Illumination of the contemporary architectural facilities
and buildings

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In the article, using as an example the Collegium Novum building in Poznań, there has been described selected problems connected with the illumination of modern architectonic facilities and building. In many cases, the author or designer of the building project has significant influence on selecting the final solution for the façade illumination. There has been indicated the significant role of the computer visualization of the artistic effects. The visualization shows possible to obtain effects, dependently on applied technical illumination solutions. The effects depend on selected illumination method, selected illumination equipment as well as on the luminaires assembling methods. The comparison of various visualization versions facilitates taking the final decision for choosing the execution.

KEYWORDS: outdoor lighting, illumination, lamps and luminaires selection, computer visualization

1. Introduction

In the night panorama of the modern cities, dominates the street illumination and the intense lighting of the shopping centers, office buildings, advertising, etc. In this situation, the not illuminated buildings hide or disappear in the darkness.

The important role of the illumination lighting of the architectonic facilities and building as well as urban groups of buildings is to recall or reappear, with use of the light, their view the same as the one recognized from the daytime street view or city panorama [1, 2].

The appropriately selected light, by showing interesting facilities and buildings, influences mood, influences subconscious which create as a result the memorized and kept in mind night view of the illuminated single building or city.

The elaboration of the illumination project is connected with the necessity of valuating a number of conditions influencing the final considered technical solution. Generally speaking, this task includes evaluation of: artistic and esthetic aspects, emotional aspects, technical and economic aspects, building maintenance and preservation aspects as well as building author or designer copyrights.
The artistic and esthetic as well as emotional criteria are related mainly to the analysis of the prospective of the facilities and buildings view or panorama, their historical or architectonic value and importance as well as attractiveness of various details. In many cases, there must also be considered the emotional relation of the inhabitants with the facility or building. The night illumination light performs the role of the information factor about the illuminated facility or building importance and standing.

The view of the not illuminated facilities or buildings causes very often the negative impression. In the urban agglomerations, illumination lighting becomes also the buildings protection measure that is very important for protecting them against graffiti attempts on the façade.

The technical and economic criteria are related to the appropriate light sources and luminaires selection, their positioning and assembling method, power supply and remote control. The modern lighting technique offers the special type luminaires providing energy saving and durable light sources. Therefore, the facilities and buildings illumination operation is not expensive and can perform its functions without the necessity of saving. It allows applying for the illumination the stronger and concentrated light to better show and distinguish the building and its details. In this way, there is very often created the interesting and intriguing building view, memorized therefore permanently.

The strong and appropriately concentrated lighting is the essential element of the undertaken night illumination project because the modern cities night panorama has been dominated by very bright street illumination and very bright shop windows.

The street lamps light and shop windows light is visible in many directions as the glaring light. It is very often the luminance of the light sources themselves. Therefore, in this situation, the building illumination should be as much intense as to become prevalent over the environment or surrounding lighting, to win the competition.

In reference to the modern facilities and buildings, in case the authors or designers are still alive, it is necessary to take into consideration their decisions that generally mean to maintain the coherence between the building night and daytime view, including the building relation with its environment or surrounding. In such cases, applying additional decorative effects should only consist in the occasional lighting during some festivities or occasional events.

In the illumination designing practice, there is applied the flood method, spot method or both methods mixed together [3, 4]. Each of the methods is connected with different executive conditions.

In the flood method (Fig. 1.), there is applied relatively small number of the high power luminaires. This method is suitable for illuminating buildings of large dimensions that are seen from the long distance.
In the spot method (Fig. 2), there are applied more pieces of the low power luminaires. The small light sources allow obtaining good luminaires optics as well as allow the luminaires assembling directly on the buildings facade.

This method of the illumination execution does not require conducting cable installation outside the building and provides more freedom in the light and shadow control.
The spot application, that uses the luminaires assembled on the façade, has however some limits. The architectonic details lighting from “the bottom” creates strong shadows over the horizontal elements and shows too much the façade vertical lines or vertical system. It often distorts the building shape perception as a whole.

The starting point, when preparing whichever illumination of the building, is the site seeing of the close and distant environment and surrounding of the building, for the purpose of:
- determining the view prospective of the building as a whole and its various parts,
- specifying fragments or elements worth particular showing or exhibiting,
- specifying colors and texture of the illuminated surfaces,
- determining places/ positions from which it is possible to illuminate the building,
- evaluating various limiting conditions,
- evaluating brightness of the illuminated building environment or surrounding.

After mentioned above preliminary stages, there can be elaborated the artistic concept of the illumination and successively its executive project consisting in the appropriate selection of the suitable luminaires and light sources as well as their appropriate positioning and light directing and moreover preparing variant programmes of switching ON and OFF the lighting illumination system.

2. Collegium Novum UAM buildings

The Collegium Novum UAM buildings have been designed and erected in the sixties of the XXth century and are located at the area limited with the following streets: Kościuski, Powstańców Wlkp. and Al. Niepodległości.

The most exposed building in this group of buildings is the one as presented on the Figure 3, which is visible very well in the prospective of Al. Niepodległości street and in the prospective of the park which is located on the opposite side.

There can be expected that the illumination of this building shall become a part of the attractive buildings sequence continuing from the Adam Mickiewicz square to the Old Brewery. Moreover, the building illumination will be closing the prospective from the park side where trees have not been illuminated.

In the selection of the Collegium Novum buildings illumination method, there should be considered the particular need of exposing as a whole the interesting architectonic façade expression of longitudinal buildings with the repeatable rhythm of various vertical and horizontal details.
3. **Computer visualization of the building illumination**

The computer visualization of the building illumination consists in realistic reconstruction of the building shape and body in the computer virtual space. There are many programmes allowing creating 3D graphics. For the visualization purposes, there are particularly applied renders because they generate three dimensional picture and allow applying on it textures and light effects [3]. The examples of such programmes are 3D Studio Max, Light Wave 3D and 3D VIZ.

The visualization can also be designed with use of technically advanced programmes for the illumination designing such as Relux Professional and DIALux.

The visualization of the Collegium Novum in Poznań, being the example of the modern architectonic building, has been created in 3ds Max programme.

The work on the computer visualization has been started, starting from modeling the building geometry, on the basis of the architectonic planes and photos of the building. After have created the geometric model, there has been determined the appearance of the surface through the appropriate selection of the parameters such as color, saturation and reflection coefficient, presented on Figure 4. Values of the mentioned parameters influenced the final visual effect of the building façade.
The next stage of the computer visualization of the illumination artistic effects consisted in applying the light distribution and the appropriate positioning or distribution of the luminaires, selected by the author or designer of the illumination concept. There have been created the computer visualizations of individual lighting variants to facilitate taking the decision concerning the final execution.

The building illumination with use of the luminaires assembled directly on the façade, the visualization of which has been presented on Figure 5, does not assure obtaining the expected result because the building shape and body is “cut” by intense, vertical light smudges or spots. While at the same time, the window recesses remain hidden completely in the shadow.

Taking into consideration small distance of the luminaires from the façade, it is impossible to illuminate the higher or top floors of the buildings.

In the visual perception of this variant, there have been dominating the excessively intense lighting effects, however the building shape and body, as a whole, have not been shown.

This illumination method would be suitable for the buildings requiring the height reduction with use of the illumination. Applying this solution for the Collegium Novum building would be inappropriate.

Moving the luminaires away from the façade, by applying extension arms, for obtaining the uniform level of the façade illumination, is impossible from the esthetic point of view. For this reason it seems more convenient to resolve the illumination with use of the luminaires assembled into the ground, having the appropriate distribution of the luminous flux.
In the visualizations of the lighting effects obtained for the selected illumination system, i.e. for the solution using the luminaires put into the ground, there have been compared variants applying the luminaires of various luminous flux distributions.

The variant presented on Figure 6, has been executed with use of the luminaires of the asymmetric distribution but has not met expectations because the higher or top floors of the building have not been sufficiently illuminated. The correction of positioning by moving the luminaires away from the building façade has not been possible because of trees growing nearby the building, which are visible on Figure 3.

The variant presented on Figure 7, with application of the asymmetric distribution luminaires, has been considered the most suitable, the most uniformly illuminating the building façade. Moreover, this illumination has been given the approval from the author or designer of the building.

Architect Zygmunt Skupniewicz has been especially interested in obtaining the building shape and body coherent perception as a whole. Finally, this solution has been implemented and presently the buildings A and B of the Collegium Novum are illuminated. The obtained results have been shown on Figures 8 and 9.
Fig. 6. The computer visualization of the Collegium Novum building illumination with use of the luminaires assembled into the ground – the asymmetric light distribution variant

Fig. 7. The computer visualization of the Collegium Novum building illumination with use of the luminaires assembled into the ground – the symmetric light distribution variant
4. Conclusions

The function of the illumination lighting should be catching the attention and creating the attractive view of the illuminated buildings in the night.

In the presented example, there has been selected the illumination method on the basis of the computer visualization variants. This method of procedure has
been applied in case of the modern architectonic building for which the day time perception dominates the building shape and body as a whole and not details.

The obtained lighting effect is satisfactory which indicates purposefulness of using the modern computer supported methods of the illumination designing.

The visualization variants of the lighting effects facilitate the decision both, by the illumination designer as well as by the architect, the author or designer of the building.

References


