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Didactic Bases of Using Software Tools for Modeling Hydrotechnic Installations for Future Engineers

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Abstract: The article provides future engineers with solutions for automating the activities of organizations that provide construction and use of hydraulic structures using modern modeling technologies in their design, designing a 3D project of hydraulic structures developed by IT companies using modern engineering programs. Also, the article is based on the need for future engineers to learn how to use the best programs and technologies for their use for modeling hydraulic structures, and at the same time to future engineers the use of modeling programs for hydraulic structures. In addition, some of the best options for learning how to make 3D models, both for video games and for professional projects, have been mentioned and a look at the activities of scientists who have conducted research on these problems.

Keywords: Hydrotechnical installations, visualization, didactics, visual image conversion, infographics, engineering graphics, 3D technologies, SketchUp, Blender.

Introduction: As we all know, the water management and land reclamation sector plays an important role in the economic growth of our republic. Therefore, a number of measures are being implemented in our republic to rationally use land and water resources, properly regulate the use of hydraulic structures, and ensure the safety of large hydro-reclamation structures. In particular, the “Action Strategy” for the further development of Uzbekistan in 2017-2021, developed under the leadership of our President, clearly defines the most important tasks for the modernization of agriculture and water management, along with all other

sectors, and their consistent implementation serves as the basis for great successes in the field.

Technology is developing, and at the same time we need to be able to do many things ourselves, one of which is to learn how to use hydraulic structures modeling programs. Therefore, now we will talk about the easiest programs to use for this purpose. This way you can get an idea of what is ideal for starting out in this world of design. It is worth mentioning that all 3D modeling programs have a level of complexity, but of course, everything depends on your level of interest in it [1,136].

Literature analysis

K.E.Razlogov believes that visualization is reflected in the screen culture, which implies a stable and effective integration of the computer with a specific means of communication and an appropriate channel for transmitting information for various purposes.

B.G.Ananyev argues that visualization should be understood as the ability of certain visual systems to convert various invisible sensory signals into visible signals.

METHODOLOGY

We will tell you through a list of some of the best options for learning to make 3D models, both for video games and for professional projects, according to several experts on this topic. We already know that this resource is very versatile. Therefore, it is important to know at least the main aspects of each of the programs presented in this article.

To make everything clear and simple, we will do it according to the cost and complexity of each. For each of the design software options we leave you, we will specify whether they are free or paid. This is because we believe it is important to be transparent when talking about any digital resource that may interest you [2,183].

RESULTS

Before showing you the best programs for modeling hydraulic structures, you may want to see later, Programs for modeling hydraulic structures:

SketchUp. This program is ideal for those who are starting out in the world of 3D design. In other words, we can say that it is the best option for beginners, since compared to others, it is very simple and easy to understand. The control panel is very intuitive and easy to use, covering all the basic principles of this activity. This program shows us all the icons of the tools that we can use in the top and side panels, and they are very easy to identify.

The important thing is that we do not get confused and think of SketchUp as a simple program, in fact it is easy to handle. But this does not mean that it can only be used by beginners in 3D design. In fact, the platform offers several options for inserting extensions, with which you can create an increasingly complete program depending on the experience you gain.

A more professional example of work with Sketchup.

One of the main advantages of this program is undoubtedly its versatility, it is used by all kinds of people. It is used by carpenters and cabinetmakers for the models that they present to their clients, as well as by students of professions such as design and engineering. And of course, we cannot fail to mention the many professionals who use this Hydraulic Structures Modeling Program for the projects that they present in companies.

The company responsible for Sketchup is Trimble, which has been operating since 1978. Thus, we can have a clear idea of the seriousness of this platform, which offers us the opportunity to have this powerful editing program at an affordable price.

Regarding the price and use of this 3D design tool for modeling, we can say that it is free in its web version. A place where you can carry out personal projects and store them in the cloud, since it offers us 10 GB of storage. As for the paid version, we can say that the price will be 255 euros per year. This will be the most complete version of the program, with which you can carry out any personal and professional projects.

You may be wondering on which devices you can use Sketchup. One of the best features of this software is that it is compatible with a variety of platforms and devices, and we name it:

- Cloud, SaaS, Web
- Mac (Desktop)
- Windows (Desktop)
- Linux (Native)
- Android (Mobile)
- iPhone (Mobile)

As you can see, it is very versatile, but in addition to this, we have a customer service center that offers the following services:

- Frequently Asked Questions
- Knowledge Base
- Phone Support
- Email Support

Summary on Sketchup.

To summarize, we can say that Sketchup is a great way to learn how to make 3D models. However, it is more

suitable for people at the professional level, it is a program used by professionals. In addition, we can give it a rating of 4.5 out of 5 on a scale of 4. It is worth noting that you can choose a trial version from the link that we left you in this article [3,86].

Blender. This is another one of the best hydraulic engineering modeling programs we can find. In addition, it is free and open source, making it a great option for people who are learning to make 3D models. But it does not limit you to this, you can also simulate textures, liquids and smoke, simulate particles and perform compositing. As you can see, it is a very complete program, with which you can learn to use each of its functions quickly and easily. But that's not all, another advantage of Blender is that it has a built-in game engine. This is what makes it one of the most outstanding tools in this sector.

If we go deeper into what Blender offers us, we can say that it is an ideal tool for those who want to do professional work in rendering projects, simulating and editing high-quality videos.

This ultra-realistic system offers us the possibility of rendering GPUs and processors, which is convenient for people who require a high-performance program to perform video simulations in optimal conditions.

Implementation and support of Blender.

We can use this program on both Mac and Windows, both in desktop versions.

As for support, we can get it through Chat, so we can clarify any technical problem on the platform.

Blender features:

• Speed adjustment.

• Audio recording.

• Split and merge.

Examples of how a hydraulic structures modeling project works with Blender:

In the first example, we see a simple example of a cup or Grael, in which each detail can be modified step by step.

In this second example of hydraulic structures modeling with Blender, we can see a more advanced project in which more functions of the tools offered by the platform are used.

Learn to use Blender.

Blender is an open source program, so we can use it for free, a great advantage for those who want to learn how to make 3D models with a free program. If you want to know how to use this program, we leave you a very good video tutorial from an expert on this platform so that you can learn at your own pace.

Conclusions about Blender. Without a doubt, it is one of the best programs for learning and developing in this field. Moreover, it is ideal for both beginners and experts thanks to the special features mentioned above. Due to its ease of use, we can give Blender a rating of 4.7 out of 5, and we can get it for free from the option we left you [4.66].

CONCLUSION

Technology is evolving and at the same time we need to be able to do many things ourselves, one of which is learning to use programs for modeling hydraulic structures. Therefore, now we will talk about the easiest programs to use for this purpose. In this way, you can have an idea of the ideals of what to start with in this world of design. It is worth mentioning that all programs for creating 3D models have a level of complexity, but of course, everything depends on your level of interest in it. We will tell you through a list of some of the best options to learn how to make 3D models, both for video games and for professional projects, according to several experts on the subject. We already know that this resource is very versatile. Therefore, it is important that we know at least the basic aspects of each of the programs that we will talk about in this post.

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