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LED lighting in Healthcare Facilities

Overview

The use of LED lighting in healthcare facilities is an effective strategy for achieving energy savings while improving the visual quality of light and maintaining light levels. In 24/7 working environments like hospitals, energy and cost saving potential with use of LED lighting is substantial. While the LED fixtures have a higher initial cost, they consume less energy and require less maintenance than fluorescent fixtures. A comparative study performed by a consulting and design firm concluded that the LED lighting performs better than conventional fluorescent lighting in terms of energy efficiency, maintenance costs, disposal costs, visual comfort, physical size, and quality of light.[1]

Ambience, Well-being and Sustainability

Independent research has shown that there is a clear and positive relation between exposing patients to sufficient light during the day and their health and wellbeing. LED fixtures deliver almost full spectrum light, compared to fluorescents which deliver only a small part of the light spectrum. Partial spectrum lighting combined with an indoor environment keeps personnel and patients from receiving the light their bodies need to be fully awake or to restfully sleep. LED light is not only more visually appealing but also can alleviate this problem by giving off light that is closer to daylight than fluorescent light and keep those who are indoors all day on their circadian rhythm, helping them stay awake or restfully sleep. It has been proven that light can improve parameters like sleep, mood, depression and length of stay in a hospital environment.

Ambience and personalization can be particularly relevant in diagnostic areas, waiting areas, patient rooms and entrance lobbies/receptions since lighting provides a unique way to transform our surroundings and create appealing, emotionally uplifting atmospheres.[2]

Applications

Following are some spaces in a healthcare facility where use of LED lighting can enhance the spaces while still reducing energy consumption.

1. Harmonious lighting atmosphere in the entrance halls makes people less apprehensive, inspires confidence and makes the surroundings appear friendlier.
2. For a hospital, corridors and circulation areas are the arteries of the building. Diffused homogeneous lighting avoiding sharp contrasts should be considered. It is also important to ensure that a high level of brightness is avoided so patients are not uncomfortable when they are wheeled along on gurneys.
3. In waiting rooms, dimmable wall lighting and table luminaires will radiate a relaxing, domestic ambience.
4. Exam rooms with optimal light color and high quality color rendering assist in examination and diagnosis.
5. In imaging rooms, a calming environment that can include colored lighting using LEDs, video projections and animations selected by the patient during examination and diagnosis can help them to feel more at ease and create a welcome distraction.
6. In patient rooms, use of recessed or surface mounted luminaires, with the addition of spots to create accent lighting provides a pleasant atmosphere and can be controlled by patients. Added cove lighting provides a variety of scenes and more flexibility in scene setting.
7. Nurse's station with task lighting, down lighting and accent lighting on the backwall creates a pleasant working atmosphere.
8. LED lights offer great solutions for indoor and outdoor parking.

Advantages of LED lights

1. *Energy efficient* - LEDs are now capable of outputting 135 lumens/watt
2. *Long Lifetime* - 50,000 hours or more if properly engineered
3. *Rugged* - LEDs are also called "Solid State Lighting (SSL) as they are made of solid material with no filament or tube or bulb to break
4. *No warm-up period* - LEDs light instantly – in nanoseconds
5. *Not affected by cold temperatures* - LEDs will start even in subzero weather
6. *Space Efficient* – Recessed LED lights require less space above ceiling
7. *Directional* - With LEDs you can direct the light where you want it, thus no light is wasted
8. *Excellent Color Rendering* - LEDs do not wash out colors like other light sources such as fluorescents, and are preferred for displays
9. *Environmentally friendly* - LEDs contain no mercury or other hazardous substances
10. *Controllable* - LEDs can be easily controlled for brightness and color

Disadvantages of LED lights

1. *Higher initial cost* - LEDs are currently more expensive, price per lumen, on an initial capital cost basis, than more conventional lighting technologies. However, when considering the total cost of ownership (including energy and maintenance costs), LEDs far surpass incandescent or halogen sources and begin to threaten compact fluorescent lamps.
2. *Heat Dissipation* - LED performance largely depends on correctly engineering the fixture to manage the heat generated by the LED, which causes deterioration of the LED chip itself. Over-driving the LED or not engineering the product to manage heat in high ambient temperatures may result in overheating of the LED package, eventually leading to device failure.
3. LEDs must be supplied with the correct voltage and current at a constant flow.
4. *Color shift* - LEDs can shift color due to age and temperature.

[1] Use of LED fixtures in Healthcare facilities
http://www.mazzetti.com/images/uploads/LED.pdf

[2] Healthcare Application Guide
http://www.lighting.philips.com/pwc_li/main/application_areas/assets/documents/Healthcare-Application-Guide.pdf