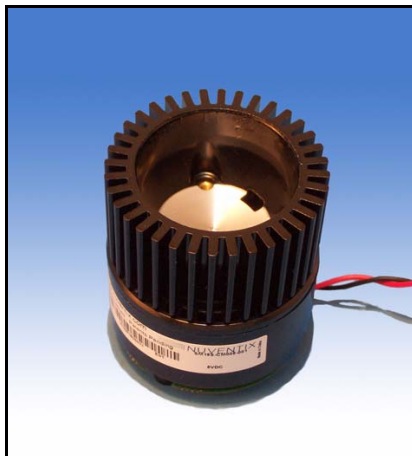


## LedEngin Case Study

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**LedEngin LuxSpot**



**Nuventix SynJet MR16 LED Cooler**

In January 2007, at Strategies in Light, the premier tradeshow for the LED industry, an introduction was made between LedEngin, a leading manufacturer of high power LEDs and light modules, and thermal management specialist, Nuventix. LedEngin had a challenge – cooling the LED light source – and Nuventix had a solution – the SynJet<sup>®</sup> cooler. Thus, the LedEngin LuxSpot<sup>™</sup> was born.

Ahead of its time, LedEngin already had a 10 W LED emitter in a very compact package capable of producing light equivalent to a 50 W halogen light source. However, the industry did not have an acceptable thermal solution to allow LedEngin to take full advantage of its power density in the small form factor typical of a halogen spot lamp. The company wanted to bring to market a product with an MR16 form factor equivalent to a 50W halogen fixture with all the benefits of LED light sources but needed to maximize thermal performance. LedEngin turned to Nuventix to overcome the challenge of balancing performance and form factor in the LuxSpot.

The MR16 is a very high volume market segment. Retail and commercial buyers for track lighting applications are prime customers for compact, high brightness modules because this form factor is perfect for their installations. The market was hungry for an LED solution with this magnitude of brightness and performance to compete with the 50 W halogen.

### Problem

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The goal of the product design was to achieve output equivalent to a 50 W halogen and bring a high brightness LED module to market with the form factor of an MR16 fixture.

Lux means surface brightness. Brightness and efficacy were the objectives and could not be met with passive cooling. Like all LedEngin products, LuxSpot was built using a unique LED emitter design that produces superior flux density and brightness, has a very concentrated light source, excellent optics, and color uniformity. The challenge with light engines is to maximize light density in small areas so packaging is key. This thermal challenge requires active cooling. Traditional cooling options like fans did not offer adequate form factor variations nor did they meet reliability and noise requirements.

In redesigning the product, small form factor, low audible noise and reliability were critical for LedEngin. Additionally, Nuventix was required to match the look and feel of the industrial design so it appeared as an integrated unit – not a problem for the versatile SynJet cooler.

### Solution

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SynJets effectively cool with no form factor constraints, nearly silent acoustic levels, and high reliability. Using synthetic jets to create a turbulent pulsating flow of air, the process cools with greater efficiency and effectiveness than fans – and without the noise or reliability issues. SynJet technology is the only active cooling solution that offers silent operation, long life and optimal cooling in a small package. This was the best solution for the LedEngin LuxSpot.

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The SynJet cooler enabled LedEngin to reach its goal of a 50 W halogen equivalent in a module that is similar in size and shape to an MR16 fixture. Using the SynJet cooler, LedEngin was able to fully utilize its technology and product capabilities.

The LuxSpot integrates LedEngin’s high powered LED technology and Nuventix’ SynJet cooler into a simple, intelligent, and modular lighting solution. LuxSpot is an innovative source replacement which delivers both the performance of a conventional light source and the benefits of solid state lighting. Perfect for a broad range of spot, accent, track and down lighting applications, the versatile LuxSpot simplifies the task of design integration and accelerates time to market.

## Today

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OEMs to lighting designers around the world have been impressed with the quality and output of light from the LuxSpot. LuxSpot is perfect for accent and spot lighting in applications including museum, retail and display, hospitality, task, and architectural detail lighting — anywhere the form factor must be small, yet functional.

## Optical Specifications - Typical Values

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**Table 1: Optical Specifications**

Parameter	Warm White	Neutral White	Cool White
Color Temperature	3200 K	4100 K	5500 K
Beam Angle (FWHM)	23°	23°	23°
Light Output (in beam)	350 lm	420 lm	500 lm
Illuminance (at 1 meter)	1500 lux	1900 lux	2200 lux
Illuminance (at 3 meters)	170 lux	205 lux	245 lux
Color Rendering Index (CRI)	>80 <sup>a</sup>	>75	>75

a. Warm white product option delivering CRI >90 available upon request.

## Operating Specifications

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**Table 2: Operating Specifications**

Parameter	Value
Input Voltage	24 V DC
Power Consumption	<14.5 W
Ambient Temperature	-40 °C to +60 °C
Noise Level	<22 dBA
Storage Temperature	-40 °C to +85 °C
Lumen Maintenance	Average >70% at 50K hours, Ta 40 °C