ISSN NO: 2770-4491
Date of Publication:30-04-2022

Methodology for Conducting Practical Exercises to Study the Simulation System 3DS Max 2020

Korolkov A.N., Mamadalieva L.K.
Fergana Polytechnic Institute

Annotation: In this article, you can familiarize yourself with the methodology for conducting practical exercises on studying the 3Ds Max 2020 modeling system. The program also explains the lines from specific objects that will be used.

Keywords: 2D splines, Linear spline, modeling, Drag Type, Initial Type.

Introduction

The 3ds Max modeling system is a CAD system and one of its latest versions was released at the end of 2019. This is the 3ds Max 2020 system. Design, engineering, and design students should study this system in their first or second year of study. Working with this system should certainly be of interest to students, especially the practice of designing their own scenes. At the same time, it is important that students can use the entire amount of knowledge gained in lectures and apply it creatively.

When working with splines, students have questions about the definition of the very name "spline". It is necessary to explain to students that in mathematics a function is called a spline, the domain of which is divided into a finite number of segments, on each of which it coincides with some algebraic polynomial (polynomial). The maximum degree of the polynomials used is called the degree of the spline.

This definition from mathematics is somewhat difficult to understand, therefore, in order to better understand the nature of the spline, it is necessary to demonstrate to students all the ways to create splines. The use of a projector or interactive whiteboard is not desirable, but mandatory.

In 3D design, 2D splines serve as the basis for building 3D models.

The creation of the simplest two-dimensional figures is performed by selecting Create | Shapes (Create | Spline) (Fig. 1).

Here we have the ability to create: Line (Line), Rectangle (Rectangle), Circle (Circle), Ellipse (Ellipse), Arc (Arc), Donut (Ring), NGon (N-gon), Star (Star), Text (Text), Helix (Spiral), Section (Cut), Egg (Egg), Freehand (Freehand). These splines can also be created using the Object Control Panel. If we are creating a standard 2D spline using the FCU, then we should click on the Shapes button and select the Splines item from the drop-down list.

2D splines are usually created in one of the Front, Top, or Left viewports. Here you need to give examples of creating the same spline on different viewports.

ISSN NO: 2770-4491
Date of Publication:30-04-2022

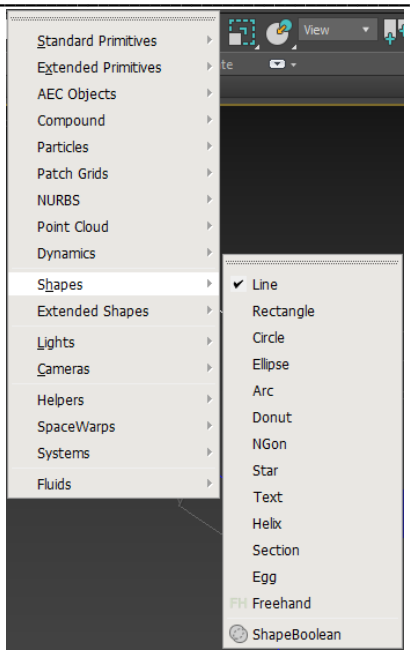

Fig.1. Menu selection for creating 2D splines.

Linear spline (line) is one of the commonly used two-dimensional shapes. Linear splines are drawn with the mouse. The Perspective view is not normally used for this.
When creating a Line spline, two sets of options on the Create FSN tab are of most importance:

- Initial Type. If the type of the first vertex is defined as Corner, then when changing the direction of the linear spline, breaks will be created, if the Smooth type is selected, then a smooth curve will be created.
- Drag type. This parameter determines the nature of the linear spline change during its creation with the mouse and has three values (Fig. 2): Corner, Smooth and Bezier. A Bezier curve is a spline whose vertices are provided with control handles. If we need to change the shape of a linear spline, then it is best to use the Bezier type.

Here, the best way to demonstrate the difference between these types of splines is to plot splines with different Drug Type values in different viewports, as shown in Figure 2.

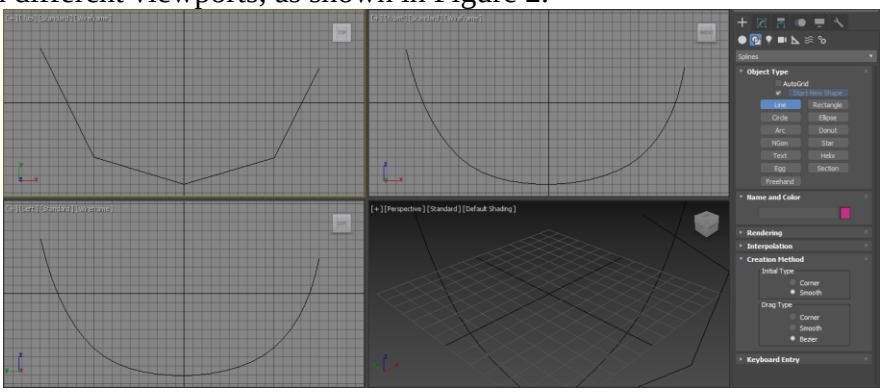
Fig.2. Linear splines top left Drag Type = Corner, bottom left Drag Type = Smooth and top right Drag Type = Bezier.

The Line spline is an open (not closed) spline. In order to make it closed when you finish drawing the spline, click on its initial vertex, and then click on the Yes or Yes button in the Spline dialog box that appears.
Once a linear spline has been created, it can be modified using the options and tools on the Modify tab of the Object Control Panel.
There are a lot of these parameters and tools in the PEP window, so when studying, you can consider only one of them, and students can work with the rest by doing independent work.
In the Selection section, right below the section name, there are three buttons (Fig.3):

ISSN NO: 2770-4491
Date of Publication:30-04-2022

Vertex (left button) - enable / disable the mode of selecting spline vertices, which can then be transformed.
Segment (middle button) - enable / disable the selection of spline segments, which can then be transformed.
Spline (right button) - enable / disable the selection of the entire spline as a whole.
Segment End - This checkbox is only available if the Vertex button is enabled, and if this checkbox is checked, then clicking on any segment of the spline results in selecting its end vertex.
Show Vertex Number - if this box is checked, then their serial numbers are displayed near the spline vertices. In addition, in this case, you can check the Selected Only checkbox. Then the vertex numbers are displayed only if they are selected.
Students need to be shown the difference between these modes.

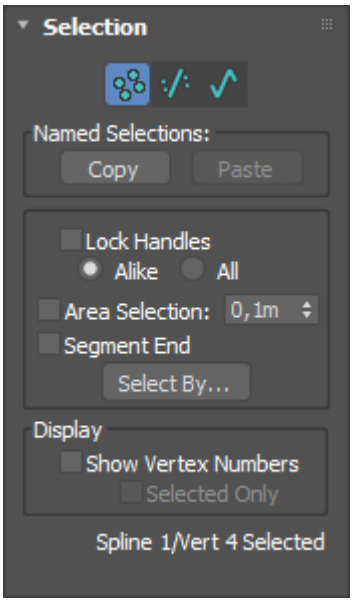

Fig.3. Selection panel of the Modify ASN tab.

The Geometry section has a large number of options and tools. This section takes up a lot of vertical space and in Figure 4 this section is split into two parts. You must list all the parameters in this section:

Create Line - when this button is pressed, the mode for creating a linear spline is active; in this case, the type of the next vertex is determined using the New Vertex Type radio button group;

Break – splitting the spline at the currently selected vertices or at those vertices that can be defined with the Break button pressed;

Attach - a tool for combining the current spline with another two-dimensional figure; after this button is pressed, you must click in the viewport on the attached spline;

Attach Mult. – joining splines using the Select Objects dialog box;

Automatic Welding - if this box is checked, then when a vertex approaches another vertex at a distance not exceeding the value of the Threshold parameter, these vertices are merged into one;

Connect is a tool for connecting two vertices with a line.

Insert is a tool for creating new vertices on a spline.

Fuse - merging several selected vertices into one.

Cycle - splitting the spline into independent segments according to the currently selected vertices.

Delete is a tool for removing spline vertices.

Rectangle

Rectangular spline (rectangle) is a rectangle, i.e. closed linear spline with right angles. When studying this spline, students usually do not have questions. This shape is created with one click and one movement of the mouse pointer. Pay attention to students that if the Ctrl key is held down while creating the rectangle, then not a rectangle will be drawn, but a square with equal sides.

ISSN NO: 2770-4491
Date of Publication:30-04-2022

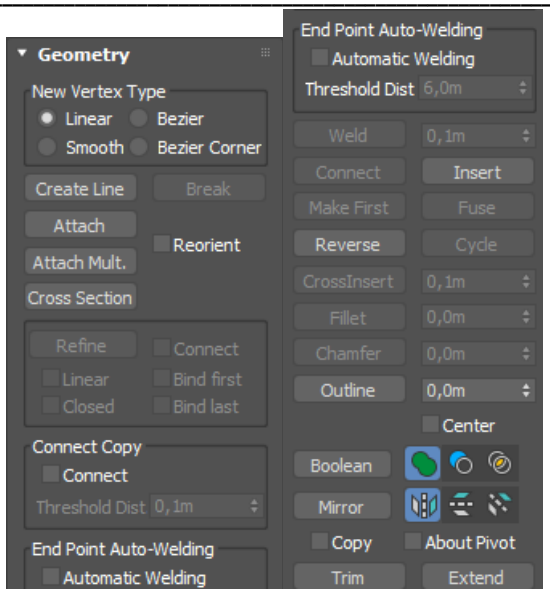

Fig.4. Group of tools and parameters Geometry.

Among the other rectangle options available on the Modify tab of the SCP, the Corner Radius option is especially important. By default, its value is 0. The larger the value of this parameter, the more the corners of the rectangle will be rounded. Very large values of the smoothing radius lead to the creation of shapes that look a little like a rectangle (Fig. 5).

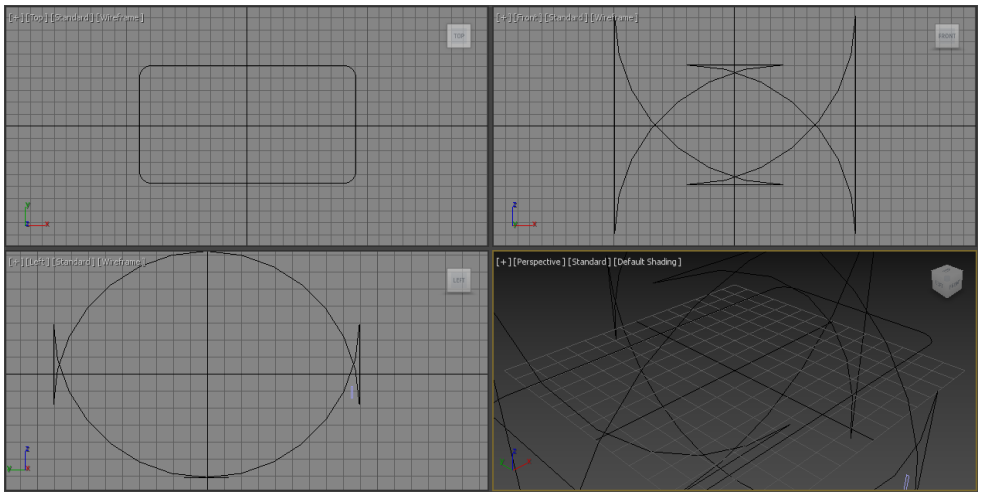
Fig.5. Rectangles with different Corner Radius values for right angles.

Circle

This spline is just a circle. It is also created with one click and one movement of the mouse pointer (Figure 6).

Ellipse (Ellipse)

Like a circle, an elliptical spline is created with one click and one movement of the mouse pointer. If at the same time hold down the Ctrl key, then the ellipse will have the shape of a circle (Fig. 7).

ISSN NO: 2770-4491
Date of Publication:30-04-2022

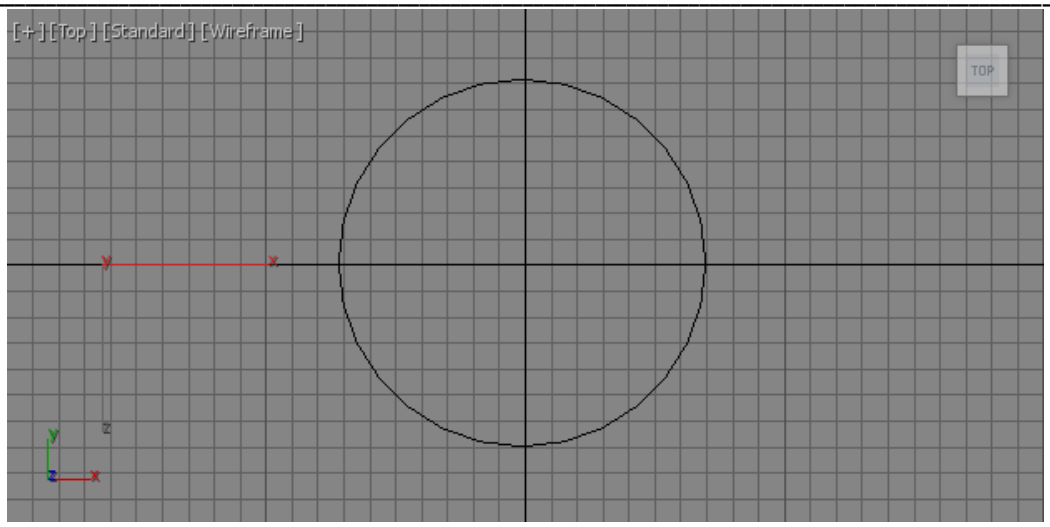

Fig.6. Spline Circle.

Arc (Arc)

An arched spline is an arc, i.e. part of a circle. In order to create it, you must first click the left mouse button, defining the beginning of the arc, then move the pointer and release the left button, marking the end of the arc, and, finally, move the pointer again and click the left button, defining the radius of the invisible circle, part of which is this arc (Fig. 8).

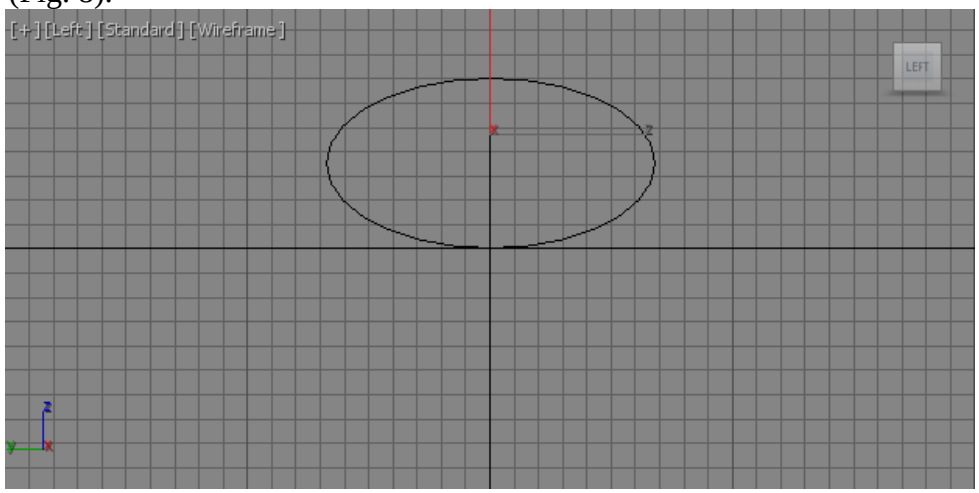

Fig.7. Spline Ellipse.

Figure 8 also shows a sector, which is a special case of an arched spline. If you check the Pie Slice checkbox in the PDO (sector of a circle, literally - a slice of a pie), then lines will be drawn from the edges of the arc to the center of the circle, of which this arc is a part, creating a sector.

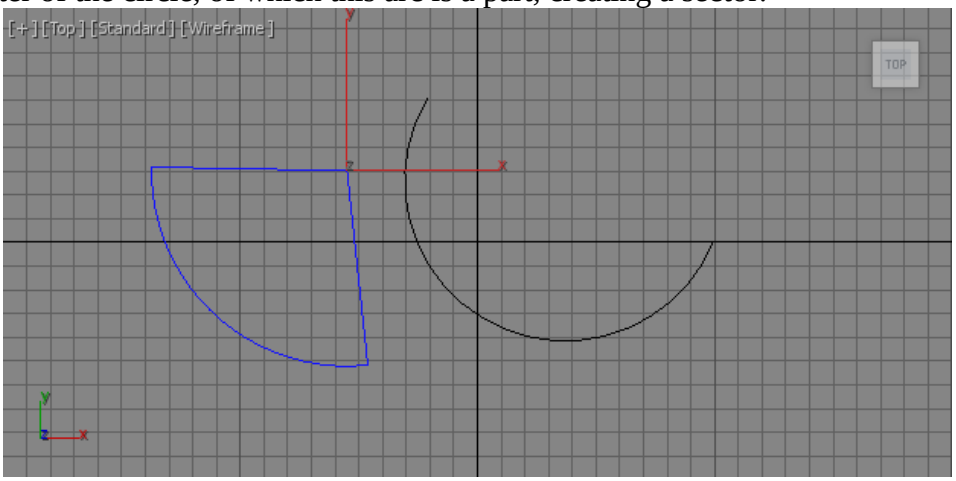

Fig.8. An Arc spline that creates a circular arc or sector.

ISSN NO: 2770-4491
Date of Publication:30-04-2022

It is also necessary to work with other splines using a large number of examples, showing how this or that spline changes if its parameters are changed in the FPU.

Active learning methods like nowhere else are required to be used when learning the 3ds Max system. It is also very important to control the assimilation of knowledge by students, i.e. make extensive use of reflection methods. From a large number of types of reflection, the teacher needs to choose the one that will most objectively assess the degree of understanding and assimilation of the information received by students and ensure the development of their cognitive abilities.

Students are involved in the learning process through questions and answers. In this way, students are stimulated to think, to express their opinions. Because students answer questions on the one hand, and on the other hand, they have the opportunity to ask questions themselves.

At the same time, there are many question-and-answer-based teaching methods. One of them is the question-answer method. It can be done in a variety of ways.

Brief question-answer method:

In this method, the teacher prepares short questions depending on what the goal is. It also requires students to give a short, succinct answer. It can be done in different ways. To use this method, it is a good idea for the teacher to prepare a question and answer them in advance, taking into account which option to use. If the lesson is organized in the form of a blitz question-and-answer session, the students will be reminded of the need for clear, concise answers. In this case, the questions can be prepared depending on the number of students in the group.

The interview method:

The interview method involves the oral presentation of the content of education provided to students. Certain pedagogical methods are used in applying this method. For example, logical measures such as activating attention, narrating, comparing, separating the basics, and concluding. The conditions for its effectiveness are: careful planning, ensuring consistent coverage of the topic, successful selection of exhibitions, achieving the necessary emotionality in the statement.

Conversation is one of the oldest methods in the didactic process. Conversation - it stimulates the desire of participants to learn, read, study. That is why it is so common.

The advantage of conversation is that it activates thinking to the maximum, allows you to control the process of cognition, creates the conditions for this. However, in order to use this method effectively, students need to have a certain amount of knowledge.

In studying this topic using this method, it is possible to conduct it in the form of inductive and deductive conversations. In doing so, the teacher achieves the goal set by moving students from practice to theory, generalization, or by linking theory, general rules, to practice.

Another of the modeling process's dynamic aspects rests on the relationship established among the class participants, understood as a form of social practical of the many aspects involved in this kind of practical, diversity of participant viewpoints is a fundamental condition in order for the modeling process to be produced, to an extent that, if these differences did not exist, it would be a required condition to provoke them (Duschl, 1990).

In the experience analyzed in this article, the diversity of viewpoints was provoked by encouraging each group of students to manipulate a different material and to communicate the way these manipulations were understood by way of an interrelated set of linguistic and nonlinguistic representations—drawings, physical models, gestures. These external representations were compared and discussed, therefore used as instruments (Hymes, 1972) with which to reduce the diversity of viewpoints and to construct explanations that have common ideas in tune with the scientific consensus model. In this sense, the function of the teacher was crucial, since his or her interventions had a fundamental influence in two aspects: they assisted in "seeing" the aspects in common, which were in line with the ideas selected from the scientific consensus model, and helped the students to proceed with the adjusting of their model to the results of the manipulations they were performing.

ISSN NO: 2770-4491
Date of Publication:30-04-2022

Because of their relevance in the modeling process, in the case analyzed in this article, we highlight the interactions among members of the classroom that are encouraged by the following:

– the communication of a variety of viewpoints expressed during a particular manipulation, and the group identification of common aspects among these viewpoints;

– the collective search for use of the ideas agreed by consensus in a first stage in order to deal with the interpretations of the new manipulations performed;

– the metacognitive moments of reflection on what is being learned, on what has changed each pupil's way of thinking, etc.;

– the use of different linguistic and nonlinguistic expressions to encourage richness of perspectives and to encourage each child to discover the expressive form which best helps him or her share their viewpoints;

– the intervention of the teacher, by selecting, from among all the ideas expressed, those that are the best for constructing the model, putting them in order of importance or helping to redefine them.

The three aspects chosen to characterize the students' modeling process—the relationship with specialized scientific knowledge, with the physical manipulations, and with the interactions among class participants—are considered to be basic aspects of a dynamics capable of promoting the abstraction and organization of models in science classrooms in early years.

References

1. Duschl, R. (1990). Restructuring science education: The importance of theories and their development. New York: Teachers College Press.
2. Hymes, D. (1972). Models of the interaction of language and social life. In J. Gumperz & D. Hymes (Eds.), Directions in sociolingu¨´ıstics: The ethnography of communication. New York: Holt, Rinehart, &Winston.
3. Avazjon o'g'li, V. D., & Esonali o'g'li, M. Y. (2022). Use and Importance of Three-Dimensional Images in Fields. Journal of Ethics and Diversity in International Communication, 2(2), 1-4.
4. G'ofurovich, T. X. A., & Esonali o'g'li, M. Y. (2022). Computer Using Dynamic System Modelling Environments. Journal of Ethics and Diversity in International Communication, 2(2), 9-13.
5. Охунов, Д. М., & Охунов, М. Х. (2018). РАЗРАБОТКА МОДЕЛИ ВЫБОРА АВТОМАТИЗИРУЕМЫХ ОБЪЕКТОВ ДЛЯ РЕАЛИЗАЦИИ ПРОЦЕССОВ УПРАВЛЕНИЯ РАБОТАМИ ПО СОЗДАНИЮ И РАЗВИТИЮ ИНФОРМАЦИОННЫХ СИСТЕМ. САПР и моделирование в современной электронике, 147-150.
6. Горовик, А. А., Зулунов, Р. М., & Мамадалиева, Л. К. (2019). МЕТОДИКА ПРЕПОДАВАНИЯ ВИЗУАЛЬНОГО ПРОГРАММИРОВАНИЯ ДЛЯ ДЕТЕЙ. In Цифровой регион: опыт, компетенции, проекты (pp. 193-197)