

Case Study



Case Study: Perpignan Fountain, France

Fountain Lighting : a Spectacular Display of Light, Sound and Movement

Perpignan's fountain is a festival for the eyes conjuring the spirit of ancient fountains that entertained and cooled city dwellers. But behind the mesmerizing visual dance of water and light lie very modern, high technology LUXEON power LEDs whose size and stealth belie their power to manipulate a scene. With 900 separate points of light embedded in individual water jets, controlled centrally to provide routines that coordinate colored light, water and music, the new Perpignan city center fountains are a spectacular illustration of the novel effects made possible with the use of power LEDs.

The choreography required to create the stunning new fountains started with a simple but challenging brief from the Perpignan city council which commissioned the work:

- Create a spectacular, permanent water-and-light show that would be a regional attraction—like the London Eye or the Pompidou Center in Paris—and thus attract tourists and other visitors to Perpignan.

The fountain would have to be extraordinary and city leaders devoted an area 30m in diameter in front of the conference center for the installation.

In addition to the creative vision, city leaders identified the two key challenges that would face the fountain's developers and owners:

- the installation would need to be both spectacular and innovative to stand out amongst the many attractions in the region, physical size would not be enough, and
- the installation was to be permanent, so long-term maintenance and replacement costs would have to be minimal and manageable.

Using LEDs permitted Sacopa's design team to build a huge array of bright light sources—each of the installation's 217 water jets has a LUXEON K2 LED embedded in it. This effect is not economically viable when using conventional light sources, since the short relamping intervals of these lights would give rise to crippling replacement and maintenance costs.



In this first-of-its-kind project, the city provided the land and infrastructure, and the design and construction would be done by Fluidra, the Spanish multi-national dedicated to developing applications for sustainable water use. The lighting solutions for the new fountain were designed and built by Sacopa, a Spanish division of Fluidra that specializes in the development of LED lighting for aquatic applications and already had expertise in the design of distributed control systems that integrate color-changing light schemes, sound, and water effects.

The designers and engineers at Sacopa understood that the small size and the longevity of LEDs were the only solution that would allow the creation of a vast installation covering a wide floor area with an unusually large number of individual light sources. This would satisfy the requirement for a spectacular and novel effect, since fountain lighting is traditionally designed with small numbers of large spotlights illuminating a few water sources.

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Sacopa expects their lighting solutions for the Perpignan fountains to last approximately 27 years assuming five hours of use a day, 365 days a year. This extraordinarily long lifetime is made possible by the robustness of the LUXEON K2 LEDs and the associated components in the fixtures designed by Sacopa.

With Sacopa's LED selection and engineering approach the key challenges from the city's brief would clearly be met and what remained was determining how to implement so that the effect would truly be an eye-opener.

Colored Water Dancing in the Dark

So, with the fundamental idea in place, Sacopa was able to elaborate the detailed design. The scheme envisaged the detailed illumination under precise control of the hundreds of water jets. Sacopa thus designed a stainless steel fixture made in the shape of a flower, which contains a tri-color LED luminaire and a water jet inside its 'stem'. While the diffuse beam of light from incandescent sources is hard to focus, the beam from the RGB LEDs is mixed and directed by a lens integrated into the fixture with almost no light loss.

Each of the fixtures, which can produce 16,000,000 colors, is connected to a DMX network controller. LED light sources are more controllable than any other light source and Sacopa's DMX controller uses the LEDs ability to be blinked, dimmed, flashed, and (in

tri-color configurations)

color-changed, to produce routines in which this vast array of water jets leaps and dances in synch to music—with flashes or washes of light turning on and off, fading and changing color in time. The effect of so much coordinated light, motion and sound across such a wide area is mesmerizing.

Engineering Married to Innovative Design

Behind the aesthetics of the lighting routines, however, is some very practical engineering. The metal flower housing, together with an aluminium heatsink underneath the LEDs, provide a

About Sacopa

Sacopa, based in Girona, Spain, specialises in the design and manufacture of lights for aquatic applications, such as swimming pools, lakes and fountains.

Sacopa markets a range of commercial off-the-shelf lighting fixtures, which are available at www.light-thechno.com.



good thermal conduction path from the LEDs. This is important because controlling the operating heat at the LEDs below a certain threshold helps to maintain a high light output and extend operating lifetime. The LUXEON K2 LEDs in Sacopa's flowers operate at a typical junction temperature of 80°C (in air) and 70°C (when cooled by water) even though they are driven at a high 700mA in order to produce a strong beam. Since the robust LUXEON K2 LEDs used in the installation have a high temperature tolerance (a maximum rating for junction temperature of 150°C in the case of the red, and 185°C for the green and blue versions), the Sacopa fixtures are comfortably inside Philips Lumileds' recommended operating conditions. Perpignan, located on the shores of the Mediterranean Sea, can enjoy daytime, unshaded temperatures of up to 50°C, but extensive product testing before installation showed that the luminaires' performance would be unimpaired, even on the hottest nights.

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The excellent thermal performance of the flower fixtures and of the LUXEON K2 LEDs also enhances the efficiency of the lights: at full power, each LED consumes 3W, and each RGB luminaire consumes 11W in total. Thus the complete installation consumes 9,900W (maximum). Sacopa's calculations show that a halogen-powered equivalent installation, producing the same light intensity, would consume five times as much power.



Perpignan Unveils Its *Piece de Theatre*

The installation went live in July 2008, and has since been thrilling crowds of townspeople and visitors nightly. The spectacular displays of light and motion are meeting the objective of gener-

ating buzz for Perpignan in the short term. But, thanks to the precisely engineered Sacopa luminaires and the robustness of the LUXEON K2 LEDs inside them, this must-see show is set to run and run for years to come.

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