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CONCEPT OF MODELING AND VISUAL PROGRAMMING AND PRINCIPAL DIRECTIONS OF DEVELOPMENT

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Abstract: The article covers the possibilities of Autodesk Revit software for conceptual modeling and visual programming in the construction of complex buildings and structures in the construction of forms, improving the efficiency of architectural design and construction work.

Keywords. Concealer, model, 3ds Max, BIM , AutoDesk, visual, Revit, design, application.

Introduction

Conceptual model - a sketch of the future object of customers (investors) in 3D, through which you can get information about the future object (history, style, clippings, sections). Allows you to understand the concept in the early design stages with all the necessary looks and drawings. These types of

models are quick to create and easy to edit, allowing you to make as many changes as you want. You can also quickly create high-quality photo-realistic designs and animated videos by later importing these models to other graphics applications (3ds Max and Lumion).

Modern architects are well aware of the advantages of using the BIM model when working on a project and providing project documentation. But at the stage of creating the architectural concept it is described in a completely different way - no general BIM model is created, separate 3D models and drawings are created and the calculations are done literally by hand and in a very rough way. This separation involves the use of multiple software products designed to solve a single task.[1]

The concept of architectural concept is a pre-executed sketch project about the appearance of the building on the terms of reference, taking into account the wishes of the client. The initial draft usually consists of general photo-realistic views, plans, sections, and calculations of key technical and economic indicators. Thus, the architect faces 2 main tasks:

• Concept - the formation of an idea;

• Visualization of the idea - to create realistic images of the exterior and interior of the future building

Reconciling the situation, creating and approving a concept is a process that requires proposing several options for the same project and making fundamental changes. It can be very difficult to link common types of projects, drawings, and calculations created in different applications. In such cases, there is a risk of inconsistency of information and as a result it is not possible to create a BIM model without modifications based on customer-approved materials.

The ideal solution for an architect would be not only a powerful tool for translating and imagining architectural ideas, but also a tool for creating 2-dimensional drawings and calculating all created designs.

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[1] Жонузаков, А. Э., & Холиков, С. Р. (2020). Архитектурный комплекс Хазрати Имам (Хастимом)- пример сохранения и использования культурного наследия в Узбекистане. Academy, (11 (62)).

Let's take a look at the capabilities of AutoDesk's Autodesk Revit software used for this purpose.

Features of "Concept Forms" through the Revit program.

Conceptual forms are a tool that allows you to create a structure at any level of complexity in the future and break it down into levels.

In addition, on the basis of "Form", it is possible to automatically build indoor structures to get a clear view. The main differences of a 3D editor are that you can build and modify shape-related structures. Devices are reset, their settings and settings are saved. All changes made are immediately reflected in the views and specifications created.

You can complete the construction of additional structures in the resulting model, create the layout, and fill the model with the necessary elements. When you change the size of the "form", the additional elements created in the project remain in place.

With such a BIM model, you can get solid plans, shorten, and get key technical and economic performance. And the model itself can be paired with a 3ds Max scene, or take pictures in 3D on Revit itself.

You can create a conceptual form using a special template in the Revit program, which is available on all versions of Autodesk Revit

When you create a conceptual form, you can access additional tools that are lacking when creating projects or creating Revit families. But basically, this is standard and familiar in the architectural tools used in many 3D editors.

• Create shapes using planes;
• Create route forms;
• Merge and cut shapes;
• Create surfaces from spline curves.

There are additional tools for editing ready-made forms:

• add edges and profiles;
• Side and profile change.

An architect can create absolutely any shape to know the features and capabilities of the equipment.

An additional useful feature is the Change Parameters item.

This speeds up the work when creating events in repetitive shapes and provides an additional opportunity to make quick changes to the shape.

Note that the model will not be duplicated after repeated changes because the modified items are no longer manually corrected, but are automatically restored by the program and accepted as "new", but they retain the material settings and Revit settings. For example, hydrogen is not extended in the construction of windows because the building is expanding, but the size of these panels - that is, their number increases.[2]

Possibilities of practical application of the tool of conceptual forms.

We use the simplest forms to quickly create a concept.

Let's create the main volume of the building from the polygon and intersect the volume created by connecting the vertically placed images and the horizontally placed circle.

The amount of volume obtained is loaded into the project and the standard equipment is divided into levels by Revit. While the height and number of rows in a layer can change, splitting the form can change them automatically.

Along the edges of the object, with the help of Revit special equipment, we automatically created stained glass and floors, set the configuration of the canceled areas, and installed the materials.

We are creating additional structures and planning within the project. If changes are made to the requested form, it will not affect the elements of the project and vice versa, so at this stage it is important to determine for ourselves what form depends and what should not.

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[2] Холиқов, С. Р. (2021). Историческое развитие архитектурного комплекса ХазратИ Имам (ХАСТИМОМ). INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION, 2(1), 104-107.

We create and decorate architectural landscapes. Create a view template for use in the following projects.

Once such a BIM model is created, we can calculate all sectors as well as their percentages. It also allows the buyer to quickly calculate the amount of materials.

We choose the parameters that interest us and create technical specifications in the project.

Turn off the architectural elements, leaving only the part of the structure that is intended to delegate tasks to the constructors.

Advantages of using Revit "Conceptual Forms":

• Accelerates the process of resizing and bringing it to the required technical and economic performance;

• Eliminates the difference between 3D view plans and calculations;

• Allows you to create multiple options based on a single BIM model;

• Simplifies the process of changing and altering the appearance of a building;

• Reduces the time to create a BIM model in the later stages of the project.

What is needed for the successful development of this process: Here are the basic information about Autodesk Revit tools first. Know the basic methods of creating and editing forms. (All 3D editors use such forms).

In addition, a good project template that needs to be created in advance will speed up the process:

• Necessary materials;

• Types of main structures;

• Allocated according to specifications for calculation;

• Customized templates for architectural innovations.

I would like to emphasize that this technology needs to be studied and put into practice, but its capabilities save the time of the architect involved in the first project, which allows you to create additional options for comparison, select the most optimal and continue working on the BIM model allows you to

Now that this part of the work, the model part, is done, we want to talk about visual programming.

The concept of "visual programming"

What is visual programming?

Design often involves establishing a visual, structural, or geometric connection between project parts. These relationships are often based on rules developed by us conceptually. Perhaps without knowing it, we work in an algorithmic way - defining sequences that perform the basic logic of input, processing, and output. Programming allows us to continue to work in this way, but we go through this process by designing algorithms.

The following sequence is an example of how written instructions can be used to explain a workflow in a sequence that connects it to a concept. In this case, each stage of the work process is explained in writing. Finally, it is possible to complete the work by reading this information in sequence and following the written instructions for the work to be done at each stage.

The system works the same way in the visual instructions. However, illustrated instructions do not provide the same information as written instructions. In this case, you understand the information about the object by looking at the sequence of images in the same way as they are arranged in sequence, so that the object is made in the order in which the final state of the object is obtained. 'lasiz.va you do in sequence.[3]

If you have a final form using either of these two instructions provided, you will have used the algorithm in the process. The only
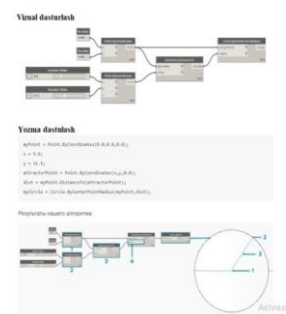
[3] Холиқов, С. Р. (2021). Историческое развитие архитектурного комплекса ХазратИ Имам (ХАСТИМОМ). INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION, 2(1), 104-107.

problem here is how to formalize this instruction, which will lead us to the software later. Unlike most computer programs, programming is the process of converting a series of actions into a program that can be executed. If we put the above instructions in a format that can be read and executed by a computer, and finally get the form through this work, we will have done the programming. The key and the first hurdle found in programming is that we need to rely on certain forms in order to communicate effectively with our computer. It can be used in any of the programming languages such as JavaScript, Python, or C. For example, if we write a series of repeating instructions for a building form, we will need to translate it later so that only computer programs can read it. As a result, the ability of the software is to prepare a set of tasks that are assigned to us without error by the human factor without the help of a computer.

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