Periods of Formation of Historical Structures of Architecture with Geometric Shapes

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ABSTRACT

This article is about how everyone understands architecture, because it surrounds and accompanies us throughout our lives. No art form is closely related to architecture and geometry. The article revealed that the designs of various architectural structures are formed by geometric shapes.

Keywords: architecture, geometry, great architect, character of buildings, spatial forms, cultural outlook, art, mathematics, construction.

Introduction. The great architect Le Corbusier once said: "The world around us is a world of geometry, before our eyes it is pure, real, flawless. Everything around us is geometry."

No other art form is as closely related to geometry as architecture. Everyone needs to understand architecture because it surrounds and accompanies us throughout our lives.

The purpose of the article is to reveal the relationship of the properties of architectural structures with geometric shapes.

It is the formation of the idea of the objectivity of mathematical relations, which manifests itself in architecture as one of the forms of reflection of reality.

Geometry should be considered as a theoretical basis for the creation of works of architecture.

Expanding the general cultural outlook by getting acquainted with the best examples of architectural art. The structure of the departments is related to the general concept of the work. The main part consists of three chapters. The first is related to the main features of architectural and spatial forms. The second chapter highlights the characteristic geometric shapes of buildings that are typical of different architectural styles. The third section provides an overview of the magnificent architectural structures of the city of Volzhsky, with comments on their architectural styles and forms.

Geometric figures are of great importance in architectural constructions. “Centuries have passed, but the role of geometry has not changed. It will still be the architect’s grammar. ”Le Corbusier.

Figure 1. It is a building material with an uneven base that ancient pagan tribes used obelisks (menhirs, dolmens, or cromlexes) for ceremonies.

The first geometric concepts appeared in prehistoric times. Man in nature observed various forms of material bodies: plants, animals, mountains, river meanderings, circles and crescents, etc., but he not only observed nature passively, but also mastered and used its riches in practice. In the course of practical activity, he collected geometric data. Material needs motivate people to make tools, spread stones and build houses, make pottery sculptures, draw bows, and so on.

The first architectural structures were of religious significance. Ancient pagan tribes used obelisks (menhirs, dolmens, or cromlexes) for ceremonies (Fig. 1). The main problem in the construction of the obelisk was the vertical instability: the level of development of science did not allow to process the building material (mostly stone) with an uneven foundation. The problem was solved simply: the obelisk was placed in a hole previously dug.

Thus, the practical activity of man served as the basis for the long process of developing abstract concepts, the simplest geometric relationships, and the discovery of relationships.

The first information about the success of geometry that has come down to us is related to the tasks of measurement, calculation of volumes (Ancient Egypt, Babylon, Ancient Greece). At that time, the abstract concept of a geometric body (figure) emerged as an object devoid of all other properties unrelated to the concepts of distance, length, etc., but only preserving the spatial properties of the corresponding physical body.

Thus, geometry has studied some features of the real world since its inception. The connection between geometry and the real world has been maintained throughout its development, while the level of ambiguity of the research object has risen to an increasingly high level.

The geometric data and issues in the papyri that have come down to us are mainly concerned with the calculation of areas and volumes. They have no information about the methods of deriving the rules used by the Egyptians in calculating them.

In addition, approximate calculations were often used. Geometry as a practical science was used by the Egyptians after each flood of the Nile, in various economic activities, in the construction of irrigation canals, magnificent temples and pyramids, and in the restoration of plots of land when famous granite sphinxes were carved. The transition from the simplest buildings to complex architectural structures was carried out gradually, the measuring instruments, materials, mechanisms required for construction were developed.

Geometric features of architecture and spatial forms. Architectural structures consist of separate parts, each of which is built on the basis of certain geometric shapes or a combination of them. In addition, the shape of any architectural structure has a certain geometric shape as its model. Structures in mathematics correspond to geometric shapes.

Of course, talking about how architectural shapes fit geometric shapes can only be a distracting assumption from small details. Almost all geometric shapes are used in architecture. The choice of using this or that figure in an architectural structure depends on

many factors: the aesthetic appearance of the building, its durability, ease of use, and so on.

The basic requirements for architectural structures, formulated by the ancient Roman architect theorist Vitruvius, were: "power, benefit, beauty." Each geometric shape has its own set of architectural features.

Exhibition complex "BelEkspo". This building, resembling flowers, grew up in 1980-x on Togdashnem Avenue Masherova, and now Pobediteley. Proektirovaniem zanimalsya arhitektor Leonard Moskalevich, kotoryy potom nazovet etu rabotu luchshey v svoem tvorchestve. Chtoby ponyat vse velichie kompleksa, stoit oboyti ego.

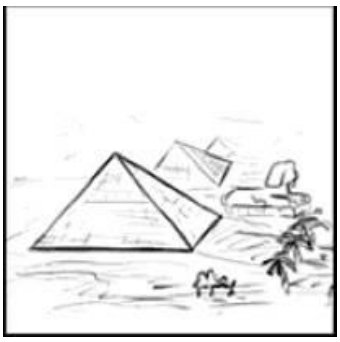
"It was a breakthrough in architecture": The most brutal building in Minsk

Engineering corps of Ministries avtomobnyx dorog, Tbilisi, Georgia

In Belarus, for example, a cone-shaped hotel building has been designed near an international airport. The cone changes the direction of the sound wave that enters it. An example of using this feature is a simple megaphone. This feature of the cone has proven to be very useful in reducing noise in hotel rooms. Sometimes, when trying to solve certain ideological problems using architecture, project authors get a negative result.

For example, the building of the Soviet Army Theater, built in Moscow during the Soviet era. Trying to bring the architectural image as close as possible to the name of the theater, the authors gave the building the shape of a five-pointed star. As a result, this has led to significant difficulties in planning buildings and additional costs. Only the birds could see the ideological five-sided form of the theater.

Strength is one of the most important qualities of architectural structures. It depends on the properties of the materials from which they are created and the design features. And the strength of the structure in general depends directly on the basic geometric shape of this structure. The strongest architectural structures of ancient times are the Egyptian pyramids (Figures 2).



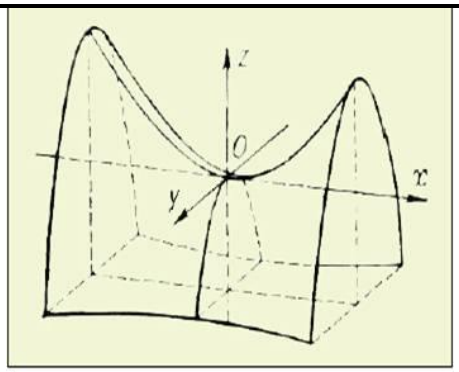
Figures 2

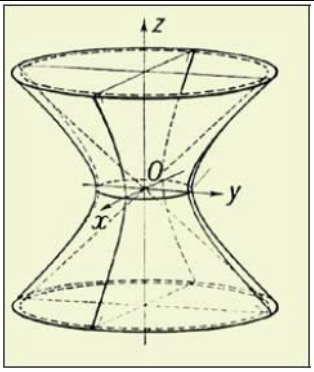
They are known to have the shape of regular rectangular pyramids. It is this geometric shape that provides the greatest stability due to the large base area. On the other hand, the shape of the pyramid provides a decrease in mass with increasing height from the ground. It is these two features that make the pyramid stable and particularly strong. The "rationality" of the geometric shape of the pyramid allows the choice of impressive dimensions for this structure, gives the pyramid splendor, evokes a sense of eternity.

Currently, frame structures used in the construction of modern structures made of metal, glass and concrete have maximum strength. Examples of such structures are the famous towers: the Eiffel Tower in Paris (Figure 4) and the TV tower in Shabolovka in Moscow (Figure 5). The teleminora, built according to the project in Shabolovka, consists of several parts of single-leaf hyperboloids stacked on top of each other. In addition, each section consists of two families of straight-line beams.

4- pictures

This feature is called linearity. It is used in the construction of various reinforced concrete structures. The molds are made of flat boards to give this material the desired shape. Although not flat, it is possible to draw single-leaf hyperboloids and hyperbolic paraboloids using straight lines.



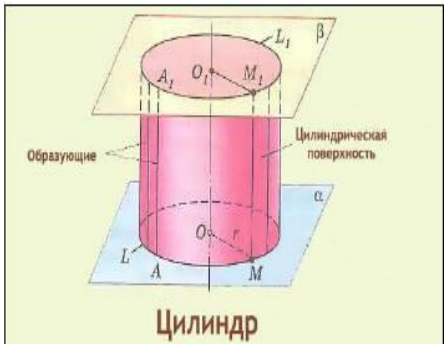


Figures 6-7

A single-leaf hyperboloid (Figure 6) is a surface formed by the spatial rotation of a hyperbola symmetrically about one of the coordinate axes in a rectangular coordinate system. In the form. 6 shows a hyperbola that is symmetrical about the y axis and rotates around the z axis. Thus, a single-leaf hyperboloid is obtained. Any axial part of a single-leaf hyperboloid is bounded by two hyperbolas.

A hyperbolic paraboloid (Fig. 7) is a surface with a parabola and a hyperbola in cross section u1080. Its architects call it hyper for short. F. Candela was a hyper used in the construction of an evening hall in Acapulco (Mexico)

(Fig. 8).




Ф. КАНДЕЛА. Вечерний зал в Акапулько. *Мексика.* Линейчатое свойство гиперболического параболоида.

Figures 8-9. A single-leaf hyperboloid and a hyperbolic paraboloid can be formed by moving two straight lines. The simplest non-flat surfaces - cylindrical (Fig. 10) and conical (Fig. 9) - can be constructed by sliding a single straight line.

Conclusion.

As a result of this work, it became clear that geometry is directly related to architecture - geometry is an integral part of architecture, one of its foundations.

Geometric shapes define the aesthetic, operational and durable features of architectural structures of different time and style. In addition, each architectural style is characterized by a general set of geometric shapes of buildings and structures and a specific set of their individual elements. With the development of construction technologies, the possibilities of using geometric shapes are expanding. On the example of the city of Saransk, various architectural styles and their geometric features were analyzed.

Geometry was considered the theoretical basis for the creation of works of architecture.

They form ideas about the objectivity of mathematical relationships, which are manifested in architecture as one of the forms of reflection of reality.

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