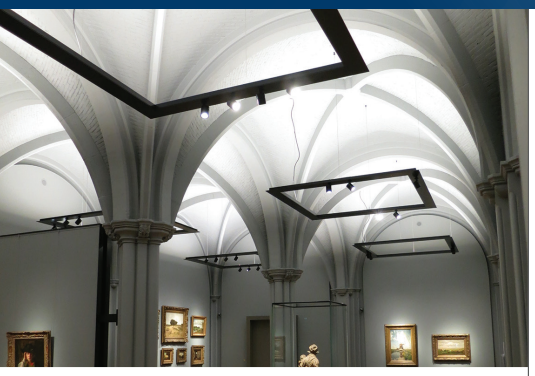
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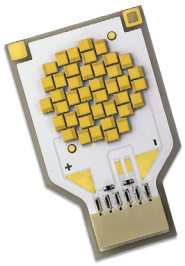
CASE STUDY



Amsterdam Welcomes New Age in Museum Lighting

New Rijksmuseum is largest gallery space ever lit by LEDs

Choice of Philips LED lighting ensures beauty and preservation for decades to come



Summary

Customized lighting by Philips proved to be the right choice for the new Rijksmuseum, a renovation project driven by art preservation and viewer connection. Highlights include:

- Warm white (3000K) LUXEON S LEDs with CRI of 95 deliver precise rendering across the spectrum
- No UV radiation and little heat from fixtures, minimizing damage to artwork
- DALI control and fixture dimming via an iPad
- Upgrade-ability using Zhaga-compliant LED modules

Challenge

The Rijksmuseum in Amsterdam, the Netherlands, is the national museum and home to master works of art from artists including Rembrandt, Vermeer and Van Gogh. It is one of the largest museums in the world, spanning 9,500 square meters and showcasing 7,500 works from the Middle Ages to the present. As part of a top-to-bottom renovation, the lighting was redesigned with an eye toward art preservation and achieving the quality of light that would best enhance the viewer experience. The goal was to mimic the color rendition of natural daylight throughout the museum, atrium, café and all other public spaces using LED lighting. It also became important, as Philips worked with the Rijksmuseum and other project partners, to optimize spotlights to bring out the unique features of each work of art — a task best accomplished using LED lighting.

Solution

Artwork in galleries has traditionally been lit using halogen lighting. However, halogens tend to be very good at rendering reds and yellows but less efficient at rendering blues and greens. Halogen light also tends to become redder upon dimming. LEDs do not suffer from these limitations.

On the artwork, the LED solution from Lumileds uses LUXEON S LEDs in warm white (3000K) with very high color rendering index (95) to bring out all colors of the spectrum — rendering the pinks, reds, ochres, yellows, greens and blues brilliantly. The LEDs emit uniform light that is safe for the artwork and meets international criteria for the conservation of art.

Suspended light racks from the original museum were upgraded by interior designers Wilmotte & Associes in partnership with Philips, consultant Arup and engineering firm Bronnenberg. To achieve a minimalist design on the racks, the Philips StyllD fixture was

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customized using a magnetic mounting scheme with remotely-positioned driver. The light racks contain 3,800 StyllD fixtures with Fortimo LED Spotlight Module Tight Beam containing LUXEON S LEDs.

Ceiling lighting was provided by approximately 1.8 kilometers of Fortimo strip up-lighting, also positioned within the light racks. This approach allows seamless coherent lighting of the ceilings of varying heights in the galleries.

LED Advantages

One benefit to the combination of Philips Fortimo LED SLM Tight Beam and LUXEON S LEDs is the small light emitting surface (LES). Small LES allows a smaller optical reflector design, enabling very narrow beams, including 5° and 10° beams with high center-beam candlepower. In museum applications, a uniform and sharp beam pattern is possible with a crisp single-point-source shadow, which enhances the texture and sparkle of artifacts. To minimize glare from the light sources, an internal glare shield was developed for the StyllD fixture.

When not directed at the artwork, the Rijksmuseum lighting mimics the color rendition of natural daylight (5000K). Additional benefits to the use of LED lighting over halogen include a typical lifetime that is 10x longer, significantly impacting maintenance costs, little heat generation and no ultraviolet radiation, which are known to damage artwork.

Control and Future-Proofing

The lighting control scheme was designed to enable museum staff to set lighting levels on individual works of art. The Philips' Dynalite DALI control system and web-based control interface were installed to provide flexibility in lighting including the dimming via a mobile application and iPad. Using DALI-controlled Xitanium drivers, practical dimming cut-off levels were set at 10%, which proved adequate for all but a few artifacts where neutral-density glass lenses were incorporated. The control system also addresses light output, which is constant, ensuring long-term lumen depreciation of the LEDs.

Even given the long lifetime of LEDs, repair-ability and upgrade-ability must be considered. Philips designed for the future with Zhaga-compliant LED modules. Both the spot fixtures and LED strip up-lighting can be upgraded or repaired at a later date using standard Zhaga-compliant modules.

Viewing the Rijksmuseum

The renovated Rijksmuseum reopened to the public on April 13, 2013. It is the largest gallery space lit by LEDs, containing ¾ million LEDs. All parts of the museum including the exterior and façade use LED lighting.

To encourage visitation and education, the museum has made high resolution versions of 125,000 of its painting and artifacts available on its website, www.rijksmuseum.nl. While online viewing can provide insight into the luminance and color rendering delivered in these artworks, only a visit to the Rijksmuseum can fully reveal the beauty that LED lighting elicits from the works of the Dutch Masters.

> "At the heart of all the decisions we take are two aspects, the visitor's experience of the museum and the preservation of our art. We chose LED lighting for firstly, the high quality of the light emitted, and secondly the color rendering of LED lighting, which is very close to that of daylight. This allows the art to be viewed in the best light possible to bring out all the colors and details that the artist intended us to see."
>
> — Tim Zeedijk
> Head of Exhibitions, Rijksmuseum



"LED lighting in particular outlines the visual contrast and relief in the paintings. We see this in the way we light our sculptures, but also the paintings with thick impasto. For example, when viewing Rembrandt's work, LED light reveals more of the detail."

— Tim Zeedijk
Head of Exhibitions,
Rijksmuseum

About Lumileds

Lumileds is the light engine leader, delivering innovation, quality, and reliability.

For 100 years, Lumileds commitment to innovation has helped customers pioneer breakthrough products in the automotive, consumer and illumination markets.

Lumileds is shaping the future of light with our LEDs and automotive lamps, and helping our customers illuminate how people see the world around them.

To learn more about our portfolio of light engines visit lumileds.com.



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