Georgia's Garden City Terminal before and after Musco's work

Enlightened thinking

Lighting manufacturers are challenging port facilities to make the transition to newer types of energy-efficient technology, as Emmanuel Mair reports

Anyone tasked with the day-to-day running of port operations will be familiar with the usual discourse about increasing efficiency. Yet management is all too aware that some solutions such as investing in new infrastructure are costly. Meanwhile, more automation always runs the risk of upsetting workers.

In this climate, lighting offers a "quick fix". At least, that is the opinion of Yazi Fletcher, chief technical officer at Phoenix Products Company, based in Milwaukee, Wisconsin. Speaking to *CM*, Fletcher said: "When your energy cost is high, you're going to adopt a new technology that saves you 70% of the energy. It's a quick fix to save energy by changing your light fixtures instead of changing your motor or going to shore power. Those are expensive changes."

The general trend in the industry over the past year has been to switch from legacy technologies such as high-pressure sodium (HPS) to newer lighting solutions such as light-emitting diode (LED) and light-emitting plasma (LEP).

As shipping lines are using bigger ships, with the average size of new-build doubling from 4,000 teu in 2009 to 8,000 teu in 2014, there is a greater need for bigger port equipment to handle them. Thus, post-Panamax and super post-Panamax cranes are becoming more common, and LED manufacturers are taking advantage of this.

Phoenix's new LED Cube-Light product

Fletcher is a firm believer in LED, explaining: "As you raise a crane, you need to put more lighting on it because it needs to shine a longer distance. If you imagine a flashlight held above the ground, the higher you raise that torch, the bigger the beam spread, and you want to control that light over that area of lighting. LED allows you to optically control a light source because it has multiple light sources with lensing, allowing you to cover a specific area."

He continued: "Previously with existing products, the more you raised the crane, the more fixtures you needed. But with LED you don't necessarily have to add more fixtures since you have the ability to optically control them better. So there's energy saving there. Also, you don't get the same light pollution because you have better optical control."

Phoenix's newest product is the Cube-Light, a 13W LED floodlight, which has a weight of 2 lb (0.91 kg). Fletcher believes that the low wattage and light weight of the product will make it attractive to customers for walkways, machinery houses and other small areas that require good lighting.

He said: "Because it's lower in wattage, you can use a lighter-gauge wire – so you're using less weight. I know that on a crane it doesn't sound that important, but it's lighter in every way. You're saving energy and saving cost on the installation because you've got a lighter-weight product."

Another area where efficiency can be improved is related to automation. Fletcher expects this to become more prevalent in the lighting sector over the next two years with wireless control systems that operate the lights.

He added: "By integrating a control system, you get longer life out of your equipment. Phoenix has already started installing on-and-off switching for lights so you can turn them off in automated areas."

With expectations of more new installations and retrofits of LEDs over the next few years, Fletcher is confident that Phoenix will achieve significant growth. He summarised the situation: "Every port operator analysing

lighting options for new or retrofitted equipment would benefit by considering new technology like LED and plasma. It's hard to justify a 10-month-life lamp with a traditional fixture when you can get 5-10 years from an LED product."

High mast applications

While LED lighting is typically used for mobile equipment, LEP has tended to be more commonly used for high mast lighting. Last year, a study by the Pacific Gas and Electricity Company (PG&E) found that, for high mast applications at full output, LEP lighting could produce energy savings of 52% compared with HPS.

Furthermore, findings at a site in northern California showed that a wireless control system installed with LEP lighting could provide combined energy savings of 67% compared with the existing HPS lighting, with 32% savings compared with LEP lighting without active controls.

The LEP fixtures used in the study were manufactured by Bright Light Systems and John Chalmers, the company's director of marketing, sang the praises of the plasma-based solutions they offer. He said: "We've seen plasma lighting as a good fit in the high mast application due to its lumen density – it's 100 times denser than an LED. It's able to cut through a lot of fog and put light on the ground in challenging port applications."

He added: "With that said, LED has made some good improvements and strides to try and target the high mast market. But LEDs have had their challenges with managing the light on the ground and managing the thermal dissipation that comes with putting such a high number of high-brightness LEDs in close proximity to each other and managing the heat that's generated."

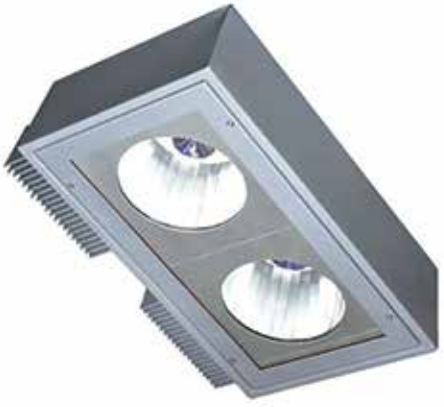
This year, Bright Light Systems introduced a new optical distribution element – a type IV Asymmetric optic for its BLP1000 high mast lighting product. This has received interest from customers looking to replace 1,000 W floodlights at ports and airports.

In August, the Georgia-based manufacturer announced that it had replaced 48 400 W HPS lights at San Juan Airport in Puerto Rico with 48 160 W plasma BLP400 luminaires, with added wireless lighting controls and motion sensors. Randall Corsi, special projects manager at Aerostar Airport Holdings, claimed that the plasma solution had increased energy efficiency by 75%.

Bright Light Systems has also replaced 1,000 W HPS fixtures with LEP lighting at the Port of Seattle and the nearby US Naval Station Everett, with the latter projecting energy and maintenance savings of over US$20,000.

While the PG&E report did also mention some teething problems related to dimming and wireless controls, Chalmers outlined some new plans: "We're innovating by integrating advanced wireless controls with LEP, which is a solid state technology. We actually couple wireless controllers with each fixture that we deploy into the field. This allows us to monitor the kW/hour usage and also to control the on/off dimming profiles for these fixtures."

He continued: "Data management and control are performed by our Bright Light Management System software, which is a cloud-based enterprise application that our customers use to achieve up to 25–30% energy savings on top of what they save on hardware replacement alone."



BLP1000 high mast fixture from Bright Light Systems

Bright Light Systems was named New Company of the Year in the 2014 Governor's International Awards

Mixed sources

These two examples lay out a strong case for newer types of lighting technology. Therefore, a necessary issue to consider is whether other lighting sources still have a part to play in the industry. As Tom Morrison, global accounts manager for area lighting at Musco Lighting, points out, decisions by ports on equipment may not always be so simple.

Describing the Iowa-based company's strategy, he said: "A lot of people right now in this industry are saying, 'LED or LEP plasma is the greatest' and they are moving forward with these types of solutions. However, Musco has been doing this for nearly 40 years. We listen to what the client is most interested in. We continue to sell metal halide equipment with our efficient Life-Structure Green system and we see a lot of benefits with that."

He added: "We also offer solutions with an LED light source. There's a lot of interest in LED and we are absolutely capable of that and provide that on projects. We try to listen to where the balance is for our customers. Energy savings, maintenance, initial capital cost – all those things play into what solution is going to fit best for that particular facility."

One of Musco's customers, the Georgia Port Authority, has acquired a "customised" lighting solution, which is estimated to save it US$636,000 annually. Morrison explained: "Since the terminal was moving towards automated operations there was no longer a need to light the entire area. So we strategically aimed the fixtures towards the high-traffic areas, further improving efficiency."

The metal halide solution provided has reduced energy consumption by 65% and annual CO_2 emissions by 3,569 metric tonnes, and has eliminated maintenance costs for 10 years. It also allows for system performance monitoring and flexible management of the facility, with scheduling capabilities

using web-based software and a 24/7 call centre.

Other recent projects include the Global Container Terminal in New Jersey, where Musco was responsible for all the new lighting plus retrofitting part of the old terminal, and the intermodal container transfer facility in Port Everglades. There have also been rail projects in the form of the BNSF railway in Portland, Oregon and the Union Pacific Rail Facility in Santa Teresa, Mexico.

Morrison emphasised that Musco's status as a complete solutions provider was a key reason behind its recent success. He said: "We are looking at it from a beginning to end sort of philosophy from a customer base. Our Light-Structure Green system provides customers with a complete solution from foundation to pole-top."

He continued: "That doesn't mean that we don't do retrofits on existing poles or products. But looking at newer areas, we can provide a complete solution that is custom-built 100% by us – versus splitting that out, buying the pole from someone, buying the electrical material from someone, buying the lamp from someone."

As for future growth, Morrison tends to agree with the broad consensus that it will be driven by new technologies. He noted: "Older facilities that continue to spend money on high energy costs will look at our LED solution as it further reduces energy consumption, offers superior spill/glare control and better aiming logic, and eliminates long-term maintenance with our comprehensive warranty."

Georgia's Garden City Terminal received a customised solution from Musco

It seems evident that, while lighting manufacturers may have differences in strategy, they all agree that it is a no-brainer for ports and other transport networks to modernise their lighting solutions.

Morrison summed up the feeling, saying: "When you have facilities that have older systems, when they have a significant power requirement, when they're using the facilities for a significant amount of time, over 4,000 hours a year, lighting should be a vital factor in what these ports are taking a look at."