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BIM TECHNOLOGIES IN CONSTRUCTION AND DESIGN ON THE EXAMPLE OF A SKETCH PROJECT OF A RESIDENTIAL BUILDING

BIM technologies in construction and design is a very important topic today. This tool for designing is very important to those of you who would like to start using new soft for modern and accurate designing.

Considering the current realities of Ukraine, the field of construction and design needs high-tech, modern and effective tools for architects and engineers. The design process can contain many mathematical operations of the same type that can be automated by certain means. Autodesk Revit software can serve as such a tool. The program was created for designing, documenting, coordinating, managing the presentation of architectural projects. [1,2] If an architect or a construction engineer can remove the need to "manually" solve many of the same type of computer problems, then he will free up time and resources for more complex, creative and unusual work.

As an example, a sketch project of an apartment building with six floors. The structural scheme is a reinforced concrete frame with monolithic columns, floor slabs and stairs. The foundation is piled with gratings. The outer walls are made of:

-Ceramic brick, b=250mm;

-Insulation, basalt wool, b=150mm;

-Hinged facade subsystem, b=80mm;

-Cladding with facade ceramic granite tiles, b=20mm.

Internal partitions are made of aerated concrete blocks with a thickness of 200 mm. The roof is flat, inverted, insulated.

The sketch project was performed in the Revit. The software allows you to simultaneously create a digital 3D model of the building, 2D drawings of plans, facades, sections and nodes. This provides an opportunity to exchange tasks and materials with such specialists as:

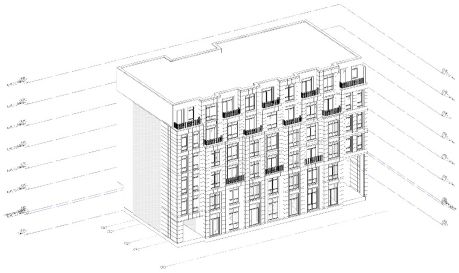
-Civil engineer (designer), providing a digital 3D model of the building with load-bearing structures;

-Designers of engineering networks (water supply, sewerage, electricity, heating, ventilation, etc.), providing a digital 3D model of the building, indicators of volumes and areas of premises, which are calculated automatically by the program;

-3D visualizers. They will receive a digital 3D model of the building, in which every design, element of decoration, facade, landscaping contains information about the visual and physical-physical properties of materials (color, texture, reflection and absorption of light);

-Sales and Customer Service Department. These departments will receive up-to-date information about the design object in the form of drawings, 2D and 3D (see image 1) building schemes;

-Estimate department. They receive information, specifications and tables of general construction materials for the project.



Pic. 1. 3D scheme of the house

Conclusions. Modern problems require modern solutions. BIM technologies in building design solve many similar, straightforward problems. This allows architects and engineers to devote more time to more complex tasks. The fast automated operation of the BIM programms allows to check quickly several options and to choose more economical, technological and up-to-date solution. Such tools help to create more economical, more accurate projects and as well as to build perfect structures.

REFERENCES

1.Salman A., Khalfan M., Maqsood T., Building information modeling (BIM): Now and beyond [electronic resource]. Australasian Journal of Construction Economics and Building, 12 (4) 15-28 URL:https://www.researchgate.net/publication/272491129_Building_information_modeling_BIM_Now_and_beyond

2.Jordani, M. (2010) 'BIM and FM: The Portal to Lifecycle Facility Management', Journal for Building Information Modeling, Spring 2010, 13-16

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OPTIMIZATION OF ORIENTATION IN THE SPACE OF SOLAR PANEL

More than 2 billion people on the planet still rely on coal, wood, oil, and gas for both cooking and heating their homes. Today, the implementation of alternative energy sources, autonomous and decentralized, is more advantageous in many countries, both economically and environmentally. Fossil fuels are becoming yesterday's energy source. Today, other forms of future energy are appearing and one of them is solar energy. Solar power is considered to be one of the most promising directions for obtaining clean electrical energy for consumer power supply, Solar power is. It's development is driven by both purely economic factors, such as constantly rising prices for traditional sources like coal, oil, peat, and gas, and environmental concerns. Eastern Europe is a sunny region, that is why the application of solar photovoltaic panels is particularly relevant here.

A solar photovoltaic system is a solar power station that utilizes the direct conversion of solar radiation energy into electricity. The installation consists of a set of solar modules (panels) placed on a supporting structure or on the roof of a residential building, battery storage, charge-discharge controller, and an inverter for converting DC to AC voltage when necessary. Despite all the advantages of using solar panels, such technologies have certain drawbacks, particularly caused by their dependence on the level of illumination. Solar energy systems are often stationary and therefore operate differently at different times of the day.

The sun does not remain stationary relative to the horizon. Every day it rises and sets, and it occupies different positions in the sky throughout the day. Its position also varies depending on the season. In winter, the sun rises lower, and in summer it rises higher. This fact significantly affects the generation of solar electricity. [1,2] For the most optimal positioning not only during the season but also throughout the day, solar trackers, a movable structure that automatically determines the best position for solar panels and sets it independently, are used. The advantage of solar trackers is the automatic positioning, which allows to achive maximum electricity generation output.

In industrial applications the ground-mounted solar power stations (SPS) with dual-axis trackers and actuators the movable devices for controlling in two axes - changing the tilt angle and azimuth, are used to adjust the optimal tilt angle of the panel with achievements of the highest efficiency of the SPS at the moment. [1,2]