

Seeing Aids-to-Navigation in a New Light

Carmanah Technologies Corp., Victoria, BC, Canada

The Suez Canal stretches more than 163 kilometres through the Egyptian countryside, accommodating about eight per cent of the world's shipping traffic. Equally impressive is Australia's Sydney Harbour, an international landmark and tourist destination as well as a busy working port. What do these two high profile maritime icons have in common? They are similar in their lighting choice for their aids-to-navigation: solar-powered LED marine lighting. In fact, the world's leading maritime authorities, including the UK's Trinity House Lighthouse service, the United States Coast Guard and the Canadian Coast Guard are equally attracted to this advanced aids-to-navigation lighting technology. Solar-powered LED marine lanterns guide thousands of vessels and millions of tonnes of shipping cargo safely through channels, ports and harbours in countless waterways throughout the world.

LEDs – changing the way we light our waterways

Imagine an LED as a tiny light bulb, but without a filament. LEDs are dissimilar in many ways to the common light bulb. Unlike incandescent bulbs, LEDs utilise 90 per cent less energy and are unaffected by shock and vibration. With an operating life of 25 years or more, LEDs are powerful and long-lasting, virtually eliminating maintenance pertaining to changing bulbs and ballasts. LEDs convert electric energy directly into light via the movement of electrons in a semiconductor material. LEDs use 'cold' light generation technology, producing light in a visible spectrum and therefore producing negligible amounts of heat. This eliminates wasted energy in the form of heat and makes LEDs a more efficient lighting technology. Incandescent bulbs, on the other hand, produce great amounts of heat as they produce light in the non-visible or infrared portion of the spectrum and are significantly less efficient than LED counterparts.

LEDs are an incredibly efficient light source, and with advancements in LED colour and brightness consistency, LEDs are now used in the creation of progressive innovations that were previously unattainable. One of these innovations is the LED marine lantern.

The synergy of LEDs and solar power

Self-contained solar-powered lanterns are the result of a natural synergy between highly efficient LED lights, state-of-the-art solar panels and superior battery technology. The result is a marine lighting solution that offers harbours and ports a cost-effective and reliable way to light their aids-to-navigation.

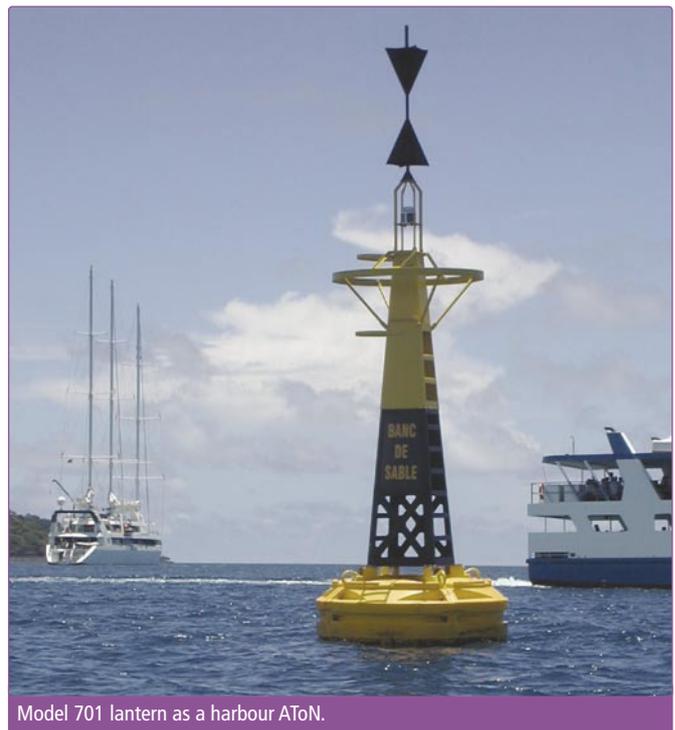
The most innovative feature of self-contained LED lights is their low voltage which allows them to operate autonomously for long periods of time with relatively small battery capacity. This specialisation enables the use of a compact solar-powered charging system that can be fully integrated into the unit's design.

By eliminating the need for external cabling or connectors, self-contained solar-powered LED lights can also be completely sealed. Many of these units are developed free of gaskets and grommets allowing them to remain impenetrable to salt water and UV ray damage. In addition, installation on buoys and other navigational aids is completed within an hour, and the lights can



Model 701-5: GPS lantern used as a lead light in Busan Newport, South Korea.

Photo courtesy of Dongkang M-Tech Co., LTD



Model 701 lantern as a harbour AtoN.

be programmed to meet user requirements. Solar-powered LED lights exceed reliability criteria, and once installed maintenance requirements reduce to zero.

These unitised systems are extremely durable and perform reliably anywhere in the world: they withstand extreme swings in ambient temperature, shock, heavy vibration and UV degradation. It is not uncommon to hear of such lanterns being submerged in water for lengthy periods of time only to resurface still working.

Solar-powered LED lighting applications

With emerging smart technologies, the range of marine and land use applications for compact, solar-powered LED lighting



Solar-powered floodlight and security camera installed in inner-harbour, Victoria, BC, Canada.

is experiencing unprecedented growth. Previously, areas where illumination was deemed unfeasible were left without light. With innovations in solar-powered LED technology, it is now impossible to imagine any place in the world without light.

As can be expected, these unique lanterns are finding uses in more than just the marine environment. The self-contained and maintenance free nature of this technology lends itself immediately to land-based applications. A natural market extension for solar-powered LED lighting can be found in variety of other products, such as solar-powered flood lighting for docks and harbours, solar-powered security cameras for port security and solar-powered engines that provide clean, reliable and free energy to power all manner of equipment. These systems install quickly, without any trenching, cabling or site remediation and operate independently of the power grid. Solar-powered lighting and solar-powered systems pay for themselves within the first two years of operation based solely on the reduction or elimination of ongoing electricity costs.

While compact solar-powered LED systems address many lighting requirements, earlier versions of the technology were engineered to perform in the worst weather conditions as they were unable to 'sense' the environment and regulate themselves by calculating average daily ambient light levels. New technology now allows the solar-powered LED lights to automatically adapt to the solar environment where they are installed, greatly extending performance and reliability while reducing component size and associated cost. Next generation solar-powered LED lights monitor the charge received by its batteries over the course of the day via the solar panel(s). Through a sophisticated algorithm, the lights recognise any trend in battery voltage levels to develop

an approximate understanding of its installation location and/or prevailing weather conditions. With this information, the units self-adjust their light output to ensure continuous, reliable operation 365 days a year.

Marine-based transportation applications

The most obvious applications for solar-powered LED lighting in a port scenario are aids-to-navigation lighting, channel marking, lighting mooring buoys, and lighting docks and shoreline infrastructure. Since 2002, solar-powered LED lights have steadily gained acceptance as the most cost-effective, low maintenance and reliable choice for marine navigation aids. Today, solar-powered marine aids-to-navigation can be found guiding maritime traffic around the world from Hong Kong Harbour to the Port of Rotterdam, Holland.

Port and harbour security

Security issues are a primary concern with all businesses, and ports and harbours are not exempt from threats to security or potential acts of terrorism. With the advent of low-voltage, wireless camera technology, solar power can be applied to enhance port security. Solar power provides the capability to install entirely autonomous security cameras in locations that were previously considered unfeasible or uneconomical. Other potential applications include motion sensors, alarms and wireless communications, all geared towards taking advantage of compact solar power systems.

Flood lighting

To enhance security throughout ports and harbours, durable solar-powered floodlights install quickly and efficiently to provide light in locations where power is not available. In addition, without a static infrastructure, lights can be relocated where and when required.

Alternate power supplies

Larger solar-powered systems offer a practical and innovative alternative to power buildings and equipment reliably and cost-effectively. As a stand alone unit or as a system working in conjunction with the electrical grid, solar engines are already in use by ports around the world.

Summary

Continuing advances in LED technology are enabling the creation of new synergistic technologies. The introduction of solar-powered LED lighting for aids-to-navigation has been adopted by some of the world's leading waterway authorities for their ease of installation and cost savings in infrastructure and maintenance. As more efficient, 'smart' technologies continue to be developed it becomes easier to install lighting solutions for safety, security and communication equipment, and to expect reliable, maintenance-free performance for years. LEDs and solar power are making it possible for businesses and authorities worldwide to solve real lighting and power problems, be they marine or land-based. In an increasingly environmentally conscious world, solar power also provides cost-effective, clean and renewable energy solutions that don't contribute to greenhouse gas emissions.

ABOUT THE COMPANY

Carmanah Technologies Corp., manufactures renewable and energy-efficient technology solutions, including solar-powered LED lights, LED illuminated signs, and solar power systems. Carmanah's technologies are used extensively in the industrial, marine, aviation, transportation, recreational, and point of purchase markets.

ENQUIRIES

Building 4
203 Harbour Road
Victoria, British Columbia
Canada V9A 3S2

Tel: + 1 250 380 0052

Fax: +1 250 380 0062

E-mail: info@carmanah.com

Websites: www.solarmarinelights.com & www.carmanah.com