INNOVATIVE MEANS OF THE REVIVAL OF SYNTHESIS OF ARTS IN ARCHITECTURE

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ABSTRACT

Modern architecture is built on such diverse values as individualism and conformism, technocracy and technophobia, pragmatism and irrationalism, and by and large - chaos and diversity, the desire for order and the search for the new and non-traditional solutions. The emergence of new style trends today is often done according to the principle of opposition - in response to the universally established style, new style, contrary to latter, in terms of values and aesthetic sense is born. At the same time, a specific emotional climate is created in the architecture system - the environment in which people live and act. This environment is always in a state of dynamics, adjustment and tension. At the same time, it is a holistic aesthetic reality, which is perceived in a certain way by man in all its diversity of contradictions.

Referring from this position to the questions of the correlation of system and chaos, orderliness and diversity in architecture, it must be noted that this problem is one of those to which constantly sustain interest in the community of architects, art historians and artists. Today, on the one hand, we see a rejection of artistic traditions in architecture, and on the other hand, there is resurgence of interest in them. In these conditions, the problem of preservation of traditional values, and the synthesis of tradition and innovation in the process of architectural creativity, becomes very urgent.

Keywords: architecture, system, chaos, canon, style, image.

1. FORMATION OF A NEW LANGUAGE OF MODERN ARCHITECTURE

By the early 20th century century, the approach to the formation of the architectural environment was marked by a turning point, the consequences of which the specialty is experiencing up to now. Conventionally, it's beginning can be attributed to the times of the Chicago School of Architecture, whose creative direction was very aptly called "Commercial style." Henry Hobson Richardson, Dankmar Adler, Daniel Burnham, William Holabird, William LeBaron Jenney, Martin Roche, John Root, Solon S. Beman, and Louis Sullivan laid the foundation for changing the consciousness of several generations of customers and architects [1, pp. 234–235].

By the time of the birth of the "commercial style" the world's largest metropolitan areas began to grow in population at a speed of 20-50 thousand people per year [2].

The first and second industrial revolutions, the globalization of production and the struggle for human rights led to a significant increase in the requirements for the number and duration of construction of industrial and public architectural objects. As a result of the changes that have occurred, the art of urban development has reached a new level of its development, and the role of synthesis of arts in architecture has significantly decreased. Probably, the 70-80s of the last century are to be considered as the apogee of the utilitarian and commercial approach to architecture. Business districts of megacities of this period differ among themselves as histograms - by characteristic peaks and much less often in architectural masterpieces.

By the 90s of the last century, the "explosive" growth of cities in Europe and North America slowed. At the same time, the construction industry and commercial architecture have reached such a level of development that some construction corporations (for example, Broad Sustainable Buildings [9]) for the purposes of PR actions companies began to build skyscrapers within several weeks. The real estate market began to "overheat" creating "soap bubbles". In conjunction with the advent of digital technologies created new preconditions for the release of architecture to another level of development.

By the end of the millennium a new type of customer arose - large investors and communities willing to risk hundreds of millions of dollars to get not only a utilitarian but also aesthetic effect. For future generations of architects, the concept of the "Bilbao effect" is likely to be included in textbooks. Already 20 years have passed as an example of the risk and brave experiment of the architect Frank Gehry and Mayor Bilbao demonstrating to the whole world the importance of the emotional and aesthetic impact of architecture.

The Guggenheim Museum has become the center of attraction for millions of tourists from all over the world and the basis of the city's economic revival.

As was often the case in the last century, a new style began with a protest. It is widely known that one of the most important reasons for the emergence, for example, of deconstructivism in architecture was the protest against the homogeneous environment of business city quarters in 1970-1990. "Hacking" the huge planes of cities, the new style tries to add a new, discordant note to the monotony of the building, which first causes a protest in the slowly falling asleep brain, and after the recipient begins to notice the refinement of proportions and the purity of the lines, thus obtaining a new, somewhat painful from sharp contrasts, pleasure.

Trying to escape the monotony of the architecture of business districts of the second half of the twentieth century, Frank Gehry develops a line of "dismantling and assembling not according to the rules." "Asymptote Architecture" space in attempts to induce earthly attraction. The group "Coop Himmelblau" demonstrates "psychograms of destruction", works with "splinter" aesthetics. Remment Koolhaas creates hypertrophied surrealistically colored versions of brutal forms of early constructivism. Zaha Hadid plays with the surface like a skilled chef with a piece of dough - then picking it up with bizarre folds, then cutting it into expressive layers. So, the poetics of uncertainty, temporary in spirit, was

able to create an innovative aesthetics - movement, fragility, chaos, both rooted in modern visual culture and architecture [4].

Such a "poetics of uncertainty," a bizarre and contrasting combination of denials and affirmations, attracting and threatening, proved capable of creating an innovative aesthetics - the paradoxical "beauty of destruction" - mobility, fragility, chaotic, fluidity and angularity, diagonal dominance and acute angle - ingrained in the visual architectural culture. Constructions of this type are inherent atectonic and ambiguous perception. This gives the architecture of this type dynamism, and hence visual information. However, this informativeness threatens to degenerate into chaos, as an imaginary alternative to mechanical order.

Until modern times, the history of architecture has been closely linked with the canon and tradition. The ancient civilizations of Mesopotamia took several millennia to accept the idea of a right angle in the dwelling [6]. Only a specialist can distinguish the architecture of Ancient Egypt by it's thirty dynasties. Romance style developed for three centuries, Gothic – four, Baroque – less than two, Classicism - a century. In modern times there was a civilizational breakthrough, because of which the art of architecture broke into dozens of style movements, developing simultaneously.

In modern architecture there is a breakdown of old stereotypes, a kind of a rejection of the established principles and methods of form-building and an appeal to the symbolic role of the form and its artistic characteristics. Modern global culture requires from architecture such expressiveness, which would go far beyond the functional program of the object. Innovative architectural objects take the form of a complex image structures and symbolic transformations, which represent a hierarchy of forms and meanings of a new level in combination with traditional compositional techniques of the artistic language of architecture. These structures challenge the standard notions of order and harmony. Such an unstructured form removes the opposition "beautiful - ugly", creating a base for a new type of aesthetic consciousness.

The canons of classical geometric forms and figures were replaced by fractal and parametric architecture, borrowing its figurative and morphological characteristics of the natural natural landscape of the Earth, zoomorphic and bionic forms, which, on the one hand, amaze with their singularity and some strangeness. On the other hand, they are a natural continuation of nature, the main inspirer and stimulator of creativity.

The rapid pace of development of the planetary information field has created an extraordinary precedent in architecture - often the fashion trend has become obsolete before the building is constructed. Megapopular in the architectural environment, especially with student, parametric architecture lasted several years and lost most of its followers. Libeskind is no longer imitated, Frank Gehry has lost many admirers, critical remarks are often heard about Calatrava's works. The canons are discarded, fashion passes, the most intricate forms and star architects remains with their glory and numerous legal claims from customers.

2. TRADITIONS AND CANONS IN ARCHITECTURE

Dialectics of the traditional and unusual, standard and non-standard defines the trajectory and vector of the development of the architectural form system. This unity of opposing principles receives quite a variety of manifestations in architecture. The fascination with new, more expressive means often obscures, slows down the impact of old, classical styles and they seem uninformative, unemotional. However, such inhibition extends only to the period of entrainment by new means, which corresponds to the need for the existence of man in a system where the ratio of similarity and difference is in dialectical unity.

The language of architecture characterizes the desire for some artistic norm, along with deviations from this norm, when the repetitions of these deviations become too frequent, they form a new norm. The norm is determined by the predictability of a phenomenon.

Modern architecture determines the type of creativity, focused on overcoming the norms. The violation of the norm is itself endowed with value.

The reason for the colourful, variegated atmosphere in modern architecture is that modern architects believe that its very nature is oriented to the periodic breakdown of rigid systems of traditions and canons. The artistic norm eliminates the heuristic nature of creativity, based on deliberately ambiguous initial data; it deprives the architecture of the degree of unpredictability, and hence of informativeness.

In today's style democracy there is also a serious problem that threatens to destroy the system of architectural language as such. Today, thanks to the incredibly rapid development of building technologies, modern architectural creativity strives to increase information opportunities. But the ability to carry information is directly proportional to the number of structural alternatives. The system of permissions is relevant only against the background of prohibitions and implies the memory of them.

Tradition is necessary for the stabilizing role that architecture plays in culture. At the same time, only against the background of tradition and in comparison with it can a new, individual be perceived and evaluated. Consciously or unconsciously people try to keep in the form of fundamentally new signs connecting the form with its old purpose. There is a tendency to preserve in the new elements of the acquaintance, ensuring the continuity of culture.

The stability of the values of the past was determined to a greater extent by submission to artistic canons and norms, which include the relationships of similarity-differences that have been established in aesthetic experience. The act of creativity included the implementation of rules, the system of which, preserving the unity, varied depending on the specific task. The individuality of a few great masters, allowing themselves to deviate from artistic norms, stood out clearly against this background and provided an update. With the continuity of the tradition that provides for the purposeful perfection of means of expressiveness, any concrete thing has become the result, the established algorithm of the work of many generations. This is how the transformation of it into a generally accepted stable language was achieved, the signs of which cause complex series of associations in consciousness. The system of the environment was formed due to this in a deeply meaningful artistic text.

Perception of new styles is always emotionally enhanced. But over time, when the new style, continue numerously repeating itself, becomes familiar, its perception, connected with the novelty and destruction of old canons and norms, also disappears. Emotional perception is leveled and only here, obviously, the final artistic value is established. Some works with the loss of novelty grow old and die, others continue to live, making up the fund of masterpieces of world culture.

3. REDUNDANCY OF VISUAL INFORMATION

Modern research in the field of perception provided a convincing explanation for the question of why people had tried to decorate their surroundings since the early Neolithic period. The reason, and this fact is proved, is the need for constant positive stimulation of the cerebral cortex. The lack of such stimulation has a very negative impact on both human health and its mental activity.

To respond to non-standard, critical situations in their environment, there is a special function in the human brain - involuntary attention. Moreover, a man constantly strives to create critical states around himself, in all spheres of his activity - art, sports, gambling,

etc. This also indicates that the critical state in the brain is supported from the outside. Thus, randomness and instability are a fundamental property of the functioning of the brain and the very phenomenon of art and architecture. [3, pp. 62, 195—219.], [8, 215—230.]

In the aspect of studying the correlation in the architectural object of the content of randomness and structure, we can agree with scientists that claim that for a favorable perception of architecture, the latter should have a certain share of "redundancy" of visual information. If the lack of informativeness of the architectural environment can generate negative emotions, then the fullness of information makes it a source of diverse emotions and a positive emotional state associated with the fundamental cognitive, information needs of a person.

As you know, the dominant emotion that stimulates activity is interest. The qualities of the external environment that motivate this interest are novelty and complexity. However, the novelty and singularity of the forms of an architectural work, provoking interest in it at the moment of acquaintance, quickly becomes boring - at the very best, they simply stop paying attention. So, there must be some other mechanisms that would stimulate interest in this environment. This stimulation is precisely provided by the redundancy of the architectural form. [5].

The most important reason forcing a person to come back again and again to already known works of art or spatial sensations is a huge number of degrees of freedom of aesthetic information. If the semantic information contained in a certain spatial form can be fully accepted in memory, then its aesthetic essence in terms of content richness far exceeds the capacity of the perceiving system of man.

A person getting into an architectural environment that does not have a sufficient amount of informativeness, redundancy, feeling lost, which leads to serious stressful situations. A person needs unpredictability, and therefore - information, which can only be achieved through a subtle knowledge of the rules and laws of human perception. Obviously, the ancient architects were familiar with this law. It is hard to imagine that the abundant decoration, the variety of complex details that characterized the appearance of architectural structures from century to century, were random.

If we look at the architecture of different historical epochs and styles, then we must emphasize that in them the number of different elements and details exceeds the possibilities of human perception and does not have a visible functional design. Not only in the buildings of the modern period, for example, with their fine and picturesque details of the facades, but also in the architecture of classicism with its aspiration to large forms it is almost impossible to perceive and remember the details of the drawing of capitals, ornaments, grids, etc.

An unusual phenomenon in the field of perception of the environment is found in the study of the behavior of pedestrians crossing the famous Venetian square of St. Mark. Instead of the optimal route-crossing the square along one of the curved lines approaching the diagonal, they chose the "navigation" option, guided by landmarks far from the diagonal, and consistently moved from one landmark to another. This example demonstrates that the redundancy of information affects even the deep, psychophysiological level of behavior - the motor activity of a person.

Redundancy of information does not allow a person to get used to monotony, providing new and new stimuli for visual perception.

4. COMFORTABLE VISUAL ENVIRONMENT

Unlike other spectacular arts, architecture is not perceived selectively, but routinely. We can not read this or that book, choose a music concert or CD at will, but we can not

choose architecture. This probably involves a special function of architecture in the cultural system as a whole, which distinguishes it from other arts that operate sporadically.

Analyzing the search for new expressiveness in architecture, we once again think that the ways of managing this complex subject-spatial environment should be determined by certain factors related to the needs of a person in visual comfort, in order to remove the estrangement between a person and the architectural environment, to make the environment opening possibilities of a choice. It seems that there are two main conditions for the viability of the system: an increased influx of innovations and the preservation of the profession's core.

The need in chaos and diversity on the one hand, and in an orderly environment on the other hand objectively exists. The methods of ordering a complex object-spatial environment must be determined by certain factors that are related to the needs of a person in visual comfort in order to remove the estrangement between a person and the architectural environment. It is obvious that the architectural space in the aspect of its visual qualities, in the first place, should be interpreted as safe, comfortable, harmonious.

5. INFORMATION ASPECT

One of the main characteristics of the perceiving individual is the existence of the maximum limit of the speed of perception of information. This is due to the fact that the bandwidth of the human senses in the visual perception has certain boundaries, sufficiently studied by the psychology of perception. The surplus of information does not allow one to fully grasp it. Deficiency - will cause sensory hunger. These two thresholds (satiety and monotony) reflect the possibilities of human perception of information and the zone of comfort of perception.

Information embedded in the object of perception can be either old, known, expected for the recipient, or new, unknown, unexpected. But the true aesthetic value of information lies in its novelty, a form that does not contain novelty for the recipient does not carry any information for it. However illiterate and one-sided, it sounds like the statement that the old information does not play any role in the act of perception of art. On the contrary, only through comparison with the old knowledge, thanks to the opposition to it, novelty acquires true value. From the point of view of information theory, the acquisition of aesthetic pleasure occurs only in cases when there is an element of old knowledge in the novelty, and in the old knowledge there is an element of novelty, and since in the person initially conservative principles are laid, then on their background novelty always causes tension, and with it an emotion. [7, p.52.]

In order for the general structure of the perception of the work of architecture by a person to remain informative, it must be constantly removed from the state of equilibrium, automatism, by the receipt of new information. However, at the same time, the opposite trend is working in the system - only elements, put in certain predictable sequences, can fulfill the role of communicative systems.

6. SYNTHESIS OF ARTS IN ARCHITECTURE AS MEANS
OF INCREASING VISUAL INFORMATIVENESS

The digital architecture of the last decades was another significant step in the development of the specialty without the main feature of the temples and palaces of the past - the redundancy of information. Definitely works by Daniel Libeskind, Santiago Calatrava, Frenka Geri, Zaha Hadid and other "star architects" have sufficient aesthetic value to occupy a prominent place in the history of architecture. However, their small expressiveness at the tactile level will not allow us to achieve the charm of the old architecture that we can see in the historical cities of Europe.

Today there were prerequisites for achieving the next level of development of architecture. Forced departure from the active use of the synthesis of the arts in the plastic structures created in our time architecture has received a unique tool to return to the traditions of past generations. It's about connecting digital design and construction technologies with digital materials processing methods. There are two

main areas that are actively developing at the moment: Building structures as art and enclosing constructions as art.

6.1. Building constructions as art

6.1.1. The self-bearing framework

The development of construction technologies of the last time allowed to significantly expand the visual capabilities of architectural objects, allowing to join on their surface ornament and architectural designs. Such projects as: O-14 Tower Dubai; New L'Oreal Office Building; King Abdullah Petroleum Research Centre in Riyadh; King Abdullah Financial District Metro Station, Riyadh, Saudi Arabia; Sleuk Rith Institute, Phnom Penh, Cambodia et al. (Fig.1 – 6)

Fig.1. O-14 Tower Dubai. Design by RUR Architecture. Source: Fot. Nelson Garrido
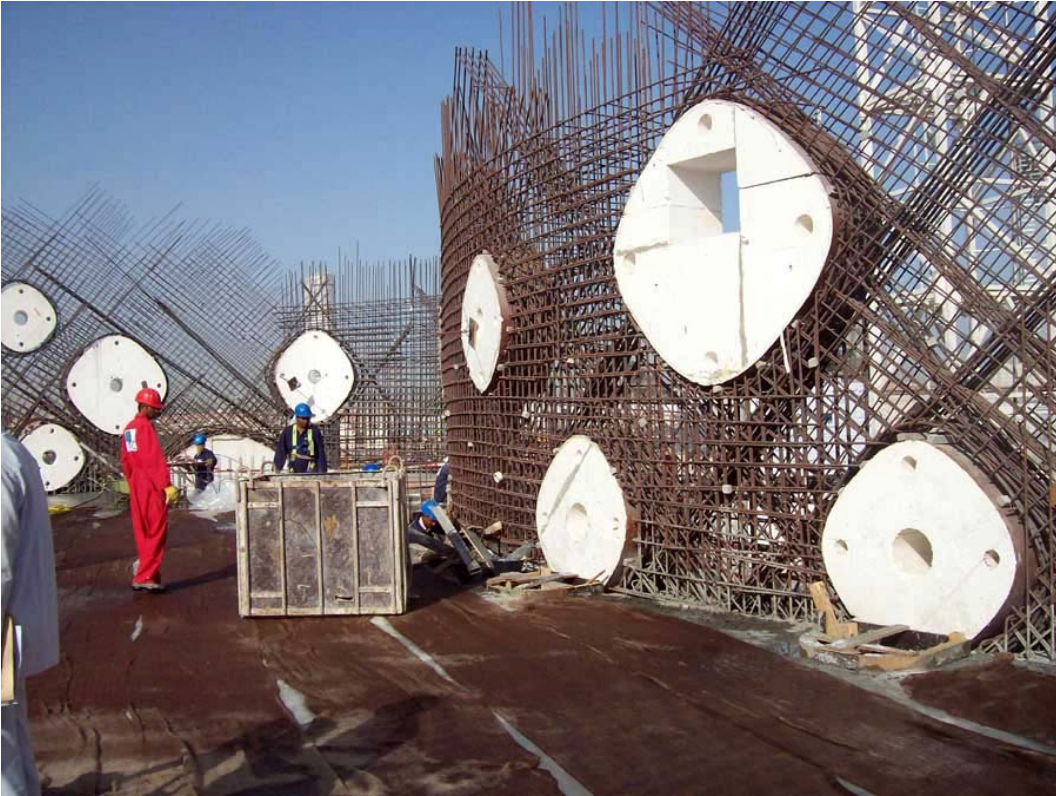
Fig.2. O-14 Tower Dubai. Design by RUR Architecture. Source: Fot. Nelson Garrido

Fig.3 The L'oreal. Architects: IAMZ Design Studio. Source: Fot. IAMZ Design Studio

Fig.4. The King Abdullah Petroleum Research Centre in Riyadh. Architects: Zaha Hadid. Source: Fot. Zaha Hadid

Fig.5. The King Abdullah Financial District Metro Station. Architects: Zaha Hadid. Source: Fot. Zaha Hadid

Fig.6. The Sleuk Rith Institute, Phnom Penh, Cambodia. Architects: Zaha Hadid. Source: Fot. Zaha Hadid

Mentioned earlier concepts of famous masters and constructed facilities demonstrate how much the technical and plastic range of architecture has expanded recently.

6.1.2. Fencing structures as art

At present, we observe the development of the practice of combining innovative enclosing structures with ornamental art. In this case, there is a combination of millennial traditions with new technical capabilities. For example: The Orange Cube; Liverpool Insurgentes Department Store; The Filigrane Project in Tourcoing, France; Lumina Building et al. (Fig.7 – 8)

Fig.7. The Liverpool Insurgentes Department Store. Architects: Rojkind Arquitectos. Source: Fot. James Florio

Fig.8. The Filigrane Project in Tourcoing, France. Architects: D'HOUNDT + BAJART architects & associates
Source: Fot. Maxime Delvaux

6.2. The imaginative and artistic potential of innovative technologies for 3D prototyping in architecture

The development of digital means of material processing created the prerequisites for the revival of traditional values in architecture. Innovations make it possible to accelerate and cheaper the production of architectural decor and complex artistic elements tenfold. There are already successful experiments on the use of 3D prototyping in architecture. But in this context there is a desire to turn to Ecclesiastes:

"All things are in labor: a person can not retell everything; The eye will not be satisfied with sight, the ear will not be full of hearing. What was, it will be; and what was done, it will be done, and there is nothing new under the sun. There is something about which they say: "Look, this is new"; but it was already in the centuries that were before us. "

With all the variety of 3D technologies, the base remains unchanged, such as it was thousands of years ago - it's either the art of removing the extra, or adding the missing (as Michelangelo said about the sculpture).

6.2.1. 2D and 3D material processing technologies

a) Cutting plotters. (Fig.9)
b) Sand blasting.
c) Etching (Fig.10).
d) Digital milling machines. (Fig.11)
e) Engraving machines. (Fig.12)
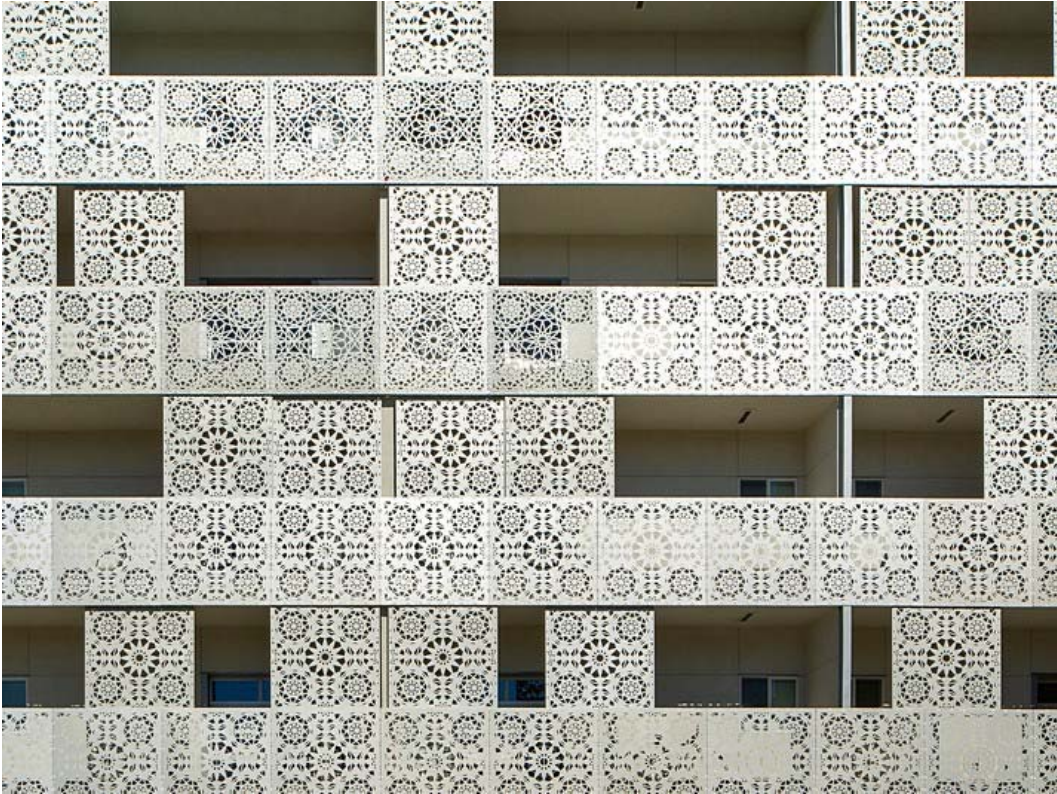f) Laser engravers. (Fig.13)

Fig. 9. The Lumina Building. Architects: Tres Birds Workshop. Source: Fot. James Florio

Fig.10. St. Pauls School for Girls. London, UK. Design: Derix Glasstudios Taunusstein. Source: Fot. Derix Glasstudios Taunusstein

Fig.11. The 8 axis robot Duchesne Lac-Mégantic. Source: Fot. Duchesne Lac-Mégantic Inc

Fig.12. Engraved metal panels, manufactured by: N.V.Metal. Source: Fot. N. V.Metal
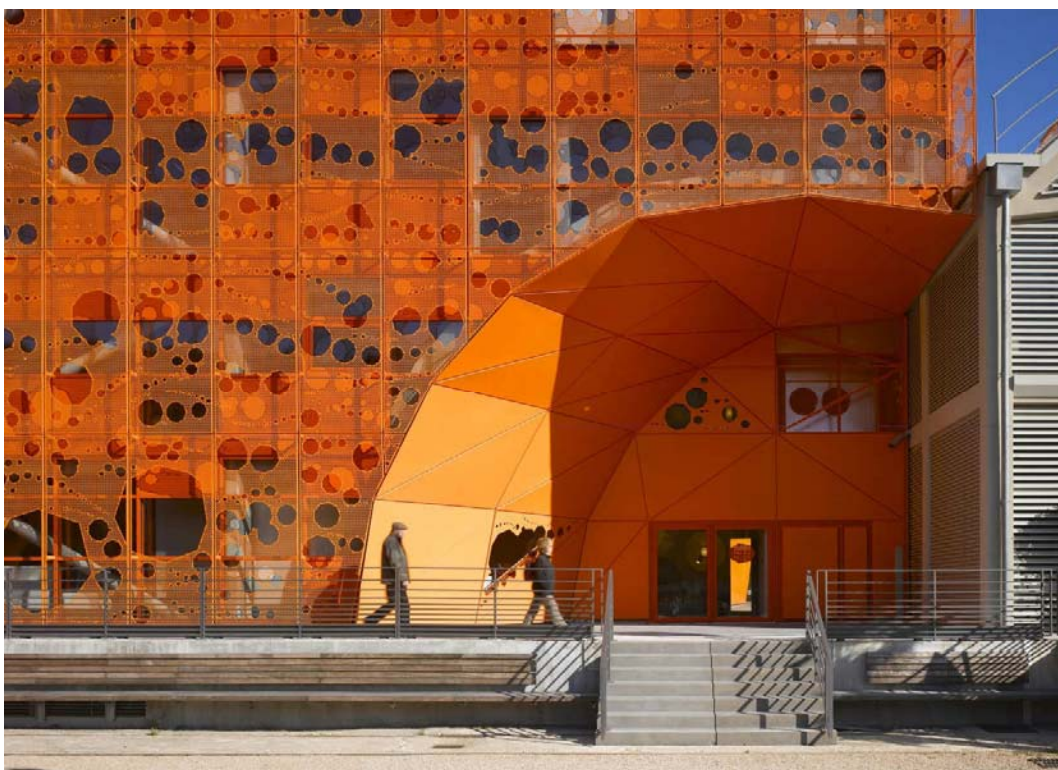
Fig.13. The Orange Cube. Architects: Jakob + Macfarlane Architects. Source: Fot. Roland Halbe

6.2.1. 2D and 3D art to add the missing

a) 2D printers. UV printing. (Fig.14 -15)
b) 3D printers. (Fig.16)
At the moment, printers are being used in the architecture to print with a variety of materials such as concrete, ceramic mixture, metal, glass, plastic, wood, etc.

Fig. 14. The AFIMall City in Moscow. Architects: «Mosproject -2». Source: Fot. JYC GLASS Co

Fig.15. The Carmel Academic Campus, Israel. Architects: Knafo Klimor Architects. Source: Fot. JYC GLASS Co

Fig. 16. Printing a house on a 3D printer. Stupino. Russia. Manufacturers: Apis Cor. Source: Fot. Apis Cor

7. CONCLUSIONS

Having come to understand the physiological needs of a person in the visual informative nature of the environment, it is difficult not to assess the prospects that open up to architects with the development of three-dimensional production technologies. Printing clay, metal and concrete 3D carving on wood, metal, and stone, media facades - all these are dynamically developing prerequisites for the return of the synthesis of arts in architecture.

Here it is necessary to give a relevant analogy: how digital technologies have changed the architecture of modernity so it can be changed by means of 3D prototyping. These expectations are based on the above studies on the features of human perception of the architectural form. The first attempts to return the synthesis of arts already exist. Thanks to new building materials and technologies, the expression of architectural constructions considerably.

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