# LED Technology -

## Putting unattainable goals within reach

***Ryan Hertel and Melissa Stephany from Phoenix Products Company, USA explain the benefits of LED technology in the port environment.***

Port and terminal operators are under constant pressure to increase productivity and reduce costs while working to achieve aggressive environmental goals. The size of cranes and terminals, as well as around-the-clock operation in harsh conditions, put tremendous stress on equipment. In a highly competitive market, meeting these goals is increasingly difficult, but operators are wise to look for solutions in engineering advancements such as automated equipment and energy-efficient technology. Changes have revolutionised the seaport industry in recent years. Cranes and vessels have become much larger and more technologically advanced. With automation, there is better utilisation of resources and decreased environmental impact. The improved design and equipment in container handling has reduced costs for ship owners, port operators, and, ultimately, consumers. Installing energy-efficient LED floodlights onto container cranes dramatically reduces their energy consumption from lighting, virtually eliminates lighting-related maintenance requirements, and moves terminal operators closer to universal goals of safety, sustainability and profitability.

### LEDs and cranes

Automating terminals presents new opportunities to reduce maintenance expenses. Upgrading to the latest technologies can minimise downtime, further reduce operating costs, and improve productivity. There is a strong trend to outfit Automated Stacking Cranes (ASCs) with LED lighting, generating significant maintenance savings and reducing energy costs to put that particular terminal on the path to sustainability. In fact, the US Department of Energy (DOE) is a strong proponent of this technology. Lighting is often perceived to be a fixed expense; however, lighting energy costs can be reduced by up to 75 percent with LED technology. Trolley light fixtures are subject to the highest vibration on the crane, and the lights installed on them fail most frequently. The use of LED floodlights can eliminate constant maintenance in this difficult area while improving light quality. Just as crane manufacturers have engineered revolutionary advances, so too have LED fixture manufacturers, making these lights ideally suited for the harsh, corrosive environment in which container cranes operate.

### Beneficial change

Most ASCs can operate in darkness unless a problem occurs. And when it does, the remote operator can take control of the crane, a step that requires illumination. Traditionally, up to eighteen 400W floodlights would have remained on throughout the evening in anticipation of the potential need for remote control operation. But LED floodlights installed on an ASC trolley and girder can remain off during operation and can be activated instantly when remote control operation is required. They illuminate immediately at full intensity, and the on/off cycles have no negative impact on expected lifespan. For this same reason, LED fixtures are also beneficial for ship-to-shore (STS) cranes that can experience power outages and necessitate a wait time of up to 20 minutes for a traditional light source to strike and return to full intensity. LED technology minimises downtime, increases safety and improves operational efficiency. Access to the light fixtures on cranes can be difficult and dangerous. With LED technology, no relamping is required during usable lifetime. Properly designed LED fixtures will not fail catastrophically, but rather slowly dim. The light source is assumed to have run its lifespan when light output reaches less than 70 percent of the original amount. In fact, well-designed fixtures can last over 50,000 hours, eliminating equipment downtime due to lamp failure. For a port operating with lighting 24 hours a day, a fixture could last 5.7 years! Terminals considering LED lighting should ask the LED fixture manufacturer to provide third-party

LM79 test data to prove expected lifetime. The lifetime of all fixture components - not just the LED chip - must be considered. Not all manufacturers build fixtures around the long life of the light source, so all parts should be analysed or the risk of early failure can grow.

## Durable and versatile

Another important advantage to LED technology is its inherent durability. LEDs are solid-state light sources that contain no moving parts, filaments or fragile glass, thereby dramatically reducing the risk of damage during transportation, installation and operation, even in the toughest environments. LED technology also offers a great deal of versatility. If a port operator prefers a warmer light source, lenses can be inserted over the luminaire to decrease the colour temperature. Furthermore, a modular design of LED fixtures allows for customisation specifically for crane heights. The directional nature of LED light allows for improved light penetration at the bottom of the vessel hold and improves operator viewing conditions. Companies on the forefront of this technology are considering the variety of lighting requirements of ports while designing their optic packages. An LED fixture can incorporate an array of point sources that direct light precisely where it's needed with very little scattering or loss of light to the environment surrounding the port. Distribution is controlled by the placement of LEDs as well as by efficient use of optics that take advantage of the focal point presented by each individual LED. Effective fixture design can translate to lower optical losses, higher luminaire efficacy, and an even distribution of light across the target area. Crane floodlighting garners the most attention, but some companies offer LED fixtures to replace all lighting installations on a crane including walkways, the machinery house, and the electrical room. LED lighting can virtually eliminate costly maintenance in all of these areas.

## LED - Ready for prime time

Debate continues about whether LEDs have adequate lumen output. However, as US terminals on all coasts have begun to embrace LED floodlight solutions, concerns have been quelled. In fact, replacement of four trolley mounted 1000W HID light fixtures with 300 watt LED floodlights on an STS crane operating at an East Coast terminal in the United States resulted in a 55 percent increase in measured light levels within the truck lane below. Operators especially appreciate the colour of light and improved visibility into the vessel hold. The LED revolution is clearly well under way in the lighting industry. According to many industry sources, the use of LED technology will likely exceed traditional lighting within the next three years. Terminals procuring new equipment for delivery in the coming years can now incorporate LED lights into equipment specifications and be confident in both the performance and expected savings once in operation.

## On the road to improvement

Increasing environmental regulations, along with the need to lessen costs and increase productivity, are placing tremendous pressure on port and terminal operators. Finding solutions is challenging, but advances in technology have addressed these issues. Incorporating high-performance LED luminaires into port container cranes provides the necessary illumination that allows crews and automated machines to work with maximum efficiency and safety. WPD

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