Basic 3D Character Modeling

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3D Character Modelling

1. Definition Character Modeling

Character Modeling is the process of creating a character for animation. An animator has to design the character before he can animate it. So in the process of character modeling an objcte will be created and its basic look will be defined.[1]

2. General Modeling

You want to animate a character? Then you have to create it first. As mentioned above this process is called character modeling. There are some basic concepts and techniques of modeling.

If you begin modeling you have to think about how the character should look like. Should it be realistic or should it be a cartoon character. The term character doesn't mean that it has to be a human. A character could also be an animal or even a piece of furniture or a toy. If you know how the character should look like, you have to know which movements it should be able to do. Maybe you want to animate a tabel which is behaving like a hores, a lamp like the one from Pixar, an animal or human. It is important to model the character in the right pose. We differentiate two basic poses the standard T-pose and the relaxed T-pose.

The **standard T-pose** shows the character with the arms stretched out to the sides. The feet are positioned under the shoulders. This pose isn't very natural. So it can cause some problems in the process of rigging. It can cause problems to model the character with straight limbs. For rigging it is better to bend the limbs a little bit.

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[1] http://www.webopedia.com/TERM/C/character_animation.html

The **relaxed T-pose** is more natural. Here we see the arms slighly dropped. Thy are in the middle of the area where the majority of the arms movement will be done. You should also model the elbow and the knees with a slight bend. So it is easier to apply the IK chain.[2]

Of course if you model a tabel or a lamp there are no limbs to stretch out. You should model the character in a neutral position. That makes the preperation for animation much easier.

3. Types of Modeling

3.1. Polygon meshes Modeling

Polygon Meshes are connected polygons. They are connected through edges. Together they form a surface with which we can model an object. A good thing about polygon meshes is thier felxibility. Polygons can have three, four or more edges. You can aslo add as many points into a polygon as you want. So you can build very complex objects with polygons. Unfortunately they don't represent smooth, organic shapes very good. You need many subdivisions to get a organic shape. Therefore a complex construction is required. That results in a long rendertime.[3]

The fundamet of polygon mesh modeling ia a polygon. It consists of points, edges, and faces. The points are also called vertixes. They can be shared by various polygons. Edges connect two points to each other. An edge can only be sharde by two polygons. If an edge isn't shared by two polygones it is a boundary.[4]

The simplest types of polygons are triangles and quads. Triangles have three edges and Quads have four edges.[5] A geometry which consists of

[2] „Modeling, Texturing und Animation of a 3D Comic Character" (SEITE 4)
[3] SOFTIMAGE®|XSI® Basics
[4] „Modeling, Texturing und Animation of a 3D Comic Character" (Seite 113)
[5] SOFTIMAGE®|XSI® Basics

Quads is easier to overlook. The same geometry would be much more complex if it would consist of triangles.[6]

Pic. 1: *Quad-Geometry & Triangle-Geometry*

There are different types of modeling within the polygon mesh modeling type. You can use Box Modeling, Modeling with curves or a polygon by polygon Modeling.

3.1.1. Box Modeling is one of the most commen and easiest ways to create an object. You start with a shape like a cube. Then you increase the number of subdivisions. So the cube gets more points and polygons to work with. Now you edit the shape of the object by deforming, adding edges or points, extruding, scaling or relocating points or edges.

3.1.2. Modeling with curves means that you start with a simple curve. You create the outline of the wanted shape with one or more curves. After that you convert the curves to Polygon meshes. Now you can edit the shape like you want. Therefore you also can use deformation, extrusion or adding and relocating points and edges.

3.1.3. polygon by polygon Modeling is simple to explain. You draw one polygon after the other to create the shape you want directly.[7]

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[6] http://www.dma.ufg.ac.at/app/link/Allgemein%3AModule/module/13152/sub/13192
[7] SOFTIMAGE®|XSI® Basics

3.2. NURBS Surface Modeling

NURBS Surfaces are two dimensional NURBS patches. A surface consists of four points and four edges. That means NURBS Surfaces are defined by NURBS curves. Every surface consists of four curves.[8] NURBS means non-uniformed rational B-splines. With this modeling type you can get oragnic shapes with relativ few control points. The accuracy is based on the mathematical interpoation between the control points. One disadvantage of NURBS Surfaces is the lack of flexibility. The patches always have four edges and four points.[9]

The components of NURBS Surface are points, NURBS hulls, knots, knot curves, and Isolines. The points of a NURBS Surface are control points. These points doesn't lie on the curve they are just control points. Through the position of the points we can define the shape of the surface. NURB hulls are the displayed lines between the control points. It is useful to see them when you work with the curves. Surface knots are the points on the curve. These knots define the surface. The knot curves are the lines which connects the surface knots. They are the wires in the wireframe view. Isolines arn't true components of a NURBS Surface.

3.3. Subdivision-surfaces modeling

Subdivision modeling is a combination of NURBS surface and Polygon Mesh modeling. It provides the advantages of both modeling types.[10] The smoothnes of NURBS Surfaces and the local detail and texturing capability of polygon meshes.[11]

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[8] SOFTIMAGE®|XSI® Basics
[9] SOFTIMAGE®|XSI® Basics   + http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/13205?step=3
[10] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/13376
[11] SOFTIMAGE®|XSI® Basics

4. Texturing and Shading

A shader defines the surfaces of objects and the shadows as well as the lighting and camera lens effect. You can apply shaders on single objects or polygons as well as on the whole scene. You can change the parameters and basic characteristics of a shader and combine different shaders by using the render tree.

4.1. SURFACE SHADERS are one of the most important shader types. It determines the basic shader of an object. Every object has a surface shader even if it is the default shader. The surface shader determine the objects parameters like reflectivity, transparenty and refraction.

4.2. TEXTURE SHADERS are connected to the surface shader to define the object's texture. There are two different types of texture shaders. 2D texture shaders just result in a two dimensional texture applyed on an object. With 3D texture shaders you can apply three dimensional textures. A texture shader applys an image or a texture onto the object. The texture shader alone wouldn't response to light or wouldn't be transparent or reflective. Usually the surface shader is connected to the material node's surface input. The texture shader is connected to the Ambient and Diffuse parameters of the surface shader.

### 4.2.1. Texture Projections and Support

A texture projection and a texture support is needed everytime you apply a texture to an object. The texture support defines how a texture is projected on an object. A object's texture projection is always constraint to the object. The texture projection defines where the texture is projected on the object.

It is very important to be familiar with the types of texture projection. If you choose the wrong type the texture won't turn out the way you need it to. The different texture projections are for example Planar Projection, Cylinderical Projection, Lollipop projections, and sperical

projections, cubic Projections, UV Projections, and Spatial Projections, camera projections, contour stretch projections, and Unique UV's Projections.

4.3. The Render Tree

The render tree is a very important and helpful tool for texturing. You can connect shaders to create visual effects. Each shader has a set of properties. These can be dynamically linked. You just have to connect the output of one shader to the input of another one. To connect a shader's output with the input of a parameter you just select the output and draw a line to the parameters input.
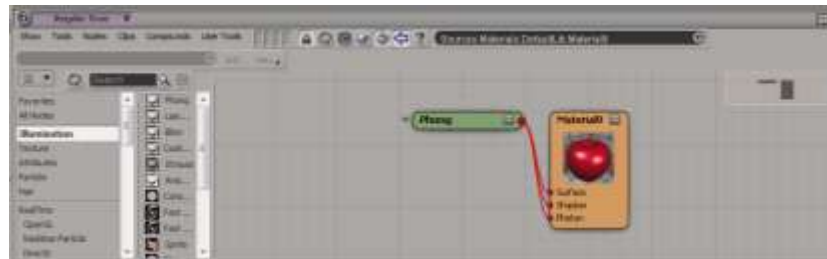
Screenshot 1: Rendertree

4.3.1.   Material Node

The material node is a placeholder for shaders. Every object has to have a material node. If there are no shaders applyed to the object the material will not define the object's look. Without a material or without shaders within the material the object won't be renderable. So without a material node the object can't be rendered. . A material node has various inputs which are also called ports. You can connect shader's outputs to these ports. So the shader will control the parameter to which the shader is connected. The connected shaders will alter the objects look. For example you can change the color or transparency of an object with the aid of a shader.[12] In the render tree

Screenshot 2: Material Node

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[12] SOFTIMAGE®|XSI® Basics Material (Seite 242-252)

there are different colors of nodes. Every color stands for another type of node. This color coding should help to visualize which shader ist doing what within the render tree. But not only the nodes are color coded. Also the shader's in- and outputs are coded. The color of the port will show what kind of input value the parameter will accept, and what kind of output it will provide.[13]

4.4.   SHADER PRESETS

Presets are files that contain values for all settings in a property editor. You can use the presets from you animation program or you can save the values you chose to be a preset. Then you can load it and use the same values at a later time. Through presets you can apply the same shaders with exact the same values to more then one objects.[14]

4.5. The Default Scene Materials

Every scene has a material. It is called Scene_Material. If a scene doesn't have an assigned material it inherits the Default Scene Material. If you choose a material for an object the default scene material will be replaced by the chosen material. But this is only for the selected object. If you remove the material again the object has the default material. If you delete the default material the last created material will be the new default material.[15]

4.6. Material Libraries

The material library is a container for all materials in a scene. Everytime you create a new material it will be add to the material library. If you delet an object the material is still in the library. So you don't lose the material by deleting the object. You use it later and apply it to another object. If you don't want to use a material then you just delet it from the material library. So you have

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[13] SOFTIMAGE®|XSI® Basics
[14] SOFTIMAGE®|XSI® Basics
[15] SOFTIMAGE®|XSI® Basics (Seite 242 – 252)

deleted the material of each object which was connected with this material. There are no maximum numbers of libraries in a scene.[16]

4.7. Assigning Materials to Polygons/Polygon Clusters

You don't have to assign a material to a whole object. You also can select some polygons and assign the material just to them. If you delet the material for the selected Polygons again they get the material of the object.

5. Rigging

The process of creating a skeleton and setting up motion constarins is called character rigging.[17] Rigging a character is useful for animation. It can take a long time to rigg a character correctly, but it will save time during the animation process.[18]

5.1. Basic definitions

Before you start rigging your character you have to get familiar with hierachies, skeletons, and kinematics.[19]

5.1.1. Hierarchy is important to constrain objects to chains. In a hierarchy there is a parent and one or more children. The children are underobjects of the parent. So if you rotate the parent the children will also rotate.[20]

[16] SOFTIMAGE®|XSI® Basics (Seite 242 – 252)
[17] „Modeling, Texturing und Animation of a 3D Comic Character" (SEITE 9)
[18] SOFTIMAGE®|XSI® Basics
[19] SOFTIMAGE®|XSI® Basics
[20] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14387?step=3

5.1.2. Skeleton-Systems are based on some

hierarchical chains. If you draw a new chain element it is automatically a child of the last bone. Skeleton systems are very useful for character animation. To realize a good character animation with the skeleton system you also use foreward and inverse kinematics.[21]
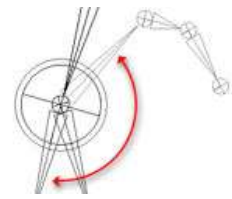
Pic. 2: Skeleton

5.1.3 Kinematics is a animation technique in the 3D computer graphic. It is based on the hierarchy of joints and bones. There are two different types of kinematics.[22]

5.1.3.1. Forward Kinematics

In the process of animation you use chains. The elements of such a chain are connected by a hierarchy. The first joint of the chain effects the next one under it. So you can animate more then one joint at the time. To bring the chain in a certain position you have to rotate all bones. You have to begin at the first bone and continue with the next. As long as the chain is in the right position.[23] If you apply foreward kinematics you know the angle of the joints, but not the target point of the chain. The animation is realised by rotating each joint seperatly.[24]

5.1.3.2. Inverse Kinematics

To animate an arm with inverse kinematics you just need to define the effector's position. The rest of the chain will automatically be moved in order to fit the chain. It is an intuitiv way to animate

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[21] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14387?step=4

[22] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14174

[23] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14174?step=1

[24] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14174

a character. You can try out different poses easily , animate simple movements quickly, and easily set up the poses of a chain by positioning the effetor.

The concept of inverse kinematics is based on the preferred angle. The direction the chain is bend is the preferred angle of rotation for a joint. It is defined by a bend which you include while drawing the chain. (PDF) You should never draw a chain straight.

The work with inverse kinematics is a great way to save time. Of course you can animate the same movements with forward kinematics but it would take much more time and working steps.[25] Inverse kinematics means that you know the target point. The angles of the joints will be calculated mathematically.[26]

5.1.3.3. Blending between FK and IK Animation

It is possible to use the advantages of both the foreward and the inverse kinematics. If you animate the movement of of a hand grapping something you will use inverse kinematics. So you just animate the effector of the chain which represents the arm. The whole arm chain will move to fit into the new position of the chain. Through blending FK and IK you can make a the movement much smoother and more precise.[27]

5.2. Setting Up Your Character

It is important how you set up your character. Therefore you have to put the character's elements into models.

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[25] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14174?step=2
[26] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14174
[27] http://www.dma.ufg.ac.at/app/link/Grundlagen%3A3D-Grafik/module/14174?step=4

Models are containers to oranize the scene's elements. It is also easier to copy aniamtion between characters. Every model can have an animation mixer. If you don't work with models then you just have one mixer for the whole scene. That makes it impossible to copy animation from one character to another. You should create a model for each character not for each part of a character. So you have a whole character in one model and one animation mixer. That makes it easier to animate the character.

Another good thing to oragnize a scene are **scene layers**. They help to not lose control about a scene. If a scene has too much components in it, it can get confusing. With the aid of the Scene Layers you can hide objects and group of objects more easily. But the groups aren't just for visibility. You also can ably selectability, renderability and ghosting. You can for examle seperate a character's envelope (geometry), its skeleton and its control objects for rig into different layers.

Groups are also very important. If you want to expot and import a scene the layer information won't be imported with the scene. Therefore groups can be helpful. Groups are properties of a model. So it can be exported with a character model. They allow you to select multiple objects at once.[28]

Before you start rigging you should position the character over the grid. Use layers to not accidently select the character. To create a new layer you have to go to the scene layer manager. To move the polygon mesh into the new layer you first have to select it. After moving the character to the new layer you disable the selection of this layer. So you can't accidently select the character.[29]

5.2.1. Elements of a Skeleton for Characters

Skeletons are made of bones. These are linked together by so-called joints which can rotate. Chains can be used to animate any type of object not just a human or creature. Chains consist of several elements. These elements are root, bones, joints, and the effector.

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[28] SOFTIMAGE®|XSI® Basics (Seite 159 - 184 Character Animation)

[29] „Modeling, Texturing und Animation of a 3D Comic Character" (SEITE 10)

ROOT: It is the starting point of a chain and the parent of all elements in the chain. The first joint has to be local to the root. So that if we rotate the root or change ist position all elements of the chain will also be moved.

BONE: A chain cosists of bones and joints. Every bone has a joint which connects it to another bone. The bone will be rotated around its joint which is on the top of the bone. The first bone in a chain is rotated around the root. There is also a hirachy within a chain. The root is the parent of the first bone of the chain. This bone ist he parent of all the other bones in the chain. To animate the chain you key the rotaion of the bones. Therefore you can use forward kinematics.

JOINT: These are the connections between the single bones, the root and the first bone and the last bone and the effector. In a 2D chain you the joints should acta s hings. They should just rotate in a certain direction and then just till a certain angle. Just the joint next to the root is a ball joint. So you can animate a limb more realistically. If you need the joints tob e able to rotate in any direction then you need a 3D chain. This is good to animate a animals tail. Therefore every joint is a ball joint.

EFFECTOR: The effector is like the root a null. It is positioned at the end of the chain after the last bone. It is connected to the last bone through a joint. If you move the effector you apply inverse kinematics. That means that the entire chain moves. If you create a chain, the effector should be the child of the root not of the last bone. [30]

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[30] SOFTIMAGE®|XSI® Basics

5.2.2. Creating a Skeleton

To draw a chain you have to choose if you want a 2D or a 3D chain. The difference between those two elements is easy. The 2D chain consists of joints that act like a hinge. So they just can rotate on one axis. Only the first joint, also called root, is a ball joint. That means that it can rotate in every direction. The 2D chain is useful for animating limbs. A 3D chain consists just of ball joints. So every joint can rotate in every direction. This kind of chains is good for animal tails, tentacles, or ropes. [31]

Choose the position of the root, the joints, and the effector. The snapping mode makes the process of drawing a chain easier. If you draw the chain in relation to the pose of the envelope you're planning to use then you don't have to waste much time to adjiust each bone's size and position later on. You can also draw the chain with slight bends. So you determine in which direction the joint should rotate when using inverse kinematics. A straight chain can cause some unprecise movements. You can also mirror a chain. This can be useful for arms or legs. To mirror the chain just select the Symmetry mode and then draw the chain. So a second chain will be created at the same time.[32]

But it is not enough to just draw the skeleton of a character. To be able to animate it right you also need a hierarchy. This will make it easier to animate the skeleton.[33]

5.2.3. HOW TO CREATE A HIERARCHY

To make a part of the skeleton a child of another you can select the part which should be the child in the explorer. Then you drag and drop it on the part which should be the parent. You can also select the part which should be the parten and choose the parent button in

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[31] „Modeling, Texturing und Animation of a 3D Comic Character" (SEITE 11)
[32] SOFTIMAGE®|XSI® Basics
[33] SOFTIMAGE®|XSI® Basics

the constraint toolbar. Then you pick all parts of the skeleton which should be the children. To end the parenting mode you have to click the right mouse button.[34]

5.2.4. Making Adjustments to a Skeleton.

You always have to resize bones, chains or the whole skeleton after drawing the chains. Sometimes you also have to add or remove bones. You should try to adjust the skeleton before you apply the envelope. So you don't have to change the envelope again after modifying the skeleton. Of course you also can change the skeleton after enveloping and you can decide if the envelope should be adjusted to the skeleton or not.

5.2.4.1 ADDING BONES

To add bones choose Skeleton>Add Bone to Chain. Then click at the position where the new bone should end and the bone will be added between the effector and the last bone.

5.2.4.2. REMOVING BONES

It isn't possible to delet single bones because of their hierarchies. But you can select a chain and delet the whole chain. If you want to keep some of the children then don't forget to cut the hierachy by selecting the bones and choosing CUT in the Constraint tool bar. Then don't forget to reparent them to modify the chain.

5.2.4.3. RESIZING BONES

You can resize bones with the MOVE JOINT TOOL. (CTRL+J) You can move any chains element to a new position and so resize the bone. The bones which are connected with the relocated element will be resized and rotated to fit the chain. You can also use the Move Branch Tool. This relocates a whole

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[34] SOFTIMAGE®|XSI® Basics

branch. So just the bone above the modifyed element will be resized.[35]

5.3. The Pose

Before you start animating you should safe the original pose of the character as a reference. This helps you enveloping and animating the character. The original pose is also called neutral pose, reference pose, or base pose. It is also known as the T-pose.

You can save the pose of the skeleton and apply it at any time again on the character.[36] You should use the neutral pose as an offset. So if the character is in the neutral pose the rotation and translation is on value 0 and the scale on value 1. So if you want to return to your neutral position you can modify the transformation values.

6.   Enveloping

The process of enveloping is also called skinning or boning. The envelope is a object which deforms automatically if the pose of the skeleton or other deformers change. The points in an envelope are assigned to deformers. You can set a value of weight for each deformer. It defines how strong the deformer will affect the envelope. Each point of the envelope has a total weight of 100. This value is devided between all the deformers which are assign to one point.[37] In the process of enveloping a weightmap will be generated. The weight map visualizes how strong a deformer affect a point of the geometry and which deformer affects which point.[38]

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[35] SOFTIMAGE®|XSI® Basics
[36] SOFTIMAGE®|XSI® Basics
[37] SOFTIMAGE®|XSI® Basics
[38] „Modeling, Texturing und Animation of a 3D Comic Character" (IVAN)

6.1. SETTING ENVELOPES

To set the envelope you should work with the neutral pose of the character. You select the objects or hierarchies that should be affected from the enveloping. The set envelope tool can be found in the animation toolbar. Pick the objects which should act as a deformer. Deformers could be bones or other objects. If you are finished with picking the deformers press the right mouse button. The value of weight of each deformer has to be set. To adjust the basic settings use the Automatic Envelope Assignment property editor. Now you can move the deformers to see how the character will be affected. To modify the weight of the deformers you need the weight paint panel. Here you can paint, add, erase, and smooth the weight of each deformer manually.[39]

In the weight map the deformers are colored in different colors. The points which be affected are colored in the same color. So you always know which deformer affects which point. To do the enveloping process right you have to try it in different poses. You should adjust the weight in the neutral pose. So you have to save the neutral pose. If you saved it you can move the character and look how the deformers work and then work in the neutral pose to adjust the settings of the deformers.[40]

You should compare the weight in different poses. So you can see if the character acts right in different movemets. By painting the weight map you can just paint one side of the character. Afterwards you mirror the painted side. So both sides of the character are exactly the same.[41]

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[39] SOFTIMAGE®|XSI® Basics (Seite 159 - 184)
[40] „Modeling, Texturing und Animation of a 3D Comic Character" (seite 25)
[41] „Modeling, Texturing und Animation of a 3D Comic Character" (SEITE 28)

7. Model a Lamp

To model a desk lamp you can apply box modeling. Start with a cylinder. Select the upper side of the cylinder and scale the surface down. Then select the other side of the cylinder and copy the faces of the polygons with Ctrl+D. Scale them just a little bit down. Extrude the polygons in the direction of the y axis until you almost hit the other end of the cylinder. Copy the surface again and scale it down before you go on extruding into the y direction. Then select the whole cylinder and rotate it.
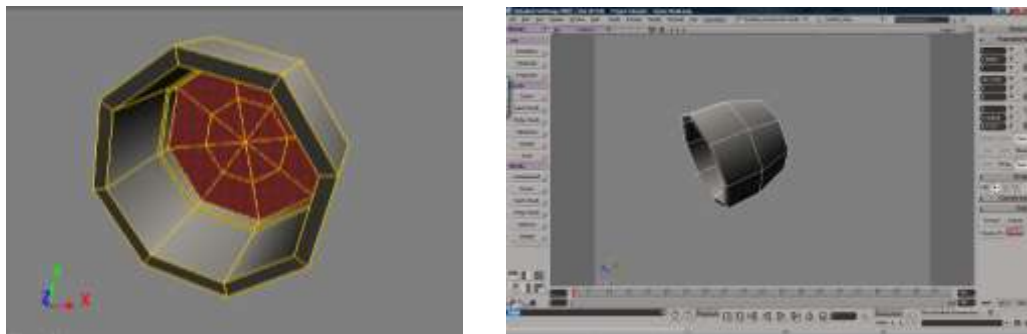
Screenshot 3+4: 1st cylinder finished

Create a new cylinder and scale it down into the y axis. Then rotate it in the same angle as the first cylinder. Position it on the upside of the first cylinder. Now we finished our Lamp head.

Screenshot 5: 2nd Cylinder   **Screenschot 6: 1st and 2nd cylinder combined**
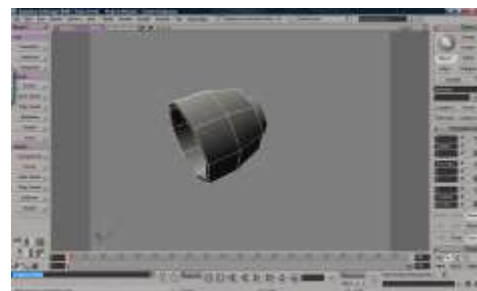
To create the stand of the lamp you use a cube. The cub should look like a long stick. So scale it in the x and z direction down. In the y direction you have to make the cube longer. Select the polygon on the top of the cube and extrude it. Relocate the extruded polygon a little bit to the left. Then extrude it again and relocate it again a little bit to the left. Repeat this working step about 7 times. Then select the polygon on the left side of the last extruded part of the object. Extrude this polygon straight. Then relocate the whole object you created to fit the lamp. It should be on the backside of the second polygon.

Screenshot 7: cube for the Stand

Screenshot 8: 3 objects together

Then create another cylinder for the bottom of the lamp. Scale it down in the y axis. It should look like a 5 cm thick plate. It shloud look realistic and fit to the other parts of the lamp proportionally. Relocate the plate that the stick is located in the middle of the plate. It should look like the stick is coming out of the plate. Then select the bottom surface of the plate and extrud it wit a little scaling up into the object. So you get a hole on the bottom side of the lamp.
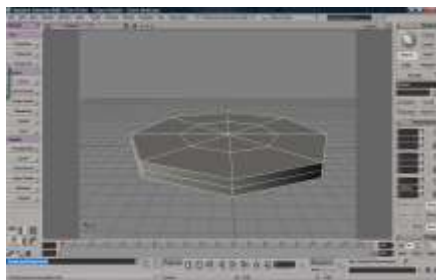
Screenshot 9: Bottom plate (Cylinder)
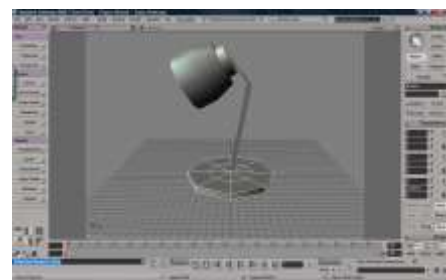
Screenshot 10: the 4 objects together

The next part of the lamp we create is the bulb. Therefore create a sphere and add more subdivisions. Don't chose too much subdvisions because of the render time. Then select the upper rings of polygons. Move the selected points and edges up. Then select the rings of polygons again but just the inner ring. Change the position again. Then rotate, scale and relocate the whole object until it fits into the lamps head. This is our light bulb.
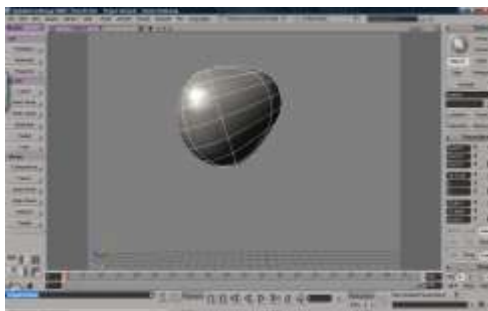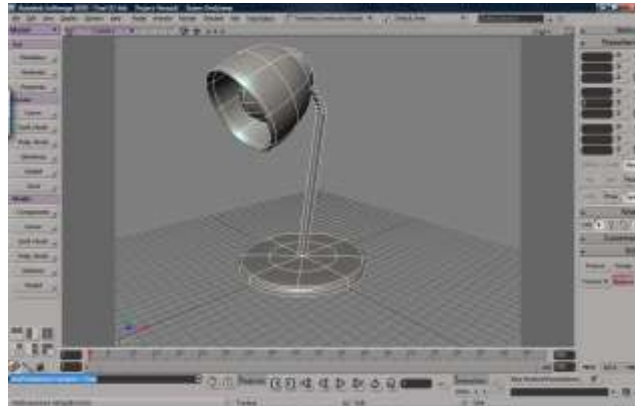

Screenshot 11: Lightbulb (Sphere)
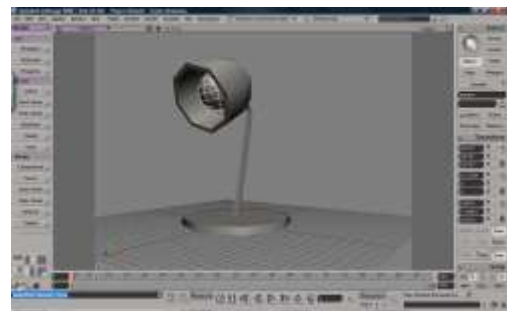
Screenshot 12: the 5 objects together

You can select all the objects we created till now and smoothen them. Therefore use the + and – on the number block. The shape of the lamp will get much smoother. I smoothen all objects but not the cube of the lamp stand.

Screenshot 13: smoothnes applyed

To model a cable we start with a cube. Select one side of the cube and extrude it. Then move it a little bit in the direction the cable should go. Extrude the polygon again. You have to be careful. If you relocate the extruded polygon too much the object will look weird. So just relocate the polygons a little bit. To model a cable you need many extrusions. The more polygons you extrude and the less you relocatethem from their original place the better and smoother the cable will look. If you are finished select the whole cable and smooth it. Now it will be round and look like a cable. To model the plug we need three more objects. First we create a cylinder and rotate in an angle of 90°. Select the inner circle of polygons on one end of the cylinder. Relocate these polygons without copying the polygons. The polygons should be moved away from the object. Move these polygons along just one axis and don't move them too far from their original place. Then select the other end of the cylinder. Copy the polygons and scale it down just a bit. Move the polygons in the same direction as the polygons on the other end of the cylinder. So you extrude the polygons into the object and a free space will be created.

The next step is creating a sphere and scale it in x and y direction down to a small stick. Then scale it in the z direction that you get a thin stick with a round end. This object will be duplicated. We locate both on the cylinders end which we extruded last. Now we just have to locate the whole plug on the end of the cable. Therefore select the both spheres and place them in the editor into the plug object. Now we

can relocate the plug and both spheres will maintain their place at the plug. This way it is much easier to relocate the whole plug.

Screenshot 14+15: cable of the lamp (cube)

We are ready for texturing. The cable should have the color black. It has no refelctivity or specs so we can use the surfacemodel Lambert. This one has no reflectivity or specs. For the bottom part of the lamp I used the color red. I used the surfacemodel Phong which has specs and reflectivity. You have to check if these characteristics are enabled. You can uncheck if you don't want to use one of the characteristics. The bulb should have a light yellowish color.
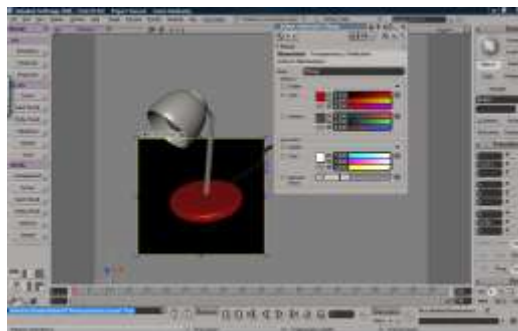

Screenshot 16: Texturing

If you want to animate the lamp you have to prepare the lamp for animation. We need two chains one for the lamp and one for the cable. I use a 2D chain for the lamp and a 3D chain for the cable. You can parent the chains to keep them to-

gether. The effector of the 2D chain schould positioned at the bulb. So if you move the effector it will be animated with inverse kinematics. The effector of the cable should be positioned at the middel of the lamps bottom plate because the cable should be moved when the lamp moves. You also have to parent the chains. The chain of the lamp should be the parent of the cabel's chain.
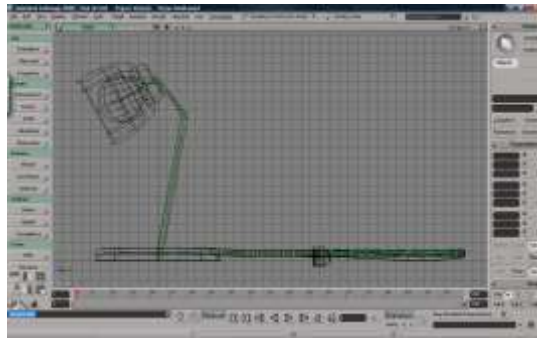

Screenshot 17: skeleton

Create a model by choosing Model>Create>Model>New Model. Now you can put all objects of the lamp in the created model. You don't have to do this if you have just one character in your scene. It helps a lot if you have more then one characters within a scene. So yoz have one animation mixer for each model instead of just one for the whole scene. This way you can copy animation more easily.
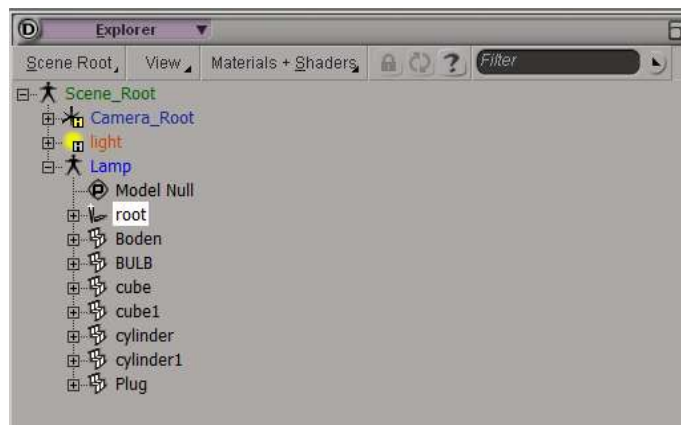

Screenshot 18: Model

For the process of enveloping you have to select all the parts that should be an envelope. Choose Animate>Deform>Envelope>Set Envelope. Pick all the objects you want to use as a deformer. I pick all objects of the skeleton. Then end the picking mode. Now the object has colored points the object is constraint to the skeleton. You can move the effector of the 2D Chain and the head of the lamp will

be moved. This is the first step to animate a character. You have to modify the envelope and the weight of the deformers in order to get the wanted movements.
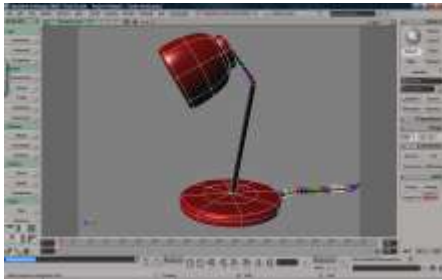
Screenshot 19: Enveloping
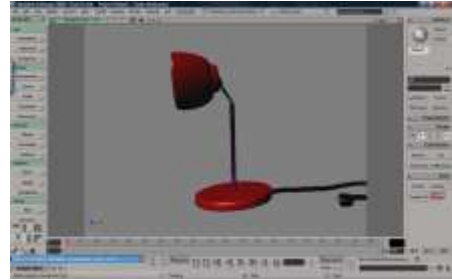
Screenshot 20: moving the head

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Table of Figures: