FUTURE Lighting Solutions
Making LED Lighting Solutions Simple™

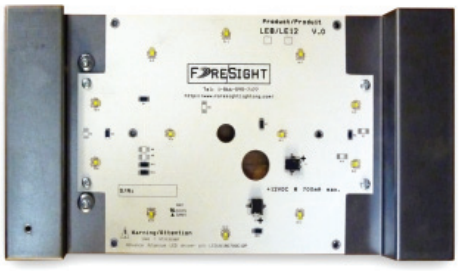
Case Study:

Ceiling & Wall Mounts

Foresight's 'One Board Fits All' LED Fixtures Shine with Help from Future Lighting Solutions

Brighter, more energy-efficient LED luminaires built with a 'universal' board to keep costs down

For most lighting manufacturers, creating LED versions of fixtures as disparate as an 11-1/4" x 7" wall bracket and a 72" pendant would involve developing, fabricating and stocking different light engines for each luminaire. Montreal-based Foresight Lighting took a leaner approach by creating 'one board fits all' LED editions of its 13W, 18W and 26W CFL architectural fixtures. With Future Lighting Solutions providing engineering services, Foresight came up with a basic board design using 6, 8 or 12 LUXEON® Rebel LEDs that fits more than 50 products of varying shapes and sizes. The boards not only consume 45% less energy, last five times longer and deliver more light than their CFL counterparts, but also significantly reduce Foresight's development, material and inventory costs.



Changing the LED count produces light output slightly brighter than comparable 13W, 18W and 26W CFL fixtures

ONE FOOTPRINT, MANY FIXTURES

Foresight specializes in manufacturing fluorescent fixtures for the commercial market. With the emergence of high power LEDs, the company decided to add an LED option to its series of custom CFL architectural luminaires because of the broad appeal of solid-state lighting benefits such as low energy consumption, long bulb life and resistance to bulb theft to commercial customers. Product managers faced with providing solid-state editions of fixtures ranging from pendant and ceiling lights to interior and exterior wall mounts proposed developing a universal board footprint to keep costs down.

"Having fewer boards to produce and stock would clearly be the most economical strategy, so we measured the inside of every fixture and tried to

"Our vision was to develop a universal board. We are not LED application engineers, so we needed a partner that could do the development work as well as point us to the right suppliers and recommend a contract manufacturer. Future came through on all counts."

Les Satov, Director, Sales and Marketing, Foresight LIghting

One LED light engine fits Foresight luminaires of different shapes and sizes, including wall brackets, ceiling fixtures and pendants

Wall Brackets
12" - 36"

Ceiling Fixtures
15" - 36"

Pendant Lights
28" - 72"

find a common denominator that would fit all of the products in our custom architecture line," said Les Satov, Foresight's Director of Sales and Marketing.

At the same time, Foresight engaged Future Lighting Solutions for their LED application engineering expertise as well as their ability to provide white color binning services for Philips Lumileds' LUXEON LEDs. "We knew from previous experience with another LED product that color consistency could be an issue, and we also wanted to offer neutral, warm and cool white LED options on any fixture," Satov noted. "Tight binning was critical for this project."

PROOF-OF-CONCEPT SERVICES

In 2008, after preliminary discussions outlining the project goals and requirements, Foresight supplied its proposed board dimensions to Future's Lighting Resource Center in Montreal and asked the engineering team to provide an LED proof of concept for its 26W CFL oval interior/exterior wall washing fixture. Challenges on Future's plate ranged from LED, driver and metal core PCB selection to board layout, thermal management, output and power consumption measurements, and visual comparisons of the lighting effects produced by the CFL and LED light sources, respectively.

The plan that Future developed utilized 12 LUXEON Rebel LEDs – driven at 350mA – that were selected for their high light output, affordable pricing, and a low physical profile that would assist in creating even light distribution with no hot spots using the fixtures' existing dome diffusers. The board proved to be slightly smaller than Foresight's prototype and considerably better-performing than the original CFL light source. Testing showed that Future's design was:

- 7% brighter than the CFL version, yielding 120 lux compared to 112
- 45% more energy-efficient, consuming 17W of power compared to 26W

The same light engine could be used to generate light output comparable to Foresight's 13W and 18W custom architectural luminaires simply

For smaller fixtures, a 6-LED board with the same wiring, components and center footprint of the larger board

by changing the LED count, using the same 6" x 8" board for both 8- and 12-LED configurations and a smaller 3" x 8" board (essentially the central portion of the larger board) for 6-LED versions. Both boards could use essentially the same layout and the same electronics, including Advance Transformers drivers. No additional heatsink was needed because the metal core printed circuit board provided sufficient heat dissipation.

These features would make it possible for Foresight to take advantage of the LED value proposition – including energy efficiency, the ability to last for 50,000 hours versus CFLs' 8,000 to 10,000 hours, absence of glass or filament to break, and reliable performance in low exterior operating temperatures – at relatively low cost. Foresight executives were sold.

THE POWER OF 'LEAN'

With the solution developed by Future engineers based on the 'one board fits all' concept, Foresight achieved all of the hoped-for economies from engineering to sourcing and stocking. Two sizes of a single board can be stocked and populated with different LED quantities and color temperatures as needed, enabling volume board orders with associated cost savings. Both boards can be attached to the same Foresight-developed custom backplate, complete with special slots to hold the drivers in place.

In addition, the same plug-and-play connection mechanism can be used with both boards for installation as well as servicing. Two boards can be paired for larger fixtures. And LED color temperature, drive current and flux bin (minimum 70, 80, 90 or 100-lumen LUXEON Rebel parts) can be changed to meet customers' needs – eliminating the need to reinvent the wheel for each custom order.

With the first LUXEON-based products hitting the market in May 2009, Foresight turned to Future to assist in the development of other LED retrofits, notably including a new light engine for linear applications such as retail displays and cove lighting. Again, the goal is to design a single board that can be reused for all luminaires with linear configurations.

"There's a big difference between designing, manufacturing and stocking one board and 10 or 15. It simply isn't cost-effective to have a different light engine for each luminaire," Satov said. "Future's engineers understood exactly what we were looking for. They literally helped get us into the LED lighting business."

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