PART_1

CHARACTER MODELING

1 Subdivision & Polygon Modeling

Many of Maya's features have seen great improvements in recent updates to the software. In modeling, the most noteworthy point is the improvement in Subdivision Modeling. The Polygon menu has also been partially improved to make modeling using Subdivision Surfaces easier.

Subdivision Surface Modeling is a technique that uses continuous surface slicing to make the initial line segment or mesh resemble a smooth curve. The biggest advantage to this method is that it allows us to make random surface slices like Polygon, while maintaining the smooth curvature of NURBS. Currently, almost all types of software offer this kind of feature, which is enough to portray almost all kinds of characters or items.

In this chapter, we will learn how to use these menus through a tutorial, which will show us just how easy it is to approach modeling.

1. POLYGON MENU

Before we can begin Subdivision Modeling, we must fully understand the related Polygon menu. This is because Subdivision Modeling is based on the Polygon Modeling method. Although there are many facets to the Maya Polygon menu, we will look at only those necessary for Subdivision Modeling.

1-1. CREATE POLYGON TOOL

(Modeling > Polygons > Create Polygon Tool)

This menu is used to make polygons. Although other polygon-based modelers use splines to make polygons, Maya does not offer this type of feature. Therefore, in order to make polygons, we need to use this tool.

Select [Modeling > Polygons > Create Polygon Tool] and then click on the desired point while clicking the LMB as shown in Figure 1-1 to make the polygon.

When the polygon is complete, as shown in Figure 1-2, press the Enter key to finish making the polygon.

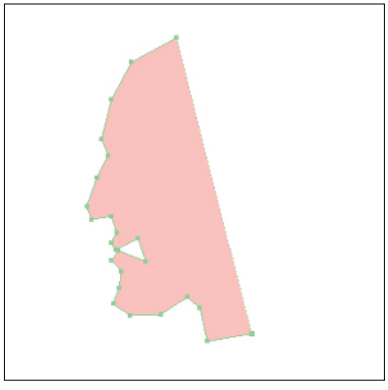


Figure 1-1 Polygon Modeling

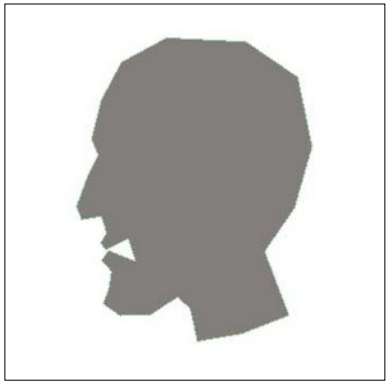


Figure 1-2 Completing the Polygon Model by Pressing the Enter Key

Users can also create polygons with holes. First, make the polygon as shown in Figure 1-3 using the Create Polygon Tool and then, instead of pressing the Enter key, click on the inside of the polygon model with the LMB while holding down the Ctrl key and then, releasing the Ctrl key, create the desired shape as shown in Figure 1-4.

To continue making holes, press the Ctrl key, instead of the Enter key, to make the desired shapes. Press the Enter key when you are finished.

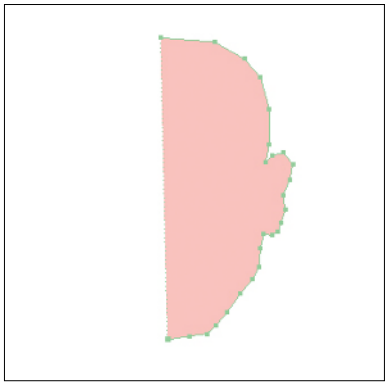


Figure 1-3 Polygon Modeling

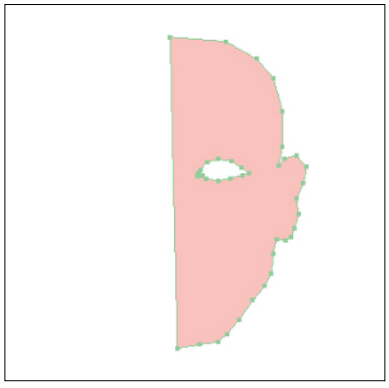


Figure 1-4 Making a Polygon with Holes

1-2. APPEND TO POLYGON TOOL

(Modeling > Polygons > Append to Polygon Tool)

This tool is used to make a new face (surface plane). Users can use this tool on a polygon that has already been made to create the desired shape or surface and create a new face.

First, select [Modeling > Polygons > Append to Polygon Tool] and then, as shown in Figure 1-5, click the LMB on the edge to which you wish to add the face. The selected edge now becomes the first edge of the new face, and the pink rectangle that appears shows the direction of the edge.

As shown in Figure 1-6, clicking any point in the window will create a line and a new point. Observing the picture, you can see that one side of the edge appears as dotted lines. This indicates that points can continue to be added in this direction to create a face.

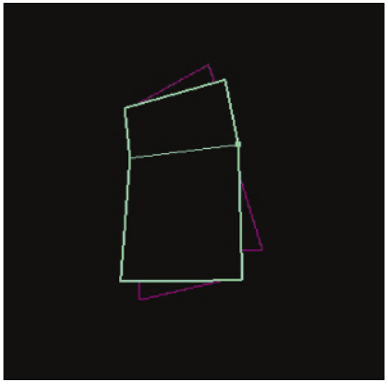


Figure 1-5 Selecting the Edge

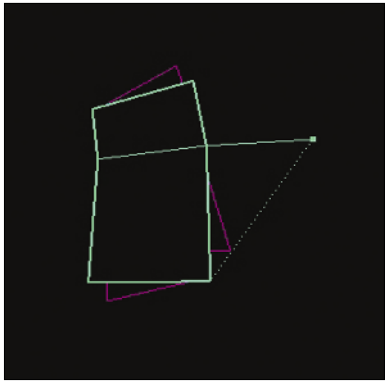


Figure 1-6 Location of the Point

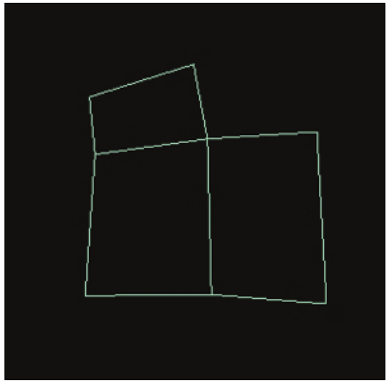


Figure 1-7 Completing the Image by Pressing the Enter Key

When the desired result is achieved (Figure 1-7), press the Enter key to exit from the Append to Polygon Tool.

Although we can continue to use the Append to Polygon Tool to make new faces to trim the shape of the polygon, it is also used quite frequently to fill in holes.

Let's look at the picture below. Figure 1-8 shows a polygon model with a face erased in the forehead to reveal a gaping hole. This tool is very effective for filling in such holes.

Select [Modeling > Polygons > Append to Polygon Tool], and then select the edge that is indicated in Figure 1-9.

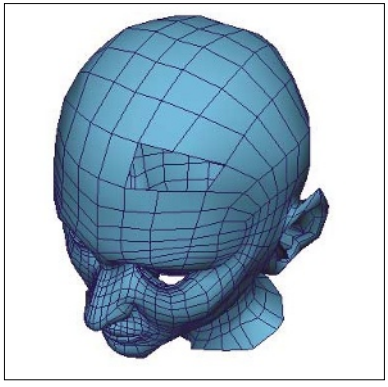


Figure 1-8 A Polygon Model with an Erased Face

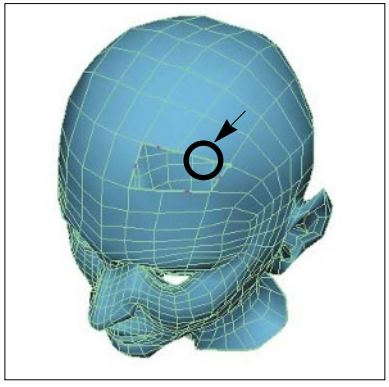


Figure 1-9 Selecting the Edge

Then, select the second edge as shown in Figure 1-10. This will create a new surface as shown. Exit from the Append to Polygon Tool by pressing the Enter key to create the new surface shown in Figure 1-11.

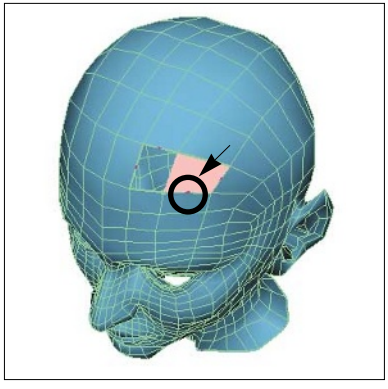


Figure 1-10 Selecting the Second Edge

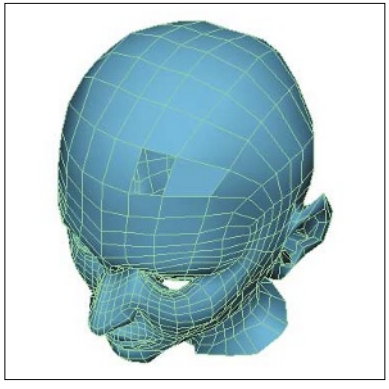


Figure 1-11 Completing the Image by Pressing the Enter Key

1-3. COMBINE

(Modeling > Polygons > Combine)

This tool combines together two separate polygons.

Let's see how to use this tool by looking at the following example. Figure 1-12 shows us the process of modeling a hand. This model shows the process of detailing the pointer finger. After working on most of the details, similar shapes can be made by copying and pasting. Although this model is basically a duplicate of the polygon model used to make the fingers, in the end, they must all be merged to blend the edges together. To merge together all the edges, all polygons must be recognized as one object.

Let's see how this is done.

First, as shown in Figure 1-13, select the faces of the polygon that will be copied.

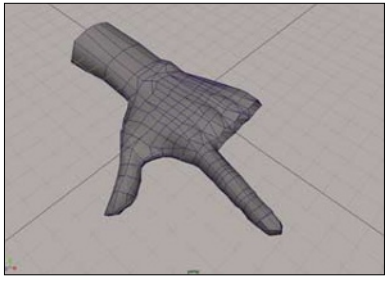


Figure 1-12 Polygon Modeling of a Hand

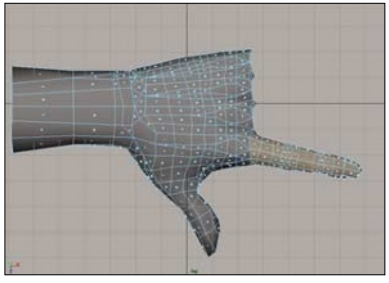


Figure 1-13 Selecting the Face to be copied

Select [Modeling > Edit Polygons > Duplicate Face]. The selected face will be copied as shown in Figure 1-14. Click the LMB on the area indicated in Figure 1-14 and then arrange it as shown in Figure 1-15. Finally, adjust the values for the size, location, and rotation.

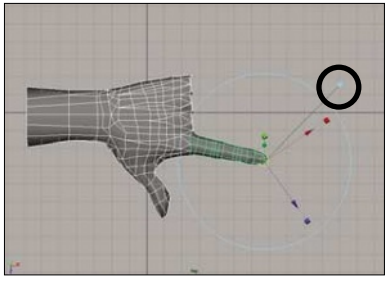


Figure 1-14 Duplicate Face

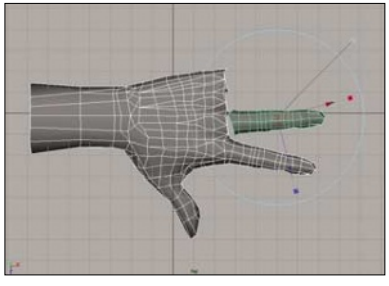


Figure 1-15 Adjusting the Placement of the Finger

We now need to use the Merge Edge Tool to blend together the edge of the hand and the duplicated finger. This is because the two polygons are two separate objects. The Merge Edge Tool is used to link together one polygon with its displaced edge.

Therefore, the Combine Tool must be used to combine the two polygons into one.

Select the two polygons and then select [Modeling > Polygons > Combine] to make one polygon as shown in Figure 1-16.

Figure 1-17 shows the use of the Merge Edge Tool to blend the edge of the finger with the hand. More instructions on how to use the Merge Edge Tool can be found in the back of this book.

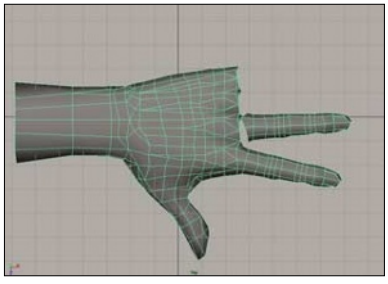


Figure 1-16 The Combined Polygon

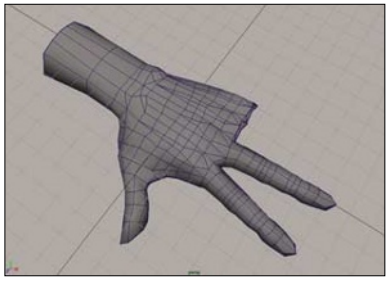


Figure 1-17 Using the Merge Edge Tool

1-4. Split Polygon Tool

(Modeling > Edit Polygons > Split Polygon Tool)

This tool is used to slice a surface by adding an edge to a polygon face. Generally, when modeling polygons, it is more effective to split surfaces at random while modeling detailed areas to achieve optimal data and clean modeling data. This tool is used frequently for this purpose.

The following is a good example. Figure 1-18 shows a polygon cube that has been reduced in scale, to approximate the shape of a hand model.

Select [Modeling > Edit Polygons > Split Polygon Tool] and the edges marked "A" and "B," in this order, as shown in Figure 1-19. Before removing your hand from the mouse, drag it from side to side to position it. After making the selections, press the Enter key to exit from this step.

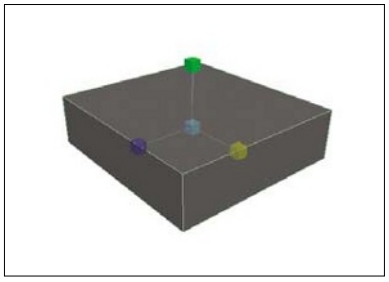


Figure 1-18 Adjusting the Scale of the Polygon Cube

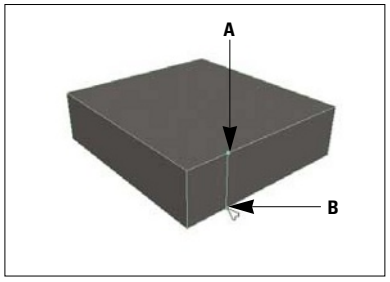


Figure 1-19 Using the Split Polygon Tool

Users can select edges to continue splitting the surface. Before pressing the Enter key to exit from this step, click on the desired edge to continue splitting the face.

1-5. EXTRUDE FACE

(Modeling > Edit Polygons > Extrude Face)

This tool allows us to create a new face by extruding a face.

Let's use it in conjunction with the Split Polygon Tool, which was explained above, to see how it works. Figure 1-20 shows how the surface was split by adding edges using the Split Polygon Tool.

Select the polygon object, press the RMB as shown in Figure 1-21, and select Face from the Marking Menu.

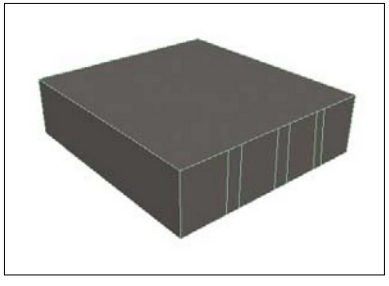


Figure 1-20 Using the Split Polygon Tool

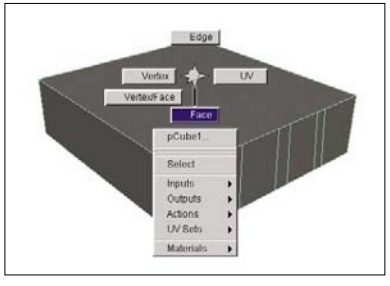


Figure 1-21 Selecting Face from the Marking Menu

As shown in Figure 1-22, select the face while holding down the Shift key on the keyboard.

Select [Modeling > Edit Polygons > Extrude Face].

As shown in Figure 1-23, select one axis of the Manipulator Move icon and then move the face to reveal the new, extruding face.

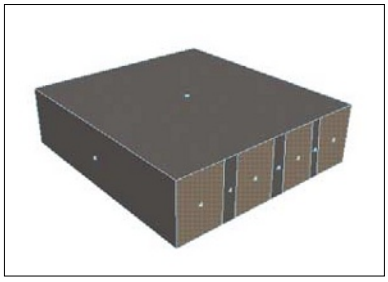


Figure 1-22 Selecting the Face

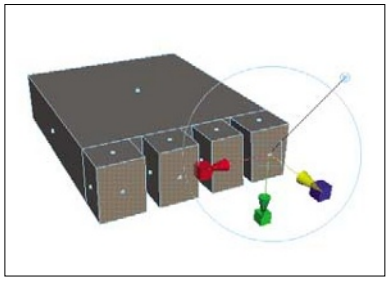


Figure 1-23 Executing Extrude Face

Continue to model by repeatedly applying Extrude Face.

1-6. EXTRUDE EDGE

(Modeling > Edit Polygons > Extrude Edge)

This feature was first added to version 3. Whereas Extrude Face, which we looked at above, is used to model by extruding the face, this tool extrudes edges to make a new face.

After making a new polygon cube and then selecting it, press the RMB as shown in Figure 1-24 and select the edge.

As shown in Figure 1-25, select one axis of the Manipulator Move icon and move the edge to create a new, extruding edge.

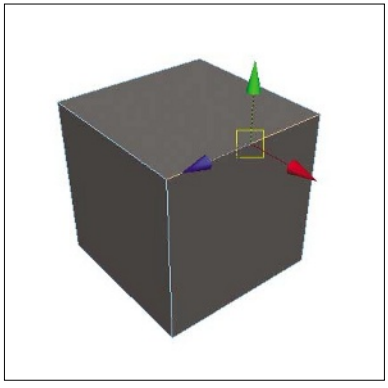


Figure 1-24 Selecting the Edge

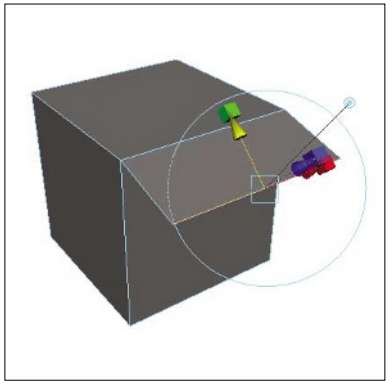


Figure 1-25 Move Edge

Keep one thing in mind when using Extrude Face and Extrude Edge: Use Keep Faces Together when extruding several faces or edges at a time. This option is used by setting [Modeling > Polygons > Tool Options > Keep Faces Together] to On. To see how this option is used, look at Figure 1-26. Select several faces and then apply Extrude Face and adjust the scale. Because Keep Faces Together is set to Off, we can see that each of the surfaces is separate from each other. In Figure 1-27, we set the Keep Faces Together option to On and then applied Extrude Face and adjusted the scale. We can see that the surfaces are connected now. The same holds true for extruding edges. Figure 1-28 shows the extruding of the edges with the Keep Faces Together option set to Off, and Figure 1-29 shows the edges extruded with this option set to On.

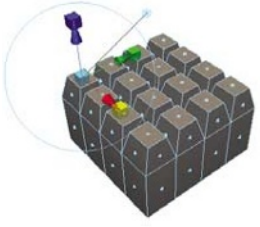


Figure 1-26 Keep Face Together; Off

Another thing to keep in mind when using these two tools is the use of the Manipulator. When these two tools are used to execute Extrude, the Manipulator appears as in Figure 1-30.

The Manipulator contains the tools for Move, Rotate, and Scale. A represents Move, B represents Scale, and C represents Rotate. When D is clicked, the extruded face or edge will be centered on the center of the extruded face or edge, which is the central axis of Transform. This is shown in Figure 1-31. When this is clicked again, the central axis will return to its original position. Test the Move and Scale Tools to see the difference between the two.

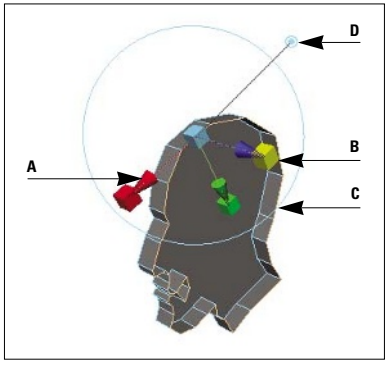


Figure 1-30 Manipulator Tool

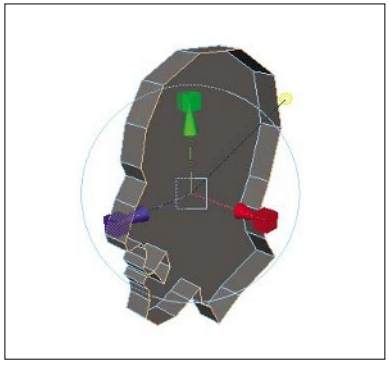


Figure 1-31 Changing the Central Axis of the Manipulator

1-7. MERGE EDGE TOOL

(Modeling > Edit Polygons > Merge Edge Tool)

This tool merges the edges of polygons. We saw earlier how this tool was used to combine two, separate polygon objects when using the Combine Tool. Figure 1-32 is the same example that was used earlier to explain the Combine Tool.

As shown, copy the face of the finger to model the fingers and then rearrange them and apply the Combine command to combine the two polygon objects into one. Now, because these two surfaces are separated from each other, as shown in Figure 1-32, we combine them into one using the Merge Edge Tool.

Select [Modeling > Edit Polygons > Merge Edge Tool] and select the *A* edge shown in Figure 1-33. Then, as shown in Figure 1-33, the color of the selected edge will change and all of the edges will turn pink.

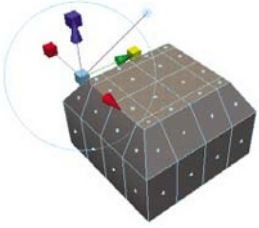


Figure 1-27 Keep Face Together; On

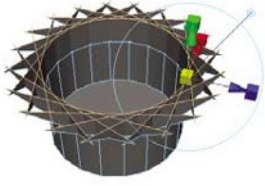


Figure 1-28 Keep Face Together; Off

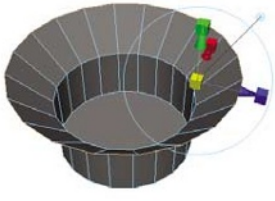


Figure 1-29 Keep Face Together; On

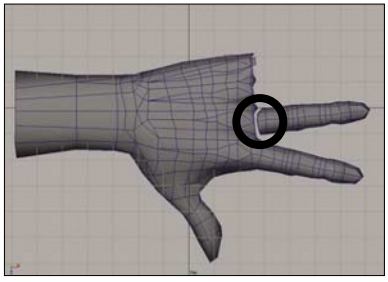


Figure 1-32 Polygons separated after applying the Combine Command.

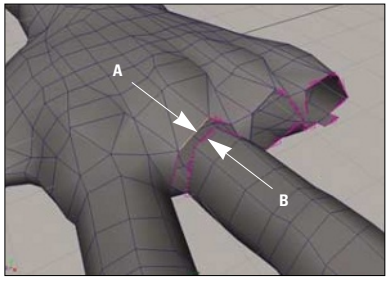


Figure 1-33 Applying the Merge Edge Tool

As shown in Figure 1-33 select the edge marked "B" and then, press the Enter key to combine the two edges. Instead of pressing the Enter key, users can also click the LMB on an empty space in the window to continue using the Merge Edge Tool to merge other edges together.

1-8. SPLIT VERTEX TOOL

(Modeling > Edit Polygons > Split Vertex)

This tool is used to divide a vertex into two to slice an edge. For example, let's suppose that we modeled the figure of a closed mouth as shown in Figure 1-34. This tool comes in handy should we want to split the upper and lower lips to model the inside of the mouth. Select the vertex you wish to divide. Select the areas marked in Figure 1-34. Select [Modeling > Edit Polygons > Split Vertex] and then move the vertex, as shown in Figure 1-35, to divide the selected vertex. If the Split Vertex Tool has been applied excessively, combine the vertices together using the Merge Edge Tool.

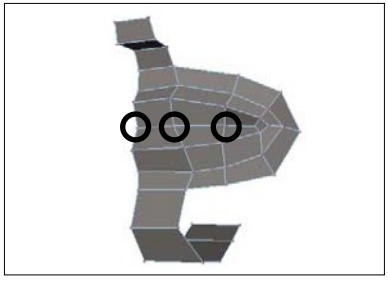


Figure 1-34 Selecting Vertex

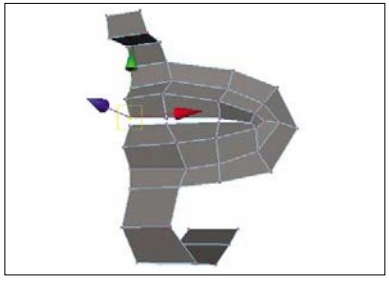


Figure 1-35 Applying Split Vertex

2. SUBDIVISION SURFACE MENU

Several Maya upgrades have brought many improvements to Subdivision Surface. This type of modeling technique is offered in almost all programs. Although the names are slightly different from program to program, the basic concept is the same.
The following is the main concept behind Subdivision Surface.
Although NURBS (Non-Uniform Raditional B-Spline) is normally used for smooth curves and complex models, it has one fatal flaw: NURBS surfaces require rectangular lattice structure to link each control vertex (CV), and that causes them to form surfaces.
In other words, triangular structures cannot exist, and we cannot freely divide Isoparms in patch units as we did for the edges in Polygon as we learned earlier. Those experienced with NURBS modeling are probably familiar with this disadvantage.

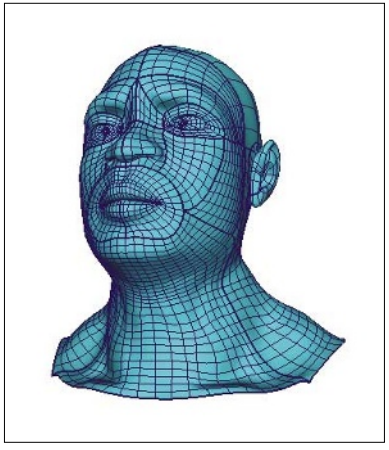


Figure 1-36 NURBS Modeling

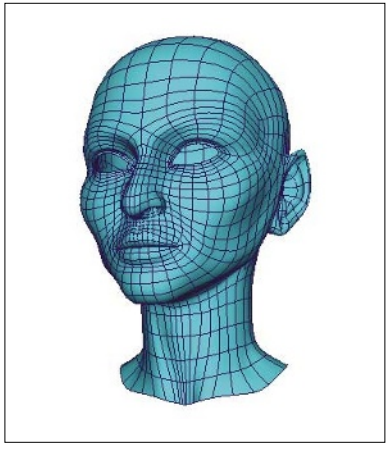


Figure 1-37 Subdivision Surface Modeling

The solution to this is Subdivision Surface. This method is similar to Polygon Modeling, and the output is a B-Spline structure. In existing NURBS Patch (Multi-Surface) Modeling, it was impossible to create one attachment due to the disadvantage mentioned earlier. Therefore, Stitch or Global Stitch was used to fit together adjacent curves so that it appeared to be linked when rendered. However, Subdivision Surfaces allow all surfaces to be attached and transformed into any shape. In addition, necessary surfaces can also be added in parts to create more detailed modeling.

If you are not familiar with Subdivision Surfaces, you might find them easier to understand if you first just browse through the explanation of the menu here and then run through the tutorial in the back before coming back and reading this section over more carefully.

This modeling technique radically simplifies the previously complex and intricate field of character modeling. Control of this technique is also quite simple. Choosing to use this method, say, to make a character and model it using Blend Shape to create many different facial expressions will make your work much faster and easier.
Maya's Subdivision Surface is a revolutionary tool. Although this will be covered in more detail in the back of this book, this tool is revolutionary because meshes can be divided into various levels, depending on the accuracy of the model, for more effective modeling.
However, there are also disadvantages. Using Subdivision Surface to bind joints conspicuously lowers the speed of the system and because it uses the Polygon Mapping method, it is extremely difficult to make the mapping axis. Also, the data is much larger than NURBS or Polygon.

In this chapter, we will look at the menus related to Subdivision Surfaces. You can put your knowledge to use by following along with the modeling tutorial in back.

2-1. POLYGONS TO SUBDIV

(Modify > Convert > Polygons to Subdiv)

Subdivision Surfaces, for the most part, use polygon objects. In other words, Polygons to Subdiv is the command used to convert polygon objects into Subdivision Surfaces. (NURBS can be changed to Subdivision Surfaces. To do so, use NURBS to Subdiv.)
After making one primitive polygon cube ([Create > Polygon Primitives > Cube]) as shown in Figure 1-36, adjust the size appropriately in the window. After selecting the polygon object, select [Modify > Convert > Polygons to Subdiv]. As shown in Figure 1-37, the selected polygon cube has been changed into a subdivision surface. To make the surface appear as smooth as it does in Figure 1-37, press **3** on the keyboard to set the Smoothness of the subdivision surface to Fine.

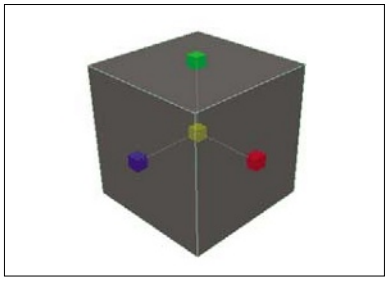


Figure 1-38 Polygon Primitive Cube

Figure 1-39 Polygons to Subdiv Surface

Let's look at the Convert to Subdiv option.

Selecting [Modify > Convert > Polygons to Subdiv] will create the option window shown in Figure 1-40.

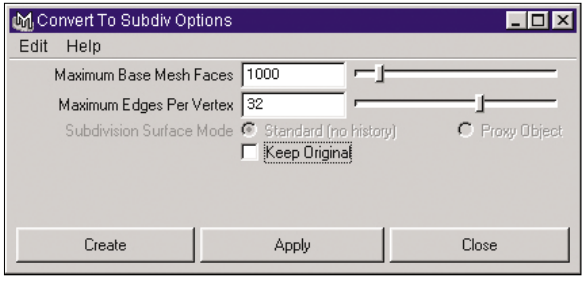


Figure 1-40 Convert to Subdivision Option Window

● Maximum Base Mesh Faces

We set the value of the face to the maximum value in order to successfully convert the original surface to a Subdivision Surface. For example, let's suppose we have a polygon object with a face value of 900. The Maximum Base Mesh Faces must be set to 1000, a value greater than 900, for the Subdivision Surface to be made. A Subdivision Surface will not be made if the value is set to less than 900, and an error message will appear.

● Maximum Edges Per Vertex

The concept is similar to the option above, but this option is used to set the maximum value for the edge of a vertex.

● Keep Original

This option is used to create a new Subdivision Surface while maintaining the original object. Setting this option to On will activate Standard and Proxy Object. This option will be explained in greater detail in the back of this book.

2-2. SUBDIV TO POLYGONS

(Modify > Convert > Subdiv to Polygons)

This is the tool used to convert subdivision surfaces to polygon objects.
To convert the subdivision surface shown in Figure 1-41 to a polygon, select it and then apply [Modify > Convert > Subdiv to Polygons] to convert it to the polygon shown in Figure 1-42.

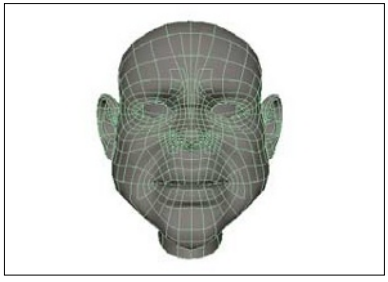


Figure 1-41 Subdivision Surface

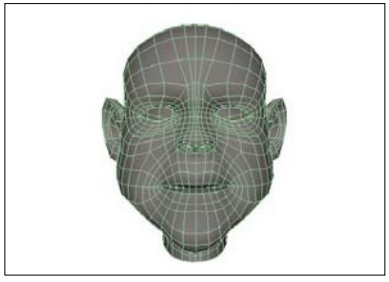


Figure 1-42 After Applying Subdiv to Polygons

Selecting [Modify > Convert > Subdiv to Polygons ❐] will create the Convert Subdiv To Polygons options window as shown in Figure 1-43.

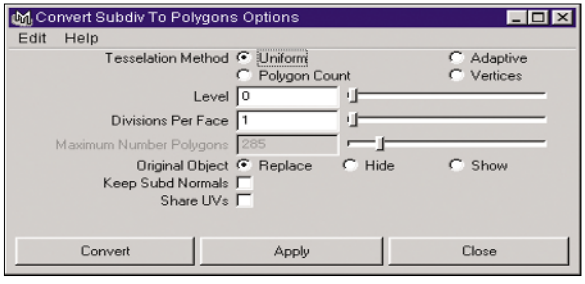


Figure 1-43 The Convert Subdiv To Polygons Options Window

● Tesselation Method

Users can use one of the following three methods to convert subdivision surfaces to polygons.

Uniform

Uniform Tessellation creates polygon objects using the same intermediary values of each of the subdivision surfaces.

Adaptive

Adaptive Tessellation creates many more polygons in detailed regions to express the precision of the subdivision surface models.

Polygon Count

This is basically the same as Uniform Tessellation. This value can be raised to increase the number of polygons, but the number entered is not the same as the number of polygons.

The Difference Between Uniform and Adaptive Let's look at the subdivision surface shown below in Figure 1-44. This figure is a portion of the finger to which a surface has been added to depict the fingernail. In the figure below, the subdivision surface is set to Standard Mode, displaying the Subdiv Mesh Point and Subdiv Mesh Edge from [Display > Subdiv Surface Component].

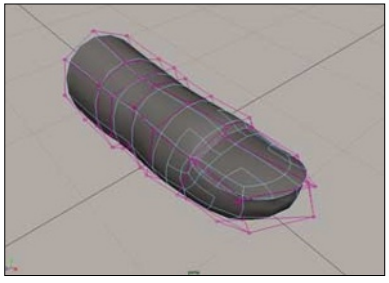


Figure 1-44 Subdivision Surface

Let's look at the difference between Uniform and Adaptive when converting to polygons when adding surfaces to particular areas for partial depiction, as we did here, or using Refine Selected Components (refer to "2-17. Portraying Detail in Another Level" for more information) to make a subdivision surface. The image in Figure 1-45 was made using the default values in the Options window and applying Uniform Tessellation. As shown here for Uniform Tessellation, it is made using the intermediary values of the subdivision face. However, the image in Figure 1-46, which was made by applying Adaptive Tessellation, adds surfaces at random for more precise delineation and adds many polygons to the created surface.

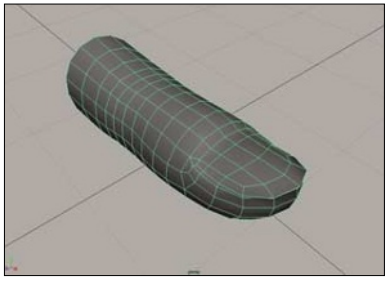


Figure 1-45 Tessellation Method; Uniform

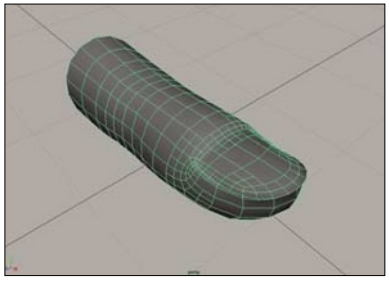


Figure 1-46 Tessellation Method; Adaptive

Level This option can only be used for Uniform Tessellation. It decides how many surfaces will be tessellated in the display level of the subdivision surface. For example, if the level is set to 3, it will be converted to a polygon at that level. (More detailed information on levels can be found in "2-17. Portraying Detail in Another Level.")

Divisions Per Face This decides how many times each surface will be sliced. This is an option that can be used in both Uniform and Adaptive Tessellation. The greater the value, the greater the number of surfaces there will be for a smoother model.

Maximum Number of Polygons This option is used when the Tessellation Method is set to Polygon Count. The greater the value, the smoother the model will be.

Vertices

Vertices are used when calculating the level points of the selected subdivision surface as polygon vertices to make polygon objects.

Let's look at the following figures. Figure 1-47 shows a simple polygon cube made as a subdivision surface. The Display Level for this object is 0. Selecting the Vertices as 0 and then executing it gives us the polygon seen in Figure 1-48.

The Subdiv Mesh Points and Subdiv Mesh Edges are displayed in Figures 1-47 and 1-49 to help you better understand. Extract Vertices must be executed in Object Mode.
Users can convert back and forth from Object Mode to Component Mode in Maya by pressing the F8 key.

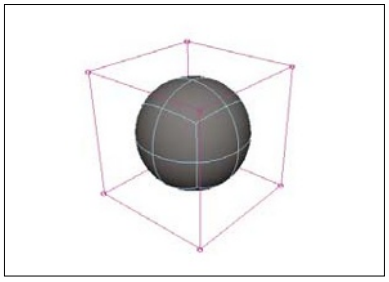


Figure 1-47 Display Level 0

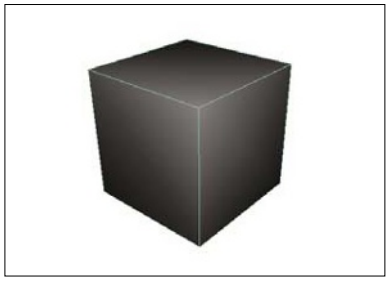


Figure 1-48 Executing Extract Vertices

The Display Level in Figure 1-49 was set to 1, and Figure 1-50 was achieved by executing Extract Vertices at Level 0.

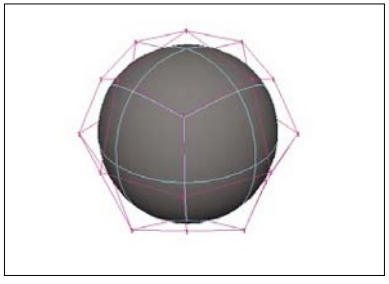


Figure 1-49 Display Level 1

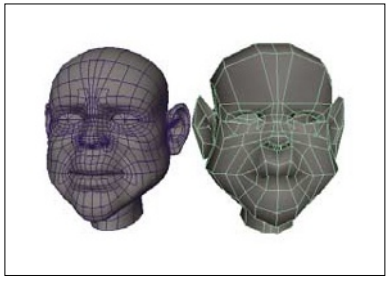


Figure 1-50 Executing Extract Vertices

Levels are defined in the Convert Subdiv To Polygons options window. Open the Convert Subdiv To Polygons Options window by selecting [Modify > Convert > Subdiv to Polygons ❐], and enter the desired value for the Level.

2-3. FULL CREASE AND PARTIAL CREASE EDGE/ VERTEX

(Modeling > Subdiv Surface)

This tool can be used to make or delete Crease in Edge or vertex.

Full Crease is the option used to make a sharp corner when transforming the subdivision surface of a selected edge. Sharp corners can also be made for selected vertices.

Partial Crease also alters the subdivision surface due to the selected Edge or Vertex, but, unlike the Full Crease, does not make a sharp corner. This option is very useful for making smooth ridgelines, like when making character lips.

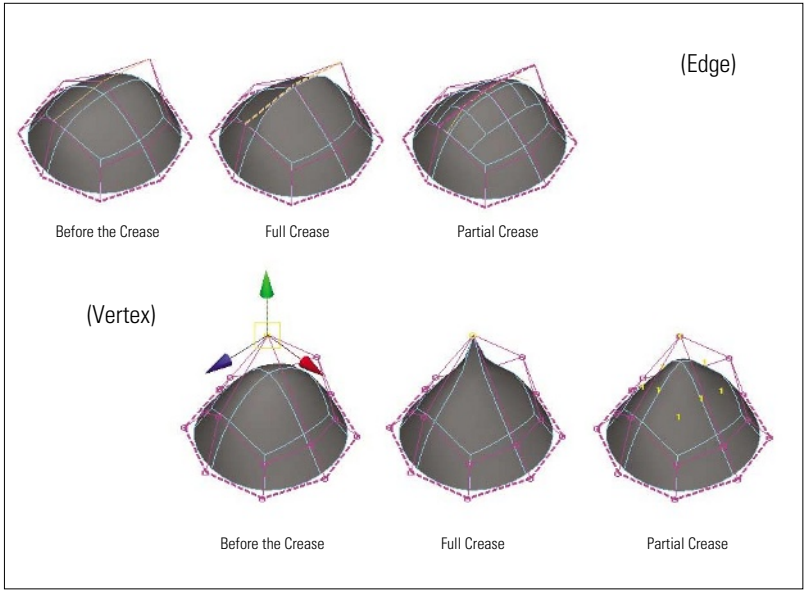


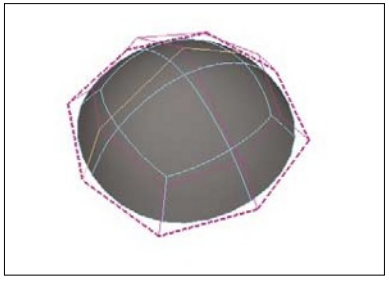
Figure 1-51 Full Crease and Partial Crease

To apply Full Crease, first, select the edge or point and then select [Modeling > Subdiv Surfaces > Full Crease Edge/Vertex].

To apply Partial Crease, first, select the edge or point and then select [Modeling > Subdiv Surfaces > Partial Crease].

This command only works in Standard Mode. It will not work in Polygon Proxy Mode.

Users can also adjust the sharpness of the Partial Crease by, first, applying the Crease, then raising the Detail Level of the Crease, and then removing the Crease.
The sharpness of the Crease is determined by how much the level is raised before the Crease is removed. However, users should know that there are many possible values. In order to adjust the sharpness of the Partial Crease, first, select Edge in the Subdivision Surface as shown in Figure 1-52, and then select [Modeling > Subdiv Surfaces > Full Crease Edge/Vertex].
An acute angle is made with respect to the selected Eedge as shown in Figure 1-53. This was done with the Display Level set to 0.



1-52 Selecting the Edge

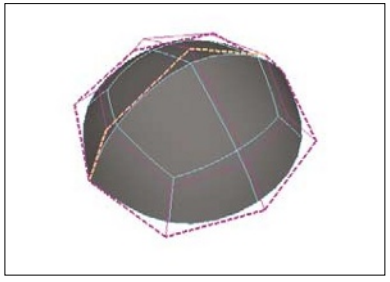


Figure 1-53 Executing Full Crease Edge/Vertex with the Level Set to 0

In the current state (with the Edge selected), select [Modeling > Subdiv Surfaces > Refine Selected Components]. Press the RMB and set the Display Level to 2 from the Marking Menu as shown in Figure 1-54. To add more detail, repeat this step one more time. With the edge selected, select [Modeling > Subdiv Surfaces > Uncrease Edge/Vertex] to adjust the angle as shown in Figure 1-55.

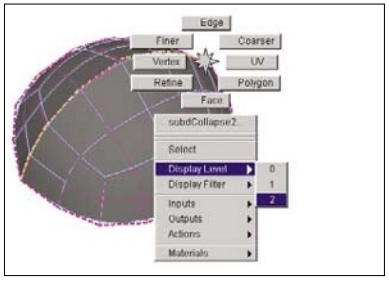


Figure 1-54 Adjusting the Display Level

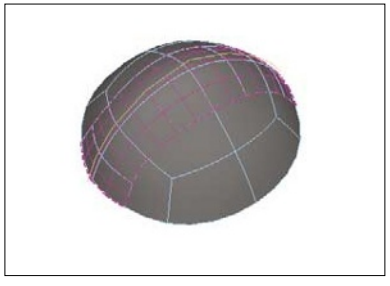


Figure 1-55 Uncrease Edge/Vertex

2-4. UNCREASE EDGE/VERTEX

(Modeling > Subdiv Surfaces > Uncrease Edge/Vertex)

After using Crease to adjust the angle on the subdivision surface, the Crease is removed using this command. The image in Figure 1-56 shows the application of a Full Crease. In this state, select the Edge and then select [Modeling > Subdiv Surfaces > Uncrease Edge/Vertex] to return the model to its original, uncreased state as shown in Figure 1-57.

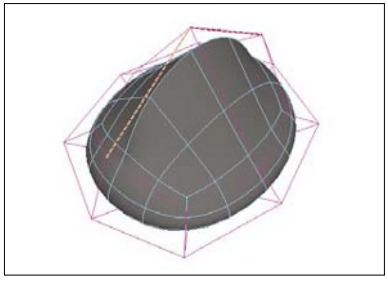


Figure 1-56 Execution of Full Crease

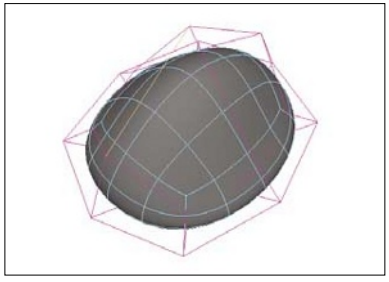


Figure 1-57 Executing Uncrease

2-5. MIRROR

(Modeling > Subdiv Surfaces > Mirror)

This option is used to Mirror Copy a subdivision surface. Figure 1-58 shows a completed model of just one half of a face. In order to make the other half, select this object and then select [Modeling > Subdiv Surfaces > Mirror] to make the mirror copy as shown in Figure 1-59.

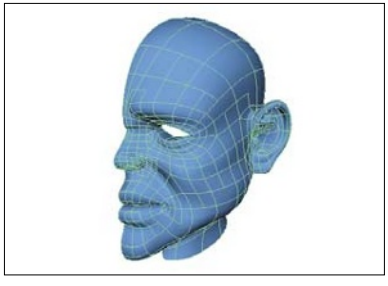


Figure 1-58 Subdivision Surface

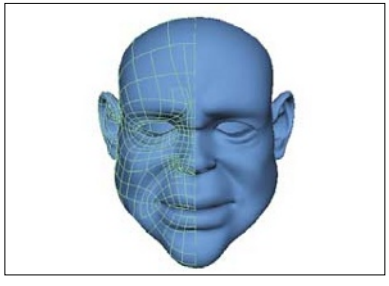


Figure 1-59 Mirror Copy of the Subdivision Surface

We can open the Mirror Options window to determine along which axis the Mirror Copy will be made.

Select [Subdiv Surfaces > Mirror ❐] to reveal the Options window shown in Figure 1-60. Select the axis along which you want the mirror copy to be made. If you normally work in front view, select the X-axis.

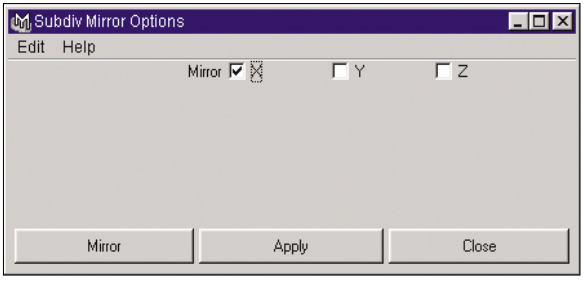


Figure 1-60 The Subdiv Mirror Options Window

2-6. ATTACH

(Modeling > Subdiv Surfaces > Attach)

This option is used to attach together two subdivision surfaces. As shown in Figure 1-61, select the object and its mirror copy, which we made in the previous step, and then select [Modeling > Subdiv Surfaces > Attach] to attach the two subdivision surfaces together as shown in Figure 1-62.

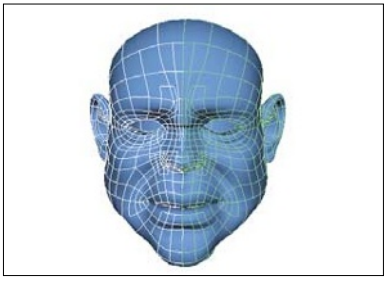


Figure 1-61 Selecting Both Subdivision Surfaces

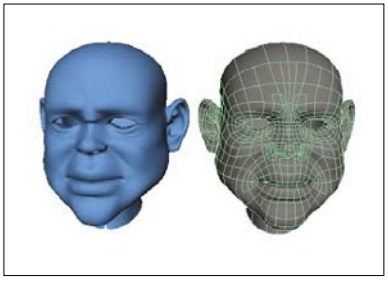


Figure 1-62 Executing Attach

Selecting [Subdiv Surfaces > Attach ❐] will open the Options window shown in Figure 1-63.

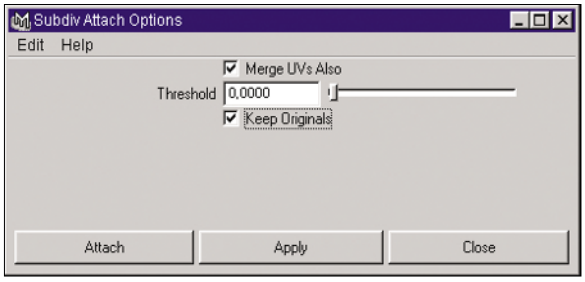


Figure 1-63 Subdiv Attach Options Window

Merge UVs Also

If the model to attach has a UV-axis, the axes on both sides of the model will also merge. Refer to Chapter 2, "Polygon, Subdivision Surface Mapping," for more detail on subdivision and polygon mapping.

Threshold

When two objects are attached on a variety of different levels, sometimes, the two surfaces do not form a clean attachment. In this instance, adjust this value for a clean fit between the two objects.

Keep Originals

When this option is turned on, a new attached object will be made separate from the original object. When turned off, the original object will be deleted.

2-7. MATCH TOPOLOGY

(Modeling > Subdiv Surfaces > Match Topology)

Match Topology is linked to [Animation > Deform > Create Blend Shape]. Generally, there is no need to execute this option as a separate step. This is because when [Animation > Deform > Create Blend Shape] is executed, Match Topology is executed automatically. When subdivision surfaces are made using Blend Shape, the same number of vertices are needed at every level, but when using Match Topology, the number of vertices is fixed automatically. Let's look at Figure 1-64. The number of vertices is different for each model at Level 1 (shown on the left and right). We can see that there are more vertices on the right for a more precise transformation of the shape.

Generally, Level 0 must have the same number of vertices.
If Level 0 has a different number of vertices, a Match Topology or Blend Shape will not be made.

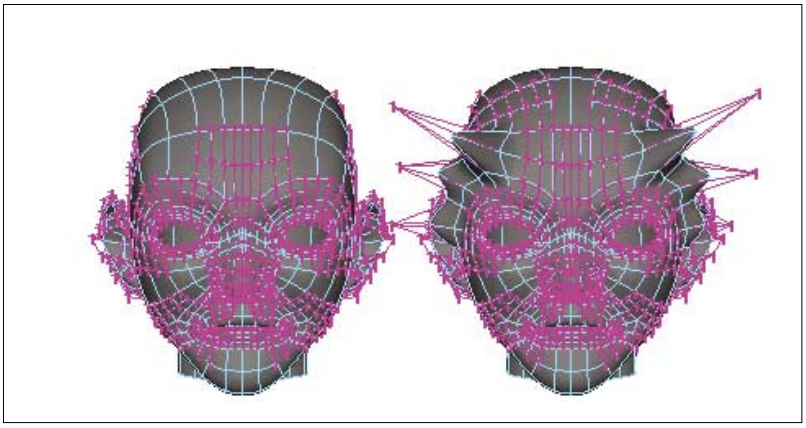


Figure 1-64 Before Applying Create Blend Shape

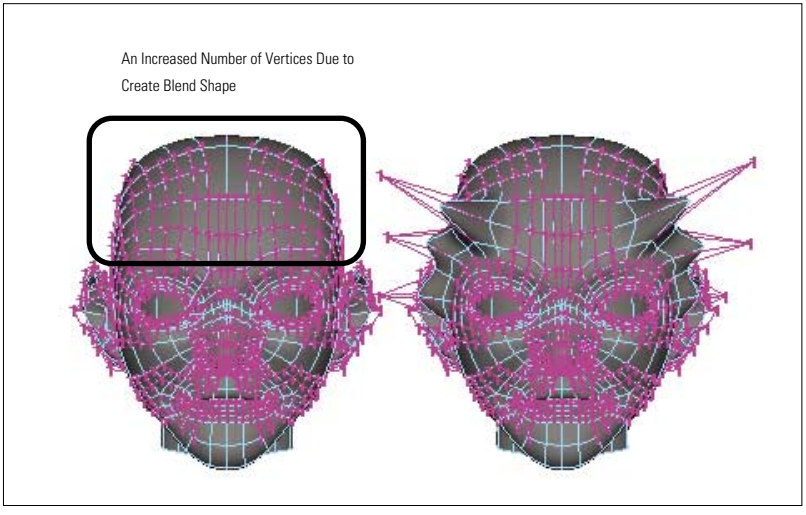


Figure 1-65 After Applying Create Blend Shape

The picture above, Figure 1-65, shows the results after applying Create Blend Shape. Comparing the model on the left in Figure 1-65 to the model in Figure 1-64, we can see that there is an increase in the number of vertices. In this way, when Blend Shape is used in Maya, it automatically matches the number of vertices between the two models. This is called Match Topology.

If the vertices have been adjusted for any level, excluding Level 0, for necessary alterations, Maya automatically matches the vertices and applies Blend Shape.

2-8. CLEAN TOPOLOGY

(Modeling > Subdiv Surfaces > Clean Topology)

This option is needed for more effective subdivision surface modeling.

This option is used to delete vertices that have not been edited in the various levels of the subdivision surface. In other words, unedited vertices are deleted to improve work speed and the amount of data is also reduced.

For example, let's suppose that we selected a face or vertex and applied [Modeling > Subdiv Surface > Refine] to divide the levels. Then, if only a few vertices have been edited, unnecessary vertices, which have not been edited, will remain. In these instances, this option is used to automatically delete the unedited vertices.

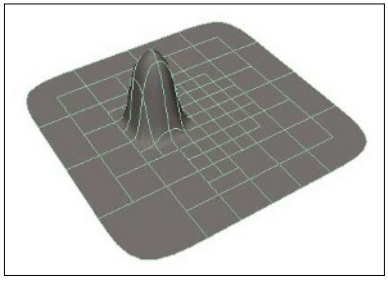


Figure 1-66 Before Applying Clean Topology

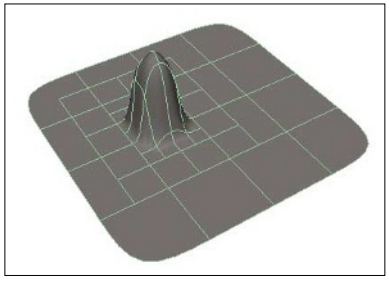


Figure 1-67 After Applying Clean Topology

2-9. COLLAPSE STANDARD

(Modeling > Subdiv Surfaces > Collapse STANDARD)

This option initializes the level in standard mode.

For example, let's suppose we have the situation shown here. The Display Level in Figure 1-68 is set to 0 and the Display Level for Figure 1-69 is set to 1. At times, you may need to randomly initialize the Display Level 1 in Figure 1-69 to Display Level 0. Display Levels are further explained in "2-17. Portraying Detail in Another Level."

The tool used at this time is Collapse Standard.

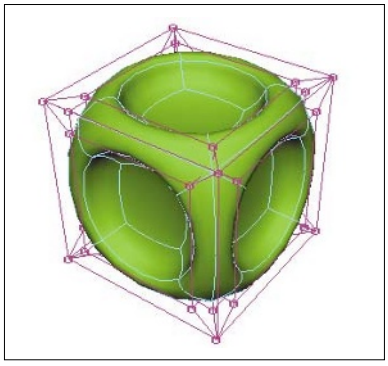


Figure 1-68 Display Level: 0

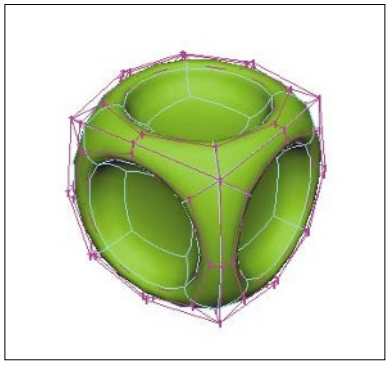


Figure 1-69 Display Level: 1

Select the Subdivision Surface and apply [Modeling > Subdiv Surfaces > Collapse Standard] to open the Subdiv Collapse Options window. In this window, set the Number of Levels to Collapse to 1 and then press the Collapse button or the Apply button at the bottom. This will take the Subdivision Surface at Display Level 1, shown in Figure 1-69, and make the new Subdivision Surface at Display Level 0 shown in Figure 1-70.

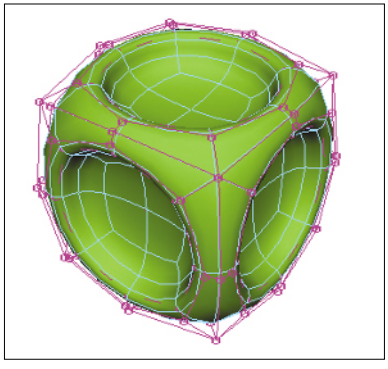


Figure 1-70 Number of Levels to Collapse: 1

2-10. STANDARD MODE AND POLYGON PROXY MODE

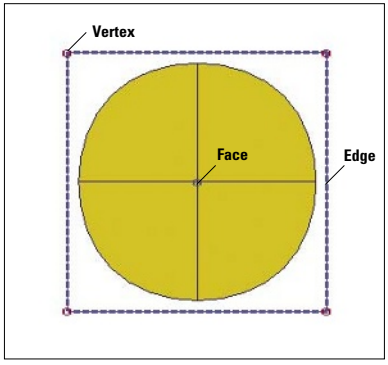


Figure 1-71 Standard Mode

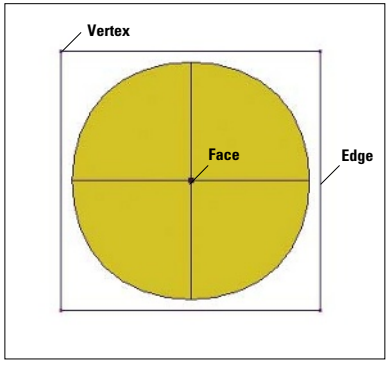


Figure 1-72 Polygon Proxy Mode

Subdivision Surface modeling usually occurs in Standard or Polygon Proxy Modes. Each of these modes has their own unique characteristics when used in modeling. Let's find out more about these two different modes.

1. Standard Mode

In Standard Mode, we can select the vertex, edge, or face in the Display Level and translate them or control them using Rotate or Scale as shown in Figure 1-73. Keyframing is also possible. However, this mode does not have a Construction History. In addition, in this mode, levels can be raised in parts to add more detail. It is also easier to subdivide points using Display Levels for more precise, partial modeling.

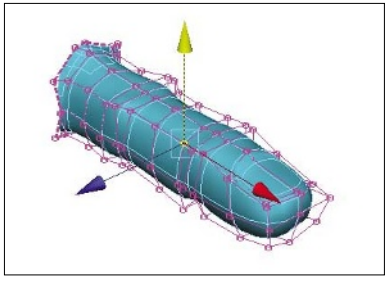


Figure 1-73 Working in Standard Mode

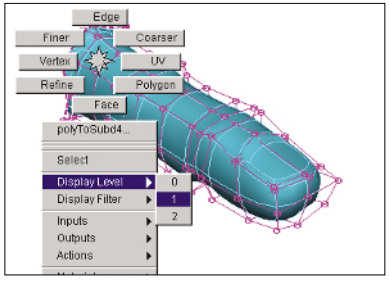


Figure 1-74 Selecting the Display Level

Figure 1-74 shows us how to view Display Levels. Place the mouse over the subdivision surface, click the RMB, and then select the desired level from the Marking Menu or enter the Display Level in the Channel Box.

This type of modeling becomes the strategic point for optimizing subdivision surface modeling. Conversion from Polygon Proxy Mode to Standard Mode is possible at any time during the modeling.

To convert from Polygon Proxy Mode to Standard Mode, select [Modeling > Subdiv Surfaces > Standard Mode] or select the Subdivision Surface and click the RMB and select Standard Mode from the Marking Menu.

2. Polygon Proxy Mode

Changing to Polygon Proxy Mode will create a coinciding polygon on the basic mesh (Level 0) of the Subdivision Surface.

Everything in the polygon proxy mode is linked through the Construction History. Therefore, basic Polygon Tools and features can be used to alter the basic mesh (Level 0) of the subdivision surface.

When using basic Polygon Tools, their use will be recorded in the Channel Box. However, when converting to Standard Mode, the Construction History will be deleted.

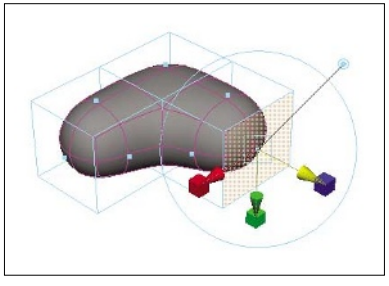


Figure 1-75 Working in Polygon Proxy Mode
(Executing the Face Extrude Command)

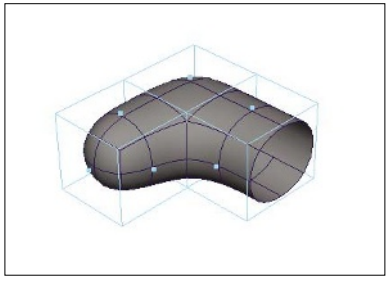


Figure 1-76 Working in Polygon Proxy Mode
(Deleting the Selected Face)

For example, let's suppose you are modeling in Standard Mode and want to extrude or delete the face. This can be done by converting to Polygon Proxy Mode, as shown in Figure 1-75, and selecting and extruding the face or by deleting the selected face as shown in Figure 1-76.

• It is a good idea to convert periodically to Standard Mode when working in Polygon Proxy Mode. This will delete the History and prevent unexpected results.

• Some features (Boolean, Bevel, Reduce, etc.) cannot be used in Polygon Proxy Mode.

Users can convert from Polygon Proxy Mode to Standard Mode at any time during the modeling. Switching from Polygon Proxy Mode to Standard Mode is done either by selecting [Modeling > Subdiv Surfaces > Polygon Proxy Mode] or by selecting the Subdivision Surface and clicking the RMB and selecting Standard Mode from the Marking Menu.

2-11. CONVERT SELECTION TO FACE

(Modeling > Subdiv Surfaces > Convert Selection To Face)

This option is used for selecting faces within a component.

In other words, let's suppose that we selected a vertex at random in the Subdivision surface of Figure 1-77. Applying this option with the vertex selected will automatically cause the faces linked to the selected vertex to be selected as shown in Figure 1-78. The remaining edges, vertices and UVs use the same command. Try using the command for each of these to gain a better understanding of how this command works.

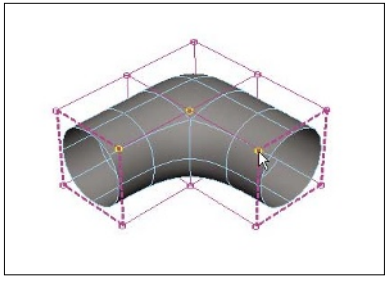


Figure 1-77 Selecting the Vertex

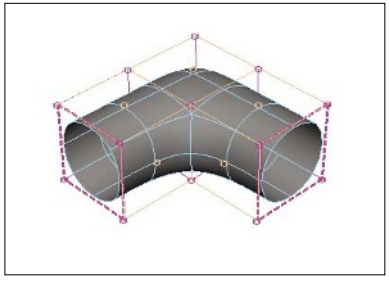


Figure 1-78 Executing Convert Selection to Face

2-12. REFINE SELECTED COMPONENTS

(Modeling > Subdiv Surfaces > Refine Selected Components)

This option is used to raise the level of the selected components.

Selecting a vertex in Level 0 and applying this command will cause the area around the vertex to be divided into Level 1. Level 1 will be divided into Level 2, Level 2 will be divided into Level 3, and so on to create greater subdivision of the surface.

For example, let's suppose we are modeling the nose of a character as shown in Figure 1-79. Let's suppose that we want to create a more precise modeling of the nose. However, the levels around this area are not further subdivided making precise modeling

impossible with this current structure. It is at times like this that we apply the command to raise the levels. As shown here, select the vertex in the desired area and apply [Modeling > Subdiv Surfaces > Refine Selected Components] to divide the area around the selected vertex to Level 2 as shown in Figure 1-80.

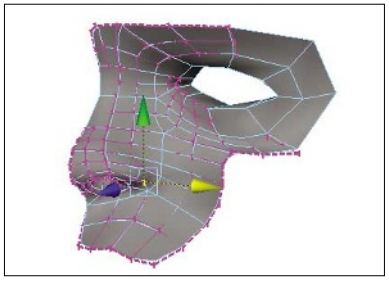


Figure 1-79 Selecting the Vertex

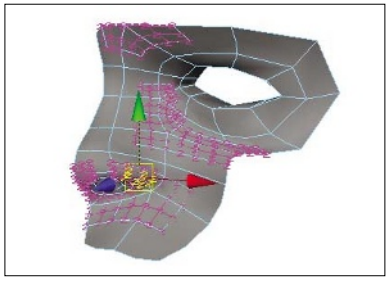


Figure 1-80 Executing Refine Selected Components

2-13. EXPAND SELECTED COMPONENTS

(Modeling > Subdiv Surfaces > Expand Selected Components)

When the levels are divided using the Refine command, only the levels around the selected vertex will be divided. This command is used to expand the divided level. Let's suppose we have a divided level as shown in Figure 1-81. Select the desired vertex and apply [Modeling > Subdiv Surfaces > Expand Selected Components] to expand the level as shown in Figure 1-82.

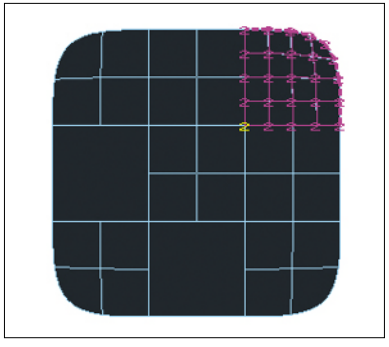


Figure 1-81 Selecting the Vertex

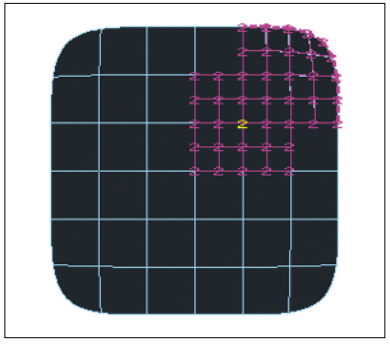


Figure 1-82 Executing Expand Selected Components

2-14. COMPONENT DISPLAY LEVEL

(Modeling > Subdiv Surfaces > Component Display Level)

Users can also use [Modeling > Subdiv Surfaces > Component Display Level] to select the Display Level as above.

If the Display Level is currently set to 1, apply [Modeling > Subdiv Surfaces > Component Display Level > Finer, Coarse, Base], and select Finer to change to Display Level 2. Coarser changes a current Level 1 to 0, and Base returns a level to Level 0.

In other words, Finer increases the current Display Level one at a time, while Coarser decreases it one step at a time.

2-15. COMPONENT DISPLAY FILTER

(Modeling > Subdiv Surfaces > Component Display Filter)

This menu is used to display only the edited vertices in the current level.

For example, let's suppose that we had modified a few points of Figure 1-83, which is at Level 1. Selecting the vertex, apply [Modeling > Subdiv Surfaces > Component Display Filter > Edits] to display only the modified vertices shown in Figure 1-84.

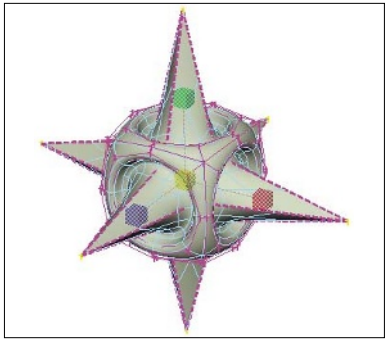


Figure 1-83 Modifying Vertices Using the Scale Tool

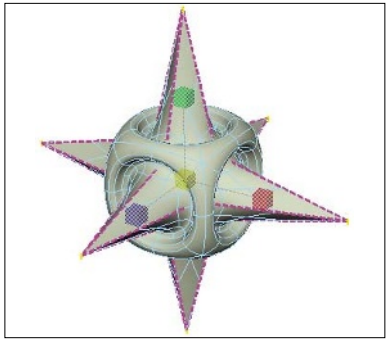


Figure 1-84 Display Filter = Edits

Selecting [Modeling > Subdiv Surfaces > Component Display Filter > All] will display all the points again.

UV Borders can only be verified through the UV Texture Editor ([Window > UV Texture Editor...]).
By making the UV boundary thick, we can easily see which UVs have not been linked.
Adjust the size of the Normal by opening the Attribute Editor. After expanding the Subdiv Surface Display, set the Normals Display Scale to the desired size.

2-16. DISPLAYING SUBDIVISION SURFACES COMPONENTS

We can model subdivision surfaces in standard mode by displaying the vertices, edges and faces of the subdivision surface.
To display these components, select the subdivision surface, apply [Display > Subdiv Surface Components] and choose between Vertices, Edges, Faces, and Normals (Shaded Mode).

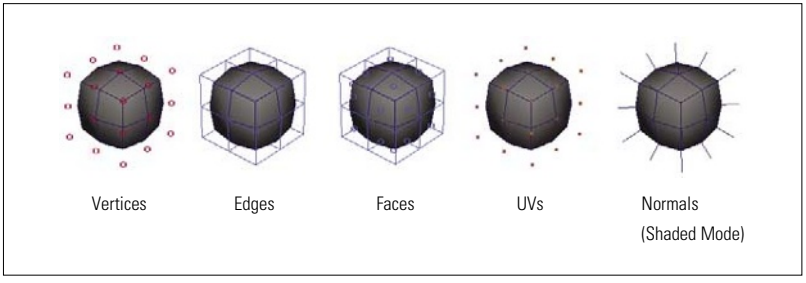


Figure 1-85 Subdivision surface components

We can also select the Subdivision Surface and press Ctrl+A key to open the Attribute Editor (shown below in Figure 1-86) to display the components of the Subdivision Surface.
Select the desired component in the Subdiv Component Display Section of the Attribute Editor.

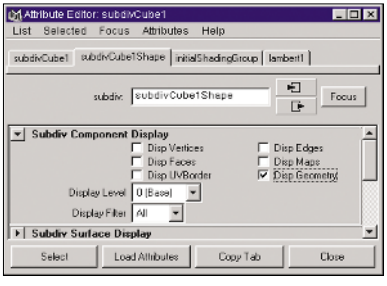


Figure 1-86 Attribute Editor

Users can also use the Marking Menu to quickly display the components of the Subdivision Surface and select them to make the shape of the surface. As shown in Figure 1-87, place the mouse over the subdivision surface and click the RMB. Then, select the desired component from the marking menu.

A more general method is to use the Components Mask.

Select the Subdivision Surface and then press F8 to convert to Component Mode. Then, as shown in Figure 1-88, select the desired component from the Components Mask.

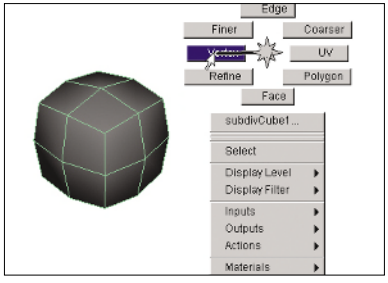


Figure 1-87 Selection Using the Marking Menu

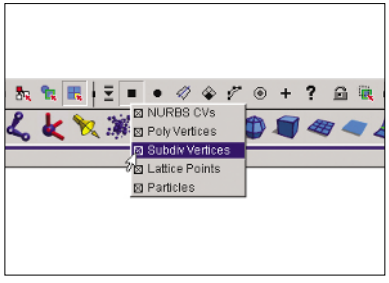


Figure 1-88 Making the Selection from the Components Mode

2-17. PORTRAYING DETAIL IN ANOTHER LEVEL

Subdivision surfaces offer levels for depicting detail. Users can use these levels to more accurately model an area of their choice. A maximum of 13 (0-12) levels can be made in the base mesh. A subdivision surface generally has two levels, 0 and 1. Selecting the vertex, edge, or face and then applying [Modeling > Subdiv Surfaces > Refine Selected Components] will create another layer. We can confirm this by selecting the Subdivision Surface in standard mode, clicking the RMB, and selecting Display Level from the Marking Menu.

Let's look at how to use this through a simple example.

Figure 1-89 on the next page shows the base mesh at Display Level 0. Level 0 is called a Base Mesh. Figure 1-90 illustrates the selection of Display Level 1 in the Marking Menu.

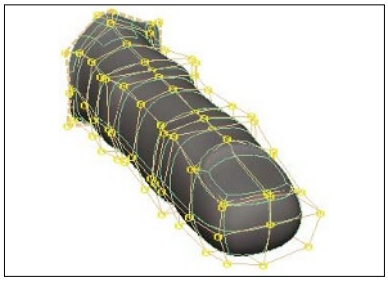


Figure 1-89 Display Level = 0

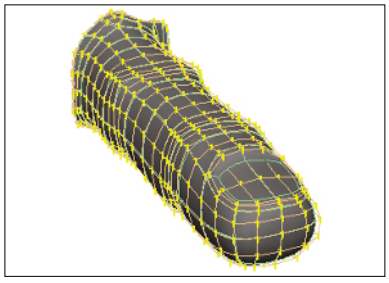


Figure 1-90 Display Level = 1

The figures above are models of a finger. Users will require more mesh points, edges, or faces to depict the fingernails.

The option Refine Selected Components is used to raise the Display Level of the selected area. First, select the edge of the area where the fingernail will be placed as shown in Figure 1-91. (You may also select the point or the face.) After selecting the edge, select [Modeling > Subdiv Surfaces > Refine Selected Components] to raise the Display Level to 2 as shown in Figure 1-92.

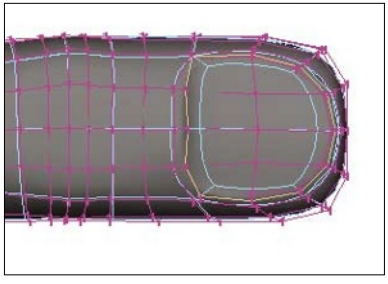


Figure 1-91 Selecting the Edge

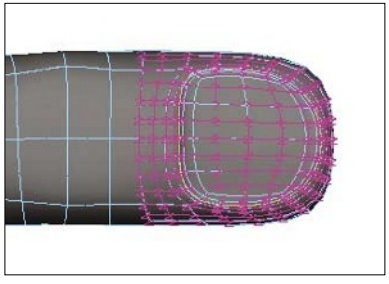


Figure 1-92 Raising the Display Level

In this way, we can create more accurate modeling in a given section by raising the Display Level.

You may continue to select the point, edge, or face and apply Refine Selected Components to raise the Display Level up to 12.

1. Selecting the Display Level

Display Levels are selected in the following manner. First, they can be selected using the Marking Menu. This is done by placing the mouse over the subdivision surface, clicking the RMB, and setting the Display Level to the desired value in the Marking Menu as shown in Figure 1-93.

In selecting Display Levels using the Channel Box, we must first select the subdivision surface or its components (vertices, etc.) to display the Display Levels in the Channel Box (below the polyToSubdShape node) as shown in Figure 1-94. Clicking on the value using the LMB will display the level allowing us to select the desired level.

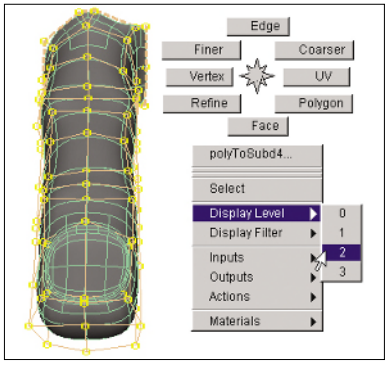


Figure 1-93 Selecting Levels Using the Marking Menu

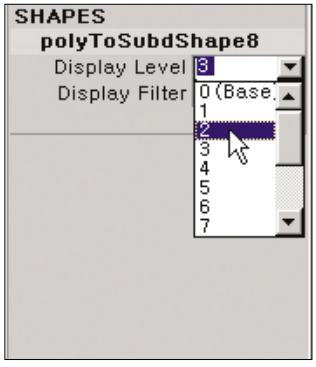


Figure 1-94 Selecting Levels Using the Channel Box

2-18. DEFINING THE SMOOTH VALUE FOR THE SUBDIVISION SURFACE

The Subdivision Surface, much like NURBS, can define how smooth the surface will be displayed.

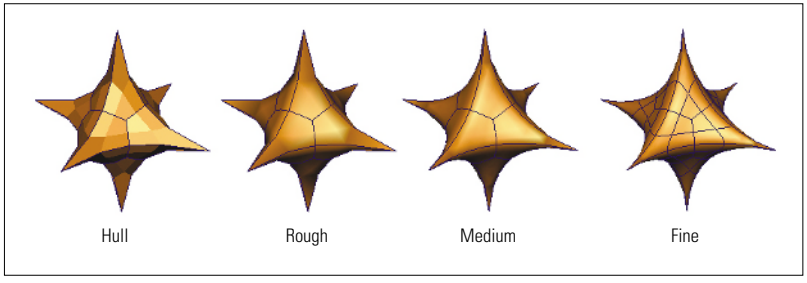


Figure 1-95 Smooth Values for the Subdivision Surface

Select one of the smooth values, depicted above, from [Display > Subdiv Smoothness].
Hull is the lowest setting and portrays the surface in angles. Being the lowest setting, the speed in which it is displayed is the fastest.
Rough, Medium, and Fine (using the respective shortcut keys of 1, 2, and 3) represent increasingly smoother and more accurate displays, which conversely, leads to lower view speeds.

3. QUICK START TUTORIAL

Up until now, we looked at the basic Polygon and Subdiv Surfaces menus for the purposes of learning how to model using subdivision surfaces. It is very difficult to understand subdivision surfaces through a simple explanation of the menus.
The following tutorial was designed to facilitate a general understanding of subdivision surface modeling.
A brief explanation will be offered on how to create comparatively simple characters and how to texturize them using Maya's 3D Paint feature.

step 1 Subdivision surfaces use polygons as their base. First, use [Modeling > Polygons > Create Polygon Tool] to make the polygon shown in Figure 1-96. In order to remain faithful to the example given here, try to make the same shape and vertices shown here.

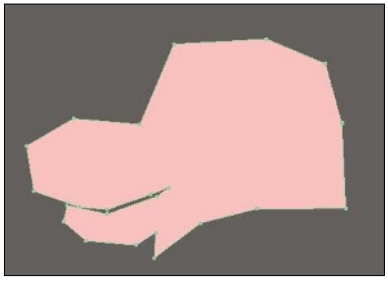


Figure 1-96 Using the Create Polygon Tool

It does not matter what direction the figure is drawn, just as long as it takes on the same shape. When you have finished drawing the shape, press the Enter key to exit from this tool. You can edit the vertices to modify portions of the shape.

Check the box to make sure that the [Modeling > Polygons > Tool Options > Keep Faces Together] option is turned on.

Select the model, click the RMB, and select Edge from the Marking Menu. Select all the edges of the polygon, and select [Modeling > Edit Polygons > Extrude Edge].
This will create the Extrude Manipulator shown in Figure 1-97.

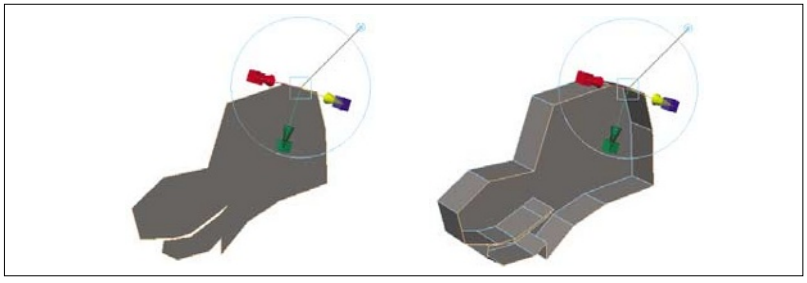


Figure 1-97 Moving the Edges Using the Extrude Manipulator

Use the Manipulator as shown to move the edges so that they extrude from the page.

step 2 Select the polygon, and then click RMB to select the face. As shown in Figure 1-98, select the side and neck surfaces and then press the Delete key to remove.
After selecting the polygon again, select [Modify > Convert > Polygon to Subdiv] to convert the polygon to a subdivision surface.

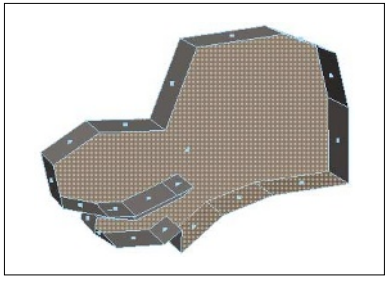


Figure 1-98 Selecting the Face to Delete

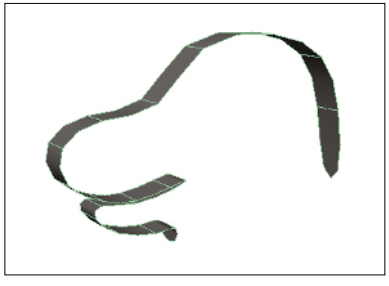


Figure 1-99 Converting to Subdivision Surface

Select the subdivision surface and select [Edit > Duplicate ❐] to open the Options window, as shown in Figure 1-100. In the window, set Scale X to -1, the Geometry Type to Instance, and then press the Duplicate button at the bottom.

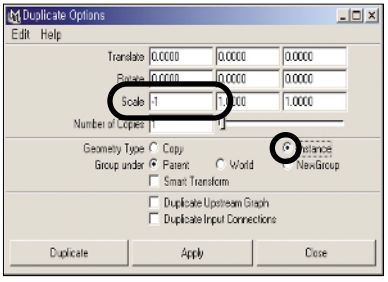


Figure 1-100 The Duplicate Options Window

Figure 1-101 Mirror Copy

Because the subdivision surface was mirror copied and the Type was set to Instance, only one side of the subdivision surface is made with the remaining portion matched automatically to create the overall modeling.

To make partial modifications, select the subdivision surface, click the RMB, and select Vertex from the Marking Menu. After selecting several vertices to verify the attachment between the vertex and the vertex edge, select [Display > Subdiv Surface Components > Edge].
This will display both the vertex and the edge as shown in Figure 1-102.

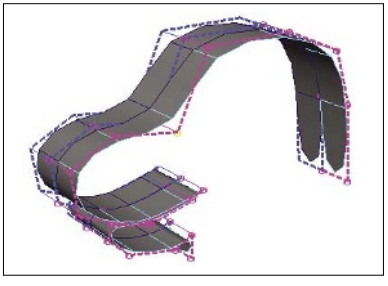


Figure 1-102 Subdiv Surface Component Display

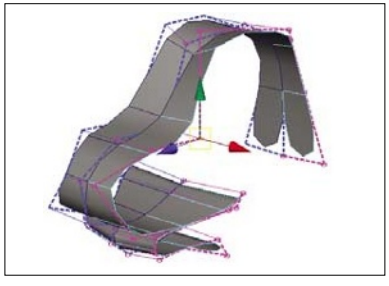


Figure 1-103 Trimming the Shape by Adjusting the Vertex

To make the overall shape, adjust the vertex of the subdivision surface, as shown above in Figure 1-103, to form the shape. There is no need to make your picture look exactly like the one shown here. Just try to make it as similar as you can.

step 3 Now that we're done with the basics, it's time to start making the surfaces to complete the overall shape.

First, in order to make the surface, select the subdivision surface, and then either click the RMB and select Polygon from the Marking Menu or select [Modeling > Subdiv Surfaces > Polygon Proxy Mode] to convert the subdivision surface to Polygon Proxy Mode.

Figure 1-104 Polygon Proxy Mode

Most of the overall surfaces will be made using Extrude Edge or Face. First, in order to extrude the edge, select the edge inside the mouth as shown in Figure 1-105. Select the mode so that the borders of the edge are clearly visible and then open the Options window by selecting [Display > Custom Polygon Display] and select Border Edge from Highlight.

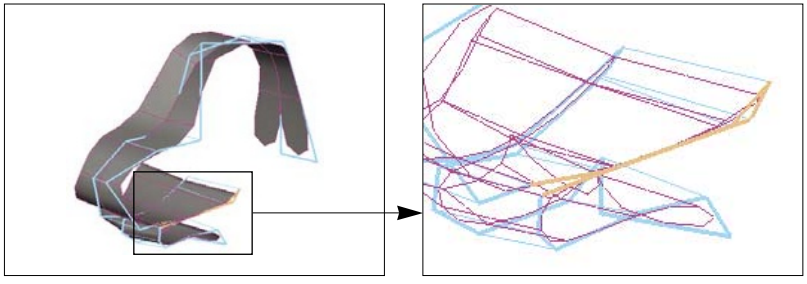


Figure 1-105 Selecting the Edge to Extrude

Select [Modeling > Edit Polygons > Extrude Edge]. This will create the Extrude Manipulator shown in Figure 1-106. In the beginning, the Manipulator will fit itself to the local axis of the edge. Moving the extruded edge at this time will cause to edge to move abnormally. To prevent this from happening, click on the area indicated in Figure 1-106 to fit the Manipulator to the World axis.

This will create an appropriate extrusion of the edge as shown in Figure 1-107.

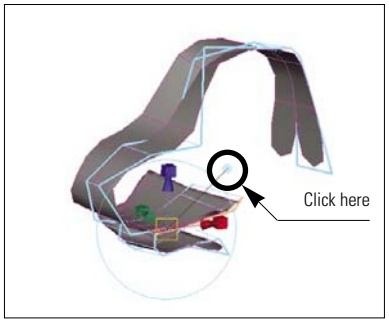


Figure 1-106 Extrude Edge

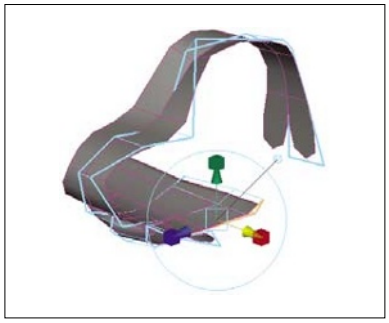


Figure 1-107 Moving the Edge

After moving back to standard mode, adjust the overall vertex as shown in Figure 1-108 to make the overall shape. Again, an accurate recreation is not necessary. Just make sure you represent how the inside of the mouth is organized.

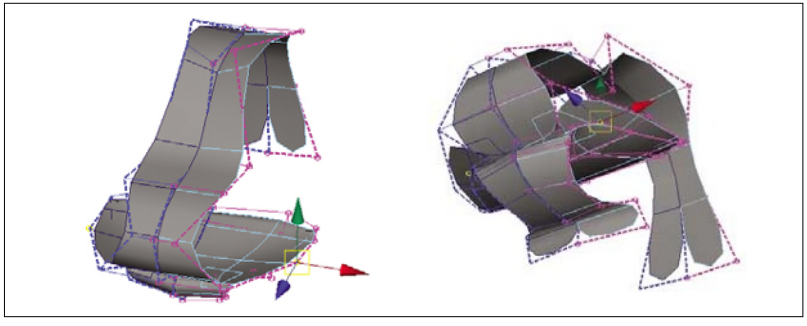


Figure 1-108 Trimming the Shape

After moving back to Polygon Proxy Mode, extrude the respective edges as shown in Figure 1-109 to make the surface.

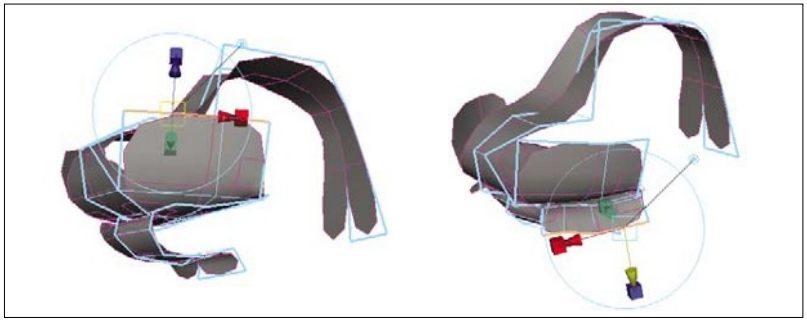


Figure 1-109 Extrude Edge

Attach the separated edges by selecting [Modeling > Edge Polygons > Merge Edge Tool]. As shown in Figure 1-110, selecting Edge A, the edge we wish to adhere, will cause all edges to turn pink. At this time, select Edge B to merge together Edges A and B. Continue to merge the edges to achieve the result shown in Figure 1-111.

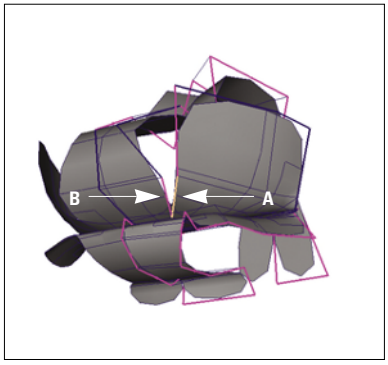


Figure 1-110 Merge Edge Tool

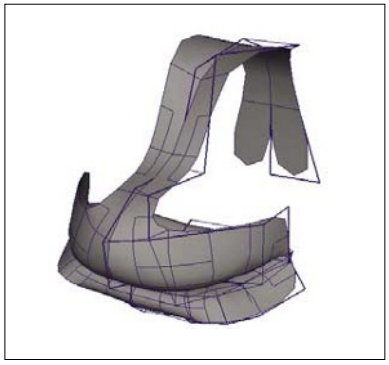


Figure 1-111 Merge Edge Tool

Extrude the edges as shown in Figure 1-112 to make the surface, and use the Merge Edge Tool to merge the edges in the back.

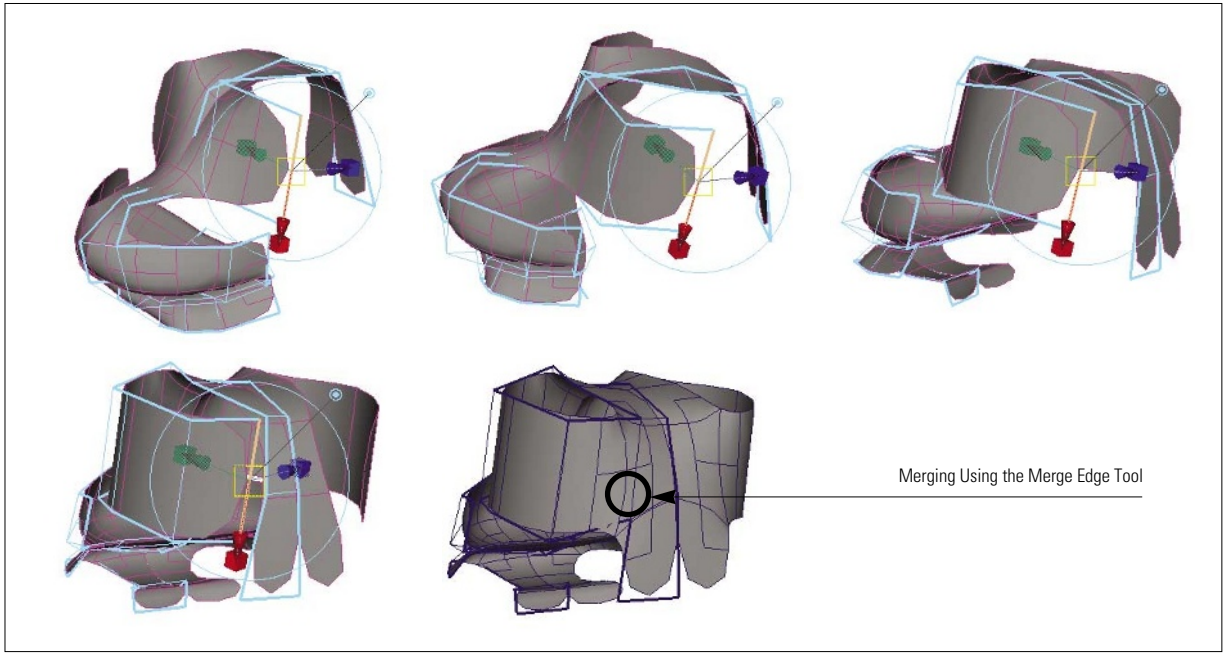


Figure 1-112 Extrude Edge and Merge Edge Tool

Select the model and then select [Modeling > Polygons > Append to Polygon Tool]. Selecting Edges 1 and 2, in succession, will create a preview of the filled surface as shown in Figure 1-113. To fill in the surface, press the Enter key. Select all the other edges in consecutive order and apply the Append to Polygon Tool to fill in the surfaces.

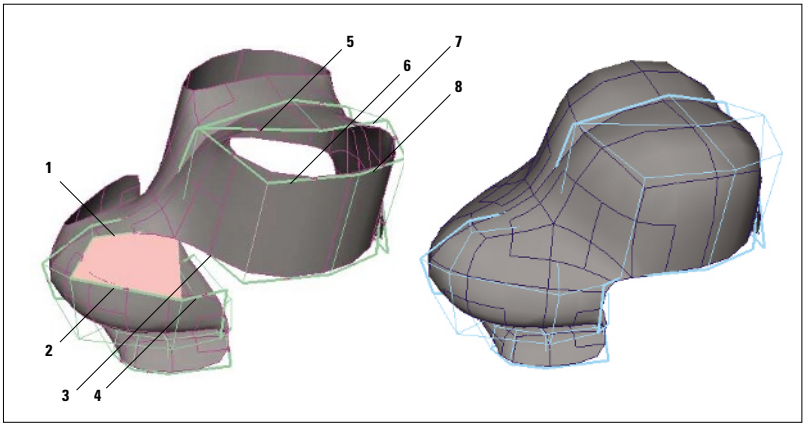


Figure 1-113 Using the Append to Polygon Tool

As shown in Figure 1-114, use Extrude Edge and Merge Edge Tool to make the lateral face and merge the edges together as shown.

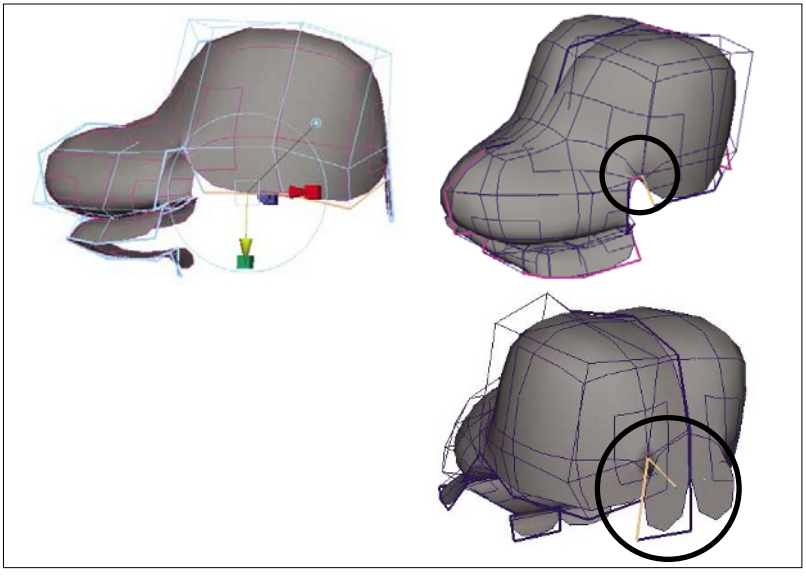


Figure 1-114 Extrude Edge & Merge Edge Tool

Fill in the holes on the chin by using the Append to Polygon Tool as shown in Figure 1-115.

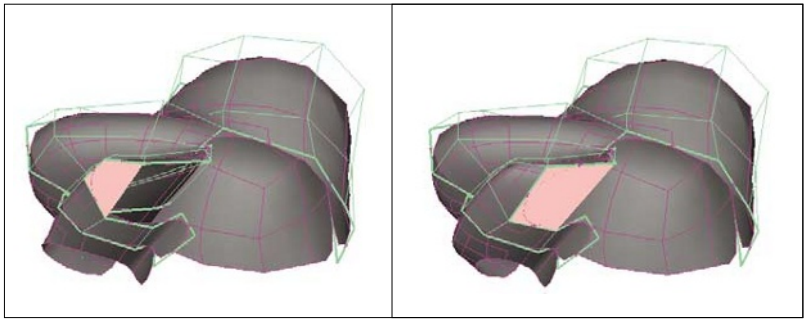


Figure 1-115 Append to Polygon Tool

Now it's time to model the slightly more complex region of the mouth. Figure 1-116 shows an extrusion of the edges around the mouth. If you have followed the tutorial faithfully up until this point, your edges should take on the configuration shown here. Extrude this edge.

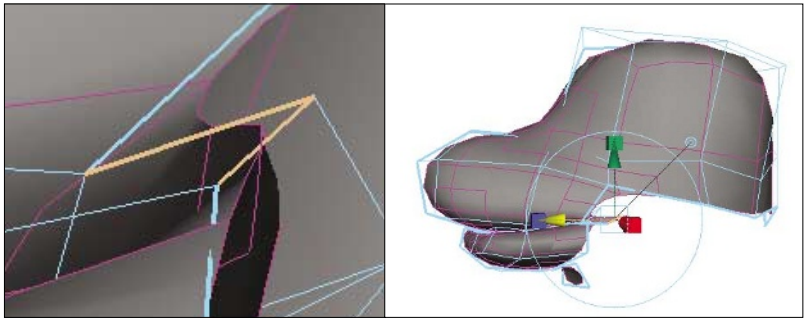


Figure 1-116 Extrude Edge

In standard mode, adjust the vertex so that the surface appears to spread as in Figure 1-117. Merge the edges together in Polygon Proxy Mode as shown in Figure 1-118.

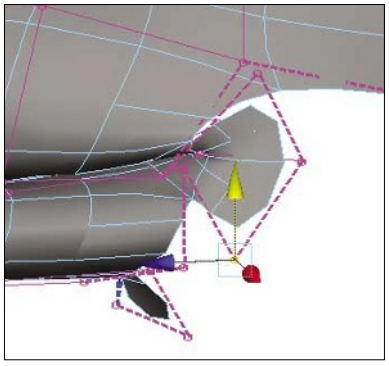


Figure 1-117 Modifying the Shape

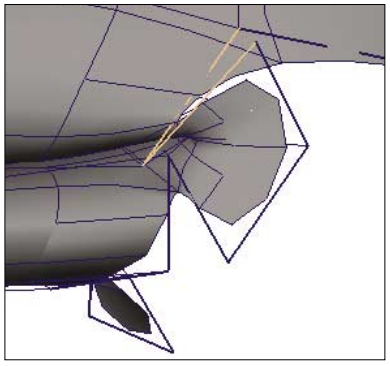
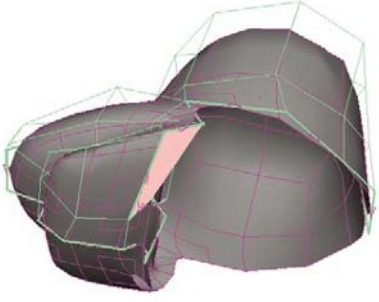
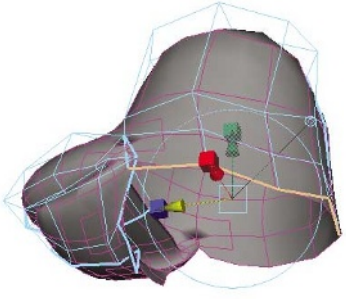


Figure 1-118 Merge Edge Tool

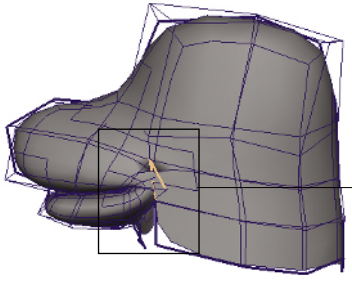
The next steps involve making the remaining surfaces. Each of the steps is illustrated using pictures, and you should have no problem following along to complete the next few steps.



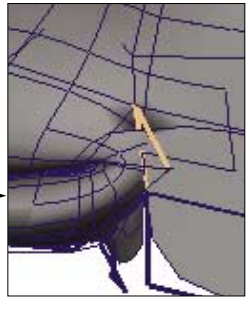
Append to Polygon Tool

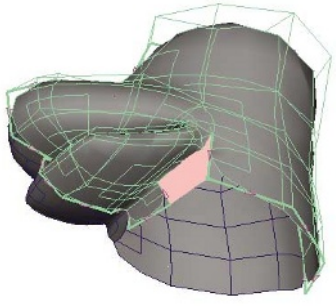


Extrude Edge



Merge Edge Tool





Append to Polygon Tool

Figure 1-119 Modeling

After the surfaces have been made, revert back to standard mode and adjust the vertices to trim the overall shape of the character.
Figure 1-120 shows the process of trimming the character.

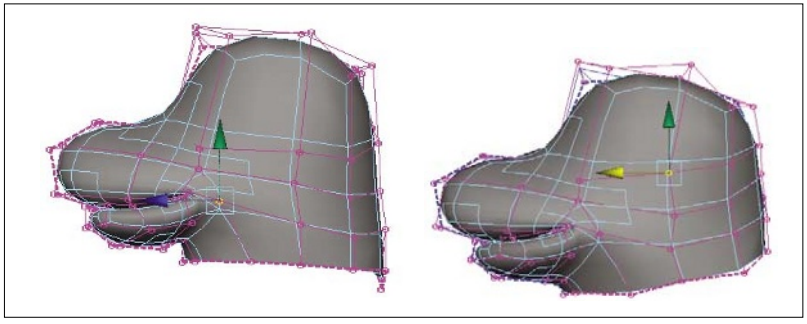


Figure 1-120 Modifying the Shape

step 4 Let's now find out how to use Extrude Face to model the other eye and the nose. First, we need to revert back to polygon proxy mode.
As shown in Figure 1-121, select the face where the nose will be made. Select [Modeling > Edit Polygons > Extrude Face] to slightly extrude the selected face. Repeat this step 2 more times until it looks like the character shown in Figure 1-122.

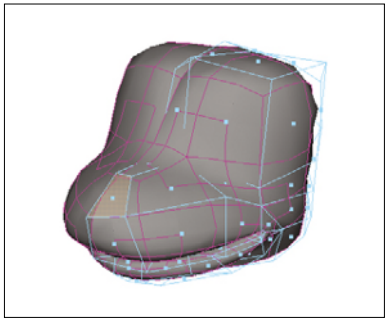


Figure 1-121 Selecting the Face

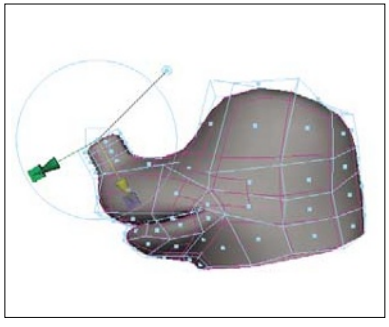


Figure 1-122 Executing Extrude Face

Select the inside of the nose as shown in Figure 1-123, and press the Delete key to erase. Select the face where the eye will be made and execute Extrude Face. Adjust the Manipulator until you get the result shown in Figure 1-124.

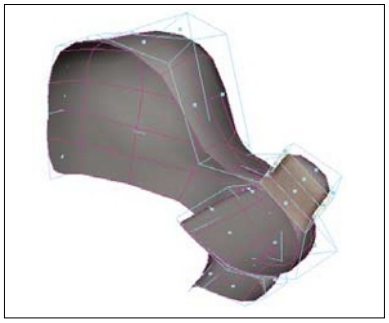


Figure 1-123 Selecting the Face to Delete

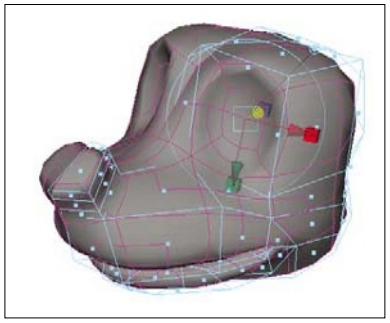


Figure 1-124 Executing Extrude Face

Convert back to standard mode to trim the shape.

We will now begin adding more detail to the model. First, in order to model the eyes, make a sphere and position it in the eye socket. Make the sphere by selecting [Create > NURBS Primitives > Sphere] and, after moving it to the position of the eye as shown in Figure 1-125, adjust the size as shown.

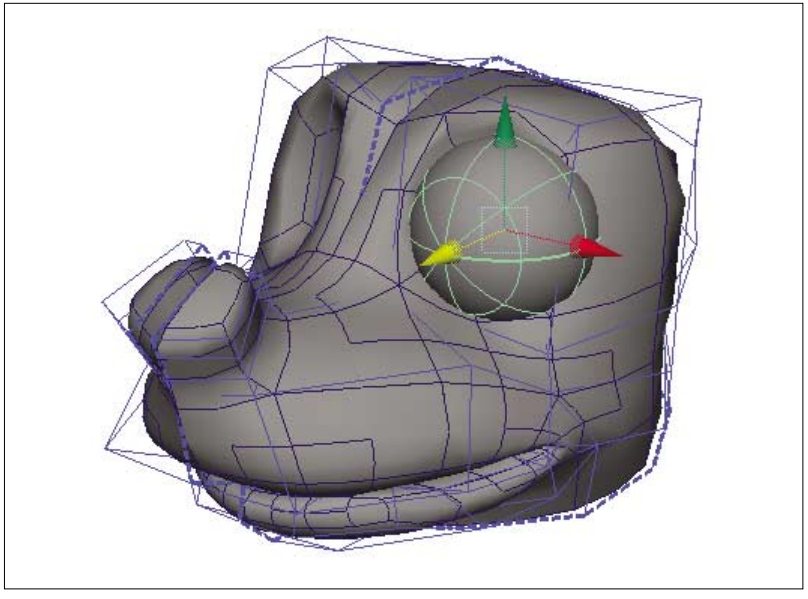


Figure 1-125 Arranging the Sphere

Now, adjust the vertices to trim the overall shape.

This process is illustrated in Figure 1-126.

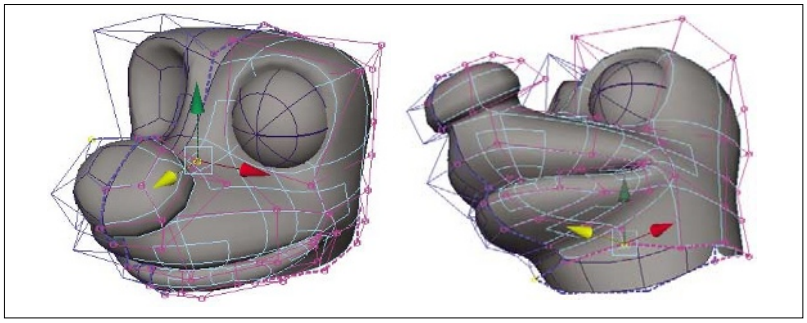


Figure 1-126 Trimming the Shape

To make modifications to portions of the surface, revert to polygon proxy mode, select the model, and then apply [Modeling > Edit Polygons > Split Polygon Tool] to slice the edge as shown in Figure 1-127.

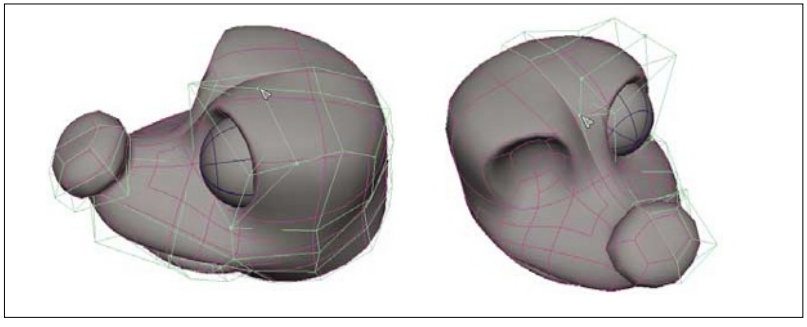


Figure 1-127 Split Polygon Tool

Go back to standard mode.

Let's attempt to divide the levels of the subdivision surface to depict greater detail. First, place the mouse over the subdivision surface, click the RMB, and then select Display Level 1 from the Marking Menu as shown in Figure 1-128. As the subdivision surface is raised to Level 1, greater detail is added to the surfaces and the vertices. Adjust the vertices in Level 1 to model the area around the eye as shown in Figure 1-129.

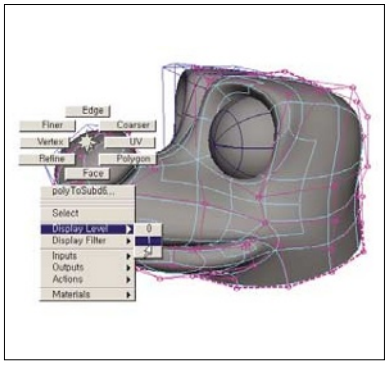


Figure 1-128 Selecting the Display Level

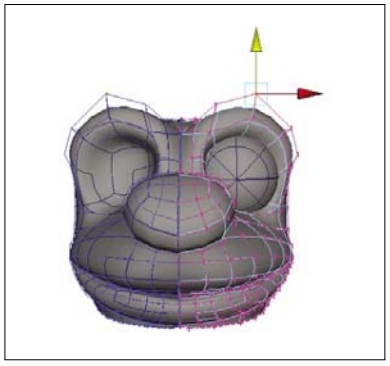


Figure 1-129 Trimming the Shape in Level 1

To add greater detail, select the vertex of the area you wish to modify, as shown in Figure 1-130, click the RMB, and select Refine from the Marking Menu. Selecting [Modeling > Subdiv Surfaces > Refine Selected Components] will divide the model into Level 2, as shown in Figure 1-131, to increase the number of vertices, which can be adjusted. As follows, detail can be added to a particular region in Polygon Proxy Mode without having to add additional surfaces.

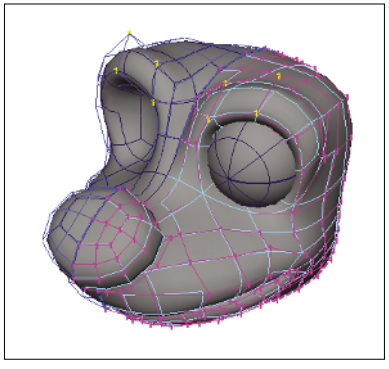


Figure 1-130 Selecting the Vertex

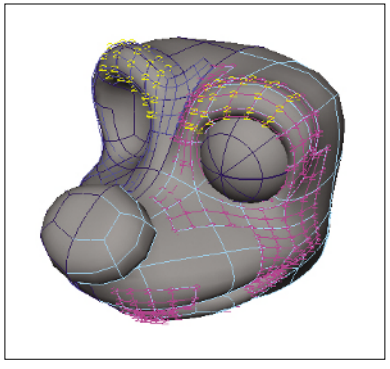


Figure 1-131 After Applying Refine

step 5 Set the Display Level of the subdivision surface to 1.

Click the RMB and, after selecting Edge from the Marking Menu, select the edge of Level 1 as shown in Figure 1-132. Select [Modeling > Subdiv Surfaces > Full Crease Edge/Vertex]. This will create an acute angle in the selected edge. Use the vertex to make the shape as shown in Figure 1-133.

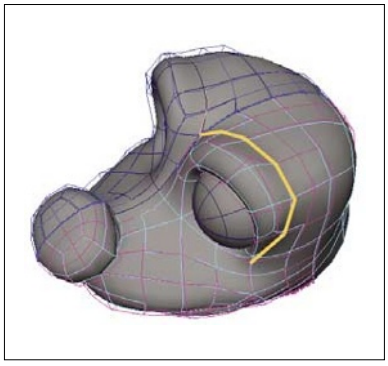


Figure 1-132 Selecting the Edge

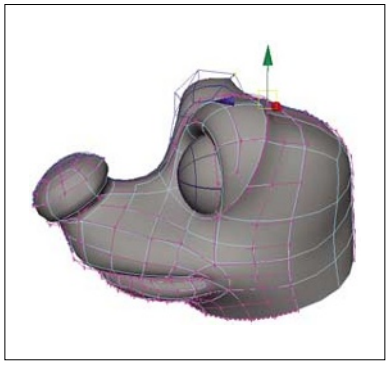


Figure 1-133 Trimming the Shape

After modifying the shape, prepare for the next step by deleting the half of the model that was copied using Instance.

step 6 As the final step in modeling, we need to mirror the model that we made and attach it.

Before we can do this, however, we need to first examine the following situation. It is very difficult to obtain a precise attachment if the vertex, which is linked to the central edge of the model shown in Figure 1-134, is off the Grid Center Line of the window. Therefore, in such cases, we need to select all the vertices, as shown in Figure 1-135, press the X key on the keyboard to create the Grid Snap, and then match the X-axis of the grid to the center line as shown.

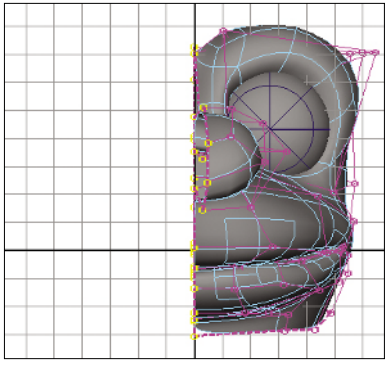


Figure 1-134 Selecting the Vertices

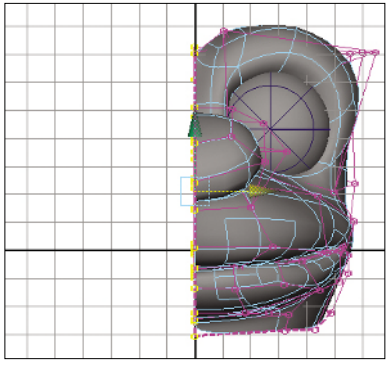


Figure 1-135 Aligning the Vertices

Select the subdivision surface, select [Modeling > Subdiv Surfaces > Mirror ❐] to open the Option window, select the X-axis and then press the Mirror button. If the polygon was modeled in side view from the beginning, the X-axis must be the base.
A mirror copy of the model will appear as in Figure 1-136. Select both subdivision surfaces, and then select [Modeling > Subdiv Surfaces > Attach]. The two models will attach to become one as shown in Figure 1-137.

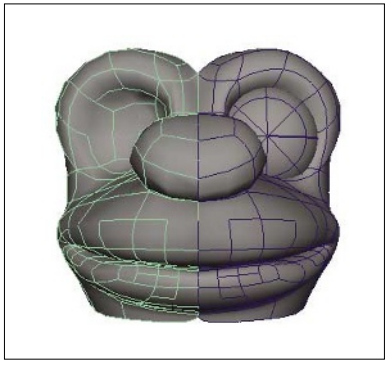


Figure 1-136 Mirror

Figure 1-137 Attach

We have now completed a modeling of a character using subdivision surfaces.
Greater detail and more accurate modeling will be covered later in this book.

● Texturing Subdivision Surface Model

Now, we will look at how to create a simple subdivision surface texture. Again, greater detail will be covered later in this book.
Through this process, we will learn how easy and quickly we can create a simple texture.

step 1 Select the subdivision surface, click the RMB and then select Face from the Marking Menu. Select the entire face of the subdivision surface. Select [Modeling > Subdiv Surfaces > Textures > Automatic Mapping ❐] to open the Options window and make the configurations shown in Figure 1-138. (Refer to Chapter 2 "Polygon, Subdivision Surface Mapping," for more information.)

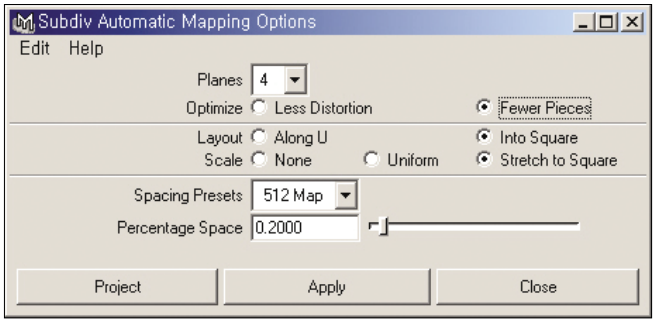


Figure 1-138 Options Window

Click the Project button at the bottom of the window.

Open the UV Texture Editor by selecting [Windows > UV Texture Editor] to automatically create the UV on the subdivision surface as shown in Figure 1-139.

Figure 1-139 UV Texture Editor

step 2 Because we cannot paint directly on the subdivision surface, we must convert it to a polygon first.

Select the model and then select [Modify > Convert > Subdiv to Polygon ❐] to open the Options window. Make the configurations shown in Figure 1-140, and then press the Convert button at the bottom.

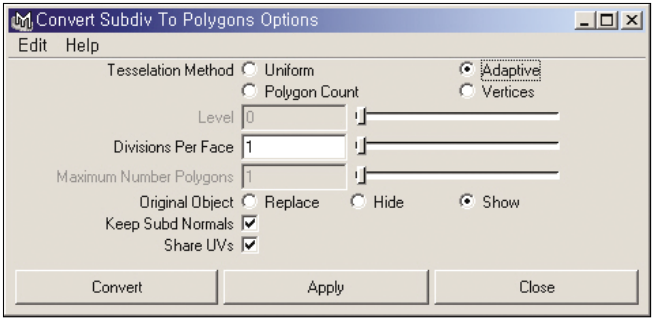


Figure 1-140 Options Window

Select [Edit > Delete by Type > History] to delete the history of the polygon object. Hide the subdivision surface by selecting the model and pressing the Ctrl+H key.

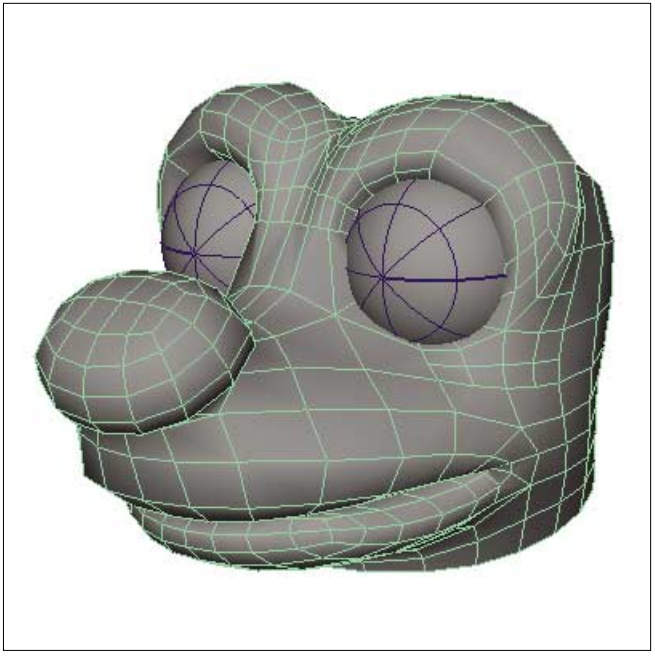


Figure 1-141 The Converted Polygon Model

step 3 Select the Polygon Model and then select [Rendering > Texturing > 3D Paint Tool] to open the Tool Settings window.

As shown in Figure 1-142, click the Assign Textures button in the File Texture Section to open the window that asks for the texture size (shown in Figure 1-143). Enter **512**, and then click the Assign Textures button.

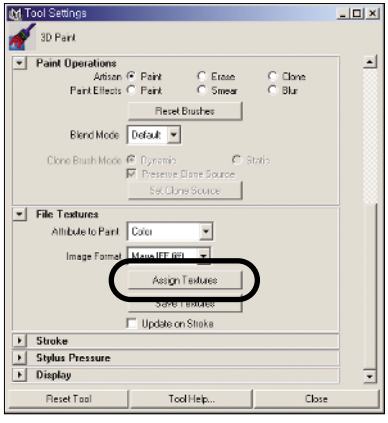


Figure 1-142 Tool Settings Window

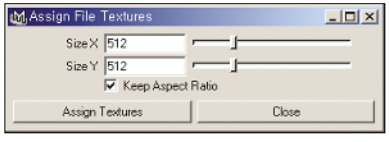


Figure 1-143 Configuring the Texture Size

In the color section of the Tool Settings window, shown in Figure 1-144, click on the Color Box next to the Flood Color to open the Color Chooser window. From there, we can make a more specific color choice.

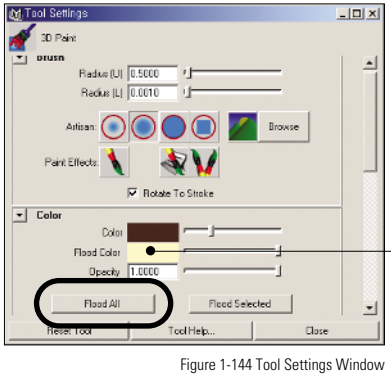


Figure 1-144 Tool Settings Window

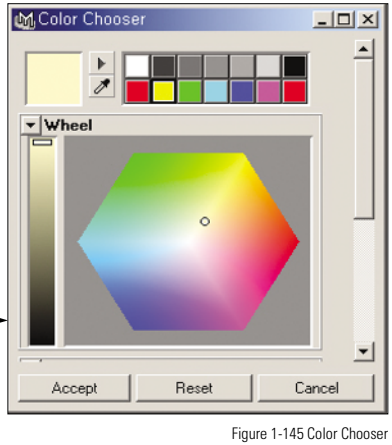


Figure 1-145 Color Chooser

Click on the Flood All button in the Tool Settings window, shown in Figure 1-144.

We can see that the polygon model is filled in with the color we chose.
To paint the model, click on the Color Box next to Color, as shown in Figure 1-144, and select an appropriate color. As shown in Figure 1-146, check Reflection X under Stroke Selection in the Tool Setting window. This option allows us to paint symmetrically to the X-axis with respect to the absolute axis in the window as shown in Figure 1-147.

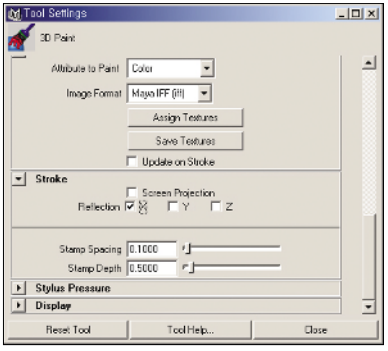


Figure 1-146 Tool Settings Window

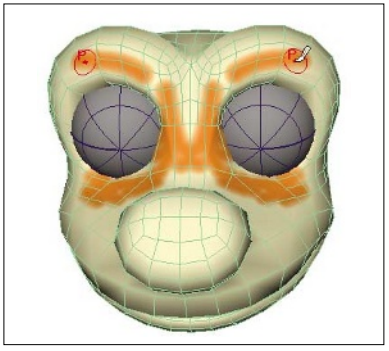


Figure 1-147 Reflect Paint

Now, use the desired colors to paint the model as shown in Figure 1-148. The brush size can be adjusted in the Brush Section. Opacity is used to adjust the opacity of the color in Color Sections. Flip back and forth between these options to create the desired texture.

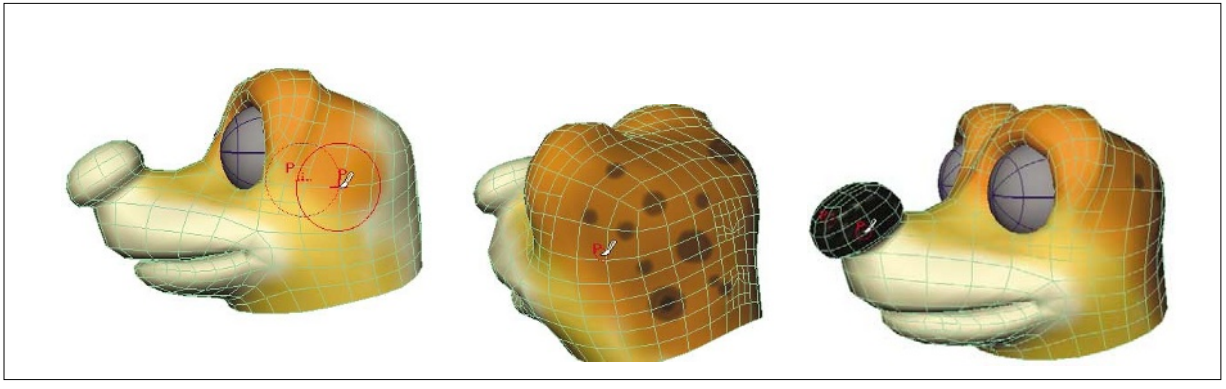


Figure 1-148 Painting Texture

step 4 When you have completed painting the model, click on the Save Texture button in the Tool Settings window as shown in Figure 1-149.

Select [Windows > Rendering Editors > Multilister]. You can see the texture file we just made in Figure 1-150.

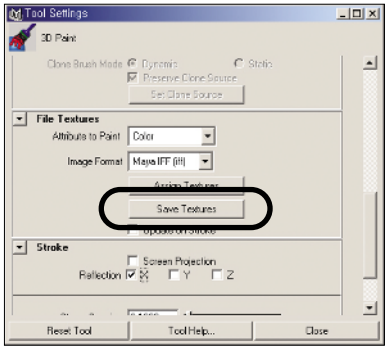


Figure 1-149 Tool Settings Window

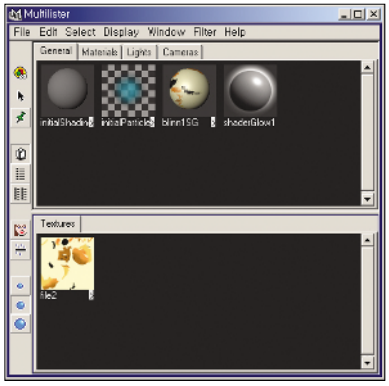


Figure 1-150 Multilister

Make a new shader and place the texture in the color. Reveal again the subdivision surface, which was hidden earlier, by selecting [Display > Show > All] and assign this shader to the subdivision surface.

Hide or delete the polygon object.

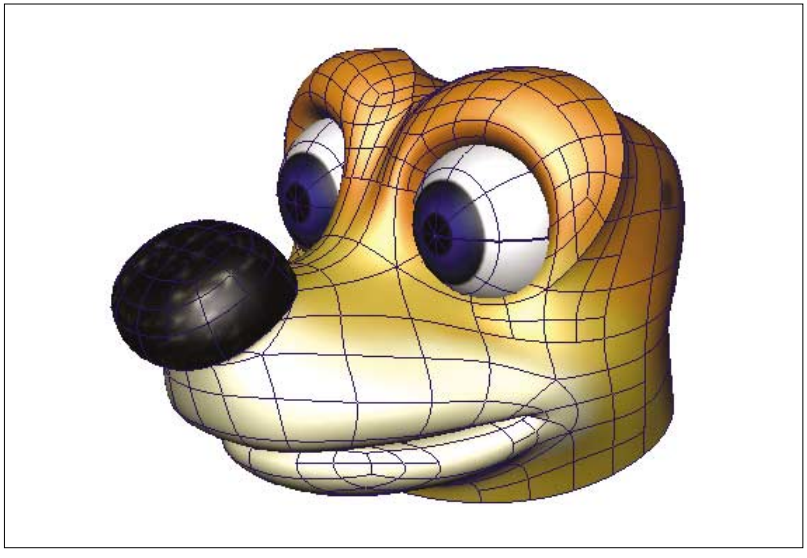


Figure 1-151 The Completed Model