Creating a brand character for making animations in 3D graphics editor

A Kolesova
Department of Design and Visual Arts, South Ural State University, 76, Lenin Ave., Chelyabinsk 454080, Russia
E-mail: kolesovaaa@susu.ru

Abstract. The article focuses on the stages of designing a 3D brand character, algorithms for practical usage. It also reveals the necessity of using a character as an element of a corporate style. The author analyses the significance of using a 3D character in advertising for brand promotion. The article also summarizes the basics of working in Autodesk 3Ds Max and presents the definition of a 3D model, spline, characteristics of Edge, Border, Polygon, Element and Vertices, renderers, animation. The author demonstrates how to use a polygon and spline methods as well as animation method with Bones. The paper dwells on creating primitives, splines, materials and light sources. The author also suggests an example and step-by-step instruction starting from a sketch and finishing with a scene visualization with a character. The results can be used by graphic designers who face the task of creating a 3D character.

1. Introduction
A character is frequently used in animated entertaining and educational videos and games. A character can become part of a brand, an element of a corporate style. A corporate character helps a company establish a dialogue with the target audience. A corporate character adds individuality and makes a brand instantly recognizable [1]. The creation of a 3D character usually involves 2D and 3D graphics. We will consider a problem of creating a 3D character model and preparing it for animation. A three-dimensional model (3D model in short) is a visual dimensional image of an object.

Initially, the object is presented as a number of points or coordinates in a 3D space. A 3D coordinate system is defined by three axes: horizontal, vertical and depth usually called axis x, y and z correspondingly [2].

The creation of a character can be divided into three stages. The first stage consists in information gathering in the form of text. Starting from the description of a company, its goals and objectives, we should also analyze the target audience. This information influences the character’s appearance, its personality and area of interests. The second stage involves a search for a visual image of a character, its silhouette, typical poses and coloristic decision. For creating 3D sketches designers usually use 2D graphics. Only the third stage involves 3D modeling and animation. We will consider the process of working in a professional program Autodesk 3Ds Max. This editor has extensive means for creating different in terms of complexity and shape 3D models, realistic and abstract objects, various techniques and mechanisms [3]. 3Ds Max was used in such world-famous movies as "Elf", "A
Cinderella Story", "Scooby-Doo 2: Monsters Unleashed", "Jurassic Park", "The Last Samurai" and others.

2. Materials and methods, Editable poly
Using an imaginary situation we will create a character model from the ground up and prepare it for animation. According to the legend, a marketer advised a juice bar network owner to add a brand character to the corporate style. In the future this character is going to be engaged in advertising, a computer game and even in a children’s movie [4]. Our task is to start the process, to create an image, design a model and make a number of visualizations. Imagine that the first two stages are over, the necessary information is gathered and the sketches are approved by the customer [5,6]. The final sketch presents a character in three projections: the front, the profile and full-face (Figure 1).

Figure 1. A character sketch from various perspectives.

We are going to create a new scene and design a plastic cup from a standard primitive Cylinder. The standard primitives are a number of basic geometric shapes which serve a basis for creating more complicated objects. Let us set the size by height and width and change the primitive parameter in Height Segments to 5. Then we click the object using the right mouse button and choose from the list Convert To: → Convert to Editable Poly. In Editable Poly there are sub-object levels, such as Vertex (peaks), Edge, Border, Polygon, Element. The vertex is a one-dimensional object or a point in space. If we connect, for example, two peaks we will get an edge. An edge is a two-dimensional object which is defined by two vertexes and presents a line. Three and more edges form a polygon. The Border is a closed boundary between the polygons. The sub-object Element is used when it is necessary to select the whole object [7].

In the menu Modify we select a group of vertexes using Selection and by means of ScaleTransform and Move Transform make the shape slightly narrowing to the base. The air cap can be built using an object Sphere, so we run the command Convert to Editable Poly, select the lower part of the sphere by means of Modify → Polygon and delete it. Then we put the half of the sphere at an angle and add several spheres of various size to the cap (Figure 2).

3. Character modeling using Splines. Editable Spline
Besides primitives, splines are also widely used in modeling. Splines are two-dimensional geometric objects and simple lines which can help create the contours of objects. They are not three-dimensional and in default settings are not seen during rendering.
We pass over to designing upper limbs of a character and draw splines by means of the main menu Create → Splines → Line (Figure 2).

Creating a spline starts from clicking the left mouse button. After the click there appears the first fixed point of a spline, then we create a line itself, a repeated click of the left mouse button helps us create a new point and so on. Clicking the right mouse button allows us to interrupt the mode of line creation. Applying short clicks we will get a straight line and if we hold down the mouse button, we will get a curve [8]. The character’s hand was designed using a primitive Box. The primitive in Modify parameters was divided into several segments along the sides. Length Segs: 3, Width Segs: 3, Height Segs: 3. On the polygon level the hand was formed (similarly to the creation of the plastic cup body).

![Figure 2. Stages of designing a model using primitives.](image)

Create Box → Convert To: → Convert to Editable Poly → Modify can be selected using Selection, a group of vertexes can be edited using Scale Transform and Move Transform. In order to create a copy of a hand we hold down the mouse button on the model and push the Shift button (Figure 3).

Spline modeling is a way of creating a volumetric object based on the closed or non-closed line – a spline [9].

![Figure 3. Modeling the character’s hand using a primitive Box.](image)
First we create the lower limbs using a spline (Splines → Circle). In order to edit the vertexes we export the spline into the editing mode ConvertTo: Convert to Editable Spline. Using the tab Modify we select vertexes or segments → Selection → Vertex. There can be different types of points, if we select one or some of them and click the right mouse button, we will get a list of point types.

The Bezier Corner type can bend or straighten the spline segments from two sides. The Corner point creates a straight line, the Bezier point creates a customizable symmetric curve for two segments, the Smooth type can automatically apply smoothing without manual control. After designing a closed spline of a foot we apply a modifier Extrude: the menu Modify → Modifier List → Extrude. We can adjust the height using a numeric value in the parameter Amount (Figure 4).

The character’s smile and a spoon can be designed using the same method. The eyes can be designed using standard primitives Sphere. The cocktail straw can be created from a spline Create → Splines → Line. In order to set the thickness of a straw we should switch to the editing mode Convert to Editable Spline. In the parameter Rendering we switch on Enable In Renderer and Enable In Viewport. These parameters enable and disable the visibility of a spline thickness. The numeric value in the parameter Radial should be set at Thickness, thus we can regulate the thickness of a straw’s spline and use the same parameter for the hands’ splines.

4. Material overlay and creating light sources
When all the segments of a model are ready, we should overlay the materials. By means of Autodesk 3Ds Max program we can use ready materials from an embedded library, download libraries from the Internet and configure the material manually. In order to overlay the materials we should enter the tab Material Editor, by default, all the suggested materials will be standard (Standard). Using a parameter Diffuse we choose the material color, using the tab Opacity we set transparency. To apply the material we should select the model’s segment and click the icon Assign Material to Selection and Show Shaded in Viewport. The material libraries can be divided into the following groups: Standard, mentalray, VRey, Corona. Besides, 3Ds Max contains texture libraries, but using textures was not envisaged for our model [10]. After applying the materials we should enable lighting.

There exists no lamp so far, by default we have only Default Lighting [11]. The main drawback of this universal lamp is the absence of user settings. When we need a controllable light source we should create a new one. As far as there are several groups of light sources, we will consider the type Standard. The Omni light is a light source located at a point and emitting light in all directions of a 3D scene space. This light source is also called a point one. The Target Spot (targeted projector) is a light source located at a point and emitting a cone-shaped or a pyramid-shaped light with a vertex in the emitting point. This projector has a target setting the direction of rays.

The Target Direct is a similar light source which is emitted by a plane, not by a point. Such light source can be presented as a parallelepiped or a cylinder. The FreeSpot is a light source identical to the targeted projector but without a target point. The direction of a light ray can be changed by the rotation of a light source. The Free Direct is a similar light source emitting light from a plane (like the Target
Direct). The Skylight is light emitted by the sky dome [12]. In order to create a light source we should click Create → Lights → Standard → Omni. In the settings we should regulate the intensity of a lamp in the parameter Intensity → Multiplier.

5. Rendering and animation
In order to create a final image (figure 5) we should use the tab Render Setup → Render. The parameter Renderer should be set before the overlay of the materials in case we use Corona, VRey or mentalray, since they correctly display only the materials and light sources from the self-titled group of materials and light sources. Rendering is a process of calculating all the settings of scene elements, the export from a current 3ds scene into the final file e.g. jpg, png or avi. All the computer programs have an export command. This process does not usually take much time whereas in 3Ds Max rendering can last for several days and requires a high computer power. After pushing the button Render the final image of a scene is ready and we can display the plastic cup from any angle [13]. In order to prepare a character for animation we need to bring together all the segments of its body and create a frame from the Bones.

![Figure 5. The ready-made model in work windows and rendering the logo scene.](image)

Bringing the segments together should be performed using Boolean operations. They are called after George Boole, an English mathematician, who in the 19th century developed a basis for modern digital computers [14]. Boolean operations or logical operations are based on the notions of intersection, subtraction or union, they came into 3D graphics from algebra. First we select the plastic cup and go to the tab Create → Geometry instead of Standard Primitives we choose Compound Objects Boolean → Union and pushing Pick Operand B click the segment for merging. Thus, we can bring together the whole character. Some elements can be left independent, e.g. a spoon or a straw-cane.

The frame consists of Bones – it is a special type of hierarchically interconnected objects, the Bones are aimed at easy management during animation [15]. As a rule, the system of bones is placed within the character’s body. In order to create bones we push Create → Systems → Bones. In order to connect the skeleton with a model we use a modifier Skin → Bones: Add. After applying the modifier Skin and designating bones, each bone has a capsulized envelope. If we open the window Weight Tool, we can change the value of the vertex-attachment to each bone [16].

The 0 in the parameters means the absence of attachment, 1 is the maximum value. The button Exclude Selected Verts excludes the selected vertexes from the bone-dependence zone. Include Selected Verts enables them, whereas Select Excluded Verts selects the excluded ones. After
customizing the force of vertex-attachment the character is ready for animation. In 3Ds Max animation we can always see the panel at the bottom, where Time Configuration contains all the settings of a time scale and Auto Key button serves to create a key shot [17].

6. Conclusion
In the nearest future a plastic cup with oxygen cocktail will be getting ready to become a feature film character that is why we chose a 3D graphics. A volumetric character is closer to reality, during montage it will be in harmony with a live video, 3d graphics will help create a video with an illusion of real interaction of people – actors and a fictional character. The corporate character will enhance the company’s brand awareness, it will provoke an emotional response and establish relations with the target audience. The more a viewer communicates with the brand character, the more trust the company inspires. All we have to do now is to prepare a good quality script for a film. A character besides personality must have an interesting history and understandable motivation.

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