

美术馆照明

浙江美术馆

Light for museum

Zhejiang Art Museum

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博物馆照明

博物馆照明的主要作用是为了收藏并展现艺术作品和文化遗产。离开优秀的展示方式和有效的收藏措施,博物馆的寿命将会受到严重的影响。问题是在展示的过程中总会伴随着损坏的危险。艺术品的曝光率越高,受损的危险性就越高。展示还增加了光损耗的危险,包括光化学损害(褪色)和光学机械损害(结构损害)。博物馆可以通过易被艺术品吸收的能量最小化将光损耗降到最低。首先,利用优秀的照明设计降低整体的光强度是非常重要的。利用全波段可见光以及正确的灯具安装位置(既不偏上、也不偏下)能在不增加光强度的情况下将可见度增加两倍。消除阴影、眩光以及反射光,利用柔和的背景光,对艺术品进行重点照明等可以增加可见度的同时降低整体的照度。此外,在不降低任何我们能看见的反射能源的同时,可以非常容易地降低整体吸收的能量。这可以通过选择合适的光源(根据IESNA标准),消除不可见光(紫外线和红外线),并对光进行过滤予以实现。浙江美术馆对艺术收藏品的照明设计或许值得我们借鉴。

Lighting for museum

A museum main role is to preserve and present art and heritage.

Without both good presentation and effective preservation, a museum won't be able to continue. The problem is that exhibition always increases the risk of damage. The more visible and more accessible an artifact, the higher the risk. Exhibition increases the dangers of light damage, both photochemical damage (fading) and photomechanical damage (structural damage). Museums can minimize light damage by minimizing the energy absorbed by artifacts. First, is important to use a good lighting design to lower the overall light levels.



图1: 浙江美术馆鸟瞰图
(图片提供: 浙江美术馆)

图2: 浙江美术馆大厅
(图片提供: 浙江美术馆)

Picture 1: Overview of Zhejiang Art Museum
(courtesy: Zhejiang Art Museum)

Picture 2: The Lobby
(courtesy: Zhejiang Art Museum)



Full visible spectrum lighting with all colors represented and none over or under-represented can double visibility without increasing intensity. Eliminating shadows, glare and reflections, lighting artifacts and not areas, and keeping backgrounds subdued also increase visibility while letting us lower overall light intensity. On top of that, it is easy to greatly reduce total absorbed energy without reducing any of the reflected energy that we see. This can be achieved by choosing the proper light sources (following IESNA guidelines), eliminating nonvisible radiation (UV and IR), and filtering lighting to match colors. A good examples of good lighting design and well preserved artworks is the newly opened Zhejiang Art Museum

The Zhejiang Art Museum

Located adjacent to West Lake, Hangzhou, Zhejiang Art Museum has an area of 35,000 m² and a construction area of 32,000 m², with 14 different exhibition halls. It takes 7 years to build Zhejiang Art Museum, with a total investment of 420 million RMB.

Exhibition hall 4-9

Zhongtai Lighting provided the integrated solution for exhibition hall 4-9, including design and installation. On the top of the exhibition board, grids and flexible boards are used to display diversified items. Hall 6 is to display large-scale items;

浙江美术馆

浙江美术馆位于杭州西子湖畔，占地面积35000平方米，建筑面积32000平方米，拥有各种规格的展厅14个。自2002年筹建起，历时7年建成，总投资4.2亿。

4-9号馆

4-9号馆的6个高规格展厅由中泰照明提供包括设计、设备供应、施工安装和调试服务在内的整体照明解决方案。4-9号馆大部分展厅的内装设计基本都是一样的，顶部都采用了格栅，展厅内采用活动展板，只有超高空间的6号厅采用了发光顶棚的设计，主要陈列一些大型的展品。设计师利用发光顶棚和荧光灯管模拟了自然光，让人不会因长时间处于封闭的室内而有烦躁、压抑感。7号厅采用了靠墙固定展柜，恒温恒湿柜内陈列高敏感和高规格展品。

考虑到展品的不固定性，设计师尽量选择灵活的设备类型和安装方式，并配备了可单灯调节的 DALI 系统。中泰照明的设计师和项目团队在开馆布展前提供24小时服务，现场解决各种问题，从而保证了最终的光的效果。

充分理解艺术家的艺术语言和表达需求，是照明设计师理解作品的照明诉求的关键。中泰照明集团的照明设计师方方举了一个例子。浙美开馆时有一个西班牙国宝级大师米罗作品展，参展方是西班牙米罗基金会，该会工作人员的工作态度非常严谨，对空气湿度温度包括照度等都有非常高的要求。“我们研究分析了米罗的个人作品特点，针对每幅作品不同的材质，不同绘画材料，广泛了解馆方和基金会工作人员的需求和理解，针对不同的装裱方式，对每幅画都有不同的照射方式不同的表达，最终呈现出一个非常和谐的光的氛围”。

照明技术

环境照明

环境照明主要使用了热辐射光源的几种系列产品，如Wallwasher；天花照明的出光角度从7~40度不等；此外还选用了不同的柔光雕塑棱镜等。根据展出艺术品材质、颜色、敏感度的不同，环境照明与重点照明的比例分别有所不同，如雕塑为1: 8，国画为1: 3。

局部照明

单个艺术品的照明手法，取决于现场条件及对艺术品的理解。如用侧面光表现展品纹理，用顶光表现小型或平面展品，用阴影表现

展品体量感等。主要是为了更生动的还原作品本身的价值。为了避免光与影的过度对比，所选择的灯具都预留了灯位，包括对雕塑品、对画品的考虑，都有预留了可能的设备，以便采取补光措施。针对需消除阴影的展品，配制了防眩光网、柔光镜等防阴影设备，并采用多位补光、调整照射方向等方式弱化或消除阴影。针对重点照明可能带来的眩光，照明设计师选择了控光性能极佳的灯具，并配备防眩光配件以及调光设备等避免直射眩光；通过柔光镜配件以及协调观众视线与展品、灯具三者间的角度的方式避免反射眩光。



图3：浙江美术馆6号馆通高展厅（图片提供：浙江美术馆）

Picture 3: Exhibition, hall 6 (courtesy: Zhejiang Art Museum)

therefore it has very high and luminous ceiling. Through a luminous ceilings and fluorescent tubes, the lighting designer simulated natural light, to create a pleasant environment and avoiding the feeling of "being in a very closed place". Fixed showcase are installed next to the walls. Special cabinets with constant temperature and humidity are used to display high sensitive and expensive display items. "Because the displayed items are not permanent, we have selected flexible equipment for installation and a DALI system to control each single lamps. We can also provide 24 hours on site service to solve all the unexpected problems to guarantee the best lighting effect. Correct lighting in a museum is very important to emphasize in a correct way an art manufacture, so

any problems has to be resolved as soon as possible" explains Fang Fang, Zhongthai lighting designer. "In order to achieve the correct balance of lighting it is important to understand the language and the needs of the artist" continues Fang Fang "The opening of Zhejiang Art Museum was the exhibition of Spanish master Joan Miro's works. The foundation organizing the exhibition had a lot of strict requirements on the level of air humidity, temperature and illumination. Was very important to have a continuous communication with them. We did an analysis on the characteristics of Miro's works and provided different lighting design for different works, materials and mounting techniques. The final lighting effect is very harmonious".

Lighting techniques

Ambient lighting

Heat radiation light source series, such as wall washers are used for ambient lighting. The angle of the ceiling light varies from 7 to 40 degrees. The sculpture lens with soft light is also used to provide ambient lighting. The ratio of ambient lighting and accent lighting are differentiated according to the material, color and sensitivity of the displayed artworks. For instance, a sculpture is 1:8, and a traditional Chinese painting is 1:3.



图4: 浙江美术馆4号馆展厅 (图片提供: 浙江美术馆)

图5: 浙江美术馆1号展厅 (图片提供: 浙江美术馆)

Picture 4: Exhibition, hall 4 (courtesy: Zhejiang Art Museum)

Picture 5: Exhibition, hall 1 (courtesy: Zhejiang Art Museum)



敏感性材料

部分展品为敏感性展品, 在选择光源时, 设计师应当考虑到红外线和紫外线对展示材料的损坏作用。本案中选择了UV含量较少的热辐射光源, 部分节能光源使用了防UV的进口品, 并利用部分UV滤镜和IR滤镜进行搭配使用。书法、绘画等为非常敏感的展示材料, 对曝光量有严格的限制标准。如照度标准为50lx, 曝光量为120000lx.h/年。敏感度适中的展品照度标准为150lx, 曝光量为180000lx.h/年。本案中设计师对照度进行了严格的控制, 以减少照射时间。

1-3, 10-12号展厅

1-3, 10-12号展厅由奥德堡照明提供室内专业照明部分的设计。与4-9号展厅一样, 这些展厅对于今后的展品及展示方式都是没有确定的, 因此在设计的过程中需要考虑到适应性、功能性、易用性等诸多因素。来自奥德堡的照明设计师孟宪立表示, “在设计的过程中我们经常由于射灯导轨的设计不能满足将来变化, 或者与移动展板有冲突而不断地修改方案”。通过调整轨道的排布, 设计师很好的解决了临时性展品的照明问题。

Local lighting

Lighting techniques for the individual art works depends on the on site conditions and the correct understanding of the artwork. For instance is better to use side light to express the texture, down light to express small or flat items, and shadows to express the volume. The main purpose has always to be to best reflect the value of the works, while at the same time reducing the risk of damage. To avoid the excessive contrast between light and shadows, space for additional luminaries are reserved to light up sculptures and paintings, to provide supplementary

light when necessary. Anti-shadow equipment, such as anti-glare and soft lenses can eliminate the unnecessary shadows. Other measures such as supplementary light and adjusting the light emission directions help reducing or eliminating shadows. The lighting designer selected luminaries with good optical control properties and equipped with anti-glare components and dimmers to avoid direct glare; the use of soft lens and the balance for the viewpoint, the displayed items and the luminaries helps to avoid reflected glare.

Sensitive materials

Some of the displayed items are made of sensitive materials, which require anti-UV/IR luminaries. Heat radiant lighting source that contains few UV and anti-UV energy saving lighting source are adopted to avoid the problem. UV filter and IR filter are combined to work together. Calligraphy and paintings are very sensitive displayed items, which has strict requirement for the exposure. The illuminance standard is 50lx and 150 lx for sensitive and moderate sensitive items respectively. The exposure is 120000lx.h and 180000lx.h for sensitive and moderate sensitive items respectively. Lighting designer had a strict control on the illuminance to reduce the exposure time.



图6: 浙江美术馆5号展厅 (图片提供: 中泰照明)



图7: 浙江美术馆8号展厅 (图片提供: 中泰照明)

Picture 6: Exhibition, hall 5(courtesy: Zhongtai Lighting)

Picture 7: Exhibition, hall 8 (courtesy: Zhongtai Lighting)

照明技术

在浙江美术馆的1-3, 10-12号展厅中使用了大量奥德堡的聚光灯。孟宪立表示, “选择奥德堡品牌, 是因为它在国内外的博物馆、美术馆领域中有丰富的经验。” 环境照明主要采用了奥德堡Arcos系列射灯中的洗墙灯, 照度控制在50勒克斯左右。为了体现每件艺术品的特点, 使用了奥德堡的Arcos射灯系列的聚光灯。灯具主要安装在距墙1.5米的位置, 以减轻投影。此外还使用了造型灯, 将灯光所在画框之中, 这种有些像灯箱的效果在一些平面美术展中得到了很好的应用。作为美术馆的灯具, 美学效果非常重要。孟宪立表示, 选择奥德堡的Arcos系列, 主要是因为它简单紧凑的外形设计。这款由David Chipperfield先生设计的灯具符合当今简约潮流, 能够与浙江美术馆很好的结合。” 环境照明与单个艺术品照明的亮度比为1.5-2之间。为了减少环境光与重点照明的对比, 设计师利用背景光进行补光。常规展厅中的敏感性材料除了具有红外防护功能外, 滤红、滤紫功能也是设计师选择灯具的起码标准。孟宪立表示, 滤镜要具备 $75 \mu W/lm$ 及以上的过滤能力, 同时应当将曝光值控制在 $15000(lux \cdot h/y)$, 将照度维持在 $50lux$ 的状态下。应该通知馆方在无展出任务时关闭相应的照明。■

项目信息 Project exhibition

建筑设计 Architectural design: 杭州中联程泰宁建筑设计研究院
Zhonglian Chengtaining architectural design institute

室内设计 Interior design: 杭州典尚建筑装饰设计有限公司
Hangzhou Dianshang Building. Decoration Design

4-9号展厅照明设计 Lighting design for exhibition hall 4-9: 中泰照明集团, 万虹、方方
Zhongtai Lighting Group, Wan Hong, Fang Fang

常规展厅照明设计 Lighting design for exhibition hall 1-3, 10-12:
奥德堡照明 Zumtobel lighting, 孟宪立 Netro Meng

4-9号展厅照明工程安装及调试服务 Lighting engineering for exhibition hall 4-9:
中泰照明集团 Zhongtai Lighting Group

4-9号展厅照明设备 Luminaries for the temporary exhibition hall: 欧科照明 Erco

1-3, 10-12号展厅照明设备 Luminaries for exhibition hall 1-3, 10-12: 奥德堡照明 Zumtobel Lighting

Hall 1-3, 10-12

Zumtobel lighting is in charge of the lighting design for hall 1-3, 10-12. Similar to exhibition hall 4-9, the displayed items and the way to exhibit are not fixed. Therefore, lighting designer needs to take into consideration the flexibility, functionality and adaptation.

Netro Meng, lighting designer from Zumtobel says, “As the track for the spot light can not meet the needs of the future changes and it has some conflict with the mobile exhibition boards, we have to revise the program constantly”. By adjusting the layout of the tracks, the designer finally can solve the problem.

Lighting techniques

Zumtobel's spot light are widely used in exhibition hall 1-3, 10-12. “We choose Zumtobel, because it has rich experience to light up museums,” says Netro Meng. Zumtobel's Arcos spot light washer is used for ambient light, the illuminance is around $50lx$. Arcos spot light are also used to light up individual art works to highlight their unique features. The luminaries are installed 1.5 meters away from the wall to reduce shadows. Modeling lamps are also used to light up two dimensional art works. Aesthetics are very important for luminaries used in the art museum. “We choose Arcos (designed by David Chipperfield), because of its simplicity and compactness

which matches the style of the Museum”, remarks Netro. The brightness ratio of ambient light and individual artwork is between 1.5 and 2. To reduce the contrast between ambient light and accent light, backlight is used to provide supplementary light. The sensitive material in the conventional exhibition hall requires anti-UV functions as well as anti-UV and anti-IR filter functions. According to Netro Meng, the filter lens should contain more than $75 \mu W/lm$ filter ability. The light exposure is within $15000(lux \cdot h/y)$, and the illuminance is below $50lx$. The owner was also notified that the light for sensitive materials should be turned off at night. ■