

It was decided to add a second side wall to protect against rain and wind. But in order not to disturb, not to burden the image of a light, dynamic form, the side wall was made of plexiglass.

Conclusion. The result of this work was the “STOP” project, which took into account the shortcomings of existing stops, wishes of users, and based on the principles of ergonomic and functional design, an aesthetically attractive and multi-functional stop was developed.

1. Minervin G. B. Design.Illustrated Glossary / G. B. Minervin, V. T. Shimko, A. V. Ephimov: by G. B. Minervin, V. T. Shimko. – M.: Architecture-C, 2004. – 288 c.: ill.

FIGURATIVE FORMS IN ARCHITECTURAL BIONICS

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Tracing the entire history of human development, we see that man changed externally and internally, and as far as possible went from the origins of wildlife, changing the natural habitat to artificial. Considering himself a Creator, he is fenced off from the environment by all sorts of buildings, erects walls of concrete, designs high-rises and glass skyscrapers. But no matter how hard man tried, in the construction, he still had to take as a basis natural structures and forms.

“Bionics is the science of using knowledge about structures and forms, principles and technological processes of wildlife in engineering and construction” [1].

One of the branches of bionics is architectural bionics – it is a kind of innovative style that takes all the best from nature: forms, contours, structure, relief, explores the principles of shapes, as well as the interaction of architecture and the world around us.

On the basis of examples of various forms and formations of architecture and analysis of the use of the structure of natural material, it is necessary to investigate biological systems and underlying principles, as well as to check whether such solutions can be applied in the creation of architectural structures.

The purpose of this study is to determine the typology of the formation of the main natural forms used in architecture.

Material and methods. The source of the actual material for this study was the structure of famous architects from around the world, which were used in the creation of natural forms. Basically, the research method is descriptive based on the analysis and observation.

Findings and their discussion. Architectural bionics does not involve the complete copying of forms, but only the use of the principles and laws of formation in nature. Researchers A. Guillot and J. Meyer distinguish the following natural forms:

- cone-shaped designs;

- spiral designs;
- shells;
- prestressed designs;
- mesh, lattice and ribbed designs;
- space-lattice structures;
- dynamic architecture [2].

Let's take a closer look at each of the forms above:

- *cone-shaped designs*. Y. Lebedev classifies them into several types:

The first type is the cone of stability, it can be seen in the plant world of plants (plant stems, trunks and crowns of trees) – the base down [1]. A striking manifestation of this type is noted in the design of the giant cone of the Cathedral of the blessed virgin Mary in Maringa by the architect Jose Augusto Bellucci;

The second type of cone – the desire to grow, from "one point", up, out into space – the dynamic shape of the cone. In architecture, this principle underlies the shaping of the Midrand Water Tower, in South Africa;

The third type-the "Struggle" of two cones – growth and stability-is manifested, for example, in the crowns of trees, which can be seen on the example of the monument to Christopher Columbus in San Domingo [3]. As a result in organic nature on the basis of a combination of two cones there are various forms;

- *spiral designs*. Spiral is a kind of form of movement, growth. The spiral surface of the building is better adapted to overcome wind loads-the wind seems to slide along its convolutions, reducing the full power of the impact on the structure of the structure. This type of construction is often used in the construction of high – rise buildings and is actively used in modern architecture;

- *shells*. Vault – shell – shell – acts as an example of the gradual change of stress from compression to tension. In this case, the shape of the shell itself is a structure in the form of a vault. The structural form of the shell – shell type, complex surfaces called turbosomes, where are: (turbo – rotation, soma – body). The design principle formed the basis for the roof of the national hotel in Beijing, China.

- *prestressed designs*. Created by the system of shrouds – resistance of structures in shape, an example is an unusual and original Parking with a service center built on the territory of the Volkswagen Austostadt in Wolfsburg, Germany;

- *mesh, lattice and ribbed designs*. The basis of many designs is the voltage line. This is manifested in the structure of the thinnest leaf of any plant. The frame of such a structure is a network of veins, lattices, and stiffeners, which in turn form the ribs underlying this form. The rib vault is also called a fan vault. The system of ribs is mainly traced in Gothic architecture by the example of the vault of the Cathedral in Laon, France;

- *space-lattice structures*. The main task of which in nature – is to prevent damage to the structure due to accidental actions and loads. This organization of forms is widely used in the construction of frames and cranes. On this principle, and was designed (world – famous architectural structure) - the Eiffel tower.

• *dynamic architecture*. An example of which in nature is the feature of plants to respond to various changes: humidity, light, temperature. An example of this form is the architectural structure of the sports stadium on Prospekt Mira in Moscow.

Conclusion. Thus, it can be concluded that in modern architectural design, one of the main principles in the work of architects is the creation of "living architecture", where the building and structure is a "living organism". The most common buildings on the example of the use of shell type, mesh, lattice and ribbed structures. Here bionics is "content" with the fact that it does not use natural organisms directly, but only the principles of their "construction".

The process of shaping architectural bionics is both a fragmentation of the integrity of the object to the smallest elements of its structure, and, conversely, from the smallest particles, the possibility of creating a form for the construction of a new object of architecture.

Geometric forms, borrowed from nature, are the material for creating something new. From the taken natural forms, the architect is able to create a huge number of different combinations [4]. Each object, building has its own spatial structure and shape. And of course each object of modern architecture has its own structure and rhythmic organization. Today, bionics as a science can predict a great future. Here the scientists of tomorrow open a wide field for research in the field of architectural forms.

1. Large encyclopedic dictionary / A. Prokhorov. – Moscow: Soviet encyclopedia, 1993. – 632 p.
2. Bionics. When science imitates nature / A. Guillot, J. Meyer. – Moscow: Technosphere, 2013. – 280 p.
3. Architectural bionics / Y. Lebedev. – Moscow: Stroyizdat Press, 2005. – 269 p.
4. Architectural shaping and geometry / OTV. ed. – Moscow: LENAND, 2010. – 248 p.

FORMATION OF GAME COMPLEXES FOR CHILDREN IN PUBLIC SPACES

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A shopping complex is a place in which a person comes regularly and there may be a lot of time in his space. The most convenient day to visit the shopping center is a day off when parents spend time with their children and can go shopping together. The organization of a child's play area in the interior of a supermarket will help solve the problem of a child's occupation at a time when adults choose goods. Designing facilities for children's use, especially in an environment of active social processes, places high demands on design. Therefore, this topic is subject to in-depth research.