RESILIENT
TOUGH LIGHT

WHITE PAPER

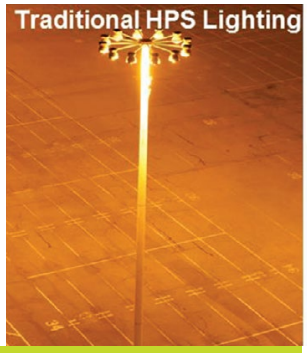
Key Considerations for Transport & Logistics Lighting

WHAT'S INSIDE:

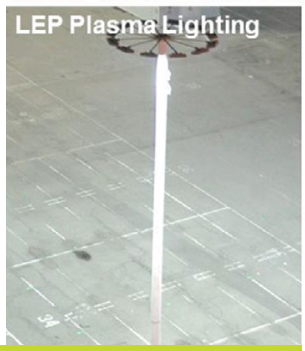
MAY 2015

INTRODUCTION

Lighting is essential to the safe and secure operations of transport and logistics facilities, including sea ports, airports, truck terminals, and railways—especially at night and during extreme weather conditions. It provides workers with a safe environment to perform their duties safely, effectively and comfortably. When deployed properly, lighting offers uniform illumination over large areas, allowing for accurate color rendering, and with minimal glare so that workers can easily and safely discern their surroundings.



1000W HPS, 20,000 Hour Life,
High Glare, 20 CRI



500W LEP, 50,000 Hour Life,
Low Glare, 80 CRI

Figure 1. A typical 12 luminaire high mast pose before and after replacing traditional high pressure sodium lighting with Plasma lighting (LEP).
Photo courtesy of Brightlight Systems.

With recent advances in LED and plasma lighting, transport and logistic operators can achieve substantial savings in energy and maintenance costs. Today, LED and plasma technologies use 2–3 times less energy and require up to 90% less maintenance compared with traditional Metal Halide and High Pressure Sodium High-intensity discharge lamp (HID) lamps. These efficiencies have propelled lighting to the forefront of worldwide initiatives for sustainability and cost reduction at transport and logistics facilities. Ports and railways are now upgrading their mission-critical lighting systems to achieve rapid payback on investments, better light quality, and more precise lighting control. This white paper discusses the major lighting applications within the transport and logistics sectors and the key considerations when upgrading to LED or plasma lighting.

Within any transport and logistics facility, there are different lighting applications—each with specific requirements in regard to light levels, mounting heights, spatial layout, and accessibility. Resilient provides proven solutions to match each application with the most suitable technology, ensuring that these facilities are running efficiently and on budget. Resilient ensures that sea ports, airports, and railways can save energy and reducing maintenance costs, while improving safety.

"Ports and railways are now upgrading their mission-critical lighting systems to achieve rapid payback on investments..."

APPLICATION AREAS

SEA PORT

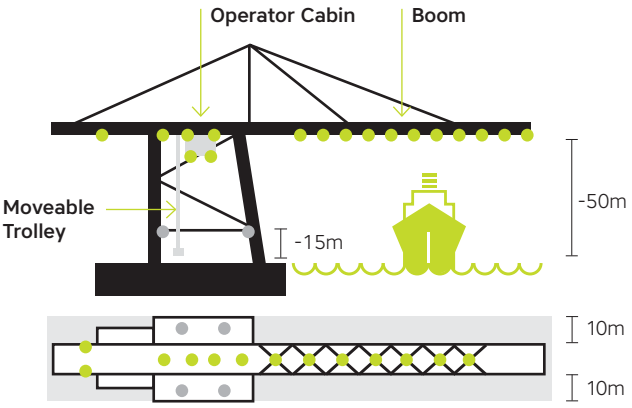
Port lighting enables crane operators and dock workers to safely handle goods and equipment, provides security around the facility, and creates a well-lit environment without spilling unwanted light into the surrounding community. The lighting system must be able to keep up with the 24/7 operation of the port and withstand the harsh conditions of a wet marine environment, including high winds, heavy rains, corrosive salt fog, and extreme temperatures.

Crane Lighting: Cranes are essential pieces of port equipment used to transport cargo from ships onto loading docks (Quay cranes) and within container yards (RTG cranes). The targeted work area where containers are loaded and unloaded needs to be illuminated from above with mounting heights often exceeding 30 meters. These pieces of heavy equipment require high levels of illumination, often greater than 150–200 lux, so that operators can safely handle the cargo. In addition, constant vibrations from crane movement create a challenge for lighting equipment. Therefore, luminaires must be bright and be designed to withstand such mechanical stresses.

High Mast: Large storage yards with rows of container stacks need a sufficient level of horizontal illumination on the ground and vertical illumination onto the container walls so that workers can safely and efficiently navigate the area. This is typically accomplished by

Figure 2. CRP0400 uses a specially designed high efficiency narrow beam optic that provides ideal illumination for cranes without any noticeable glare and greater than 90% efficiency.

QUAY CRANES



Med output Flood (400–600W)

High Output Beam (1000W HID)

Lighting Requirement:

100 lux average
Min/Ave uniformity of 0.5

Quay cranes are used to move containers from a sea vessel onto a cargo truck. They require a very high level of uniform illumination for operating the trolley safely—typically 100 lux under the boom arm and 200 lux under the operator cabin. This is achieved by installing high output, narrow beam flood lights directly under the boom arm 50m high slightly spaced out and medium output, wide beam flood lights at lower heights.

Recommended Products:

CRP0400 for narrow beam
FLL0400 for medium-wide beam

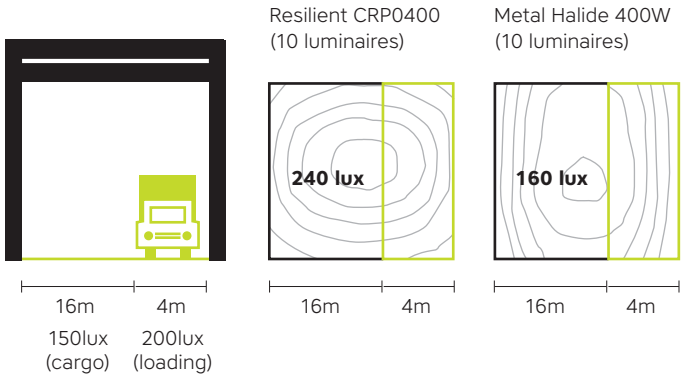
placing lights onto a mast pole greater than 30 meters in height. High mast lights need to illuminate a large area, and the optics must be configurable for the different spatial layouts of containers stacks. Fixtures mounted at such heights need to be able to withstand strong winds and vibration.

AIRPORT

Airport aprons require significant illumination so that ground crews can service planes and operate equipment effectively. To facilitate the activities that occur on the aircraft stand, a lighting system must provide both horizontal and vertical illumination at the apron, while minimizing glare on oncoming aircraft. Apron light fixtures should be designed with specialized optics that precisely illuminate the required surfaces, without adversely lighting unintended areas, like runways, taxiways, and control towers. Aprons are typically lit with flood lights from poles greater than 15 meters tall,

Figure 3. Container yard in an APM terminal in Mumbai, India showing the importance of uniform illumination on horizontal surfaces for navigating around the area and vertical surfaces for indetifying tall stacks of containers. *Installation and photo courtesy of EcoLights.*

RTG CRANES



RTG cranes load container stacks onto transport vehicles and require high levels of illumination. On average, they require 200 lux in loading areas and 150 lux in cargo areas. These areas are illuminated from roughly 20m height.

Recommended Product:

CRP0400 narrow beam

and from two different directions to eliminate shadows. The luminaire design should provide the ability to aim light fixtures with at least two degrees of freedom in order to accommodate any given airplane size. With the availability of advanced LED control systems, airports are starting to require lighting with the ability to dim each aircraft stand individually, while still maintaining light levels in the adjacent stands—a feature not possible with traditional lighting.

RAILWAY

In order to continue railway operations into the night, rail yards require sufficient lighting to conduct trains and identify potentially hazardous situations. High output luminaires are needed to not only provide visibility on the tracks and loading areas, but also to create a safe environment by providing illumination for closed-circuit television (CCTV) surveillance. It is also important that the fixtures do not produce light pollution into the surrounding neighborhoods. For such applications, high mast lighting with precise cutoff is generally used to ensure that a large area is illuminated, and that the fixtures are not in the way of rail yard operations. High masts installed in railway yards experience severe vibration from passing rail cars, which often cause fixtures to fail prematurely. As a result, they need to be designed to tolerate frequent movement.

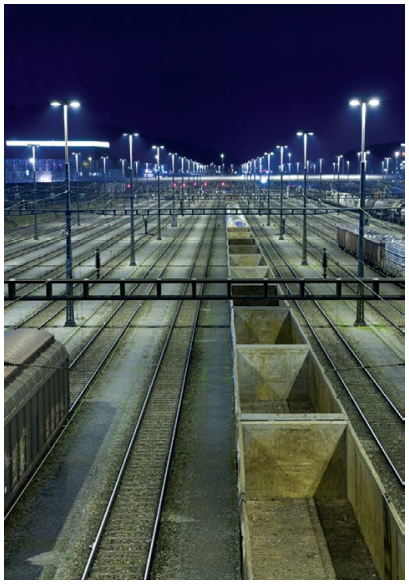
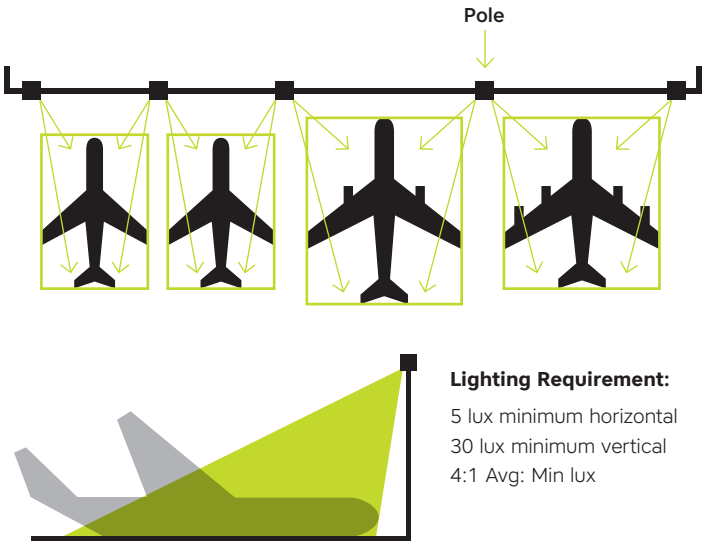


Figure 4. Railway Yard Lighting using LED

APRON LIGHTING



Airport stands are lit from luminaires mounted on poles or terminal buildings usually 50m or highter according to ICAO and FAA standards. Each aircraft stand is required to be liet to the farthest corner with a minimum light level of 5 lux measured horizontally and 30 lux measured vertically at 1m working height from the ground. No more than two poles can be utilized in order to minimize shadowing. Each stand must also have redundancy in case of unexpected failures and the ability to dim individually. To satisfy all of these requirements, apron lights need to include specially designed optics, mounting, and control features.

CRITICAL LIGHTING FACTORS

DIRTY OR INDUSTRIAL POWER HANDLING

Voltage and current fluctuations in power lines are a known problem in transport and logistics facilities. Large temporary surges in power can be caused by lightning storms, but more often the facilities are impacted by smaller, dirtier surges from load switching, and the use of low power factor devices. Constant dirty power use over time will lead to premature lighting failures. **Resilient's power solutions counteract and guard against this at the individual luminaire level by utilizing proprietary protective circuits to defend against various types of dirty power.**

GLARE CONTROL

When illuminating large areas, such as container yards or airport aprons, individual luminaires need to produce a great deal of light, which can often cause glare and excessive contrast when looking toward them. Glare can be uncomfortable and distracting to workers, greatly hindering their productivity and potentially compromising their safety. **Resilient's precise optical system design, combined with the proper lighting scheme, can provide an environment with minimal glare.**

VIBRATION TOLERANCE AND HIGH WIND LOADING

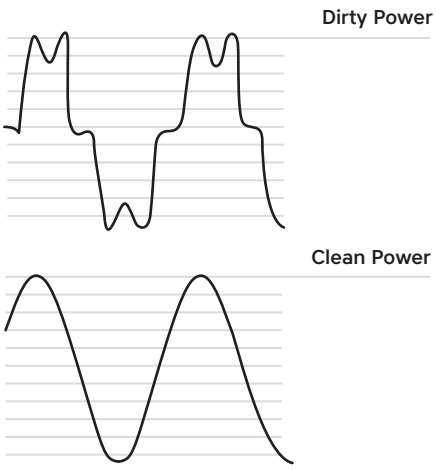
The lighting used in transport and logistics facilities are often hung on high mast poles or tall cranes exceeding 30 meters. Subject to extreme winds and continuous vibration, amplified by heavy machinery on the ground, the luminaires must be able to endure these unstable conditions. **Resilient's choice of components and smart luminaire construction provide light fixtures that are vibration resistant and have low wind loading.**

LIGHT TRESPASS

Light trespass is the spilling of light into unintended areas. Airports, seaports, and railways are often located adjacent to commercial or residential properties. It is important that the lighting systems utilized are not a nuisance to the neighboring areas by shining unwanted light into them. **Resilient products have been engineered to illuminate target applications with precision and accuracy.**

"Subject to extreme winds and continuous vibration... the luminaires must be able to endure these unstable conditions. "

DIRTY POWER



Resilient Luminaires can defend against two different types of dirty power: lightning strikes and switching related transients. Lightning strikes can create huge, short-duration high-voltage transients. These surges can be up to several thousand volts in amplitude. Switching-related surges are lower in amplitude, but longer in duration and more frequent.

Most surge suppression devices are only designed and tested for the short duration impulses. But, it is equally, if not more important, for a long-lifetime LED luminaire in a heavy industrial environment to be able to withstand the longer duration oscillatory transients.

PRODUCTS

CRP0400—Plasma

HMP1100—Plasma

RDL0400—LED

ARL0100—LED

Resilient is focused on serving the lighting needs of transport and logistics sector. We develop 'Tough Light' for tough environments with strict safety and compliance requirements. Together with our end users, we identify opportunities for energy and cost savings and tailor our product solutions to meet application specific needs. Please contact us for a site evaluation or consulting at **info@resilientlighting.com.**

RESILIENT

TOUGH LIGHT

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