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**PECULIARITIES OF LIGHT FUNCTIONING IN MODERN
GREEK CATHOLIC CHURCHES OF UKRAINE**

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Abstract. In each historical period, light played an important mystical role in the creation of the sacred space of the temple, and was and is an integral part of religious ritual. Light is an architectural phenomenon, the formative and communicative element of the spatial structure of the temple, the most important factor in the perception of space and layout of the temple. The subject of the analysis contained in the article is the light environment in the space of modern churches of Ukraine. An analysis of the functions of light in churches is made on the example of recently built iconic Greek Catholic temples. The peculiarities of the distribution of natural and artificial light in the space of modern churches, the similarities and differences in the organization of the light environment, as compared to the historical temples, have been revealed. The influence of the light on the architectonics of temples and the visual perception of their object environment, on the formation of the corresponding mystical mood and sacred atmosphere is defined. The values and functions of electric lighting in the structure of the light environment of the temple, the directions of development of electric lighting systems due to the expansion of their utilitarian and decorative functions are determined.

Key words: light, sacred space, modern church architecture, sacrum, tradition

Introduction, problem analysis

Light is a symbol of the presence of God in the space of the temple, an attribute of the liturgy, part of a religious ritual. It is an integral part of the architectural image of the temple, in which it is actively involved. Light is a part of the codification and interpretation of the tradition of the Eastern Church, through it manifest in the architecture of a temple with the use of symbols, archetypes and canons. Light is an architectural phenomenon, a form-shaping and communicating element of the spatial structure of a temple, the most important factor in the perception of the space and layout of the temple. The space of the religious core of a temple is created by inseparable integrity – the “coherence” of form, light, colours, and the exterior form of the temple organically created through

the logic of the development of the interior space. The architecture of the Eastern Church is the architecture of the light (Yatsiv, 2017).

Analysis of recent research and publication

The problem of shaping the light environment of modern churches in Ukraine has not yet become the subject of fundamental research. Some aspects of the role of light in the formation of church architecture and the perception of the interior space of the temple are highlighted in separate studies by domestic authors (Proskuriakov, 2005; Dyda, 2017) and several Polish researchers (Siwek, 2005; Malinowska-Petelenz, 2017; Węclawowicz-Gyurkovich, 2017; Janisio-Pawłowska, 2017; Górczewska, 2016).

Basic theory part

This article is a synthesis of the author's theoretical and experimental research into the functioning of natural and artificial (electric) light in the sacred space of new Greek Catholic temples in Ukraine.

Through the entire period of the development of traditional sacral architecture in Ukraine, the architectural and spiritual organization of the lighting environment of temples has been subject to the following requirements and principles: the priority of religious and liturgical function over aesthetic and utilitarian ones in the model of the shaping of the lighting environment of the church; the dominance of upper natural light; the hierarchic order of natural and artificial light, following the symbolic hierarchy of the space of a temple; the equivalence of direct and reflected light; the minimum sufficient of light within the space of a temple and the semantic correlation of the religious, lighting environment and its spatial form-shaping elements.

The principles of architectural and spiritual organization of the lighting environment of the Christian church of the Eastern rite remained unchanged in the history of architecture of the Orthodox and Greek Catholic churches in Ukraine. These principles should remain an integral part of both the architect's overall creative concepts and the temple design process. The principles and methods of organizing the lighting environment of a Christian Eastern Rite temple, the genesis and evolution of religious symbolism, as well as architectural forms – are genetically linked with light – especially natural light. The lighting environment, together with different categories of symbols and archetypes, needs to be participated as a method of transmitting traditions within the Ukrainian church, as a criterion of the values of its architectural and spatial organization. The significance of light in the space of traditional Orthodox and Greek Catholic temples is the same. The slight differences in the decoration of the temple, the liturgy and the rites do not significantly affect the organization of light in the temples.

The architectural and spiritual organization of the lighting environment of a Ukrainian temple should not go far away from historical and cultural tradition, which is treated as a methodological and theological postulate.

Natural light in the space of modern temples. Let us consider the peculiarities of the functioning of light and the formation of light environment of modern church buildings in Ukraine, on the example of some temples of Kyiv and Lviv.



Fig. 1. Facade (a) and interior (b) of the Church of St. Basil the Great in Kyiv [1]

Church of St. Basil the Great in Kyiv, 2003. In the architectural image of the temple, the search for a new temple synthesis felt like a combination of an artistic concept connected with the creative development of the past and the breakthrough to new technologies, modern building materials the latest expressiveness of the architectural form. Sufficiently successful is the unconventional geometry of the building and the development of dramatic interior space diagonally from the entrance to the altar. Outside, the temple is endowed with laconic, slightly simplified forms. However, the spatial shape of the towers loses its function of domination in the interior space of the temple, acquiring only sign and decorative content, so that the sacral vector shifted from the vertical axis, which is characteristic of Ukrainian churches, to the horizontal. Such tectonics of the temple and the desire to create an interior space without columns demanded a rigid spatial structural solution, which led to the appearance in his space of “rough” bearing reinforced concrete structures of the coating.

The natural light system generates a multi-vector of light that enters the interior space through all the light openings. This creates some visual discomfort due to the high brightness of the surfaces perceived by the peripheral vision. The temple has a lot of sunlight and reflected light from light surfaces (Fig. 1). The abundance of light in the church emphasizes festivity however, has the opposite effect: high contrast of light from windows and bright surfaces can cause visual fatigue, partial blinding when exposed to direct sunlight. Spots of sunlight on the walls impair the perception of iconography. Excessive illumination does not contribute to the formation of the sacred space of the temple. In the article about the differences of the Christian temple of the Eastern rite, Ivan Muzychka states: “...it has an atmosphere of sacred, spiritual, secret... Eastern worship will be manifest in an atmosphere of sacrament incomprehensible and unknown” (Muzychka, 1999). Excessive illumination of spaces and surfaces leads to a number of undesirable phenomena: high brightness in the field of view, partial blinding, visual discomfort and the like.

Some “inaccuracies” in the visual picture of the temple draw attention. Through the upper windows of the temple we see the adjacent buildings, and through the window in the altar – a pillar. The sense of sacredness, seclusion, isolation from reality, mystical mood, which has always been the most characteristic feature of the inner space of churches in Ukraine, is lost.

Church of the Nativity of the Blessed Virgin Mary in Lviv. Among the new temples of Lviv, which have been built during the years of Ukraine’s independence, stands out for its architecture the Church of the Nativity Virgin Mary of the UGCC (1997–2001). With its expressive pyramidal silhouette, the harmony of regular rectangular prisms, general restraint and asceticism in spatial means, the church is the best achievement of the modern church architecture of Lviv (Cherkes, 2009).



Fig. 2. Facade (a) and an interior (b) of the Church of the Nativity of the Blessed Virgin Mary in Lviv [II]

The daylight of the temple was ensured through narrow rectangular windows in the rectangular prisms and the walls of the temple. The illumination in the horizontal plane (at eye level), which is created by light fluxes that penetrate through all windows, gradually increases from the entrance to the altar, where it reaches its maximum. A slight increase in the illumination in the horizontal plane was also observed in the space under the domes, where the light coming from the windows under the domes added to the light from the windows in the walls. The intense increase in the illumination of the wall surfaces from the bottom up can be seen only on the vertical surfaces of the walls on which the domes rest. In the space of the temple, the principle of domination of the upper light is obtained in the absence of visual communication with the external environment. The architect also used the traditional method of “visual detachment” of the icon of the Savior Almighty from overlapping in the central dome due to the use of a light ring under the dome. The perception of the upper tier of the temple is exacerbated by the change in illumination on the flat ceilings adjacent to the bright wall surfaces of the prisms and the light stripes in the places where the side walls adjoin the flat ceiling (Fig. 2). On sunny days, visitors to the temple, whose eyes are directed toward the altar, may experience visual discomfort from the bright windows of the lower tier in the eastern wall of the temple.

The Patriarchal Cathedral of the Resurrection in Kyiv. The decoration of the exterior, interior surfaces and structural elements of the cathedral, as well as the throne, altar, bishop's throne, made only in white, symbolizing the unearthly light of the most important evangelical event to which the temple is dedicated, the light of the Resurrection of Christ. This character of surface decoration significantly affects the overall illumination of the temple, increasing the proportion of reflected light in its space. The same brightness of the surfaces in all directions contributes to the visual expansion of the central part of the temple. The huge interior space of the temple was created thanks to a bold design of the dome, built without supporting structures. It seems that it is supported by an invisible celestial power, and the dome becomes a symbol of Heaven on earth. Light streams are concentrated in the centre of the temple, due to the windows at the base of the dome and the large lantern at its top. Such distribution of illumination of space and brightness of surfaces visually and mentally displaces the sacral centre of the temple towards its geometrical centre, a place of “domination” of the vertical axis. The altar space, compared to modern Catholic temples, is dimly lit, mainly by streams of reflected light, as well as by the lateral windows around the perimeter of the church. The windows in the walls of the altar space, raised high above the floor, give little light except for the larger central window (Fig. 3).



Fig. 3. Facade (a) and interior (b) of the Patriarchal Cathedral of the Resurrection in Kyiv [III]

The given examples of modern church architecture in Ukraine, testify to the gradual transition from retro-styles, which have spontaneously developed in the last quarter of a century in the work of Ukrainian architects, to the search for modern sacral architecture and rethinking the whole arsenal of professional means. There is an active search for the new architectonics of the temple and new principles and methods of its interior illumination with natural light.

The unconventional solutions of modern shrines sometimes significantly change the nature of the spread of light in their space. According to the results of the study, we can point out some differences in the organization of the light environment of modern temples in Ukraine, in comparison with traditional churches:

1. The lack of understanding by modern architects of the importance of light in the formation of the sacred space of the temple has led to the over-saturation of its interior space with natural light, too high levels of illumination of surfaces and bright contrasts in view. The excess of light and its unmanageable dynamics do not approach, but rather distract the faithful from prayer and liturgy.

2. The window in the traditional temple of the Eastern ritual was identical to light. In the modern Ukrainian church, the window is mostly a composite element of the church architecture. The large glass surfaces of church buildings in emotional and formal aspects bring them closer to secular buildings.

3. The high intensity of lateral illumination in the lower tier of the temple leads to the devaluation of the sacred symbolism of the upper light, destroys the hierarchy (traditional unevenness) of light distribution in the temple space, diminishes the symbolic value of the dome. The light in some of the new temples carries more functionally realistic than emotional and mystical load.

4. The high intensity of direct daylight reduces the symbolic significance of reflected light from the interior surfaces and the light of traditional artificial sources (lamps, candles), and the high brightness of the windows impairs the visual perception of the elements of the interior space and decoration.

Artificial light in the modern Church. Candles and oil lamps were and remain the sources of artificial light in historical churches of Ukraine. They have deep symbolic meaning but are not effective for the general lighting of the temple. The low brightness of the candle flame allows you to painlessly observe them and place them in front of cult images. The constant flickering of the candle flame and the glare of light on the frescoes, the gilded surfaces of the mosaics create the feeling of the “living presence of God” in the space of the temple.

In churches, candles in traditional lamps are replaced with electric lamps. Luminous fluxes from a large number of lamps significantly increase the overall lighting of the interior, changing the hierarchy of light distribution, the contrast of lighting. The widespread introduction of electric lighting into the sacred space of the church creates some problems in the organization of artificial lighting. Problems associated with objective circumstances – a change in the assessment of internal architecture and iconography, due to a significant increase in general lighting, and purely subjective – the need to avoid high levels of lighting to maintain the mystical nature of the interior of the temple.

In the Greek Catholic churches that we analyzed earlier, electric lighting is no longer traditional, but its role is limited by the utilitarian function. Lamps (sconces), evenly distributed around the perimeter of the inner walls, and large chandeliers scatter light in all directions, creating uniform illumination on the surfaces and in the space of the temple. Such a lighting system does not meet the lighting requirements of modern temples. In European churches, electric light sources are used not only for utilitarian lighting. They actively influence the creation of a new light image of a temple. Modern lighting systems make it possible to obtain lighting effects, not by chance, but thanks to the needs and functions of the church. Lighting design must be a balance between the nature of the church as a place of worship and as works of architecture and sacred art. A good lighting solution is to use a large number of lamps with the appropriate technical and photometric parameters, which can give a unique character to special church ceremonies⁸.

We can very likely predict that the electric lighting systems in the sacred places of the temples of the future will be improved with the development of lighting technologies and with the search for design solutions in the organization of temple lighting. Most likely, the dominant method of electric lighting will be not stable, but dynamic lighting, which will be subordinate to the type of worship and help to focus the attention of temple visitors on important points of worship.

Lighting technologies soon will allow creating almost unlimited possibilities of saturation of interior space of any temple by light phenomena, surface and spatial images, in particular by creating light projections of religious subjects on wall surfaces using projection technologies. The use of modern methods of electric lighting 3D video “mapping” technologies, light installations, holographic images, etc. This may seem incredible, especially in the tradition of the Eastern Church. However, it is worth reflecting on the words of the famous Russian sacred art researcher A. Lidov: “...the closest tradition of church art seems to be exhausted; it ceases to meet the needs of modern man. I am convinced that the future of sacred art and temple architecture is to create an iconic image through modern multimedia installations” (Lidov, 2007). The visitor of the temple should feel in the space not earthly and not heavenly, in the space of the mediator. The temple exists for this, and to recreate such a space, it is necessary to use all means: rite and architecture, and images, and light dramaturgy (Lidov, 2008). Light of electrical sources will play a significant role in this process.

Conclusions

At all times, light in the space of the church has been and will remain not only a visual factor but also an effective creator of its sacred space and architectonics. In the interior of modern temples, the light remains perhaps the least understood medium of its mystical and theological content. The organization of natural lighting of contemporary Greek Catholic temples in Ukraine generally preserves the nature of the lighting of traditional churches. The space of temples is dominated by the direct and reflected upper light coming from domes and windows raised high above the floor. Despite the significant increase in general illumination, the hierarchy of brightness distribution remains in the interior of the temples: the increase of illumination from the walls to the centre of the temple, and accordingly from the floor to the vaults and domes. Well-designed electric lighting for the modern sacred buildings must match the requirements of the liturgy, the comfort of vision and the need appropriately to reflect the symbolic and aesthetic values of the

sacral interiors. Modern lighting solutions make it possible to achieve this goal. Properly selected and appropriately positioned light sources can achieve a new light image of the temple.

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Source of illustrations:

- [I] <http://pilgrimage.in.ua/hram-i-monastyr-svyatoho-vasyliya-velykoho-ottiv-vasyliyan-u-kyjevi/>
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ОСОБЛИВОСТІ ФУНКЦІОНУВАННЯ СВІТЛА У СУЧАСНИХ ГРЕКО-КАТОЛИЦЬКИХ ХРАМАХ В УКРАЇНІ

Анотація. У кожен історичний період світло, як природне, так і штучне, відіграло важливу роль у створенні священного простору храму, атмосфери містики і зосередженості, було і залишається невід'ємною частиною релігійного ритуалу. Водночас світло як явище архітектонічне – формотворний елемент просторової структури християнського храму, найважливіший чинник сприйняття його простору та іконографії.

Предметом аналізу, що міститься у статті, є світлове середовище у просторі сучасних греко-католицьких церков. Аналіз функцій світла в церквах зроблено на прикладі нещодавно побудованих знакових храмів в Україні, що належать УГКЦ. Виявлено особливості розподілу природного та штучного світла у просторі сучасних церков, подібності та відмінності в організації світлового середовища порівняно з історичними храмами. Визначено істотний вплив світла, насамперед природного, на образ та архітектуру храмів, візуальне сприйняття їхнього середовища, на формування відповідного містичного настрою та сакральної атмосфери у його головному просторі. Встановлено, що незважаючи на значне збільшення загального освітлення, ієрархія розподілу яскравості зберігається у внутрішній частині храмів: збільшується загальна освітленість від стін до центру храму, і відповідно, від підлоги до склепін та піднебін куполів.

Встановлено значення та функції електричного освітлення в структурі світлового середовища сучасного храму, напрямки розвитку систем електричного освітлення завдяки розширення їх утилітарних та декоративних функцій. Визначено, що продумане електричне освітлення для сучасних сакральних будівель повинно відповідати вимогам літургії, комфорту зору та необхідності належно відображати символічні й естетичні цінності сакральних інтер'єрів. Сучасні освітлювальні рішення дають змогу досягти цієї важливої мети. Правильно дібрані та належно розташовані джерела світла можуть створити абсолютно новий світловий образ храму.

Ключові слова: світло, сакральний простір, сучасна церковна архітектура, традиція, УГКЦ.