



## Light-Emitting Deficiencies

By Mike Gambino

**N**o matter the field, keeping up with the latest product developments is critical to supplying clients with state-of-the-art results. It's also important to track current design and application trends and to distinguish innovations of true value from those that don't add up or aren't far enough along the developmental curve to warrant broad acceptance.

Using my field of landscape lighting as an example, the past quarter century has seen a small clutch of products and technologies that have made the grade – the chief among them being halogen lights for use in low-voltage systems. When these came on the scene about 25 years ago, it was a revolutionary step that set a standard for performance and serviceability that hasn't been topped since.

More recently, I've been watching carefully as the marketplace has been flooded by messages about light-emitting diode (LED) technology, which has for several years now been touted as the *next* great evolutionary step in lighting technology.

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I can also remember 10 or so years ago being told that fiberoptic lighting would replace low voltage landscape lighting systems – something that never came anywhere close to happening. While LEDs may prove worthy someday (perhaps even in the near future), from where I stand today as a quality-oriented landscape lighting designer and installer, I have significant concerns I will be explaining in this edition of my column.

### light of day

To be sure, LEDs have gained ground fast for an emerging technology. For all that, however, I see persistent problems that have not been resolved and, more disturbing, marketing messages that seem to misrepresent product performance. On top of that, there are issues related to the fact that the technology is simply so *new* in landscape applications.

Before I get specific, let me note that I have nothing against LED technology *per se*. I've been at it long enough that I'm always open-minded about new technologies, and if LED products were doing everything their manufacturers have been claiming, I might not feel compelled to write this at all.

Indeed, I have used LED technology in limited applications and do *not* dismiss them out of hand. In addition, I've seen some applications beyond landscape lighting (automotive lighting and traffic lights, for example) where LEDs seem to work beautifully. But in my opinion, when it comes to landscape lighting, LED manufacturers and marketers have a way to go before the technology comes close to living up to its promise – or its hype.

I recognize that some will take issue with areas (or even the totality) of this discussion. That's fine by me – and if there are products out there I haven't considered or some major points I've missed, by all means I would love to hear about it.

As I mentioned above, I am not unfamiliar with LEDs. In the past four years or so, I have experimented (on my own property) with a number of sample products I've received and, in some situations, with ones I've purchased and installed on projects. The bottom line is, overall and for a wide range of applications, they just don't meet my standards. Until they do, I will see LEDs

in the landscape as a fringe product with limited utility at best.

Based on what I've observed, the problems with LEDs break down into a range of concerns related to performance, serviceability, energy efficiency and technical support. In no way does it help that manufacturers seem to be continuously changing their products – presumably to address the problems? – which means that nothing on the market has really had a chance to prove itself over time because nothing is ever more than a year or two out of the development cycle at most.

As a result, claims about service life can only be considered hypothetical because there's no field history – in real-life, extreme, exposed outdoor conditions within compact landscape lighting fixtures – to back up those claims. Also, there's the nagging fact that LED fixtures cost several times more than their halogen counterparts – an issue that magnifies all of the problems I'll discuss just below.

## seeing is believing

Let's start with the most basic elements of lighting performance, beginning with light output – that is, brightness measured in lumens.

► **Output:** In my informal tests, I've found repeatedly – side by side in actual landscapes – that LED lights do not provide the same level of output you find in equivalent halogen wattages.

Moreover, LED systems offer no viable replacement for lamps of 35 watts or greater, which means there's nothing available to light large trees effectively with LEDs. I simply have not been able to create the same range of effects – especially when I try to create dramatic focal points in the landscape – because LED lights are not nearly as bright or as effective as halogen bulbs.

By the same token, I find LEDs to be effective in applications calling for dim or soft light on highly reflective surfaces, as is the case with some path lighting on hardscapes or in illuminating light-colored surfaces such as walls or small statues – applications where all I want to do is wash an area with a hint of light. But when it comes to cre-

ating eye-catching effects that define large trees or dense plants in landscapes at night, LEDs don't perform the way they should and must.

Manufacturers may cry foul at my observation and point to specification sheets that indicate levels of performance equivalent to halogens. As far as I know, however, there's no standardized testing for LEDs that backs up claims about LED suitability for high-output applications.

As I've said in past columns, some clients are more sensitive to brightness than others and might prefer less light. If that's the case, and especially if they're sold already on LED technology, it might be the right call. Even then, however, I'd bring several other factors into consideration before turning to LEDs.

► **Color:** The color balance I have observed in working with LEDs is less than wonderful. Generally the higher the color temperature measured in degrees Kelvin, the higher output the LED. Trouble is, the color of light produced is downright unnatural-looking. For example, there's a marked tendency toward blue and green that can be quite unflattering if you're illuminating light-colored walls, statuary or color-sensitive types of plants.

Hollywood might find this an appealing way to light the set for a horror movie, but for practical purposes it would never be the light color of choice, especially for human skin.

On the flip side, the lower the Kelvin temperature, the more natural-looking the color (leaning toward amber/white) and the lower the light output or brilliance. My own research shows that the color-of-light specifications for LED lamps are not the same when compared against equivalent halogen temperatures. In plain language, they simply do not have an equivalent color or light output.

There's also an issue with color *consistency*. True, this assessment is more subjective than measures of output, but as an expert with a well-trained eye and across a spectrum of products I've evaluated, the color of LED light is far less consistent than is the color of halogen light. Again, side-by-side comparisons tell the tale – but this time it's compar-

ing one LED to another: The colors are noticeably different even when specs tell me that the Kelvin temperature is the same.

I want to attribute these issues to the fact that the technology is still being developed and that the scientists and engineers are still playing with varying combinations of fixtures, reflecting materials and components. Regardless of the reason, however, manufacturer claims of LED color consistency cannot at this point be taken at face value.

► **Green concerns:** It's no secret that incandescent lights are under attack by environmental groups, and it's a fact that these products are being phased out for interior applications. Personally, however, I'm deeply concerned that overzealous regulators will also target incandescent halogens for exterior use as well: That, I think, would be a huge and unfortunate mistake.

In this context, some promote LEDs as *the* efficient alternative not only to incandescent lamps but also to low-voltage halogen lights. While such a claim may be true in gross terms, it only applies if performance is sacrificed to the perception that something good is being done for the planet.

The energy-consumption picture is somewhat complicated by a surprising misperception that LED fixtures do not require current to the fixture – that they, in other words, are like fiberoptic systems in that no electricity flows to the actual point of light output. That's not the case: LED systems are designed to work in an operating range from 11 to 18 volts, which should tell everyone that these systems draw power.

In addition, some MR-16 LED lamps – designed as substitutes for halogens and marketed as three- or six-watt replacements for 20- and 35-watt halogens – actually consume slightly more than their rated power consumption. Yes, three watts compared to 20 is a significant difference in power consumption per fixture, but it is of little significance if the three-watt lamp comes nowhere close to replicating the light output and color of the 20-watt halogen lamp it is meant

to replace.

Durability is also a green issue. Today's LED fixtures contain electronic components such as drivers that may not be able to withstand the rigors of outdoor environments, meaning they may fail more quickly at the hands of careless gardeners or simply break down when exposed to the elements such as ambient moisture and heat buildup in diminutive landscape lighting fixtures. In addition, the lighting element in some LED fixtures is integrated into the fixture itself, so when the light dies or light output depreciates or experiences color shift, the entire fixture must be replaced. Not only is this expensive, but it's remarkably wasteful and environmentally unfriendly in and of itself.

In fairness, there are LED retrofits that are made to be inserted into in-

being replaced is the halogen lamp itself – a far greener approach than using a system where you're routinely replacing entire fixtures.

► **Service and Support:** As they now exist and beyond performance, probably my biggest issue with LED lights revolves around service. As mentioned above, nobody really knows how long these products will survive or effectively perform in the field because they haven't been around long enough, so it's impossible (despite manufacturer claims) to set up realistic expectations for service life with clients.

This in turn creates huge problems with manufacturer warranties for product replacement: There's no reliable standard, so everyone is making things up as he or she goes along and the potential for con-

It has been my experience that many homeowners erroneously believe that their landscape lighting systems require no maintenance if they have no burned out bulbs. But fixtures may be knocked out of adjustment, and plant material will definitely grow and change shape and will block and change light output. Lenses also will require scheduled cleanings to maintain light color and output, and whole systems should be checked at least every six months to make sure everything is performing at its best and as designed. At this point, putting a price and even setting a schedule for such service is decidedly difficult when LED systems are in use.

Finally, LED products are so new that there's no reliable information on how fast deterioration will occur. Even if all you consider is simple things, such as scale build-up from water and other normal types of damage, the products will gradually diminish in terms of light output. When you combine that fact with what is *already* lower light output, these systems will become dim sooner rather than later – and replacing old with new is an expensive proposition.

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candescent and halogen sockets. In my view, these have the greatest chance of success if the inherent issues with using LED technology outdoors can be resolved.

But it still rankles that some manufacturers are using inferior materials in the construction of their fixtures to offset the higher cost of the LEDs and make the technology friendlier to consumers' pocketbooks. What good is having an LED marketed with a claim that it will last ten years plunked into a fixture that will be lucky to last for three to five years? It's the sort of practice that threatens to send the landscape lighting industry back 20 years to the days of disposable, ineffective, low-quality lighting.

As I noted in my last column, cast-brass lighting fixtures will last indefinitely and can even be reconditioned if ever needed. Thus, the only material

flict shoots over the moon. How are operating hours reliably measured? How can failure from being dropped or rough handling be detected or determined and guaranteed? How will light depreciation over time be guaranteed and gauged? The general lack of answers for these questions is bad for business, and it gets worse when you consider that many of these products come from overseas via circuitous distribution channels with no recognizable brand name.

And given the higher initial cost of LED systems (many times that of an equivalent halogen system), it's asking a lot of clients to commit themselves to routine LED replacement as part of any pre-determined service plan: The cost is remarkably high relative to those for halogen or incandescent systems. Still, such plans are necessary, because (as is also true with halogens) light output will depreciate over time as LEDs age.

## technology downgrade

Let me conclude this discussion with a last observation about how these systems are being marketed: Personally, I get concerned when LED advocates try to make it seem acceptable to simplify and downgrade overall electrical system design when you use their technology.

Some say, for example, that you can use smaller transformers and smaller wire compared to halogen systems, or that voltage requirements can range between 11 and 18 volts without affecting fixture performance. To my mind, that is monkey business of the worst kind: an open invitation to substandard wiring and loose system-design practices.

It's also an open invitation to non-passionate and less-than-dedicated landscape lighting installers to get involved in this business as a sideline or occasional pursuit. These operators have no great interest in the long- or short-term performance of what they've installed, do not offer any kind of maintenance ser-

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vice and are simply in it for a one-time payday – no looking back.

This industry has been significantly damaged by these operators in the past and doesn't need to create new openings for them.

Consumer demand for LED technology in landscape lighting is still relatively low – which is somewhat surprising given how extensively these products are

hyped as being green and ultra-contemporary. Even in the Los Angeles area, where consumers and their architects and contractors are known to pursue the latest and greatest without much reference to practicality, I hear little clamoring for these products.

Ironically, that low profile might end up saving LED technology, because it's giving manufacturers the time they need to resolve some of the issues I've mentioned here. As I said at the beginning, I have no axe to grind against LEDs, and if the products improve I'll be more than happy to embrace them.

My hope is that in the very near future I look back at this article and say, "Wow! Conditions have really improved and my December 2010 column is no longer relevant." Until that day comes, I will continue to ask how LEDs, with their higher

up-front costs and range of performance deficiencies, are made worthy of consideration simply by saving homeowners a bit on their electric bills.

Until that day, I will continue to wish that manufacturers would tone down some of their occasionally outlandish performance claims. For us in the field, I hope we won't get caught up in the hype and will continue choosing the very best for our clients as we carefully evaluate what's new and interesting. [WS](#)

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