

LIGHT IN THE MUSEUM: EXPERIENCES AND CHALLENGES

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ABSTRACT

The article is focused on the peculiarities of the lighting in the museum halls, restoration workshops, depositories, the operation of lighting equipment, and the organization of exhibition lighting in the halls of the State Tretyakov Gallery. Initial focus areas in the development of technical specifications for accent lighting equipment have been outlined. The information may be useful to the staff of museums, galleries, etc. engaged in the exhibition activities.

Keywords: light, accent lighting, museum pieces, illuminance/illumination, light resistance

“For an artist or a craftsman, the light is both a blessing and a curse – it is inseparable from the beauty of art, but can physically or chemically do harm,” Thomas Brill wrote in his book [1].

This dilemma is a cornerstone in museums, galleries, and everywhere where they store and display collections of any genre and content: artistic, local history, zoological, botanical, decorative and applied art, etc. It is necessary to simultaneously show the collection in the most spectacular representation and to protect the exhibited items from harmful light exposure.

Light in the museum or museum light, lighting of museum spaces: no matter how you call this specific area of lighting engineering, which emerged when the humans began to gather for the descendants the collections of artistic values and artefacts of scientific and research thought of the era. Castles, palaces, public rooms, temples, and universities were adapted for the arrangement of collec-

tions. The collections were placed, but how to make the items visible, and at the same time, to protect the collection from light, humidity, fungus, and another adverse impact? Initially, the visit to the Kunstkameras took place mainly in daylight, but over time, the collections became public, and the opening hours of the museums increased, the need for artificial lighting appeared.

In the world there are many museums, galleries, salons, exhibition halls on the one hand, depositories of the items that make up the collections, on the other hand, and restoration workshops, laboratories, conservation service, and many others ensuring the proper condition and preservation of museum pieces and enabling them to be examined by third parties. All this represents the functionality of the museum living organism. The custodians and the researchers develop and prepare the topics of exhibition projects, the restorers prepare museum pieces for the exhibition halls, and the designers architect the exhibition space. The exhibited items are arranged at their places and, unfortunately, most often, only at this stage, the lighting engineers (lighting designers) are invited to create a beautiful and spectacular light atmosphere at the exhibition area.

The responsibility of a lighting engineer is that he makes the final touch before the vernissage. The fineness of the exhibition depends on the lighting installation. Any exhibition can be best remembered by the visitors or can create little stir. It is not only about the uniqueness of the presented items, but also about how they are presented to the audience. Light is the key aspect affecting the perception of the exhibition as a whole.



Fig. 1. Setting accent lighting in the hall of the Tretyakov Gallery

A lighting engineer is required to create interesting light images with an aesthetic, emotional, and psychological impact on the viewer and to ensure the safety of the exhibited items from the influence of the visible part of the spectrum, ultraviolet, and infrared radiation (Fig. 1).

Each museum piece presented in the exhibition hall: flat, volumetric, monochromatic, polychromatic, with a diverse texture of the surface should obtain the proper lighting, directly dependent on the properties of its material.

The lighting of exhibition halls consists of two main components: general (working) lighting and accent lighting. General (working) lighting can include the combined lighting consisting of daylighting and artificial lighting (Fig. 2), or only daylighting or artificial lighting.

Accent lighting is selected after the exhibition space has been assigned: for a permanent exhibition or for a temporary thematic exhibition. Depending on this, various ways of accent lighting are used to ensure good visibility and preservation of museum pieces.

In the last few years, in the regulation of light characteristics in museums, galleries, and utility rooms (depositories, restoration workshops, etc.)



a)



b)

Fig. 2. a) General artificial lighting of Hall No. 35 of the 1st floor, light background; b) general combined (day + artificial) lighting of Hall No. 17 of the 2nd floor, light background

there is no legal framework in Russia, as the Appendix B of the GOST 8.586–2001 [2] was cancelled in 2016, and there were only recommendations of the State Research Institute on museum storage [3], which require significant modification. Often, during temporary exhibitions the requirements for the preservation of museum pieces are reduced, the light resistance groups are not taken into account. In pursuit of shine, light, and efficacy, the exhibited items during short-term exhibitions gain greater irradiance, which could gain a long



Fig. 3. Hall of Graphics. Illuminance of exhibited items at a height of 1.6 m due to accent lighting is 60 lx

time being permanently exhibited with lower illuminance levels.

The permanent exhibition of museum pieces in the halls is the representation of identical and equivalent items having equal rights to attract public attention, and the exhibition should not, due to a large amount of information, tire the audience viewing the gallery. Therefore, in the permanent exhibition halls of art museums the accent lighting should be used very carefully and unobtrusively (Fig. 3), so as not to exceed the theatricality of the exhibition (Fig. 4), not to distract the attention of visitors with light effects influencing the emotional state and mood of the audience. Additional accent lighting in such cases may add extra irradiance to the exhibited items, which may worsen the preservation of museum pieces (Fig. 5).

The temporary exhibition is a representation of items united by one concept or idea, which creates a significant impression and has an emotional impact on the visitors of the exhibition.

The other extreme in the light design of exhibitions is the use of accent lighting only without general uniform lighting, and this exhibition lighting technique provides powerful lighting and psychological effects. The use of this lighting technique, in any case, for an art museum with a large collection placed in the permanent exhibition, is questionable. The viewers get tired of the intense visual



Fig. 4. The alternation of “light and dark areas” in the halls of temporary exhibitions creates the effect of “theatricality” of the exhibition space

work on the combination of “dark background – light object” (Fig. 6). The visitors should be at a close distance from the exhibited items to scrutinize the details of medium and small size paintings or the items of small size, while the visitors in the front row obstruct the view to those standing behind. The advantage of this lighting technique is that due to the “contrast effect” it is possible to reduce the illuminance level of the exhibited items.

In the market of the spotlights for accent lighting, there is a large number of lighting equipment of Russian and foreign production. In the Tretyakov Gallery after the opening of the Engineering Building and the Major Building in Lavrushinsky Lane after reconstruction, as well as in the halls of New Tretyakovka on the Krymsky Embankment, a large number of luminaires of different manufacturers are used, each having its own advantages and disadvantages. Over a long time of their operation, a lot of experience has been gained in installing the spotlights on the busbars fixed on the ceilings of exhibition halls and other structures.

The recommendations for museum staff on the choice of lighting equipment, additional accessories to it, and on the installation of busbars are as follows:

1. Before selecting any luminaire for accent lighting, it is necessary to conduct simultaneous testing of lighting equipment of different manufacturers, visually and instrumentally comparing the results obtained on thematic samples from the museum collection;
2. When testing, it is recommended to measure the flicker of luminaires while adjusting the lumi-



Fig. 5. General and accent lighting of the 2nd floor hall, light background (a); general and accent lighting of the 2nd floor hall, dark background (b)

nous flux, to check the presence of halo around the light spot that hits the item;

3. The light emitted by the luminaires produced by different manufacturers and having the same colour temperature documented may be visually similar, whereas when testing the light distribution of luminaires, the light spots on the white surface may have different shades of white colour. This should be kept in mind when selecting the colours of the exhibition space and the design of the exhibited items;

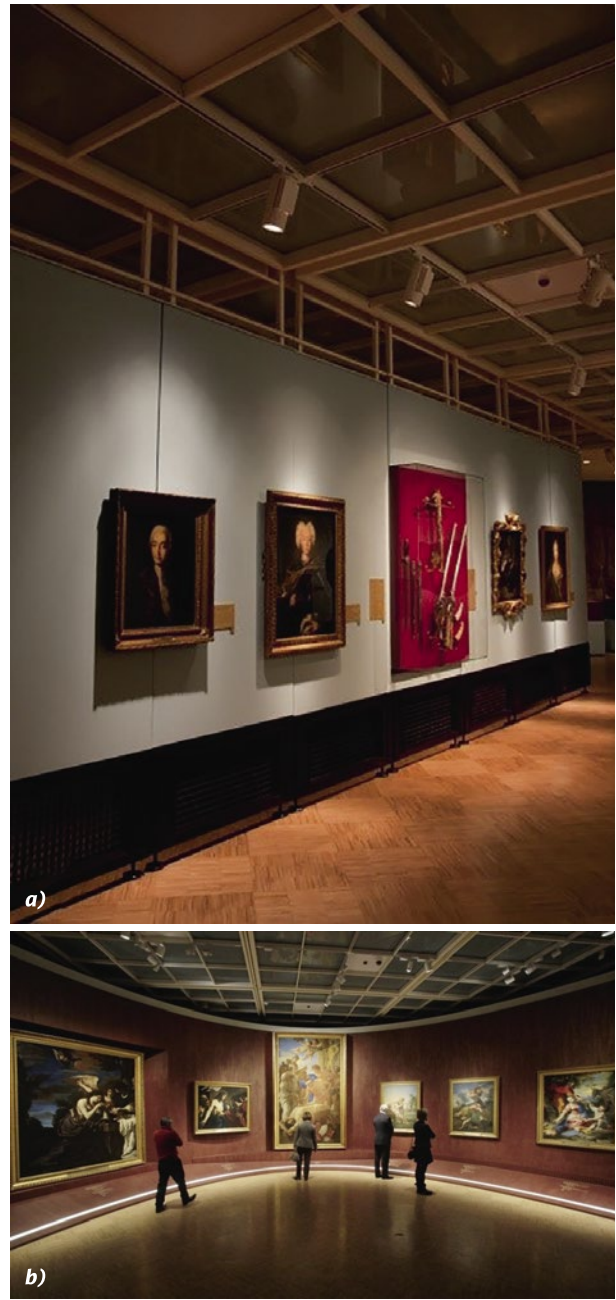


Fig. 6. Temporary exhibition, accent lighting without general lighting of the hall, light background (a); temporary exhibition, accent lighting without general lighting of the hall, dark background (b)

4. It is desirable that the luminaire set includes various lens shades, casher, cells, cross attachments to protect the visitor’s eyes from bright light rays, halos, and occasional glare (Fig. 7). The luminaires should be combined with lenses correcting the light beam, framing attachments, oval drawing lenses, etc.;

5. The spotlights should have control over the light parameters: on the luminaire casing or via Wi-Fi, Bluetooth, etc.;

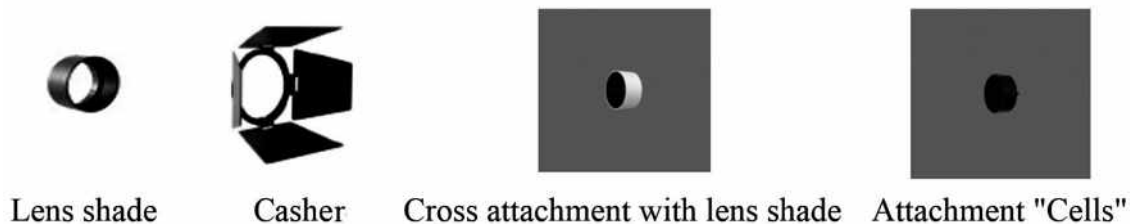


Fig. 7. Variety of attachments for spotlights to protect against halos

6. Modern LED luminaires and spotlights can have different sets of adjustable parameters: luminous flux, colour temperature, expansion angle of beam, luminaire rotation; these are interesting options, which, however, increase the price for quality products, and therefore, when choosing lighting equipment, it is necessary to determine which parameters are really necessary for the setting of accent lighting and to refuse unnecessary options;

7. For high halls and large spaces, the luminaires made on the basis of theatrical spotlights or luminaires for photo studios can be used as accent luminaires (with protective filters, if necessary);

8. After selecting the lighting equipment, it is necessary to determine the location and installation method for the busbar, taking into account the height of the hall, the architecture of the hall, the nature of the collection, the place of museum pieces on the walls, showcases, pedestals, in the centre of the hall, etc.

The installation of museum lighting in the exhibition halls depends on the features of the building in which the Museum and its utility rooms (restoration workshops and depositories) are located. The installation of general and accent lighting in the building adapted to the museum, where the interiors are the objects of exhibition activity, and in the building constructed according to a special project, where all the process requirements of modern museum activities are taken into account, have technical differences in the installation of lighting equipment, especially in the presence of windows and roof lanterns.

One of the essential components of lighting exhibition spaces and restoration workshops is the light sources used for this purpose. The general lighting in these rooms should be close in its colour properties to daylighting. This is an undeniable necessity in art museums, and for the restorers, it is significant that the result of evening work in artificial light would not differ from what the restorer sees in the morning at daylight.

After the phased enactment of the Law “On energy saving and energy efficiency improvement and on amendments to certain legislative acts of the Russian Federation,” due to the gradual displacement of halogen and fluorescent light sources in favour of LED sources, the range of lamps used for the exhibition lighting has decreased significantly. For example, the Tretyakov Gallery was working on the modernization of the Depository electrical lighting installations. The project selected the line of *REGO* and *REGO LED* luminaires, produced by the *Light Technologies*, which were to replace the Finnish luminaires installed in 1983. The new luminaires were chosen by size, installation method, and, if possible, without increasing the power consumption, to increase the illuminance on the working surfaces (restoration of oil and tempera painting, general lighting not less than 500 lx). The overriding requirement for lighting restoration workshops was to achieve a uniform light distribution on the working surface, excellent colour rendering, and high level of illuminance for high accuracy work. Daylight in these rooms is a significant proportion of the general lighting. According to the results of the comparison between *REGO* luminaires with *LUMILUX DE LUXE T8 OSRAM* series 954 fluorescent lamps of higher colour rendering and *REGO LED* luminaires with different colour temperatures, the luminaires with fluorescent lamps of greater power consumption were selected and installed. The proposed LED lighting options were suitable for household, office, or industrial use, while the museum lighting requires a wider range of affordable LED sources with fixed spectral characteristics simulating the daylight. The following premises were equipped with LED lighting in the Depository building: offices, corridors, utility service rooms, and storage rooms for museum items, without high requirements for colour rendering, high accuracy visual work.

In conclusion, the priorities in the museum lighting include the following:

1. The examination of museum pieces having different photosensitivity (light resistance) for radiation exposure in the visible, ultraviolet, and infrared regions of spectrum for development of the regulatory framework, which started with the Appendix B of the GOST 8.586–2001 [2], where the issue of parameters standardization of daylighting and artificial lighting in the museum halls, galleries, utility services rooms (storage facilities, restoration workshops, packaging rooms, etc.) was outlined, and it was developed with the participation of the Museum Climatology Laboratory of GosNIIR in terms of light resistance of museum pieces and regulation of lighting and recommendations on organization of the museum space lighting [4], so, the introduction of adjustments in relation to the recommendations of the GosNIIR “Museum storage of artistic values” [3] was started;

2. The development of a methodology allowing to measure lighting characteristics directly in the exhibition halls, on the surfaces of exhibited items of various shapes, sizes, configurations, with using a minimum number of measuring instruments to obtain objective data for operational control of the light environment, and verification of measuring devices in accordance with GOST R8.586–2016 [5];

3. Based on the research and development carried out, taking into account the introduction of new LED sources into the museum lighting practice, create a state standard for standardization of parameters for the light environment in museums;

4. Clarification of the parameters of non-reflective glass, other protective materials (triplex) for the absorption of radiation by the material protecting the collection item from the exposure to all spectral components;

5. Installation or improvement of new, energy-efficient, eco-friendly light sources that replace traditional light sources such as high-power halogen lamps and fluorescent lamps, which will have spectral characteristics equivalent in colour perception to daylight, and should be present during the working day in restoration workshops and other utility services rooms where high accuracy work is performed, as well as ensure the creation of an individual, unique atmosphere and comfortable visual environment in the museum halls;

6. Establishment of convenient systems of dispatching and control of specified light parameters in the museum premises for permanent and temporary exhibitions.

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¹ Replaced by GOST R8.586–2016 [5], in which Annex B is absent



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