So, as we see, at present, the pace of construction of skyscrapers will only increase in urban development. This is facilitated by the rise in price of urban land in large cities of the world and the improvement of the material and technical base, building materials, programming of building design using calculation programs. The population seeks to live in large cities with urban centers, which also provokes the demand for high-rises.

The next stage in the development of the operation of skyscrapers is predicted - their universal connection with each other using overhead transitions at different altitude levels according to the transition of the Petronas twin towers in the center of the capital of Malaysia, Kuala-Lumpur. The introduction of horizontal transitions can solve a whole range of negative factors of skyscrapers. For example, evacuation in case of fire is not down, but to the side, into the transition of the neighboring building.

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Vitruvius. From the Renaissance to the end of the 18th century

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Abstract

This article provides a brief overview of the works of the Great Architect. His contribution to the development of human existence is appreciated. The article notes that Vitruvius studied works in construction and engineering, including military equipment. Vitruvius saw six categories at the heart of the aesthetic component of architecture. The work of an engineer is considered, in which the author systematized all the information known to him at that time, generalized the practical experience accumulated by predecessors and contemporaries.

Keywords: aesthetic component of architecture, architect, aesthetics of architecture, ancient architect, symmetry, recommendations, harmonious architecture

The topic of the article is VITRUVIUS. From the Renaissance to the end of the 18th century.

The main goal is to give a brief overview of the works by the Great architect.

The task of our work is to collect information about the activities of the architect from various sources.

Among those who contributed to the development of human existence is the Roman engineer Vitruvius - the most famous ancient architect who lived in the second half of the 1st century BC. Vitruvius, also known as Marcus Vitruvius Pollio, was born in the Campaign in a family of architects, thanks to which he received a comprehensive education.

The Roman engineer knew Greek, which allowed him to study works in construction and engineering, including military equipment. Under Caesar and later under Augustus, he leads the creation of military vehicles.

Basically, little is known about vitruvia as a person, but his works are the source of most of the biographical information. they will be able to tell us about the mysterious personality of an engineer through millennia.

Vitruvius placed *the architect* in the first place in architecture. He was well aware that architects (as engineers were called in those days) should not only be good practitioners, but also possess a certain amount of theoretical knowledge, in particular they should have a good knowledge of geometry and arithmetic.

He wrote: *"The knowledge of the architect ... is obtained from practice and theory."* Moreover, he clarifies that in addition to technical knowledge, the innate quality of the architect is even more important.

"He must be a competent person, a skillful draftsman, study geometry, thoroughly know history, listen carefully to philosophers, be familiar with music, have a concept about medicine, know the decisions of lawyers and have knowledge in astronomy and in celestial laws."

Vitruvius was credited with the conclusion that the relationship in the structure of the Universe and man is proportional, therefore, in the proportionality of the building and man, which should be guided by both the construction of buildings and the construction of machines.

His proportionality system has gained wide popularity in the visual arts and architecture thanks to the "Vitruvian Man" (picture 1.). This drawing of Leonardo Da Vinci, called canonical proportions, is a figure of a naked man in two superimposed positions on one another: with arms spread apart, describing a circle and a square.

Picture 1 «Vitruvian Man»

It is worth noting that Vitruvius included in the duties of the architect not only the construction of buildings, but also the construction of mechanisms: hoisting machines, siege and throwing tools, time measuring instruments. Therefore, he considered important for the architect not only knowledge of aesthetic regularity, but also the technical foundations, scientific theories underlying them.

For example, planning the construction of a building or an entire city is impossible without taking into account human physiology and hygiene rules, as well as without knowledge of the climate and natural features of the construction site; It is impossible to navigate building materials without knowledge of botany, geology and mineralogy; the construction of theaters is impossible without knowledge of the laws of musical theory and acoustics; and it is absolutely impossible to build lifting and propelling mechanisms without knowledge of theoretical mechanics.

Vitruvius' theoretical knowledge was embodied in his own projects - the basilica in the Colony of Pano on the Andriatic (picture 2) and the construction of the Roman aqueduct. The architect was the first to think about the origins of the emergence of architecture, the first to investigate the issue of musical acoustics of rooms.

Picture 2 «The basilica in the Colony of Pano on the Andriatic»

The aesthetics of architecture from the point of view of Vitruvius has its roots in the natural-philosophical concept of the universality of numerical values and proportional relations, which can describe both the structure of man and the universe, as well as a precisely working mechanism, and an aesthetically harmonious building.

Vitruvius belongs to the formula «*Firmitas-Utilitas-Venustas*». This golden rule of architecture states that only a combination of these properties will allow buildings to look harmonious and complete. And no property can be compensated for by others. The harmonious architecture of the building is possible only taking into account all three properties, that is, during construction it is necessary to achieve the technical perfection of the building, and aesthetic, and ergonomics.

Vitruvius divides the aesthetic component of architecture into six categories:

1) *Ordinatio* is the general principles of architecture, the basis for the formation of volume, the proportions of the dimensions of the building. Here Vitruvius describes the Ionic, Doric, Tuscan and Corinthian orders, as well as a triad: three qualities that architecture must necessarily have: *firmitas* (structural strength), *utilitas* (good), *venustas* (beauty). To measure the various parts of the orders, the architect used a conventional unit - a module equal to the lower diameter of the column, using the module it is easy to calculate the proportions of the order.

2) *Dispositio* - this is the design of a particular building, the planning of its shape, the organization of space and the display of this on the drawings: general plan, facade and perspective.

3) *Eurythmia* - bringing all parts of the building to harmonious proportions, that is, ensuring a beautiful composition of the structure.

4) *Symmetria* is an anthropomorphic criterion: parts of a building are likened to parts of the body.

5) *Decor* - a category that makes up aesthetics, which describes how the shape and design of the temple corresponds to religious considerations.

6) *Distributio* — this category describes the method of economic use of an object.

Throughout his life, Vitruvius prepared his own essay on architecture. At an advanced age, the architect secured a pension from Emperor Augustus, which allowed him to write the only treatise «*De Architectura Libris Decem*» («Ten Books on Architecture») (picture 3), published in 13 BC. In this work, the engineer systematized all the information known to him at that time, summarized the practical experience accumulated by predecessors and contemporaries.

The treatise included 10 books, each devoted to a separate issue - the professional skill of the architect, building materials, the peculiarities of the construction of temples and public

buildings. The problems of the construction of country estates and agricultural facilities, the decoration of the facade and the painting of buildings, water supply, and the assembly of watches and mechanisms are raised.

The book gives the first definition of a machine as a combination of parts connected together, which has great strength for moving heavy loads.

Picture 3 «De Architectura Libre Decem»

Considering that the greatest success in practical actions can be achieved only by combining «mechanical dexterity» with «theory and scientific knowledge», Vitruvius devoted much attention to the theory of machines in his treatise, devoting to it the tenth book of the treatise entitled «*Fundamentals of Mechanics*». This book is a short practical guide to applied mechanics, containing a description of the various mechanisms for lifting weights, practical rules and building recipes.

Vitruvius' hope for posthumous glory did not deceive him. Pliny the Elder and Frontin drew material from his work. The Capitol and Windrose are build in Dugge in accordance with his teachings (picture 4). M. Cetius Faventin makes an extract from Vitruvius that Palladium will use. Sidonius Apollinaris makes him an almost mythical embodiment of architecture. The Byzantines are guided by him in the construction of Christian basilicas. In the VI century. the doctrine of the winds is shifted to poetry.

Picture 4 «The Capitol in Dugge»

Conclusion: the principles established by Vitruvius and his recommendations were perceived by many architects as indisputable truths, and the books published by him remain the only documentary evidence of the construction and mechanics of that time, the basic tenets of which are successfully used today.

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