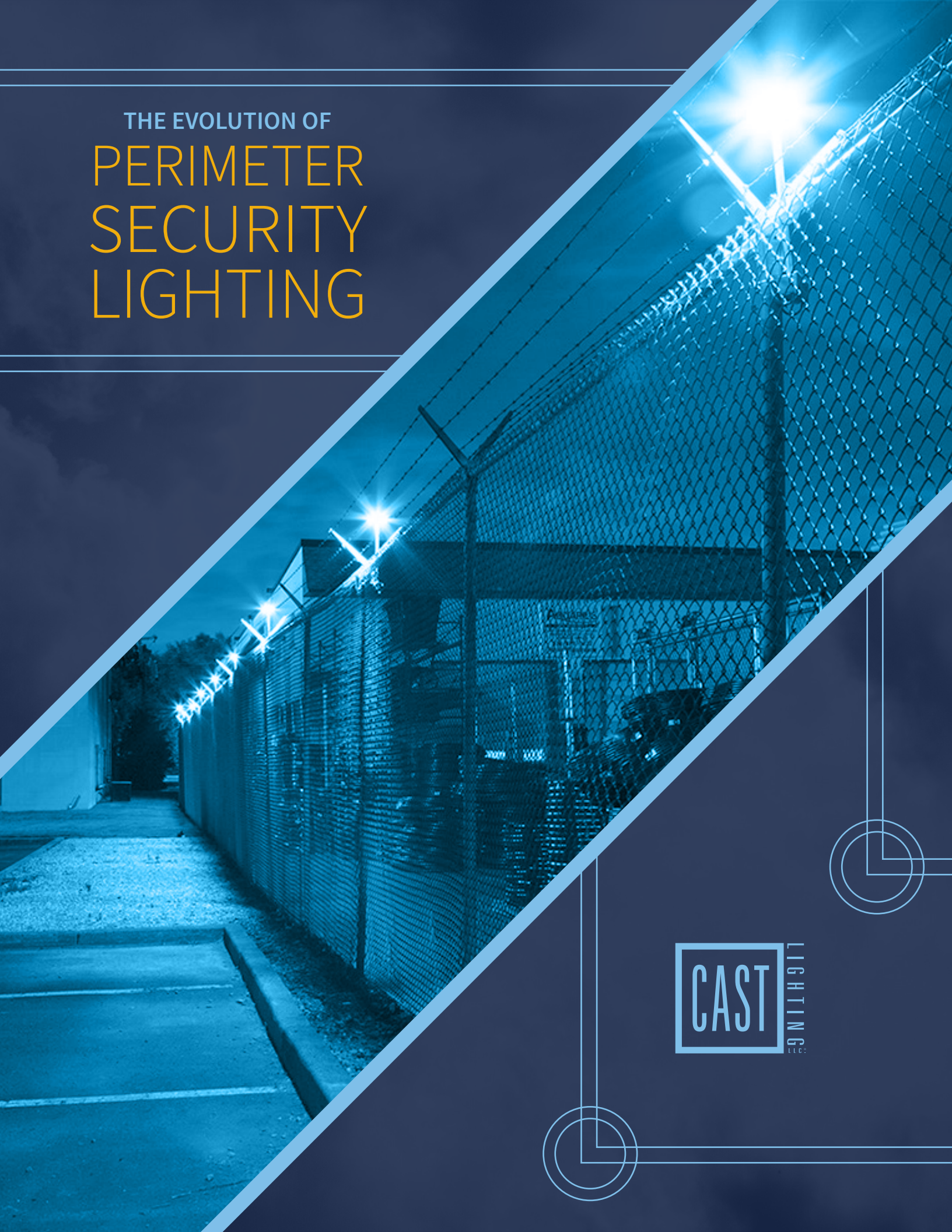
THE EVOLUTION OF

PERIMETER SECURITY LIGHTING



CAST LIGHTING LLC

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INTRODUCTION

> A need exists to deliver low-level, glare-free, even-light distribution across the perimeter fence lines to protect critical assets and people in a way that works with the human eye, the physical surroundings, and current surveillance technology.
>
> **— DAVID M. BEAUSOLEIL | INVENTOR, CAST LIGHTING PRESIDENT**

According to independent studies on crime conducted by the Illinois Coalition for Responsible Lighting, shadows, blinding glare, overly bright nighttime illumination, and uneven illumination are key contributors to creating unsafe situations.

SHEDDING LIGHT ON THE ISSUE

Thousands of miles of perimeter fencing are installed annually in order to protect personal property, critical infrastructure, and individuals from theft, vandalism, and harm. Since most disturbances occur under darkness, adding perimeter lighting is an essential part of every security plan. The role of lighting is to deter, detect, and detain individuals who would attempt to breach a secure perimeter. Before the introduction

of the CAST Perimeter™ Security Lighting system, installing lighting along the fence line was limited to installing lighting products that were designed in another era for entirely different applications such as roadways, parking lots, and buildings.

A BRIGHT IDEA

CAST Perimeter™ Security Lighting system is the first low-voltage fence-mounted security lighting solution designed from the ground up around the needs of security professionals, closed circuit camera systems, the outdoor environment, and interaction with the human eye. The first-of-its-kind, the dedicated low-level glare-free perimeter fence illumination system has evolved into an internationally recognized industry leader and innovator. The CAST Perimeter ™ is a seven-time national industry award recipient and continues to set the industry standard.

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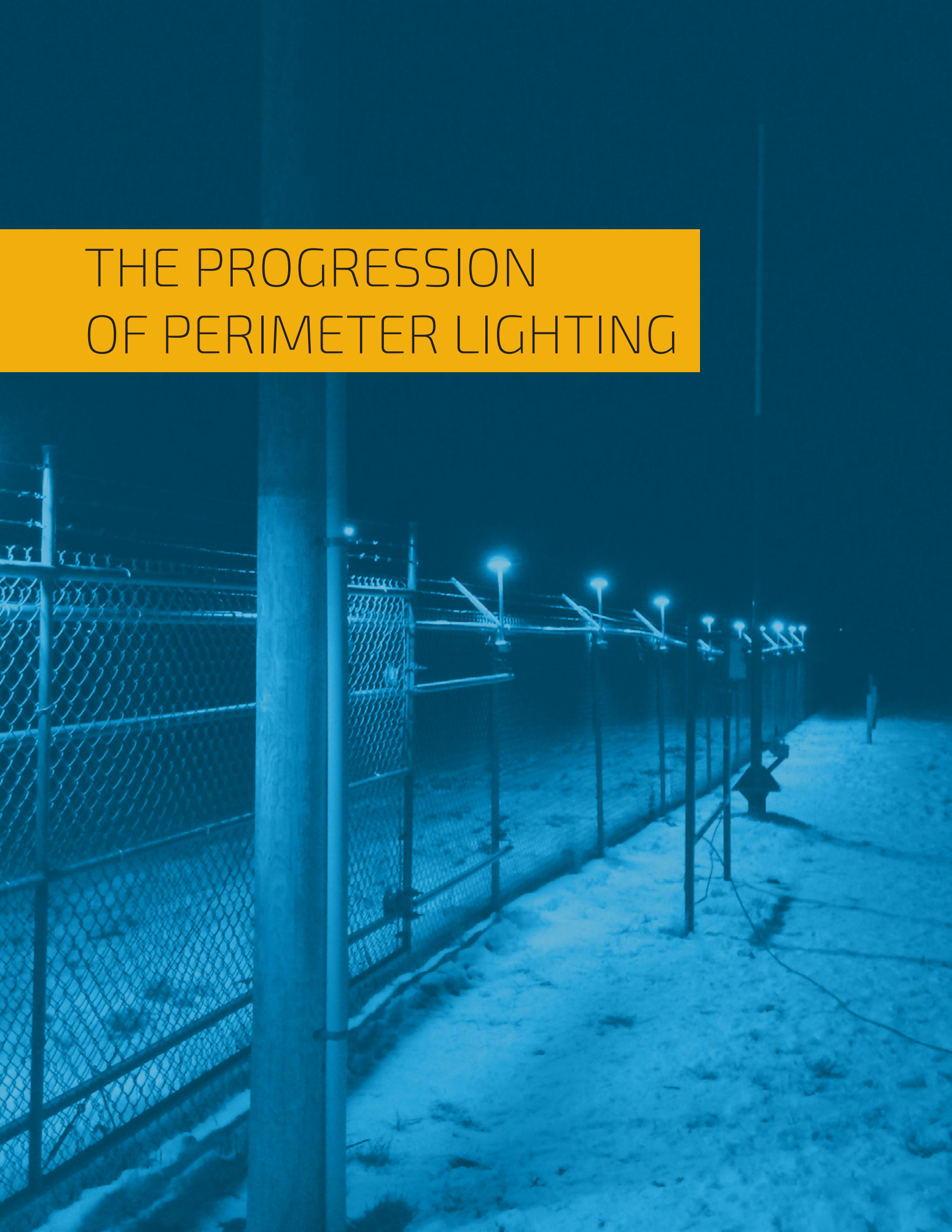
Both our clients and industry associates look to CAST Lighting as a thought leader, abreast of trends and innovations that will directly affect their budgets and needs. In this e-book, we will help you understand the evolution of perimeter lighting; take an in-depth look at industry challenges; and share our inventive solutions that yield superior performance and uncompromising security.

THE PROGRESSION OF PERIMETER LIGHTING



THE HUMAN EYE & HOW IT REGISTERS LIGHT

To navigate and survey your surroundings effectively at night, you don't need as much light as you'd think. So, why spend money on excess lumens, power, and infrastructure only to produce a light level that is ineffective in most security lighting applications? This is the common mistake most people fall victim to when considering security lighting.

More light is not necessarily better when it comes to night lighting. When illuminating for optimal security, it is important to understand how the human eye works and design around these parameters. The iris of the human eye—just like a camera aperture—widens or narrows depending on the amount of ambient light. In the evening, the iris widens to allow in greater amounts of light, adjusting so you can see at night. As a result, the security lighting goal now becomes twofold. The first objective is to create the perfect interaction with human eye for optimal performance; the second is to create the right light setting for CCTV camera operation.

THE INHERENT FLAW WITH LEGACY POLE-MOUNTED SECURITY LIGHTING SYSTEMS

Pole, street, and parking lot lights were never designed specifically for perimeter security lighting camera systems or on-site security personnel. Rather, these lighting products were adapted to meet the need for “security lighting.” Often times, legacy pole-mounted systems deliver way too much light, creating a slue of potential problems including shadows where intruders can hide, blinding glare that renders security personnel ineffective, and making the surrounding unlit areas even darker. Thus, a need was identified for better-targeted perimeter lighting that integrated with human eye and today’s camera technology.

TRADITIONAL LIGHTING, A WAY OF THE PAST

Traditional lighting design has always followed the thought: “More lighting is better.” Many lighting designers today continue designing to specifications using outdated lumen and lux values that were developed in the 1960s, way before the advent of LEDs, precision optics, and complete comprehension of the interaction between light and the human eye.

One important factor that has been ignored over the years is that the human eye will always adjust itself to light levels that are far too bright. As a result, over-lighting has become the industry standard as is the case with most pole-mounted security lighting; unnecessary expenses are made on equipment, energy, and resources that only cause the site to become darker in the surrounding unlit areas, creating hiding places for intruders, and consequently, an environment that is more unsafe overall. While this lighting is adequate for a parking lot or a roadway, it’s unacceptable for security lighting.

Better lighting requires matching the optimal light level for the human eye and effectively working with the onsite camera systems. Providing an evenly-distributed, lower level, glare-free lighting system is the goal of any optimized perimeter security lighting system.

OTHER INDUSTRY CHALLENGES, CAST'S SOLUTIONS

GLARE

Glare is a result of artificial light. It occurs at night when the human eye is most sensitive, which is an important factor to consider when designing any high security lighting system. Virtually all legacy pole-mounted lighting systems create blinding glare.

Glare causes the light-sensitive rods and cones of the eye to become temporarily overloaded, which renders an individual momentarily blind and susceptible to attack. The resetting of the human eye, or adaptation to darkness, can take anywhere from 15 to 60 seconds depending on the severity. This blindness creates vulnerability for onsite security personnel and should be eliminated or significantly reduced.

In addition to eliminating glare, the right light level must be delivered to allow the eye to adjust to the artificial light and become comfortable in the night setting. This eye/site acclimation allows the individual to see into the surrounding darkness, become better aware of the property, and pick up movements that otherwise would be undetected. The improved lighting condition allows security to identify and respond more rapidly to threats than in a glare-filled environment. Glare must also be avoided with all cameras as it reduces resolution quality and increases image contrast, making it more difficult to review captured footage. CAST Perimeter™ Security Lighting uses glare-free technology to avoid unsafe situations that create vulnerability, breaches in security, and poor image capture.

REFLECTIVITY & CHANGING SURFACE CONDITIONS

Closed-circuit camera systems must consider the reflectivity of changing ground conditions caused by rain on plant materials, puddles that create mirrored surfaces, and the reflective value of white snow. Overly illuminated areas cause these conditions to worsen significantly, which interfere with camera images by creating unwanted glare. The CAST Perimeter™ Security Lighting system delivers the right light level, reducing this potential problem before you even knew it was an issue.

EVEN, CONSISTENT LIGHT DISTRIBUTION

Even, consistent light distribution spread across an entire perimeter fence line is critical to avoid eye fatigue, eyestrain, and quality night camera images. Avoiding contrasting brightness levels, especially total darkness (what we call “black holes”) to full brightness (“light bombs”), is paramount for security personnel and camera systems. These site conditions must be avoided at all costs. Such extremes of uneven light levels severely reduce an individual’s ability to process images and capture site-specific threats. The Cast Perimeter™ Security Lighting system provides even and consistent light distribution across an entire fence line or property border without hot spots, black holes, or light bombs with a light level that bleeds off gradually into the darkness to extend the range of the viewing field.

LUX LEVELS: THE HUMAN EYE AND CAMERA IMAGING

The human eye has an amazingly effective working range. For example, the brightest full moon (a harvest moon) is only .108 lux while the typical lux value on a sunny summer day at noon is 107,527 lux. The CAST Perimeter™ Security Lighting system delivers the right light lux level for both effective camera imaging and optimal eye performance at night with the added benefit of greatly reduced glare for both.

> “ The CAST Perimeter™ Security Lighting system delivers the right light level for advanced CCTV camera systems and also allows the human eye to adjust to the artificial light.

Most high quality 2-megapixel cameras and the human eye operate quite well at between 2 to 4 lux. The CAST Perimeter™ Security Lighting system delivers the right light level for advanced CCTV camera systems and also allows the human eye to adjust to the artificial light and see into the surrounding darkness. This achieves the main objective of producing a more secure site condition.

A BETTER DEFENSIVE LIGHTING LINE

Legacy pole-mounted light covers much larger areas, however, this isn't a solution by itself. The typical pole spacing is usually 100 feet (30 meters) apart. However, should a legacy pole-mounted fixture fail, the resulting unlit area is considerable, which creates significant vulnerability to the security of the perimeter. CAST's Perimeter™ Lighting System, on the other hand, spaces poles typically 20 feet (6.09 meters) apart for added security. Should a Cast perimeter fixture fail or break, coverage is not completely lost as the two adjacent fixtures provide overlapping or backup light coverage. This redundancy is extremely valuable when properly securing a defensive perimeter.

NIGHTTIME VIDEO SURVEILLANCE DATA STORAGE

Combination day/night surveillance cameras operate as two cameras in one, a daylight camera during the day and an infrared camera at night. Every video surveillance camera system uses some form of digital storage to record events, and the cleaner the image the less storage space on the DVR or cloud storage system is required. Often times when a the infrared camera is operating at night “artifacts” or images resembling snow appear in the scene as a result of the low-light condition which can require 50 to 100 percent additional data storage than during daylight image capture. Thus a need exists to improve surveillance camera images at night while, at the same time, reducing the data storage requirements of the system. This is especially important when dealing with a large surveillance systems as the data space requirement can add up exponentially. The CAST Perimeter™ Security Lighting system applies the right amount of light to enhance camera image quality and also decreases the data storage requirements of the camera system at night.

THE CAST DIFFERENCE

AT A GLANCE

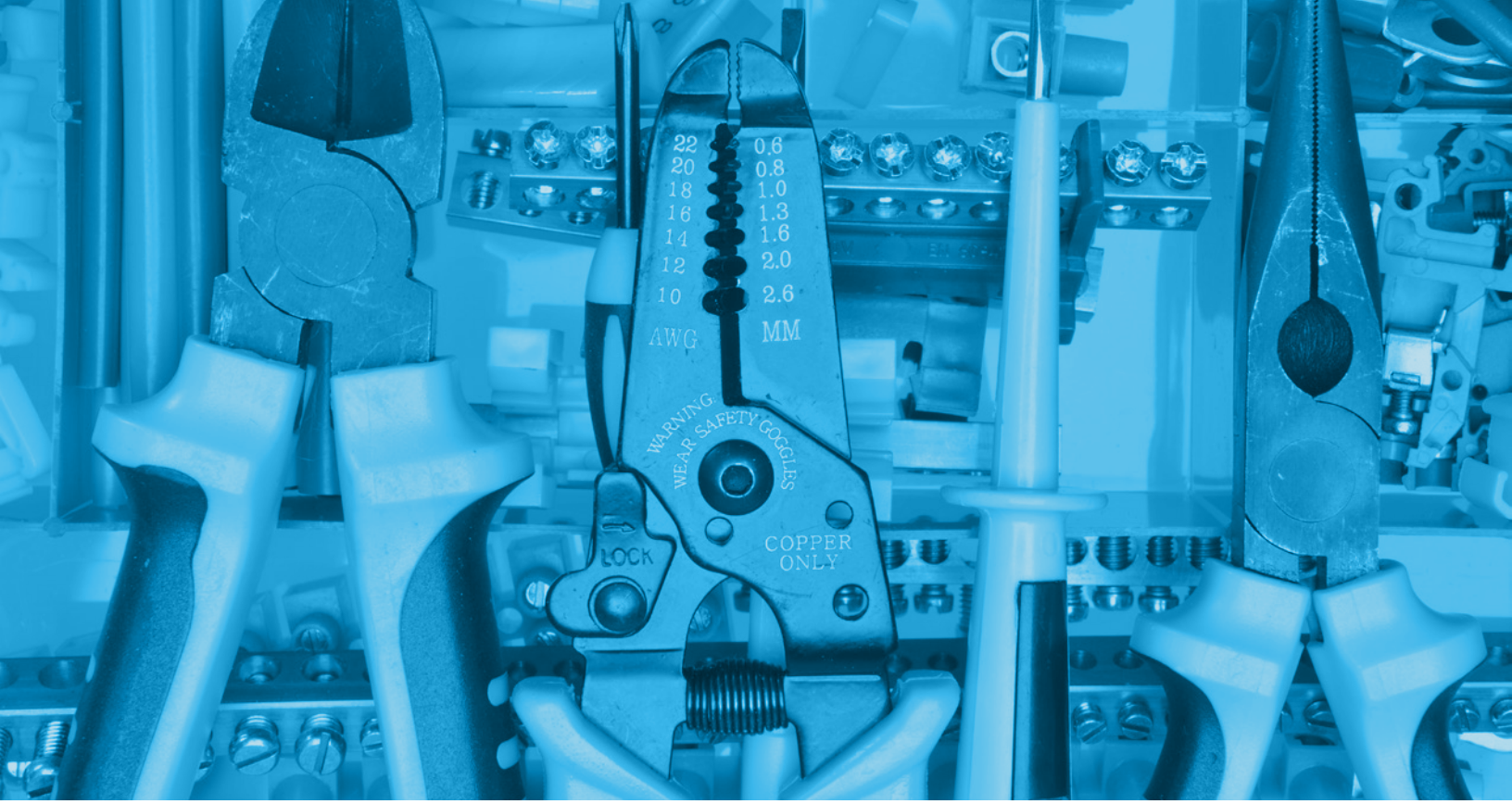
As mentioned earlier, CAST Perimeter™ Lighting optimizes the light source and output to enhance the interaction of light with the human eye and improve closed circuit camera system imaging. Our perimeter lighting system requires minimal maintenance, and completely eliminates the need to pour concrete footings, install light poles, trench conduit, and backfilling, reducing installation expenses and material savings by as much as 80 percent compared to legacy pole-mounted systems. This system uses safe low-voltage power, long-life LEDs, and can be custom designed for any size project or purchased in ready-to-install lighting kits, ranging from 80 to 750 feet in length.

DRIVING THE LED & JUNCTION TEMPERATURE

Every LED lighting fixture designer makes a choice concerning how hard to drive the LED and how hot the LED will become during operation. We operate perimeter LEDs at only 42 percent of the maximum limit of 150^{0}C (64.6^{0} C) and we're more than happy to provide the reports that support this exercise. A good rule of thumb is to never operate your LEDs over 75^{0} C, otherwise they simply will not last the L70-rated life expectancy of 65,000 hours of operation.

SAFE LOW VOLTAGE

Instead of unnecessary high-voltage power, we use low-voltage as a safe alternative. By using 24-volt power, there is never a need to worry about the risks of installing dangerous high-voltage power on the fence line. Low voltage is safe and easy to install and maintain. Unlike 120 volts or 220 volts in a 24-volt system, the direct burial UV-resistant wire that powers the fixtures attaches directly to the fence, which significantly reduces installation time and labor expense.



MAINTENANCE

Legacy pole-mounted street lighting fixtures require large concrete footings, construction cranes, bucket trucks, high-voltage power and yearly maintenance. When these fixtures require servicing, which could be in a remote area, the task requires coordinating sophisticated equipment and expert personnel that are very expensive and often times not readily available. Conversely, the CAST Perimeter™ Security Lighting system uses safe low-voltage power, requires a stepladder, pickup truck, and one man to repair or maintain. It is a quick and simple system to install, service, and maintain, which is extremely important when considering critical high-value perimeter security applications in remote locations.

SAFETY

All CAST Perimeter™ Lighting products are UL Listed to the 1838 and 8750 standard for safety, IP66 ingress protection rated, CE listed, and FCC class B Certified against conducted and radiated emissions (Electro Magnetic Interference [EMI]) which will not interfere with wireless communication signals.

DARK SKY FRIENDLY

Overly illuminated areas create light pollution, which is negatively impacting us worldwide. Light pollution is harmful to our health, the environment, and has a disruptive effect on the world's ecosystems and natural cycles.

> “ CAST adheres to the Modern Light Ordinance, which regulates outdoor lighting in North America to help reduce glare, light trespass, and skyglow.

To do our part, CAST Perimeter™ Security Lighting is dark-sky compliant. In 1988, the nonprofit International Dark-Sky Association was founded to protect the night skies and advocate for environmentally responsible outdoor light solutions. CAST's lighting meets the Illuminating Engineering Society of North America (IESNA) classification for “full cutoff” optics and reduce high-angle brightness. In other words, our light angles do not exceed 90 degrees, and therefore CAST adheres to the Modern Light Ordinance, which regulates outdoor lighting in North America to help reduce glare, light trespass, and skyglow.

CAST PERIMETER™ LIGHTING FEATURES

Our engineer team continues to develop innovative products and features designed to work seamlessly with modern intrusion detection systems while delivering unmatched benefits and value. No shortcuts or sacrifices are ever made in our manufacturing process. Our commitment to the safety and security of our clients is our core value, and every step of our product development process carries that steadfast commitment. We've patented features that deliver superior performance and flexibility, and strive every day to continue to offer innovation and value.

Highlights of the CAST Perimeter™ Security Lighting features include:

- 50 to 80 percent less material cost than traditional lighting systems
- 50 to 80 percent less labor cost than traditional lighting systems
- Safe low-voltage 24-volt power supply
- Low 7 to 28-wattage consumption models available
- Excellent L70-rate life expectancy of 65,000 hours LEDs
- Simple fast installation
- Mounts easily to a fence, post, pillar or wall
- Great warranty

CUSTOM PERIMETER SOLUTION DESIGN

CAST Perimeter™ Security Lighting offers custom design services to maximize each of client's security. Each solution is customized based on the following criteria:

1. Height of the fence or wall
2. Length of the fence or wall
3. Fence post or column spacing
4. Average lux or lumen value, if applicable
5. Location of power source and voltage
6. Intrusion Detection System plan, if applicable
7. Or you can simply purchase a kit containing everything you need to cover a perimeter fence line of 80', 150', 250', 500' or 750' using 120-volt or 220/230-volt power.

INTEGRATED INTRUSION DETECTION SYSTEMS

The CAST Perimeter™ Security Lighting system can be integrated to work in unison with most modern intrusion detection systems to create effective zones of protection. During an intrusion, CAST Perimeter™ lights can be triggered to operate for a specific duration or setting coinciding with the specific detection zone for optimized security.

CONCLUSION

As evidenced, security lighting extends far beyond simply illuminating a perimeter; it is a precise science that involves analysis, customization, and innovation. At CAST, our commitment to the safety and satisfaction of our clients is a core value. We employ highly trained and experienced engineers and professionals, and use the highest quality materials and components to create superior products that outshine the competition. Through our steadfast dedication to security and award-winning design, our clear objective is to create safer environments that bring comfort and relief to our clients.

> “…our clear objective is to create safer environments that bring comfort and relief to our clients.

FENCE LINE FIRST LINE OUR LINE™

PERIMETER™

LED Security Lighting Solutions

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