3-D Max

INTRODUCTION :-

Today it is difficult to imagine the development of three-dimensional scenes, interactive games, and realistic effects in the film industry without the use of modern computer simulation technologies. The designer work, which should not only create realistic scenes but also pay attention its artistic qualities, becomes indispensable. This book covers learning of modeling tool for 3-dimensional Computer Scenes.

3ds Max graphic system is developed by Autodesk Company (USA) and is designed for modeling of three-dimensional Scenes and animation. The first versions of this program emerged about twenty five years ago and the program has become almost the most popular modeling tool for both beginners and professional designers since that time.

3ds Max 2018 recent version, described in the manual, is the result of its evolutionary development. 64-bit operating System windows 8 professional X 64 and higher with a multi-core Intel or AMD processor, at least 4 GB of RAM, a video card with at least

512 MB of memory, and a disk space of about 6 GB are recommended to install 3ds Max 2018 graphics system.

This manual is a revised and enlarged edition of the publication. The manual uses the author's long-term experience as a teacher of Computer-graphic disciplines. The teaching and methodological material presented in the manual has been successfully tested for 15 years at the Engineering Technological Academy of the Southern Federal University in Tagnarog.

This manual is based on the step-by-step acquistion method from the creation of flat forms for further modeling and assignments of materials and installation of lighting to realistic rendering. The learning of commonds and tools is carried out with specific excerises with objects of a single scone are modeling in stages. The interior of the bar room is used as a modelling scene. Creative tasks on three-dimensional objects modeling are presented for self-study. The manual also includes control questions and a list of educational and methodological literature.

following themes are addressed in the training modeling;

* Description of the main elements of 3ds max 2018 editor window;

* Basics of two-dimensional forms modeling.

* Modeling based on 3D primitives,

- Basic methods of 3D modelling,

* Assigning of materials and textures to 3D objects'

- Lighting Sources installation and adjustment;

* Cameras installation and Setup.

1. Interface of the graphic editor 3ds max 2018.

After the first Start of the graphic editor 3ds max 2018, the welcome Screen appears on the Screen. with it, you can open recent files and view the training videos that come with 3ds max. To disable the display of this window at Startup, you must close the Show this welcome Screen at Startup check box and click the close button.

The main elements of the interface :-

To call and delete the corresponding interface element of the 3ds Max editor, you can use the Customize/Show UI/Show .... Command. If the process Seems long, then you Can use one more method : more the mouse pointer to the border of the Command panel and the toolbar, When the icon appears as a white double rectongle, click the right mouse button and you will get a menu access to the main interface panels.

The menu bar includes the following drop-down menus : file, Edit, Tools, Group, Views, Create, modifiers, Animation, Graph Editors, Rendering, Lighting Analysis, Customize, Max Script, Help and Tentacles.

The main toolbar provides one of the easiest ways to execute 3ds Max Commands, because only need to click on the Corresponding button of the

fundamentals of Two - Dimensional Modeling :-

This chapter will introduce methods of creating flat forms in 3ds Max form two - dimensional primitives to multicomponent curves. it Should be pointed out that the word " Shapes" is collective fore all 2D objects in 3ds Max. forms consist of Vertices, Splines and Segments' Hereafter we will use these two - dimensional forms for Scene modelling in the bar room interior form. However, in order to include rendering for the last scene, you will need to arom yourself with paitence, Since the modeling process will not be a simple set of Specific Commands, but it will be full Creation.

Two - dimensional Shapes :-

Before you build the first Shape, you need to set the units of measurement. In the next exercise, Consider the Setting of the units, the Step of the grid and the Snap mode.

Setting the Units :-

- Run the 3ds Max program. The default unit is one inch. Run the Customize/ Units Setup command to open the units Setup dialog box. Here you can set the Scale price & the System Scale type.

- Select the metric System in the Display unit scale section by setting the unit of measurement — mm. Although you can use other units from the metric Scale.

- Next, Set the System unit by pressing the System Unit Setup button.

- As the System unit, we also set - mm and press the OK button. When setting the units of measurements, we ~~also set~~ it is recommended to select the same screen and System units in order to avoid unforeseen situation.

- To set the grid Spacing and building binding objects, Select Tools / Grids and Snap settings.

- In the Snaps tab, bindings to various Constituents elements of the scene are set: to Vertex, to Grid points.

- Go to the Home grid tab and set the grid Spacing to 10mm, set the other parameters according to the dialog box. Close the dialog by clicking on the Cross in the upper right corner.

- In order to verify the performed settings, Check the grid Step in the Status bar, next to the Counter along the z axis you will see the inscription Grid = 10.0 mm.

- If necessary, the entered settings can also be saved in a separate file at Startup.

When Creating two - dimensional primitives, they are assigned a System name and an individual Color in a random way, selected from a Certain Color palette. By definition, each form Contains at least one Spline. Complex Splines Contain various Compound Shapes. Composite two - dimensional Shapes

Can be Created in two ways:

- Use the mode start new Shape;

- Using the Join operation based on primitives'

Creating a outline of the front wall :-

1.) Continue the Construction with the established metric units. In this exercise, we will Construct a rectangular outline of the front wall with two window openings.

2.) Click on the front projection window to activate it, and then press the < Alt + W> key Combination to expand the f window to the full screen.

3.) Then click the 3D Snap Toggle button located on the toolbar to activate the binding mode. The type of Grid points binding that we need is used by default.

4.) To Create a rectangle, click the shapes button located on the toolbar to activate the binding mode.

4) To create a rectangle, click the shapes button located on the command bar in the Create tab, and then on the Rectangle button of the opened object Type rollout.

5) Click in the left part of the projection window on the bold black line corresponding to the horizontal axis of coordinates, and drag the cursor diagonally to the right and up. When you see that in the rollout of the Rectangle Spline parameters there appeared the values length = 100mm & width 380mm, release the mouse button, fixing the values of the parameters.

Rendering of two dimensional Shapes :-

Sometimes it may be necessary to rendering of Scenes containing two dimensional Shapes. If you enable rendering, you can not find them on the final Scene. These objects do not have a third dimension, and by default they are not renderable. In 3ds Max it is possible to make two - dimensional Shapes available for rendering. In the next exercise, we have to create a web, and then rendering it.

"Invisible" Text :—

1.) Execute the File / Reset Command. click on the top projection window and then use the ⟨Alt +W⟩ Key Combination to expand the window to full Screen.

2.) click click the Shapes button on the Create Command bar and on the Text button. click on the free field of the projection window. The window will display MAX Text.

3.) To edit it, go to the modifier. in the Text Section of the parameters rollout, you Can enter or edit text.

4.) Click the Render button on the toolbar. or press the F9 Key. If you see a black window of the virtual frame buffer) then do not be Surprised, We will soon find this text.

5.) To rendering the text, open the Rendering roll in the modifier. Select the Enable in Renderer check box, click the F9 button again. The thickness of the font is adjusted by the value of the Thickness Counter.

Fundamentals of 3D Modelling :-

Working with flat forms is quite an important step, but such work does not lead to the direct creation of 3 three-dimensional Scenes in 3ds Max. Therefore, in this chapter we have to learn how to create mesh manifolds of three - dimensional objects, Sometimes called Simply meshes, on the basis of two - dimensional forms. We will consider the basic methods of 3D modelling; the use of other methods requires additional study. But if you study the key techniques considered in this chapter, you will acquire the basic skills that allow you to build frequently used objects often used in the modeling of three - dimensional Scenes.

Path forward on building a bar room model will help you to study many methods of 3D modelling. There are no "right" or "wrong" methods of solution. But the more methods of modeling you know, the easier it will be for you to choose the right method subsequently when youre implement your own projects.

Some of the methods that you saw in the previous chapter will be considered once again as an Illustration of the effectiveness of editing the shape of three - dimensional bodies. In working with two- dimensional Shapes and three dimensional grids, there are many Common points.

- Conversion to Editable mesh :-

This transformation is exactly the same as Converting two- dimensional Shapes to editable Spline. with its help you get access to the editing levels of Sub objects, of which the three - dimensional grid Consists, Vertices, edges, polygons of elements. However, After you have Converted a three - dimensional primitive, such as box, to an editable view, you can no longer Change the basic parameters of this primitive Such as length, width & height :

- you can apply modifiers to Selected sub- objects in the same way as when editing a two - dimensional Shapes;

- The presence of modifiers working only with three - dimensional objects.

Modifier. fillet / chamfer. works only with two-dimensional forms. Similarly, the Mesh Smooth, Mesh Select, or UVW map modifiers can only be applied only to two-dimensional shapes. If you have a grid object selected, you will not even see such modifiers in the list available for use.

- Extrude
- Bevel
- Bevel profile
- Lathe

Extrude Modifier :-

The extrude modifier works only with two-dimensional shapes. As a result of its application, the outline of the shape extends along the local Z axis, in the positive or negative direction. In this exercise, we will use the previously created form of the front wall with window openings, as the basis for applying the Extrude modifier. We will also get acquired acquainted with the method of attaching objects from other scenes to the current scene.

Creating a Facade wall :—

1.) Run the Program 3d2 Max. To extrude the front wall, Create outline of the foundation line based on the rectangle.

2.) Go To the Top projection window and expand it to the full Screen. Then click on the 3D Snap Toggle button on the toolbar to activate the Snap mode. The type of Grid points Snap that we need is used by default.

3.) To Create a rectangle, click the Shapes button located on the Command bar in the Create tab, and then on the Rectangle button of the opened object Type rollout.

4.) Click in the upper-left corner of the projection window and drag the cursor diagonally to the right down. When you see that in the rollout of the rectangle Spline parameters there are values of length 200mm and width of 380mm, release the mouse button, fixing the values of the parameters. Try to arrange the form symmetrically with respect to the horizontal bold line.

5.) Go to the prospective window & execute the file/ Merge command. In the merge file dialog box, Select the file " facade max" from the folder lesson 1.

6.) To extrude the wall, Select the " facade wall" object, then select Extrude from the modifier list.

7.) To set the wall to its place, Select the Align tool on the toolbar and point to the outline of the foundation.

8.) In the Align Selection dialog box that appears, select the X position and Y position Check boxes. In the current object and Target object switches to the minimum position. After this, the front wall will be leveled relative to the foundation.

9.) In order to finalize the scene, it is necessary to delete the left and bottom Segments of the rectangular outline of the foundation in the Top projection window.

Bevel Modifier

The Bevel modifier allows you to create three-dimensional bodies by multilayer extrusion. After applying the Bevel modifier, new faces appear, resulting in an increase in the grid density. But in some cases, with the help of additional faces, you can make the scene more effective. These additional faces reflect light, resulting in an underlining of the shape of the object. In this exercise, we will create a window trimmer & frame.

Creating a frame and trimmer :-

1.) Execute the file / Reset command.

2.) Open the file "facade wall. max" from the folder. Execute the command file / Merge and in the dialog box merge file select the file "facade with the outline of the frame. max" from the folder. In the merge constructions or attach the upper and lower parts to each other, otherwise, the wall bar stand will consist of two parts.

3.) To finalize the profile, go to the modifier in the vertex editing mode and convert the original spline to the form shown in fig. on the right. You can change the shape of the profile to your liking, taking into account ergonomics.

5.) Save the file with the profile of the bar stand in the folder lesson. under the name "profile of bar stand. max".

Lofting based on Several basic cross Section:-

We have already examined how it is possible to create a Simple two - dimensional Shape section, extrude it along some Spline path, also editing the original two- dimensional shapes, and change the appearance of the resulting three - dimensional gridd. In the next exercise, we will look at the additional features of the loft method.

- Selection of waypoints for placing Sections.

- Use of more than one section.

- deformation of the reference sections.

We have to create a set of objects for the design of the bar stand: a bottle and a wineglass. At the base of the bottle there is a section in the form of a circle, but along the height it passes into an eight - pointed star, and on the top of the bottle back to the circle inf the form of a cylindrical bottle cork.

In this case, the Star will rise along the helix. You can not Create a similar object using the Extrude, Bevel profile, or lathe modifiers.

When creating a wall bottle, we will use the tools for deforming the left bodies located in the Deformations rollout of the modify command panel.

Creating a Bottle :-

1.) Run the Command file/ Reset.

2.) Expand the perspective viewport to the full screen. Construct a circle with a radius of 20mm, an eight pointed Star with an outer radius of 40, an inner radius of 30mm, Set the rounding radius of the outer Vertices of 4mm.

3.) Also in the Snap mode, Construct a Vertical line in the front view with a length of 250mm.

4.) Select the vertical line to be constructed, to apply the lofting, Select the Compound

Objects option from the drop-down list of the varieties of the created panel objects. click the left button, in the Creation method rollout, click the get Shape button, point to the circle. As a result get a cylinder.

5.) Increase the cursor in the path Count of the path parameters rollout of the modify Command panel. The distance from the Start of the Spline to the Point of Specifying the new section to 10.

6.) Note the yellow cross at the lower end of the Spline path, which moves when the Counter is pressed. This is the active waypoint. you will also notice a circle that was used as the Starting Section. After setting a new value, the yellow cross will move 10%. up along the track line.

7.) Click the Get Shape button in the Creation method rollout and click on the Shape of the eight-pointed Star. At heights of 70 and 100, point to the original circle. As a result, we got the workpiece of or the further

transformation

9.) In the deformations rollout of the modify Command bar, click the Scale button. A window opens dialogue Scale Deformation (x).

10.) In the Scale deformation (Y) dialogue window, the view of which is Shown in There is a red line with black markers at the ends. The red line shows the magnitude of the deformation of the Scale of the loft body Sections as a function of the path length, and the black markers represent the vertex Control points. Vertical dotted lines Show the position of each section.

11.) To adjust the deformation of the scale, you need to place additional control points on the deformation Curve.

12.) Click the move Control point button. move the points and bring the Curve to

the view. Right - clicking they can also be converted to a Bezier type for a smooth transition. you can apply your variations to create a bottle.

13.) To Create a Screw thread, click the twist button of the Deformations rollout of the modify Command panel. Add one or more points to the Control line in red. Move it to the upper right Corner in two divisions, to create a thread on the Surface of the bottle.

14.) You can set the rounding of the inner Vertices of the eight - pointed Star to Smooth out the contours of the thread. In the final form, the bottle is Shown.

15. To Complement the bottle, you can also Choose a wineglass, which is Created by the same sections and is Shown. To Create an internal volume, you can apply the Shell modifier to the wineglass.

16. Create and Save the set from the bottle with the wine glass in the "set. max" file in the folder lesson.

Individual work :-

As a creative task, you can try to create a snake, as a shape of the path used three - dimensional Spline and the shapes of sections are the circle and the ellipse.

Assigning Materials and Textures :-

Creating of lighting and assignment of materials are very important when making photorealistic Scenes. This stage Sometimes seems to be more labor intensive than the primary 3D modeling of Scene objects. A beautiful model or an unfortunate picture can be made from the same Scene objects. ~~A beautiful model or an~~ depending on the purpose of materials and selection of lighting.

We will study foundations of Creating materials that will be Subsequently applied in a variety of Combinations in this Chapter. Therefore, we have to create the original Components for modelling Complex Color Structures, Shadows and textures. A Special material editor Dialog box is used to Create and edit materials in 3ds Max, it Can remain open while you are working with other objects.

The ability to Stimulate Small details on the surface of a geometric model is very important when working with materials.

As you know the process of modeling and rendering can be accelerated if you leave the minimum number of faces and edges necessary to convincingly reproduce an object. Sometimes you can refuse from the creation of small details, making the illusion of their availability with the help of the material.

Let us consider the main terms with which we shall meet later.

- Materials :- the set of characteristics assigned to geometric surface model to impart resemblance to the real object surface.

- Maps :- These are images assigned to materials as a characteristic pattern, or texture. In 3ds Max, there are several types of texture maps: bitmap; procedural maps

- Diffuse Color :- Color of light rays scattered by the object in arbitrary directions.

- Ambient Color :- The color of the object in the shaded area.

- Specular Color :-
  Color of light rays mirrored by the Surface of the object.

- Specular Level :-
  Brightness of Specular highlight on the Surface.

- Glossiness :-
  Size of Specular highlights on the Surface.

- Shader :- algorithm for smoothing edges b/w faces and displaying Specular highlights.

- Opacity :-
  The ability of a material to hold back light, a property opposite to transparency.

- Self - Illumination :-
  Creation of the illusion of glow an object by replacing Shadows on its Surface with the color of diffuse Scattering.

- Material Libraries :-
                    Recorded files on the hard disk, used to store materials and maps.

- Bump maps :-
            A texture map whose pixel brightness variations controls the creation of an illusion of troughs and bumps on the surface of an object without changing its geometry.

- Opacity maps :-
            A texture map whose pixel brightness variation controls the transparency property or the opacity of the surface.

- Tiling :-
            Method of repeatedly repeating the image of a sample of a texture to cover a surface area exceeding the sample by size.

- Smoothing :-
            The effect of the disappearance of edges b/w faces when rendering.

— face Normal :-

      The vector that determines its orientation is perpendicular to the face. If the normal of the face is directed towards the viewer, then the face is visible.

it should also be noted that you can create a completely correct material, but its realism will depend on the curvature of the assigned surface and its illumination.

CONCLUSION

This manual reviewed fundamentals of 3D modeling in the 3ds Max 2018 graphics System. The first chapter described the interface elements: a graphics system viewport, main panels, tools, some system settings, and methods for moving objects in three dimensional Space.

The Second chapter presented the fundamentals of two - dimensional modeling, units of measurements Setting, Creation and editing of flat forms and their rendering.

The third chapter described 3d modeling methods based on 2d forms.

It Should be noted that this manual describes only the foundations of 3D modeling in rather than a Compact form, were described, but the 3ds max graphics System capabilities also cover methods for Creating landscape objects, environmental effects, improved lighting and rendering methods, and for a wide range of animation tools. with modeling experience, you can independantly

imperove your skill level of this graphic System for your future professional activities. The book can be useful for individuals wishing to learn the basics of 3-d Computer modelling.