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BIM TECHNOLOGY IS A NEW TREND IN ARCHITECTURE AND CONSTRUCTION

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АННОТАЦИЯ

В статье представлена информация о повышении эффективности архитектурного проектирования и строительства, анализ возможностей CAD и BIM систем в процессе проектирования, сущность технологии BIM и ее содержание, преимущества, а также все этапы и содержание программного обеспечения

Ключевые слова: BIM-технология, CAD-система, EXM (электронно-вычислительная машина, 3D-модель, 4D, 5D, 6D, 7D,8D, ArchiCAD, Allplan, Revit, Autodesk.

ABSTRACT

The article provides information on improving the efficiency of architectural design and construction, analysis of the capabilities of CAD and BIM systems in the design process, the essence of BIM technology and its content, advantages, as well as all stages and content of software.

Keywords: BIM technology, CAD system, EXM (electronic computer, 3D model, 4D, 5D, 6D, 7D,8D, ArchiCAD, Allplan, Revit, Autodesk.

INTRODUCTION

We are surrounded by a three-dimensional world. How to convey a constructive image of future buildings and structures to people through a clear vision in advance? Architects and designers often ask this question about the tools they use to showcase their creative work and express their ideas. Until recently, the use of manual graphics

in connection with this, using the principles of pictorial geometry and the artistic language of graphics, architects created hand-drawn drawings, sketches, with which they tried to convey the three-dimensional image of buildings. Gradually, we know that computer technologies are being used to present the creative products of the industry.

The computer revolution of the second half of the 20th century radically changed human life, appeared a new way of thinking, new possibilities for designing and building using digital information programs. The life of modern society is unthinkable without computer hardware and software, electronic media that cover all areas of computer activity.

State enterprises, medicine, culture, education, production, in a word, information technology have become one of the leading tools for creativity in all aspects of our society. At the same time, these technologies have become an effective assistant among students and professionals in the creation of architecture and design. With the advent of computer software, there are many benefits to our business as well.

Mankind has always sought to automate production. But until the middle of the 20th century, these were attempts to improve mechanisms and technologies. The first experiments on the use of automation systems began after the Second World War. The first serious successes in experiments appeared only in the 70s, when electronic devices appeared that could work with large amounts of data. This period is usually referred to as the first stage in the development of computer-aided design systems. The efficiency of using computers in solving production problems has been proven. The second phase of the electronic revolution began in the 1980s. By this time, the size of computing devices had significantly decreased, and the speed had increased significantly. The main reason for this is the production of personal computers, which is explained by the increase in the number of users.

Thus, along with many areas of development, in mechanical engineering, high-tech industries, CAD systems (Computer-aided design) and AAM (Automated production - automated control systems) began to appear.

MAIN PART

These abbreviations and the concept of CAD adopted in domestic engineering practice are of a general nature. According to the Uzbek description, CAD (CAD - computer-aided design system) is an automated system that implements information technologies to perform design functions, allowing you to automate the design process, consisting of hardware, software and other organizational automation tools. and technical system. It covers all possibilities of software engineering. These terms mean:

1. CAD systems (computer-aided design) - computer-aided design tools. Programs with a set of modules for creating three-dimensional objects, their capabilities and opportunities for obtaining a complete set of design and project documentation.
2. ACS (automated control system) systems - in translation, automated production. Software for project implementation. With their help, the algorithm for the operation of digitally controlled computers is determined. These machines are based on 3D models made according to CAD standards.
3. CAE (computer-aided engineering) systems - a class of products for automated computational and engineering analysis. The emergence of the possibility of creating a rigid model required its detailed description, prediction of operational loads, including temperature ones, and the influence of average resistance.

In the process of evolution, the computer-aided design system was divided into separate areas, within which highly specialized tasks were solved. At each stage of production, it is possible to choose the system that is most suitable for a particular situation. The technology of creating a 3D model in CAD has significantly accelerated the release of new products with specified characteristics.

So far, not only in our country, from architects around the world to engineers, specialists in this field are well acquainted with the AutoCAD software package from Autodesk. One of the main tools of the CAD mentioned above is this software product. This program has been the closest assistant in the implementation of our ideas for many years with the help of very simple, intuitive tools. Architects, designers, engineers, technologists, and even higher and public educators use the program's ability to work in two- and three-dimensional spaces in their work

In general, today it is customary to use AutoCAD in the process of drawing in many construction companies, teaching classes and technology in education system, training schools.

Preliminary conclusions show that the program, which at first glance was perfect. The projects which were done using it gave the users of the program sufficient results in their work. The reason is that architects and designers, engineers and teachers have been working on hand-drawn graphics for a long time, and the program, it would seem, easily solves these problems with its convenience. But in fact, not all issues are resolved as we thought.

Over the years of practice, I have been able to familiarize myself with almost all the software available in the field for the tasks that I perform in my architectural and design developments.

BIM is a new method applied in the field of construction, from design to construction and operation, reconstruction, so to speak, a unique new methodology. Although the technology has existed for more than 10 years, over the past year or two in our country, we can see a lot of ideas and comments in this area, the relevant regulations adopted by the government. In particular, one of them is the Decree of the President of the Republic of Uzbekistan No. PF-5577 dated November 14, 2018 “On additional measures to improve state regulation of the construction industry”.

We know that when we say BIM, the acronym comes from English and BIM stands for Building Information Modeling, but we don't have a complete understanding of what BIM is?

The idea of BIM was put forward in the 70s and was originally called the Building Description System (BDS). The term "building model" first appeared in 1985, and in 1992 the term "building information model" was used in an article on building automation, and only 10 years later "building information modeling" and "building modeling" became the concept of building informed model (BIM).

Building information modeling (BIM) is a numerical expression of the physical and functional properties of an object. BIM is a common information resource for obtaining information about an object and provides a reliable basis for decision making in its life process, described as existing from the earliest conception to the present disorder. There are different stages of BIM and conditions of use, which are characterized by dimensions (3D model), 4D (time), 5D (cost), 6D (work), 7D (predisposition) and even 8D (safety).

With these definitions, I will try to answer the question: “What can BIM technologies offer to every specialist?”

ArchiCAD is one of the software products based on the BIM system, which has been used by architects in our country for many years. Although it is clear that the main area of application of the product itself is architecture, today the tasks in such departments as architectural solutions and interior departments have been completed, and developers now offer their users precisely these. ArchiCAD has the ability to simultaneously generate and display building data, as well as visualize the design process. Can we make other sections in ArchiCAD? In this regard, in the 24th version of ArchiCAD, it is indicated that engineering work is possible, and the presentation of the developers showed the capabilities of ArchiCAD in this regard. But this is not enough for the introduction of BIM technology.

Autodesk Revit, or simply Revit, is a set of computer software that performs design work based on BIM principles. This program, designed for architects, planners and engineers, can combine the tasks of the above specialties. Examples include Revit

Architecture for architects and designers, Revit Structure for designers, and Revit MEP for engineers in one application. The program allows you to model and draw complete architectural and structural elements in 3D, create objects in detail, organize team work on a project, from concept to production of working drawings and specifications. In addition, the developers of this program are developing a number of similar additional programs to make the tasks performed compatible with the BIM system, and in the future, the models developed in Revit will be used along with many other programs used in other stages of BIM.

Allplan is a computer-aided design system developed by Nemetschek Allplan Systems, a subsidiary of the Nemetschek Group. The software package combines the following sections of building design: architecture, design estimates, scope of construction, engineering systems of buildings, master plan, metal structures, reinforced concrete structures. The program includes the following sections:

1. Allplan Basis 2D - Creation of 2D drawings;
2. Allplan Design - 2D drawing and 3D modeling;
3. Allplan Architecture - architectural direction;
4. Allplan Engineering- work with reinforced concrete structures, frames;
5. Allplan Building engineering systems - heating, ventilation and air conditioning systems, power supply, sewerage
6. Allplan BCM - estimate of the volume and cost of construction;
7. Allplan Allfa - management of project files and data in the enterprise;
8. Allplan Campus a section for students intended only for use in teaching in educational institutions;
9. Allplan Prekast - assembly production and logistics management department.

The programs named above and abbreviated are used in the initial stages of BIM, i.e. when generating 2D and 3D models, in fact, I could add a few more similar programs to this list, but I will only move on to 4D modeling. I preferred to give information about.

What is 4D modeling? 4D modeling works on the basis of a 3D model of an object, and the work performed by it is based on the formation of a construction schedule and thus the workflow that takes place on a construction site over a certain period of time. A visually supported worksheet is formed in such a way that it can be made as detailed as possible or, conversely, enlarged. With this program, you can view the entire building construction process in the form of animation and identify errors in the project, optimize the work of builders by writing comments on these errors.

The 4D model contains data not only on the construction schedule of various elements of the building, but also on the objects involved in the construction and having

a significant impact on this process. The location of the crane and its working area, the number and size of machines that can pass through the construction site per day, the location and size of the construction camp, garbage disposal and much more - all this is in the planning of the construction be taken into account. Visual and detailed visualization of the table allows not only to eliminate various errors, but also to optimize the process before construction begins.

The 5D model adds a Value dimension to the BIM model, allowing you to immediately determine the material cost and appearance of the materials in the model. This improves the regularity of the estimated data, reducing data inconsistencies that typically occur with CAD.

6D allows you to manage the BIM object. The addition of a detailed description of building and utility elements with complex geometry descriptions and property capabilities creates an ideal database for object management in BIM.

The 7D model incorporates sustainability components into BIM, enabling professionals to achieve their goals for a particular project element and make decisions, coordinate, test and compare options.

8D covers safety issues in the design and construction process.

When we draw our designs in AutoCAD, we make several edits, starting with a simple line and finally forming a building model. But what does this model give us? We can get information about the design, constructions, styles, working drawings, nodes and much more about the future building. But how do we get this information? Do the elements of the building we design, such as the walls, really tell us anything about themselves? Before these questions are asked, think about why and what information this wall should provide. So far, no one has been able to send an ideal solution, which is not strange. This information is given to us by working in a BIM system, and the main idea of the system is Building Information Modeling. Whether you are working in ArchiCAD or Revit with BIM, you are working with models that can provide information during the design process. As an example, if we take the mentioned wall, the feature of our wall that BIM provides is that it has all the necessary information on it. These are some of the advantages of BIM technology over CAD.

A BIM model is not just a graphic drawing of an object, but information. Thanks to BIM, you can automatically perform the necessary calculations or create drawings, reports, perform analytical work, create work schedules, automatically calculate many parameters needed for construction, and much more - all this gives engineers endless possibilities and simplifies their work. Now you can quickly calculate and make wise decisions without making mistakes. The ability to quickly process and organize various data is essential for complex work such as construction projects. BIM effectively

allocates people and resources to make the best of them. In addition, this data can be used continuously throughout the life of the building and prevents data loss.

CONCLUSION

In recent decades, we have witnessed the widespread use of BIM technologies in foreign countries and the development of models of buildings and structures that are supposed to be erected in the future. Of course, it should be noted that not all stages of this technology are fully operational. However, if we start giving students the benefits of BIM as knowledge, then in the future we will be able to get perfect results in the field of architecture, urban planning and designing. Starting today, with the active use of digital technologies, we will be able to get new opportunities for their speed, time savings in multivariant projects, as well as automation and the formation of an error detection system for project stages.

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