

the world, but users want a better system to track backwards compatibility of new components across older cranes.

One customer remarked that ZPMC has focused on building new cranes, but making money from these is difficult, while service is where the real value of a crane supplier is measured. Another customer remarked that with a fleet of more than 5500 STS, RTG/RMG cranes in the world, ZPMC has an opportunity to shift to being a service provider offering "whole life" service.

ZPMC has secured a break-

through in automated yard cranes with a contract to refurbish 24 RMGs at HPH's Hong Kong International Terminals (HIT) with automated crane control systems and remote control stations. ZPMC has delivered ASCs previously, but the drives and controls have always been supplied by a specialist - ABB, in particular.

For the HIT project, ZPMC will supply automated crane control "with independent intellectual property rights used in the actual automated container terminal project, which indicates a key step in the field of Terminal

Automation Technology for ZPMC electric company," said ZPMC in a statement. ZPMC Electric Company is a new division that ZPMC has formed to engineer drive and crane control systems.

The cranes will be refurbished and refitted over a period of two years. The controls include an anti-sway system that controls spreader tilt during stacking. The remote control station consists of 12 stations to manage the 24 cranes over six blocks, and the productivity requirement is 30 moves/hour under "general traffic conditions." □

LED lighting for cranes

US-based Phoenix Products has launched a range of LED light fixtures designed for applications such as STS container cranes



Phoenix's "ModComHi" floodlight

There have been major advances in Light Emitting Diode (LED) lighting over the last five years and lighting industry giant GE is forecasting that LED will take over the market within a decade.

LED lighting offers lower power consumption, longer life (50,000h is widely given as the service life of an LED) and it is free of mercury. Until recently, however, LEDs were available only with low light output and were very expensive.

The LED challenge

Phoenix Products is based in Milwaukee, Wisconsin and has been producing industrial lighting for mining and heavy crane applications since the 1950s. The company philosophy is "Durability by Design" and its niche is heavy duty fixtures built to withstand extreme shock and vibration, and corrosive environments.

Phoenix believes that LED fixtures can be engineered for heavy industrial applications at an affordable cost. Until recently light output was the main limiting factor; seven years ago the best LEDs produced a maximum of 30 lumens (lm) per watt (LPW). Today high quality LEDs are producing 150 LPW.

By combining multiple LEDs in a fixture, it is possible to produce enough light to replace 1000W metal halide of high pressure sodium floodlight. Suppliers have also found effective ways to soften harsh white LED light by coating the diodes with phosphorous and the sharpness and clarity of LED light can be better than traditional light sources.

LEDs are not a standard product and the quality of components and performance of fixtures varies considerably. However, Phoenix is confident that the point has been reached where it can source reliable components from reputable companies to build LED fixtures that can deliver more than 50,000 hours performance.

Cost has fallen, but LEDs still require higher investment than traditional fixtures. However, if the

50,000h performance can be achieved, maintenance savings in industrial applications are significant.

Many lighting suppliers advertise that LEDs are perfect for rugged applications because they are solid-state; there is no filament or bulb to break. Yazi Fletcher, vice president, engineering, at Phoenix, said this view is based on three common misconceptions about LEDs: that they enable smaller light fixtures; run cool; and are not affected by vibration.

Three part work

An LED light source comprises three main parts: the LED array, heat-sink and driver. While an LED uses less energy than an incandescent bulb, it still loses 82% of that energy as heat. That heat does not radiate outwards, but builds up in the LED array and other components. LEDs produce their maximum light at their design temperature. Unless heat is properly dissipated, light output falls and the LED lifespan is cut.

LED floodlights combine up to 10 LED modules in one fitting. Without effective heat dissipation the LEDs in the middle of the fixture will dim and fail prematurely, resulting in blackspots in the light pattern.

Phoenix has designed aluminium heat-sinks for each fixture to maximise heat dissipation and prolong the life of the LED modules. Other heat control measures include leaving sufficient spacing between LED units, and painting the units white to reduce heat absorption from sunlight.

With regard to the solid state of LEDs, this is true only of the LED array itself. The driver and all internal connections still have to be protected from vibration and shock. Phoenix uses various measures including sealing arrays with optically clear silicon, encapsulating drivers to protect from moisture and heat and using stranded wire, which withstands vibration.

Fletcher also makes the point that long life low energy lighting is "green," but unless fittings can be repaired and upgraded that label is misleading. Phoenix designs its fittings so that all the components can be replaced individually if required, and it has standardised the driver current so users can take advantage of new arrays or drivers as LED technology develops.

The fixtures

Phoenix's LED range includes the VA-LED series 12W and 16W fixtures designed to replace INC and CFL "jelly jars" commonly used as door lights on machinery control rooms. Another product, the RSL Series, has the same mounting footprint as Phoenix's linear fluorescent fixtures commonly used inside machinery control rooms.

Georgia Ports Authority has taken its first step with LEDs on a crane by replacing seven fluorescent fixtures in an electrical control room with five Phoenix RSL 2 module LED fixtures using 52W per fixture. The LED lights were fitted in the same locations, using the exact same mounting brackets as the fluorescent fixtures.

Three of the original fluorescent fittings were provided with an emergency battery back-up and four were mounted on the ceiling (offset from the centre be-

cause of HVAC systems). With the LED fixtures there are two fewer fixtures on the ceiling, while three are still needed for emergency lighting above the doors and directly over a circuit breaker cabinet. The five LED fixtures achieved a light intensity of 27 footcandles compared to 25 footcandles with seven fluorescent fixtures. The power requirement fell from 340W to 260W, a 30% reduction.

For crane floodlighting applications, Phoenix ModCom Lo and HI industrial floodlights produce 12,500lm from 150W up to 25,000lm from 300W. The lighting output and coverage of the larger LED floodlights are sufficient to replace metal halide floodlights on container cranes without having to increase the total number of fixtures.

The fixtures are designed for 50,000h life, and this includes all components. Ryan Hertel, director of business development at Phoenix, said this compares to 15,000-20,000h for high pressure sodium or metal halide fixtures. "No parts or labour costs for ballast or lamp replacements are the biggest cost saver for terminal operators and ports," he added.

On retrofit projects, Phoenix LED light fixtures can be mounted in the same locations as metal halide fixtures and Phoenix uses the same size mounting brackets to make this process easier. On new cranes, however, the lighting system can be designed differently to maximise the benefits of LEDs, and Phoenix is now working with leading crane consultants and crane manufacturers on crane specifications.

One challenge that has to be addressed is that lighting fixtures are commonly specified by wattage. The most recent crane specification from the Port of New Orleans for example requires 3 x 750W floodlights on each portal beam, 2 x 750W floodlights on the portal beam facing outwards and 4 x 1000W floodlights on the trolley cab structure.

Allowing LED lights will require specifying lights by another measure, such as lm or footcandles (a measure of light intensity) and addressing the characteristics of LED fixtures that are suitable for crane applications.

Another point is that ballast in the machinery house for metal halide lamps is no longer required, and this will change the general wiring layout. The lower power requirements of LEDs also enable crane OEMs to use smaller, less expensive cabling and conduit. □

A Phoenix Products' floodlight in a mining application



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