corner. Draw the surface to fit exactly over the background bitmap of the anamorph.

11. Select the rectangular plane and go to Edit, Object Properties. Then choose Material, Basic. Click on Texture and open the anamorph image file. Click OK.

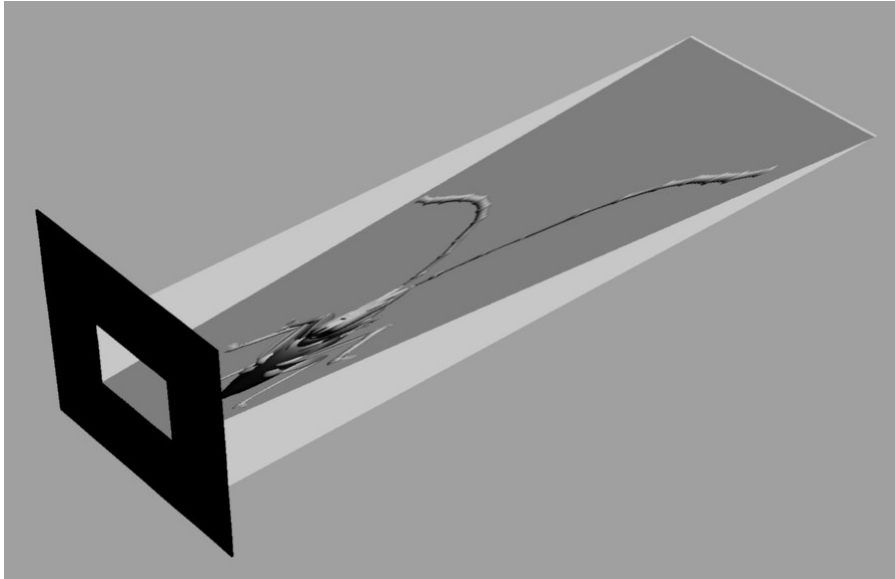
This will place the same image as the background bitmap onto the surface rectangle. This image will coincide with the background bitmap, which had only been inserted for construction purposes. When rendering an image of the model the background bitmap does not appear. It can be removed by choosing View, Background Bitmap, Remove.

12. Select the framing mat and go to Edit, Object Properties, Material, Basic. Click on Color and choose black. Click OK to verify the color and OK to leave the Properties window.

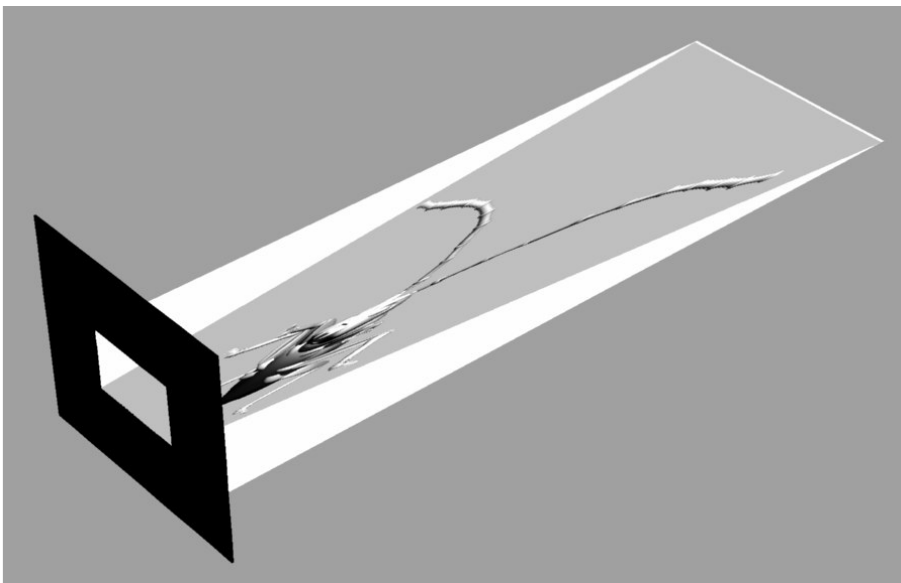
13.



Maximize the Perspective view and adjust the model to fit nicely onto the screen. Click the Render icon to create a rendered image of the model. The anamorphic image appears on the surface rectangle.

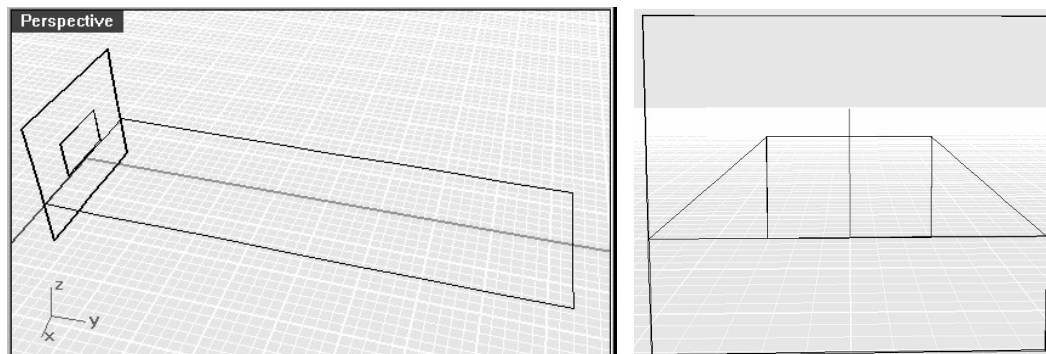


The image will have a tendency to be a bit dark. To rectify this go to Render, Properties and click on Ambient light. Choose Dark Gray from the column of colors on the left of the pop out menu.



14. Print out this image direct from Rhino by clicking on File, Print in the rendering Display Window. Make sure that the printer is set for landscape. Print on Epson Matte Heavyweight photo paper with the printer at maximum resolution.
15. The last step is to visually reverse the anamorph by adjusting and positioning the camera. First, however, center the anamorph on the grid.

Working in Perspective view, select the entire model and click on Edit, Group. Activate the Mid snap and make sure that the Snap button is active. Choose Transform, Move, and then click on the midpoint of the edge of the rectangular plane where it meets the framing mat and move that point to the origin. Later when the camera needs to be adjusted numerically, this position of the model will simplify that procedure.



### Part III: Correcting the Anamorph

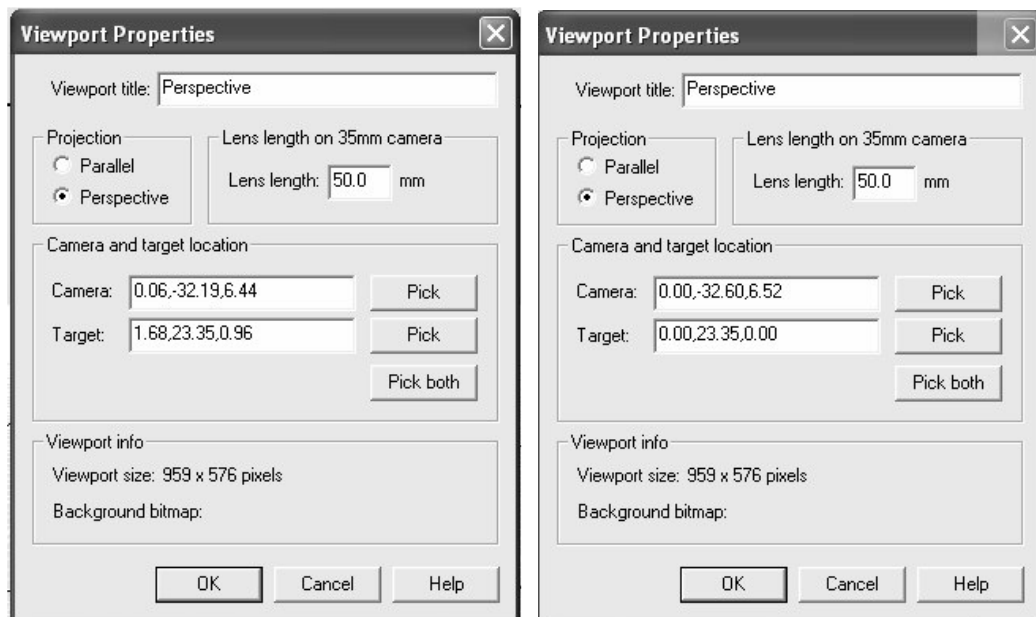
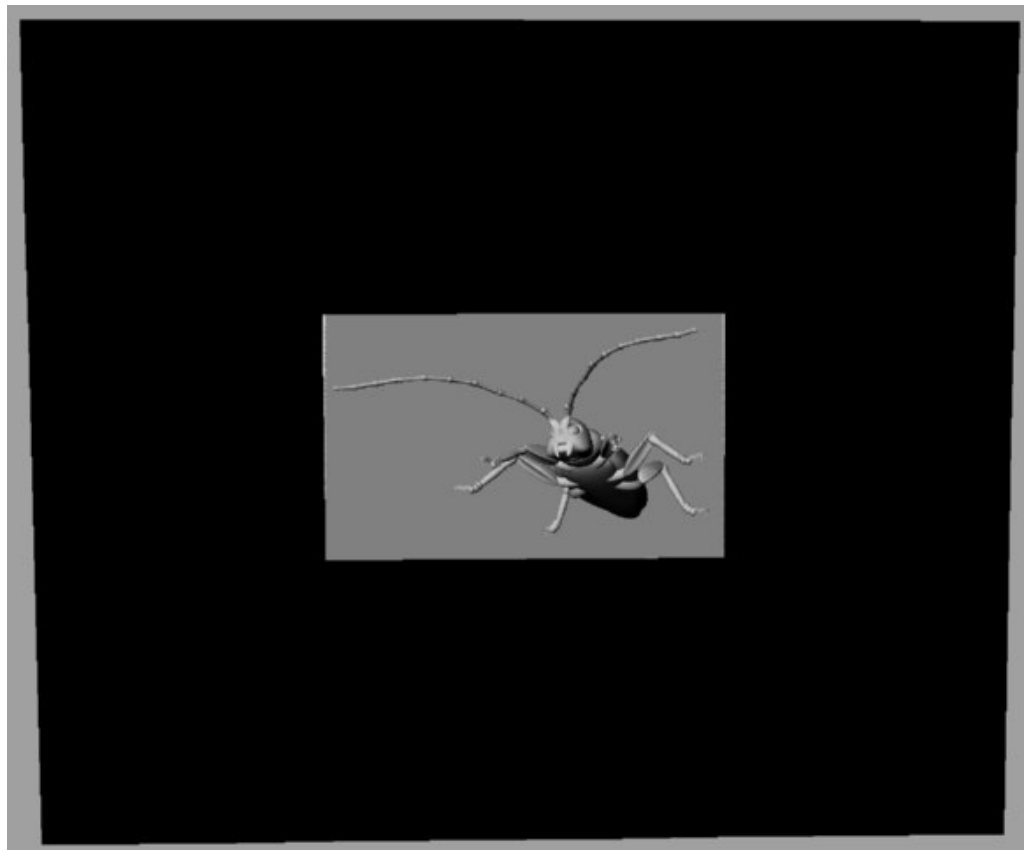
16. Maximize the Perspective window and right click on the Perspective label to open a drop-down menu. Choose Viewport Properties and in the pop-up window change the focal length of the camera to 50 mm. This adjusts the focal length to match the perspective of the human eye.



Using the Rotate tool and the Zoom Dynamic tool, manipulate the camera until the back end of the anamorph plane matches the top of the mat window (above right). Render this view.

Take a close look at the rendering below. Notice how the mat is crooked and a white sliver still appears at the edges of the image. It is now time for some numerical fine-tuning.

17. Go to Viewport Properties once again. Change the x coordinate of the camera to 0, and the x and z coordinates of the target (the point the camera is angled toward) to 0 as well. This will straighten out the mat in the rendering.



To remove the white sliver you will need to move the camera slightly further from the mat by increasing the absolute value of the y coordinate of the camera. This will take some experimenting to get the distance just right. Note that the z coordinate is exactly 1/5 of the y coordinate. This is because the z

coordinate corresponds to the viewing height specified in Anamorph Me and the y coordinate corresponds to the viewing distance. Recall that these values were 1 and 5 respectively or 1/5 proportion.

