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SHEDDING LIGHT ON L.E.D.s

LEDs can provide thousands of hours of light and are practically maintenance-free.

Noel Cupkovic



Once limited to use in electronic gadgets, gizmos and control panels, LED (light-emitting diode) lighting is making a splash in retail and entertainment design through color and movement.

Current market LEDs can be used as decorative and accent lighting indoors and out, offering more than 16 million colors and animated displays. They can be used to highlight a wall, a sign or a product, all while providing 100,000 hours of virtual maintenance-free service. Operating 12 hours a day, seven days a week, that amounts to approximately 23 years. "By the time you need to change or replace them, you're probably ready to renovate anyway," says Jeff Smith, national sales manager for ColorCorp in Cleveland, Ohio.

Whether prefabricated pieces or custom-designed systems are used, LED lighting displays bring color and animation to any retail mall, store, restaurant or club with dynamic and dramatic results. Effects or "shows" including color-cross fades, color washing and fixed or variable color strobes can be preset

or custom-programmed simply by changing the built-in controls. Alternately, they can be changed at any time after installation via a PC or DMX512 interface, allowing for ultimate flexibility and creative freedom.

Color accents and animated settings can be used for interior or exterior signage, to highlight or add visual interest to a wall, ceiling or floor, to illuminate and enhance point-of-purchase displays, showcases or shop window displays or to create light artwork.

According to Dean Pritchard, a partner in ColorCorp in Cleveland and owner of WLS Lighting in Fort Worth, Texas, no more than 2 percent of commercial facilities have realized the potential of this enhanced technology and are using LED systems in these capacities. But he sees that number climbing in the future. "It's a new phenomenon," he says. "Most people just don't know about it yet."

"It's so new, we've only had shippable product for about a year," adds Smith. "Most people are just finding out about this as a possibility, so they haven't

had a chance to implement it yet — but we're ready." ColorCorp has been a pioneer in the field of designing LED color lighting display systems and developing LED products for use as decorative and accent lighting in retail spaces.

WHAT EXACTLY ARE LEDs?

Chances are you've seen LED lights and lamps without ever realizing it on your computer, television control panel or digital clock. The product has been around for many years, but new developments and enhancements are changing the way people view and utilize LED lighting. To understand how an LED works and how it differs from current standard light sources (incandescent and gaseous discharge lamps), let's take a look at those sources.

An incandescent bulb works by lighting a filament within a vacuum-sealed glass bulb. Since its initial invention by Thomas Edison, improvements have extended the useable life cycle of incandescent halogen light bulbs, but eventually the filament will burn out or



This Limited Too in Nashua, New Hampshire, uses an LED system with a changing color-wash effect on a colored sign. It creates the illusion of animation through the interaction of the colors.



Jillian's LED system in Boardman, Ohio, utilizes the Rainbow Chase effect.

break, or the glass sphere (bulb) will shatter due to impact, pressure or reverberation. Because these lamps give off light based on heating the filament element, the bulb gives off a high level of heat as well.

Fluorescent and neon lamps (gaseous discharge lamps) produce light as a result of electrical current passing through a gaseous discharge enclosed under pressure in a tube or bulb. Fluorescent fixtures are frequently used in commercial environments for general, task and some decorative lighting. While they burn longer than incandescents do, they are still at risk for burnout and breakage when exposed to weather extremes or when jarred or struck. They also generate significant heat based on wattage and length of usage. An issue of specific concern to retailers is that lamps of this type can alter the perceived color of the objects they are lighting.

Developed in the 1960s as a by-product of research on semiconductor devices, LED lights are solid state crystals (diodes) mounted on circuit boards. "Diodes are electronic devices that allow current to pass in only one direction," explains Smith of Color-Corp. "When they started building them with semi-conductors they found that some of them glowed, and it ended up being developed from there as a light source."

The light-emitting diode or crystal is about the size of a grain of wheat and can be grouped in any configuration. Out-of-the-box board assemblies are about an inch wide by a foot long with double rows of the diodes. LEDs are also configured into a variety of hanging yoke style fixtures, plugged into MR16 fixtures and contained within a typical light bulb for flexibility of

use — easily replacing incandescent or fluorescent fixtures.

LEDs generate light at a particular spectral wavelength frequency when current is applied. The original LEDs were red. But gradually, by manipulating the semiconductor materials used and energy levels applied, LED developers were able to alter the specific wavelengths at which the diode chips resonate. Variations in colors resulted—first ambers, then greens and finally blues were developed. Once red, green and blue (RGB) were possibilities, RGB color mixing became a reality and, like television or computer screens, more than 16 million color and shade variations were made available.

LEDs offer another color advantage — truer, more color-intense light. An incandescent bulb gives off white light, which is created using the full spectrum of colors. To give off a single color, that light must be filtered, basically wasting the energy used to produce the spectrum since only a portion of it is being utilized. With LEDs, the crystals are tuned to resonate on the particular frequency of the color they are generating — nearly all of the energy is used to create that color of light.

These lamps operate on a mere 24 volts DC and can offer energy savings of up to 95%, according to Smith. A typical LED display contains many small LEDs that are individually controlled by computer circuits, so displays can be easily controlled and shows programmed. Many systems available include a variety of preset show settings as well as the ability to customize a system. Current systems can utilize multi-chip and multi-LED arrays to mimic the effect of incandescent filaments.

Because of the low voltage and minimal heat, LEDs are a positive in the safety column. While prototyped, customized designs of boards might be more costly initially, installation and maintenance costs can be dramatically reduced — maintenance is nearly unnecessary. The "install-it-and-forget-it" idea makes LEDs ideal for hard-to-reach areas. According to LEDTRONICS, another distributor of LEDs, the diodes are "virtually impervious to temperature extremes, shock and vibration," making them more durable and safer than conventional lamps. In addition, they produce almost no ultraviolet rays, so there is no denigration of materials or merchandise being lit.

Another smart use for LED lighting in commercial facilities would be for directional and safety lighting such as movie theater stair and aisle lighting, mall or store exit signs and for emergency exit way-finding signs. Failed lighting in these areas can result in injury (or worse) to customers and employees. Often these lamps are in unreachable locations, making replacement and maintenance nearly impossible. Since LEDs are so long lasting, they are perfect for these uses. Also, since they operate on a low voltage, they are more compatible with most facility uninterrupted power systems, generators or battery back-ups.

WHAT LEDs CAN'T DO ... YET

Due to initial costs and current limitations of white light LEDs, they are not practical for replacing all white light incandescent, halogen or fluorescent bulbs for general and task lighting needs now. But, according to Smith, it is definitely the lamp to use for decorative and accent lighting in color. "If you're just using white light, it may not be the most cost-effective way to go, but it will be in the future, at some point. I don't know if it'll be three years or 10 years — it could be the standard," says Smith.

The term "white light LED" is a misnomer at this time. There is not currently a true white light LED. Because LED lights resonate on particular spectral wavelengths and white light is full

spectrum light, the current limitation to create a white light LED is obvious. However, there are shortcuts or "cheats" being used to create the effect of white light LEDs.

The effect is achieved by using a high-brightness blue LED and a white phosphor dot. However, GELcore LLC, a joint venture between GE Lighting (Cleveland) and Emcore Corp (Somerset, N.J.), was formed last January specifically to develop, research and eventually market genuine white LED lamps.

EXAMPLES OF LED USES

KA Inc., Architecture in Cleveland is planning to use LEDs in several of its projects. The company is considering an LED system in the Westminster Mall redevelopment being designed for Westminster Mall Company (MD Management & Dillards) and the City of Westminster, Colorado. KA designers are also utilizing LED for corporate office projects as an accent feature.

While ColorCorp has been working

with commercial and retail clients on specific design projects, other recent projects have included restaurants, nightclubs and coffee bars. Starbucks has ColorCorp working on a prototype system that will add more color and animated features to its décor.

Limited Too utilizes LED technology to reaffirm the underlying theme of their store, which can be summed up as high-color and high-energy. "We programmed the fixtures — which are completely controllable — so that when you shine the light on their sign, it changes colors," says Pritchard.

ColorCorp is working for a high-end, soft goods retailer on specialized display lighting for their fragrance counters. The system will under-light the fragrance bottles washing them in color. "It [LED] allows you to do some really creative things in your display work by having access to the full palette of colors," Smith explains.

Other ColorCorp LED system clients and users include Federated Department

Stores, Wish (a three-story nightclub in Cleveland, Ohio), Disney, Joop (Miami), Nordstrom, Jillian's Entertainment, Price Waterhouse (Philadelphia), Field Museum in Chicago, Chase Manhattan Bank and the Rainforest Café.

SEEING LEDs IN A WHOLE NEW LIGHT

Long lasting, truer colors, no filaments to burn out, no glass bulbs to break, shatter or replace regularly, low voltage and heat and completely programmable animated lighting effects capabilities make LED systems a smart alternative for display and accent lighting now and, perhaps with more research and development, general lighting in the future. **PRSM**

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