Lab Activity: Animating with Morph Targets

Purpose
This lab introduces the use of the following tools and techniques:

- named and saved selections;
- sets of vertices identified as morph areas;
- morph targets defined for specific morph areas; and
- using morph targets in animation.

Read the entire general description of this activity before you launch Carrara; your objective is to understand what you are doing at each step, not just to follow the steps.

General Description

A morph area is asset of vertices in a polymesh that is susceptible to deformation. On a polymesh for Shrek’s face, morph areas would include the eyelids, the brows, corners of the mouth—anything that might need to be deformed in some way to make a facial expression.

A morph target is a specific deformation of a morph area. In the example just provided, there might be the following morph targets for the brows: brows up; brows down, left brow up, left brow down, right brow up, right brow down (really the list would be much longer, including up and down for inner and outer brows, pulling the brows together in a scowl, etc.). Each morph target, once it has been defined, is controlled with a slider that transforms the mesh from zero to 100 percent of the defined change. Several morph targets may be used in combination: for astonishment, brows up 100%, for anger, both brows down 100%. To show a look of bemusement, one brow up slightly and the other one down slightly.

Since we are short on time, this lab won’t involve character animation, but a simple model that will take only an hour or so to complete, animate, and render. Go to the Links link on the class web page and view the Spy Satellite movie. It shows a low-rent version of a satellite, ala early James Bond movie, deploying a sinister (goofy?) antenna. A hatch drops open, swivels and withdraws from sight, and an antenna extends and unfurls a satellite dish.

An Overview of the Procedure

To make this animation, you will create a model beginning with a vertex sphere. You’ll detach the upper set of polygons to make the hatch, add a small amount of thickness to the walls, and then save the hatch polymesh selection for easy later retrieval. You’ll define a morph area for the hatch, and then create three morph targets for it.

You will then paste another copy of the original detached dome (hatch) from the sphere to use as the satellite dish, and resize it smaller. This set of polygons will also be a saved selection, as will the narrow cylinder used for the antenna mast.

The cylinder will be one morph area having one morph target; the dish will be a morph area having two targets (one to open by increasing in size, another to rise as the antenna extends).

Creating the animation will only require setting key frames and using morph settings in the correct sequence.
Building and Animating the Model

As you carry out each step, pay attention to what happens and make a point of understanding what you are doing. If something goes amiss, try to determine the cause and correct it. Ask for help if necessary. Don’t make assumptions and try to solo before you are ready!

Launch Carrara and create a new document. Insert a vertex object, and when the modeling room opens insert a sphere. Specify a definition of 12 for this object.

While the sphere is still highlighted, resize it to six inches by using the “Model…Transform…Set Size” command.

De-select the object, and from the top view select the polygons that make the uppermost circle in the mesh. Copy this selection.

Now you need to remove the circle from the sphere. If you just delete it, you don’t get the results you need—try this and see what happens. Be prepared to un-do the action.

Deselect everything, and then using the delete tool (scissors icon), delete the central vertex, and then the circular polygon that results from deleting the vertex. Now you have a sphere with a round hole in the top.

Deselect everything again, and paste the reserved copy. Now it is a discontinuous polygon from the sphere. Add a small amount of thickness (0.05 to 0.10 inches) to everything.

Deselect everything, and double-click the circle to select the mesh for the hatch. Name this selection by choosing “Name” from the “Select” menu. Now you can select the hatch polymesh quickly at any time by choosing “Select by Name” from the “Select” menu.

Animating the Hatch

You are now ready to create the morph targets that animate the hatch. Select the hatch, and click the “Morph” Tab in the properties tray. You will see a dialog box with an empty list of morph areas and a few buttons. Click “Create” to create a new morph area composed of the hatch polymesh, and name the morph area appropriately.

To the right of the box where you entered the name for the area is a pull-down menu button. Click it and you’ll see that the first choice is “Create Target.” Make this choice, and name the target “Open Hatch.” Now a slider bar appears below the name of the area, with an “Edit” button beside it. Click the button, and then go to the front view of the modeling room and move the hatch mesh straight down to the center of the sphere. When you are satisfied that the hatch is in the center, click the button again (it now is labeled “Valid”). You have created a morph target.

To preview the action of this morph target, click the “Animate” editing mode at the top of the properties tray (icon looks like a human with outstretched arms). The morph area window is still visible, but now you may move the slider to see the changes caused by the morph.

Return to the “Model” side of the properties tray by clicking the tab to the left of the “Animate” tab. Create another morph target for the hatch, and name it “RotateHatch.” Edit this target by simply rotating the hatch 90 degrees on the x-axis. Don’t worry about its location—the “Open Hatch” target takes care of that. (To rotate, select the rotate tool and type “90” in the dialog that appears in the properties tray).
Create a third target for the hatch and name it “Move Hatch.” When you edit this one, change the y-position for the hatch to –2.75 inches.

Now if you apply the three morphs in sequence, the hatch drops into the center of the sphere, then rotates, then moves to the side.

**Building and Animating the Antenna**

Still working with the same vertex object, do a paste to get another copy of the slightly-domed polygons from the original hatch cutout. Add a tiny amount of thickness, and reduce its diameter to one inch. Select the entire polymesh and save it with the name “Dish.”

Now add a cylinder 0.25 inches in diameter and 1-1/2 inches tall. This will be the antenna stalk.

Rotate the dish and position it so its center aligns with the top of the cylinder and the two almost touch. You will now create a morph area for the antenna stalk and give it one target, that will extend it to ten inches. Make sure all the length is added at the top.

Create another morph area for the dish. This will have two targets: one to move the dish in synch with the top of the stalk, and the other to make it “bloom” into a larger diameter once it has cleared the opening for the hatch.

Finally, position the entire antenna assembly in the bottom half of the sphere, centered under the hatch. Test the morph targets with everything together.

**Making the Animated Clip**

Go to the assembly room, and open the sequencer tray. For the first trial you should only use the morph targets to animate.

Move the blue “scrubber” over 10 or 12 frames, and then (if it isn’t selected) select the vertex object in the scene. The list of morph areas will appear. Choose the “Hatch” morph area, and then slide the “Open Hatch” slider all the way to the right.

Move the scrubber over another 10 or 12 frames, and adjust the “Rotate Hatch” slider. At the same key frame, move the “Move hatch” slider just a bit. These two morphs will overlap some.

Continue setting key frames for the extension of the antenna (remember that both the antenna and the dish must be moved the same amount in each key frame), and the opening of the dish.

You can preview the animation by moving the scrubber back and forth.

You may want to add another light to the scenes, like a spot, to help fill shadows. Make it less bright than the key light, and reduce the shadow intensity to 60 to 75%.

In the render room, adjust the output settings to speed rendering and reduce file size. Consider using a 320 by 240 window for test renderings, and select MPEG video compression from the QuickTime options. The movie will take four or five minutes to render at most.

**Finish**

This animation could be made pretty easily without morph targets. However, situations that require repeated deformation of a mesh in a specific way are much easier when morph targets are used. Try to think of uses of this tool you might have seen in professional work.