

# LEDs The future?

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It is very rare for a new technology to arrive and become established in light sources, once every twenty years or so we see a real and viable advance, and in the first years of this century it looks to be LEDs. These devices have been around since the nineteen sixties and we are all familiar with them as indicators on domestic technology. Riding on the wave of the silicone revolution they are very rapidly heading for viability as a mainstream lightsource.

As with all things new they are promoted as the solution to all our problems, energy efficiency, maintenance, reliability, low temperature, the list goes on. Being Scottish and a non believer in the "free lunch" I am interested to find out where the limits of this technology are.

Firstly we have the issue of speed of development. As with all things in electronics the potential and actual rate of development is so fast compared not only to the leisurely pace of lighting manufacture, but also much faster than the design and build process of the building projects we are designing for. Given a two to three year lead from scheme design to building completion how do we specify something that will be obsolete several times over before it is required for installation? Having recently tried to buy memory for a three year old computer to be told it was so far out of date I could only buy second hand memory modules at prices three times that of the current technology how can we achieve certainty that the light output that we design for will be deliverable when projects are completed?

We must also be aware that we are no longer specifying a lamp but a complete system of electronics with many components. If we have an LED with a life of 100,000 hours what do we know of the other components in the system? These will vary hugely in failure rate and tolerance of output, the cheaper the worse. Another question is do we really need a lightsource with a 50,000 to 100,000 hour life? What is the life of a lighting installation these days? A retail environment is unlikely to last 5 years, Prestige headquarters similar, even speculative offices turn over in 10 years and require total refits in 20 to 25 years. Even at a conservative rated life of 50,000 hours for the current LED technology that's eleven and a half years burning 12 hours a day seven days a week so we will be throwing away a lot more good lighting equipment as these projects change in years to come.

Another factor on maintenance is that we may no longer need to change lamps however cleaning of fittings will become a bigger issue than it is already. With lamp life or fitting life for LEDs being measured in tens of operating years when will people go back to clean fittings? Will manufacturers make fittings that stay clean and are easily cleanable?

Low operating temperature is another key advantage quoted for LEDs. However this also proves to be the LED's achilles heel. There is very little heat in the light output but heat is generated by the process of energy conversion in the LED chip. The problem for LEDs is that the rated operating temperatures of the components is also low, well below 100°C at the chip has to be maintained to preserve the rated operating life, so while we have a minute source of light, as the output gets to useable levels we will require significantly large heat sinks and therefore large fittings to accommodate these light sources.

The majority of these issues are challenges for the lighting industry. This technology is so radically different that the existing and somewhat conservative lighting industry will have to totally re-think how to supply lighting. Lamp manufacturers are jumping on the LED bandwagon, mostly partnering with electronic component manufacturers, but none are addressing the medium or long term effects to their market: No business in lamp replacement, Dynamic product specification, Reliance on a partner company. If they are not careful even the giants will find themselves in trouble, Fitting manufacturers as well will have problems : continuity of supply of LEDs and components, radically different thermal design parameters and greater long term liabilities, who is going to accept a one year guarantee on a fitting with a rated life of ten to twenty years?

Please do not mistake my enthusiasm for LEDs they do promise so much. I do hope that the lighting industry can wake up and react in a radical way to ensure that they allow LEDs do fulfil their promise, if they don't it won't be the technology that has failed it will be the ability of the lighting industry to accept radical and rapid change.

Kevan Shaw September 2001

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