LED Assemblies for Illumination in Industrial Environments

Richard Saffa, Vice President
***Control Engineering*, January 2007**

As LED technology continues to advance, its function has progressed from backlighting, indicators and general illumination to warning signs, machine vision systems and other industrial applications. Not only have the uses for LEDs increased, but LEDs themselves have evolved from single chips to multi-chip arrays. Incandescent light bulbs have traditionally been used in the industrial arena, although their high heat, high voltage and increased power requirements have limited bulb reliability, and subsequently, bulb lifespan.

Industrial environments require devices that are reliable and long lasting. LEDs have a lifespan of more than 100 times that of incandescent bulbs, and consume up to 90 percent less energy while emitting brighter light. In many applications, this is vitally important. For example, if warning lights on a machine burn out, it can be dangerous for an operator who relies on those lights as indication of the status of the machine. Also, in applications where lighting inside an enclosure is required, incandescent bulbs generate a significant amount of heat, which in turn can lead to the bulb overheating and burning out. In addition to using less power and generating less heat, LEDs can be sealed to produce a safer device. Not only is the operator able to see the indicators from a greater distance, but his safety is significantly increased with the reliability of the LED bulbs as well.

Machine warning lights are just a small part of LED use in industrial applications. Many applications require an entire lighting assembly, rather than just a single LED chip. LED assemblies, such as OPTEK's Lednium device, are capable of providing any color light in the visible spectrum in a 120 degree viewing angle.

OPTEK's Lednium Series Array, one of the brightest single source LED assemblies in the lighting industry

LED arrays achieve high brightness in a compact, energy-efficient package. LED assemblies are also capable of providing different parallel-serial connections that enable the operation of several or all of the mounted LEDs, allowing design

TT Electronics | Optek Technology, Inc.
1645 Wallace Drive, Ste. 130, Carrollton, TX USA 75006 |Ph: +1 972 323 2200
www.ttelectronics.com | sensors@ttelectronics.com

engineers to vary the light output and power consumption. Additionally, while LEDs output less heat than incandescent bulbs, some applications still generate a significant amount of heat. In those applications, LED assemblies may be constructed on specialized heat dissipating substrates. These thermally conductive substrates not only allow LED assemblies to run at full power, but they also reduce size and cost by minimizing the size of external heatsinks and mounting hardware.

As LED technology continues to advance, there are two types of LED assemblies that in the near future will have a direct impact on industrial applications. Infrared LED assemblies will be constructed for use in heating and drying applications. For example, printing presses may utilize infrared LED assemblies to dry ink. While incandescent infrared lights often waste energy due to their 360-degree bulb design, infrared LED assemblies can be designed to provide concentrated energy in a much more confined space. The use of LEDs in this application results in more control, less energy consumption, and higher reliability.

Secondly, ultraviolet LED assemblies may be specified in applications such as adhesive and finish curing. Because ultraviolet light emits tighter wavelengths, a highly controlled ultraviolet LED light source can be used for complex, fine-line lithography applications.

Compared to incandescent light bulbs, LEDs generate less heat, less energy, feature much lower voltage and power, and subsequently have a much longer lifespan. The LED market has rapidly progressed, and with the advantages that LED assemblies offer over incandescent lighting, will continue to be used in a wide range of applications, including industrial environments.

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