

Digital botany creation

Mastering 3D Graphics ~ issue #1

with Soft F/X Pro Kent Shum

The importance of a realistically produced scenic stage set is highly recognized by most movie producers and directors. The background of a stage is one of the key elements that brings high believability to a movie; whether it is a real existing place, or entirely computer generated, the look and feel of a stage set must be very convincing. Hence if one were produced digitally, the computer artists would have to create it as close to reality as possible. They would have to face many different detail oriented elements in order to create an impressive scene; some are even down to as tiny as nuts and bolts.

It really DOES make a difference because a movie or a 3D scene without detailed graphics would not look nearly as interesting as those that are produced with great extraordinary details on the background stage. For instance, if you were work-



ing on an entirely computer generated science lab, you probably would have thought of many different elements to make the scene look as interesting as possible, and that is where detailing will help you. Instead of producing a blank wall, give the wall some details, decorate it, and let it have its own identity.

As you may probably have known, numerous stages and backgrounds nowadays are done digitally. Many of the special effects, virtual sets, and matte background paintings are created with the use of 3D and postproduction applications. Creating digital botany is no exception.

It is your Jungle

Creating a jungle that you have never been to in real life; by creating it yourself digitally, is nearly as fun and exciting as visiting the real thing. It is your jungle, and you better make it look good. And to make it a believable creation, you may need to take a short trip out in the woods.

Think of one of the beautiful forests or national parks that you have been to before. Normally, the natural beauty of it as a whole would just amaze you, but you probably did not bother to think of why it looked so impressive. Was it the vibrant colors of the leaves that were flourishing on different types of trees, or would it be the sunshine that made the landscape so captivating? Or maybe

it was the grass with that healthy, green brilliance and the many kinds of flowers that were in full bloom. However, you may not have ever paid full attention to those other less noticeable elements such as rocks, mud, fungus, dirt, and other tiny details on the trees, plants, and the ground. These elements are often neglected by many 3D artists; however, they are essential ingredients for making your 3D jungle scene appear real.

Be an observer

Before you start doing anything, take a short trip to the closest park, preferably a forest, where many trees and plants have grown. Spend some time observing things that you might have neglected the last time you visited. Pay close attention to those tiny details that are on the ground, especially the areas where the trees have been growing. Look around there, notice how the root of a tree penetrates the ground and the elements that are around the area. I am sure this time you will see more than before. Do the same to the flowers and other plants. Sketch the important details you find in a sketchbook. Taking pictures would be the best, because you can create your digital jungle by referring to the size, shape and color of different elements in the pictures. Additionally, with the right planning and setup, you can even use the camera as your textures capturing device, and the pictures will serve you well when you scan and use them on your creations.

Preparation for your findings.

Whenever possible, always bring a sketch book and a camera with you wherever you go because you never know what you will discover when you are outdoors. Once you focus on observing all that surrounds you, you will be glad that you have your camera and sketch book to capture the natural images you come across.

Building your Jungle

Returning to your digital tools, you should have an idea for beginning your scene. Now you need to plan ahead to make this a reality inside your computer. Whether it is a replica of an existing scene you've long admired, or a totally imaginative jungle you are after, the tools that you need to create are the same; the overall idea comes from your own artistic talent and skills. You may want to try altering the look of certain plants that exist on Earth or inventing your own vegetation. The way it looks is only limited by your imagination.

Know your tools

The software you use will help you make your design come alive on screen, but you will need to know the software's limits. Some programs allow you to do certain things that are not possible on others. Many 3D artists

must use more than one application for their projects. Push your knowledge of a particular program to the limit as it will make you more productive while creating your image.

BytebyByte's Soft F/X Pro is a powerful and easy to learn 3D modeling and animation package. It lets you create amazingly fast previews in real time while building a scene. One of the strongest features is its top notch real time OpenGL texture mapping preview window. You can position, resize and rotate your mapping coordinate very easily and accurately. However, Soft F/X Pro is currently limited by the lack of deformation modeling tools such as bending. When you need to bend the branches of your trees and plants you will need to work around the lack of this feature.

Apprehending the design

As with many of your designs, whether it is a still or an animation, always sketch out your thoughts for visualizing and realizing the design. Draw the elements that most interest you, and try composing a scene that will let you think of the locations of all the elements, their sizes and orientations in relation to each other, as in [Figure 1](#). As of this writing, Soft F/X Pro is still not ideal for making highly organic models, it is wise to avoid complicated and hard to produce curvaceous objects. This should be

cured with the next version of Soft F/X Pro. Hence, design and sketch your scene with the modeling aspect in mind, ask yourself if it is feasible to build a specific object before really using it.

Using Soft F/X Pro's Modeler

Soft F/X Pro's Modeler is a straight polygon modeler. There is really no basic deformation-modeling tools such as bending to deform a primitive into a new organic form, but one can accomplish pretty good results with many of its other built in features. For example its Bezier Curves builder, the Extrude Along action, the Loft Multiple Curves action, and the Terrain from Bitmap tool. Along with basic primitives such as spheres and tubes, you can build a good and detailed digital jungle.

Making the ground

The very first object you will need should be the ground, without it, you cannot place your trees and plants accordingly. In order to make a believable landscape, you will need to use the Terrain from Bitmap tool. Before you do so, open Adobe Photoshop or any other paint-

ing program and start painting a gray scale plan of your design. Remember, the lighter the gray, the higher elevation the ground will be, and of course, the darker the lower the elevation will be, as you can see from [Figure 2](#). Save the painting as an 8 bit gray scale GIF file after you are done as Soft F/X Pro can only take a GIF file for terrain generation.

Now switch back to the Soft F/X Pro Modeler and choose the Terrain from Bitmap selection from the Build pull down menu. An open dialog should appear requesting you to locate the gray scale GIF file you just did. Once the file is loaded, the Height Field panel will pop up. Set the mesh detail to Medium, and leave the rest at default settings. In a few seconds, you should see your terrain generated in the quad-viewed modeler

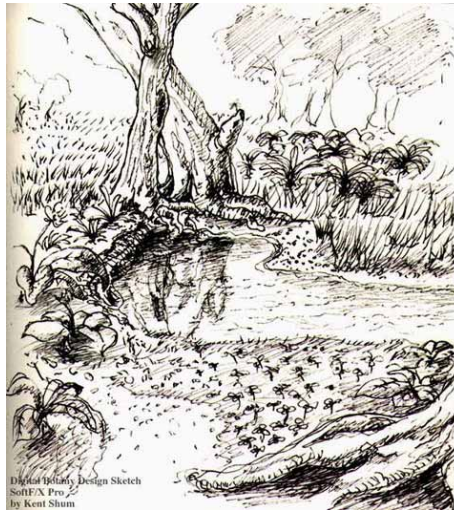


Figure 1: Compose your botany by sketching out all the elements.



Figure 2: Paint your landscape in gray scale for terrain generation.

window. Save the model now, and start the Soft F/X Animator by choosing Animator from the Window menu. At this time you will need to import the terrain in the Animator in order to help making its texture.

Load the terrain model by pressing CTRL A, Choose Model on the Add Object panel and click OK. The model should be imported without any problems. Now press R to rotate the terrain to about 90 degrees along the X-axis so that the camera is looking at it perpendicularly. Add the Fog post processing effect by pressing I. Assign a light fog color to the scene, set the range, and test render. It should look similar to [Figure 3](#). This is how you can clearly see the terrain's contours in order to paint your texture accordingly in Photoshop. Save the rendering when you can see the contours.

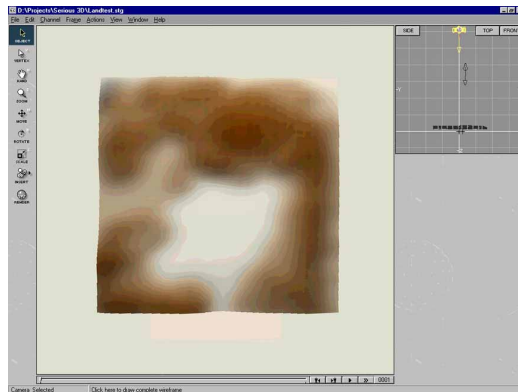


Figure 3: Using the Animator to generate a better terrain contour map for textures creation.

Why such a hassle?

Well, technically you could just use Photoshop to paint the textures on different layers on top of the gray scale file you did before you extruded the terrain. However, the truth is, you'd better not. The way Soft F/X Pro handles terrain maps is different than many other packages; it will distort your terrain. If your terrain map was painted at 640 x 480, for instance, the generated terrain will be stretched to become basically square. Actually, no matter what resolutions you painted your file, the end result of the terrain will always be square. Thus if you'd painted your textures on the gray scale map, your textures would more likely be stretched as well when you apply them to the terrain model later.

Remember those details that you have observed from an existing park or forest? You should be able to find raw textures that resemble the elements that you noticed from the observation. These textures can either be downloaded from the Internet, or be purchased; you can even paint your own if you have the passion. In Photoshop, create a few layers for the contour rendering you just created from the Animator. Open the raw textures that you have gathered from various sources, and define each as pattern and use the Pattern Stamp tool to start painting the textures on the empty layers individually. Just in case you

have forgotten, the textures must all be tileable; you will need to make some modifications to them if they are not. [Figure 4](#) shows a finished texture map for that specific terrain. It is a combination of all the other raw textures around it. I will show you how to apply the texture in a later section.

Grow some trees

Now is a good time to grow trees. As mentioned before, you cannot sculpt a primitive by means of deformation, you will have to create your trees with the 2D Bezier Curves builder. The 2D Bezier Curves builder module can be used to draw 2D paths or outlines (or profiles) of your objects, but keep this in mind, once a Bezier curve is built and imported into the main Modeler's environment, you can no longer adjust it like you could in the module. You can only reshape the curve by dragging the vertices one at a time. The Bezier Curve builder module is good for making paths for extrusion along paths operations as well, such as tree branches in this case.

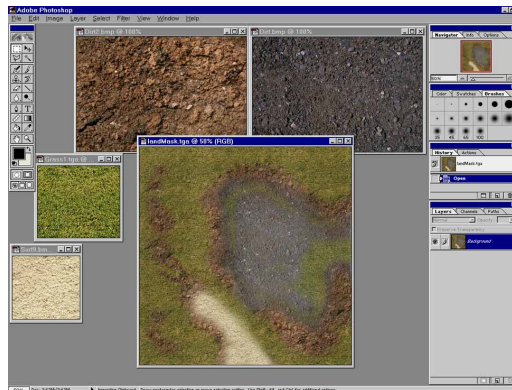


Figure 4: A mixture of many raw textures to create a terrain texture map.

Press CTRL B to load the Bezier Curve builder. You can start a drawing 2D shape once the window is open. Imagine a tree being sawed off parallel to the ground from the top to bottom, you would more likely see a variation of circular shapes. Take a look at [Figure 5](#), a group of outlines from a sliced tree is drawn, imported and moved on top of each other proportionally on the Modeler windows. The outlines evolve from top to bottom. Notice that the bottom piece is modified the most; it is not circular anymore, but a curvy, irregular shape. The process is similar to an evolution of the growth of a real tree; you just need to chop it up from the top down. The only difference is you get to do it on a computer, and you do not need to yell “Timber!”

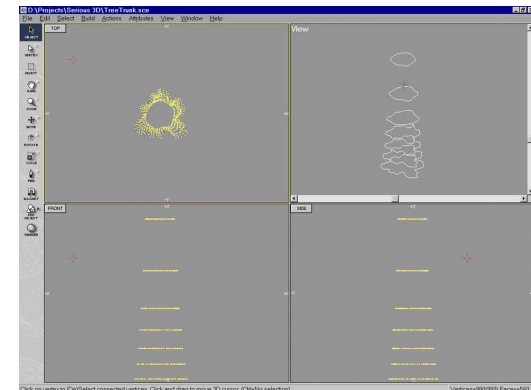


Figure 5: The outlines of the evolution of a tree.

Once the outlines are stacked proportionally on top of each other like it is in [Figure 5](#), you can start making the skin of the tree by using the Loft Multiple Curves action. Before doing so, drag the 3D cursor to a location near the top most piece of outline, and snap it to any vertices of that piece by pressing F2; it refuses to function if the 3D cursor is not snapped to a vertices. After a brief moment you should be able to see the trunk of the tree formed right before your eyes.

Leaves and branches

The way to produce branches of the tree is a bit different. You do not use the 2D Bezier Curves builder this time, but the Pen tool and the Extrude Along action instead. First load an instance of a Disk primitive by pressing F7 on the Modeler windows, choose the Disk tab and click Make. A disk primitive is inserted, resize it if necessary. Next, get rid of the center vertices of the disk primitive by selecting only that vertices and pressing the Delete key. At this point, press the P key to use the Pen tool and draw a simple path that you can do best

to represent the length of a tree branch. The path does not have to be 3D, so you can finish drawing it from within the Front window if you desire. Ok, the curve may or may not be smooth enough, but you can tranquil the entire curve by using the Smooth Subdivide Curve modeler plug-in to make the curve look better. To complete the extrusion for making a branch, you will need to move the path to a position that its first vertices is at the proximity of the center of the disk primitive as in [Figure 6](#). When the path and the disk are all set, drag the 3D cursor to the first vertices again by pressing F2 (you should be able to see the 3D cursor location in [Figure 6](#)).

Now choose the Extrude Special > Along selection. A dialogue should pop up requesting more information, check the box where it labels Expand When Extruding,

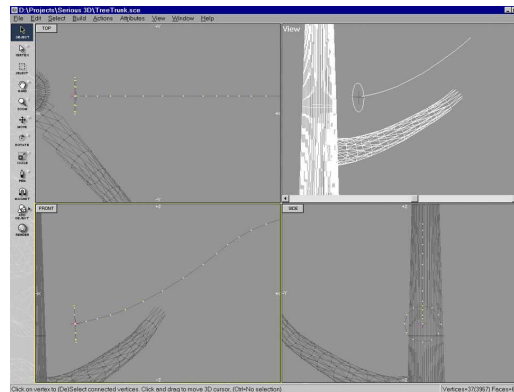


Figure 6: Extrusion along a path in preparation.

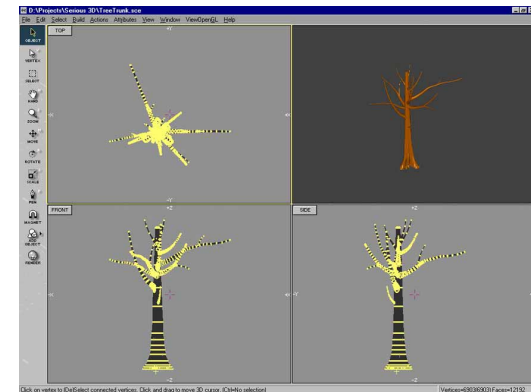


Figure 7: An example of different tree branches using the extrude along a path action.

and set the Expansion Factor to about 0.2, and click OK. Voila, your first tree branch is generated! With the same technique, try making more branches that are different, and resize and move them to locations where they should be along the tree trunk. **Figure 7** is an example of multiple different branches that are made with expansions while extruding along different paths. At the moment its time to sprout some leaves.

There are many different ways to make leaves. You can use a texture map of many leaves and apply on a flat square polygon with a transparent map to clip out areas other than the leaves, or you can build, in 3D, one leaf at a time. There is an affordable way to make leaves in Soft F/X Pro far faster than building one at a time and yet still looks better than using a flat square textured polygon.

Create an instance of a sphere primitive by again pressing F7 and clicking on the Sphere tab, leave everything at default before you click the Make button. Then, select only the bottom half of the sphere and delete the vertices, this will

leave you only the top half of the sphere. Now scale the dome to a size that is about 1/5th in diameter the length of a tree branch. Each triangulated polygon will be used as a single leaf, so you need to separate them apart from each other at a good distance. Choose the Separate Polygons selection from the Actions pull down menu, and follow with the Explode Polygons selection. Once the Explode Polygons panel appeared, leave everything at default but increase the numbers a bit in the three Expansion Factors boxes, and click OK. The polygons are now separated and exploded at randomized locations. Try adjusting the distance with larger or smaller numbers at the Expansion Factors from the Explode Polygons panel. **Figure 8** shows what you can achieve with this quick leaves-making method. And when you are com-

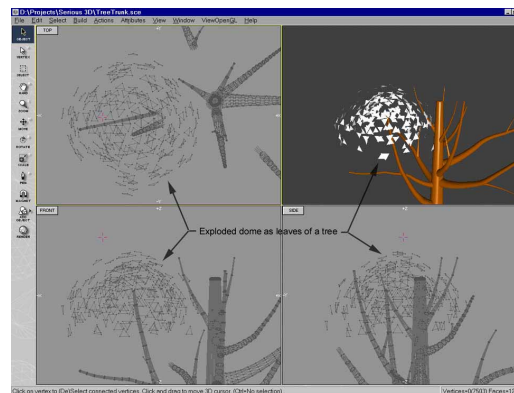


Figure 8: Make quick leaves by exploding a dome primitive.

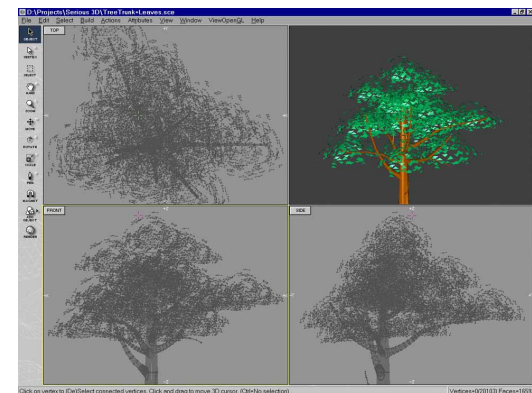


Figure 9: A new tree is grown.

fortable with the first “explosion”, produce more leaves by either copying the polygons and move to various places, or simply creating more explosive domes!

The result can be quite rewarding, as in [Figure 9](#); the entire tree is about completed. If you are a polygon-count watcher, you will be pleased to know that Soft F/X Pro handles a large number of polygon models efficiently, and still renders at good speed. This is still much less polygons than making leaves one at a time, not to mention the time it saves you doing so.

Bones to the rescue

Ever wonder how you can deform a tree, say bending its trunk, without the right tools to do so? Well, you are in for a shock. By using bones in Soft F/X Pro’s modeler you can still deform an object effectively. The number of outlines you first drew defines how many bones you need to use. A segment of polygons from one outline to another will use one bone, and the adjacent segment will use another. In [Figure 10](#), the diagram shows you how you should divide the polygon segments for bone assignments.

To assign a bone structure to the tree, you need to know where the root or the parent joint is located. By default,

the parent joint resides at the center point (CP) or the follow point (FP) of the model, but if you moved your CP or FP to a different location, the parent joint may not be at the same place. Before giving bones to the tree, move the 3D cursor to the center of the bottom outline, and select Set Model Center and Set Follow Point from the Attributes pull down menu. Doing so will ensure that the tree can be later resized efficiently when based on this point in the Animator. Now choose Edit > Skeleton > Reposition Joints, the parent bone should be showing up. At this point, if it is not at the same place as the CP, move the parent joint by first left clicking and holding the mouse on it, and then right click the mouse without letting go of the left mouse button. Drag the parent joint to the same location as the CP and release the left mouse button.

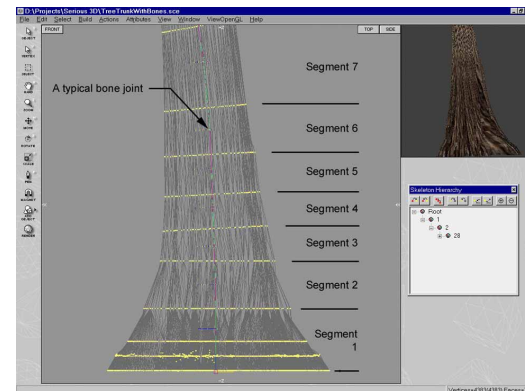


Figure 10: Joints attached to individual segments of the trunk.

Start developing the bone structure from the parent joint. First select Edit > Skeleton > Build Joints, and left click and hold the mouse button on the parent joint. Next, right click the mouse while the left mouse is still held down, start dragging the 3D Cursor to a location that is in between the first two outlines at the bottom of the tree. Now when you are sure the 3D cursor is at the correct location, right-click the mouse again to complete the operation. You will see a dialogue asking you to give the new joint a name, type anything you want that makes sense, or just hit RETURN to accept its numeric value. You have just made yourself a bone. Do the same procedure for the rest of the tree segments. If you are not seeing anything comparable to **Figure 10**, then you may just need to redo everything again by repositioning and deleting some of the joints. (To understand the bone system in Soft F/X Pro, you can visit my website at <http://members.aol.com/mindwksint>, there is a tutorial section that will explain the system with more details.)

You are only halfway through, however. The bones need to be attached to the polygon segments in order to function. Deselect everything by pressing CTRL D, and then only select the bottom 2 outlines as 1 segment. Choose Edit > Skeleton > Attach to Joint, and almost immediately, the next thing you will see is a flash at the menu bar, you will hear a system beep sound, and a note at the

lower left on the status bar stating that your bone attaching operation is performed successfully. Congratulations, it really was easy, wasn't it? Now to continue the attachment for the rest of the bones, you will have to deselect everything again, and then select the next outline segments for the second bone above the one you just worked on. A quick way to check if a bone is successfully attached to a segment is by choosing Edit > Skeleton > Pose, you will see the boned segment being drawn as a bounding box, if you do not see it, your bone is not attached.

Plants and flowers

Modeling plants or vegetation is actually quite similar to modeling trees. But this time you get to build leaves indi-

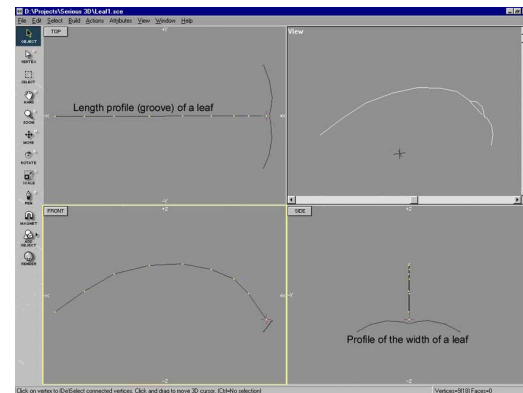


Figure 11: A typical leaf profile is about to be path extruded.

vidually for sake of fine details. The tools that are used are technically the same, but slightly different in the ways you operate them.

First, start off by creating a leaf for a special weed. We will use the extrude-along action again to make this leaf. Start a new model, and draw a path with the Pen tool that looks like the sideview of a leaf. The path would be used for the center groove of the leaf. Then draw another curve line that resembles the surface profile of both of the bisected sides. The lines in [Figure 11](#) are drawn in a way that they are ready for path extrusion, notice that the curves are not touching each other, and the 3D cursor is at the first point of the groove profile line. Now with both lines selected, choose the Extrude Along action and as before, check the Expansion box and give it a value of 0.1. A polygon leaf is fabricated after you click the OK button. But the shape of it may not be ideal; therefore, you have to resize the shape of the leaf along the Y-axis until you get the idealistic result as in [Figure 12](#).

Building the stem of a leaf is rather simple. Press F7 and

load a cylinder primitive. Resize the cylinder to be about proportional to the leaf, then select only the top vertices and extrude a few segments by pressing CTRL E and dragging the mouse. Position the stem to almost touching the groove end. Drag the 3D cursor to the top most vertices of the cylinder, while they are selected, press CTRL F to fill polygons from the cylinder top to the 3D cursor. Now the cylinder has a pointy top, and you need to move the top vertices to meet the groove of the leaf by pressing the V key and dragging the mouse. [Figure 13](#) displays a finished look of this typical leaf with a stem.

To complete the plant, make all four sides of it by duplicating the leaf with its stem. The easiest way to accomplish this is to use the Duplicate Special > Multiple action. With the 3D cursor moved to the center point of

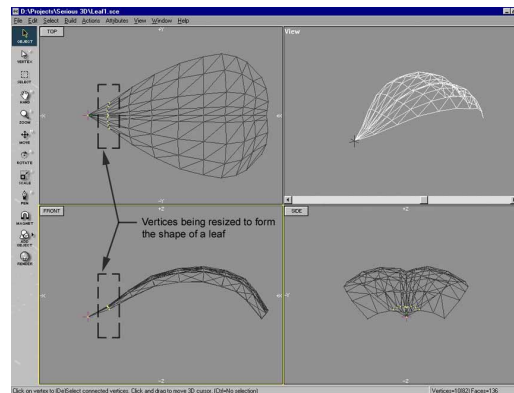


Figure 12: The more realistic leaf after some resizing modifications.

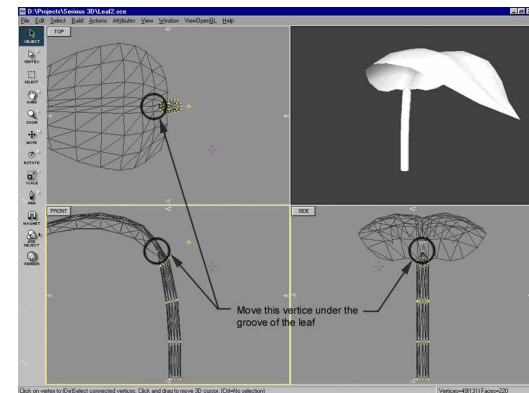


Figure 13: Adding a stem to the leaf.

the stem from the Top window, select the Duplicate Multiple action and a dialogue will pop up requesting you for inputting more options. Ignore the fact that the dialogue is labeled Lathe when it is really a multiple duplication one. Put 4 in the # Sections box, and leave the Angle at 360. The plant should now have 4 sides, but in order to make it look more natural, you will need to adjust the leaves to make them irregular. Move them a bit higher or lower; tilt the leaves at different angles, or even resizing a leaf or two will tend to make the plant look more interesting. **Figure 14** is an example of what it is like when you adjust the elements to become more natural looking.

After building this specific plant, you should have a clear idea of how you can come up with hundreds of more styles and designs. The technique is essentially the same, for instance, you can make the groove profile more curvaceous, and the stem could grow from fatter at one end to thinner at the other. Take a look at **Figure 15**, it is just another design of a typical plant, notice that the leaves are much more complicated and well developed.

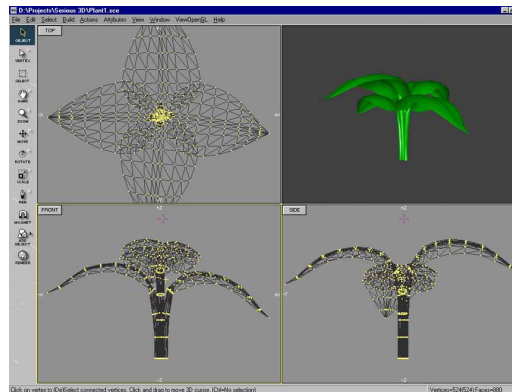


Figure 14: Complete the plant by duplicating and modifying the leaf.

Flowers have a higher level of complexity when created with Soft F/X Pro. As in reality, they are blossomed with many more elements such as stamens and petals than normal plants. The design of the flowers will need careful considerations because after all they may not even look like flowers once constructed. However, making a 3D flower isn't the most painful task, you can achieve a pretty good result with the following procedure.

Draw, with the Pen tool again, a vertical profile of the stem of a flower from the top of the butt to the root of the stem in the Front modeling window; this time only draw one side of it. We will lathe the profile to form the entire stem. Now go to the Top window and move the 3D cursor to the first vertex that is the closest to the center of the stem. Press F2 to snap the cursor to it.

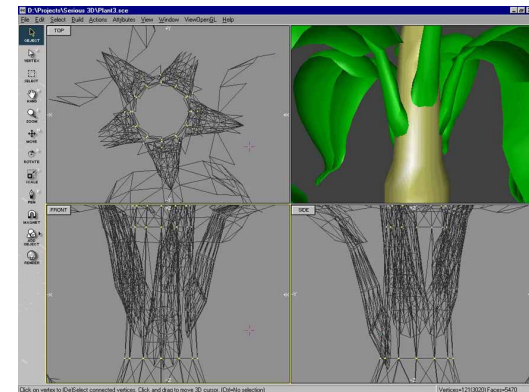


Figure 15: More complex plants can be achieved with the same technique.

Then type CTRL L, notice that the label of the popup dialogue is Lathe, unlike the Duplicate Multiple action, it does what it says this time. Leave all of the setting at default, and click OK. Figure 16 displays an example of a profile for the lathe operation. Adjust the width of certain segments of the stem by resizing them, because they may appear too fat or thin. To enhance the look of irregularity, you will need to apply a little modification to the stem. Select the entire stem and press F3, the 3D cursor will snap to the center. Use the Explode Polygons action found under the Actions menu to give the stem the appearance of random roughness and thickness. Use mild values such as 0.1 for the Expansion Factors.

Petals can be done with again the same technique of extruding along a path action. Depending on your design, the petals will be modeled in such a way that they can be multiple duplicated once a single piece is made. As with other plants, you draw the path of the length of a petal piece as you would with a leaf, only this time the surface profile of the width of the petal piece is noticeably tinier. The two profiles in Figure 17 are examples

of a design of a petal type. If your flower were a rose, the petal shape would be very much different, and would not be as narrow as the ones in Figures 17 and 18. Move the petal piece to the edge of the top of the butt, and drag the 3D cursor to the center of the stem on the Top modeler window. Make a copy of the petal piece and tilt it slightly at a lower angle, and move it so it is adjacent to the original piece. At this time, while both pieces are selected, use the Duplicate Multiple action to fill the butt with a complete revolution of petals as in Figure 18. The total number of sections for this operation is 14, but it could be larger or smaller depending on your design of the petal type.

The last thing to do for finishing up the flower is to give it leaves. Please refer back to the section on making leaves,

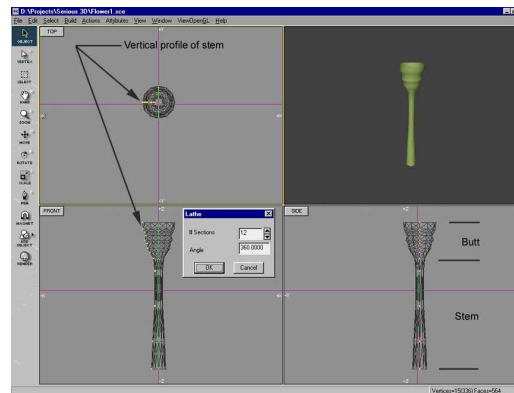


Figure 16: The stem can be lathed when the vertical profile is ready.

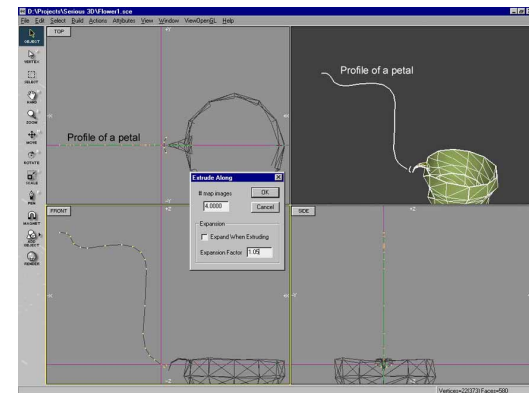


Figure 17: Extrusion along a path for a typical flower petal.

by now you should be able to crank them out without a hitch.

Grass and other vegetation

Are you ready for more details? How about grass and clovers? Making grass or clovers has been a major topic for creating photorealistic outdoor scenes among many 3D artists. These are tiny but very important elements that help bring believability to any 3D creation. However, producing grass and clovers is very time consuming and resource intensive, and could bring your machine's rendering muscle to a really good test. For Soft F/X Pro, although a particle system is absent, you can rely on polygons. The good news is the Renderer of Soft F/X Pro can render a large scene even with tons of polygonal grass.

First let's start with the clovers. Once again, draw a path as the profile of the length of a clover petal piece, and draw another profile as the width and use extrusion along a path action to complete it. As with other vegetation that were shown before, use multiple duplication to revolve a clover, and finally add a stem. Your work has been somewhat repetitive until now. To save the time of placing the clovers on the landscape with a random

fashion later in the Animator, you will do so in the Modeler instead. Now select the entire model and use a free third party plug-in named "Random Duplicate" (this Soft F/X Pro plug-in, along with many others, can be downloaded at <http://www3.tokyoweb.or.jp/yes/sfx/> or <http://cgi.tky.3web.ne.jp/~chiisuke/>) to produce the effect of multiplying the clovers in a random order.

Figure 19 shows a panel of the plug-in that is in use. Type about 20 for the total number of duplicates. Check the Z-axis box only because you don't want your clovers turned upside down randomly. Give a range of 30 for both L/R and F/B, but put 0 in U/D, and the clovers will be duplicated along X and Y axes only, so you will not get a clover floating in mid air. As a result, Figure 20 shows the aftermath of the random duplication.

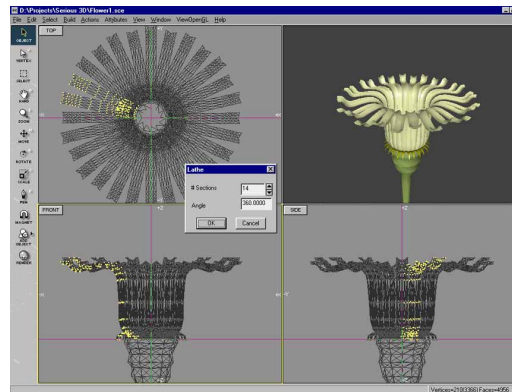


Figure 18: Create a revolution of the petals with the Duplicate Multiple action.

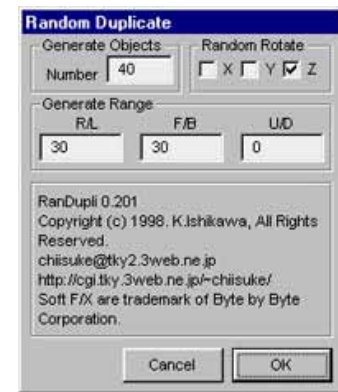


Figure 19: The Random Duplicate plug-in panel.

The creation of grass is perhaps the simplest of all. Unnecessary rendering time can be avoided by keeping the grass polygon counts as low as possible. Low polygonal grass looks just as good. Create a Polygon primitive by pressing F7, on the Primitive panel. Reduce the Sides value down to the minimum, and click Make to insert an instance of the polygon. Extrude the polygon about 3 times using CTRL E. Then alter the horizontal sections of the grass piece slightly so that it will not look too straight. Select the top most vertices only and Weld them together to a single vertices by pressing CTRL W. Making a grass piece was easy indeed, but placing a piece at a time on the landscape is no joke. This sounds like a job for the Random Duplicate plug-in again. Experiment with the settings on the plug-in panel, and you should yield some very interesting results as in [Figure 21](#). That is a tiny bunch of grass pieces, but if you use the plug-in again, and again until you get a field of grass, that's another story.

Now is the time to put the grass in good use. Load the landscape you did at the very beginning, and import the grass field to the landscape model. You may need to move

and resize a bit in order to fit the landscape proportionally and effectively. With the OpenGL shaded view window, you can now zoom in on one area at a time, and start deleting or moving any grass pieces that you may not want or at the wrong coordinates, the shaded view will show you the conditions of every piece of grass you manipulate. As you can see in [Figure 22](#), the grass field is being modified and positioned with the landscape. This will take a while, but it is well worth the time at the end.

Solid as a rock

I am sure you would find lots of them in the parks; the rocks are very similar to the primitive sphere, and therefore making them is easy. Press F7 and click on the Sphere tab, then click Make to create a sphere instance. Scale it

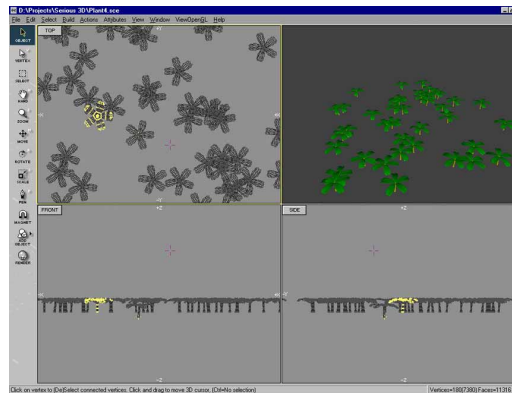


Figure 20: A clover being randomly duplicated.

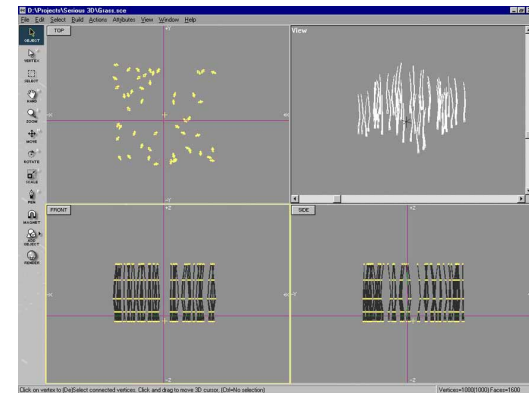


Figure 21: Giving the landscape some grass is much better than none at all, even if it's polygonal.

along the Z-axis by holding down the CTRL key while you left click and drag the mouse until you see an oval profile on the Front modeling window. Next pick the Magnet tool to deform the sphere just a tiny bit at each side of the 3 axes. Soft F/X Pro's Magnet tool behaves differently when compared to other 3D programs. It is not an organic deformation tool, but it will randomly relocate vertices by attracting or repelling them to or away from the 3D cursor. The rock model in [Figure 23](#) is first deformed with the Magnet tool, and later being exploded in small explosion factors to create surface irregularity.

Texturing the jungle

The texture system in Soft F/X Pro is well implemented, flexible, and effective. You can mix a combination of as many as 8 mathematical procedural shaders on a single polygon, and that is without counting other properties such as surface, bump, reflection, and transparency maps, and all can be animated over time. One of the best features perhaps is the Glued mapping type. Any model that has a Glued map applied can be dis-

torted in any way along with the textures as if a skin is welded to the model, very handy for deforming the trees with bones.

Applying texture maps

Applying texture maps to the plants and trees is almost the part that is the most fun; you get to use the OpenGL shaded view window to see the texture manipulations in realtime. In [Figure 24](#), a leaf texture is being applied to the leaf model with the planar mapping type. In this particular instance, you need to do the mapping 4 times for each of the leaves, and that includes the stem for each leaf. However, you can save yourself some time when you first modeled the leaf before duplicating it. Apply the leaf with a Glued mapping texture first; later no matter

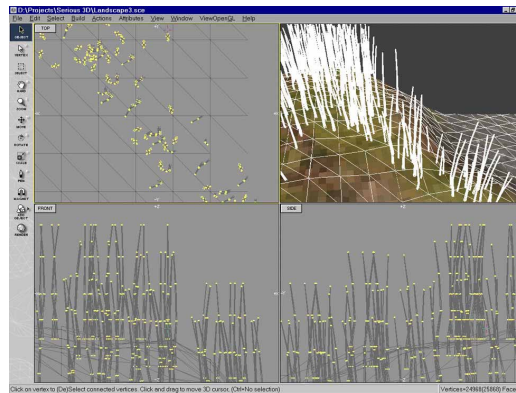


Figure 22: Putting grass on the landscape will save you more time in the Modeler than in the Animator.

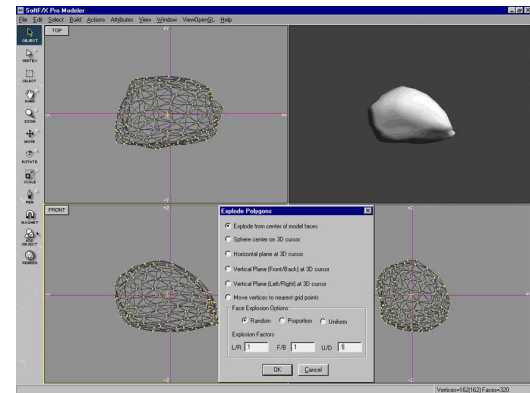


Figure 23: A deformed rock model getting its surface irregularity.

how many duplications you need, the textures will always be on the leaves because the textures will automatically be copied with the leaves. This could save you a huge amount of time when you are creating the clovers.

Deformation with Glued Mapping Not all objects will use the same mapping type, especially those that are tube-like, such as a stem, or a tree. Mapping a tree is really a no brainer, as in [Figure 25](#); the tree's texture is being applied with the cylin-

drical mapping type. However, if you later deform the tree with bones, you will find that the texture does not bend with the model; if a branch is bent, the texture just

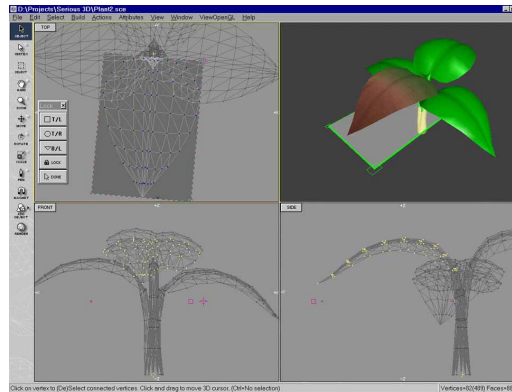


Figure 24: Planar mapping type is used for applying textures on generally flat model surfaces.

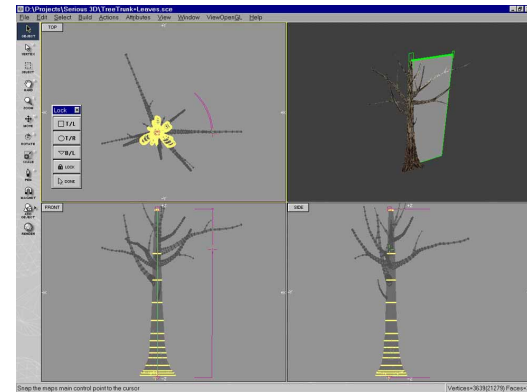


Figure 25: Cylindrical mapping type is used for applying textures on generally tube-like models.



Figure 26: It is important that you click the Glued mapping type for texture map conversions.

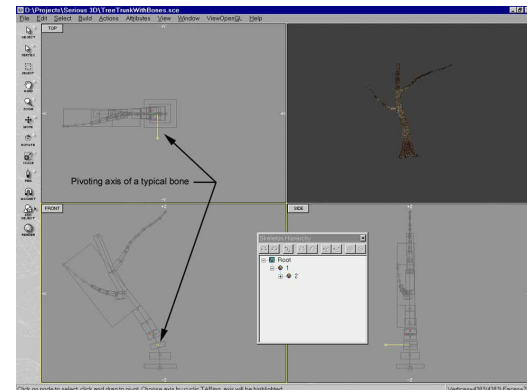


Figure 27: Bending a tree with bones.

won't follow. Hence, as with all models that you are going to animate, convert the cylindrical map of the tree to a Glue map. With the trunk selected only, choose Glued Mapping > Convert Normal Map to Glue Map under Attributes pull down menu, the panel labeled Set Glue Coords from Map will appear. Now select the map name that you'd given to the texture for the tree, and very importantly, select either as planar or cylindrical originally; your Glue map will not convert successfully if you made a mistake here. Go back to the Image Map Settings, [Figure 26](#), by pressing F8, and click the Glued mapping type to complete the conversion.

Now try posing the boned tree in the Modeler and see if the texture is reacting accordingly. Choose Skeleton > Pose from the Edit menu, and your tree instantly switches to bounding box mode. Select a joint, press the Tab key to cycle the bone axes until you find the one you like to pivot the particular segment of the tree, and start clicking and dragging the mouse as in [Figure 27](#). Do a test render and see if the texture is following the deformed tree.

Putting your jungle together

When all the modeling and texturing are done, it is time to commence your jungle. Inputting models in the Soft

F/X Pro Animator is as simple as clicking the Insert button on the Tool Bar. Select a model type before loading a model, but if you plan on importing many trees, make sure that you choose Model for trees that you do not want to do any further bending. Otherwise select Robot for those that you want to fiddle more on their poses, especially if you want to work with other objects around the trees visually.

Deal with your objects

When the stage is packed with tons of objects, it is often laborious to precisely place the models without missing the correct coordinates. The OpenGL view camera window is a big help, but your display power will be bogged down with an overly complex scene such as your botany. One of Soft F/X Pro exclusive features is that models and polygons will be clipped away when you zoom in close to a particular range. In [Figure 28](#), a cluster of clovers are being placed on top of the landscape, many of the surrounding plantations are clipped away, thus revealing a much clearer relationship between the clovers and the contour of the landscape. Always zoom in to a certain area in which you need to do accurate placing.

To further visualize the accuracy of the location of certain objects, the clovers in this case, you normally may

want to do a few test renders. But a faster way is, besides using the main camera, is to use a new camera and move around the clovers by setting the new camera's target to them. And instead of doing test renders, do wireframe renders as in [Figure 29](#). To change the camera's target, you need to open the Keyframer by pressing the K key. Select the new camera and the Keyframer will jump to the camera's channels. Double click on the Rotation channel key (the green square) and the Rotation Channel panel will appear. Select the clovers as its new target by clicking on the Target button and click OK. You should see the camera window reflect the changes. If you don't see any changes at all, your new camera may not be activated, so use the right mouse button to click on the new camera and select Activate Camera on the popup menu to do so. Wireframe rendering is much faster than shaded rendering; you will receive enough information about your objects among each other. With these techniques in mind, you should not have any problems positioning your models.

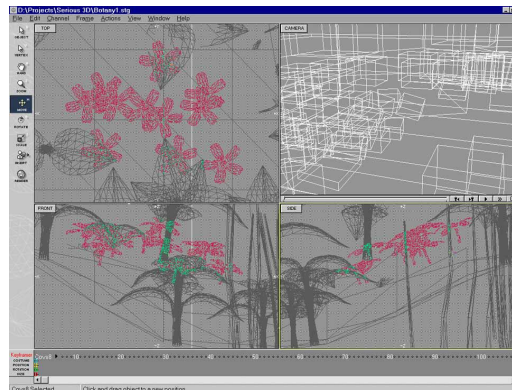


Figure 28: Zooming close to a specific object will have the surrounding ones clipped away.

Where is the light?

Lights in Soft F/X Pro are unpredictable. A normal light, or similar to a point light in other 3D packages, often produces inaccurate shadows. Unless you really need to, I only recommend the use of spotlights, because they are the easiest to control and more predictable than normal lights, also their shadows are more accurate and look better. Hopefully these issues will be addressed in the next version.

First thing you need to ask yourself is where the light is coming from. If your scene is going to be rendered in a daytime setting, all you need to do is to decide where the

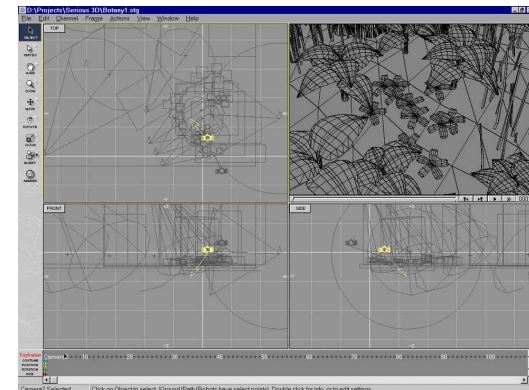


Figure 29: Using wireframe renderings to check your models is fast!

sun is located. In [Figure 30](#), you see about 8 spotlights; well, to simulate sunlight, and to maintain the shadow accuracy, you have no other choice. About 7 of them are pointing toward the same direction, more or less. Doing so will neutralize the intensity of the lights, and the range will be evened out throughout the landscape. Shadows from the trees and others will fall at the same direction as well. You may wonder... What if the same tree is casting two shadows when two spotlights light it? This is technically inevitable, you will just have to place the spotlights in such a way that the effect is reduced to the minimum. Another way to try avoiding the situation is to move the spotlights very, very high in the sky, increase the distance between the spotlights and the landscape and narrowing the light cones. The result can be rewarding.

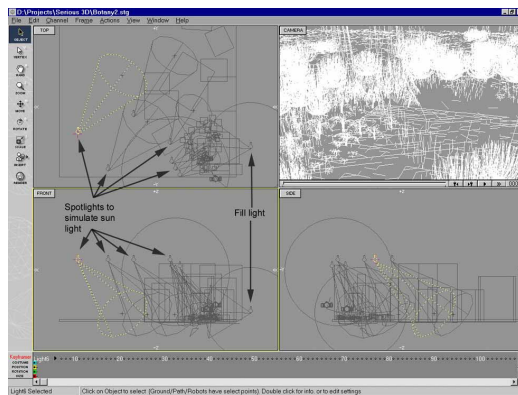


Figure 30: Using spotlights to simulate sunlight.

The last light that you find in [Figure 8](#) is the fill-light; you need it because the models need to have some degree of reflected lights on the other sides opposite to the sun light. This spotlight however must be adjusted to a lower brightness setting in order to serve its purpose.

Render and be proud

Adjust the main camera by moving either or both the camera itself and its target, until you find the right angle. To increase the depth of your rendering, try moving your camera to a location that it is next to a tree trunk, and that the camera view window reveals a bit of that same trunk. This will give a feeling that the trunk is served as a distance scale when it is really close to the viewers. Next thing to do is to add a little haze to the botany by using the Fog post processing effect. Press I to load the post processor panel, and click Add to load the Fog effect. Experiment with different settings until you get the most believable result. I found the following setting to be quite pleasing. Set the Final Visibility to 65%, use Haze instead of Fog, and set the Start Distance to 15 with the End Distance set to 25.

Before you go ahead to render your scene, you'll need to do a few things to enhance the look of the scene when it

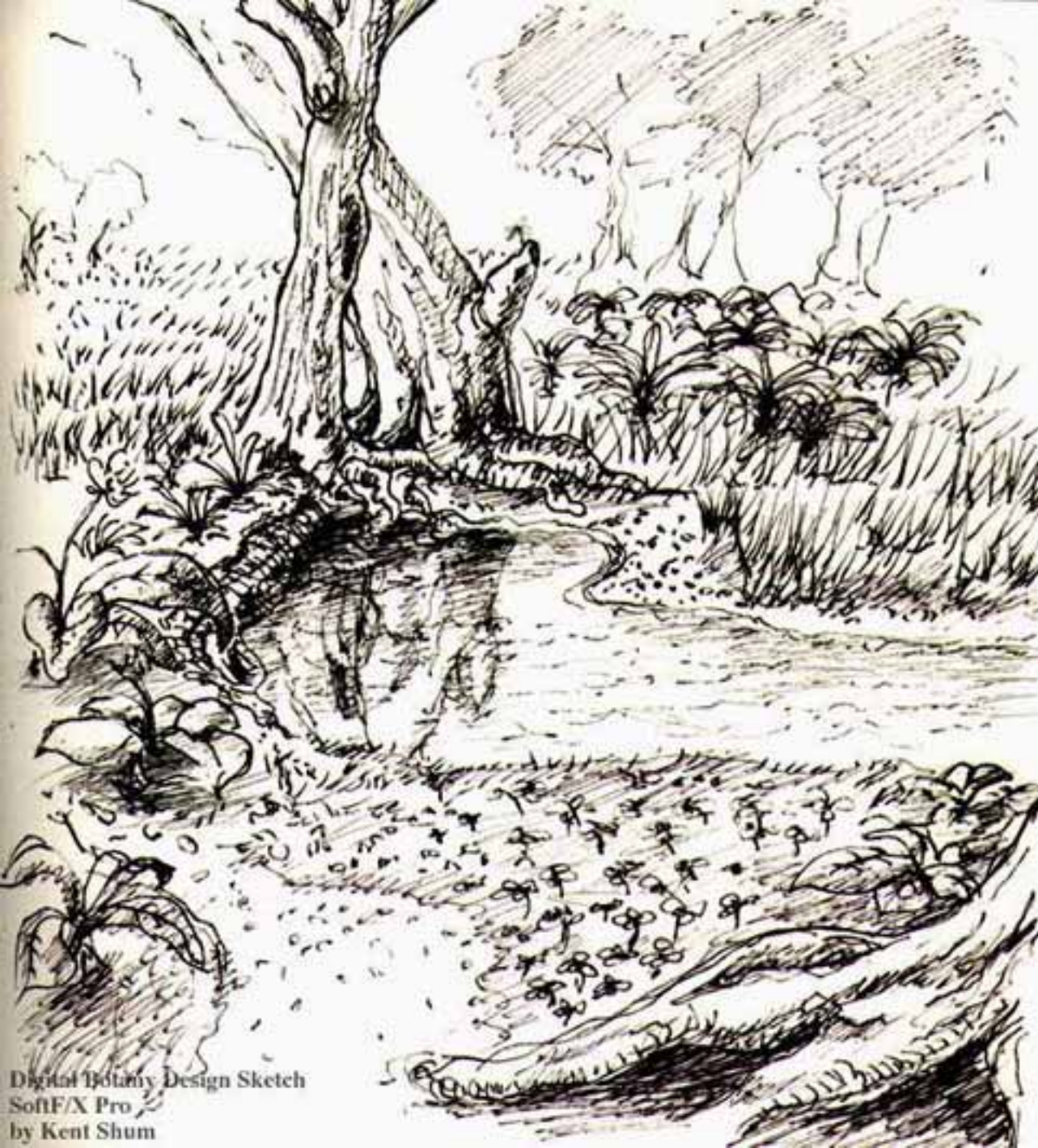
is rendered. Click on the Render button on the Tool Bar, and choose the Settings tab. Set the Ambient Lighting to only 1% to increase the contrast of the rendering. Next, set the Shadow Density to about 80%. This will make the shadows from the spotlights more noticeable. And lastly, set the Spotlight Buffer Size to 800 in order to ensure shadow accuracy.

Well, go ahead, render and be proud!

Biography: Kent Shum is a freelance digital 3D artist and animator who produces materials for games, architects, and multimedia developers. While residing in New York City, his works has been displayed in the Siggraph trade shows and on magazines. Among his clients are Pepsi Cola and Spencer Gifts. Visit his website at <http://members.aol.com/mindwksint> for the rendering and animation of the Soft F/X Pro version of "Digital Botany" and many others. He can be reached at mindwksint@aol.com or 7189968931 by phone.



Figure 31: Final rendering of the SoftF/X Pro botany.



Digital Botany Design Sketch
SoftFX Pro
by Kent Shum



OBJECT



VERTEX



HAND



ZOOM



MOVE



ROTATE



SCALE



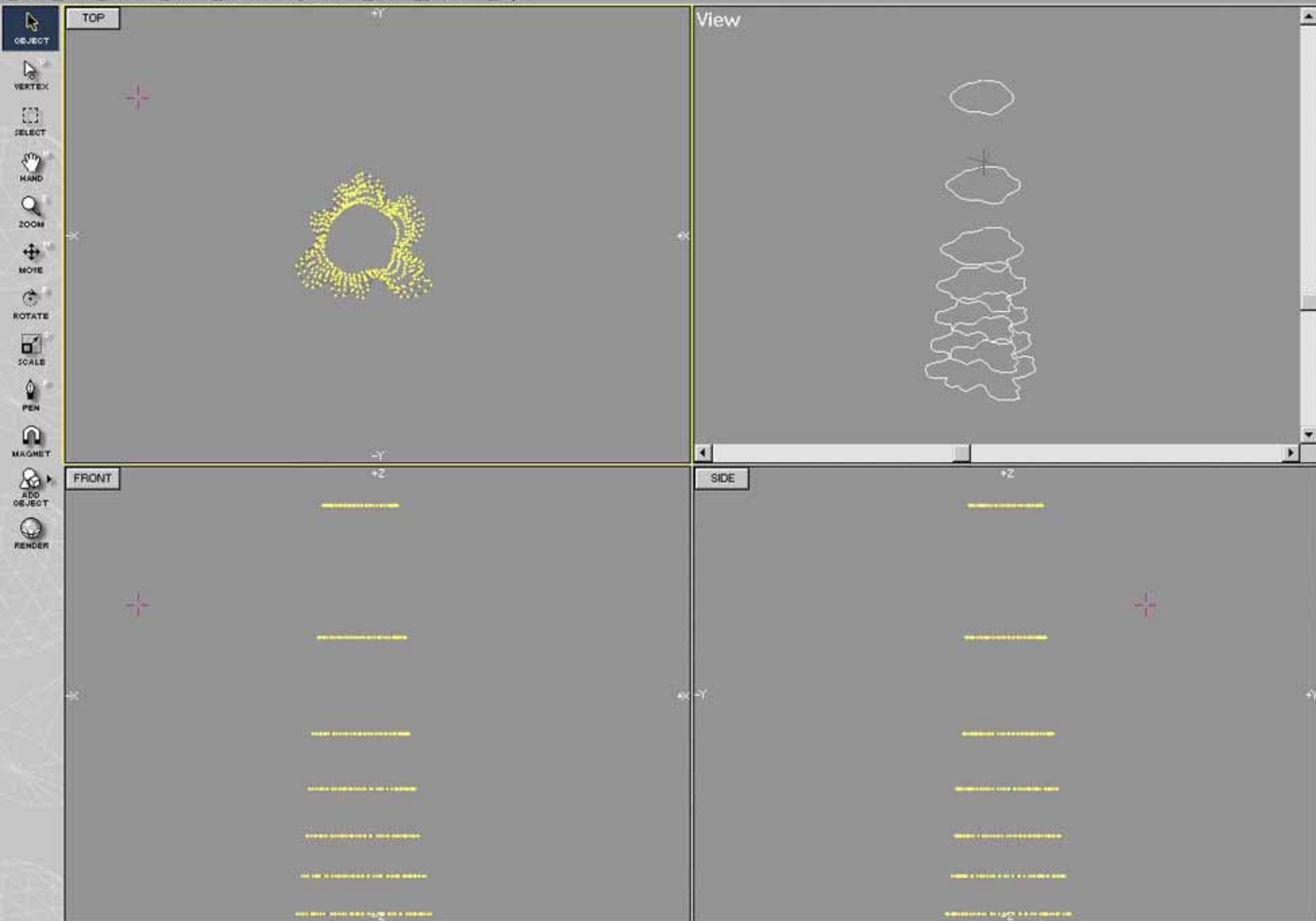
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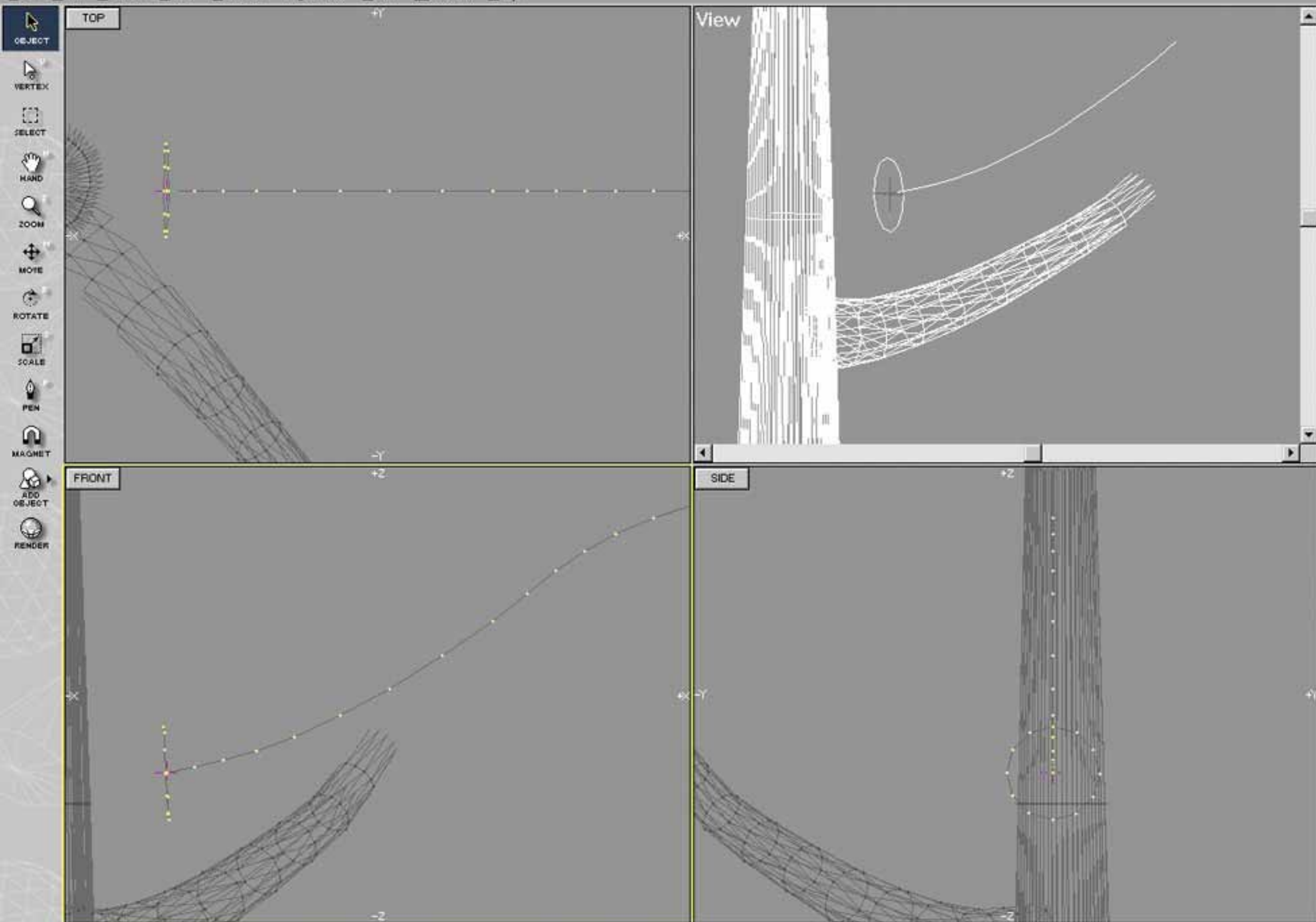


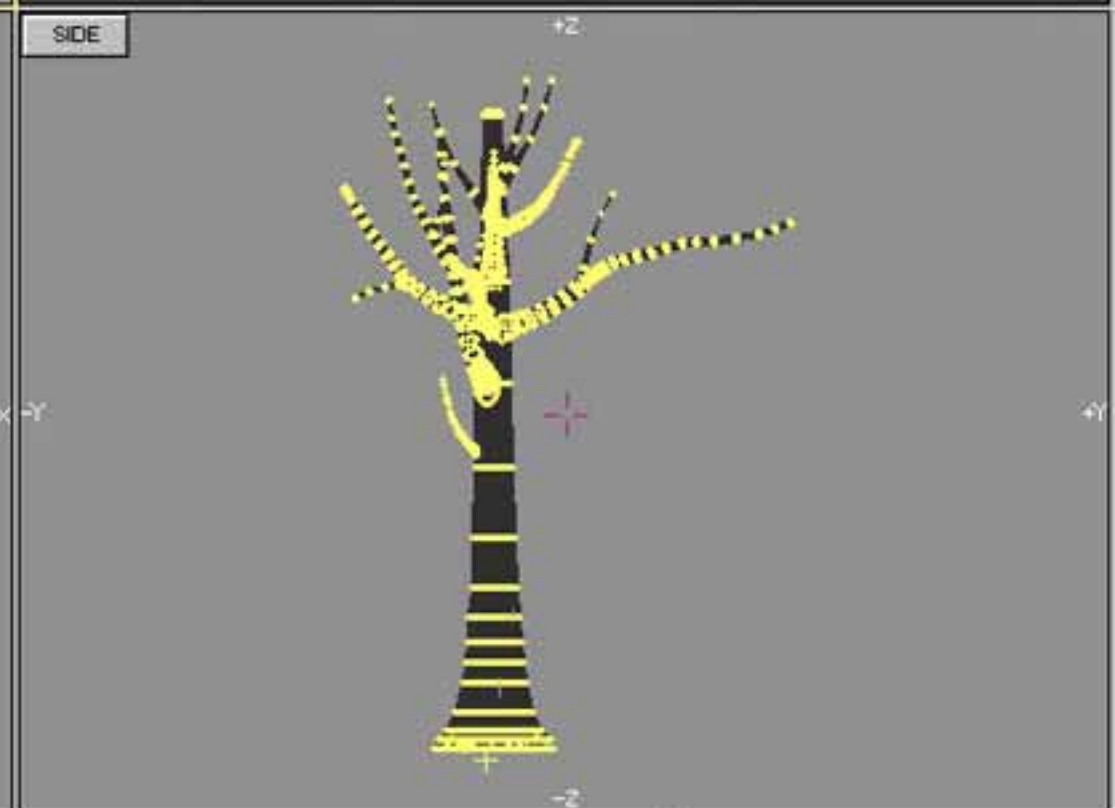
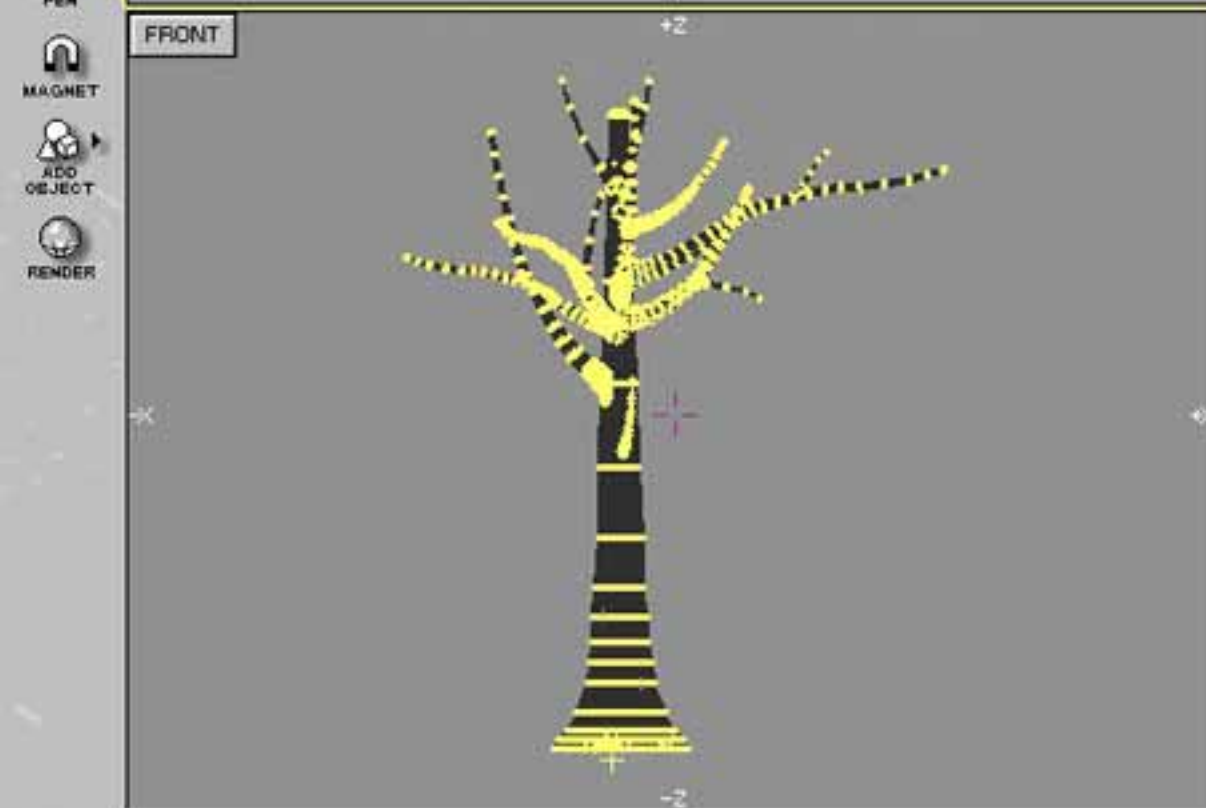
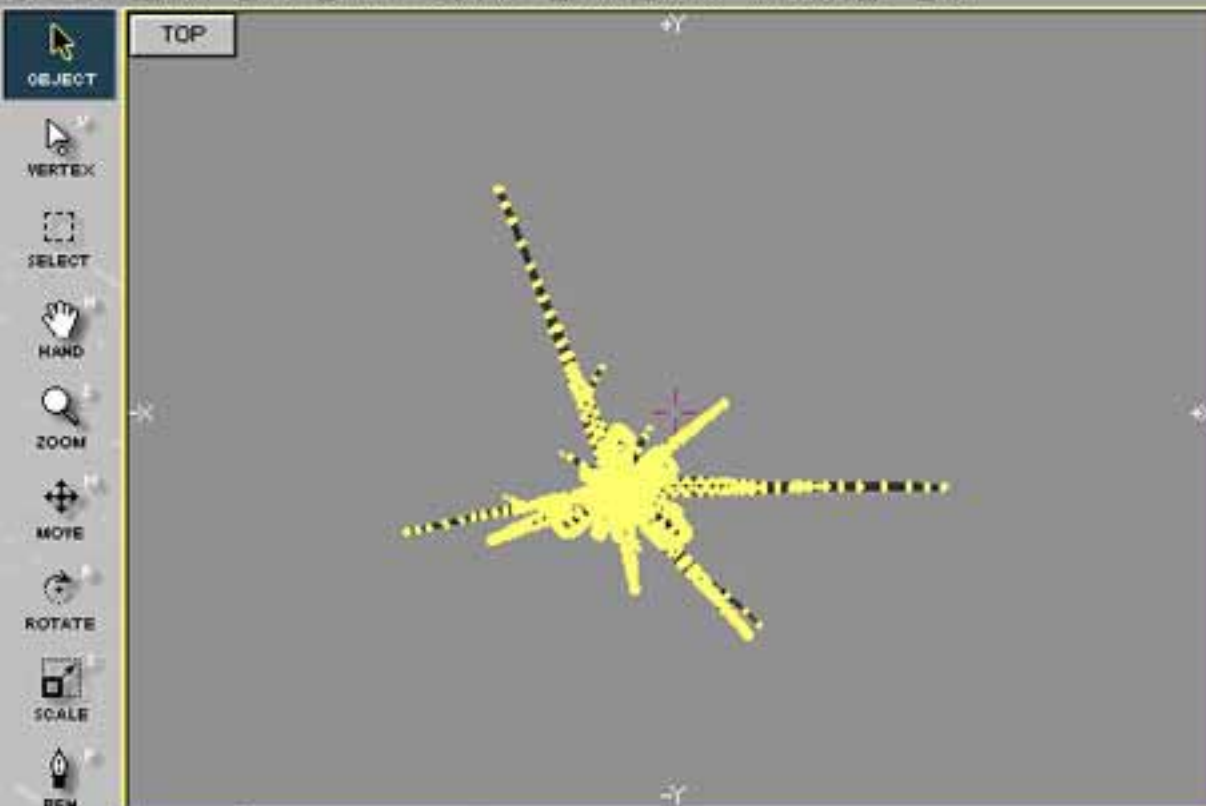
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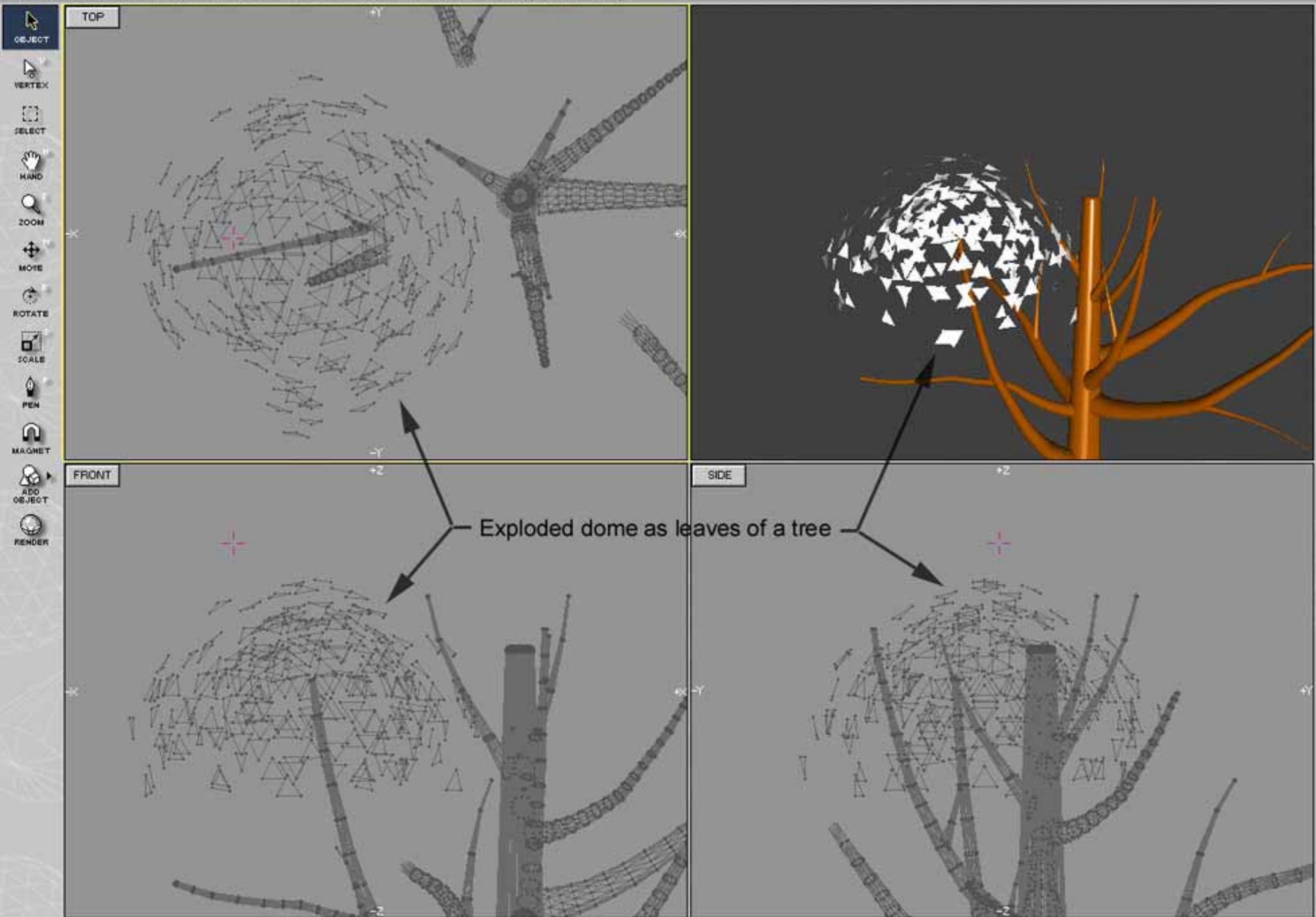


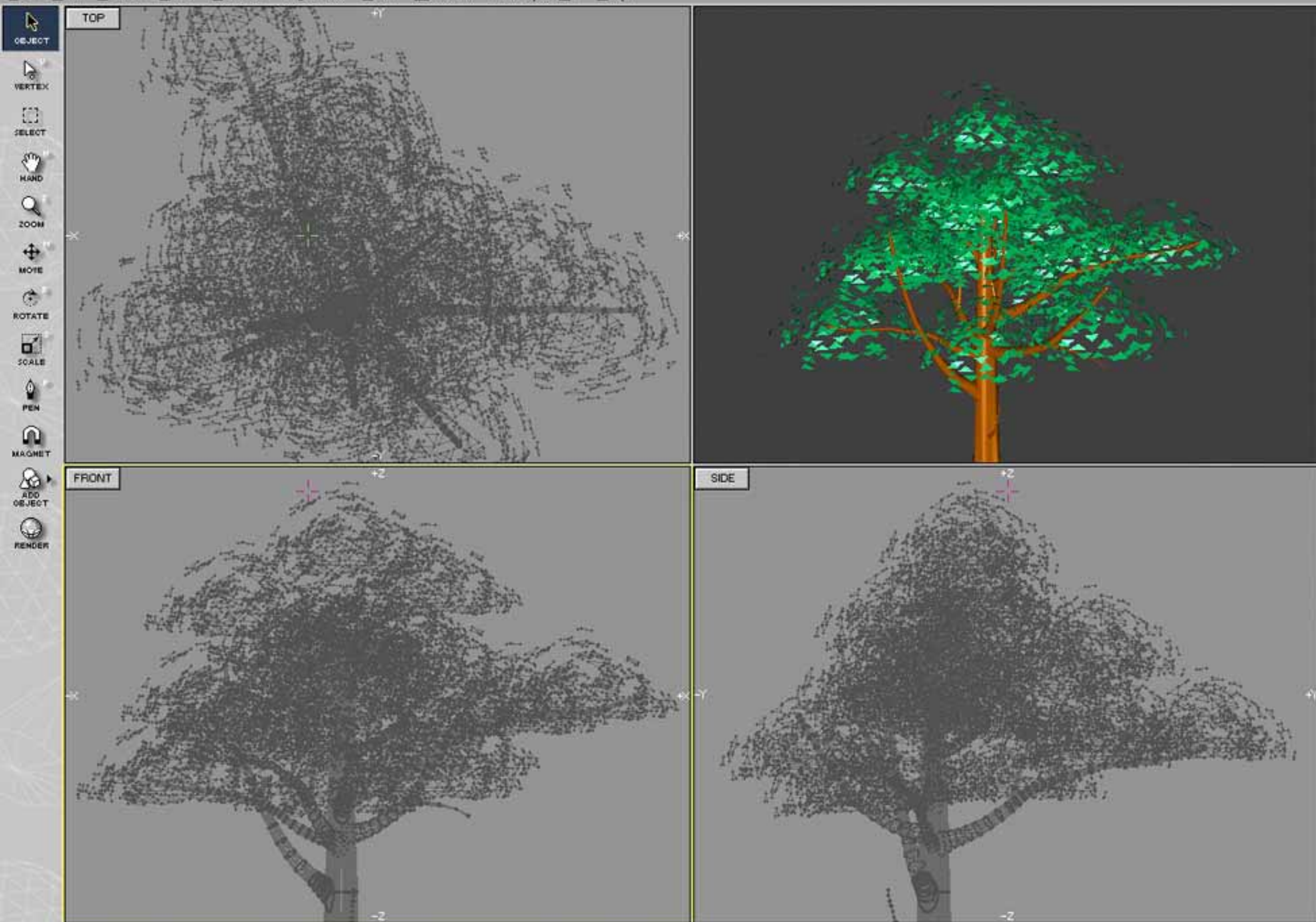


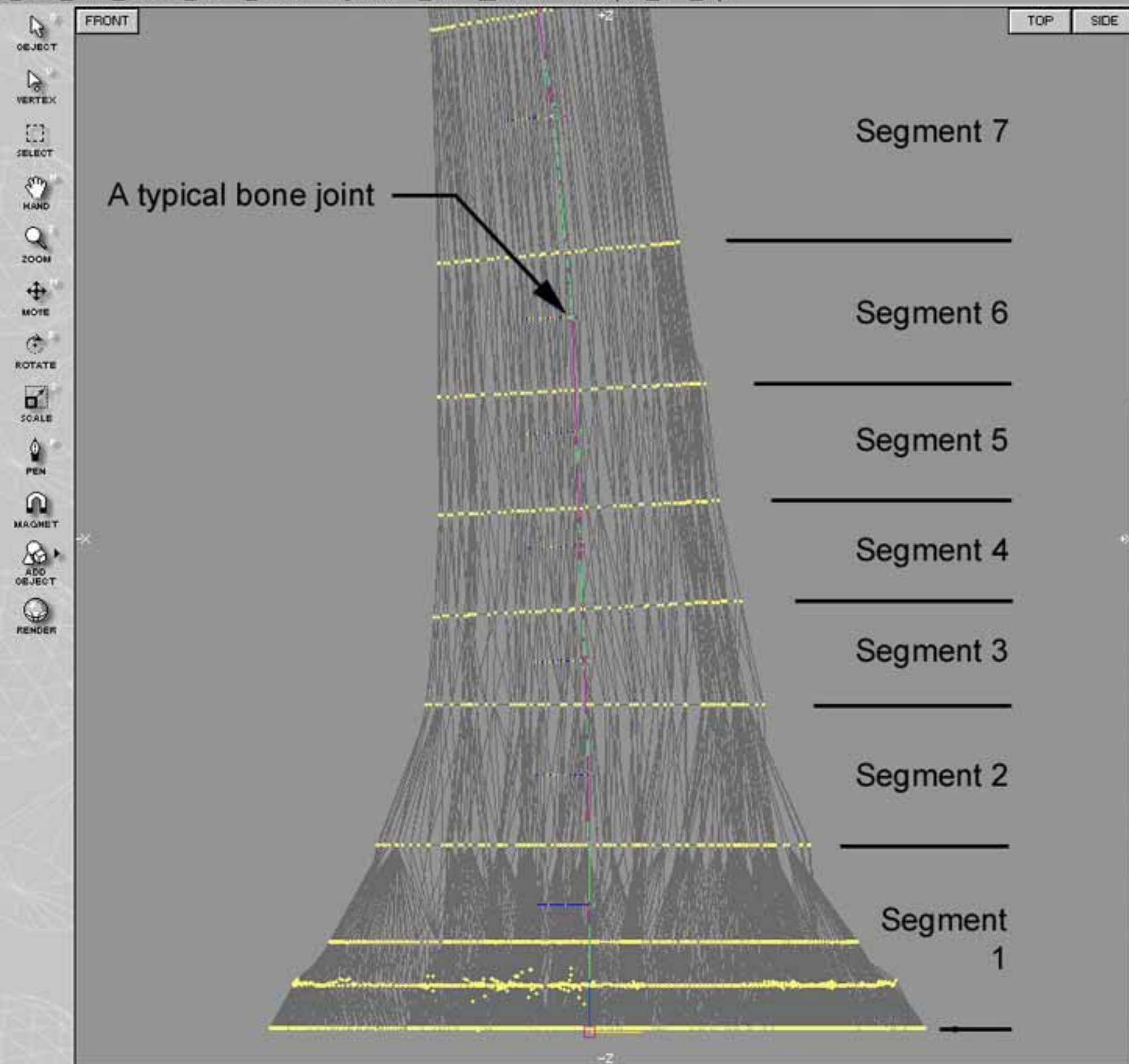


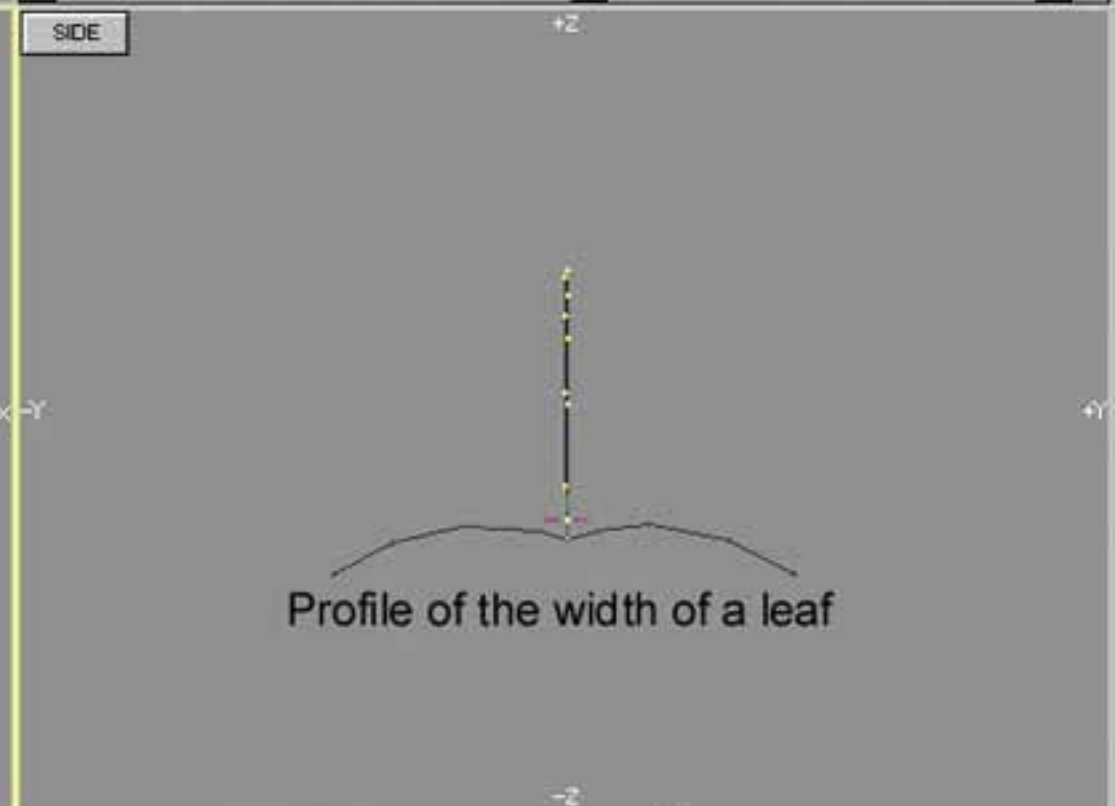
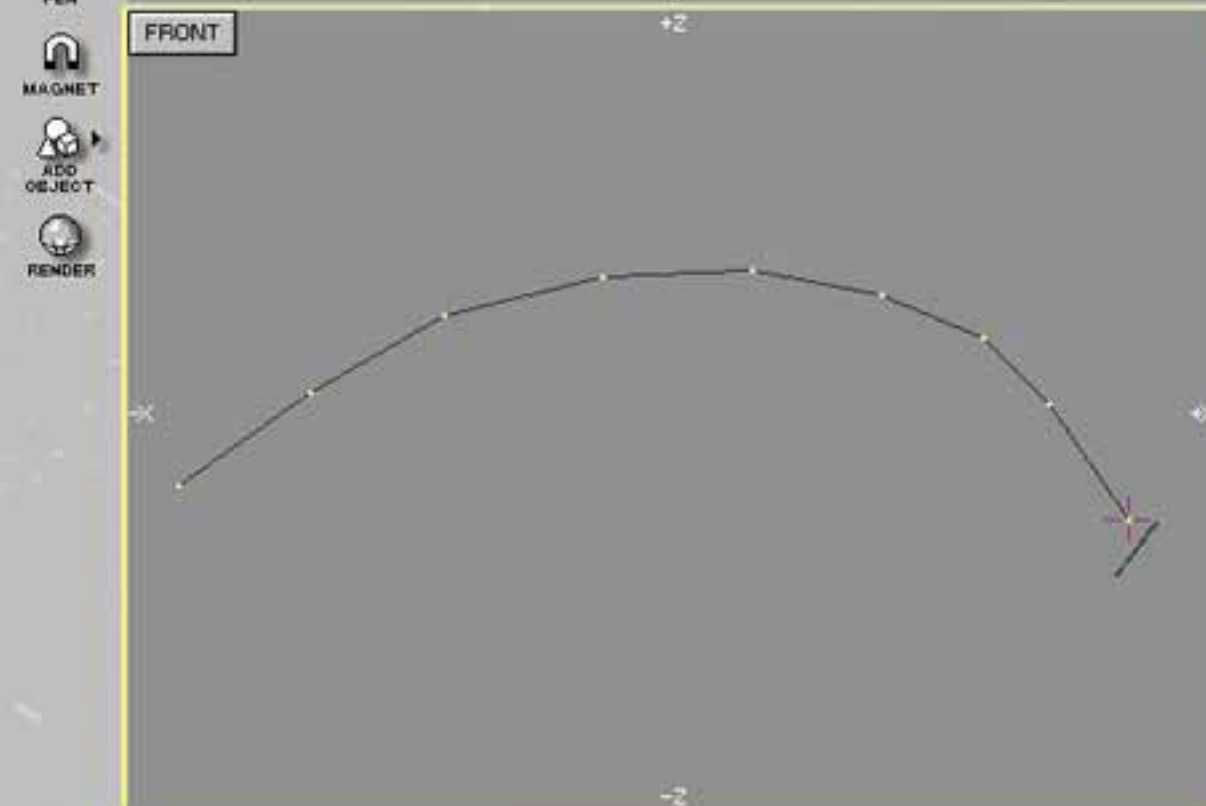
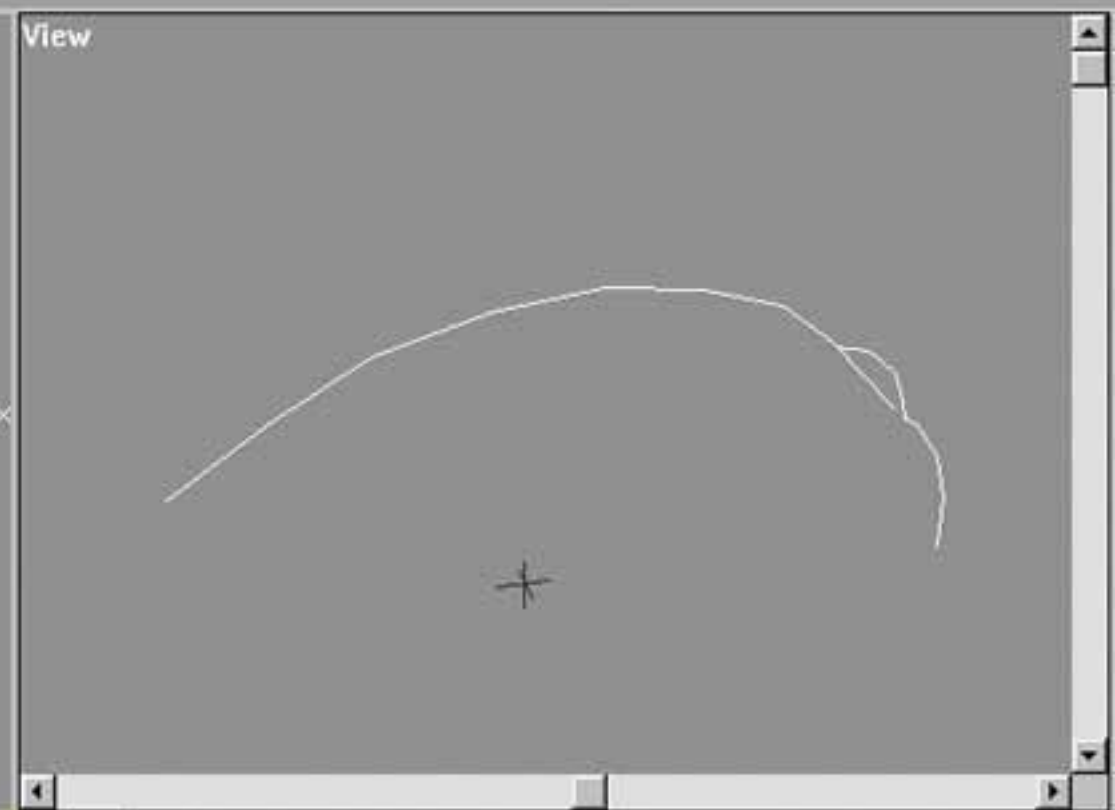
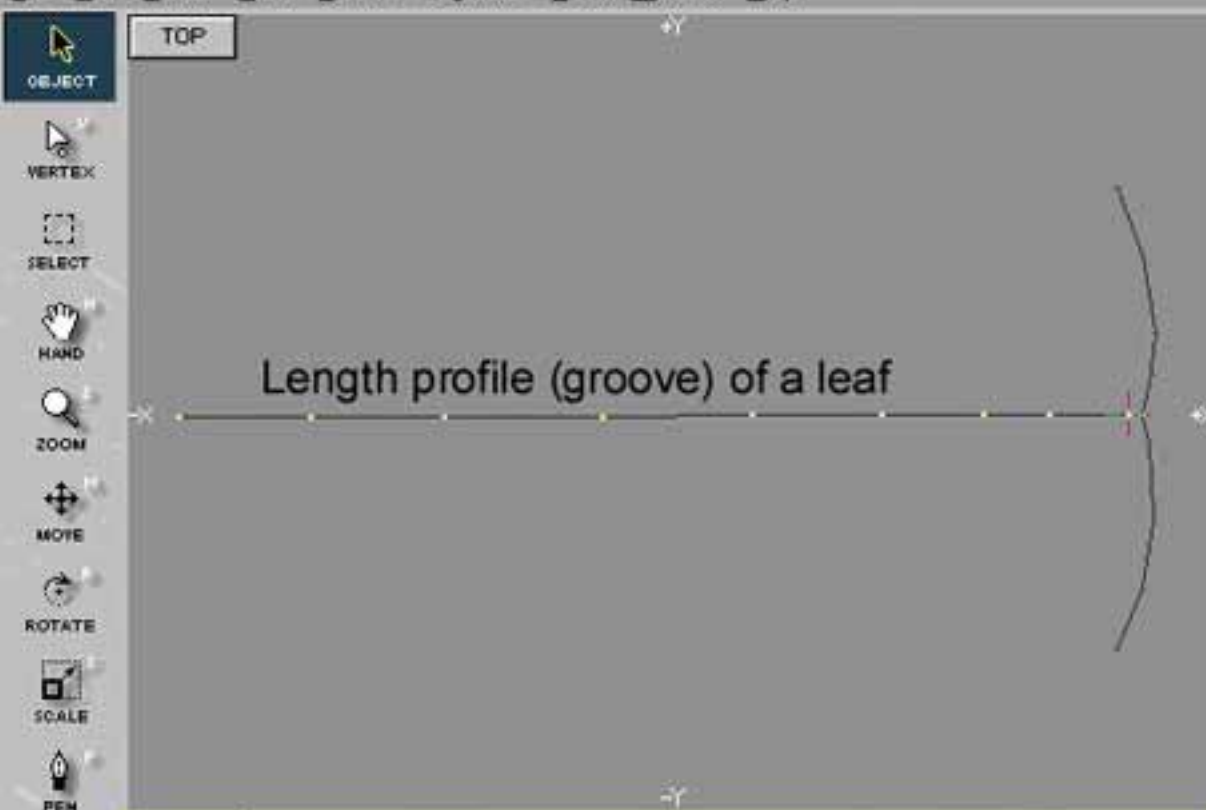


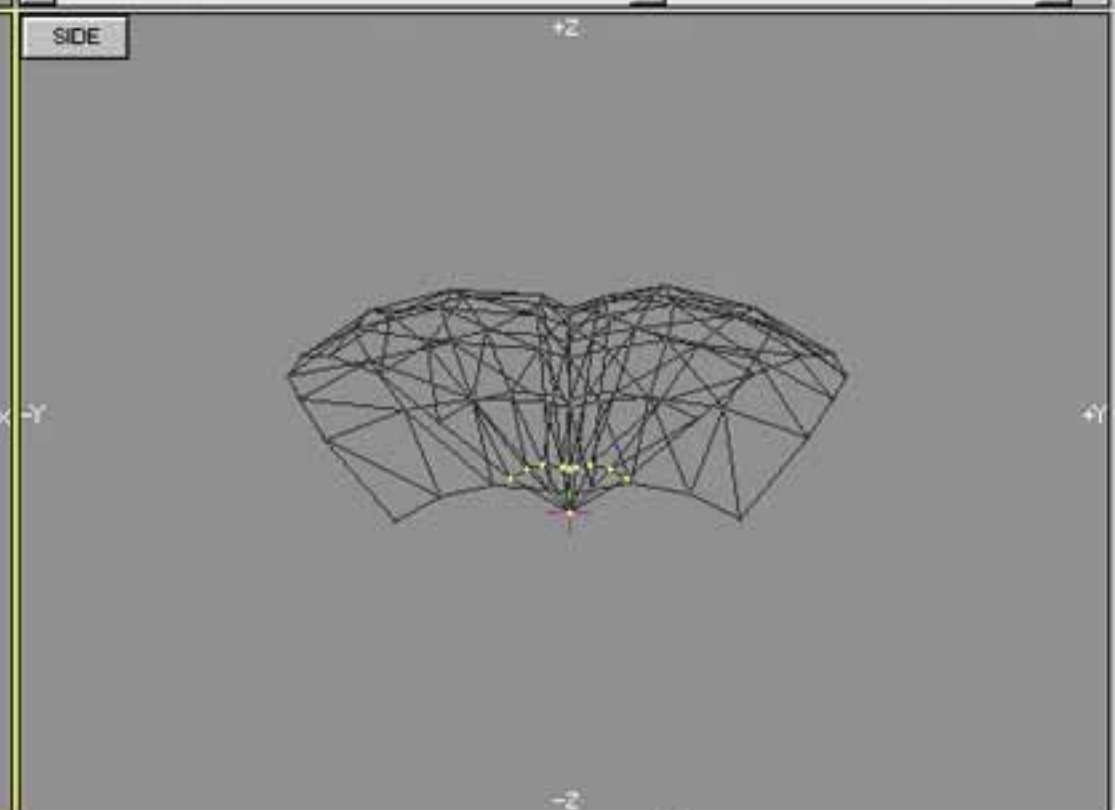
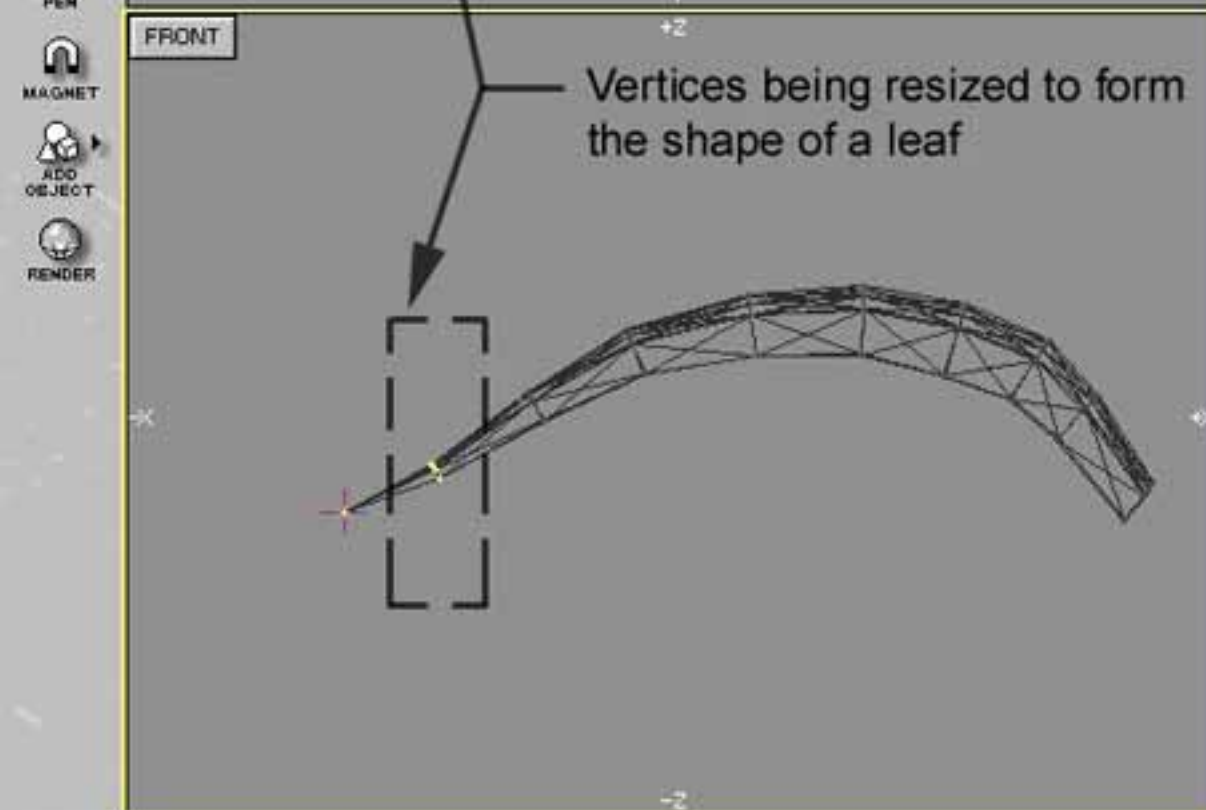
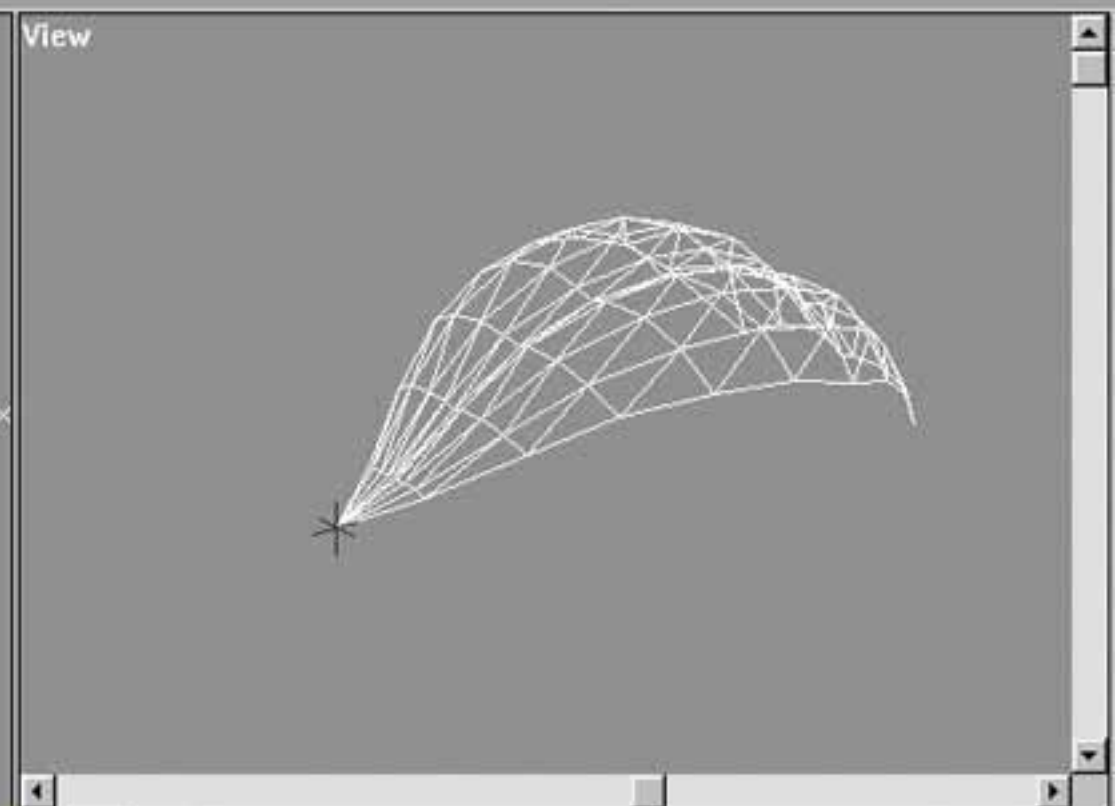
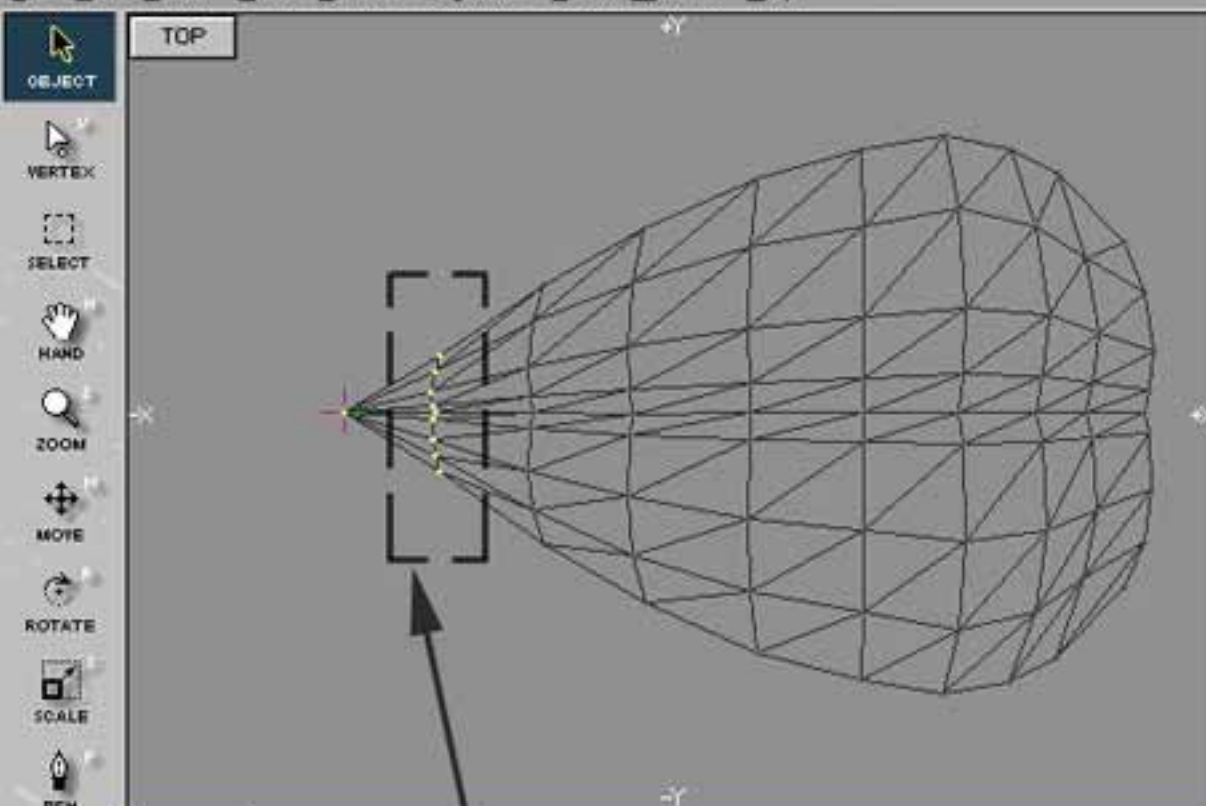


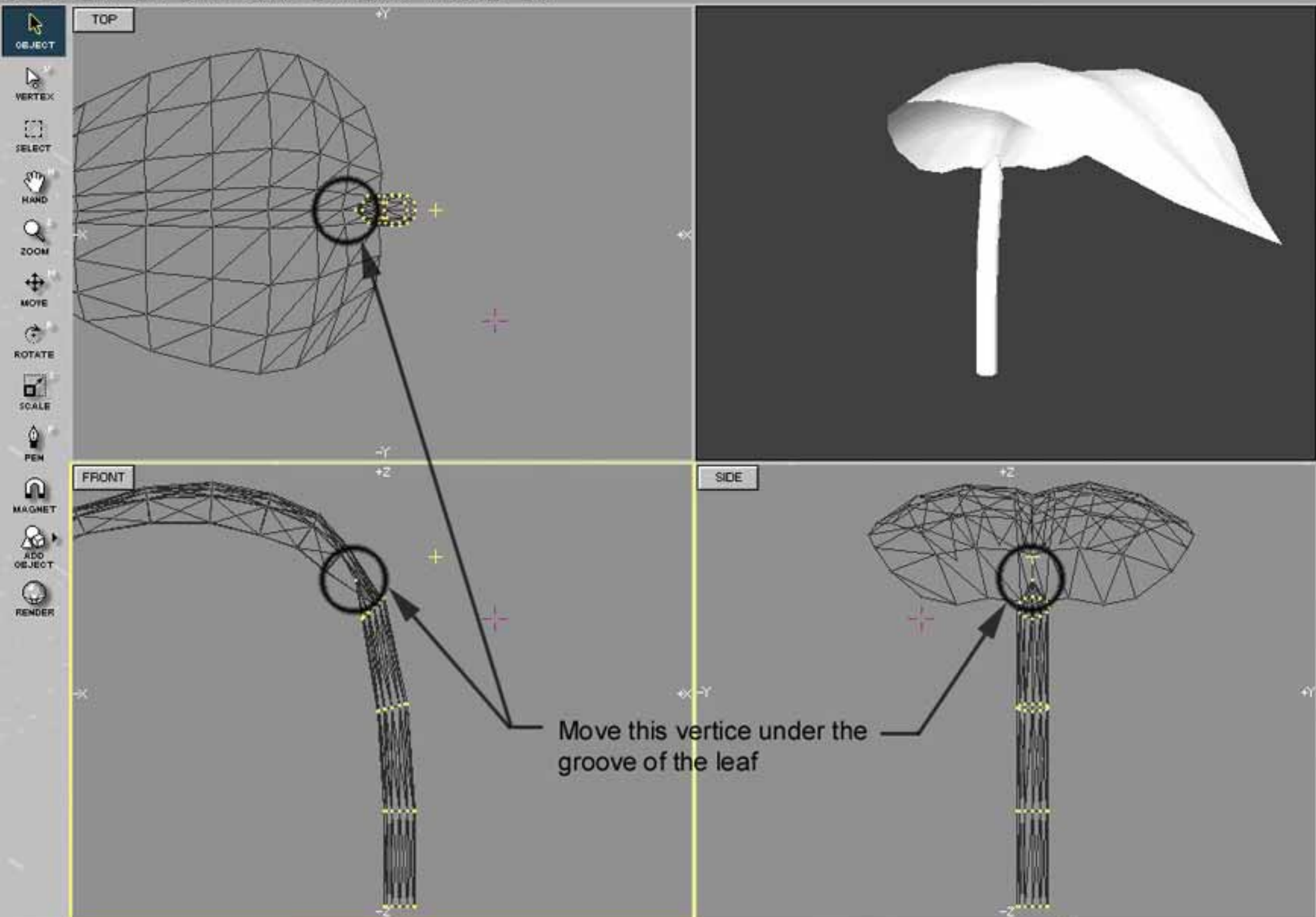


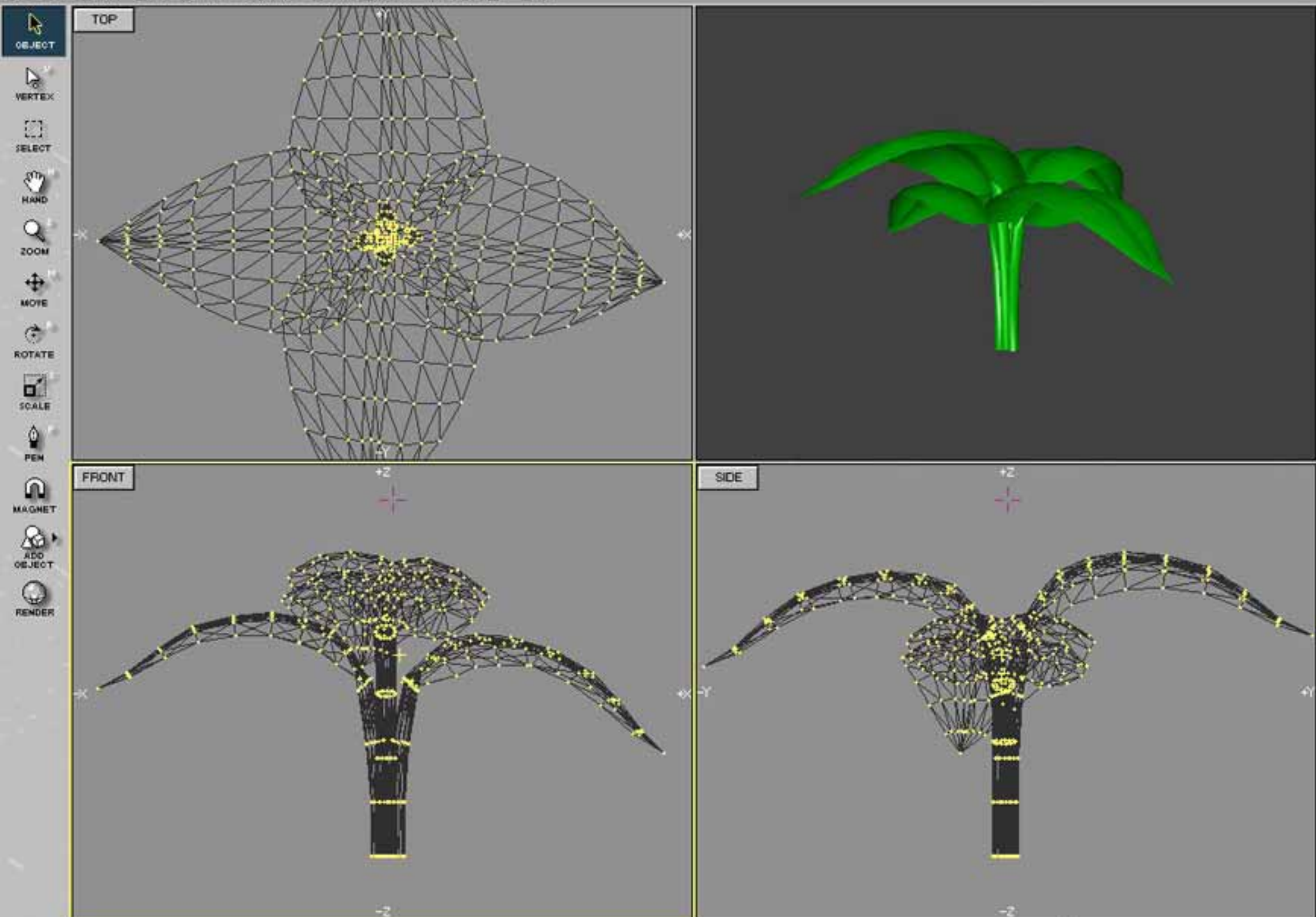


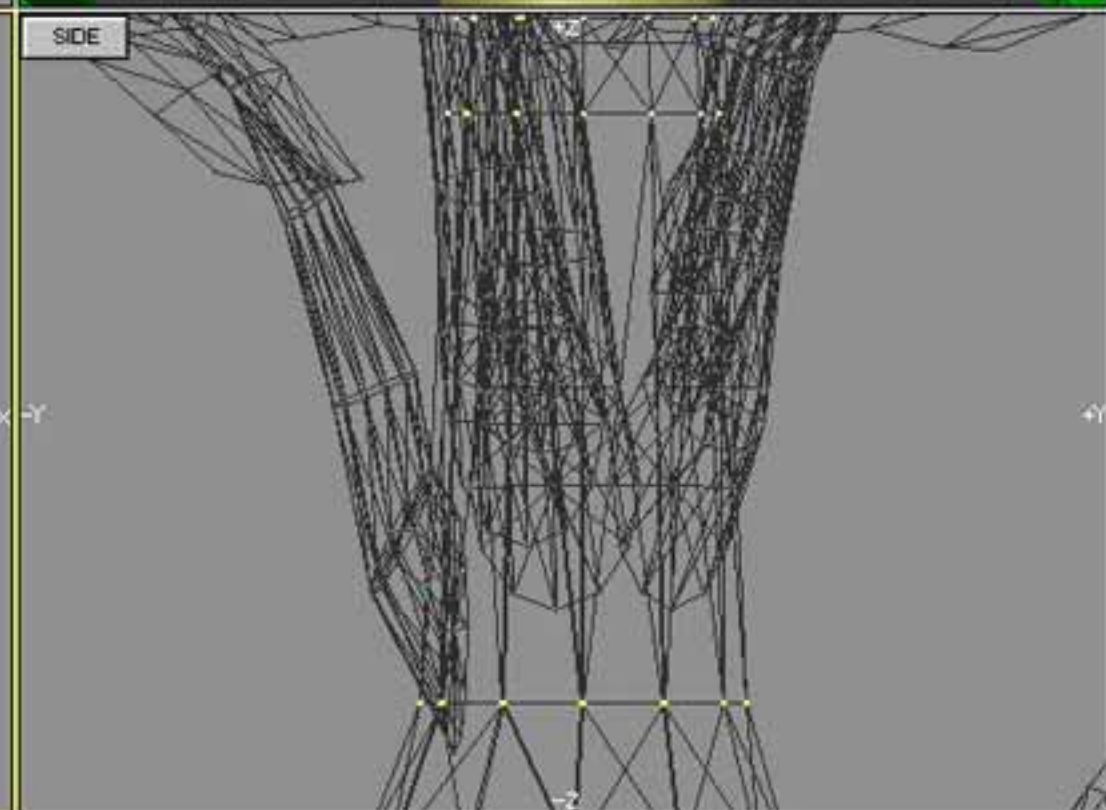
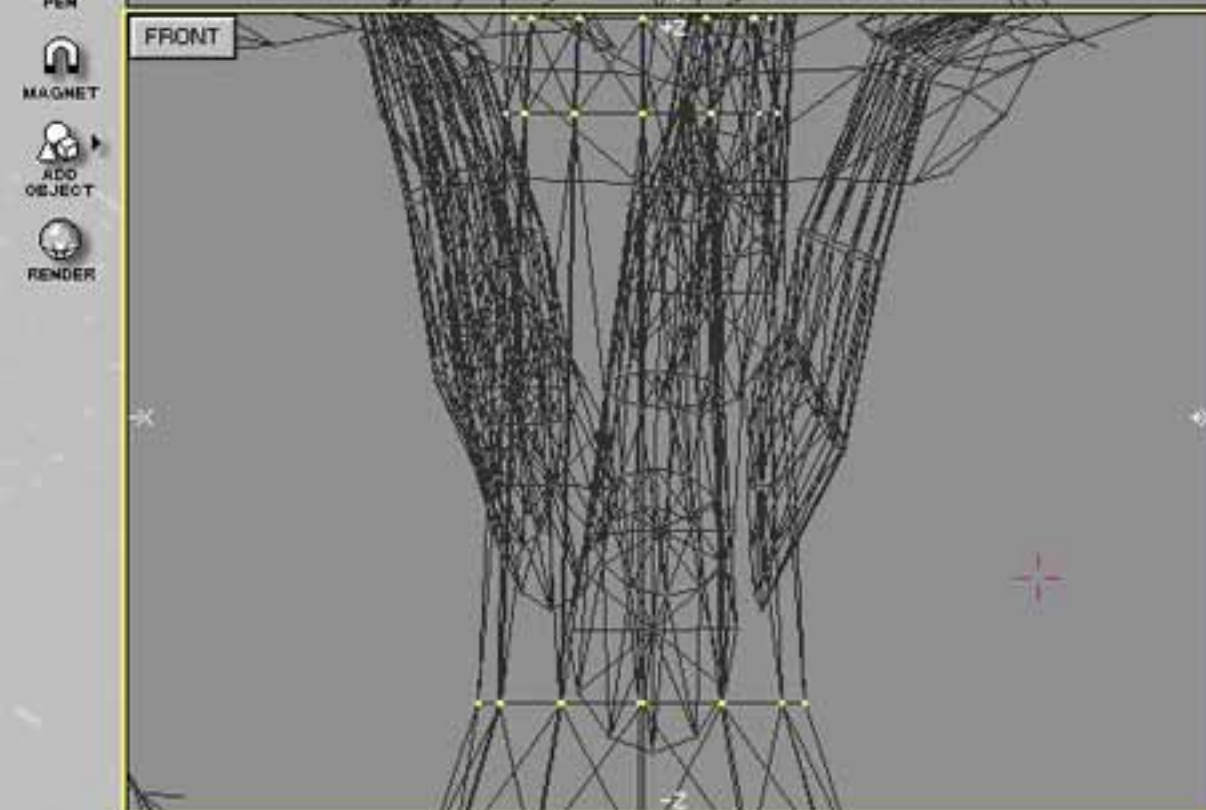
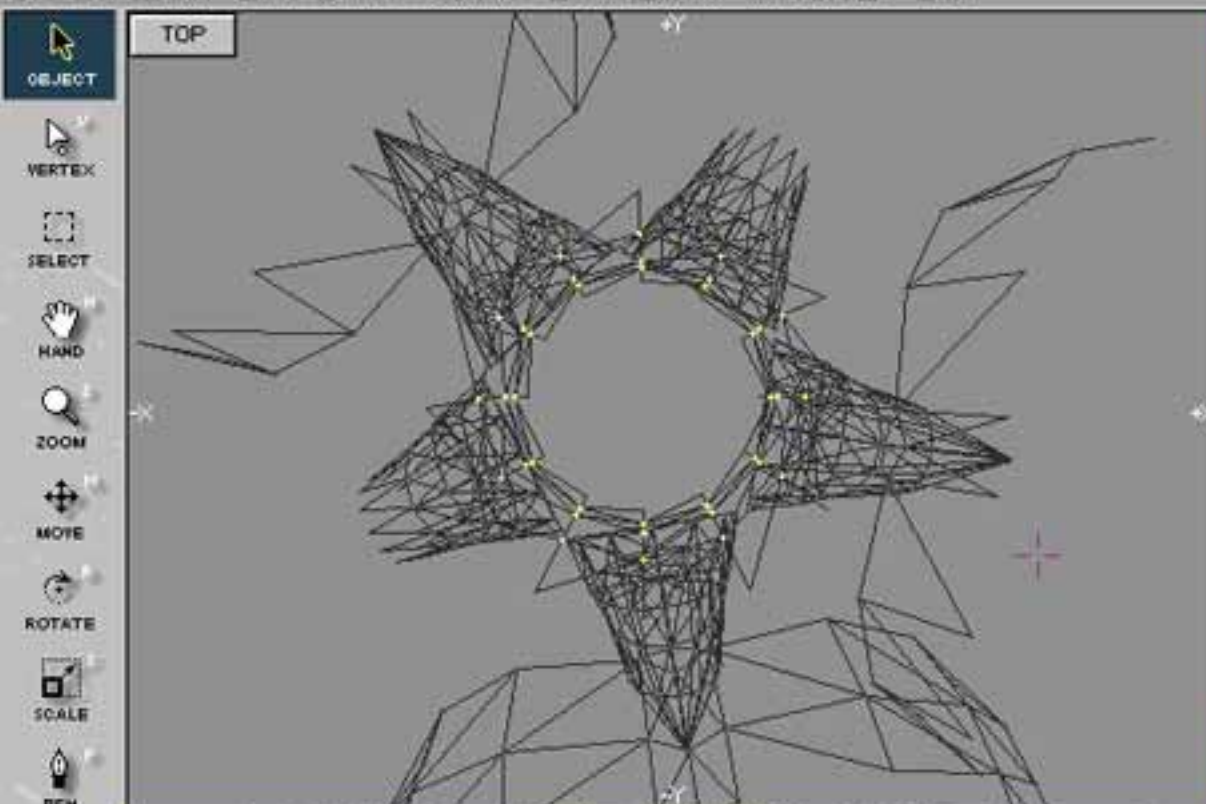


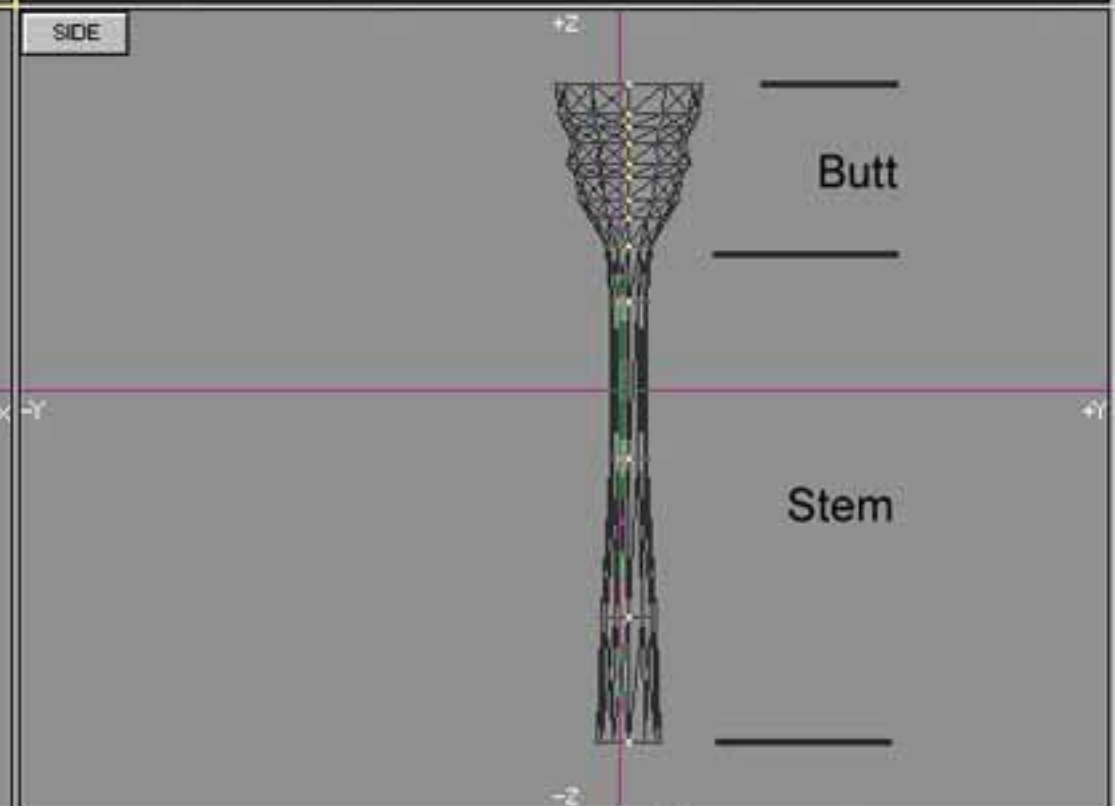
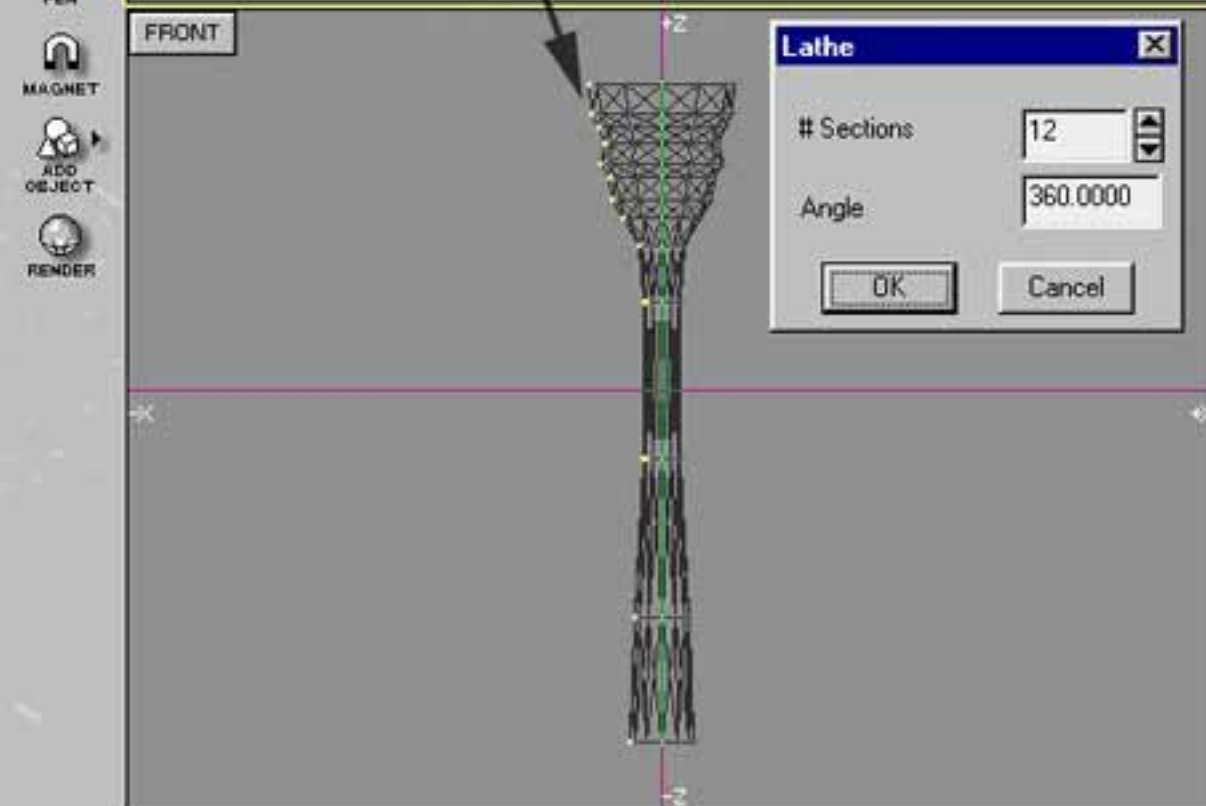
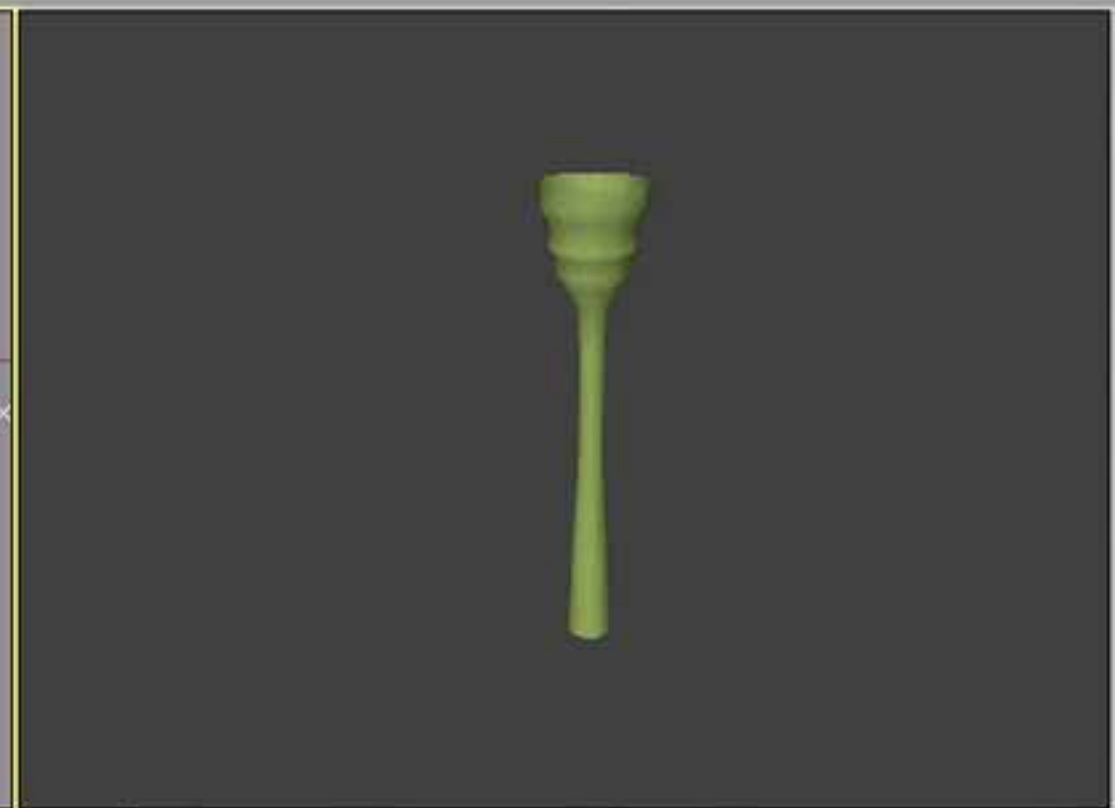
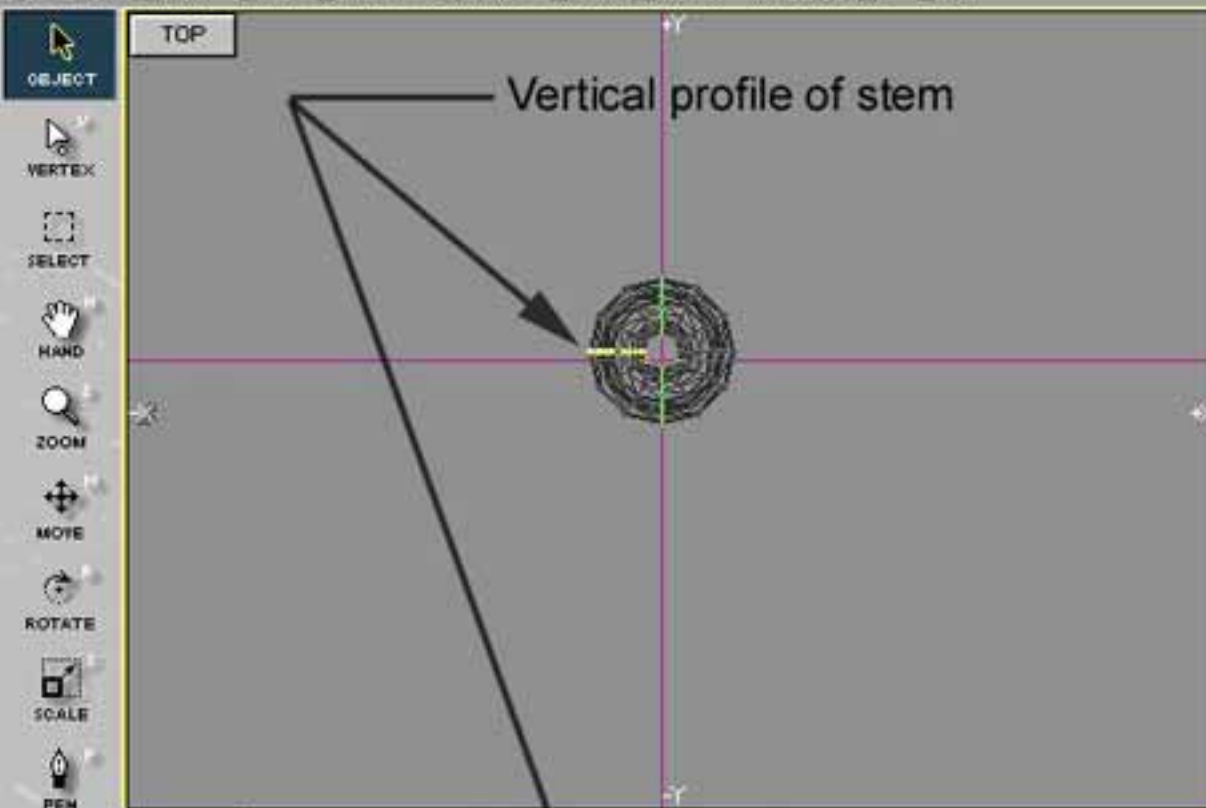


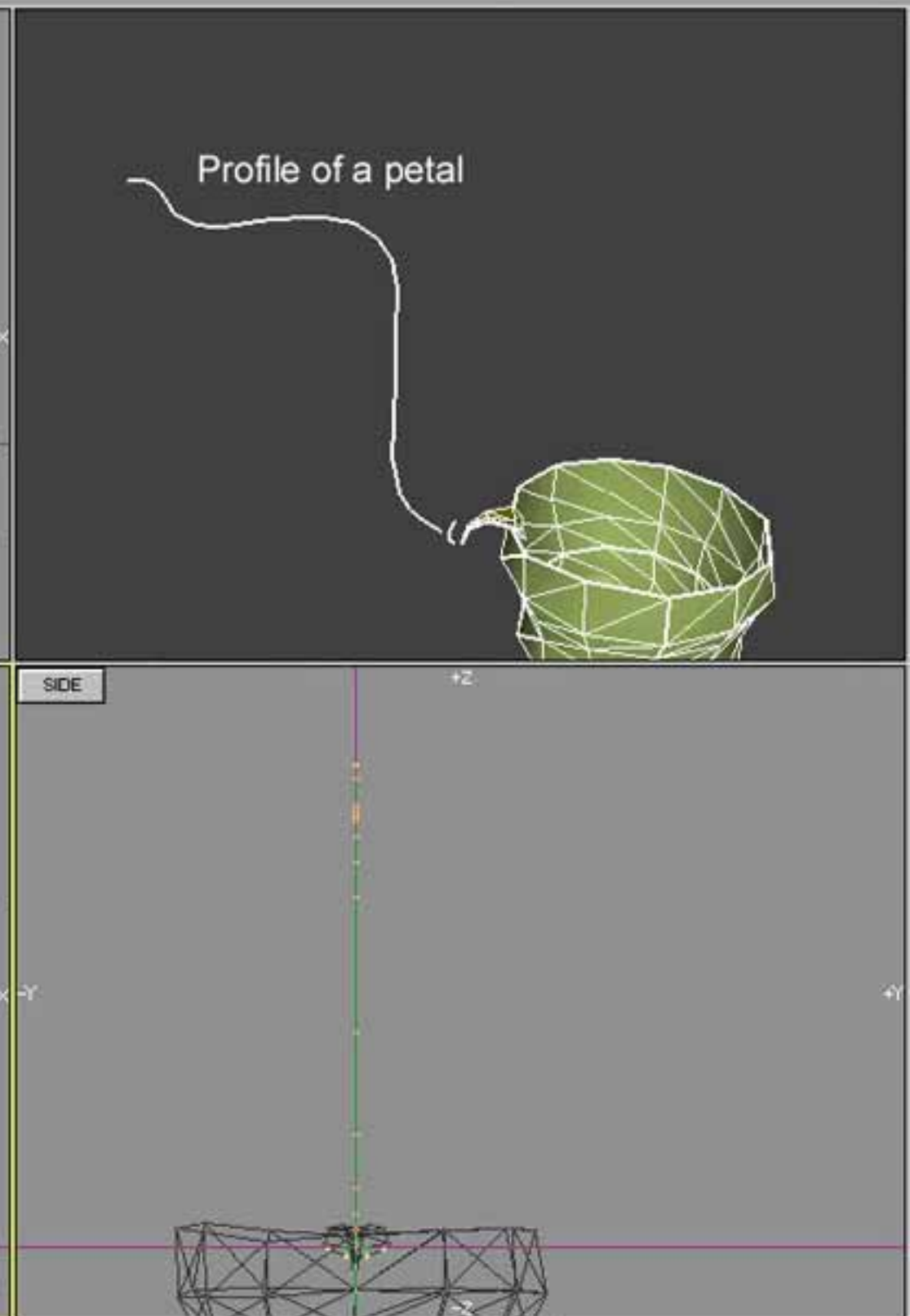
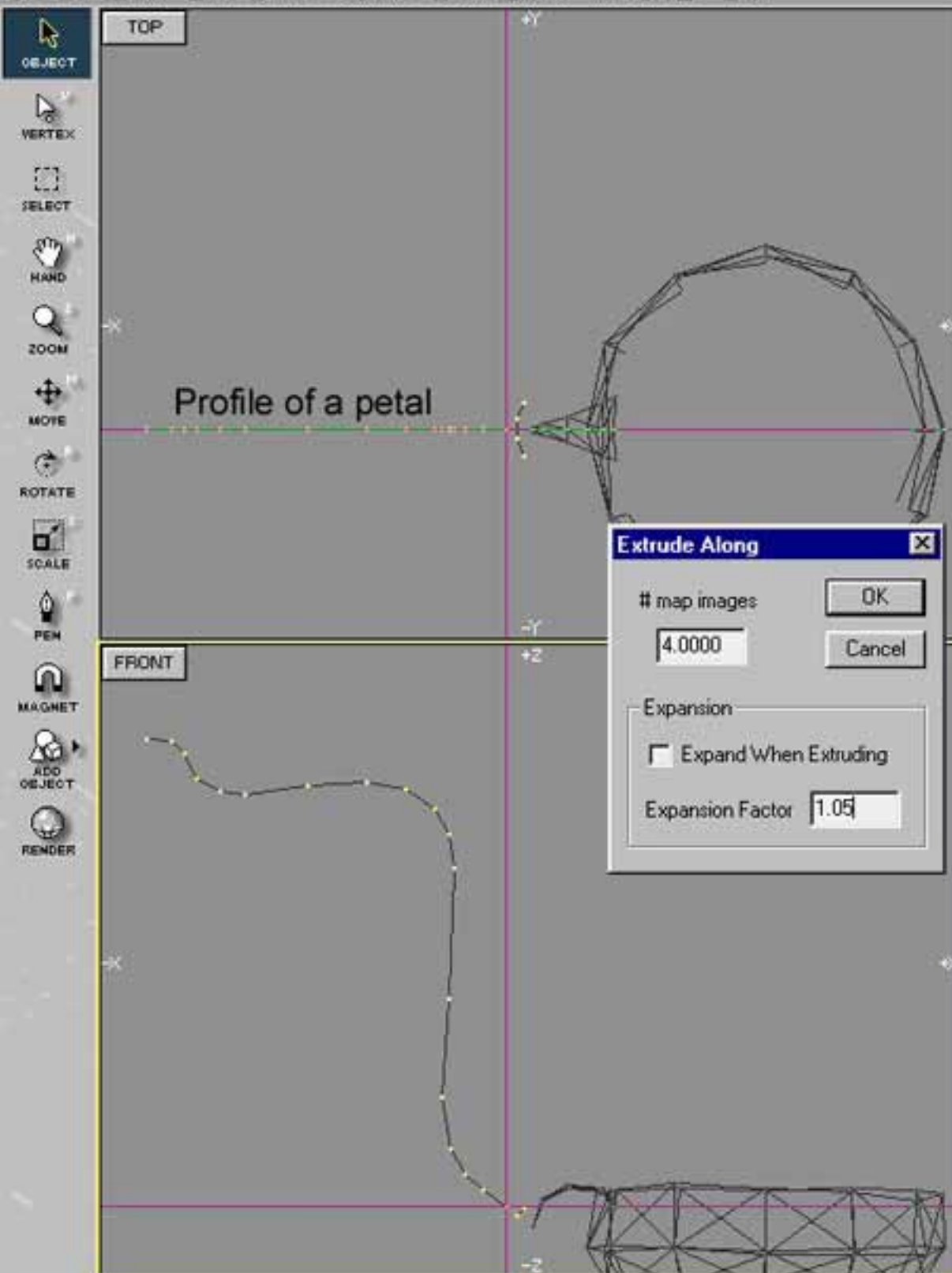


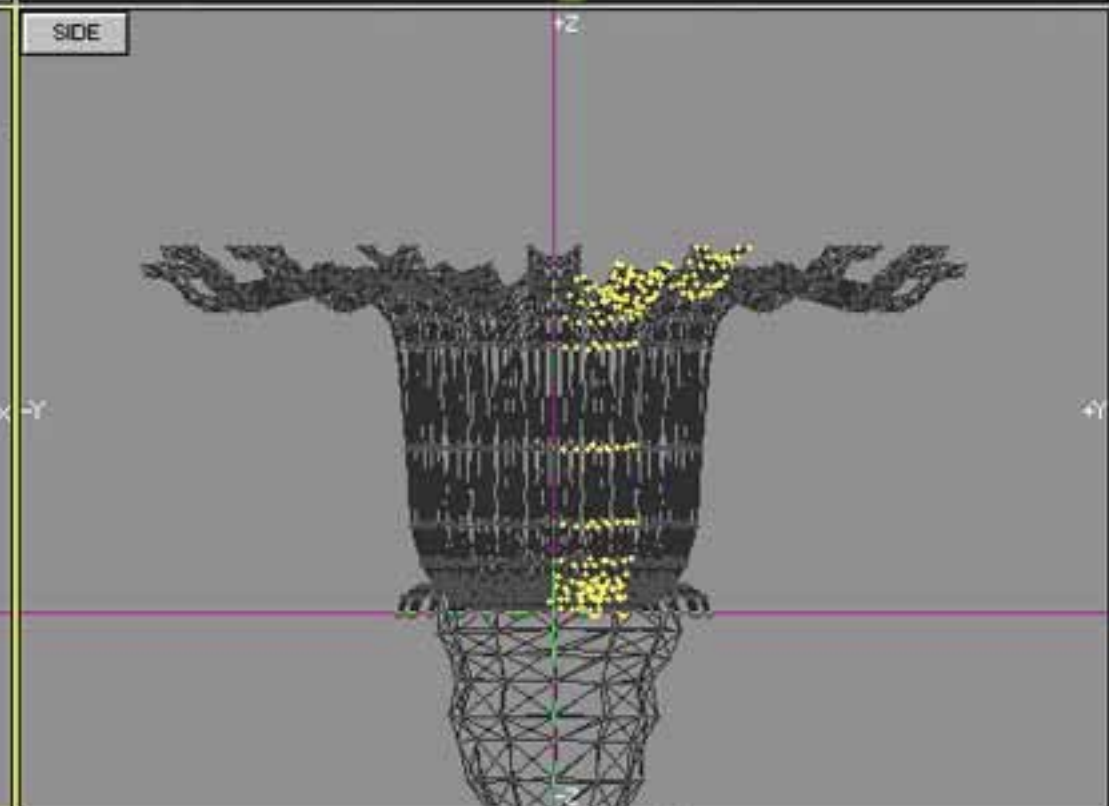
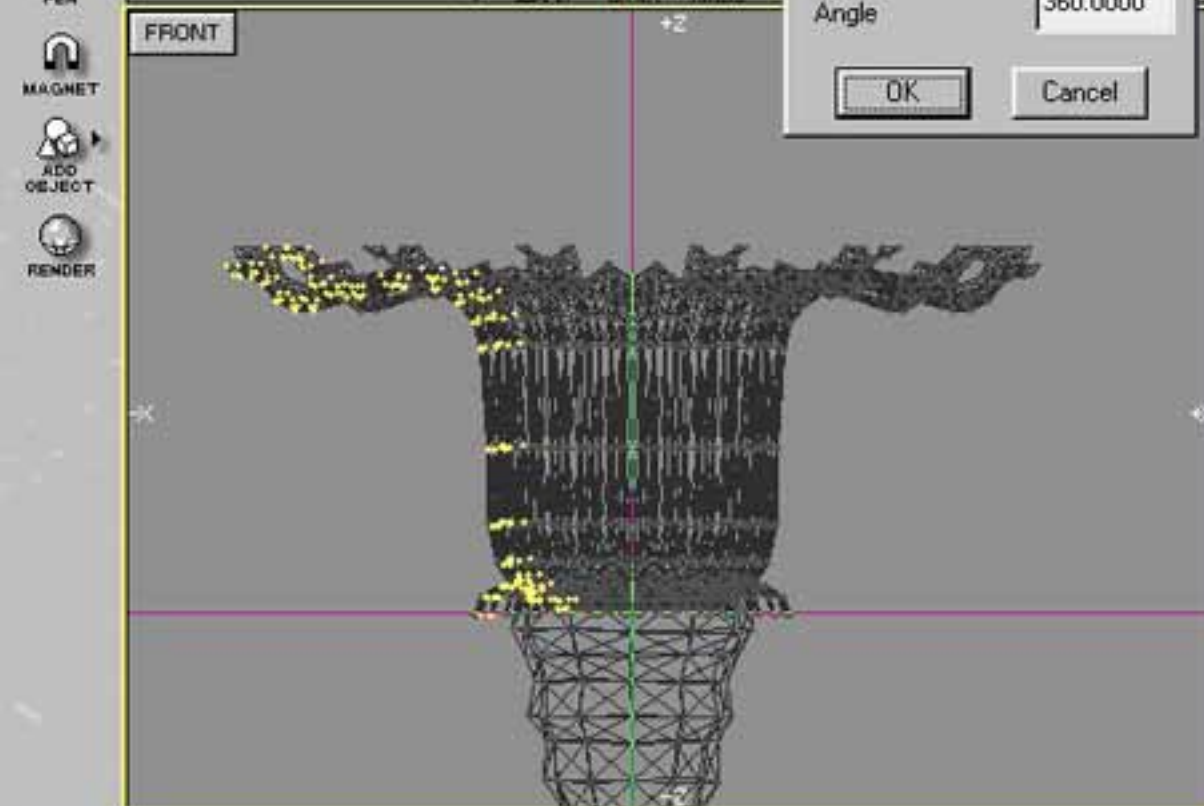
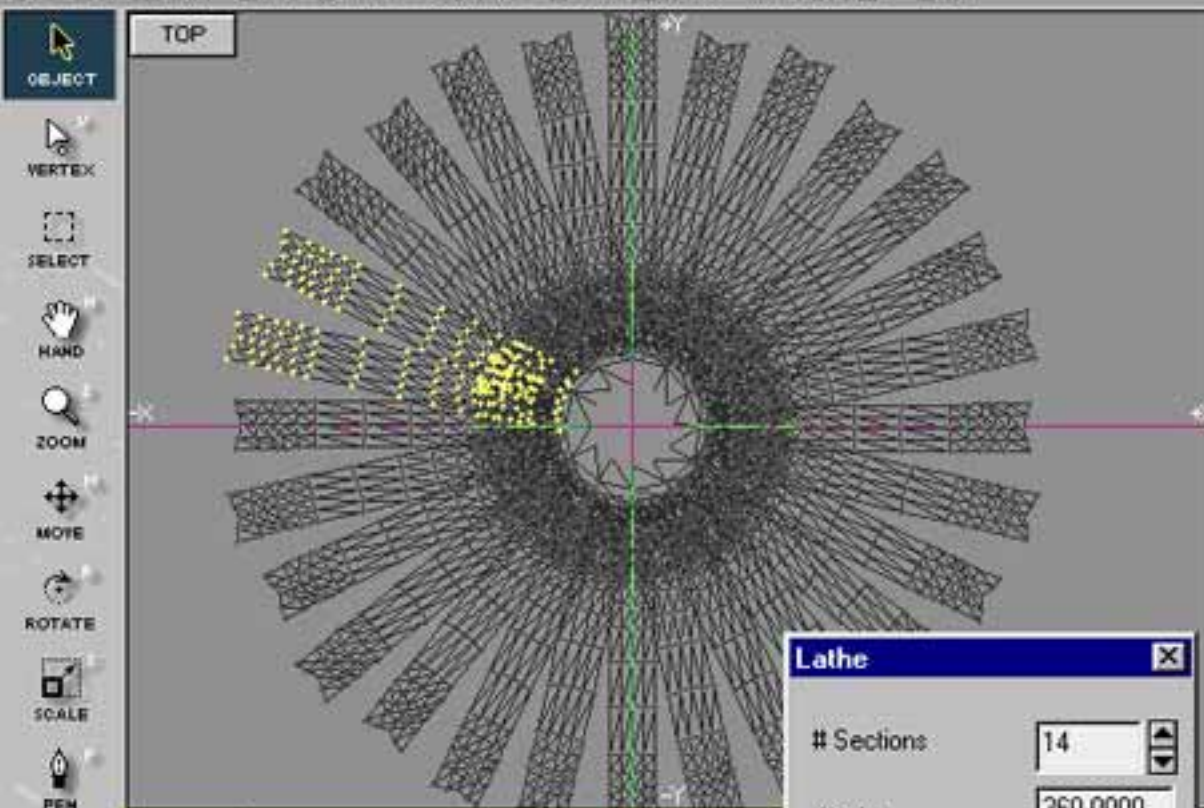












Random Duplicate

Generate Objects

Number

Random Rotate

☐ X ☐ Y ☒ Z

Generate Range

R/L

F/B

U/D

RanDupli 0.201

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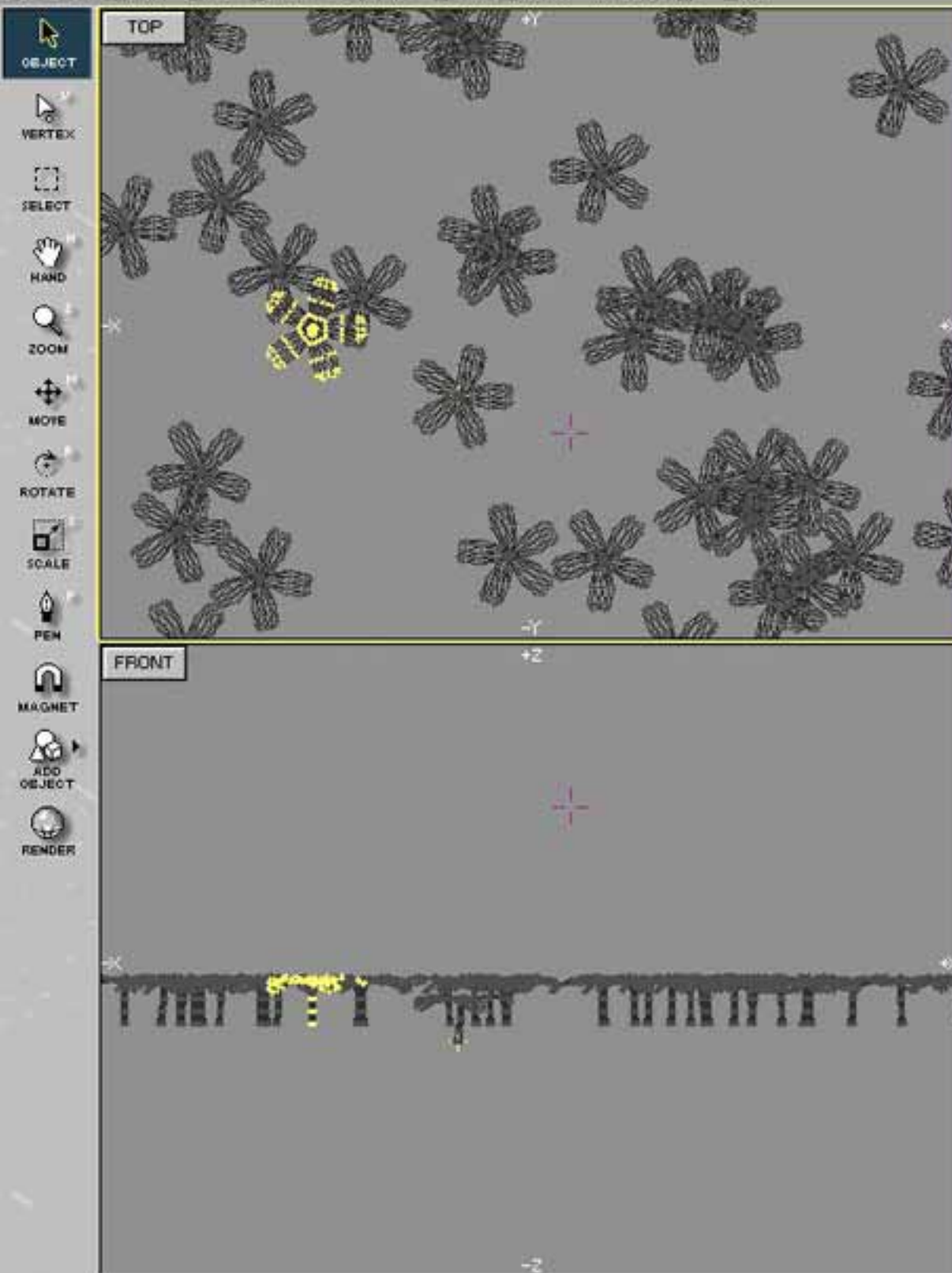
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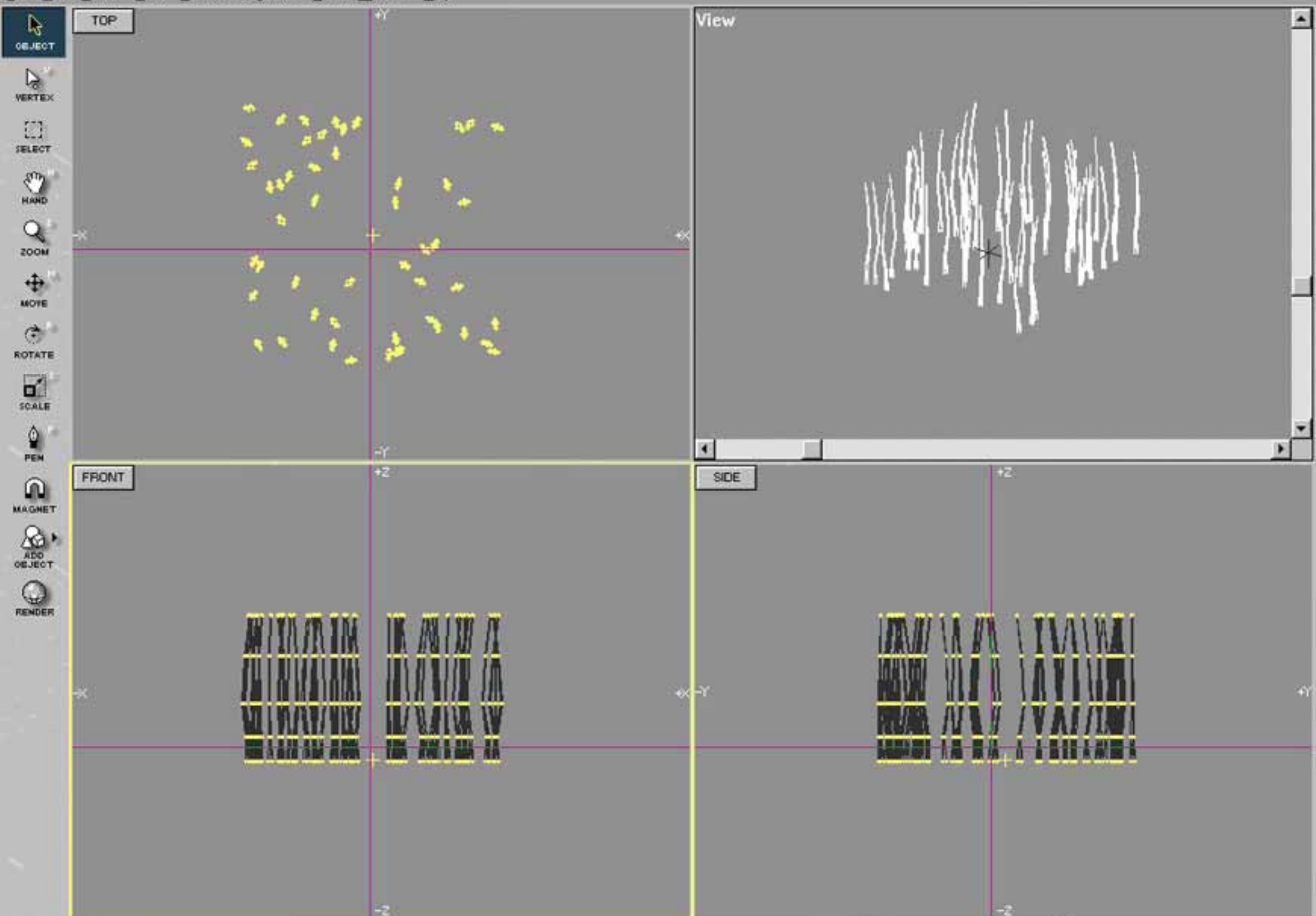
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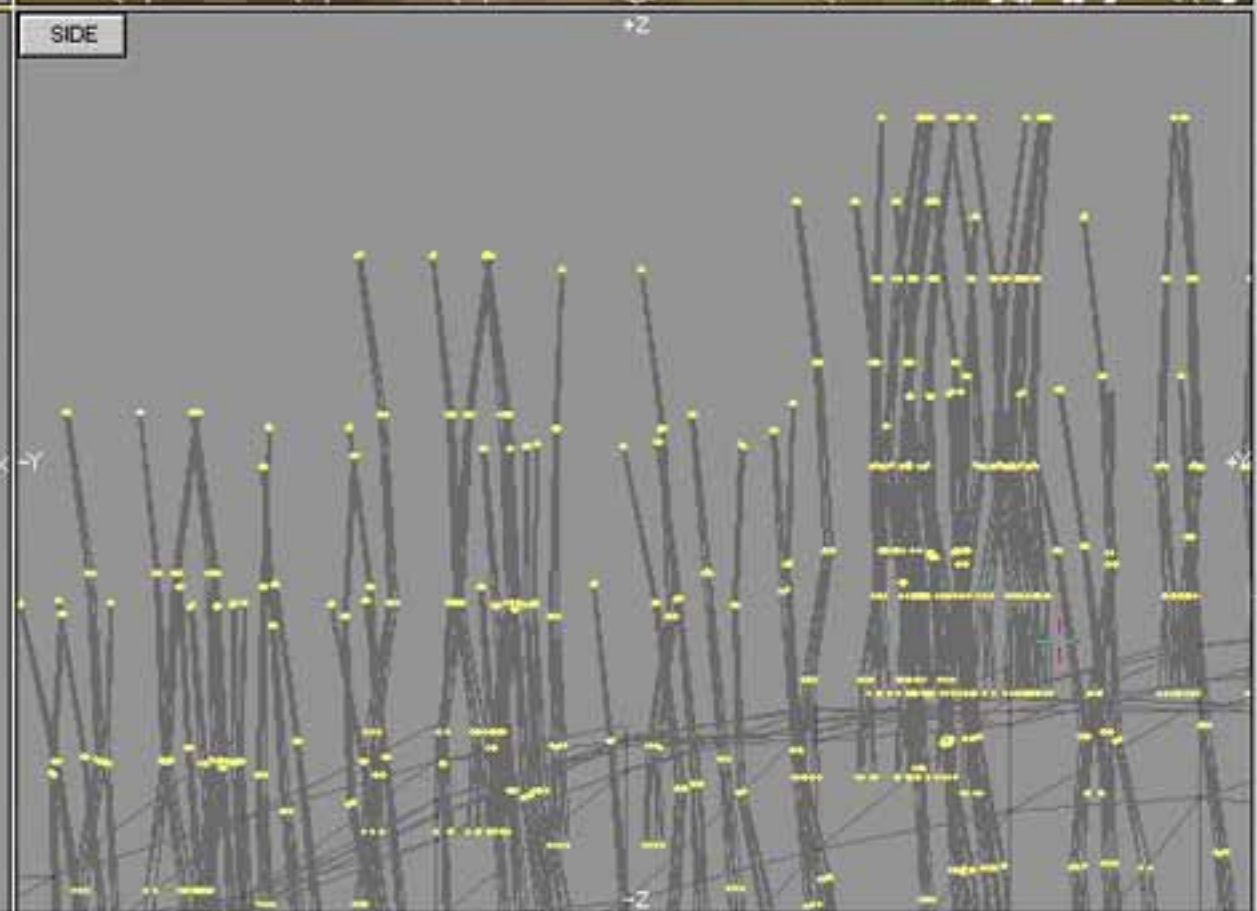
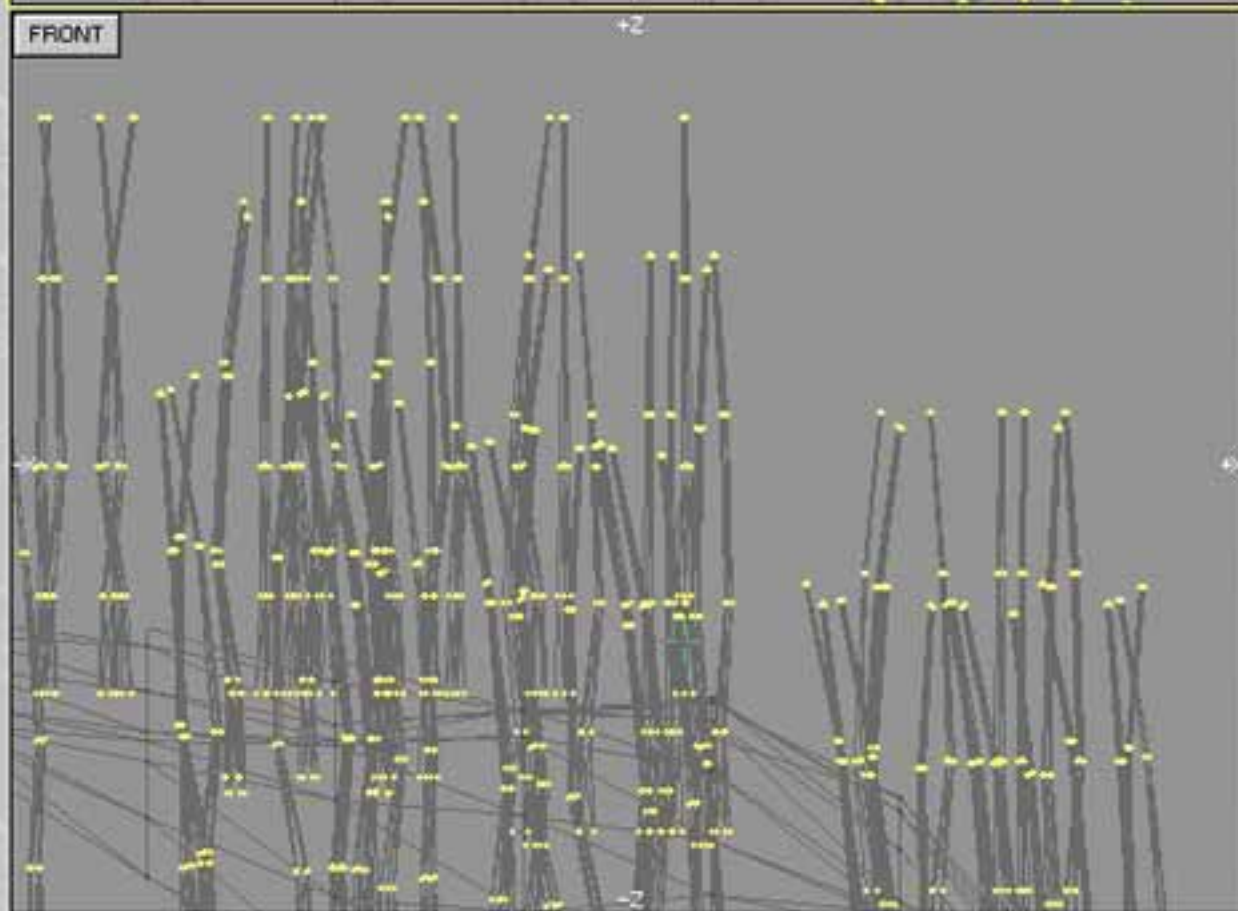
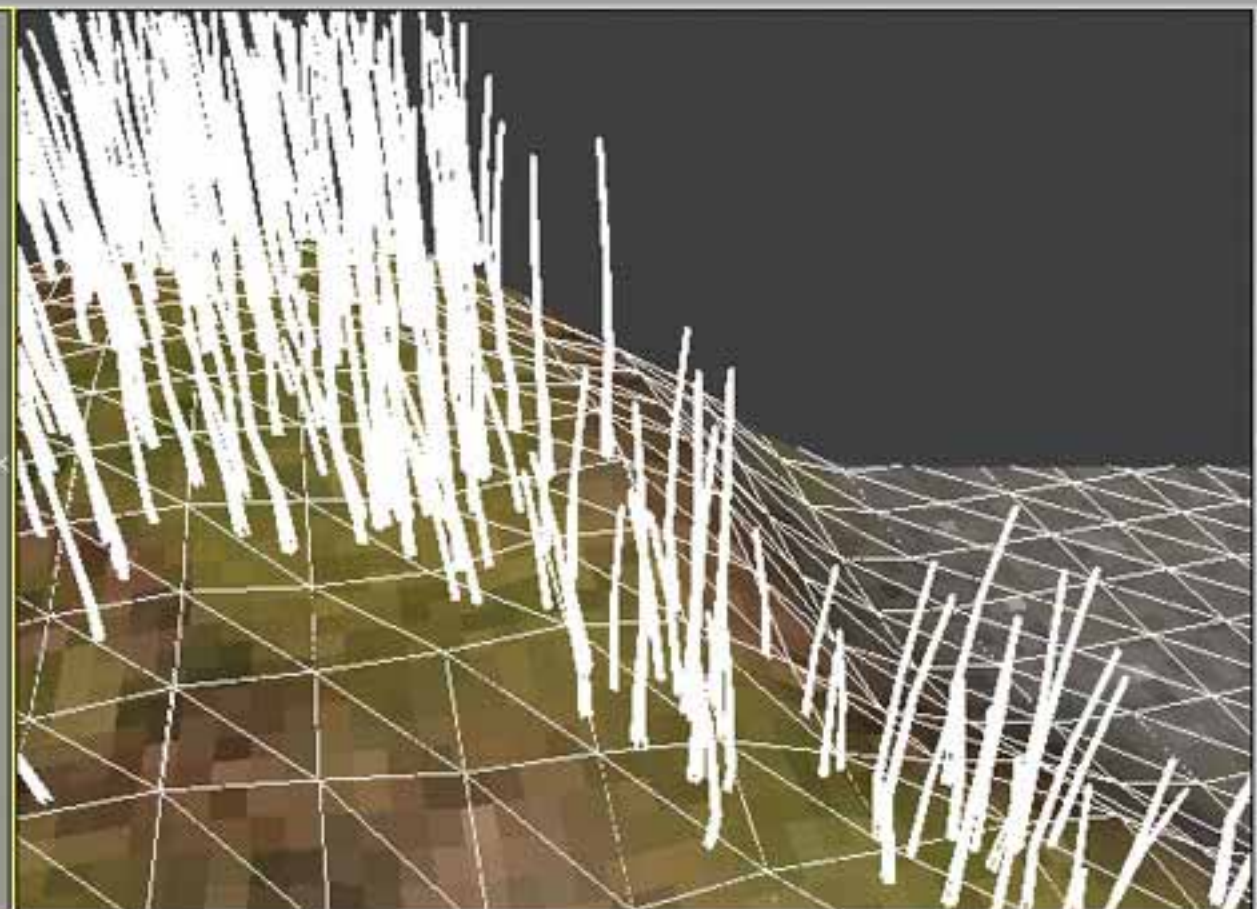
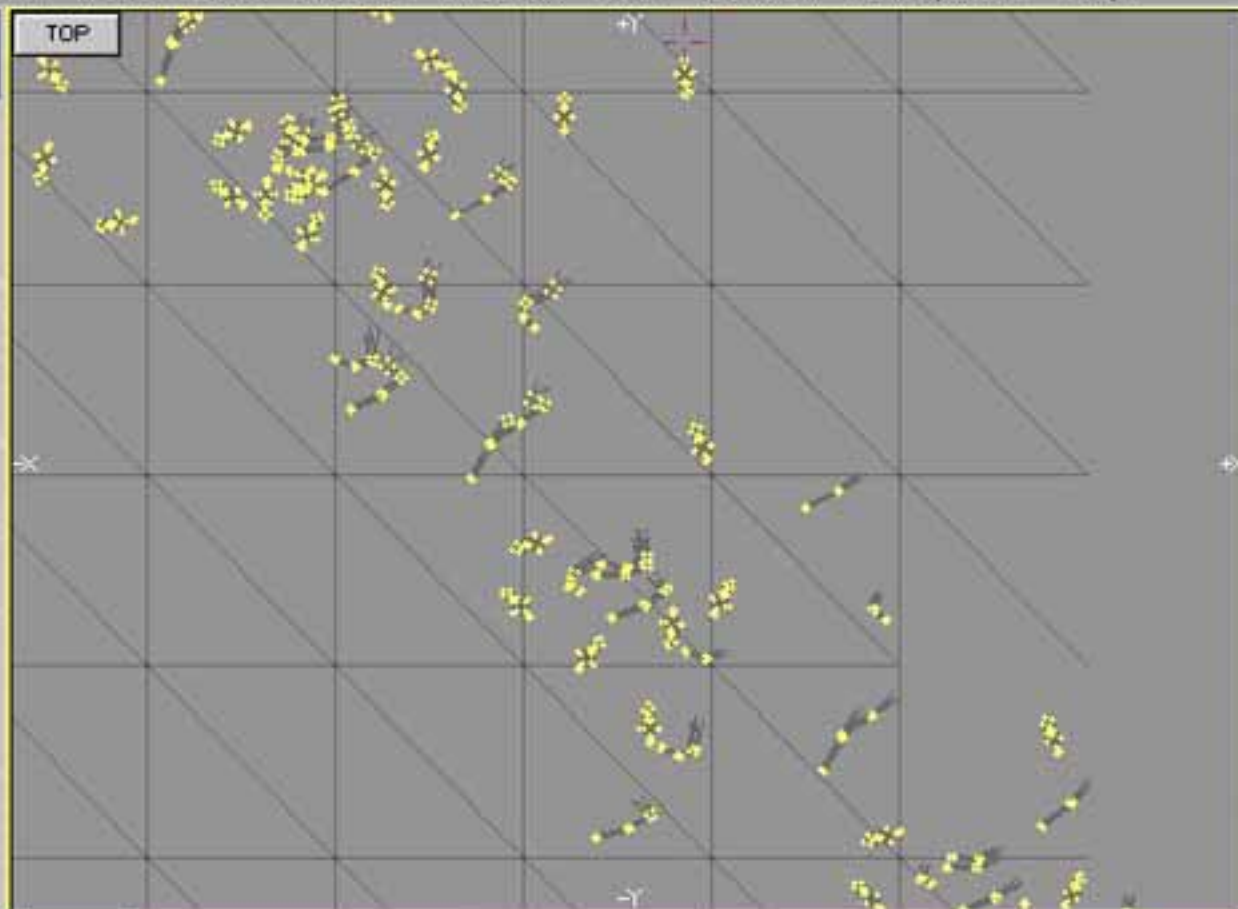
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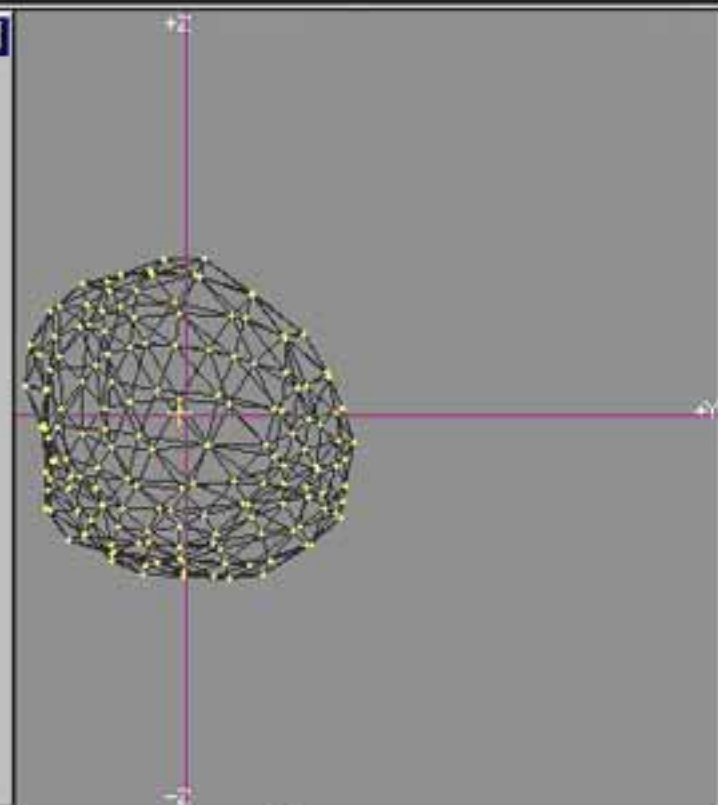
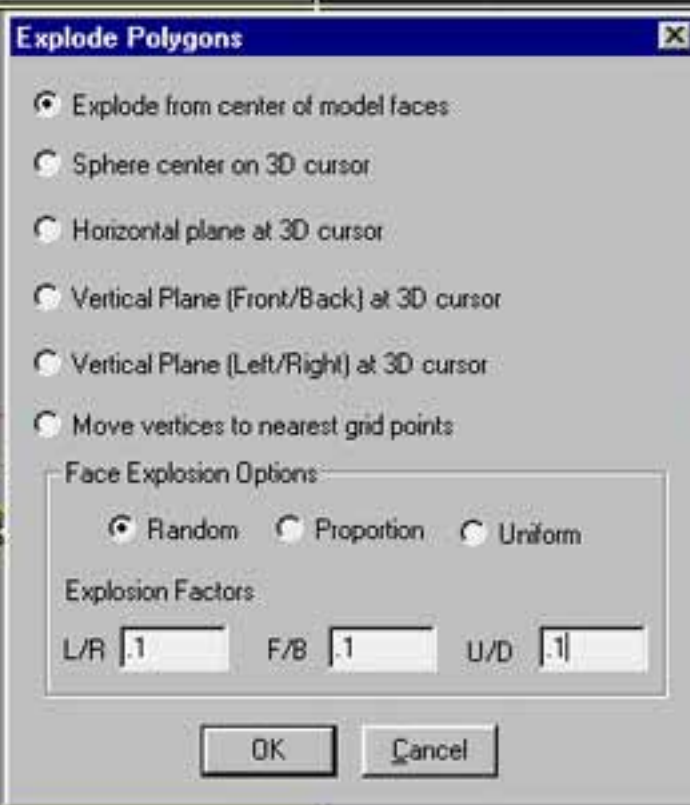
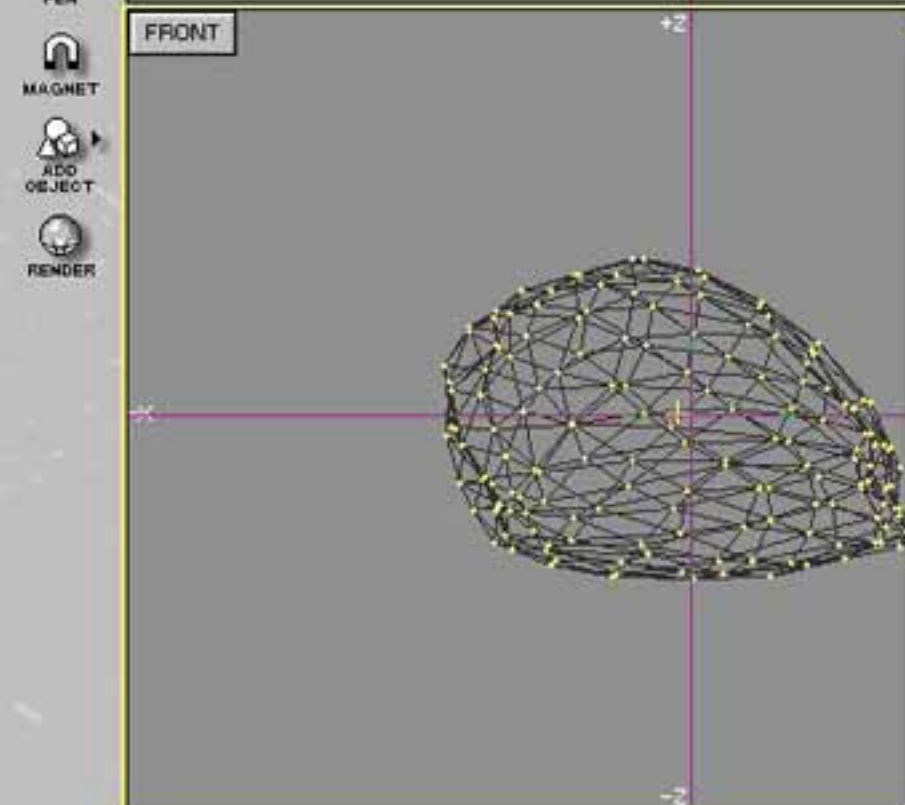
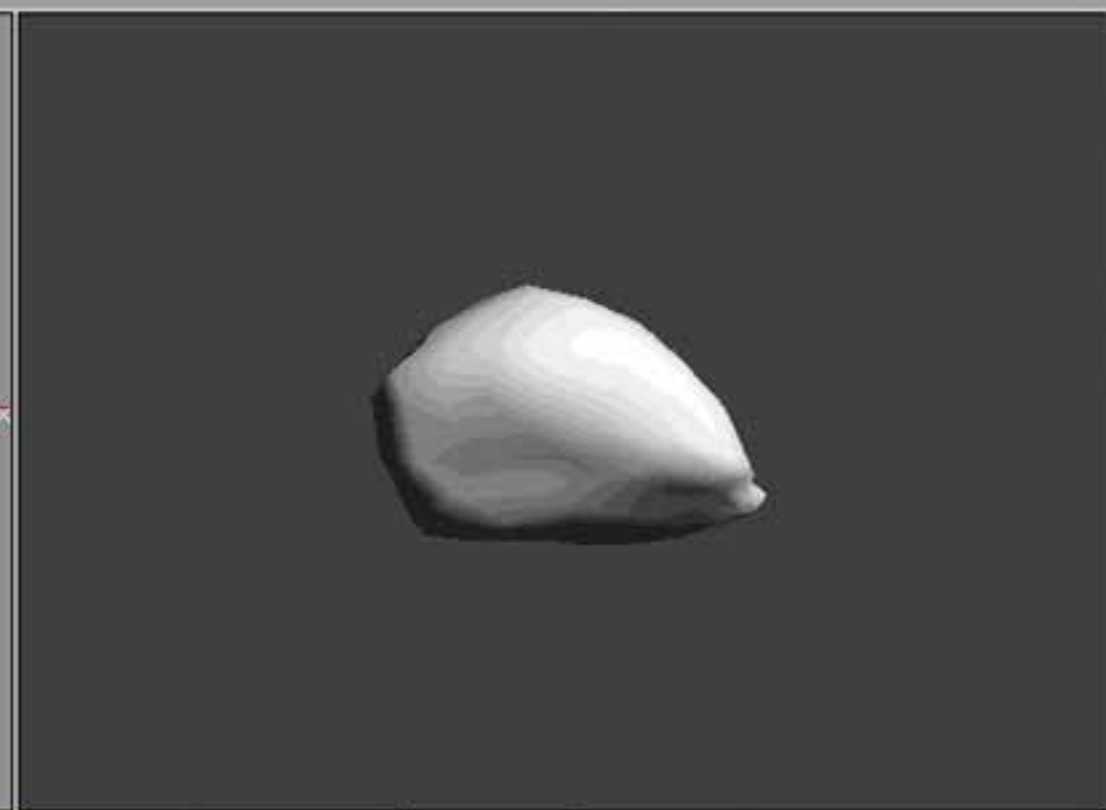
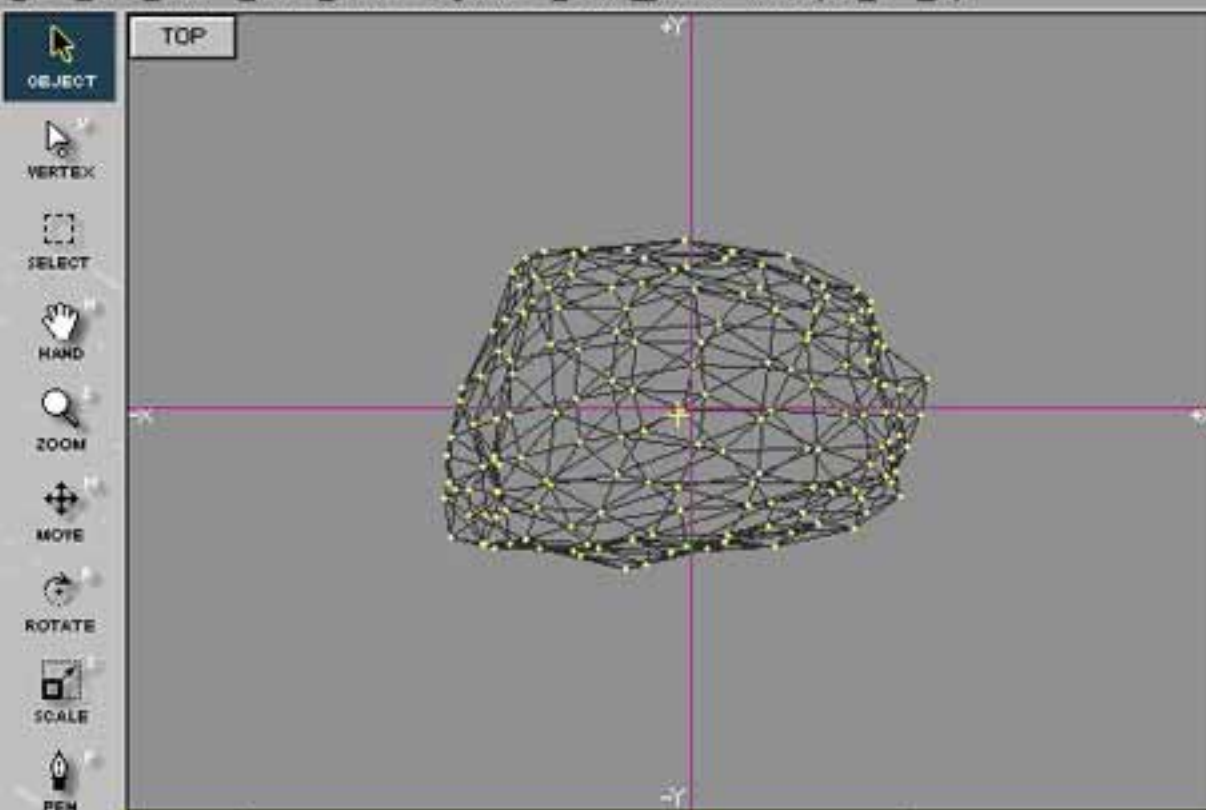
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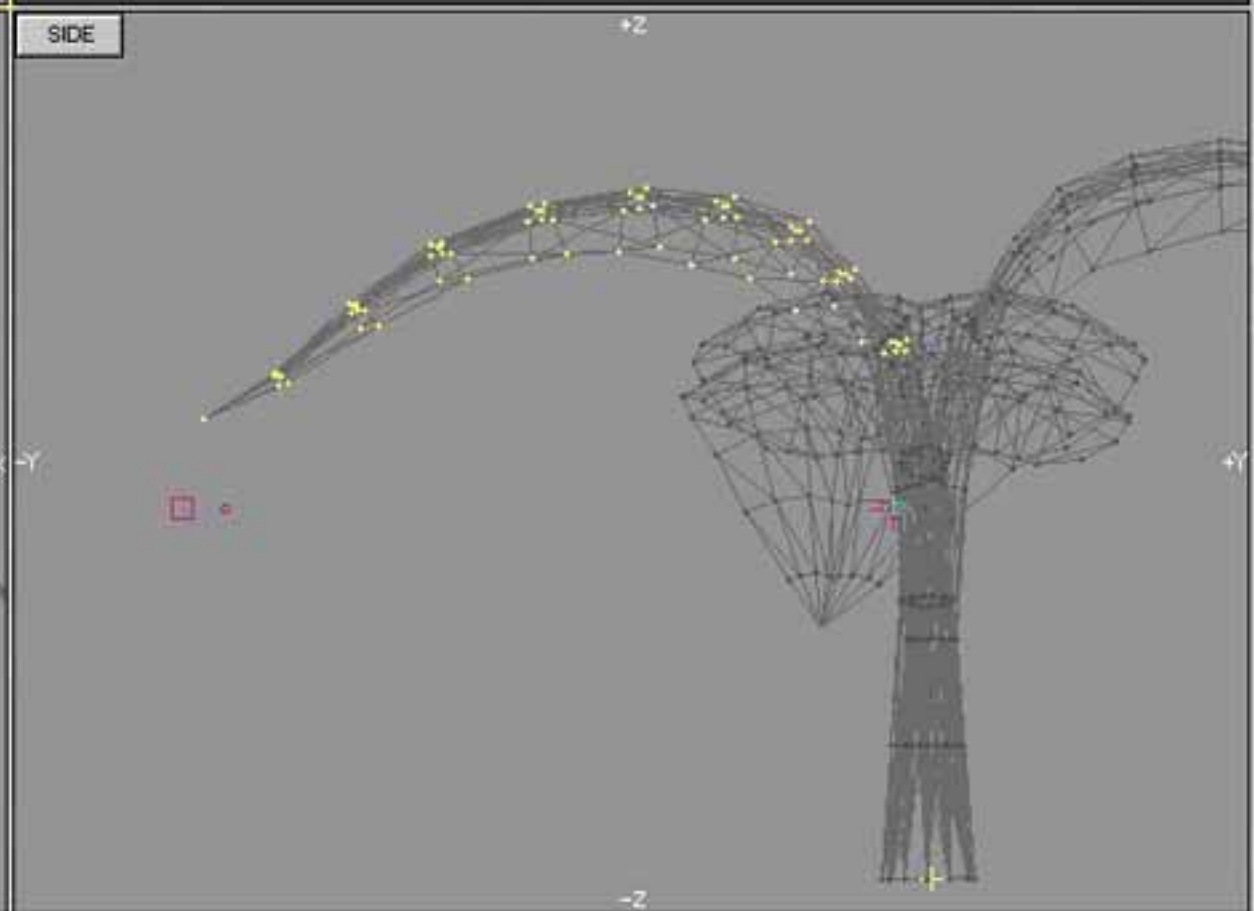
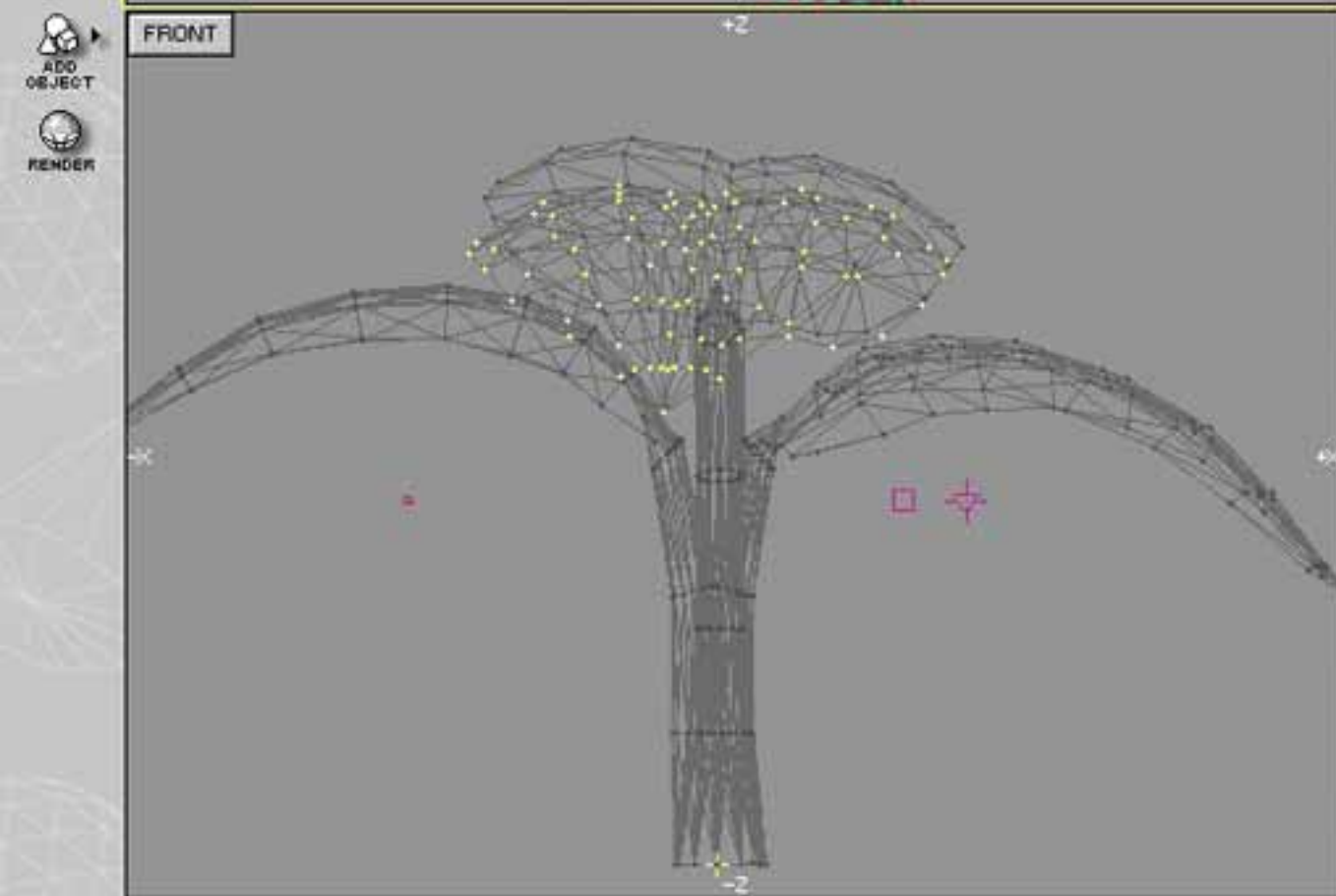
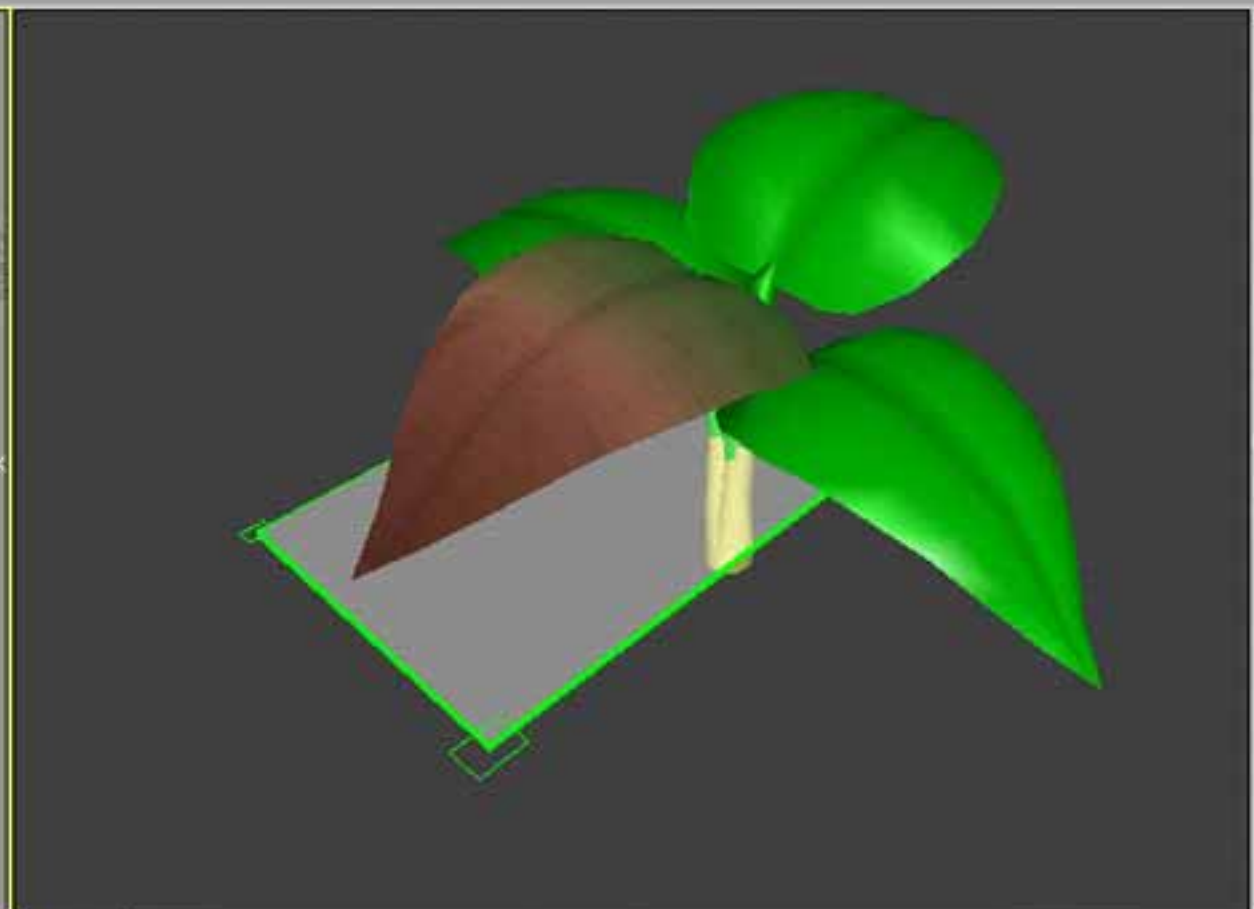
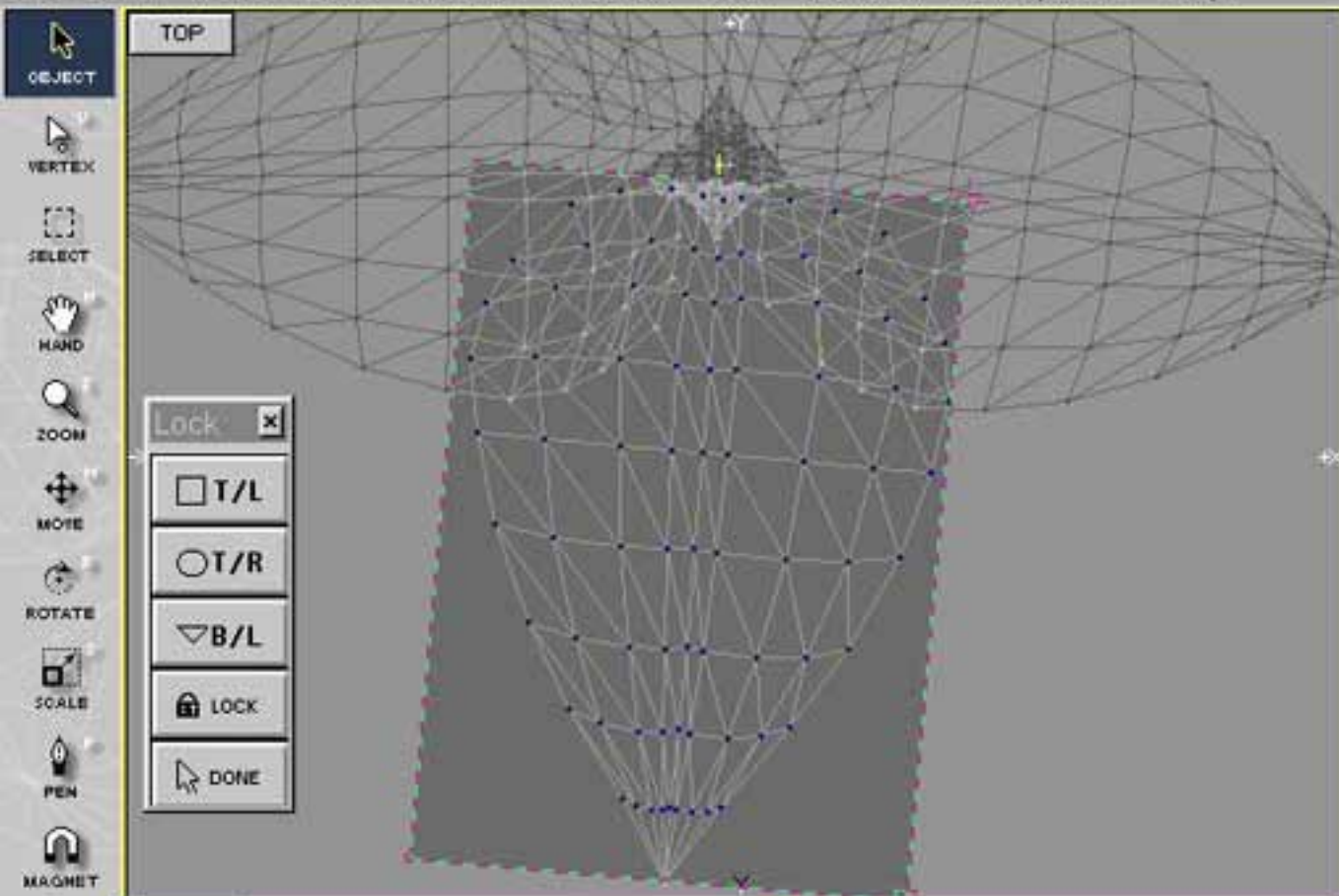
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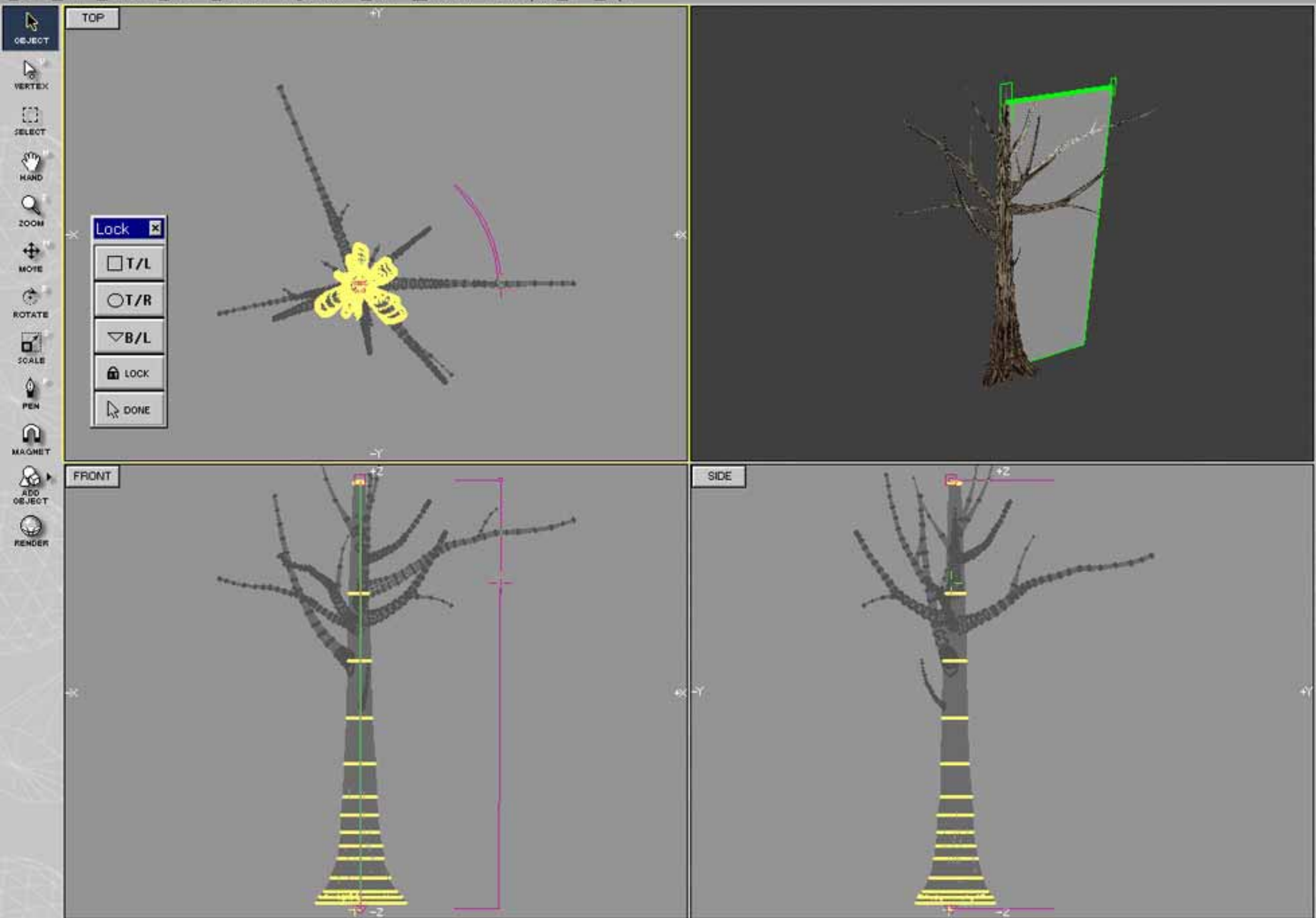


Image Map Settings

Map

Mapping Type



Planar



Cylindrical



Spherical



Glued

Map Angle



48

Tiling



Standard



Mosaic

Decal Color

☒ Index Key (0)

☐ Color Key

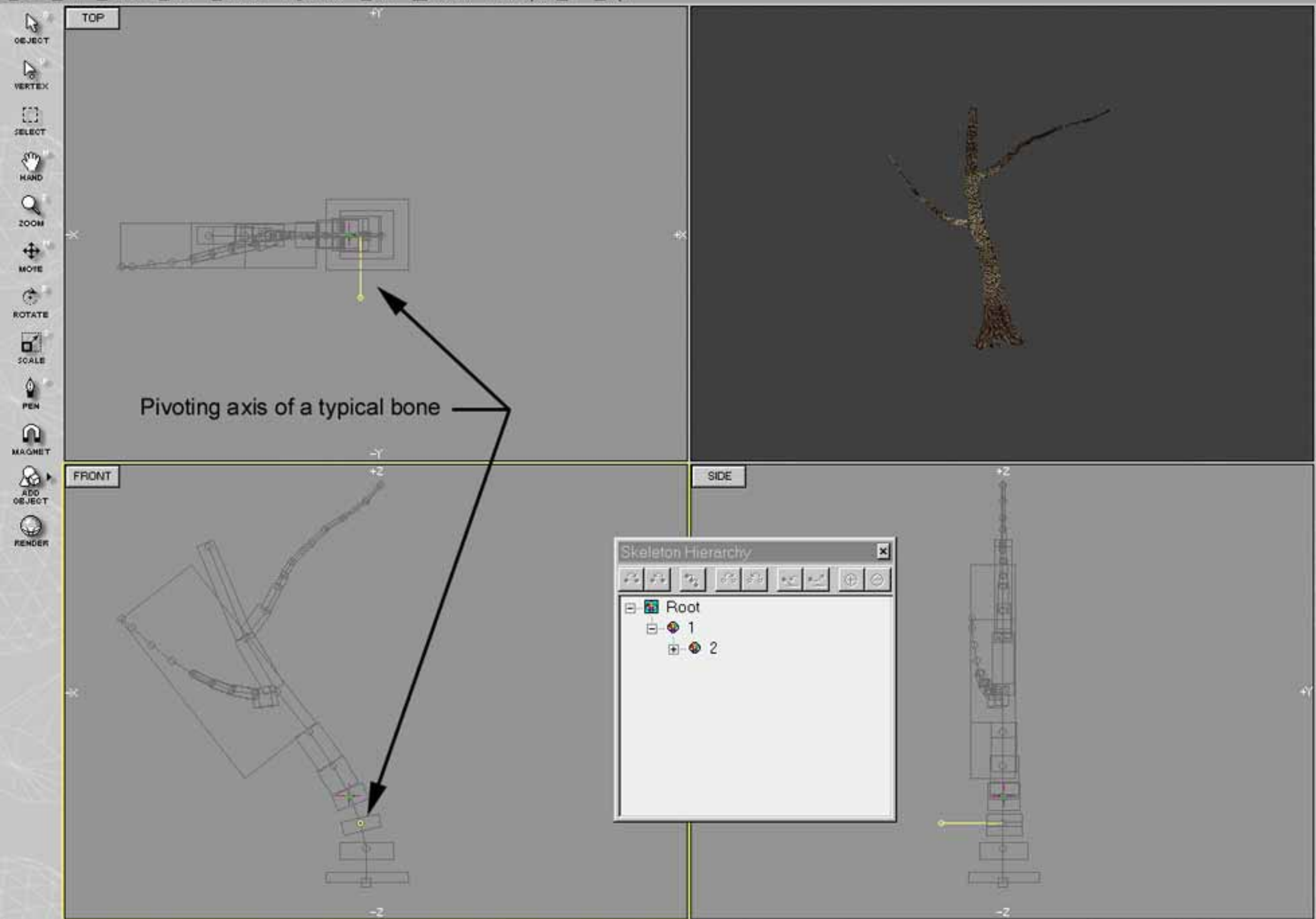
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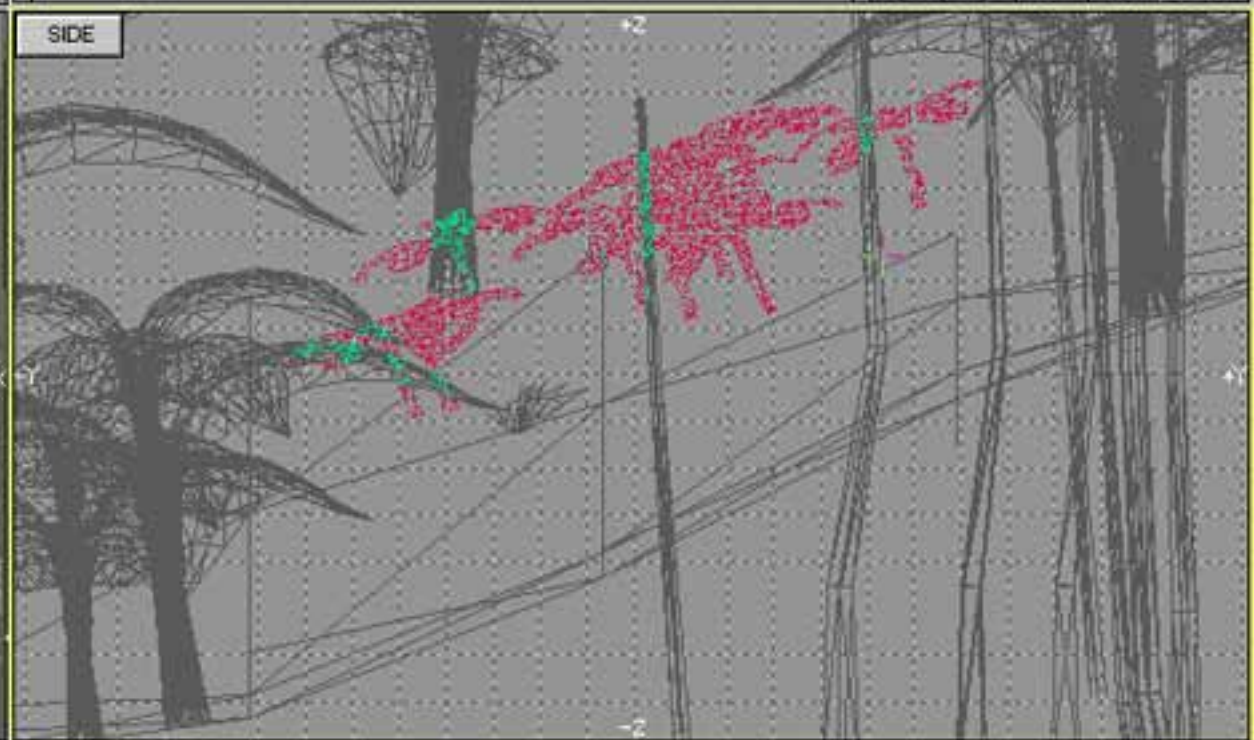
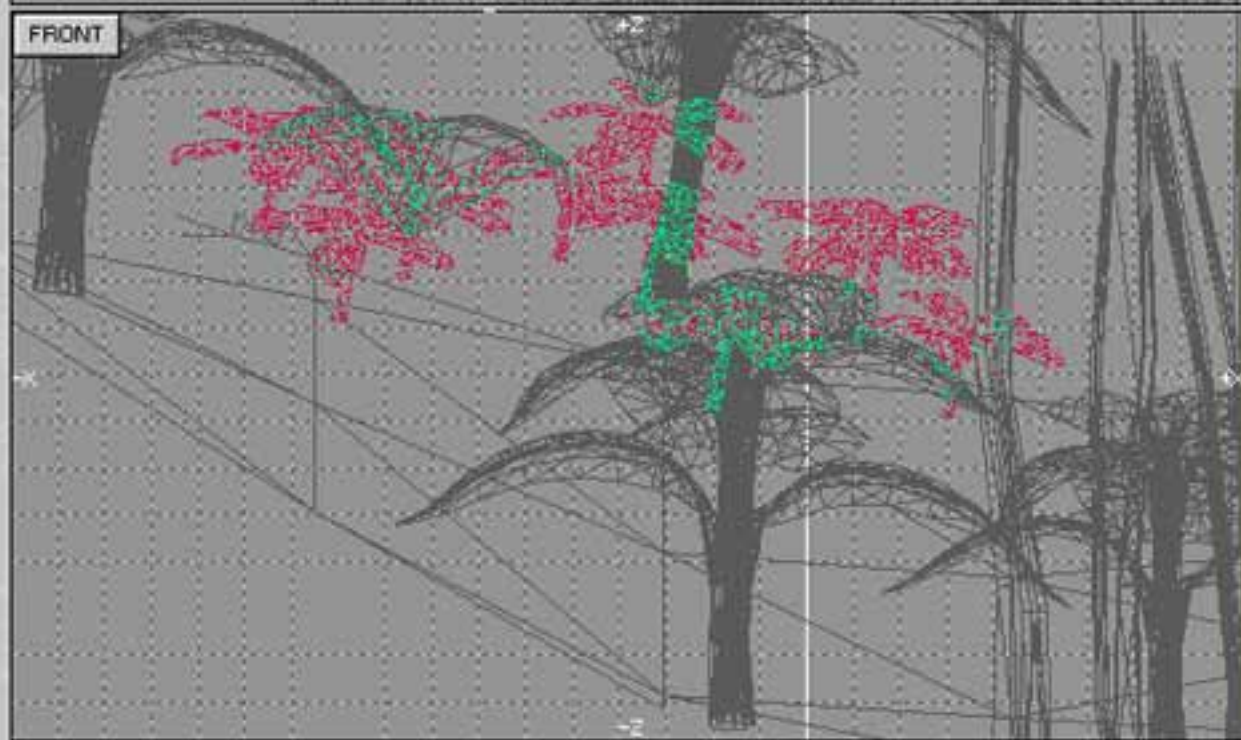
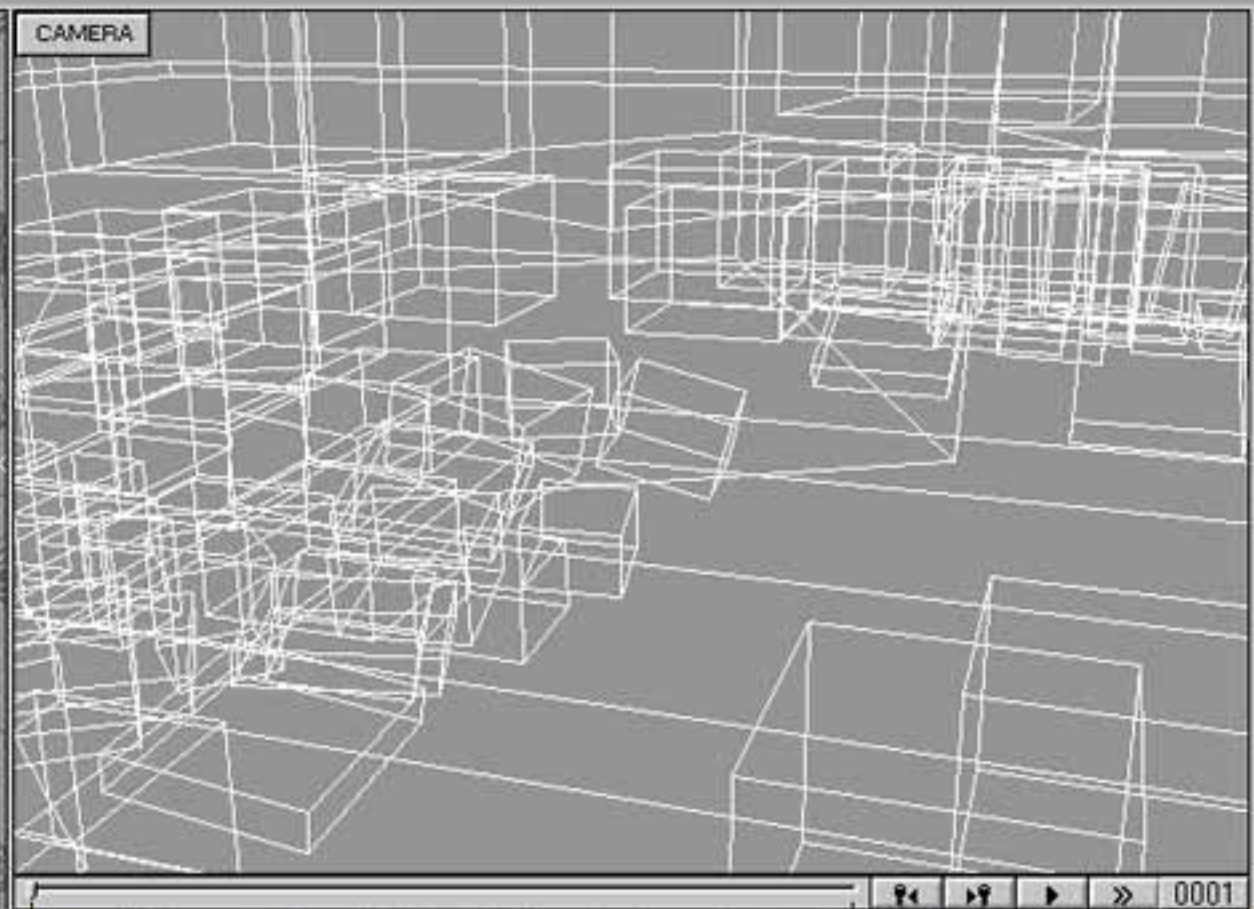
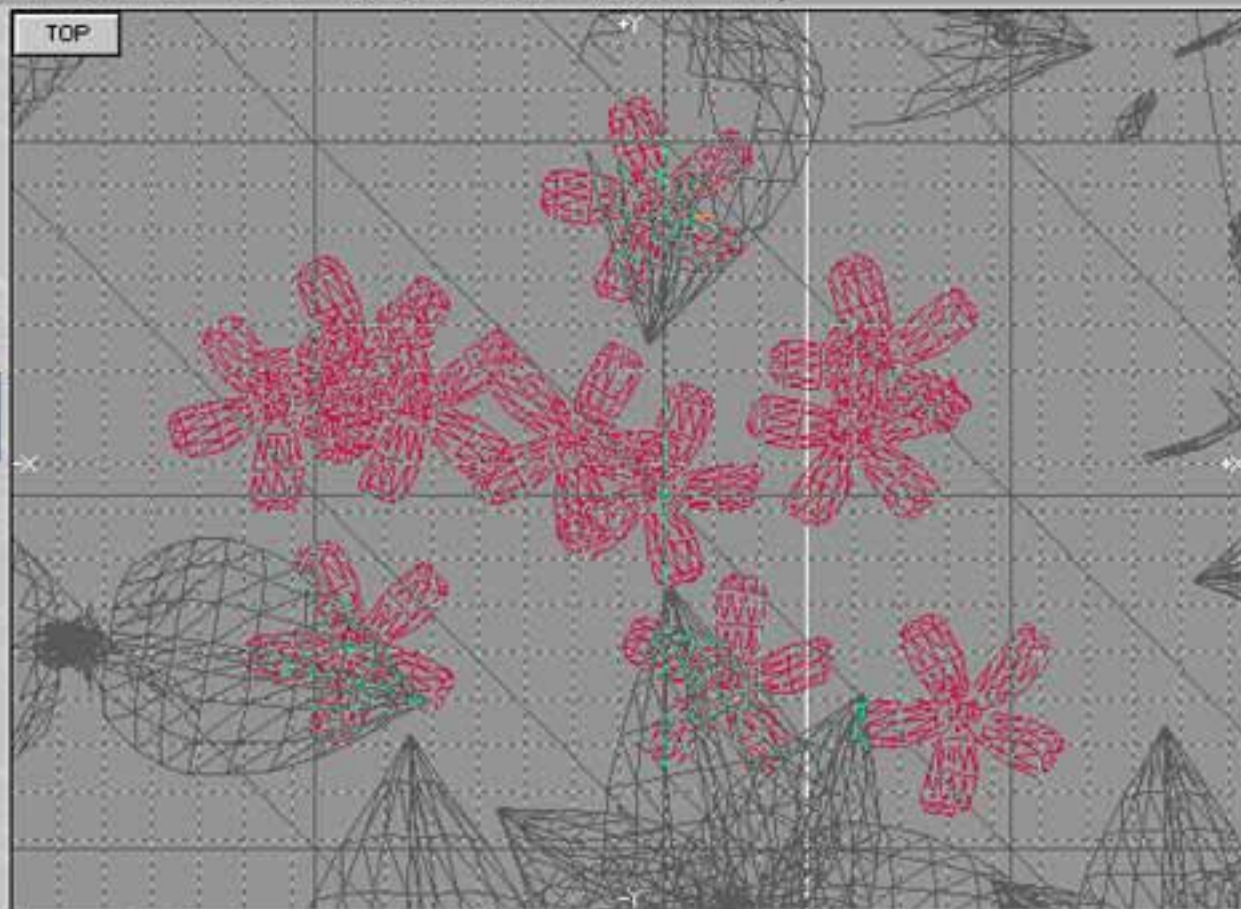


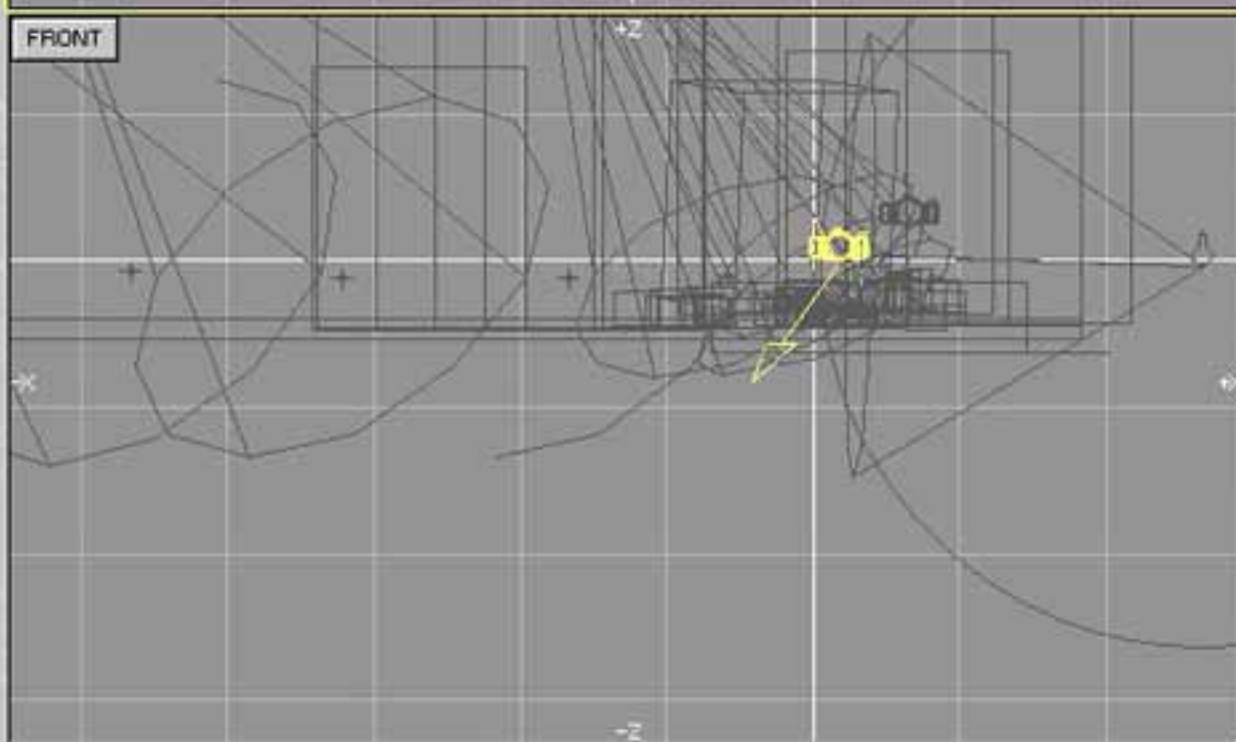
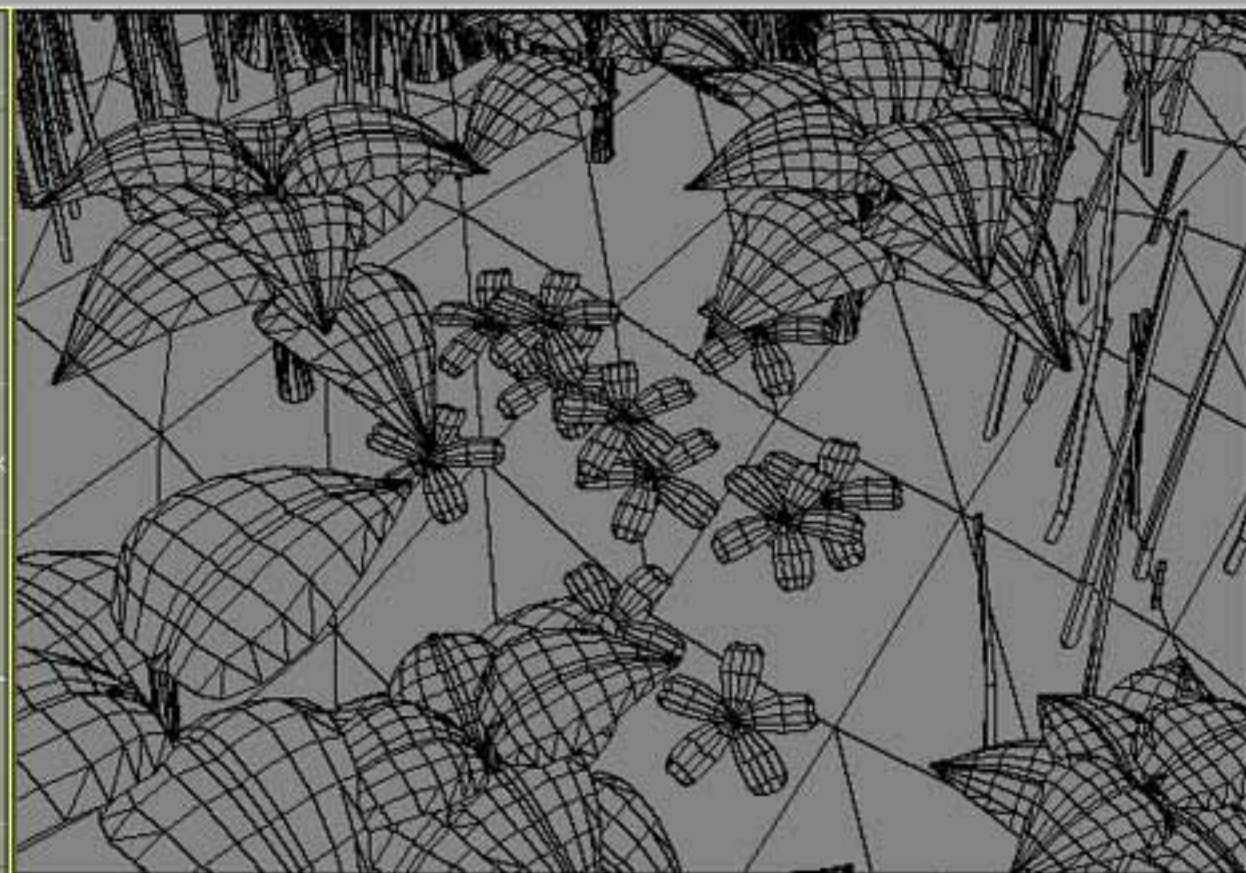
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☐ Reflection	<No image>	...	X	View...	Edit...	<input type="range" value="50"/>	50
☒ Bump	D:\Projects\Serious 3D\textures\TreeTrunk	...	X	View...	Edit...	<input type="range" value="85"/>	85
☐ Transparency	<No image>	...	X	View...	Edit...		

Animated



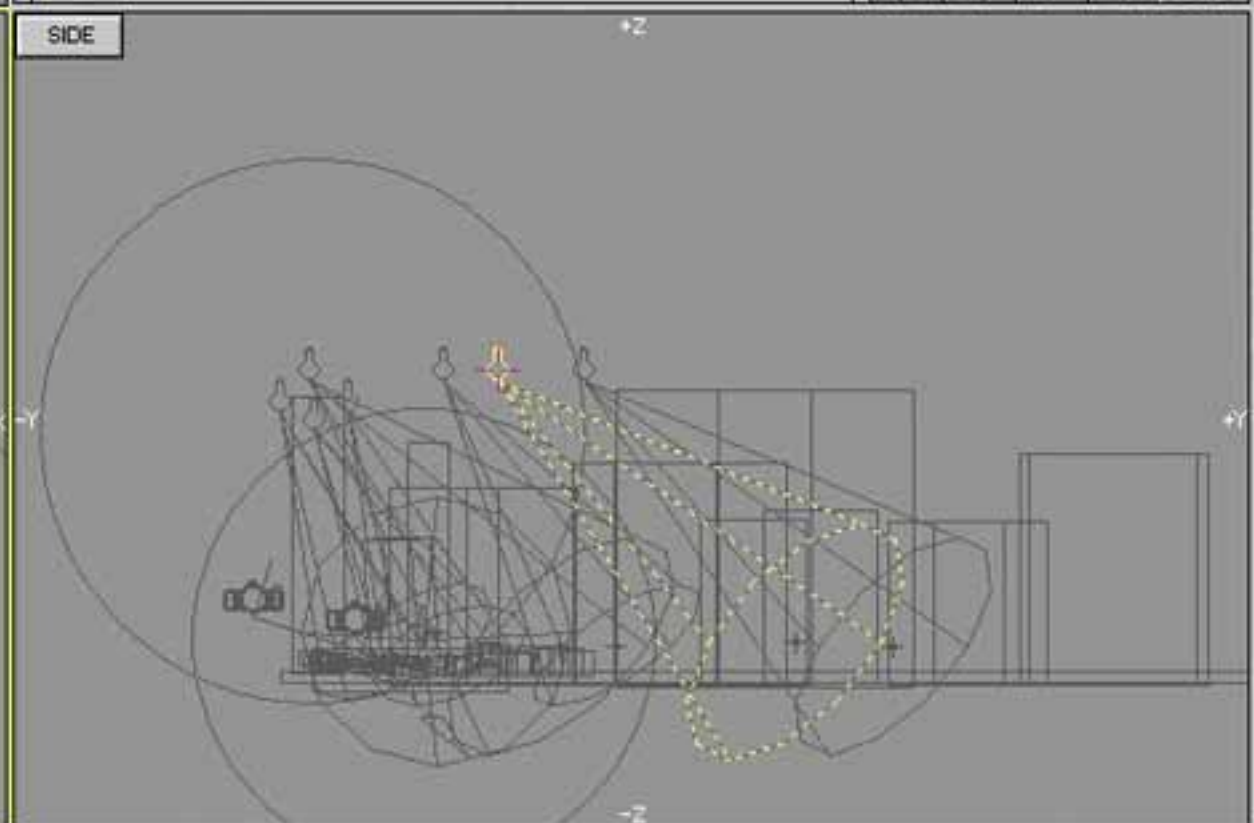
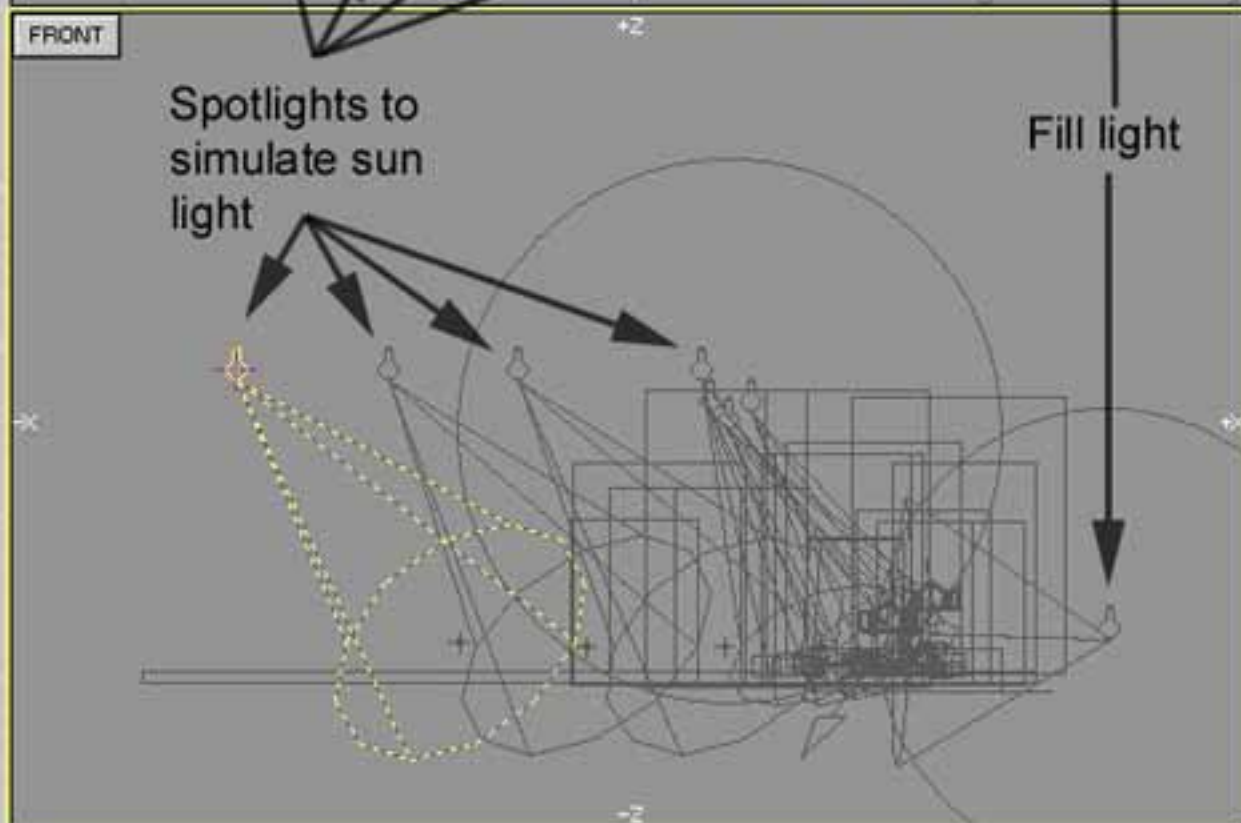
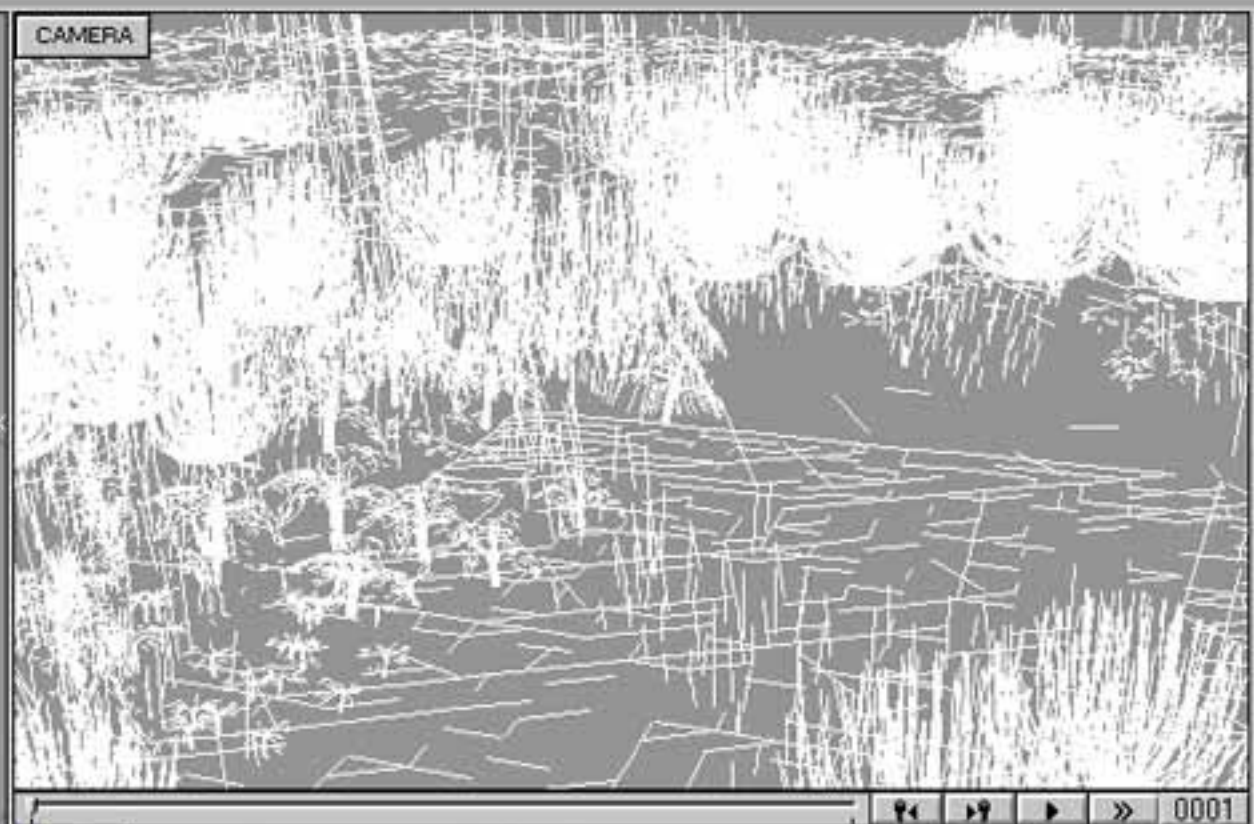
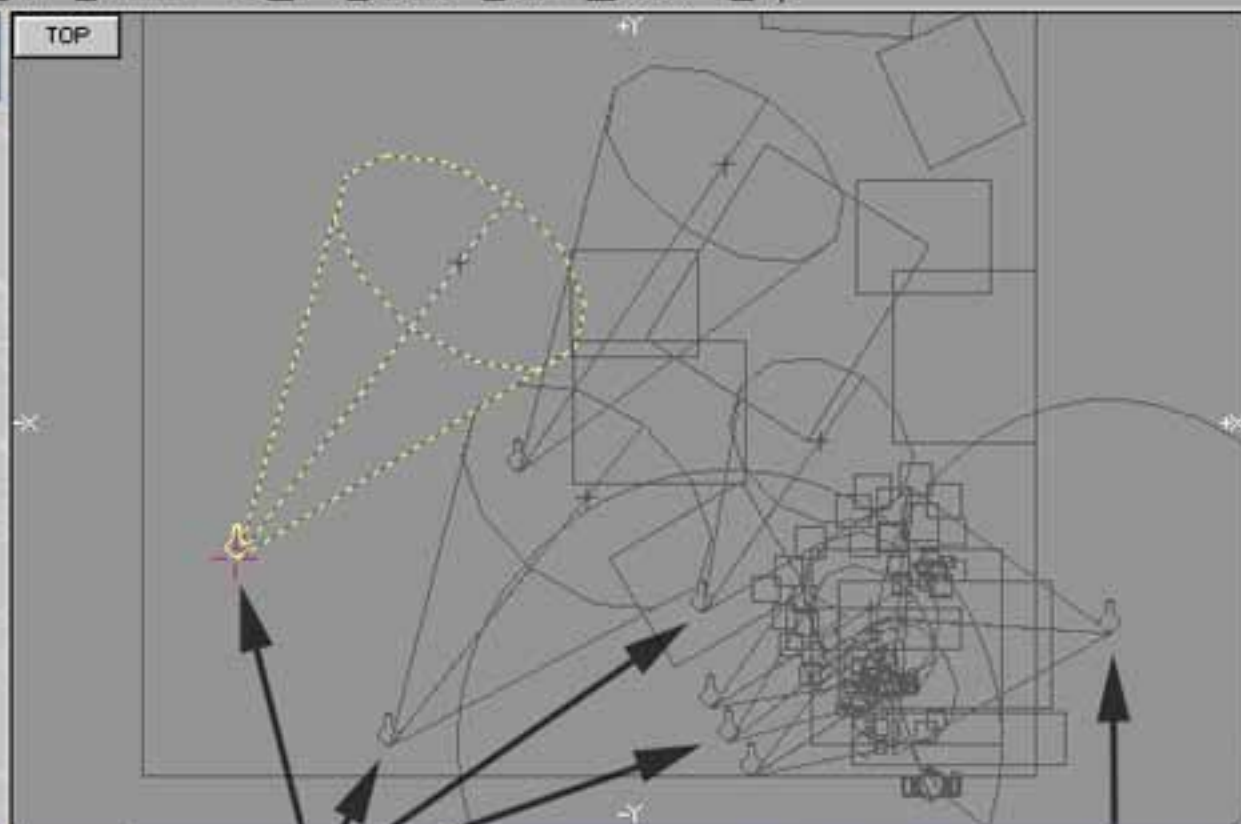






Keyframes
COSTUME
POSITION
ROTATION
SIZE

Camera2 10 20 30 40 50 60 70 80 90 100



Keyframer

COSTUME
POSITION
ROTATION
SIZE

Light6

10 20 30 40 50 60 70 80 90 100

