DIDACTIC CONDITIONS OF USING VISUAL MODELING SOFTWARE TOOLS IN MODELING HYDROTECHNIC INSTALLATIONS

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Annotation

This article presents solutions for automating the activities of organizations involved in the construction and operation of hydraulic structures by applying modern modeling technologies in their design. It highlights 3D design solutions for hydraulic structures developed by IT companies using modern engineering software.

In addition, the article discusses the best software for modeling hydraulic structures, the technologies used in such software, and the necessity of learning how to work with modeling programs for hydraulic engineering. The paper also reviews some of the best options for learning how to create 3D models both for video games and professional engineering projects, and provides an overview of the work conducted by researchers who have studied these issues.

Keywords: Visualization, converting into visual representation, Infographics, engineering graphics, 3D technologies, SketchUp, Blender.

Introduction

As we all know, the field of water management and land reclamation plays a crucial role in the economic development of our republic. Therefore, a number of measures are being implemented in Uzbekistan to ensure the rational use of land and water resources, the efficient operation of hydraulic structures, and the safety of large-scale hydromeliorative facilities. In particular, under the leadership of our President, the "Action Strategy for the Further Development of Uzbekistan for 2017–2021" clearly outlined the key tasks for modernizing agriculture and water management along with other sectors, and the consistent implementation of these tasks has laid the foundation for major achievements in the field.

As technology advances, it is becoming increasingly important to independently master various skills—one of which is learning how to use software for modeling hydraulic structures. That’s why we will now talk about the most user-friendly software for this purpose. This will give you a clear idea of where to start in the world of design. It is worth noting that all programs used for creating 3D models have varying levels of complexity. However, everything depends on your level of interest and commitment.

Based on the opinions of several experts in the field, we will present a list of some of the best options for learning how to create 3D models for both video games and professional projects.

It is already well known that these resources are highly versatile. Therefore, it is important to at least become familiar with the key features of each program discussed in this article.

Research Methodology:

To make everything simple and understandable, we will categorize each program based on its price and difficulty level. For every design software option we provide, we will clarify whether it is free or paid. This is because we believe it's important to be transparent when discussing any digital resources that may interest you.

Before presenting the best programs for modeling hydraulic structures—programs you might want to explore later—let's look at some key software for hydraulic structure modeling:

SketchUp: This program is ideal for beginners in the world of 3D design. In other words, we can say it's one of the best options for those just starting out, as it is very simple and easy to understand compared to other 3D modeling software. The control panel is highly intuitive, and using all the basic principles of this activity is straightforward. The software displays icons for all available tools on the top and side panels, making them very easy to recognize.

The important point here is that we shouldn't confuse its simplicity with weakness or think of SketchUp as just a basic program. While it is easy to manage, it doesn't mean it's only suitable for beginners in 3D design. In fact, the platform offers several options for adding extensions, allowing you to create an increasingly complete and professional software setup based on your experience.

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 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 they present in companies.

Literature Review:

The company responsible for SketchUp is Trimble, which has been operating since 1978. This gives us a clear understanding of the platform's credibility, offering access to a powerful editing tool at a relatively affordable price.

When it comes to the pricing and usability of this 3D modeling tool for design, we can say that its web version is free. You can carry out personal projects and store them in the cloud, as it provides up to 10 GB of storage. As for the paid version, it costs around €255 per year. This is the most complete version of the program, enabling both personal and professional project implementation.

Analysis and Results: You may wonder which devices support SketchUp.
One of the best features of this software is its compatibility with multiple platforms and devices.
You can use **SketchUp** on:
Cloud, SaaS, Web-based
Mac (desktop)
Windows (desktop)
Linux (local)
Android (mobile)
iPhone (mobile)
As you can see, it's extremely versatile. In addition, there is a customer support center offering the following services:
Frequently Asked Questions (FAQs)
Knowledge Base
Phone Support
Email Support
Conclusion about SketchUp. In conclusion, we can say that SketchUp offers an excellent opportunity to learn 3D modeling. However, it is also very suitable for professionals, as it is a tool widely used by experts in the field. Given the wide range of functions it provides, we can confidently give it a 5 out of 5 rating on a 4.5-point scale.
It is also worth noting that a trial version can be selected from the link provided in this article.

Blender. This is another of the best Hydraulics modeling programs that 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 do 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 amazing tools in this sector.
If we go deeper into what Blender offers us, we can say that it is the ideal tool for those who want to do professional work in presenting projects, simulating and editing high-quality videos. This ultra-realistic system offers us the ability to display GPUs and processors, making it convenient for people who require high-performance software to perform video simulations in optimal conditions.

Blender implementation and support.
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, which is 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. In addition, it is ideal for both beginners and professionals, 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 leave you.

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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