

Super Easy 3D Polygon Modeler  
HexaSuper Ver. 2.0  
for Power Macintosh

Rokkaku-Daioh



User Manual

Shusaku  
Co., Ltd.

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# Getting Started



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## Getting Started

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Welcome to the HexaSuper2, an easy to use 3D graphics software featuring a wide variety of functions, including the world's most advanced Curved Surface and 3D Manga. We hope you enjoy using HexaSuper2.

In order to use HexaSuper2 you need to have an understanding of the basic operations of a Macintosh computer. Please refer to the documentation that comes with your computer.

### System Requirements

CPU: Power PC (a G3 or G4 is recommended)

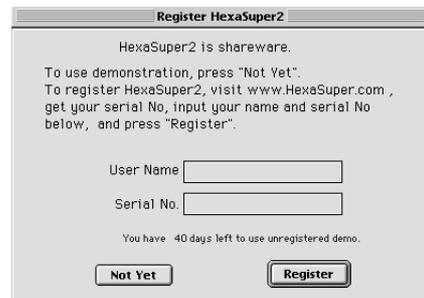
Memory: 32MB or greater

OS: Mac OS 7.5 or later

Extension: QuickDraw 3D 1.5 or later

### Starting HexaSuper2

- (1) Start your Macintosh.
- (2) Double click the HexaSuper2 icon to start HexaSuper2.
- (3) The following dialog box appears. Press "Not Yet" to use the demo of HexaSuper2.
- (4) HexaSuper2 starts and a new document window, as shown in the figure on the next page appears. With the demo version, you cannot save or export any files, except those in POV-Ray format.



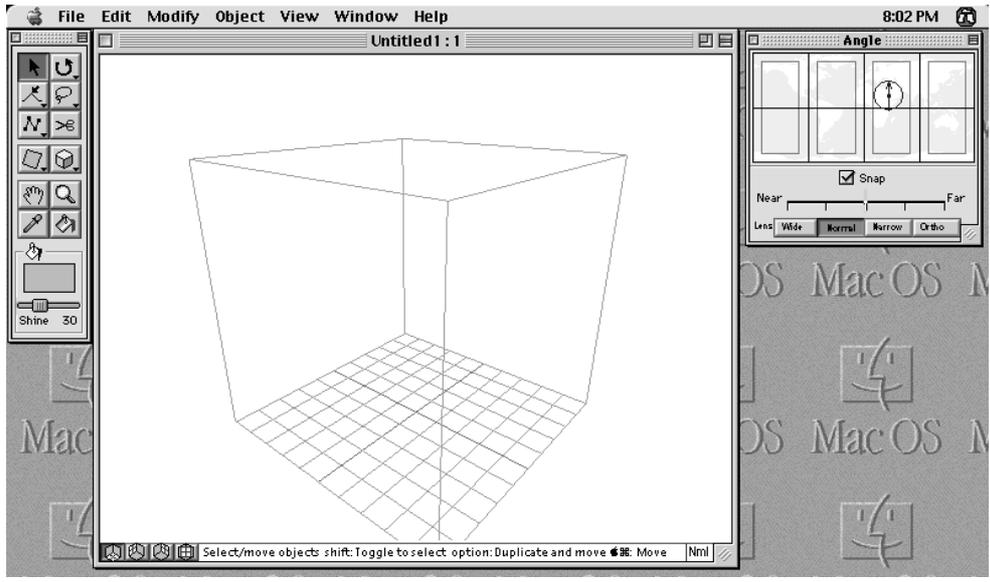
### NOTE

There is no problem using HexaSuper2 on the newer systems that come with an iMac or iBook. However, if running Mac OS 7.5 or 7.6 and QuickDraw3D is not installed, an error message will appear and the software will fail to start. In this case, install QuickDraw3D 1.5 or later, or QuickTime 3.0 or later released by Apple Computer.

### Registration

HexaSuper2 is shareware. You have to register HexaSuper2 to use its full functions. To register HexaSuper2:

- (1) Visit <http://www.HexaSuper.com/>
- (2) Click the "Register" link and purchase a user license for HexaSuper2.
- (3) Shusaku Co., Ltd. will send you your serial number by E-mail.
- (4) Restart HexaSuper2 on your Macintosh.
- (5) Input your name and serial number in the Register HexaSuper2 dialog box, then press Register to complete the registration.



**User Support**

Support for this product is offered to registered users via E-mail and postal mail.

E-mail: shusaku2@cd.mbn.or.jp

Postal Address:

Shusaku User Support Division,  
 3-23-13-206, Kugahara, Ohta-ku, Tokyo,  
 146-0085, Japan.

Please include the following details to allow us to provide clear and helpful support:

- (1) Serial No. of HexaSuper2.
- (2) Model of Macintosh you are using.
- (3) Information on operating environment
  - 1. Mac OS version.
  - 2. Unused block size of Mac OS memory.
  - 3. Number of colors displayed by the system.
  - 4. QuickDraw3D version

- 5. HexaSuper2 version
  - 6. Application memory size of HexaSuper2
  - 7. Unused block size of HexaSuper2 memory
- (The above information can be obtained by choosing Apple > System Information when HexaSuper2 is running)
- (4) Detailed description of the problem or question.
  - (5) Your mailing address.

Please refer to our Web site for the latest information on HexaSuper2.  
<http://www.shusaku.co.jp/>

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## **About This Manual**

### (1) Document Conventions

The following document conventions are used throughout this manual.

#### 1. Menus, commands and dialog boxes

Names of menus and buttons are written in title cap.

e.g. File menu, Apply button.

#### 2. Menu hierarchy

The hierarchy of menus are shown as in the following example.

e.g., Edit > Select > Select Wire

In this case, choose Select from the Edit menu and then choose Select Wire to select wires.

### (2) Basic operations

The following are definitions of some of the basic operations used throughout this manual.

#### 1. Mouse input

##### i. Click

To press and release the mouse button once without moving the mouse.

##### ii. Double-click

To press and release the mouse button twice quickly without moving the mouse.

##### iii. Drag

To position the mouse pointer over an object, press and hold the mouse button, then move the object to a different location and release the button.

#### 2. Key input

i. The terms enter, shift, option and command refer to the enter key, shift key, option key and command key (apple key) respectively.

ii. Certain operations require two or more keys to be pressed at the same time. e.g. command-N refers to pressing the command and N keys simultaneously.

#### 3. Combined mouse and key input

##### i. Shift-click

To click the mouse button while pressing the shift key.

#### 4. Others

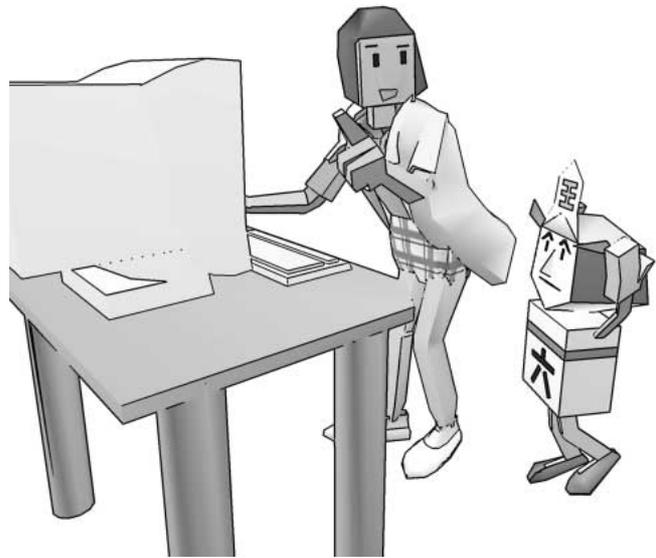
##### i. Show/hide

This refers to the showing and hiding of things such as an object or window.





# 1 Tutorials



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## How to Do Tutorials

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In this chapter, you will learn how to use HexaSuper2 by practicing various techniques demonstrated through tutorials. There are five tutorials.



### 1-1 Creating a shape from objects

Making a cute penguin using the basic functions of HexaSuper2, such as creating various shapes from solid objects and moving vertices.



### 1-2 Using Manga mode

Creating 3D outlines from a 2D illustration using the 3D Manga function.



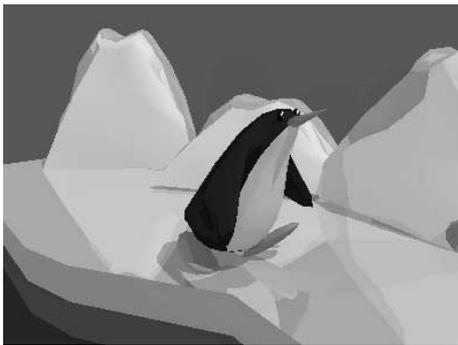
### 1-3 Using Input Line and Select/Move Area Tools

Creating a desk lamp using advanced functions of HexaSuper2 such as Polyline and Select/Move Area tools.



#### **1-4 Using Symmetry mode**

Creating a realistic human face using various techniques and some of the more advanced functions of HexaSuper2 such as Symmetry mode.



#### **1-5 Rendering with POV-Ray**

Creating a realistic picture (rendering) using the freeware POV-Ray that comes with this software package.

The tutorials start off fairly easy with 1-1 and 1-2, and then however, as we move on to 1-3 and 1-4 they become a little more difficult. We recommend that you work through these tutorials in order starting with 1-1. However, 1-5 is also easy. If you are a 3D-beginner, try 1-1 first and then 1-5, before proceeding to tutorial 1-2. Surely, this will increase your appreciation of the 3D world.

For details on each menu and tool, refer to Chapter 2 and 3.

# 1-1 Creating a Shape from Objects

## Creating "The Hexa-penguin"

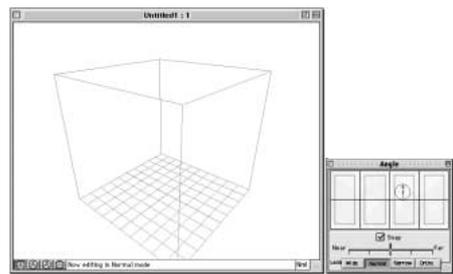
Let's create a cute penguin from a basic sphere. In this tutorial, you will learn how to use the Select/Move Area tool and Curved Surface function.



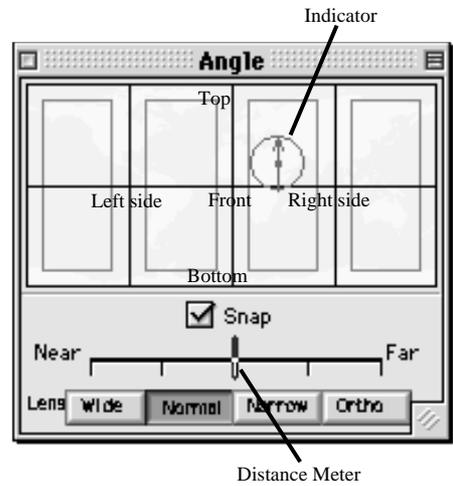
Original design: Koji Ando

(1) First, let's learn how to display different views.

After starting HexaSuper2, drag the mouse pointer within the the Angle window. The green grid cube moves.



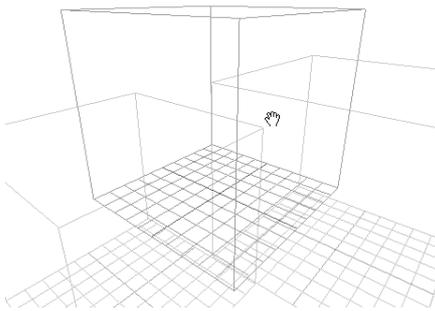
The viewpoint rotates around the grid cube. To show the front, side or upper view, click the cross sections of the Angle window.



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Hold down the space key and drag the mouse pointer in the document window. The viewpoint moves parallel to the monitor.



Drag the slider of the Distance Meter located at the bottom of the Angle window.

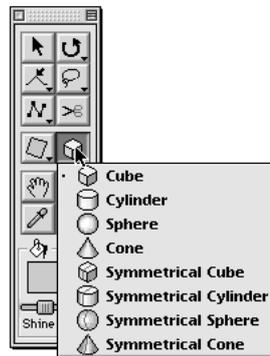
Dragging the slider towards the right decreases the size of the view and dragging towards the left increases it.

Finally, choose View > Initialize Viewpoint to reset the viewpoint to its original state.

You can also use the  tool from the Tools window to zoom in or out.

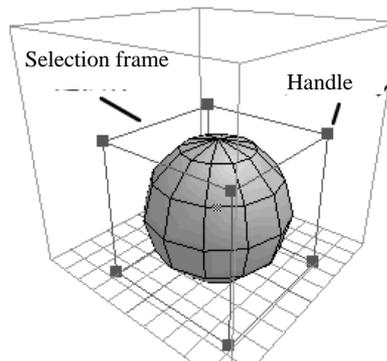
(2) Now, let's create a sphere.

Press and hold the  tool in the Tools window. If you keep it pressed, a menu appears. Select the  (Sphere) tool.



Hold down the option key and drag downwards from a position just below the center of the document window to make a sphere (which is a kind of object).

The object appears in a selected state.



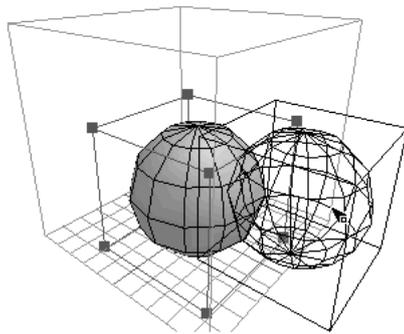
(3) Moving the sphere.

Select the  tool and move the mouse pointer over the sphere. The mouse pointer shape changes to .

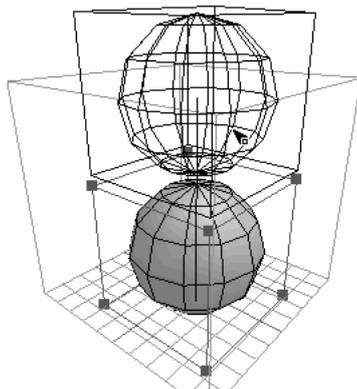
In this state, you can drag the sphere parallel to the bottom plane of the grid cube (parallel to the plane

with purple cross lines).

The plane with purple cross lines is called the "base plane." Objects and areas move parallel to the base plane.



Next, hold down the command key and drag the sphere. The sphere moves perpendicular to the base plane. The black line stretching from the center of the sphere to the base plane gives you an idea of the height of the sphere .



After practicing moving the sphere, return the sphere to its original position.

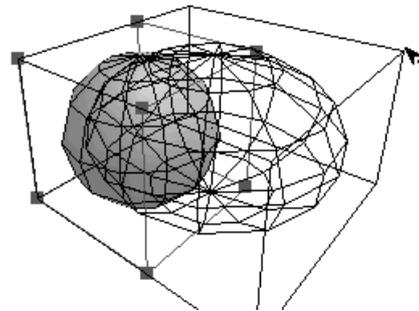
(4) Stretching the sphere.

Drag the selection handle of the sphere. The shape of

the sphere and selection frame surrounding it changes.

Holding down the command key while you drag, changes the shape perpendicular to the base plane. Holding down the shift key, permits the shape to be changed in a right-left or forward-backward direction only.

After practicing changing the shape, return the sphere to its original shape.



(5) Changing the base plane.

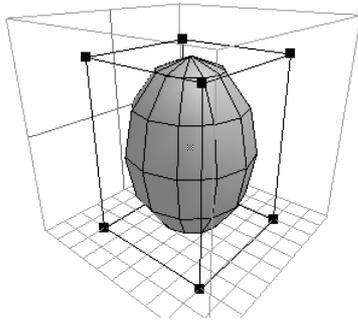
Click the base plane button  at the lower left of the document window. The base plane changes to a left-back plane as shown by the purple cross lines.



Base plane buttons

Drag the handle of the selection frame. Now, the shape of the sphere changes parallel to the left-back plane. You can change the moving and modifying direction by changing the base plane like this.

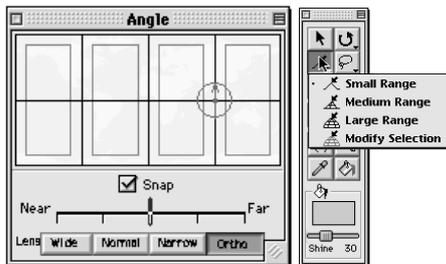
Dragging the mouse pointer up or down changes the height of the sphere by stretching or shrinking it. Stretch the sphere to a height similar to that of the sphere shown in the following picture.



When you have finished stretching, click the base plane button  to return back to the original base plane.

(6) Modifying the sphere shape.

Move the indicator on the Angle window to show the sphere from a right side view. If the view is showing an upper, front or side view, the base plane automatically changes to a view parallel to the display.



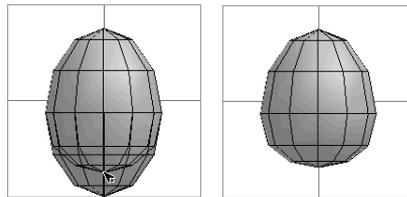
At the moment the object looks like a rugby ball. To transform it into the body of a penguin, we need to shrink the top part and enlarge the bottom part.

Hold down  and choose the  (Medium Range) tool.

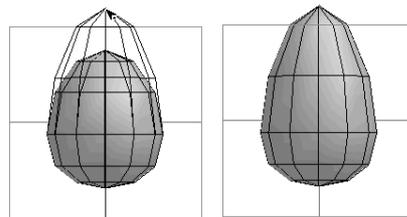
First, enlarge the bottom of the sphere. Move the mouse pointer over the lowest vertex. The mouse pointer shape changes to . Then, hold down the

mouse button and drag the lowest vertex upwards.

The lowest vertex moves along with its surrounding vertices.

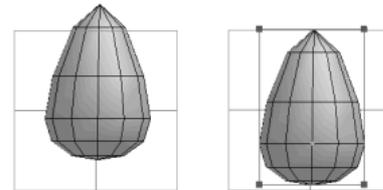


Next, drag the highest vertex upwards.



Modifying the shape in this way moves the entire object to a position higher than the original position.

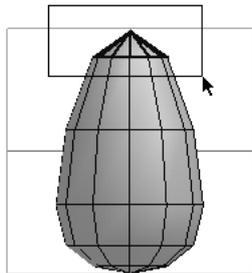
Use the  tool to lower the object to a position within the grid cube.



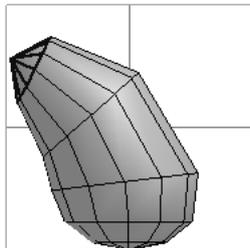
(7) Rotating the head.

Next, we will use the Select/Move Area tool to select and modify an area.

With the  (Medium Range) tool selected, drag the mouse pointer across the area shown in the following picture to generate a rectangular selection area.



Any elements within this selection area are selected. Then, select the  tool from the Tools window and drag the selected area. If you move the mouse right or left, the area rotates. Rotate the area towards the left as shown the picture.



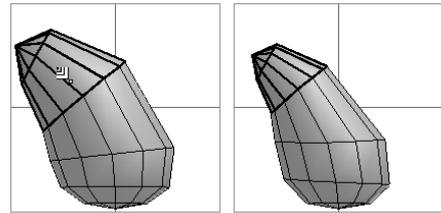
(8) Shrinking the head shape.

As in (7), select the  tool and drag the mouse pointer across the area shown in the picture to generate a rectangular selection area.

Choose **Modify > Magnify**. The mouse pointer changes shape to indicate HexaSuper2 is in Magnify mode.

If you drag the selected area, it increases or decreases in size. Decrease the size of the selected area to a size similar to that shown in the picture.

Once you release the mouse button, the mouse pointer returns to its original shape to indicate that HexaSuper2 is no longer in Magnify mode.

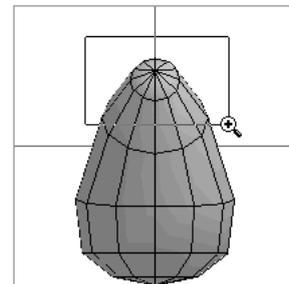


You have created the penguin's body and head. Move the indicator of the angle window to check the body shape and see how it differs from the initial sphere. Now, take a well deserved break.

(9) Zooming in on the penguin's head to create its eyes.

Move the indicator of the Angle window to show a front view of the penguin.

Then, select the  tool and drag around the upper part of the body. This magnifies the view of the upper part.

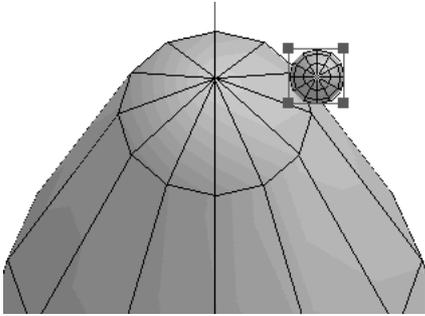


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(10) Creating an eye.

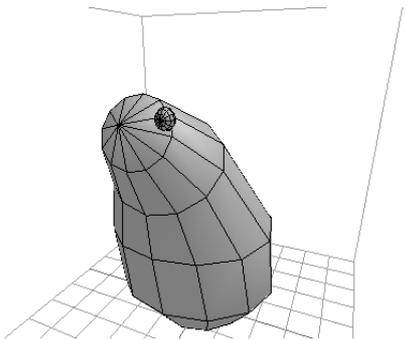
Select the  tool. Hold down the option key and drag from the position where you think one of the eyes should be to create a small sphere. This sphere is one of the eyes.

Drag the mouse pointer, to create a sphere, from an appropriate position on the head (not from a position where nothing exists) to give a sense of depth by making it seem like it is an integral part of the head.



Then, choose View > Undo Viewpoint. The view returns to its original state before you used the Zoom tool.

Check the position of the eye using the Angle window.

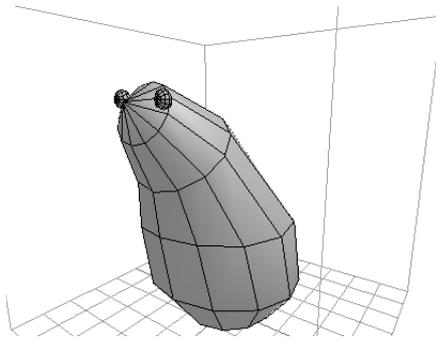


(11) Creating the other eye.

Select the  tool and click to select the eye. Then,

choose Edit > Duplicate. An identical eye (new sphere) appears in a position a little offset from the first eye.

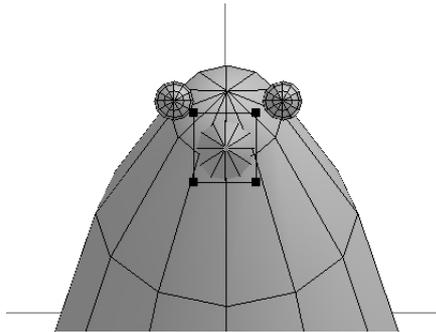
Change the view to show the front and side, and drag the new eye to an appropriate position.



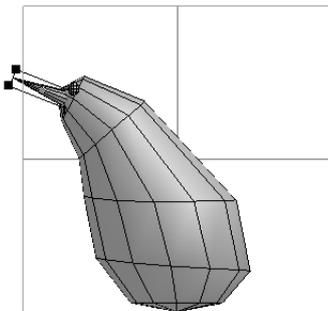
(12) Creating the beak.

Change the view to show the front of the penguin.

Then, hold down the  tool and select the  (Cone) tool. Drag on the body to create a cone like the one in the picture below.



Change the view to show the right side. Create a beak, like the one in the following picture, from the cone by adjusting its size with the  tool and its direction with the  tool.

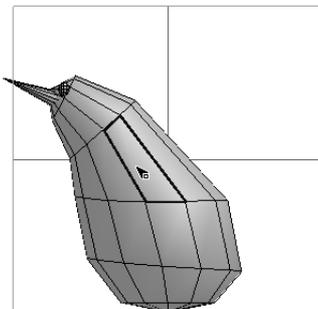


Rotate the view using the Angle window to check the shape. It is beginning to resemble a penguin.

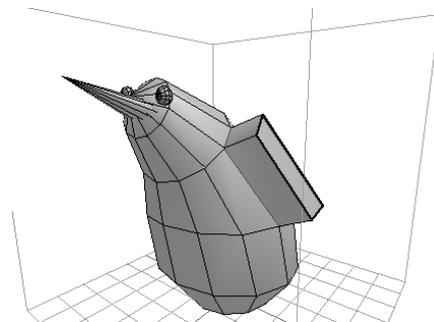
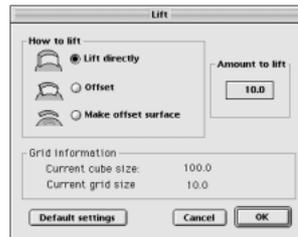
(13) Creating a wing using the Lift function.

First, hold down  and choose the  (Small Range) tool. Change the view to show the right side of the penguin.

Click the center face of the body as shown in the picture below. The clicked face becomes selected.



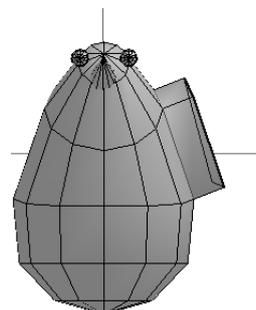
Choose Modify > Lift. The following dialog box appears. Select "Lift directly" and press the OK button.

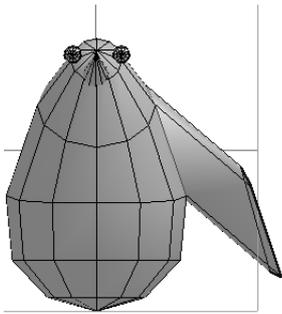


The face is raised up. It will become one of the penguins wings.

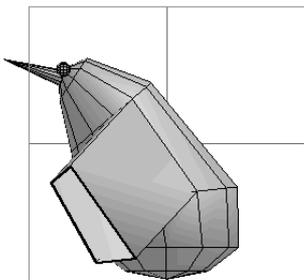
(14) Moving the wing.

Set the view to show the front. Drag the selected face to the right and in a downward direction until it resembles a wing.





Then, set the view to side view and drag the selected face to the left.



Note: When moving vertices.

In principle, to accurately move shapes, you should set the view to front, side or upper view. If you move shapes from a different view such as at a diagonal view, the direction of the depth will be effected and it will be difficult for you to know how they have changed.

(15) Ungrouping the face.

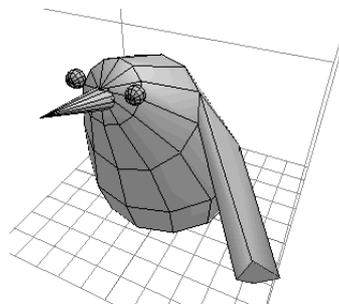
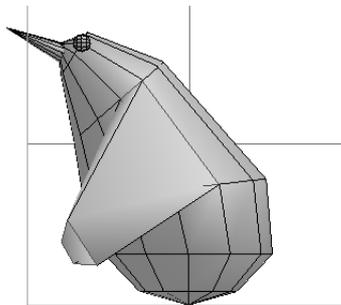
Using Lift from the Modify menu grouped the four vertices and four lines of the wing together. As a group they always move together at the same time and it is impossible to move each vertex or line individually. To ungroup them select the four vertices and four lines and choose Edit > Ungroup, then Unselect All. You can now move each vertex and line individually.

(16) Making the tip of the wing narrower.

Move the vertices and lines to form a wing like the one in the picture below.

Select the  tool. Then, lower the highest line and raise the lowest line of the four lines.

At first, it is a little tricky to move the lines to the position you desire, but do not worry, you will soon get used to using the  tool.



Does your penguin look like the one in the picture?

When you have finished the left wing, use the same procedure to make the right wing.

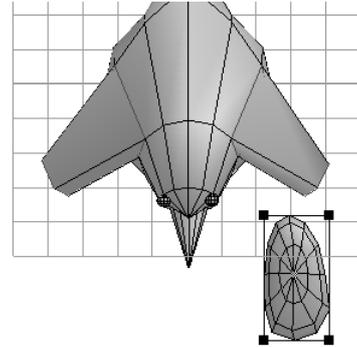
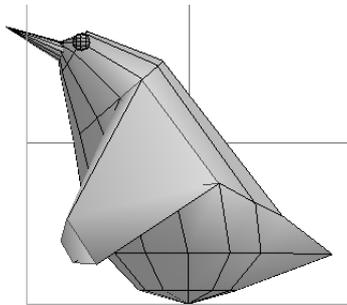
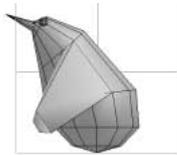
(17) Creating the tail.

Set the view to show the side of the penguin. Hold down the  tool and select the  (Medium

Range) tool.

Then, drag the vertex on the bottom of the penguin to the right to create the tail.

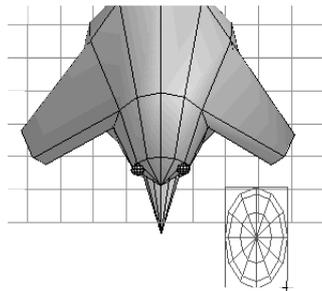
You have now finished the penguin's body.



(18) Creating the feet from spheres.

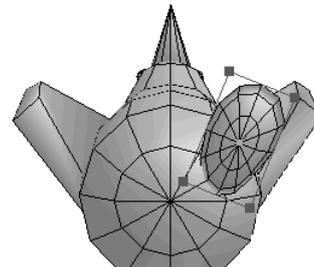
Set the view to upper view. Then, select the  tool and drag to create a long and narrow sphere.

Next, select the  tool and drag the vertices to adjust the shape of the sphere until it resembles a foot like the one in the following picture. Check the shape of the foot from a side view as well.



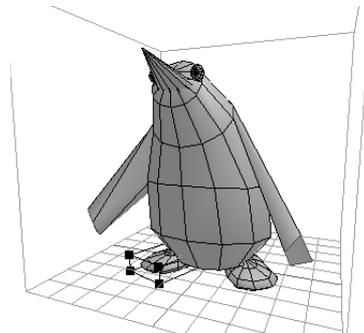
(19) Rotating the foot.

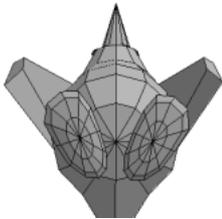
Set the view to show the bottom of the penguin. Then, select the  tool and drag the foot to rotate it to a suitable angle. Next, select the  tool and drag the foot into an appropriate position for a foot.



View the foot from the side and front, and make suitable adjustments.

Create the other foot in the same way .

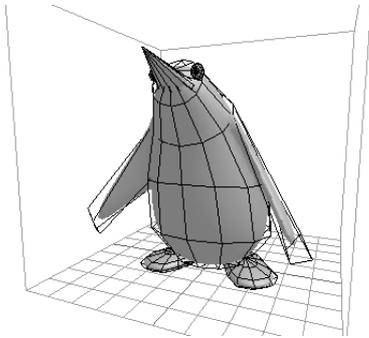




(20) Creating a smooth surface.

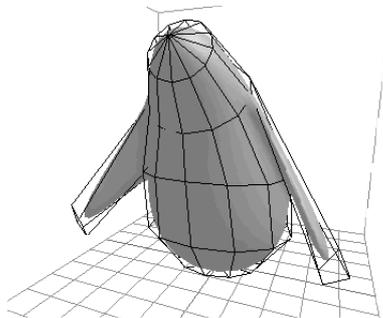
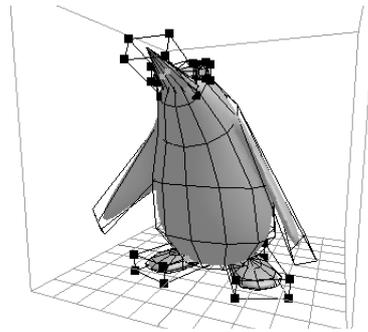
The shape now looks like a penguin, except that it appears rigid and stiff. Real penguins have smooth bodies. To rectify this, select the  tool, then choose Edit > Select All. Next, choose Modify > Unsharp Line. The color of the lines turn from blue to black. From the Object menu choose Curved Surface. The surface of the penguin's body becomes curved and smooth.

The whole shape is now complete.



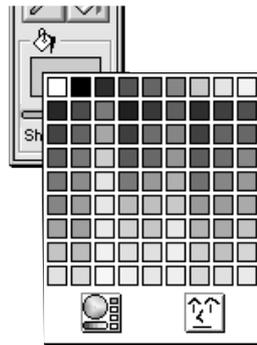
(21) Before painting the penguin.

Hide all the shapes except the body. Shift-click the eyes, beak and feet to select them as in the following picture. Choose View > Hide Selection. All objects except the body disappear. (Of course, you can show them again later.)

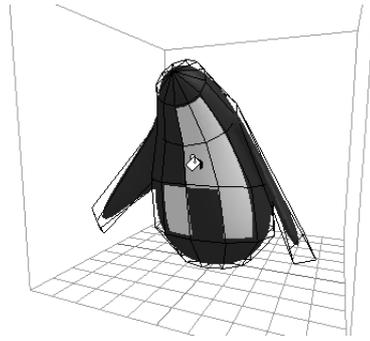


(22) Painting the body.

Select the  tool and choose an appropriate blue for a penguin from the color palette.



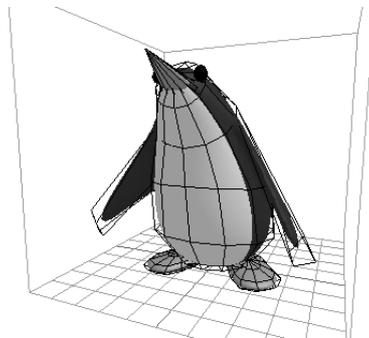
Click on the body to paint the whole body blue. Next, select white from the color palette. Then, shift-click the faces of the stomach area. Each time you shift-click a face, its color turns white.



(23) Painting the eyes, beak and feet.

Choose View > Show All. The eyes, beak and feet are shown.

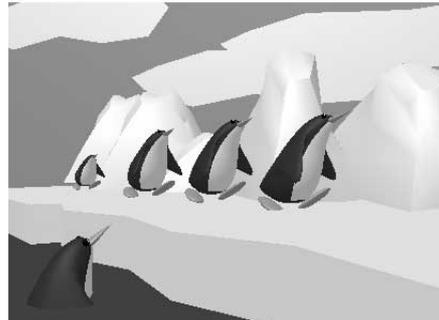
Select the  tool and paint the eyes black, and beak and feet yellow. The penguin looks cuter if you paint part of its eyes white.



(24) Changing the view mode.

Choose Show Smooth Faces from the View menu.

Congratulations, you have completed the penguin.





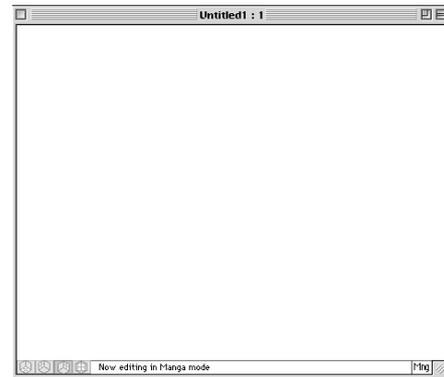
## 1-2 Using Manga Mode

### Creating 3D outlines from an illustration

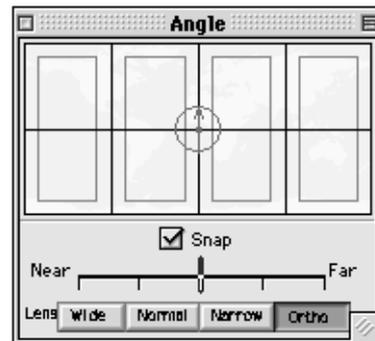
Here, we will create 3D outlines of a human face from a 2D illustration using Manga mode. Manga is Japanese for cartoon



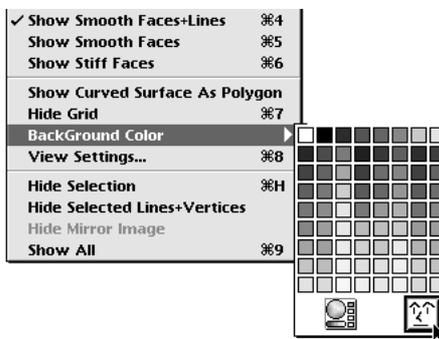
(1) Start HexaSuper2 and choose File > New In Specified Mode > Manga Mode. A new document window appears in Manga mode. Initially, nothing is shown in the document window.



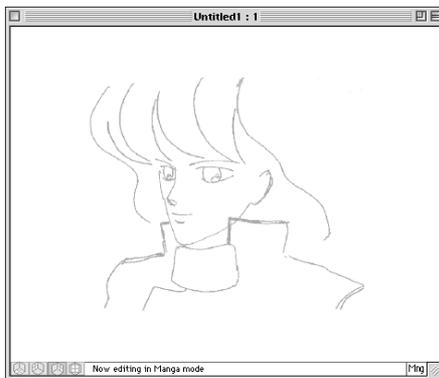
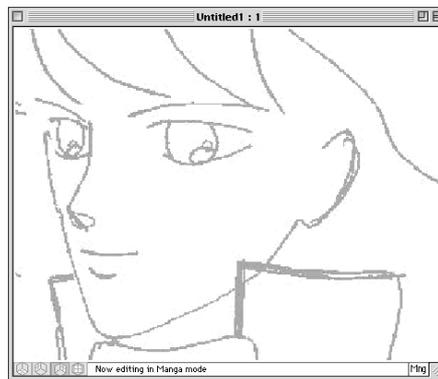
In Manga mode, the indicator of the Angle window is positioned in the center as shown below. However, this position is just for the sake of convenience. You do not have to change the view angle, when you edit in Manga mode the angle indicator is used only for checking shapes.



(2) Choose View > Background Color and select the Face button at the bottom of the color palette. The Open dialog box appears. Open Tutorial 2 Picture located in the Tutorial folder in HexaSuper2 folder. An illustration of a human face is shown in the document window as a background picture.



(3) To make it easier to see the illustration while you are tracing, move the Distance Slider in the Angle window to the left, to zoom in on the eyes, nose and mouth. (You can zoom in or out at any time while you are editing in Manga mode.)



(4) To specify the face direction, click the button in the Tools window. The button changes to . Click the button again to return to the original button. You must choose the button with the face in the same direction as the face or object in the illustration you are going to trace.

The face in the illustration we are using for this tutorial is looking towards the left, so select the button. If the face on the button is looking in the opposite direction to the face or object in the illustration, the front and back of the 3D outline is inverted.

(5) Set the line width to 2 pt by choosing Modify > Line Width > 2pt. Any lines you draw now will be thick enough to allow you to see them clearly.

(6) Select the  tool and click on the lower part of the nose. A line is displayed from the clicked position to the mouse pointer's position. Next, click on the tip of the nose. A new vertex appears at the position you clicked. (For the purpose of demonstration, these lines are thick, but under normal circumstances, the lines you draw will be thin.)



Double-click on the upper part of the nose to finish drawing the nose like in the picture. You have drawn a total of two lines and three vertices.

By the way, you can change the line color. If it is difficult to see the lines because the background illustration is dark, choose View > View Settings to display the View Settings dialog box. Then, select the Environment tab, click the color square of Line Colors/Manga mode and set a lighter color.



(7) Click the left side of the left eye and double-click the right side of the left eye to draw a line like the one in the following picture.

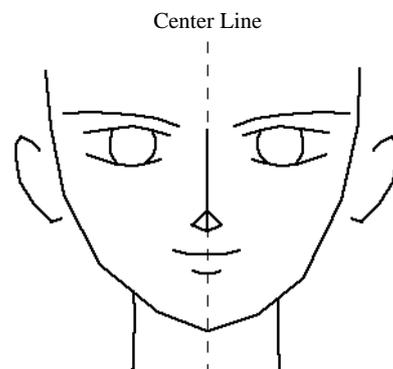
If you draw a line in the wrong position, select the  tool in the Tools window, click-select the line, then choose Edit > Clear to delete the line.



(8) Next, draw a line on the right eye and one on the mouth like in the picture. There are now 5 lines.



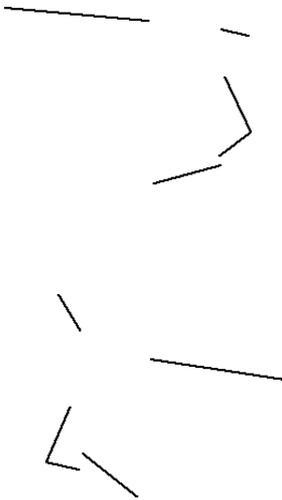
In Manga mode, you must draw lines in pairs with one on the left side and another on the right side. If there is a vertex on left eye, there must be another corresponding vertex on the right eye. An exception is if there are lines and vertices in the center of the object when looking at it from the front, as is the case with the two lines on the nose.



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(9) Drag the indicator in the Angle window. The background illustration disappears and only the lines you drew remain displayed. With eyes, a mouth, and a line for the nose at the front, it is beginning to resemble a face, isn't it?

When you view the face from different angles, it looks three dimensional because the depth of the lines have been automatically calculated.



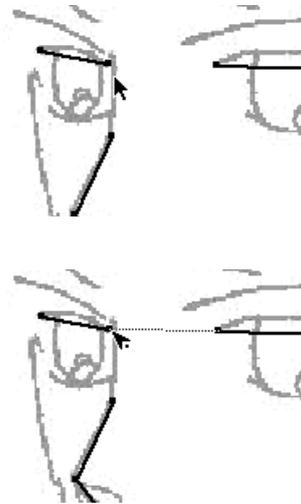
(10) Release the mouse button. The lines are again shown in their original positions and the background illustration reappears.



(11) The color of the vertices changes from white to black. This means that each vertex on the right side has been paired with a corresponding vertex on the left side. To show lines in three dimension, not only must there be the same number of vertices on the right side as there are on the left side, but it is necessary to know which vertices are paired. However, when you start dragging the indicator in the Angle window, HexaSuper2 automatically pairs vertices.

Let's check which vertices are pairs. Select the  tool and move the mouse pointer near to a vertex. (You do not have to click the vertex.) A dotted line appears from this vertex to its paired vertex.

In the picture below, the vertices on the inner part of each eye are paired.



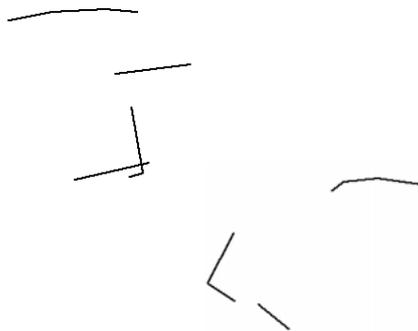
Move the mouse pointer near to the vertex at the top of the nose. No line appears because the vertex is on the center line of the face and therefore it corresponds with itself.

(12) To learn more about Manga mode, delete the lines you have drawn by choosing Edit > Select All, then Clear.

(13) Select the  tool again and trace the lines for the eyes, nose and mouth like in the picture below. This time, use four vertices to draw the left eye. This seems a bit repetitious, but it is a necessary part of this tutorial.



(14) Drag the indicator in the Angle window. This time it does not really resemble anything, except maybe a one-eyed goblin.



(15) Let's see which vertices are paired together to determine why the shape looks strange. Select the  tool and move the mouse pointer near one of the vertices of the left eye. Each vertex on the left eye must be paired with a vertex on the right eye. However, one of the vertices on the left eye is paired with another vertex on the left eye.



If the number of vertices differs between the left and right side, the vertices may be unappropriately paired and their depths may not be calculated correctly. As a result, the shapes will look disproportional.

(16) Choose Edit > Undo. The black vertices change to white and they are no longer paired.

Basically, you should choose Undo, if the shapes look disproportional when you drag the indicator in the Angle window. Correct the shapes following the instructions described below to make the number of vertices on both the left and right side identical, and manually assign pairs.

(17) Correcting the number of vertices on the eyes. Select the  tool and click on the line of the right eye while holding down the option key. A new vertex

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appears where you clicked. Drag the vertex in an upward direction as demonstrated in the picture.



(18) Hold down the option key and click on the line again. There are now four vertices on the right eye too.

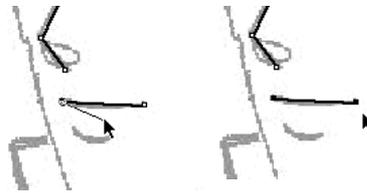


(19) Now, there are an identical number of vertices on the right and left side and the shape appears well proportioned when you drag the indicator in the Angle window.

Sometimes, the shape appears disproportional, even if the number of vertices on the left and right are identical. When this happens, you need to manually pair vertices. Let's try paring some vertices.

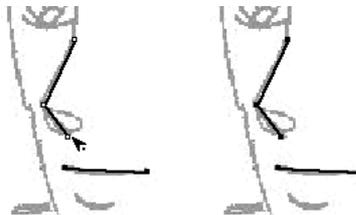


(20) The  tool is not just for checking pairs of vertices, but can also be used to manually pair them. Select the  tool and click the vertex on the left end of the mouth, then click the one on the right end. They become paired and their color turns black. (The vertices can also be clicked in the opposite order.)



(21) Making vertices on the nose correspond to themselves. A Vertex on the center line of the face corresponds to itself. It is therefore necessary to click the same vertex twice to assign itself as the corresponding vertex.

Click the lower vertex of the nose twice. This vertex also turns black. If there is not another line branching off from the vertex, all the other connected vertices will also assign themselves as corresponding vertices.

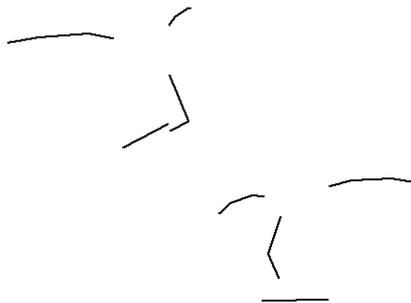


(22) Click the vertex on the inner part of the right and left eyes. Now all vertices have been assigned a corresponding vertex.

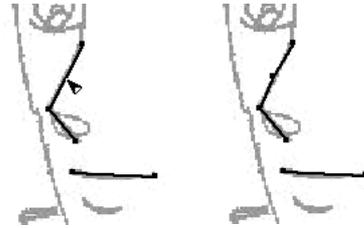


By the way, if you want to unassign a pair of vertices, click one of vertices of the pair, then click anywhere in the document window where no other vertex exists.

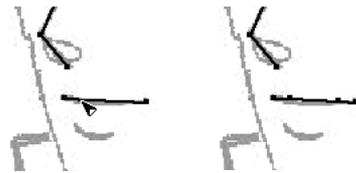
(23) Drag the indicator in the Angle window. Now, the depth is calculated correctly and the shape looks proportional. Normally, vertices are automatically paired. However, if the shape is unproportional, please pair them manually.



(24) Adding lines to fill in the details. Select the  tool, hold down the option key and click the line on the upper part of the nose. A new black vertex appears. When both vertices of a line are assigned to themselves, any new vertex is also automatically assigned to itself.



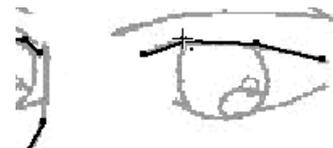
(25) Hold down the option key and click the mouth line. Two new vertices appear. One at the clicked position, and the other at a position symmetrical to it.

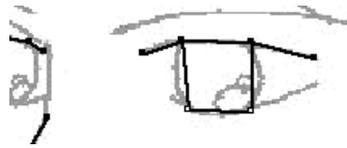


(26) Drag the new vertices to positions similar to those in the picture below, to curve the mouth.

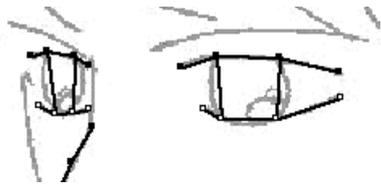


(27) Select the  tool and add three lines for the pupil of the left eye. If you move the mouse pointer over another vertex, a "." (dot) appears in the lower right part of the mouse pointer. Clicking it when the mouse pointer shows this dot connects the new line to the original vertex.





(28) Add more lines to finish off the rest of the eyes. As the right eye is close to the nose, be careful not to connect them together.



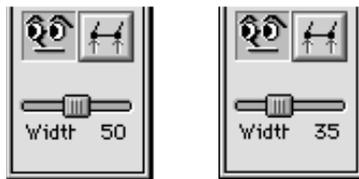
(29) Add eyebrows and lower lip like in the picture below. Again, be careful not to connect the right eye and eyebrow.



(30) Drag the indicator in the Angle window. It looks more like a face now. However, the face appears wider than the face of the illustration.



(31) If the shape is too wide or narrow, adjust the width with the Width Slider in the Tools window. In our case, adjusting the width to about 35 will be enough.



(32) Drag the indicator in the Angle window. The face has become narrower.



(33) Let's add the final touches to the shape. Draw the hair, ears, neck and shoulder using the  tool, and divide eye and eyebrow lines using the  tool, while referring to the following the picture. It is easier to roughly draw the lines using the  tool first, then check the depth by dragging the indicator in

the Angle window. Then, divide the lines using the option key and  tool.

You do not have to strictly trace the outline of the illustration. Use your imagination as you draw more symmetrical lines to create your own original shape.



(34) We have finished. Drag the indicator in the Angle window and admire your work.



(35) You can create a 3D outline by tracing an illustration in this way. You can also use photographs of mirror-symmetry objects taken from a diagonal view. It is possible to create 3D outlines from a variety of things including animals, cars, aircraft, etc.

However, you should avoid using pictures with objects that face directly towards the front, top or bottom, or pictures with an unordinary perspective (for example, the front is big and the back is small).



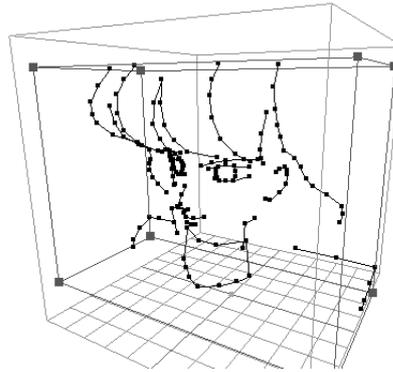


(36) Now, let's learn how to use the outline in other modes.

To bring outlines from Manga mode into another mode, choose Edit > Copy in Manga mode, then open another document window in either Symmetry or Normal mode and choose Edit > Paste. All the outlines will be pasted on the document window.

Furthermore, you can also choose Edit > Switch Symmetry/Normal Mode when you are in Manga mode to switch to either Symmetry or Normal mode.

In Manga mode, you can only edit wire-outlines, but bringing the outlines to Symmetry or Normal mode allows you to do such things as create smooth surfaces from the outlines. To do this, use the  tool to connect lines together to form rectangles or triangles, then choose Modify > Create Faces For All.



Note:

If you paste outlines to a document window in Symmetry or Normal mode or switch from Manga mode to Symmetry or Normal mode, the outlines are grouped together to form one object even though the object may be made up of several objects.

Furthermore, if you save a Manga mode document and reopen it, the outlines are always grouped together.

To ungroup the objects choose Edit > Ungroup.

## 1-3 Using Input Line and Select/Move Area Tools

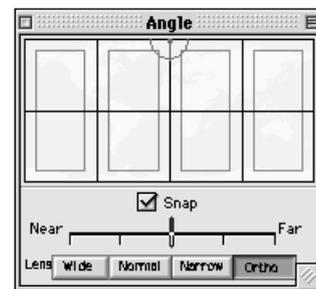
### Creating a Desk Lamp

In this section, we will create a desk lamp using the Input Line and Select/Move Area tools.



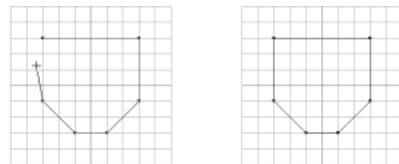
(1) In HexaSuper2, choose File > New to open a new document..

(2) Set the viewpoint angle to upper view with the Angle window.

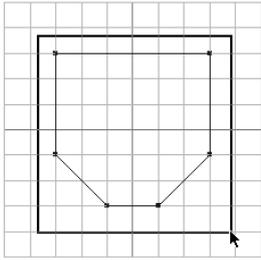


(3) Choose Object > Snap to Grid.

(4) First, we will create the base of the desk lamp. Select the  tool and input a hexagon as in the picture below. Positions where you click become vertices. Finally, double-click on the first position you clicked to complete the input operation. As Snap to Grid is active, the input operation will be conducted smoothly.



(5) Select the  tool and drag around the hexagon to select all of its lines.



(6) Choose Modify > Extend. A copy of the hexagon is generated and the vertices of the two hexagons are connected together by lines.



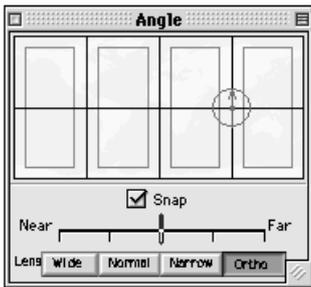
(9) Click anywhere in the document window where nothing exists to remove the selection.

(10) Set the viewpoint angle to upper view with the Angle window.



(11) In HexaSuper2, you can only create faces on a triangle or square. So select the  tool and add a horizontal line as in the picture below.

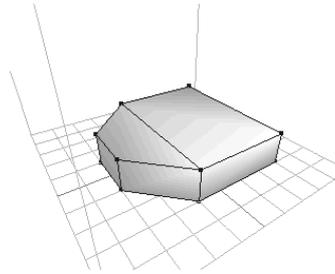
Set the viewpoint angle to side view with the Angle window. As the base plane is automatically positioned parallel to the monitor, an object or area moves in parallel to the monitor.



Note that, when two vertices are connected with a line, they overlap each other and the vertex nearest the front is active. Therefore, the line we have just input is for the upper hexagon.

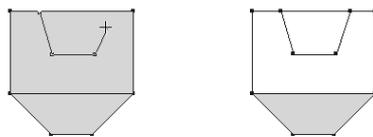
Drag the selected upper hexagon and move it over the lower hexagon as in the picture below. You should drag a vertex instead of a line, because the position of a vertex snaps to the grid, which makes it easier to move the hexagon.

(12) Choose Modify > Create Faces For All. All faces are created. Rotate your work with the Angle window to check its shape.



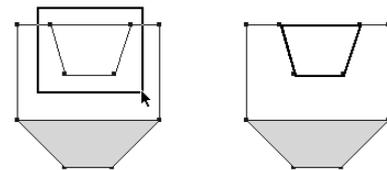
(13) Set the viewpoint angle to upper view with the Angle window again.

(14) Next, we will create a support for the stand. While holding down the option key, first click the left side position on the line, then the right side position on the face and another position on the face, finally double-click any position on the line to complete the input operation. Do not worry, a rough shape is fine. When the input operation is completed, the faces surrounding the lines disappear.



(15) Rotate your work with the Angle window to check its shape. Note that, holding down the option key and clicking any position on the line, creates a vertex which divides the line, and clicking any position on the face creates a vertex with the same depth as those on the face. After checking your work, return the viewpoint angle to upper view with the Angle window.

(16) Choose the  tool and select four lines including the three you just input.



(17) Choose Modify > Extend.

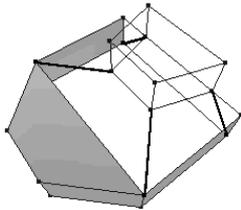
(18) Set the viewpoint angle to side view with the Angle window.

(19) Move the shape that was created with the Extend command to a position just over the original shape.



(20) Set the viewpoint angle to a diagonal view with the Angle window.

(21) In the current state you cannot create faces. So choose the  tool and input four lines to create triangles and squares as in the next picture.



(22) Choose Modify > Create Faces For All. Faces are created. Then, choose Edit > Deselect All to remove the selection. Now the edges are shown clearly and naturally.

(23) Choose View > Show Smooth Faces. The object looks a little strange because only its faces are shown as its lines are hidden. In HexaSuper2, lines except for sharp ones are shown as if they were continuous and seamless.



(24) Now, we will create sharp lines in the parts that require them to look realistic. Choose Edit > Select > Select Edges Sharper than 60 Degrees to show edges as sharp ones.

(25) Choose Modify > Sharp Line. The selected lines become sharp lines. Then, choose Edit > Deselect All to remove the selection. Now the edges are shown clearly and naturally.

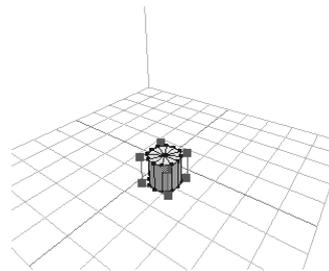


(26) Choose View > Show Smooth Faces + Lines to return the view to its original state.

(27) Next, we will create the stand.

First, we will hide the base of the lamp to make it easier to work. Choose Edit > Select All, then choose View > Hide Selection. The base of the lamp disappears.

(28) Hold down the  tool for a while to show the menu, then choose  and click in the center of the grid. A small cylinder is generated.



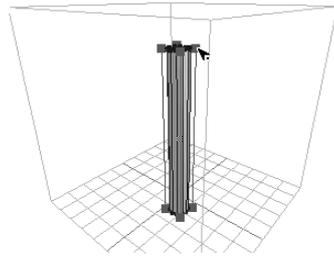
(29) The  tool is now active. While holding down the command key, drag any of the upper four handles of the cylinder to stretch it upwards. Drag it until the stand is around 3/4 the height of the grid.

**m**

When you create an object using the Solid Object Tool, edges are clear from the beginning. This is why edges are set to Sharp Line by default.

**m**

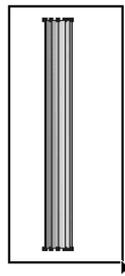
Choosing View > Show All shows any object which has been hidden.



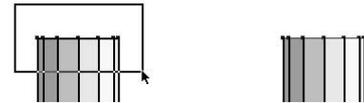
(30) Now we will divide the stand in order to be able to bend it later.

Set the viewpoint angle to front view with the Angle window.

(31) Select the  tool and drag around the cylinder to select all its elements.



(32) While holding down the shift key, drag around the top of the cylinder to remove the selection within the area you drag around. Note that when you drag around an area while holding down the shift key, the selected area you drag around is deselected and the other portions remain selected.



(33) While holding down the shift key, drag around the bottom of the cylinder to remove the selection.

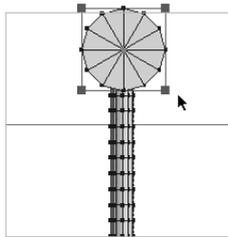
(34) Choose Modify > Subdivide > Other. The dialog box appears. Then, specify 12 and click OK. As only the side lines of the cylinder are selected, the cylinder is divided in a vertical direction.



(35) Click anywhere on the screen where nothing exists to remove the selection.

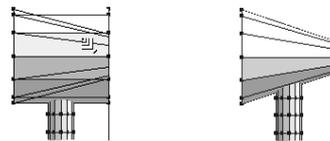
(36) Now we will create a lampshade.

Leave the viewpoint angle as it is, and choose the  tool. While holding down the option key, drag over the top of the stand to create a cylinder about the size of the one in the picture below. Note that the cylinder looks like a sphere, as the viewpoint angle is set to front view.

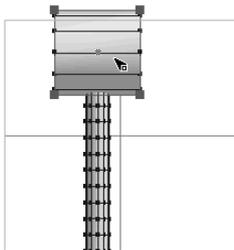


(41) Place the mouse pointer on the selected element and drag it. When you move the mouse pointer to the left, the selected element decreases in size. Change the size of the lampshade to about the same size as the one in the picture below. The lampshade is now finished.

(37) Set the viewpoint angle to side view.



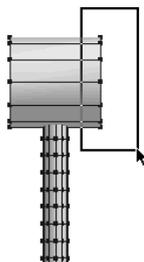
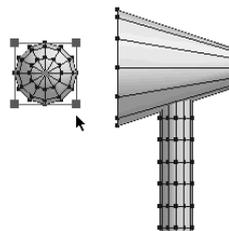
(38) Select the  tool and adjust the position of the cylinder (lampshade) until it is on the stand as in the picture below.



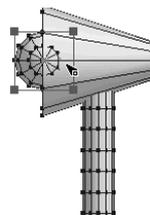
(42) Next, we will attach a light bulb.

Hold down the  tool, then choose . While holding down the option key, drag on the left side of the lampshade to generate a sphere.

(39) Choose the  tool and select the right side element of the lampshade.



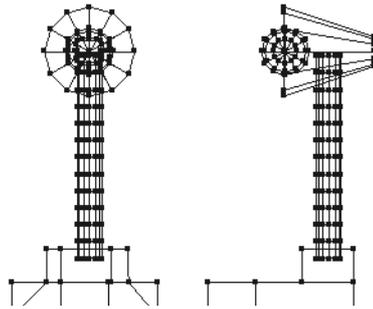
(43) Choose the  tool and move the sphere to a position half hidden behind the lampshade. The light bulb is now finished.



(40) Choose Modify > Magnify. The mouse pointer changes to .

(44) Next, we will arrange the whole shape.  
 Choose View > Show All to show the base of the lamp which has been hidden. Rotate your work with the Angle window to check the shape. The positions of the base, stand and lampshade are out of place.

(45) Choose Show View > Show Lines Only to make it easier to see the positions of the objects. Change the viewpoint angle to front or side view and adjust the positions of the objects.



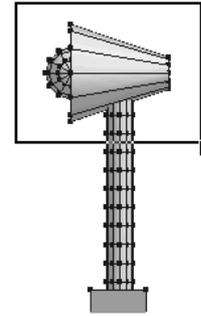
(46) When the positions are correct, choose File > Save As to save the document. You can enter any name for the file.

(47) Now we are close to finishing our desk lamp.

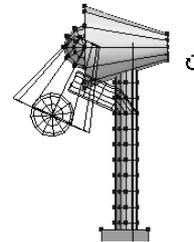
We will bend the stand to make it look more like a desk lamp.

Set the viewpoint angle to side view with the Angle window. Choose View > Show Smooth Faces + Lines to return the view to its original state.

(48) Choose the  tool and select the upper portion of the stand along with the lampshade.



(49) Select the  tool and drag the selected area by moving the mouse pointer to the left and right to rotate the object. However, the object does not move flexibly, so choose Edit > Undo to return the object to its original state.



(50) Hold down the  tool and choose .

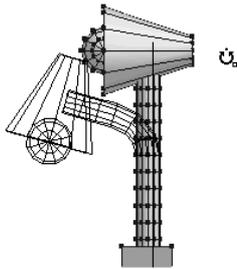
(51) Choose the  tool again and drag the selected area to rotate it. This time, the stand can be bent flexibly.

When you choose , from the Select/Move Area tool menu, the selected object plus three segments counting from the border can be moved and rotated flexibly. (When you choose , the object plus five segments counting from the border can be moved and rotated.)

Now, bend the lampshade and stand as in the picture below, then release the mouse button.

## m

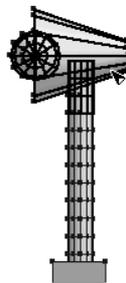
The center of rotation is the border of the selected and unselected area.



Now, the shape looks good. If you are in a hurry, you can skip the intermediary steps and jump to (59) and finish your work. However, if you want to learn more about the special features of HexaSuper2, choose Edit > Undo to return your work to its original state. We will show you another way of modifying the object.

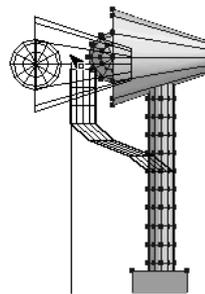
(52) Now, we will show you another way of modifying the object while explaining functions of the group area.

The upper portion of the arm is selected. In this state choose Edit > Group. The selected area becomes a group area. Then, choose Edit > Deselect All to remove the selection.



(53) Choose the  tool and click the lampshade. The whole group is selected. After checking the selection state, click anywhere on the screen where nothing exists to remove the selection.

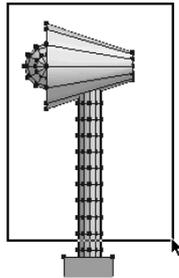
(54) Next, we will drag the lampshade. You can move the elements of the whole group simultaneously, without selecting the element that you want to move. After checking the movement, choose Edit > Undo to return the object to its original state. Note that, you can use any of the    tools to select vertices, lines or group area.



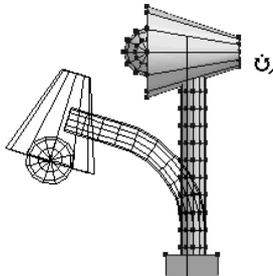
(55) Back to our work. Now, we will bend the stand.

Hold down the  tool and choose  (red icon).

(56) Select the whole desk lamp, including the lampshade and lower portion of the stand.



(57) Choose the  tool. Move the mouse pointer over the lampshade and drag to rotate it. The selected stand is bent flexibly while the shape of the lampshade does not change. Bend the stand as in the picture and release the mouse button.



(58) Click anywhere in the document window where nothing exists to remove the selection.

When we bent the stand in (51), the range of bending was restricted to the third segment counting from the border. However, when you choose , you can bend the inside elements of the selection area separately, so you can specify the

modifying range as you want.

Furthermore, when you drag a group area to modify it, the shape does not change. As you have just seen, the shape of the lampshade did not change.

To summarize, a group area has the following three characteristics.

1. When you click a group area, it is selected as a whole.
2. When you drag a group area it moves as a whole.
3. When you drag a group area to modify the elements in the selection area, the shape of the group area does not change as a whole.

(59) Finally, paint your work with colors to add the finishing touches.

Select light yellow from the Color palette, choose the  tool and click on the light bulb. The color of the light bulb changes to light yellow.

(60) Select black from the Color palette and click on the stand. The color of the stand changes to black.

(61) Choose View > Show Smooth Faces.

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You have now finished the desk lamp.

## 1-4 Using Symmetry Mode

### Creating a human face

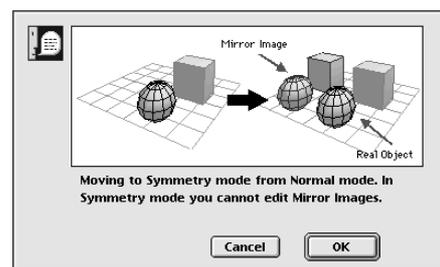
Everyone who uses 3D software desires to create a human face. Let's create a realistic human face using Symmetry mode. The same techniques can also be applied to a variety of other shapes.



Original design: Koji Ando

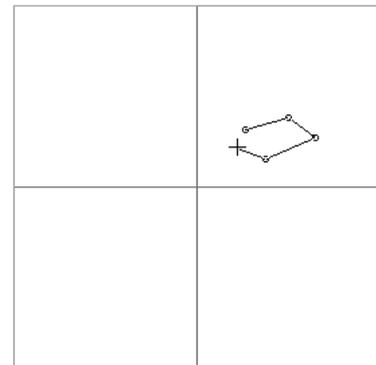
(1) Switching to Symmetry mode.

Choose File > New to open a new document window. Next, choose Edit > Switch Symmetry/Normal Mode and press the OK button in the dialog box that appears.

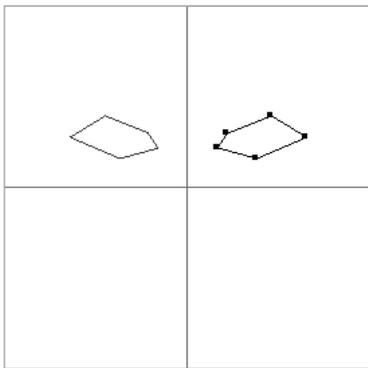


(2) Drawing an eye.

Set to front view with the Angle window. Select the  tool and draw five lines for an eye on the right side of the grid cube as in the picture below



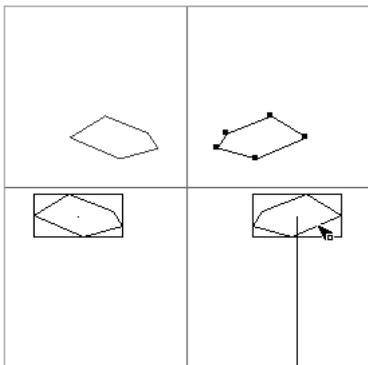
When you have finished drawing with the polyline tool, an identical shape is shown in symmetry on the left side. This is a mirror image of the shape you drew.



(3) Trying to move the eyes.

Select the  tool and drag the right eye. When you drag the right eye, the left mirror image moves at the same time. You cannot move the right eye to the left side of the grid cube. When you have finished moving the eye, return it to its original position.

By the way, pressing the / key allows you to switch the side which permits editing. Doing so transforms the actual objects into mirror-images and vice versa.

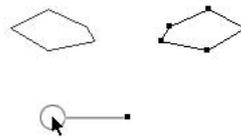


Next, try dragging the left eye. You will find that it cannot be dragged. You cannot move a mirror image or an actual shape to the left side in Symmetry mode. However, these limitations allow you to create symmetrical shapes easily.

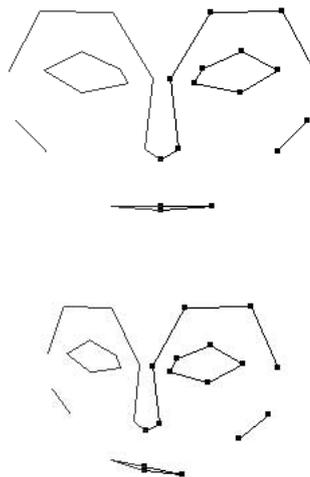
(4) Drawing a nose, mouth and cheeks.

Select the  tool. To draw two lines for the mouth, first click the lower left position, then click the lower right and finally the lower left position again. If you click the left side, the vertex appears on the center line and becomes a mirror-center vertex.

A mirror-center vertex cannot be moved to the left or right, as its movement is restricted to an upward and downward direction, or towards the front or back of the document window.



Next, draw lines for the nose and cheeks as in the picture below. (Click on the left side to create a vertex for the top of the nose. This vertex is a mirror-center vertex.)



## (5) Adding depth to lines.

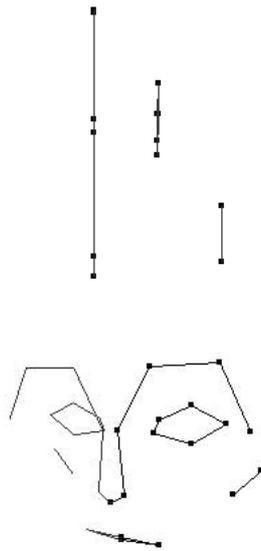
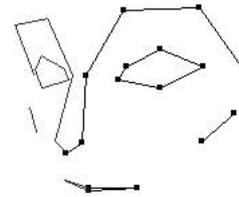
Set the view to right side view, and move the lines in a horizontal direction to give a sense of depth using the  tool.

At first, it does not matter which lines you move or where you move them to. Arrange the lines for the nose, mouth, cheeks and eyes on the left side, then do the same for the lines on the right.

Drag the indicator in the Angle window to check the shape. Now, each element has its own depth.



Drag the indicator in the Angle window and admire the shape. The shape now looks more natural.



## (6) Adding depth with more precision.

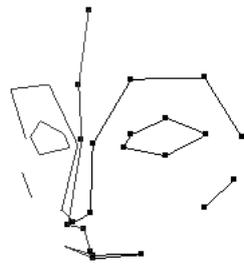
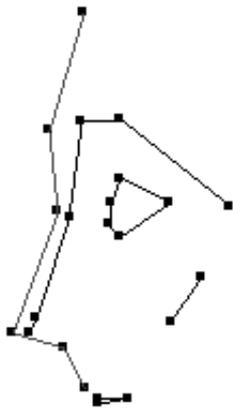
Set the view to side view and select the  tool. Move the vertices to positions similar to the ones shown in the picture. Be careful because some vertices overlap each other.

To move vertices horizontally in a side view, hold down the shift key, and drag them. If you move vertices vertically, the shape will look different when viewed from the front.

## (7) Creating center lines.

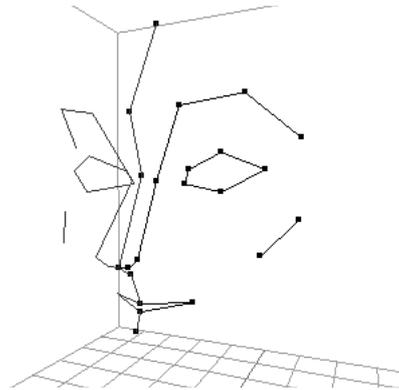
Set to side view and draw new lines for the nose, as in the picture, using the  tool. The lines turn blue. When you input lines from a side view in Symmetry mode, the new vertices and lines become mirror center.

(However, if you connect a new line to an existing vertex, the line becomes a normal line and is not mirror center.)



(8) Moving outlines more precisely.

Move the vertices precisely until you are satisfied with the face. It is better to decide the rough image of the face now as it becomes harder to alter the shape after you have added more vertices.



Note:

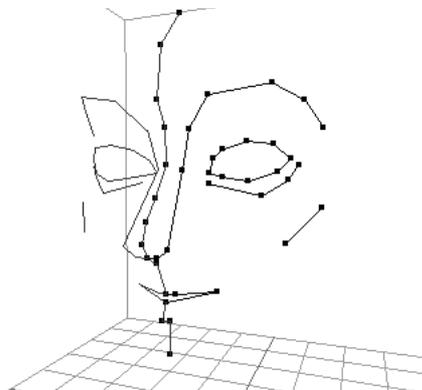
You can also draw the outlines in Manga mode as described in Section 1-2, *Using Manga Mode*. Choose whichever mode you prefer.

(9) Adding vertices.

Now, let's add more vertices and lines to give more details to the face.

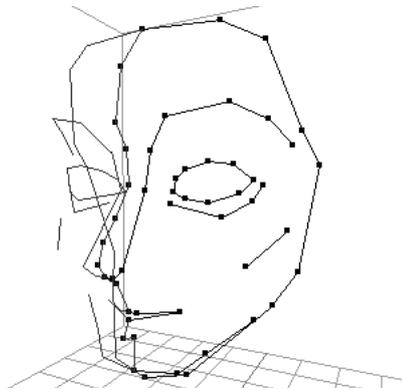
Select the  tool, hold down the option key and click on the lines to add new vertices as in the picture below.

Then, add lines beneath the eye with the  tool.



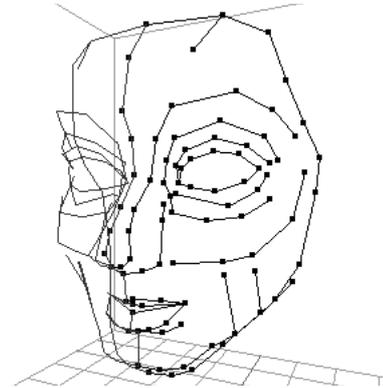
## (10) Adding lines.

Let's draw more lines to add contour to the face as shown in the picture below. First, draw lines from a front view, then give the shape more depth by adjusting them from a side view.



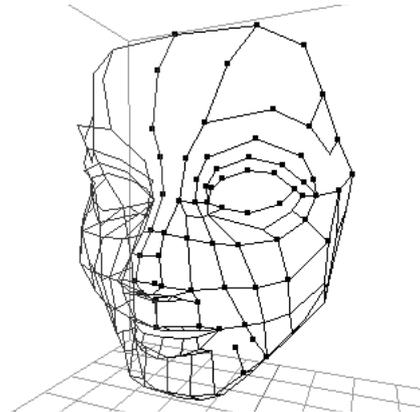
## (11) Adding more lines.

Add more lines as shown in the next picture. To obtain a good surface, adjacent polylines must have the same number of vertices. (Refer to art-sketch books when you try to draw face lines.)



## (12) Preparation for creating faces.

Connect vertices of the face together to create an array of rectangular frames using the  tool. HexaSuper2 allows you to create triangles as well, but for our purposes rectangles create a better surface.



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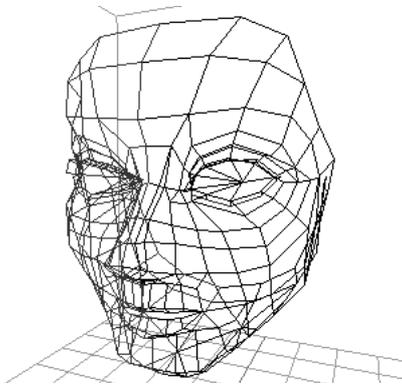
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(13) Before creating the faces.

The picture below shows the shape after creating an array of rectangular frames.

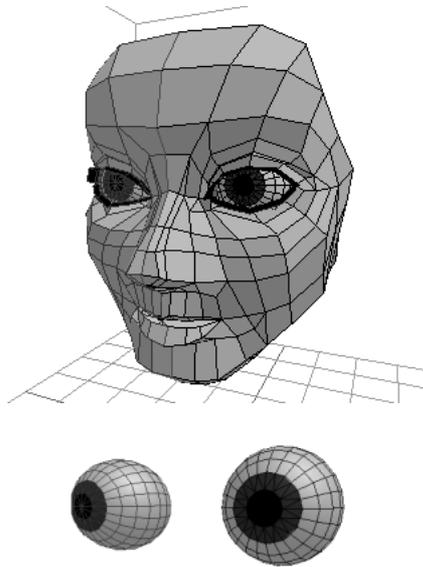
In this shape, some vertices were automatically added to make rectangles or triangles look natural.

Furthermore, eyelashes were added to the shape.



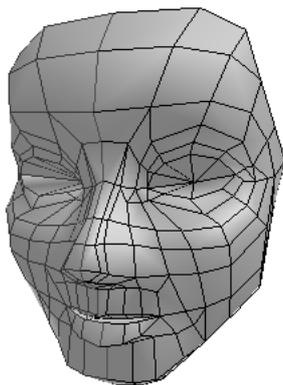
(15) Creating the eyeballs.

Create a sphere for an eyeball using the  tool and paint the pupil of the eyeball.



(14) Creating the faces.

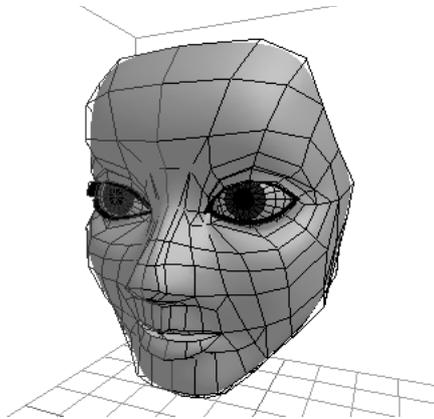
Choose Modify > Create Faces For All. A face appears within each rectangular frame of the shape.



(16) Creating a curved surface.

Select the  tool and click the face to select it. Then choose Object > Curved Surface. The surface of the face becomes curved.

However, this shape is too smooth, it needs to be given a bit more life.



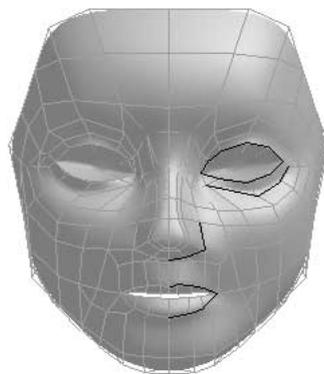
Next, choose Modify > Set Sharpness > 80%. The next pictures shows the faces before (top) and after (bottom) setting the sharpness. Now, the face has been given life.



(17) Setting sharpness.

Select the eye sphere and choose View > Hide Selection.

Select the  tool and shift-click the lines in the picture. The lines around the eye, nose and mouth should have sharp edges.



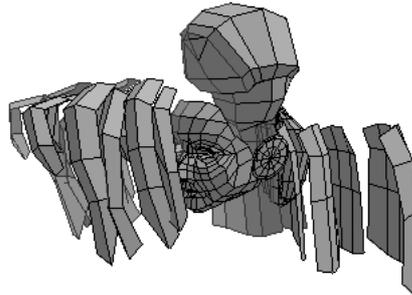
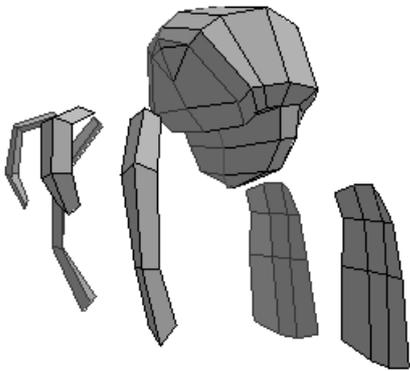
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(18) Creating Hair.

Create the hair by drawing several oblong shapes and arrange them like in the picture below.

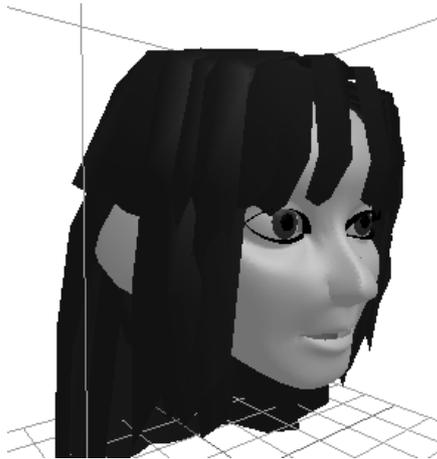
It is easier to create the hair if you hide the face and eyes beforehand. To hide the face and eyes, choose Edit > Select All and then choose View > Hide Selection.



(19) Increasing the amount of hair.

Copy and paste many oblong shapes and arrange them so as they look like hair.

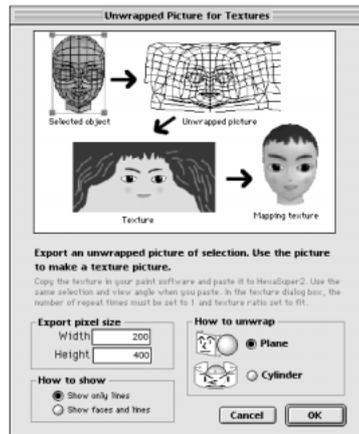
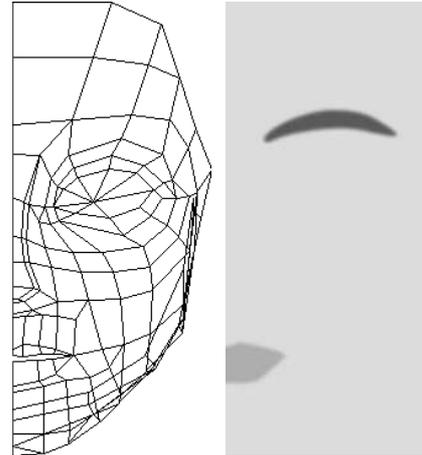
Use the Sphere tool to draw an ear like the one in the picture, and place it in position before arranging the hair around the ear position.



(20) Creating texture.

Creating detail on the eyebrows and lips using texture mapping. (Texture mapping is the process of adding detail to a 3D object by creating a picture or pattern [texture] that can be wrapped around the object.)

Set to front view, select the  tool and click the face to select it. Then choose File > Export > Unwrap For Texture. The dialog box below appears. Make the same settings as those shown in the picture below and press the OK button. The file save dialog box appears. Enter a name for the picture and save it.

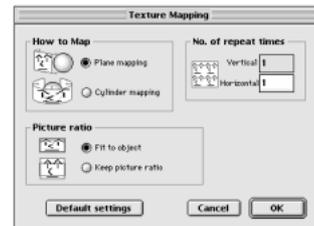


A wire-image picture like the one on the left side of the following picture is saved. If you add color and detail to this picture using any paint software available, you can create a picture similar to the one on the right side in the next picture.

(21) Adding texture.

When you have finished adding color and detail to the picture, select all and copy it in the paint software. Then select the face in HexaSuper2 and choose Edit > Paste.

The dialog box below appears. Press the OK button to add the texture to the face.





The hair and eyes are hidden in the picture above to show the texture clearly.



Finished! We have created a pretty girl. (But someone said she looks like a Stone-Age man.)

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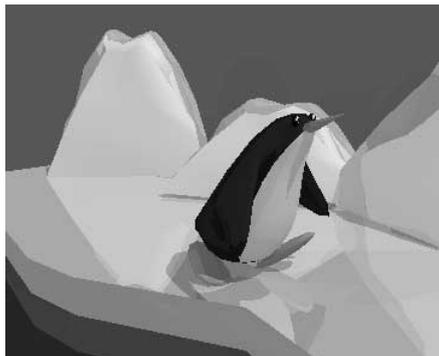
## 1-5 Rendering with POV-Ray

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### Rendering the penguin

Here, we learn how to use the software POV-Ray with HexaSuper2. POV-Ray allows rendering to make your picture look more realistic. Rendering is the creation of a picture with geometric models, using color and shading to give the picture a more realistic look.

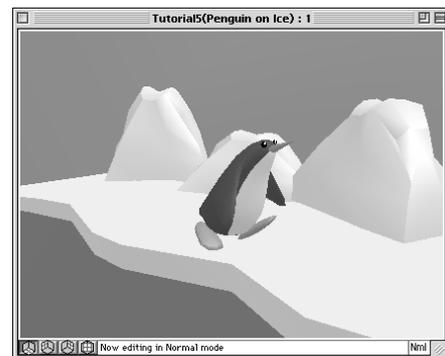
POV-Ray is freeware developed by the Pov-Ray team. How to use POV-Ray differs depending on its version. Our instructions presume that you are using POV-Ray 3.1 for Macintosh.



(1) Download POV-Ray 3.1 from <http://www.povray.org/> and install it on your hard disk.

(2) Opening the file to be rendered.

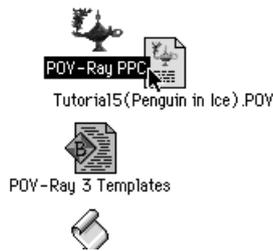
Start HexaSuper2 and choose File > Open. Navigate to and open the file "Tutorial5(Penguin on Ice)" in the "Tutorials" folder. A penguin walking on ice is displayed in the document window.



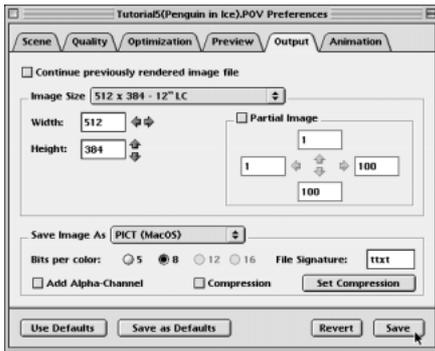
(3) Exporting this document in POV-Ray format. Choose File > Export > POV-Ray. Enter a name for the file and save it. Remember the filename and the folder where you saved it.

(4) Starting POV-Ray.

Double-click the file that you saved, or drag and drop it on the POV-Ray application icon. POV-Ray will start and open the file.



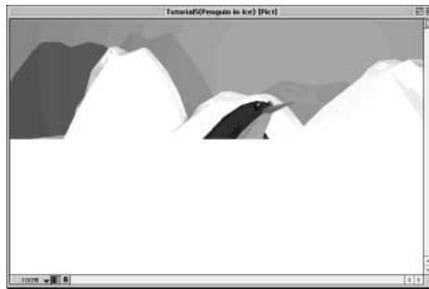
(5) In POV-Ray choose Edit > Render Settings. The dialog box below appears. Click the Output tag to select it. Then, select "512 x 384 - 12" LC" from the Image Size list and "PICT (MacOS)" from the Save Image As list. Click the Save button to close the dialog box and save the settings.



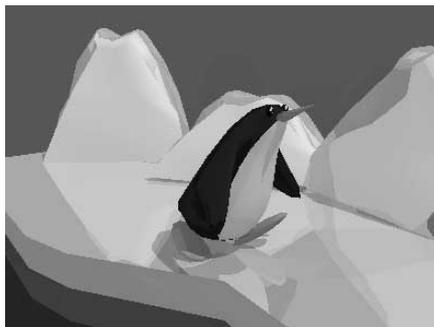
(6) Choose Render > Start Rendering, in POV-Ray.

Rendering starts immediately and takes a few minutes to complete.

(If rendering does not start and the message "Ran out of application memory" is displayed in the POV-Ray Status window, increase the application memory of POV-Ray and retry)



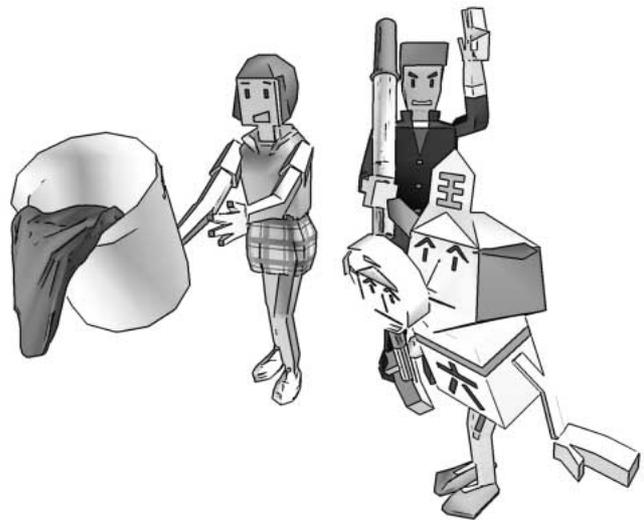
(7) The picture below shows the finished image. The image file is saved automatically. Although it takes a long time to perform rendering, it adds reflections and shadows to make the image look more realistic.





# 2

## Windows & Tools



## 2-1 Document Window

This window is where graphics are edited.

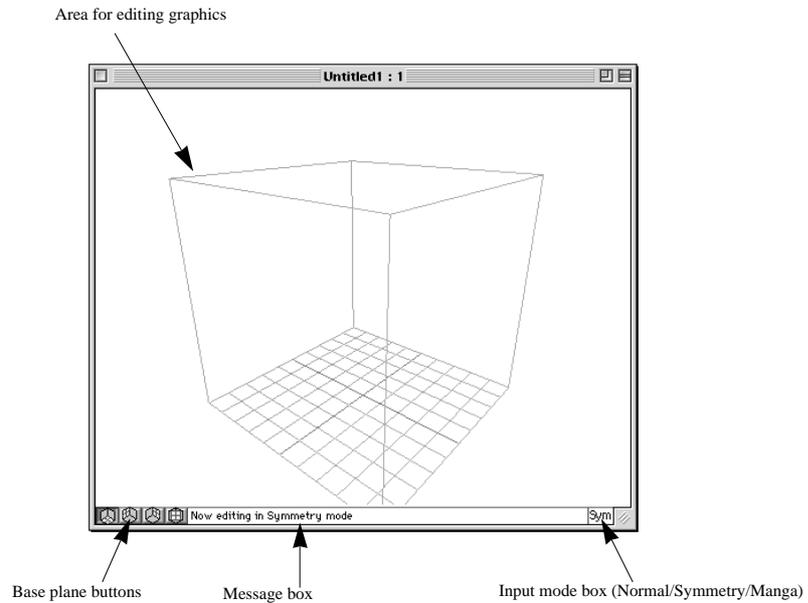
The input mode box displays the mode you are in now (Normal, Symmetry or Manga mode).

The base plane buttons on the lower left part of the document window are for selecting the base plane along which objects are moved. The plane with purple (default color) cross lines is the base plane. Change it by clicking one of the four base plane buttons. It changes to the following when each respective button is clicked.

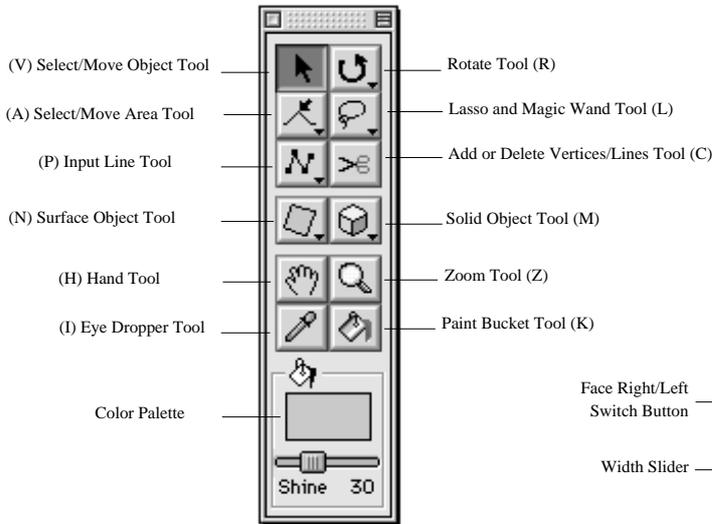
- : Base plane
- : Left plane
- : Right plane
- : Parallel to monitor

Shape elements move parallel to the base pane when they are moved.

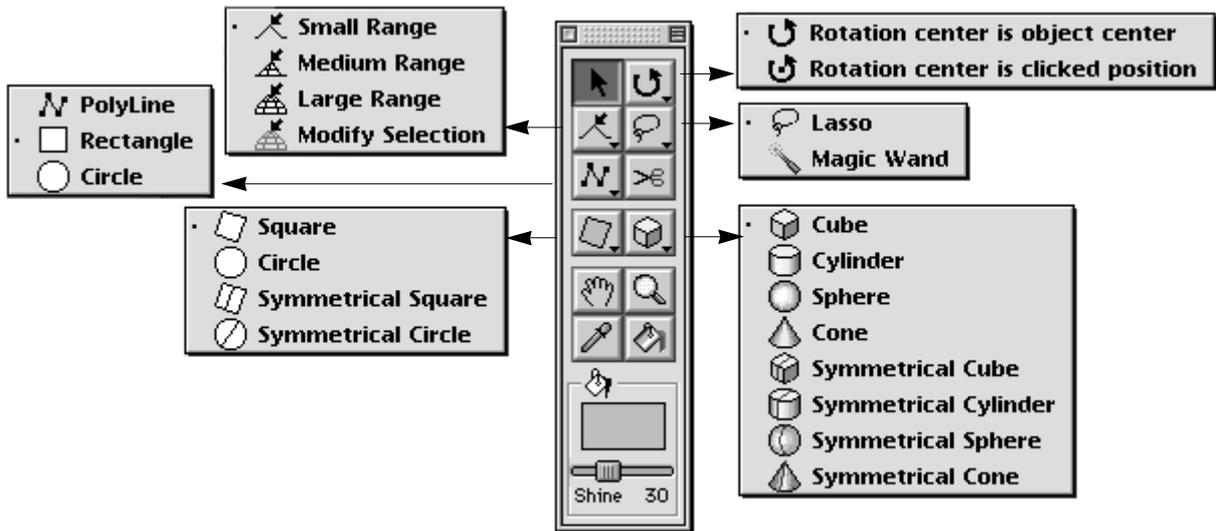
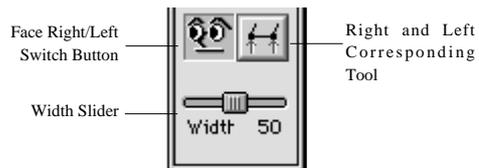
The message box at the bottom of the document window displays descriptions of each button, tool or the present status.



When in Normal/Symmetry mode



When in Manga mode



Buttons with "v" on their lower left have pop-up menus. Pressing one of these button for a short amount of time displays the menu. (The amount of time it takes to display the menu can be set on the Operation page of the Preferences dialog box, which is displayed by choosing Edit > Preferences.)

The letter displayed within parenthesis in the message box when you position the mouse pointer over a tool button is the name of the key assigned as its shortcut key. For example, pressing the V key selects the Select/Move Object Tool. In addition, the following keys have been assigned as shortcuts

**Space key:** When this key is pressed the mouse pointer changes to , allowing you to move the viewpoint parallel to the monitor by dragging the mouse pointer.

**X key:** When this key is pressed the mouse pointer changes to , allowing you to rotate the viewpoint around the center of the grid cube by dragging the mouse pointer.

**S key:** When this key is pressed the mouse pointer changes to , allowing you to alter the distance by dragging the mouse pointer to the left or right.

**. (period) key:** Pressing this key once temporarily hides the red selection lines within a selected area. (Hiding selection lines allows you to see a shape clearly.)

**Control+1-9:** Pressing the control key and one of the keys 1-9 when Large Range is selected as the Select/Move Area tool, allows you to specify the size of the area of the shape to select or move. Pressing the 1 key specifies a small area (same as Small Range) and pressing the 9 key allows you to specify a large area. The size of the area is set to that of the 5 key by

default.

HexaSuper2 supports Intuos 4D mouse.

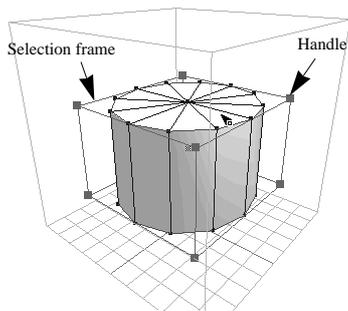
**4D Mouse:** The view and distance of the active window (window showing a perspective view when four windows are displayed simultaneously) can be changed with the Intuos 4D Mouse of Wacom Technology Co. If the distance does not change when you move the mouse wheel choose Apple > Control Panel and set the 4D mouse wheel, to work with applications in the control panel for the Intuos tablet.

#### **Select/Move Object Tool**

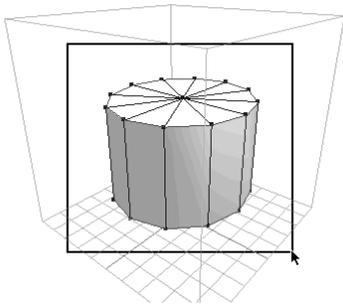
Selects, moves and changes the size of an object.

Selecting an object.

(1) Moving the mouse pointer to the position of an object, changes the mouse pointer to  when it is over an object, and  when it is over a selection handle. Clicking the mouse when it is over an object selects the shape elements, and a selection frame and handles appear as shown in the following diagram.



(2) Dragging the mouse pointer from a place where no object exists allows you to make a rectangular selection.



(3) Shift-clicking an object deselects an object that was already selected and adds it to the selection if it was not selected before you clicked it.

Clicking in a place where no object exists deselects all objects in the selection.

(4) Dragging an object moves it parallel to the XZ plane. Pressing the command key allows it to be moved in an upwards or downwards (along the Y axis) direction.

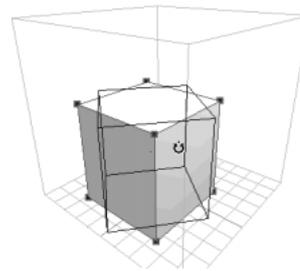
Dragging a handle changes the size of the object in the direction you drag.

You can change the base plane along which an object moves parallel, by selecting one of the base plane buttons on the lower left of the document window.

### Rotate Tool, Rotation Center is Clicked Position Tool

Rotates a selected area or object.

Pressing the shift key when rotating restricts the rotation to 90 degree increments. Pressing the option key when rotating leaves the original object as is and rotates a duplication of the object. Normally, an object is rotated parallel to the base plane, however, selecting the  button (Move objects and areas parallel to monitor) rotates objects or areas parallel to the monitor.

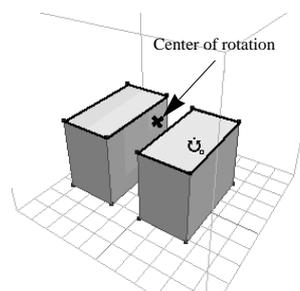


### Rotate Tool

Drag the mouse pointer to the left or right, within a selected area to rotate it. The border line of the selected and unselected area becomes the center of rotation.

Dragging elements outside of the selection area rotates only the elements you drag.

The red dot displayed when you rotate a selected object is the center of rotation.



**m**

Refer to the glossary at the back of this Instruction Manual for an explanation on an area or group area.

When more than one object is selected, the center of rotation is the dragged object. By default, HexaSuper2 is set to rotate around the center of an object, however, choosing Object > Set Rotation Center allows you to set the center of rotation yourself.

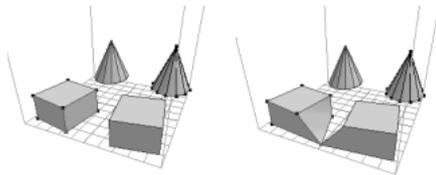
For example, if you have made a person's arm out of one object, setting the center of rotation to the point where it is joined to the body makes it easy to adjust the angle of the arm.

 **Rotation Center is Clicked Position Tool**

Rotates an object or area around the center of the position you first clicked on the base plane when you started dragging the mouse pointer.

If the Select/Move Area tool is set to Medium Range or Large Range when you rotate an area, the area around the borders of the selected area are blended with the selected area. However, if Modify Selection is selected, the effect of the rotation on the area around the borders is the same as when Small Range is selected

Rotating in Symmetry mode allows you to move an object or area in the lower-left part of the document window, where objects normally cannot be edited in this mode. Note that the position of vertices of portions of an object or area that extend outside of the lower-left part of the document window will be forced back to the center plane (parallel to YZ axis) when it is moved.



 **Select/Move Area Tool**

Selects or moves an object or shape elements (faces, lines and vertices) on the base plane.

Selecting an object.

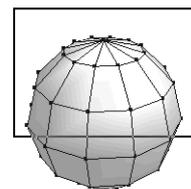
(1) Moving the mouse pointer over the object you wish to select, changes the shape of the mouse pointer to one of the following.

-  : When over a face.
-  : When over a line.
-  : When over a vertex.

Clicking when the mouse pointer is one of the above, selects the shape element.



(2) Making a rectangular selection by dragging from a place where no shape element exists, selects all elements within the rectangle.



(3) Clicking shape elements while the shift key is pressed deselects elements that were already selected and increases the selection area to include elements that were not already selected.

(4) Clicking a place where no shape elements exists deselects all selected elements..

Even if a shape element has not been preselected, dragging moves it parallel to the base plane. Pressing the command key when you drag moves shape elements perpendicular to the base plane.

You can change the base plane with the Base Plane buttons at the bottom of the document window.

When more than one shape element is selected at the same time, all elements of the selection are moved together. Dragging a group area moves and changes all the vertices of the group at the same time. Shape elements can be grouped together by choosing Edit > Group.

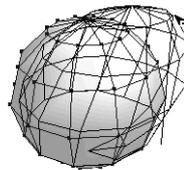
#### **Small Range**

Moves the selected elements or area only.



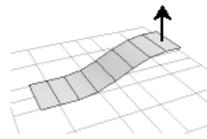
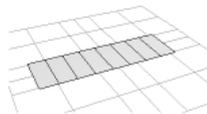
#### **Medium Range**, **Large Range**

Moves the selected elements or area and blends them with the surrounding shape elements to create a continuous and seamless area.



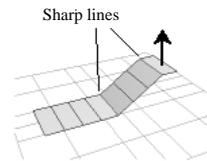
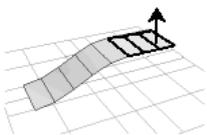
#### Modifying shapes when Medium Range or Large Range is selected

Original shape



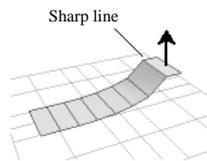
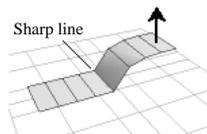
When there are no sharp lines

Moving a selected area



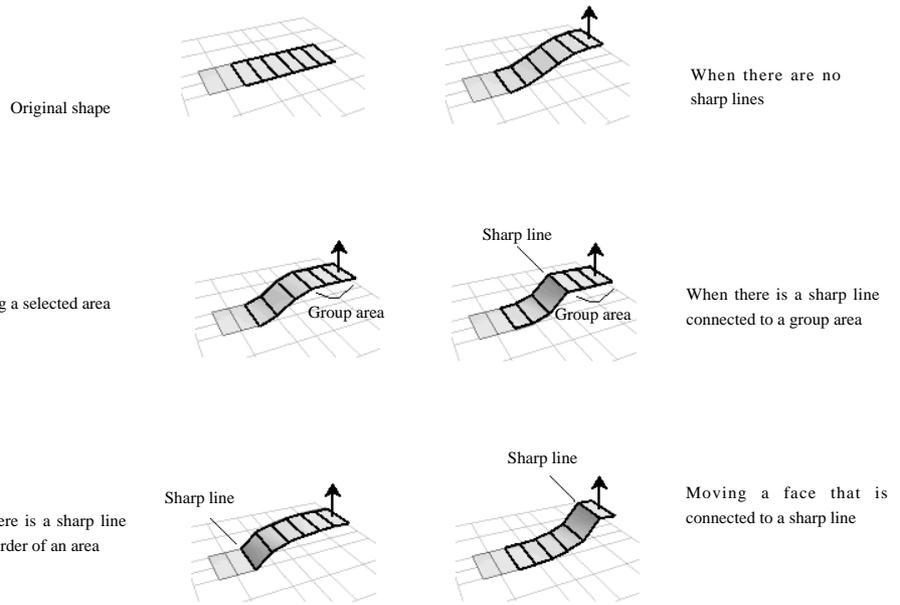
When there are 2 sharp lines

When a sharp line is positioned at a distance from the selected area



Moving a face that is connected to a sharp line

**Modifying only shapes within an area**

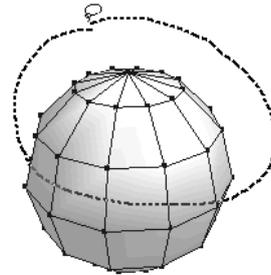


 **Modify Selection Tool**

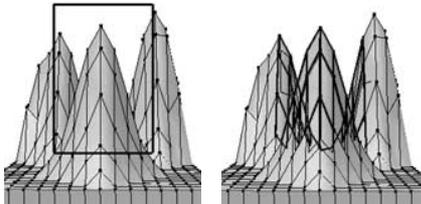
Dragging elements outside of a selection has the same effect as using the Small Range tool, however, dragging elements within a selection moves or changes only the selected elements.

 **Lasso Tool**

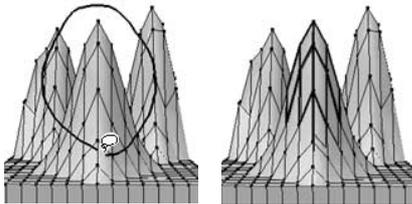
Dragging around an area with this tool allows you to select it. Also, clicking an object or shape element selects it.



To select one shape element and only the elements directly connected to it, first, move the mouse pointer over the shape element and drag around it. This tool is useful for selecting certain parts of a shape. Pressing the shift key allows you to increase the selection by dragging around different elements.



Selecting an area with the Select/Move Area tool



Selecting an area with the Lasso tool

### **Magic Wand Tool**

Selects faces with the same color. Clicking a face selects all adjacent faces with the same color and level of shine as the one you clicked. Clicking a face while pressing the option key selects all faces with the same color and level of shine as the face you clicked. This tool allows you to easily organize shapes by color and gain a clear understanding of how colors are being used.

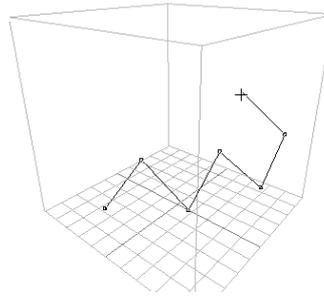
### **Input Line Tool**

Inputs polylines, rectangles and circles.

### **Polyline Tool**

Inputs polylines.

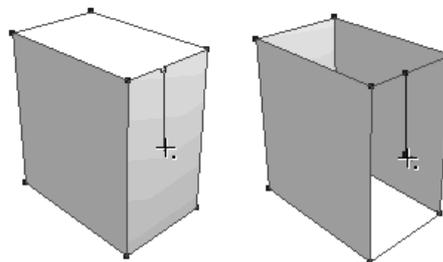
Each time you click in the document window creates a vertex of a polyline. Double-click or press the enter key to finish drawing a polyline.



Normally, a polyline is generated parallel to the monitor, and with the same depth as the center of the grid cube, but if you click in the same location as one of the vertices of an already existing object when you are drawing a polyline, the polyline is generated with the same depth as that vertex.

Holding down the shift key when you input a polyline, restricts the input of a vertex to 45 degree increments, around the last inputted vertex. You can delete the last inputted vertex with the delete key.

You can input a vertex on top of a line or face, by clicking the mouse pointer when the option key is pressed. However, this deletes all adjacent faces.

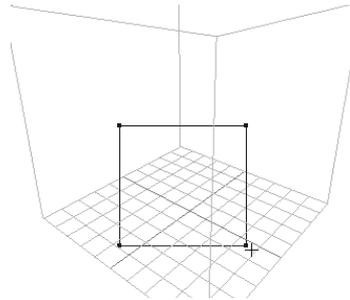


Clicking the mouse pointer when the command key is pressed, creates a vertex on the base plane.

In Symmetry mode, sometimes a polyline is generated on the left half of the grid cube where editing is prohibited. Note that, if you try to move the vertex of a polyline protruding into the left half, it will be forced onto the center face (YZ plane).

 **Square Tool**

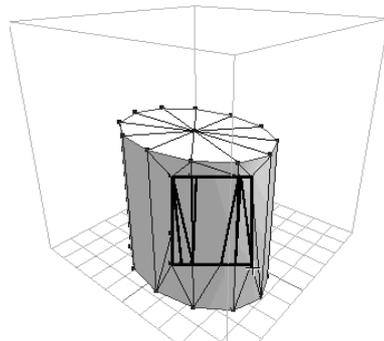
Creates a square or rectangle in the position you drag the mouse pointer.



Pressing the command key creates a rectangle that is aligned to the base plane.

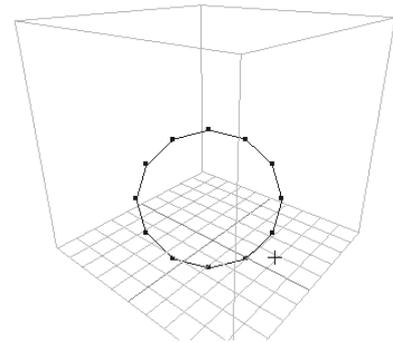
Pressing the shift key creates a square.

Pressing the option key when you release the mouse button, creates a rectangle on the face of an object. Clearing the rectangle leaves a rectangular hole on the object.



 **Circle Tool**

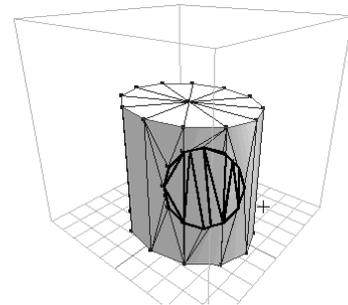
Creates a circle in the position you drag the mouse pointer.



Pressing the command key creates a circle that is aligned to the base plane.

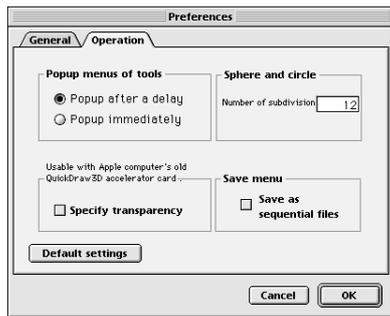
Pressing the shift key creates a perfect circle.

Pressing the shift key and option key when you release the mouse button, creates a circle on the face of an object. Clearing the circle leaves a circular hole on the object.



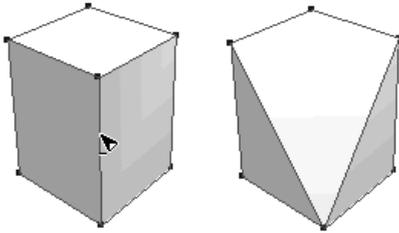
The number of subdivisions for a sphere and circle is set to 12 by default. You can change the number of subdivisions on the Operation page of the Preferences

dialog box.



### Add or Delete Vertices/Lines Tool

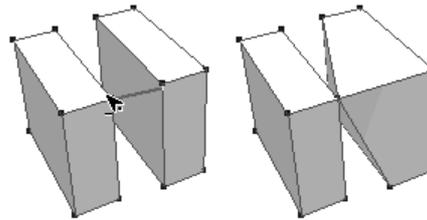
Clicking a line or vertex deletes it.



However, when deleting a vertex or line will cause two faces to overlap, it cannot be deleted.

If you hold down the option key and click a line when there is a triangular face on both sides of it, the line is deleted and both faces are combined to become one rectangular or square face.

Holding down the command key and dragging from one vertex to another, joins them together to become one vertex.



### Surface Object Tool

Creates a surface object (a two dimensional object with border lines) in the position you drag the mouse pointer.

Creating a surface object.

- (1) Click and hold down the mouse pointer at the location on the base plane where you wish to create an end vertex of the object.
- (2) Drag the mouse pointer to create the object and adjust its size.

Pressing the option key and dragging a handle, adjusts the size of the object proportionally.

### Solid Object Tool

Creates a solid object (a three dimensional object without border lines) in the position you drag the mouse pointer.

How to create a solid object.

- (1) Click and hold down the mouse pointer at the location on the base plane where you wish to create an end vertex of the object.
- (2) Drag the mouse pointer to create the object and adjust the size of the bottom face.
- (3) Press the command key and drag one of the handles up or down to alter the objects height.

Pressing the option key and dragging a handle, adjusts the size of the object proportionally.

## m

The Symmetrical Square, Symmetrical Circle, Symmetrical Cube, Symmetrical Cylinder, Symmetrical Sphere and Symmetrical Cone tools can only be used in Symmetry mode.

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### **Hand Tool**

Moves the viewpoint of an image horizontally.

You can use the Hand tool when another tool is selected by holding down the space key

Choosing View > Undo Viewpoint returns the viewpoint to its original state.

### **Zoom Tool**

Magnifies or reduces the size of the view.

Each click magnifies the view by double its size, centering the display around the point you click. Dragging a rectangular selection magnifies the area inside the selection around its center.

The plus sign of the mouse pointer changes to the minus sign while the option key is pressed, allowing you to reduce the size of the view.

Choosing View > Undo Viewpoint returns the viewpoint to its original state.

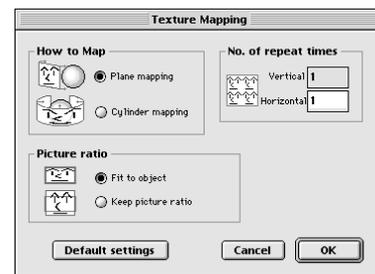
### **Eye Dropper Tool**

Reads the color, shine and transparency level of a clicked face.

### **Paint Bucket Tool**

Paints the current color, shine and transparency level of the color palette to the place you click and to any adjacent area of the same color. Also, paints the whole area of an object if it is selected when you click it.

Clicking within a selected area paints inside the selected area only. When the color displayed is a texture, the following Texture Mapping dialog box appears.

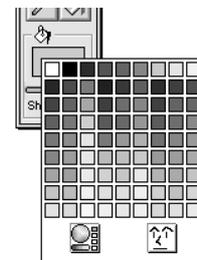


The Paint Bucket tool changes to the Eyedropper tool while the option key is pressed.

You can increase the size of the area painted by clicking faces one at a time while pressing the shift key.

### **Color Palette: Display Color**

Clicking within the color square at the bottom of the Tools window displays the color palette



Choosing a color from the color palette selects it as the current palette color and it is displayed in the color square at the bottom of the Tools window.

 Selecting this button allows you to choose a color from the Color Picker.

 Selecting this button displays the Open dialog box, allowing you to set a texture for the color palette by specifying a file in PICT format.

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Copying an image in PICT format while in another application and pasting it into HexaSuper2, allows you to specify the image to be a texture.

Changing the color of the color palette does not change the color of a selected object or area. To change the color of an object or area use the Paint Bucket tool.

#### **Color Palette: Shine**

Adjusts the shine.

When the level of shine is high an object is displayed brightly, and when the level is low it is dull.

Moving the Shine slider when an object or area is selected does not change its level of shine. To change its level, first move the slider to the desired level, then select the Paint Bucket tool and click the object or area.

#### **Color Palette: Transparency**

Adjusts the level of transparency.

Moving the Transparency slider when an object or area is selected does not change its level of transparency. To change its level, first move the slider to the desired level, then select the Paint Bucket tool and click the object or area.

If your computer is not equipped with Apple Computer's QuickDraw 3D accelerator card the changes will not be displayed.

#### **Manga Mode: Face Right/Left Switch Button**

Specifies the direction of an object drawn in Manga mode.

Clicking this button switches the face on it between a left or right direction. Clicking the button again returns it to its original direction. You must select the same direction as the face or object in the illustration to be traced. In Manga mode, when objects such as a person's face, airplane or car look towards the left, the face on the button must also look towards the left, and when they look towards the right it must look towards the right. You can change the direction even if you have already started drawing the outline.

If the face on the button is looking in the opposite direction to the face or object in the illustration, the front and back of the 3D outline will be inverted.

For a more detailed explanation on using Manga mode, refer to Section 1-2, *Using Manga Mode*.

#### **Manga Mode: Right and Left Corresponding Tool**

Assigns corresponding right and left vertices in Manga mode.

In Manga mode, each vertex on the right side of an object must be paired with a vertex on the left side. Normally, changing the viewpoint angle with the Angle window after drawing a polyline, automatically pairs right and left vertices, so there is no need to use this tool. However, sometimes the pairs of vertices are not successfully assigned and the outline does not look proportional in three dimension.

If this happens, immediately choose Edit > Undo, then use this tool to manually pair right and left vertices.

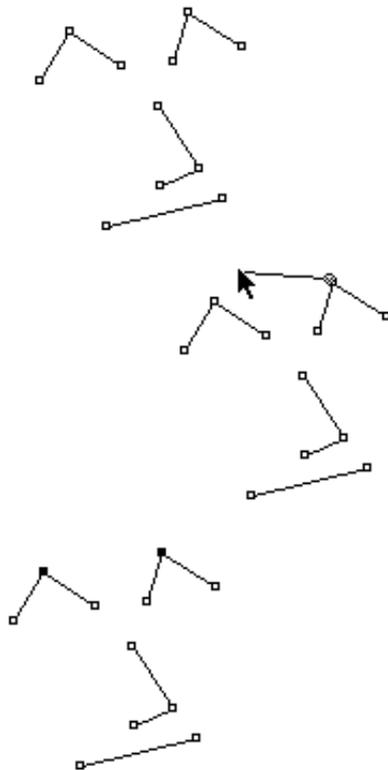
## m

The color palette: Transparency slider is not shown by default. To set it to be shown at the bottom of the Tools window, choose Edit > Preferences, and select the check box of the "Show Transparency slider" option on the Operation page of the Preferences dialog box.

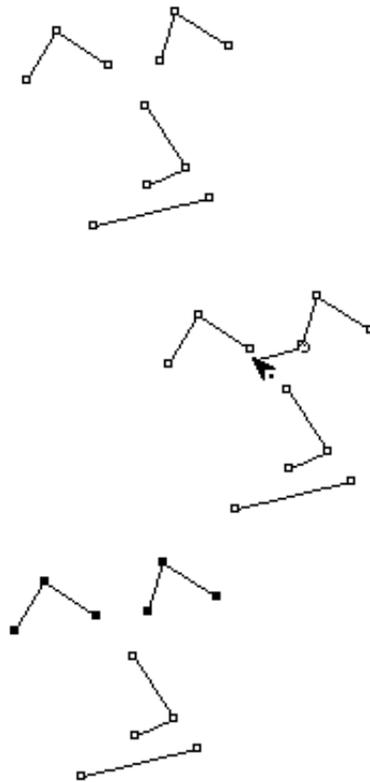
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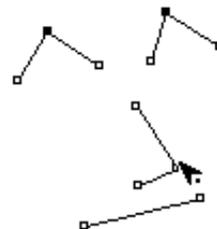
With this tool selected, first click a vertex on the right side and then click the vertex that corresponds to it on the left side. (The vertices can also be clicked in the opposite order.) The vertices turn black to signify they have been paired.

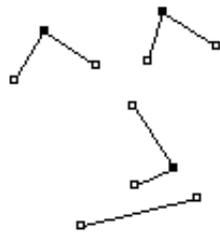


When a vertex at the end of a polyline is paired with another vertex, all the other vertices on the line are automatically paired.

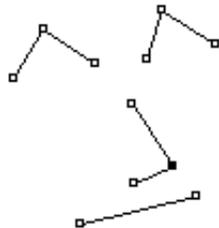
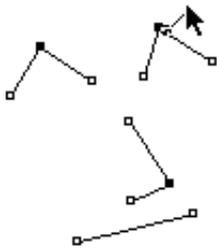


A Vertex in the center of an object, as with the nose above, should correspond to itself. Click the same vertex twice to assign itself as a corresponding vertex.





If you want to unassign a pair of vertices, click one of vertices of the pair and then click anywhere in the document window where no other vertex exists.



For a more detailed explanation on using Manga mode, refer to Section 1-2, *Using Manga Mode*.

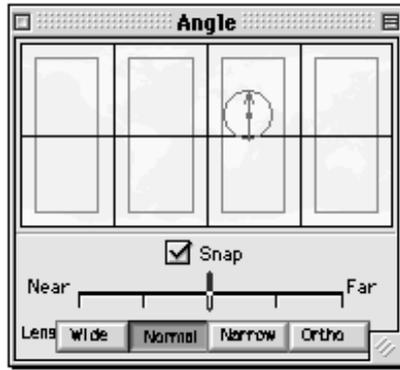
### **Manga Mode: Width Slider**

In Manga mode, you can adjust the width of a 3D shape. If you think the shape of an outline is too wide or narrow, adjust it to a suitable width with the Width slider of the Tools window.

## 2-3 Angle Window

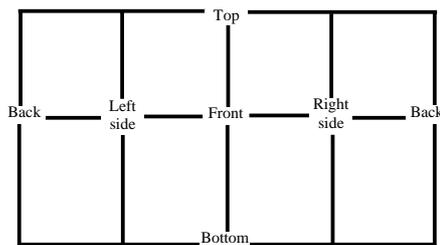
### m

Setting the Lens to Ortho makes it easy to create precise shapes.



Moving the indicator (blue circle) around the locator in the Angle window changes the viewpoint angle of the objects in the document window. The indicator can be moved by dragging the mouse pointer. Pressing the shift key while dragging it, changes the angle in 15 degree increments, and pressing the option key rotates it from the front.

The viewpoints of the locator in the Angle window are as shown in the picture below.



Selecting snap makes it easier to view objects directly from the front or side.

The Distance Meter (slider at the bottom of the Angle window) allows you to set the magnification of the

view.

Moving the slider to the left brings objects nearer and magnifies them, moving it to the right sends them further away and reduces their size.

You can alter the distance of the furthest view by choosing View > View Settings, and then changing the smallest range on the Operation page of the View Settings dialog box.

The way objects are viewed can be changed with the Lens buttons.

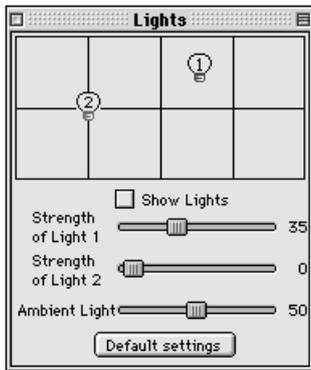
- 广角 Wide: Strong sense of perspective.
- 标准 Normal: Normal.
- 窄角 Narrow: Weak sense of perspective.
- 平行 Ortho: Orthographic projection.

You can show or hide this window by choosing either Show Angle or Hide Angle from the Window menu.

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## 2-4 Lights Window

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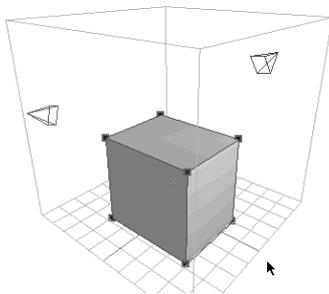


Dragging the Strength of Light 1 and Strength of Light 2 sliders changes the brightness of each light, respectively. Clicking Default settings, returns the lights to their original state.

You can show or hide this window by choosing either Show Lights or Hide Lights from the Window menu.

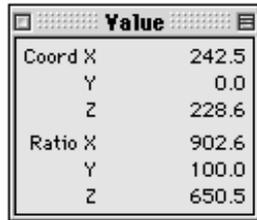
The angles within the locator of the Lights window are the same as that of the Angle window. Moving the light symbols of Light 1 and Light 2 around in the locator changes the origin of lights within the document window.

Pressing the option key when you drag the Light 1 symbol ensures that only Light 1 is moved. Likewise, pressing the command key when you drag the Light 2 symbol ensures that only Light 2 is moved. Selecting the Show Lights check box displays the origin of the lights within the document window.



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## 2-5 Value Window

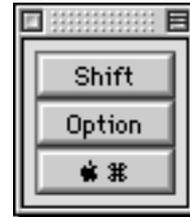


Value	
Coord X	242.5
Y	0.0
Z	228.6
Ratio X	902.6
Y	100.0
Z	650.5

This window displays information on coordinates and ratio when you use various tools from the Tools menu. Choosing either Show Value or Hide Value from the Window menu allows you to show or hide this window.

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## 2-6 Keyboard Window



Clicking one of the buttons in this window has the same effect as holding down the corresponding shift, option, or command key.

With this function you can perform most tasks within HexaSuper2 using just the mouse.

Choosing either Show Keyboard or Hide Keyboard from the Window menu allows you to show or hide this window.



This window is for organizing objects in different layers. You can show or hide each layer by switching between Show and Hide modes, and allow or prevent editing by switching between Edit and Lock mode. Each layer is displayed in the lower part of the window.

### **New Button**

Clicking this button creates a new layer and it becomes the currently selected layer.

### **Delete Button**

Clicking this button deletes the currently selected layer. The objects in the layer are not deleted, they are moved to the layer immediately above.

### **Move Button**

Clicking this button moves any objects which are selected in the document window to the currently selected layer.

### **Sort Button**

Clicking this button allows the layers to be organized by assigning each object its own layer.

### **Layer**

On each layer the layer number, Show/Hide Layer button, Edit/Lock Layer button and number of objects within a layer are shown from left to right.

Clicking the part of the layer with number indications selects the layer as the current layer and it turns light blue. Any new object created by, for example, using the    tools, becomes part of the current layer. An object that is copied and pasted also becomes part of the current layer.

Double-clicking the part of the layer with number indications selects all the objects within the layer. Double-clicking it again deselects the objects.

### **Show/Hide Layer Button**

Clicking this button switches between the Show and Hide modes. When a layer is hidden, any objects within it are not exported if you choose File > Export. More than one layer can be switched between Show and Hide Modes at the same time by clicking the Show/Hide Layer button of the top layer you wish to select and dragging the mouse downwards.

### **Edit/Lock Layer Button**

Clicking this button switches between the Edit and Lock modes. When the layer is locked you can still see the objects within it in the document window, but they cannot be selected or edited.

More than one layer can be switched between Lock and Edit modes at the same time by clicking the Edit/Lock Layer button of the top layer you wish to select and dragging the mouse downwards.



# 3 Menus



## 3-1 File Menu

File	
New	⌘N
New In Specified Mode	▶
Open...	⌘O
Close	⌘W
Save	⌘S
Save As...	
Import	▶
Export	▶
Fax Setup...	
Fax...	⌘P
Quit	⌘Q

### New

Creates a new document window.

A new document window is created when you start HexaSuper2.

### New In Specified Mode

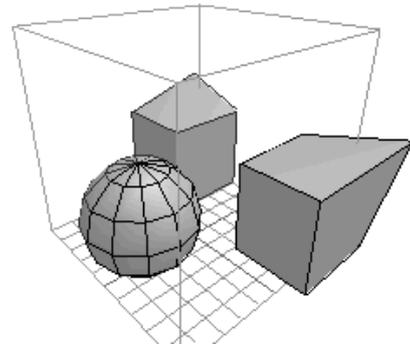
Creates a new document in a specified mode. You can select from Normal, Symmetry and Manga mode.

#### New In Specified Mode > Normal Mode

Creates a new document in Normal mode. This mode allows you to create a normal shape.

#### New In Specified Mode > Symmetry Mode

Creates a new document in Symmetry mode. This mode allows you to create left-right symmetrical shapes easily.



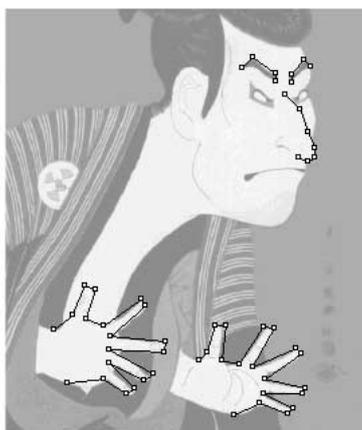
In Symmetry mode, the shapes on the right side of the grid cube are actual objects and the ones on the left are mirror images of them. Mirror images cannot be selected, moved or edited. Shapes of the actual objects can be edited, but only on the right side of the grid cube; moving them to the left side is not permitted in Symmetry mode. Furthermore, vertices (mirror-center vertices) created in the center of the grid cube (0 position on the X coordinate) can only be moved in the

center. However, these limitations allow you to create symmetrical shapes easily.

Pressing the / key allows you to switch the side which permits editing. Doing so transforms the actual objects into mirror-images and vice-versa. For a more detailed explanation on using Symmetry mode, refer to Section 1-4, *Using Symmetry Mode*.

### **New In Specified Mode > Manga Mode**

Creates a new document in Manga mode. This mode allows you to use the 3D Manga function to create a three dimensional object from a photograph or illustration.



Normally, in Manga mode you choose View > Background Color, and select the Face button at the bottom of the color palette to show the photograph or illustration you wish to create a 3D outline from. Then, you use the  tool to trace an outline. You must draw the same number of vertices and lines on both the left and right side.

When you view the outline from different angles by dragging the indicator in the Angle window, the background disappears and the outline looks three dimensional because the depth of the lines are

automatically calculated. Releasing the mouse button, returns the viewpoint angle to its original position and the background reappears.

Normally, in Manga mode Show Lines Only is selected in the View menu, and you cannot use the Surface Object, Solid Object, Eyedropper and Paint Bucket tools. Also, you cannot create faces, edit or use many of the commands from the menus.

To bring outlines from Manga mode into another mode, choose Edit > Cut in Manga mode. Then, open another document window in either Symmetry or Normal mode and choose Edit > Paste. All the vertices and lines are pasted on the document window. You cannot copy or cut a shape from a document in Symmetry or Normal mode and paste it into a document in Manga mode. For a more detailed explanation on using Manga mode, refer to Section 1-2, *Using Manga Mode*.

### **Open...**

Opens a document that has been created with HexaSuper2.

### **Close**

Closes the active document. If changes to the document have not yet been saved, the save dialog box appears and prompts you to save the changes. The document can also be closed by clicking the close box in the top left corner of the document window.

### **Save**

Saves the contents of the active document as a file in HexaSuper2 format.

### **Save As...**

Saves the contents of the active document under a different name as a new file in HexaSuper2 format.

**Import**

The data of files in a variety of formats can be read in the document window currently active. Files other than those of HexaSuper2 format that are imported into the document window when in Symmetry mode are displayed as left-right symmetrical mirage images. To prevent this from occurring, switch to Normal mode before importing the file by choosing Edit > Switch Symmetry/Normal Mode.

HexaSuper2 can import the following formats:

- DXF
- 3DMF
- LightWave3D
- Rokkakudaioh (freeware version of HexaSuper2)

**Import > All Types...**

Reads data from any file in a format supported by HexaSuper2. Although HexaSuper2 is able to distinguish between any filename extension when it reads a file, for some unexpected reason, a file may not be recognized. In the event that this does happen, enter the appropriate extension after the filename, such as ".dxf" if it is a DXF file, or ".lwo" if it is a LightWave3D file.

**Import > DXF...**

Reads files in DXF format. However, HexaSuper2 only reads DXF files with 3D faces or polyline shapes. Furthermore, only polylines that are 3D polymeshes or 2D polymeshes can be read. HexaSuper2 cannot correctly read shapes of polymeshes that use the vertex group code 71, 72, 73 or 74. You can solve this problem by exporting the shapes as 3D faces from the other software you are using, then trying to import the file into HexaSuper2 again.

**Import > 3DMF...**

Reads data from a file in 3DMF format.

**Import > LightWave3D...**

Reads data from a file in LWO format. However, HexaSuper2 only reads the polygon and color data, as it cannot read curve, patch and texture data.

**Import > Rokkakudaioh...**

Reads data from a file in Rokkakudaioh format. When data is read in Symmetry mode, symmetrical shapes are imported into HexaSuper 2 unchanged.

**Export**

The current active document window can be saved in a variety of formats. Objects in a layer that is set to hide in the Layers window are not exported. Also, objects displayed with a curved surface at the time of export, are saved with a curved surface.

HexaSuper2 can export the following formats:

- DXF
- 3DMF
- LightWave3D
- VRML 1.0/2.0
- Rokkakudaioh (freeware version of HexaSuper2)
- 3DS
- Wavefront Obj
- Locked File
- ROX-TRACE
- X-Trace
- POV-Ray
- Unwrap For Texture
- PICT

**Export > DXF...**

Saves data of faces as 3D faces in DXF format in approximately 256 colors.

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When a file is imported into some software the colors (especially gray) may not be read correctly, or the software may not be able to read the color information. When this happens, reset the colors in the software.

Also, some software cannot correctly read the color of shapes created in HexaSuper2 with more than one color. To solve this problem select each shape and paint it with one color with the Paint Bucket tool before exporting, or reset the colors of the shapes in the other software after you have imported the file.

**Export > 3DMF...**

Saves data of faces, color and textures in 3DMF format. Some software cannot read texture data.

**Export > LightWave3D...**

Saves data of faces and lines in LWO format. Texture data cannot be exported in LWO format.

**Export > VRML...**

Saves data of faces in VRML format. As the color data of textures are saved as characters, large image data generates extremely large files.

**Export > Rokkakudaioh...**

Saves data of faces and lines in the format of the freeware, Rokkakudaioh. Shapes are saved to the left side of the document because Rokkakudaioh does not support left-right symmetry mirror images.

**Export > 3DS...**

Saves data of faces in 3DS format. Texture data cannot be saved in 3DS format. When the number of faces (number of rectangular shapes  $\times 2$  + number of triangles) of an object exceeds 65,000, it cannot be saved in 3DS format and trying to do so generates an error message.

Furthermore, there are cases when some software cannot read the color data.

**Export > Wavefront Obj...**

Saves data of faces and normal vectors in Wavefront Obj format. Faces organized in layers are saved as they are, but color and texture data cannot be saved.

**Export > Locked File...**

Saves the contents of the document in HexaSuper2's Locked format. When files saved in Locked format are opened in HexaSuper2, changes cannot be saved and a shape cannot be cut or copied. This reduces the worry of somebody using your artwork without your permission. HexaSuper1 cannot read Locked format.

**Export > POV-Ray...**

Saves data of faces in the format of the freeware, POV-Ray. Retracing allows POV-Ray to display the image as it is in HexaSuper2 because texture, display angle and shine data can be saved in POV-Ray format. POV-Ray can be downloaded from <http://www.povray.org/>.

**Export > ROX-Trace...**

Saves data of faces in the format of the freeware, ROX-Trace. Retracing allows ROX-Trace to display the image as it is in HexaSuper2, because all texture, display angle and shine data can be saved in ROX-Trace format.

**Export > X-Trace...**

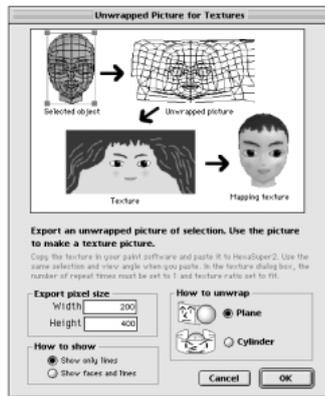
Saves data of faces in the format of the shareware, X-Trace. Saves the same data as that saved in ROX-Trace format.

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### Export > Unwrap For Texture...

Saves a wire-image picture of an object or area in PICT format. Using this picture makes it is easier to create texture (to paste on an object).



Choose Unwrap For Texture to display the dialog box shown above. Set the size of the picture, what to show, method of unwrap and click OK. Next, import the picture into a paint software and create a texture (picture) while referring to the wire image. Then, copy the picture in the paint software and paste it in HexaSuper2. Ensure that the same area is selected and viewpoint angle is set when you paste the picture into HexaSuper2. In the Texture Mapping dialog box that is displayed, set "How to map" to the same setting that was set in the Unwrap For Texture dialog box, "No. of repeat times" to 1 for both vertical and horizontal, and "Picture ratio" to fit to object.

If more than one object, or an area containing more than one object is selected, a picture of the largest object is exported.

### Export > PICT

Saves the image in the active document window in PICT format.

### Page Setup...

Displays dialog box for setting print options such as paper size and orientation.

### Print...

Choosing Print when there is an active document displays the dialog box for printing and setting various options.

### Quit

Quits HexaSuper2

If there are any open documents with changes that have not yet been saved, the save dialog box appears and prompts you to save the changes.

Edit	
Undo	⌘Z
Cut	⌘X
Copy	⌘C
Paste	⌘V
Paste Left and Right	
Duplicate	⌘D
Clear	
Select All	⌘A
Deselect All	⌘J
Invert Selection	
Select	▶
Group	⌘G
Ungroup	⌘U
Switch Symmetry/Normal Mode	⌘/
Preferences...	⌘K

### Undo

Restores the active document to the state before you performed your last change. Normally, you can undo a change even if you have selected an object or area after performing the change. However, please note that under certain circumstances the selected object or area cannot be restored to its previous state.

### Cut

Removes a selected object or area from the active document and places it on the Clipboard. When you select an area containing a part of an object and any one of the faces of the object is selected, the selected face plus the selected lines which are not a part of the selected face are deleted.

When no face of an object is selected, all selected lines plus faces which have a selected line as a part are deleted.

### Copy

Copies the selected object or area to the Clipboard.

### Paste

Inserts data that has been copied to the Clipboard into the active document as a new object.

When an image has been copied from another application in PICT format, it is pasted as the texture of the selected object or area. However, if nothing has been selected, the PICT image is captured in the color palette.

## m

Paste Left and Right has been included in HexaSuper2 to maintain compatibility with the freeware version, RokkakuDaioh. Under normal circumstances, there is no need to use this command.

### Paste Left and Right

Pastes the contents of the clipboard that have been copied in Symmetry mode to the right of the grid box, and creates a mirror image on the left of the grid box. This command is only effective in Symmetry mode.

#### Detailed Explanation

After copying an object in Symmetry mode to the clipboard and pasting it into the document window, the mirror image part becomes an actual object and all actual objects are positioned to the right of the YZ axis.

### Duplicate

Duplicates the selected object. When an area is selected, the objects in the area are duplicated.

### Clear

This is similar to Cut in that it deletes the selected object or area, but it does not place it on the Clipboard.

### Select All

Selects all the objects in the active document.

### Deselect All

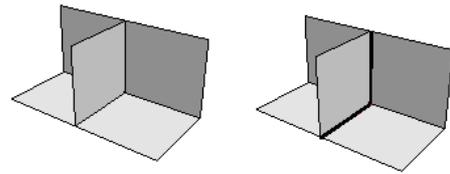
Deselects all selected objects or areas.

### Invert Selection

Inverts a selection area. All selected objects are deselected, and any object which is not selected is selected. When an area is selected, all selected lines are deselected and any line which is not selected is selected

### Select > Select 3 Faces Edges

Selects lines connected by three or more faces.

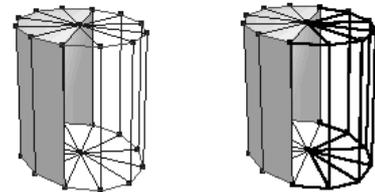


### Select > Select Sharp Lines

Selects sharp lines.

### Select > Select Wire

Selects wire frames (lines without faces).

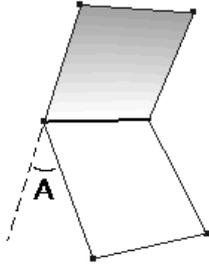


### Select > Select Edges Sharper Than xx

When the angle of the faces on both sides of a line are greater than the specified sharpness, the line is selected.

What is a line with a sharpness level higher than xx?

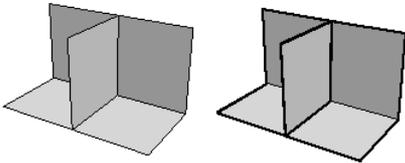
As in the following diagram, when a line has a face on either side of it, the angle of "A" becomes the angle of the line. Sharpness refers to when the angle is greater than "A."



Lines connected to three or more faces are selected normally.

#### Select > Select Face Boundary

Selects lines connected to one face, or three or more faces. Under some circumstances, lines selected with Select Face Boundary, cannot be altered with the Boolean command of the Object menu.



#### Select > Sharpness 10%-90%

Selects lines that have had their sharpness set by the Set Sharpness command of the Modify menu.

#### Group

Assembles two or more selected objects into a single object so they can be moved or changed as a group. Once objects have been grouped together, choosing Undo from the Edit menu will not disassemble them. To disassemble a group, choose Edit > Ungroup.

If there are one or more selected areas, the elements of the selected area or areas are grouped together. Refer

to (52) to (59) of Chapter 1-3, *Using Polyline and Select/Move Area tools*.

#### Ungroup

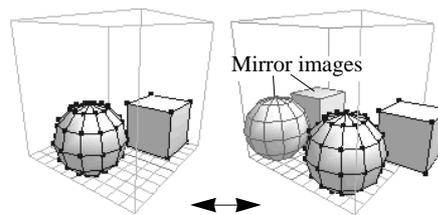
Disassembles any selected grouped object into individual objects so they can be moved or changed individually.

One object can be divided into two or more objects. (One object can even lose its integral shape if any of its lines or faces are deleted. Choosing Ungroup makes each connected part of a shape become its own object.) Choosing Undo from the Edit menu will not reassemble them. To reassemble ungrouped objects choose Edit > Group.

Any selected group area is also disassembled.

#### Switch Symmetry/Normal Mode

Switches the editing mode between Symmetry and Normal.



Normal mode

Symmetry mode

Normally, when you create a new document, it is in Normal mode. Therefore, the first time you choose this command, the editing mode switches from Normal mode to Symmetry mode, which moves all the objects in the document window to the right side of the grid cube (to minus position on the X coordinate), and shows identical shapes on the left side.

The shapes on the right side of the grid cube are the

## m

A "group area" is two or more selected areas that are treated as one.

Clicking an element of a group area with the Select/Move Area tool, simultaneously selects all the elements within it. Also, dragging an element, drags all the elements within the group area.

actual objects, and the ones on the left are mirror images of them. Mirror images cannot be selected, moved or edited. Shapes of the actual objects can be edited, but only on the right side of the grid cube; moving them to the left side is not permitted in Symmetry mode. Furthermore, vertices (mirror-center vertices) created in the center of the grid cube (0 position on the X coordinate) can only be moved in the center. However, these limitations allow you to create symmetrical shapes easily.

Pressing the / key allows you to switch the side which permits editing. Doing so transforms the actual objects into mirror-images and vice-versa.

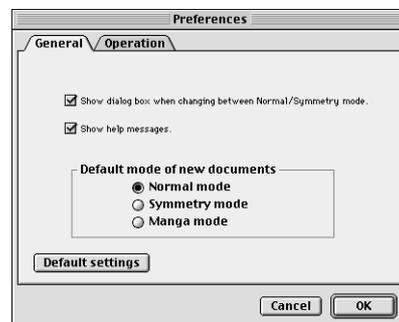
Switching back to Normal mode changes the mirror images to actual objects and they can be selected, moved and edited.

The limitations described above no longer apply.

### Preferences...

#### (1) General

Selecting or unselecting each check boxes at the top of the page determines whether the corresponding dialog box or message is displayed. On the lower part of the page there are three options to set which mode a new document is in when you start HexaSuper2, or choose New from the File menu.



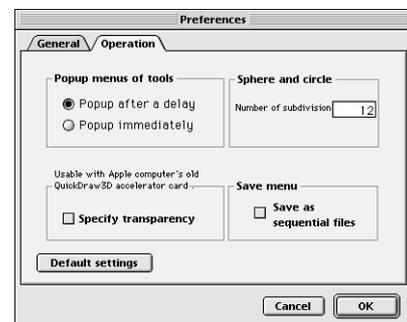
#### (2) Operation

The amount of time it takes to display a pop-up menu when you press one of the buttons with "v" on it in the Tools window can be set by choosing from one of the "Pop-up menus of tools" options.

"Sphere and Circle" allows you to specify the number of subdivisions of objects created with the Circle of the Input Line tool, Circle of the Surface Object tool, and Cylinder, Sphere, Cone, Symmetrical Cylinder, Symmetrical Sphere and Symmetrical Cone of the Solid Object tool.

Selecting the check box of "Show Transparency slider" shows the Transparency slider at the bottom of the Tools window. If your computer is not equipped with Apple Computer's QuickDraw 3D accelerator card the changes will not be displayed in HexaSuper2. However, even if your computer is not fitted with this accelerator card, when the picture is imported to ROX-Trace or POV-Ray, changes made with the Transparency slider will be displayed.

Selecting the "Save as sequential files" check box prevents a file from being overwritten. When this is selected, every time you choose File > Save, the contents of the document window are saved as a new file and a sequential number is added after the name.

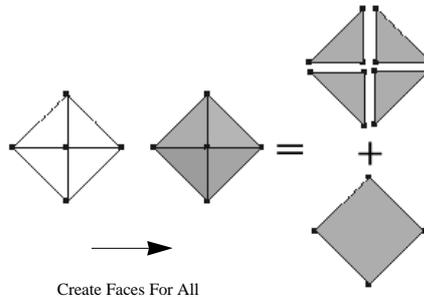


Modify	
<b>Create Faces For All</b>	⌘B
<b>Create Faces For Selection</b>	
<b>Clear Face</b>	
<b>Line Color</b>	▶
<b>Line Width</b>	▶
<b>Sharp Line</b>	⌘;
<b>Unsharp Line</b>	⌘:
<b>Set Sharpness</b>	▶
<b>Subdivide</b>	▶
<b>Smooth</b>	▶
<b>Flatten</b>	⌘=
<b>Polygon Reduction</b>	▶
<b>Extend</b>	⌘F
<b>Lift...</b>	⌘L
<b>Magnify</b>	⌘M
<b>Stretch</b>	⌘E

This menu contains the main commands for modifying a selected area.

### Create Faces For All

Creates faces for triangular or rectangular parts of all objects. When you use either this or Create Faces For Selection, faces may be created in places that you did not expect. For example, if you draw a cross and then enclose it with lines using the Input Line tool as shown in the left of the picture below, not only four triangle faces, but also one large square face is created.



If undesired faces are created, use Clear Face to delete them. For example, in the case above, selecting the four lines surrounding the cross with the Select/Move Area tool, then choosing Clear face allows you to delete it.

### Create Faces For Selection

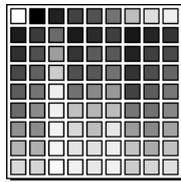
Creates triangular or rectangular faces for a selected object or area.

### Clear Face

Deletes faces of a selected object or area, leaving just the wire frame.

**Line Color**

Allows the color for a selected line to be chosen from a color palette. It is only effective if the "Display line type by color" option is deselected on the Environment page in the View Settings dialog box of the View menu.

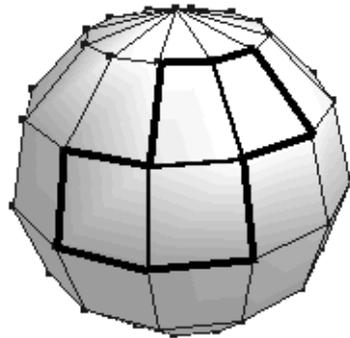


**Line Width**

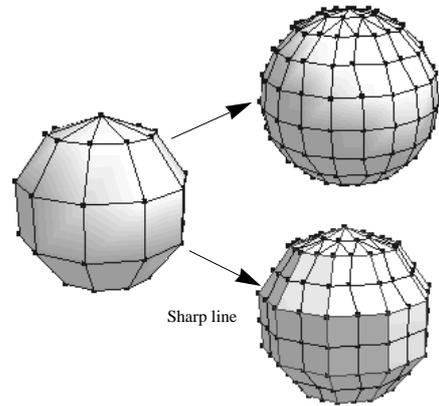
Allows you to specify the width of selected lines. You can only display line width when View > Show Lines Only is selected.

**Sharp Line**

Creates sharp lines for the lines of objects within a selected area.



If you make modifications using the Select/Move Area tool, create smooth surfaces using Smooth, or subdivide an object using the Subdivide from the Modify menu, surfaces surrounding the sharp lines remain sharp. And if you create curved surfaces on an object using Curved Surface from the Object menu, surfaces for which Sharp Line is specified remain sharp (refer to the Section *Set Sharpness*, for more details)



**Unsharp Line**

Changes sharp lines within a selection to normal lines.

**m**  
Refer to the Select/Move Area tool explanation in Section 2-2, *Tools Window*, when modifying sharp lines.

**Set Sharpness**

Sets the sharpness of lines in a selected area. When making curved surfaces using Curved Surface from the Object menu, setting sharpness for lines generates a surface with a variety of sharpness ranging between the Sharp Line and Unsharp Line modes. Choosing Sharp Line sets the sharpness at 100%, whereas choosing Unsharp Line sets the sharpness at 0%. Setting the sharpness is convenient for displaying subtle shapes.

Varying the sharpness of the top part of a cone has the following effects.



	Sharp line	Sharpness: 50%	Unsharp line
Uncurved surface			
Curved surface			

Same

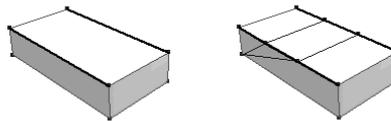
Apart from when an object is given a curved surface, a line with its sharpness level set, behaves like a normal line. In other words, the part of a line with its sharpness

level set can be modified like a normal line with the Select/Move Area tool, or by choosing Modify > Smooth or Modify > Subdivide.

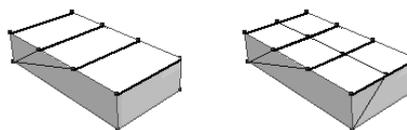
**Subdivide**

Divides lines or faces by number of times specified. All lines, except sharp lines, are divided into smooth subdivisions.

Only selected lines are subdivided. For example, selecting two of the side lines of a rectangle subdivides them as in the picture below.



Selecting the lines produced by the previous subdivision and choosing Subdivide again, results in the face having been subdivided both lengthwise and crosswise.



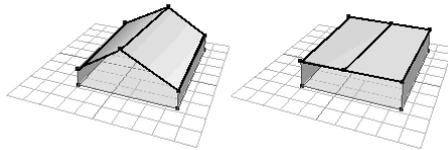
**Smooth**

Smoothly blends faces connected to a selected area when a vertex within the area is moved to create a continuous and seamless area. However, any surrounding sharp lines remain sharp.

The Smooth command removes the unevenness from adjacent vertices, and by repeating this process creates a smooth surface over a wide area.

**Flatten**

This moves the vertices of selected faces to flatten them parallel to the base plane.



An exception is when the base plane  button is selected. In this case, the selected face is flattened perpendicular to the base plane.

**Polygon Reduction**

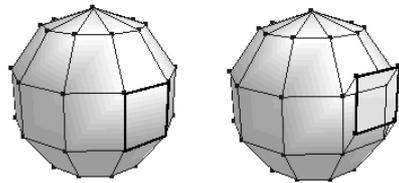
Reduces the number of lines within a selected area by the specified amount.

Lines are reduced by automatically detecting and deleting short lines and vertices of areas with few uneven parts.

**Extend**

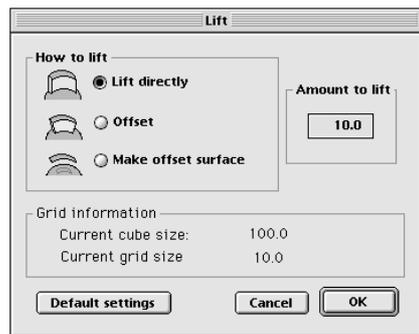
Duplicates a selected area and connects it to the original area by lines.

The duplicated area is grouped together with the original area.



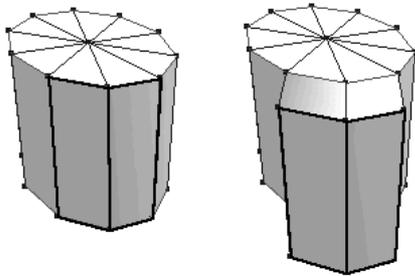
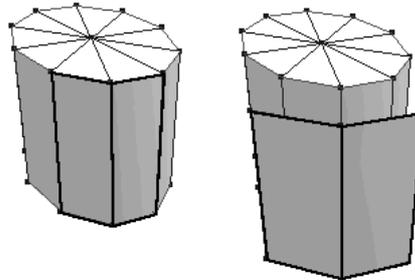
**Lift**

Separates and lifts a selected face away from an unselected area. The method of lifting and amount of lift can be specified in the Lift dialog box shown below.



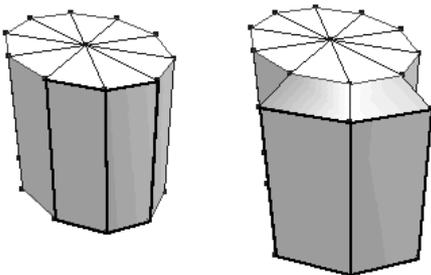
(1) Lift directly

Calculates an average face (which is an imaginable face created by connecting the most outer vertices of faces within a selected area) and lifts the selected faces in parallel with the average face. Finally, new faces are created between the lines connecting the vertices of the original faces and the new faces.



(2) Offset

Lifts each selected face in parallel to its original face, and new faces are created between the lines connecting the vertices of the original faces and the new faces.

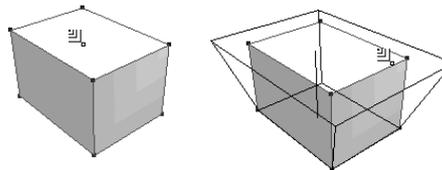


(3) Make offset surface

Creates a new object by lifting each selected face in parallel to its respective original face. This option can be used, for instance, to make clothes by applying the function after creating a human object.

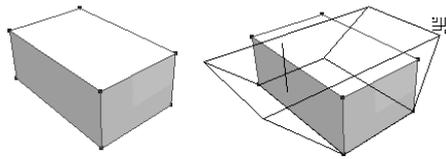
**Magnify**

Choosing Magnify changes the shape of the mouse pointer to . When this shape is displayed, dragging an element of a selected area to the left or right with the mouse pointer magnifies or reduces the size of all elements within the area. Dragging an unselected element to the left or right with the mouse pointer magnifies or reduces its size.



**Stretch**

Choosing Stretch changes the shape of the mouse pointer to . When this shape is displayed, dragging an element of a selected area in any direction with the mouse pointer stretches all the elements within the area. Dragging an unselected element in any direction with the mouse pointer stretches it. Holding down the shift key, permits the shape to be stretched in one direction only.



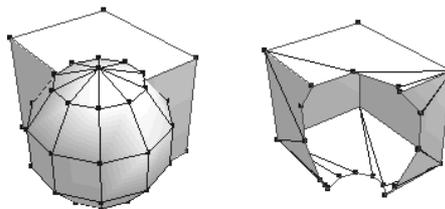
Object	
Invert Face	⌘R
Cut Face	⌘Y
Boolean	▶
Modify Value...	⌘~
Set Rotation Center	
Align To Base Plane	⌘_
Curved Surface	⌘.
Polygon Surface	
Subdivide By Curved Shape	▶
Snap to Grid	⌘T
Grid Settings...	
Create Various Objects	▶
Show Information...	⌘I

### Invert Face

HexaSuper2 cannot correctly perform Boolean calculations if there are faces of an object positioned towards the back. For example, "Boolean: Difference" results are obtained for a "Boolean: Union" calculation. Therefore, before performing Boolean calculations, invert all back faces. To determine whether faces are positioned toward the front or back, select them with the Select/Move Area tool. Faces with thick lines are positioned toward the front, and those with thin lines are positioned toward the back.

### Cut Face

Cuts off a portion of a preselected object in the shape of the object that was selected afterwards by shift-clicking. Unlike with "Boolean: Difference," the portion which was cut off is not covered with a surface, but remains as a hole.

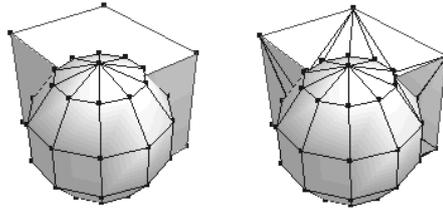


### Boolean

Joins two objects together or hollows out a hole in the face of an object with another object. Performing Boolean generates short lines and long, thin faces, but the  tool allows you to delete the short lines, thus creating a nice shape.

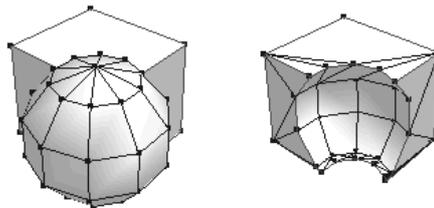
**Boolean > Union**

Creates one object from two objects by joining them together, as shown in the following picture.



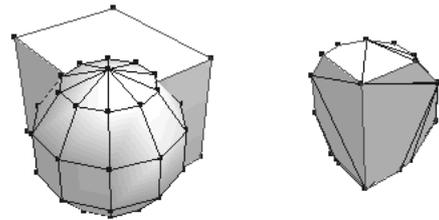
**Boolean > Difference**

Cuts off a portion of an object with the shape of another object, as shown in the following picture. When two objects are selected by shift-clicking, the difference of the two objects can be calculated because the order of selection of the two objects can be determined. However, when two objects are selected by performing a rectangular selection with the Select/Move Object tool, the order of selection cannot be determined.



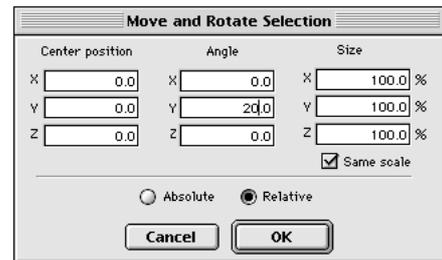
**Boolean > Intersection**

Creates an object from the intersecting part of two objects, as shown in the following picture.



**Modify Value**

A selected object or area can be moved, rotated, or magnified or reduced in size by entering specific values in the Move and Rotate Selection dialog box shown below.

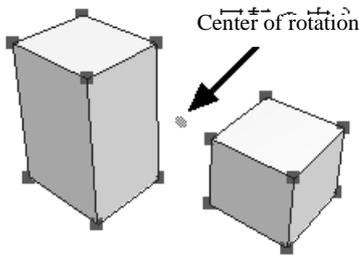


Choosing the "Relative" option allows you to specify the amount of movement, angle of rotation and percentage change in size, with regards to its present position. Choosing the "Absolute" option allows you to specify the amount of movement, angle of rotation and percentage change in size, with regards to its position in relation to the grid cube. Changing the selection from the "Absolute" to "Relative" option or vice-versa, returns the values to their initial value. Deselecting the "Same scale" check box allows you to specify the direction of change values separately. When an area is selected, you can only set the values for the position. Entering a minus value for the x axis of the size options allows you to invert an object from left to right.

**Set Rotation Center**

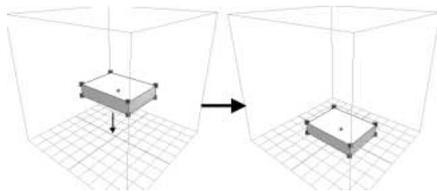
Sets the center of a selected object or area as the rotation center. To actually carry out rotation, use the Rotate tool.

When more than one object is selected, the center point between all the objects becomes the center of rotation.



**Align To Base Plane**

Moves a selected object to the base plane of the grid cube.



**Curved Surface**

Creates curved surfaces using Pixar's "Subdivision Surface" technology. Not only the display of an object, but the actual object itself becomes smooth. The following applies when creating a curved surface.

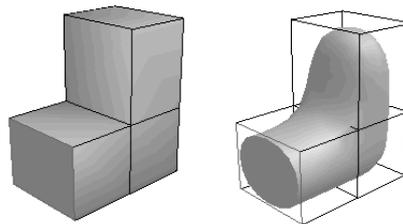
- (1) Shaves the sharpness of vertices and edges to create rounded surfaces .
- (2) In addition, surfaces are pulled together around positions where many vertices and lines are concentrated.

(3) The edges of sharp lines cannot be made smooth.

(4) Parts that have had the sharpness set remain slightly sharp.

The shape of a surface is dependent on the vertices and lines. Therefore, move the vertices and lines to indirectly change the shape of a surface.

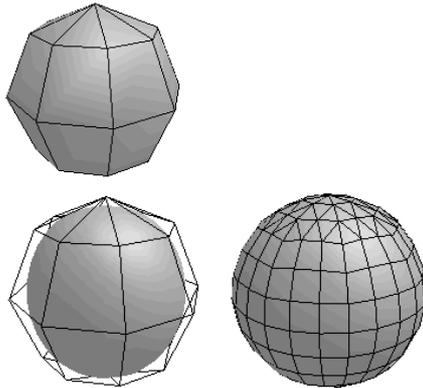
Curved surfaces slow down the display of shapes, however, you can temporarily remove all the curved surfaces and display the shapes as polygons by choosing View > Show Curved Surface As Polygon, or by pressing the tab key.



The following describes how making smooth curved surfaces with the Curved Surface command differs from using the Subdivide command from the Modify menu. Use the most suitable method for your purposes.

- 1.Creates a smoother curved surface.
- 2.Does not require as many vertices or lines to display a smooth surface, thus the size of the data is smaller.
- 3.As a curved surface can be created in a position quite far away from vertices and lines, it takes a while to get use to.

The curved surface of the bottom left shape, in the following picture, was created by choosing Object > Curved Surface. The curved surface of the bottom right shape was created by choosing Modify > Subdivide.

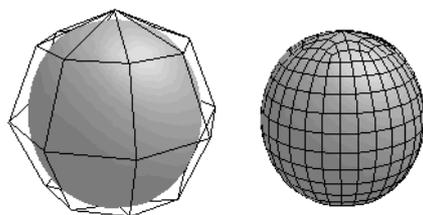


**Polygon Surface**

Changes a curved surface of a selected object to a normal polygon surface.

**Subdivide By Curved Shape**

Subdivides the shape of a curved surface of an object. Use this command when you want to make subtle adjustments to the shape of a curved surface.



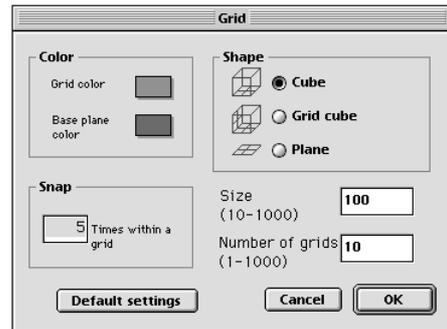
**Snap To Grid**

Makes objects or areas snap to the grid cube when they are moved. The center of an object or selected elements of an area are snapped to the grid cube when they are moved. The length of snap can be specified with the "Snap" option in the Grid dialog box.

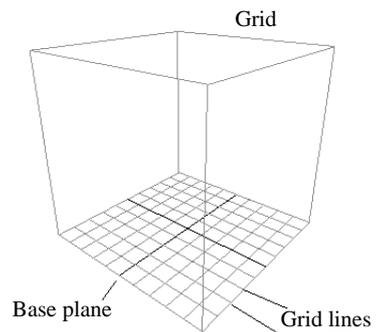
**Grid**

Various options can be set for the grid in the Grid

dialog box.

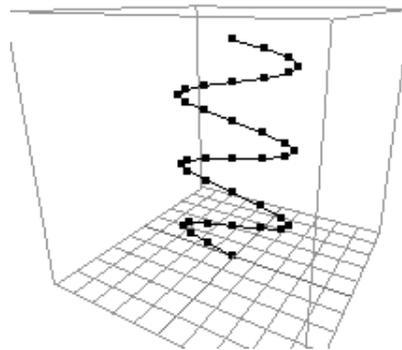
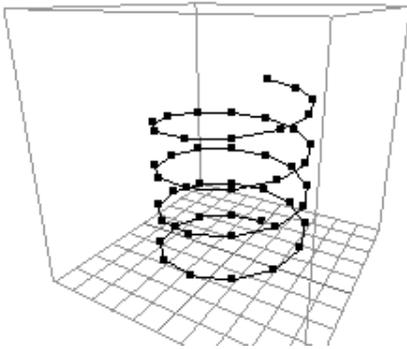
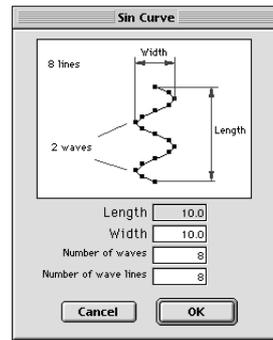
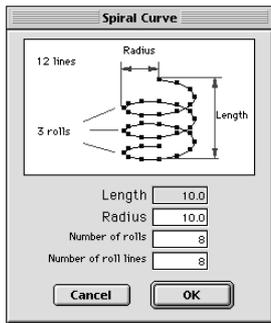


The grid below is shaped like a dice.



**Create Various Objects > Spiral Curve**

Specifying the length, radius, number of rolls and number of roll lines allows you to generate a spiral curve. A spiral curve is centered on the Y axis. You can use the path of the spiral curve to create, for example, a spring by choosing Create Various Objects > Pipe.

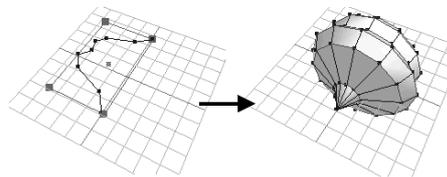


**Create Various Objects > Sin Curve**

Specifying the length, width, number of waves and number of wave lines, allows you to generate a sin curve. A sin curve is created on the XY plane. You can use the path of a sin curve to create, for example, a wavy water surface, by first selecting the sin curve with the  tool, then choosing Modify > Lift and selecting the "Lift directly" option from the Lift dialog box that subsequently appears.

**Create Various Objects > Rotation Shape**

Rotates an object without any faces on the Z axis, to generates a rotation shape with the number of sides specified.



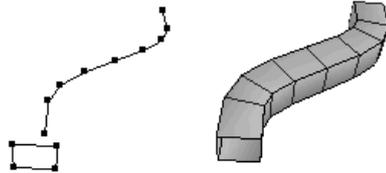
A rotation shape cannot be generated from a grouped object.

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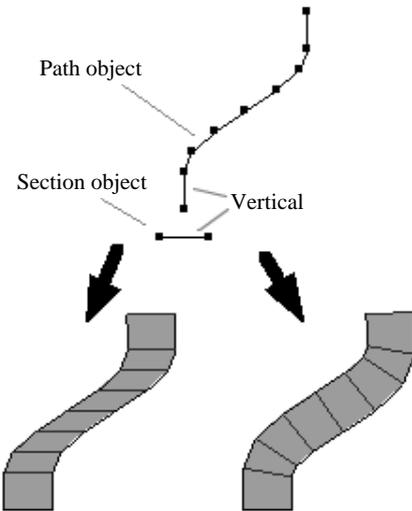
### Create Various Objects > Pipe

Generates a pipe shaped object for specified section object and path object. First, select the  tool and click the section object to select it. Then, shift-click the path object to select it. Finally, choose Create Various objects > Pipe to display the Pipe dialog box. Both section objects and path objects cannot have faces, and path objects cannot have a branch or be a circular shape.



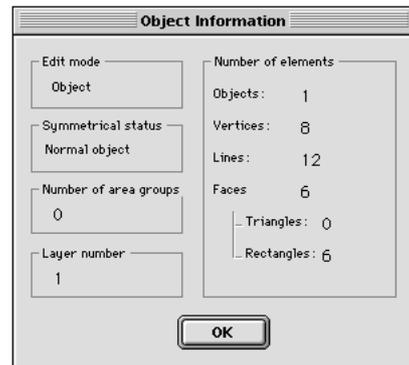
In the Pipe dialog box, you can choose whether the angle of the section object is fixed with the "Parallel sections" option, or can be moved with the "Moved sections" option. If "Parallel sections" is selected, the angle of the pipe section is fixed parallel to the path from start to finish. If "Moved sections" is selected, the angle changes as the direction of the path changes. A good pipe can be created when the line at the end of the path nearest the section object is perpendicular to the section object.

The pipe on the left of the following picture has been generated with the "Parallel sections" option selected, and the one on the right with the "Moved sections" option selected.



### Show Information

Shows the Object Information dialog box which displays various information about the selected object or area.



View	
Undo Viewpoint	⌘[
Redo Viewpoint	⌘]
Show All Objects	⌘0
Initialize Viewpoint	⌘,
Show Lines Only	⌘1
Show Monocolor Faces+Lines	⌘2
Show Stiff Faces+Lines	⌘3
✓ Show Smooth Faces+Lines	⌘4
Show Smooth Faces	⌘5
Show Stiff Faces	⌘6
Show Curved Surface As Polygon	
Hide Grid	⌘7
BackGround Color	▶
View Settings...	⌘8
Hide Selection	⌘H
Hide Selected Lines+Vertices	
Hide Mirror Image	
Show All	⌘9

Commands from the View menu only effect the currently active document window.

### Undo Viewpoint

Restores the viewpoint angle or magnification of the contents of the document window to the state before you performed your last change using the Zoom or Hand tool. You can restore the viewpoint for up to 10 previous changes. However, the document window cannot be restored by this command, if changes have been made with the Indicator or Distance Meter of the Angle window.

### Redo Viewpoint

Returns the document window to the state before you used Undo Viewpoint.

### Show All Objects

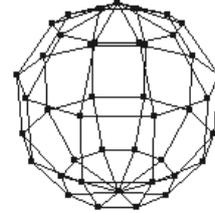
Adjusts the view so that all objects within the document window can be seen.

### Initialize Viewpoint

Returns the view in the document window to the same viewpoint as when the document was first created, with the grid in the center.

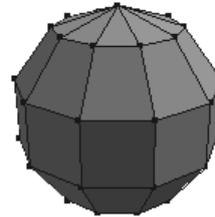
**Show Lines Only**

Displays lines only. When this is selected the display of the contents of the document window is very fast.



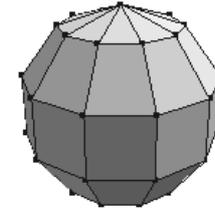
**Show Monocolor Faces + Lines**

Displays monocolored Faces + Lines only. As the display of the contents of the document window is faster than when Show Stiff faces + Lines or Show Smooth Faces + Lines is selected, this is useful when editing complicated shapes.



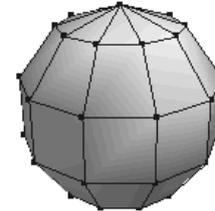
**Show Stiff Faces + Lines**

Displays faces and lines. Faces are displayed with a stiff finish.



**Show Smooth Faces + Lines**

Displays Faces + Lines. Faces are displayed with a smooth finish.



**Show Smooth Faces**

Faces are displayed with a smooth finish



**Show Stiff Faces**

Faces are displayed with a stiff finish



**Show Curved Surface/Show Curved Surface As Polygon**

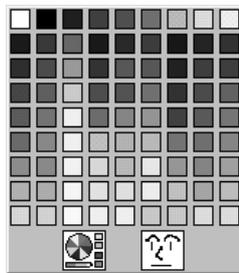
Choosing Show Curved Surfaces shows the curved surfaces of shapes. Choosing Show Curved Surface As Polygon, temporarily removes the curved surfaces and displays the shapes as they were before Object > Curved Surface was chosen. When Show Curved Surfaces is selected, the display of shapes is slow, so we recommend that you select Show Curved Surface As Polygon when creating shapes, and Show Curved Surface to occasionally check the shapes.

**Show Grid/Hide Grid**

Shows or hides the grid cube.

**Background Color**

Displays a color palette for choosing the background color.



Choosing the  button allows you to select a background color from the Color Picker.

Choosing the  button displays the Open dialog box, allowing you to specify a PICT file to be displayed as the background picture.

Selecting a background picture when viewpoint angle is snapped to front face or side face displays the background picture at the same size as the grid cube,

and when you magnify or reduce the size of shapes it changes size appropriately, making it easy to trace the outline of the illustration or photograph. However, with any other viewpoint angle, the picture is imported at its actual size.

**View Settings**

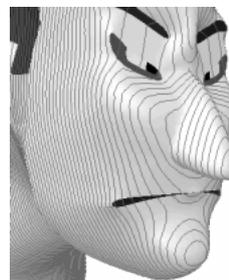
Displays View Settings dialog box for making various view settings.

(1) Method

All the options on the Method page, except "Contour," can be set via Menu commands. However, all options set via the View Settings dialog box are made simultaneously.

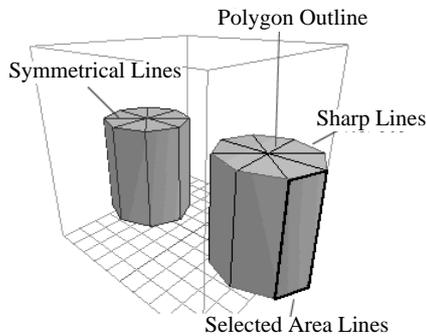
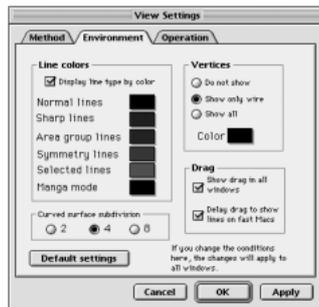


Choosing the "Show" contour option, displays contour lines on a surface in the color of group lines. Select this option when you want to closely check the shape or smoothness.



(2) Environment

When the "Display line type by color," is deselected, the color settings below are ineffective and all lines, except contour and selection lines, are displayed in black by default. Lines which have had their color set by choosing Modify > Line Color, are displayed in the set colors. Selecting "Display line type by color," displays line types in the colors shown below. Clicking the color square allows you to select a different color from the Color Picker.



The "Curved surface subdivision" option allows you to set the subdivision of curved surfaces. This specifies the number of subdivisions displayed for a face of an object when you choose Object > Curved Surface. Selecting the "Show drag in all windows" option, displays the drag of objects in all windows. This slows down the display of objects, but makes it

easy to see how the objects are being changed and moved.

If you have a high-performance computer, it may be difficult to see the lines when you drag an object, depending on the number of colors set for the monitor. In this case, select the "Delay drag to show lines on fast Macs" option, to slow down the display of lines and make them easier to see.

(3) Operation

The "Range of distance meter" option allows you to set the smallest range of the Distance Meter in the Angle window.



**Hide Selection**

Hides selected objects or area. To show them again, choose View Menu > Show All.

**Hide Selected Lines + Vertices**

Hides the lines and vertices of selected objects or area. To show them again, choose View Menu > Show All.

**Hide Mirror Image**

Hides mirror images when editing in Symmetry Mode.

**Show All**

Shows all hidden objects.



### **New Window**

Creates a new window showing the contents of the active document window.

### **1 Window**

Changes the display of the active document from 4 windows to 1 window. Documents are normally displayed as 1 window.

### **4 Windows**

Changes the display of the active document from 1 window to 4 windows. (Refer to the picture on the next page.)

### **Show Tools/Hide Tools**

Shows or hides the Tools window. Clicking the close box on the top left of the window has the same effect as choosing Hide Tools from the Window menu. Refer to Section 2-2, *Tools Window*, for an explanation on the Tools window.

### **Show Angle/Hide Angle**

Shows or hides the Angle window. Refer to Section 2-3, *Angle Window*, for an explanation on the Angle window.

### **Show Lights/Hide Lights**

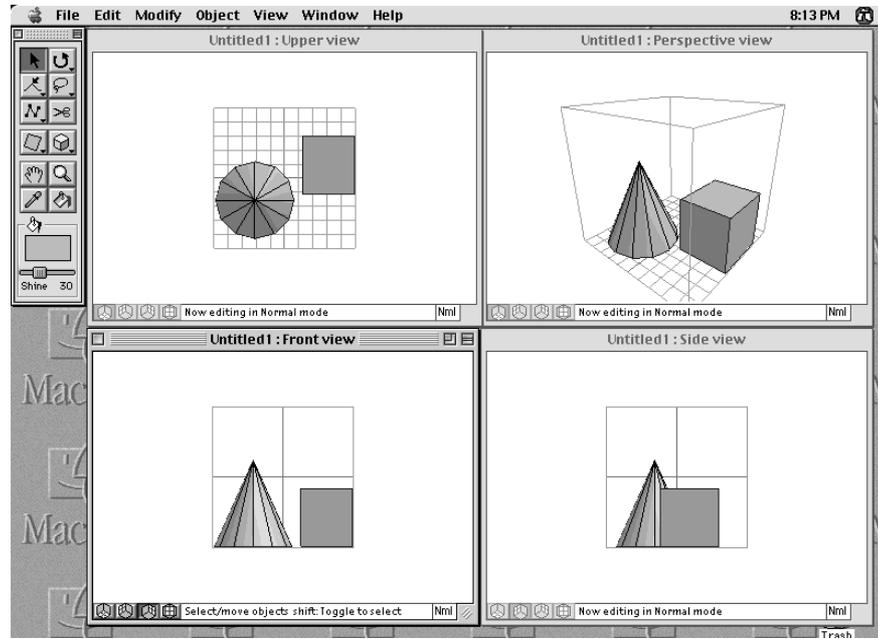
Shows or hides the Lights window. Refer to Section 2-4, *Lights Window*, for an explanation on the Lights window.

### **Show Values/Hide Values**

Shows or hides the Values window. Refer to Section 2-5, *Values Window*, for an explanation on the Values window.

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Dragging in one window is displayed in all windows when 4 Windows is selected. To display dragging in the currently active window only, choose View > View Settings and unselect the "Show drag in all windows" check box on the Environment page of the View Settings dialog box.



Four windows

### Show Keyboard/Hide Keyboard

Shows or hides the Keyboard window. Refer to Section 2-6, *Keyboard Window*, for an explanation on the Keyboard window.

### Show Layers/Hide Layers

Shows or hides the Layers window. Refer to Section 2-7, *Layers Window*, for an explanation on the Layers window.

### Document Window

The names of all open document windows are displayed in the Window menu. Selecting a document name activates that document.



### **About Balloon Help...**

Displays an explanation about Balloon Help.

### **Show Balloons**

HexaSuper2 does not provide support through Balloon Help. Therefore, even if you turn it on from the Help menu, balloons explaining HexaSuper2 features will not be displayed.

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# Glossary

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**Active document**

The document window which is currently being edited is called the active document

**Area**

A selection of elements.

**Base Plane**

The plane that objects are moved and rotated on. When you create a surface or solid object the base plane is the bottom plane. Objects are moved parallel to the base plane and rotated around an axis perpendicular to the base plane. The base plane can be specified by selecting one of the base plane buttons at the bottom of the document window.

**Boolean**

One way of modifying shapes, that involves the combination of two objects to make one new object. There are three methods of Boolean. The creation of a union between two objects which is called "Union." The hollowing out of a hole in one object to attach another object which is called "Difference," and the combining of the common parts of two objects which is called "Intersection."

**Border Line**

A line that has one or more faces connected to it, or a line that divides a selected area and an unselected area.

A border line also exists around a surface object.

**Bottom Plane**

A base plane.

**Clipboard**

A special memory area that stores the data

of shapes of areas or objects when you choose either Cut or Copy from the Edit menu in HexaSuper2. It is not possible to directly check the contents of the clipboard in HexaSuper2, but choosing Edit > Paste allows you to paste its contents into the document window.

**Color Palette**

Color information stored internally in HexaSuper2. The color palette stores information about color, shine, and level of transparency.

**Dialog Box**

A special window, displayed as a result of operations such as choosing a menu command, which solicits a response from the user. Detailed data is input in and valuable information can be gained from a dialog box.

**Document**

A file created with HexaSuper2. A new document can be created by choosing File > New, and an existing HexaSuper2 document can be opened via the Open dialog box which is displayed by choosing File > Open.

**Drag**

To position the mouse pointer over an object, press and hold the mouse button, then move the object to a different location and release the button.

**Edge**

A line that has one or more faces connected to it. A line that has no faces connected to it is known as a wire frame.

**Front/Back Face**

A face has a front and back side. The side

facing towards the outside of an object is the front side, and the side facing towards the inside side is the back side.

**Grid**

A cube with light-green lines in the shape of a lattice, which is shown when you open a new document window.

The position of the base plane, the center face of left-right symmetry and the center axis when you rotate an object are all positioned in accordance with this grid. It is convenient to refer to the grid position and angle when you create shapes.

**Group**

Two or more objects that have been assembled into a single object by choosing Edit > Group. Grouped objects are treated in the same way as a single object.

**Group Area**

A collection of elements, or areas that can be treated as one. Clicking an element of a group area with the Select/Move Area, simultaneously selects all elements within the group area. Also, dragging one element of a group area, simultaneously moves all elements within the group area.

**Handle**

A red square at an end vertex of a selection frame that appears when you select an object. Dragging a handle allows you to change the shape or size of an object.

**Initial state, Default**

The state of HexaSuper2 just after being installed.

**Light**

In 3D computer graphics, pictures of a

a model (object) can be taken with a camera. In HexaSuper2, a light refers to the light shining on the objects.

#### **Mirror-center Vertex**

A vertex created on the center face (XY plane) in Symmetry mode. Mirror-center vertices created on the center face of the grid cube can only be moved within the center face, however, these limitations allow you to maintain the symmetry of shapes.

#### **Mirror Image**

An object displayed in Symmetry mode that cannot be edited.

#### **Modeling**

The process of creating an object within a three dimensional space.

#### **Normal Line, Average Normal Line**

Normal line of a face means a vertical direction in reference to the surface of the face.

Average normal line of a vertex means an average direction calculated from normal lines of faces surrounding the vertex.

#### **Object**

A shape that is made up of connected lines and faces. The smallest unit the Select/Move Object tool can select and move is an object. Objects can be grouped together.

#### **QuickDraw 3D**

An extension supplied by Apple Computer for displaying 3D computer graphics. HexaSuper2 uses it for displaying images on the screen.

#### **Shape Element**

The vertices, lines and faces that make up the shapes of objects. Each shape element can be selected and moved with the Select/Move Area tool.

#### **Sharp Line**

A line which is not smoothly blended to its surrounding area to create a continuous and seamless area when modified with the Select/Move Area Tool. Also, its surrounding area is not displayed as a continuous and seamless area even when you choose View > Show Smooth Faces. To create sharp lines, choose Modify > Sharp Line.

#### **Shine**

The gloss effect on a face is known as shine. If the value of the Shine slider of the Tools window is set high the level of shine is high and if it is set low the level of shine is also low.

#### **Solid Object**

An object with a fill and no border lines. All objects generated with the Solid Object Tool are solid objects.

#### **Surface Object**

An object with border lines that has no fill. All objects created with the Surface Object tool are surface objects.

#### **Texture**

A picture that is pasted onto a selected or unselected object is called a texture.

#### **Transparency**

A state of transparency of a face. If the transparency value is large, the level of transparency is low and you cannot see through a face. If the transparency value is small, the level of transparency is high and you can see other objects

through a face.

HexaSuper2 files are referred to as documents throughout this manual.

#### **Toggle, Toggle Operation**

To switch back and forth between two settings. For example, you can toggle snap to grid on and off with Object > Snap to Grid. Selecting it once turns it on, and selecting it a second time turns it off.

#### **Viewpoint**

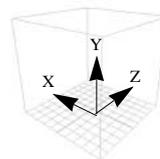
In 3D computer graphics, pictures of a model (object) can be taken with a camera. The viewpoint is the position of the camera, that is the location from where it views the object.

#### **Wire Frame**

A shape with lines but no face. In HexaSuper2, you can make a wire-frame shape with the Input Line tool. You can also hide the faces of a shape so as to view the wire frame only by choosing View > Show Lines Only.

#### **X/Y/Z axis, XY/YZ/ZX plane**

In HexaSuper2 the coordinate axis are set as in the picture below.



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## Index

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