by
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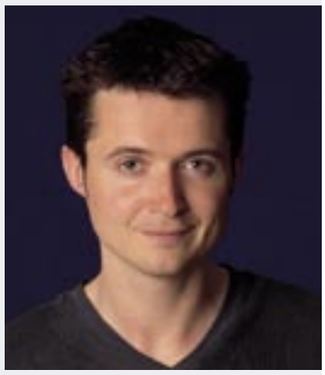
# CLOSE... BUT STILL NO CIGAR



MIKE BROWN, SENIOR LIGHTING DESIGNER FOR LAPD CONSULTANTS CONSIDERS THE MYTHS AND TRUTHS BEHIND CLAIMS BY LED MANUFACTURERS AGAINST THE REALITY OF PERFORMANCE. HE DISCOVERS THAT ALTHOUGH THERE HAVE BEEN SIGNIFICANT STEPS FORWARD, THERE IS STILL A LONG WAY TO GO

When discussing lamps used in fittings, manufacturers are generally free with information. However, when it comes to disclosing information about LEDs, manufacturers seem much more secretive. Recently a representative called at LAPD's studio with some amazing new LED fittings (not just his words, they really were amazing). But when we asked for details about the LED, he claimed that he couldn't tell us because his managing director would not let the sales guys know whose LEDs they were using!

A company with a new technology that makes their product perform better than their competitors is bound to be cagey about that technology. It is the same situation for manufacturers in the case of their selected LEDs. Although understandable, this does make it difficult for the designer to make the necessary comparisons between products.

In the best performing LED products the fitting is designed with the LED as an integral element. Many of the advantages of LED technology could be lost if the LED and the fitting are not designed together. So, the long life, cool operating temperatures, excellent colour hues, colour change, single source colour temperature mixing, lack of ultraviolet radiation, small size, and high efficacy levels that we expect may not be achieved.

The question of an LED's efficacy when operating within a luminaire is always pertinent. Results regarding the luminous output of an unenclosed LED, tested in a lab will usually differ from those results concerning an LED enclosed in a fitting where it can suffer from overheating. The efficacy figures we really need to know are those achieved within the physical constraints of a luminaire.

Another question we have to ask is "what current is the LED driven at?" And then, if it's 700 or 1050 milliamps (Ma), we also need to ask: "is the fitting designed to be capable of displacing the additional associated heat if run at the higher output?" At LAPD we have tested and run fittings at 350Ma and the case temperature is 40°C. At 700Ma the same case measured 70°C. The effect of excessive operational heat can result in massive reductions in the long life we assume when we specify LEDs.

Another hindrance to their specification is cost. Like for like (if there really can be a direct comparison) we've found that LEDs are generally more expensive than a fitting that uses a conventional lightsource. We recently reviewed an LED downlight that claimed to perform as well as a compact fluorescent downlight that we regularly specify. When tested we found that not only did the downlight produce half the light output, it was also more than twice as expensive.

Even though the light output may be less, we need to consider the viability of the 'life cost' argument. If the compact fluorescent lamp needs to be replaced every 20,000 hours and the LED and its control gear will run reliably for 50,000 hours, then potentially there can be a maintenance cost saving. But in most cases we have yet to reach a point where the use of LEDs present significant savings in the life cost analysis.

We are however, reaching a point where LEDs can match the number of lumens per watt that a metal halide or fluorescent source can produce (circa 90-100 lumens per watt). But delivering those lumens to a comparable level in a comparable fitting is still a challenge. For example, LAPD is currently engaged in several product design feasibility studies regarding the use of LEDs. In one study we questioned whether it would be possible to produce an LED alternative to a 35W CDM spotlight (GE lamp – 94 lumens per watt). To produce the equivalent light output from LEDs as from a 35W CDM source the luminaire would require 33 Luxeon Rebel LEDs running at 100 lumens each. This would give a minor reduction in load (2 watts) which wouldn't justify the increased luminaire cost payback over a sufficient timescale. In addition the luminaire would be much larger than the 35W CDM source, compromising the design intent. Making the fitting smaller would reduce its efficacy as it would not be possible to displace the excess heat. In this study the LED got close to the mark, but not quite close enough.

So, at this point in time, it seems that LEDs could, before long, become a viable alternative to conventional sources. Point source LEDs are improving in their lumens per watt, while manufacturers of white LEDs claim improvements in their colour rendering index figures. Organic LEDs, though still in their infancy could, within time, take on fluorescents and surface panel lighting. With every advance the LED moves nearer to becoming the most viable and flexible lightsource available.

As a result of this improvement in performance more fittings will be specifically developed for LED use. This will be a welcome change from the current situation, where LEDs are often retrofitted or sold within a fitting that is also designed for conventional sources.

At LAPD we look forward to the day when fittings are available that use LEDs able to achieve 250 lumens per watt. It is rumoured that, in the lab, LED manufacturers have nearly reached this point. The challenge is that the LED also needs to be available as part of a luminaire that can fulfil expectations concerning size, long life, cool operation, and maybe even cost. We still have a way to go.

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