

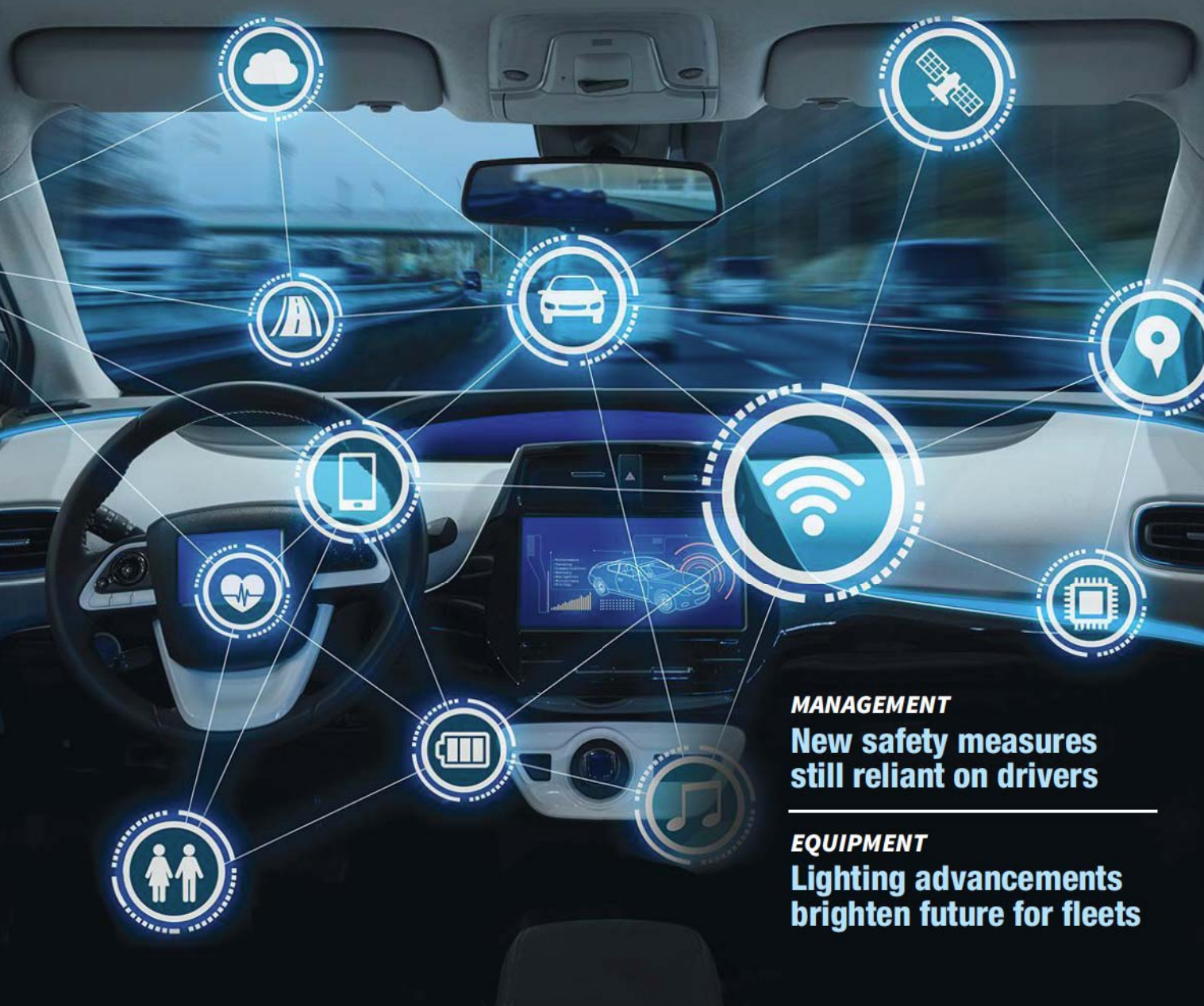
# FleetOwner®

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## LINKED IN

HOW CONNECTIVITY IS SHAPING THE TRUCKING INDUSTRY



### MANAGEMENT

**New safety measures  
still reliant on drivers**

### EQUIPMENT

**Lighting advancements  
brighten future for fleets**



# THE LIGHTING REVOLUTION

BY SEAN KILCARR, EDITOR-IN-CHIEF

## Integrating cameras with headlamps is the next frontier

**L**ighting has long been a central yet subtle concern among fleets, if for no other reason than inoperative lights on trucks and trailers quickly get the attention of roadside inspectors—and not in a good way. In fact, more than 25% of all Compliance, Safety, Accountability (CSA) violations in the heavy-duty trucking industry are related to lighting outages from inoperative lamps and/or defective/broken lights, according to Kevin Cornelius, business development manager of power delivery at Grote Industries.

"Lights that are out are an easy target for a state trooper," he said. "And when

a truck is pulled over, it can trigger the officer to investigate everything else like driver logs, brake wear or tire tread."

Inoperative lighting makes the vehicle, the driver, and the fleet as a whole "a sitting duck," echoed Brett Johnson, president and CEO of light system maker Optronics International.

"The same conspicuity that makes lighting critical to a vehicle's overall safety can make a vehicle conspicuous to authorities by its absence. A lighting problem may give law enforcement officials the sense that a vehicle is being inadequately maintained," he explained.

"It's sad but true that the failure of a \$5 lamp can result in thousands of dollars in service fees, lost productivity, fines, and points against the driver's and the fleet's CSA scores," Johnson added.

Yet, another aspect of lighting is getting more and more development attention these days—how it can improve the safety footprint of commercial vehicles and also help to more readily identify those that may one day drive themselves.

For example, Brad Van Riper, senior vice president and chief technology officer at Truck-Lite, explained that

to improve the safety function of truck headlamps, especially during nighttime operations, research is underway directly integrating cameras with forward lighting systems. Those cameras would detect oncoming vehicles and adjust the light, or lumen, output from the truck's headlamp so as not to blind the other driver.

"Commercial vehicles tend to have higher placement of headlamps, so the camera is used to create a 'glare free' environment for other drivers and to do it automatically," he explained. "Such 'adaptive' lighting can be used for tail lamps as well for a similar reason."

Van Riper emphasized that such headlamp-integrated cameras could also perform "multiple roles" as well, with collision mitigation or lane keeping systems, reducing the need for additional cameras on the vehicle.

"I think this will be revolutionary for trucking in this country, especially for night driving," he said, noting that such adaptive lighting technology is currently being used in Europe. In fact, Van Riper hopes a notice of proposed rulemaking that's currently in the works regarding



such technology is released by year's end as expected.

When it comes to autonomous vehicles, engineers are experimenting with the concept of installing "identification lighting." Similar to the way red flashing lights are used to identify emergency vehicles, blue lights for police, and yellow or amber lights for work equipment such as tow trucks and street sweepers, a turquoise light color is being considered for self-driving vehicles. This will allow motorists and pedestrians alike to quickly identify a truck that is in "autonomous mode."

"Turquoise is a good day and nighttime color; it provides high visibility," Van Riper said. "We're still discussing just how bright it should be."

## LEDS ARE EVERYWHERE NOW

Near term, however, the biggest "revolution" in truck and trailer lighting is one that is straightforward: Almost all new vehicle and equipment lights today (marker lights, turn signals, tail lights, and now headlamps) use light-emitting diode (LED) technology. The robustness of LED technology and its ability to provide high-quality illumination is what's driving this change-over, particularly where headlamps are concerned.

"LED lighting provides light quality that approximates the color temperature of natural sunlight and is therefore more conducive to human sight," noted Optronics' Johnson.

It's also light that requires less energy to produce, he added, typically requiring only 10% to 30% of the electric flow of current or "amps" needed to illuminate incandescent lamps, depending on the application.

"LED lighting frees up energy that would otherwise go toward simply seeing one's environment—a difference can translate into additional hours of operation that would not be possible in an incandescent lighting scenario," Johnson pointed out.

Demand for LEDs is hitting a high peak right now and that's a reason why, added Marcus Hester, vice president of sales and marketing at Optronics. "Our best data says that today, the ratio of LED lamp sales versus incandescent lamp orders by OEMs is finally surpassing the 90/10 mark," he explained. "In the aftermarket, though, the replacement ratio of LED lamps vs. incandescent lamps is about 70/30."

In both cases, the data indicates there's an "irreversible shift" occurring toward LED lamps over incandescent lamps, Hester emphasized. For example, the headlamps on the new Freightliner Cascadia (unveiled in September 2016) is equipped with what the OEM calls a "full LED system"—LEDs in low beam, high beam, daytime running lamp, park lamp, and turn signal lamp positions.

"LED provides an impressive field of view in nighttime and bad weather conditions, which enables drivers to better distinguish objects in the road as well as reduce eye strain," noted Richard Howard, senior vice president of sales and marketing at Freightliner's parent company, Daimler Trucks North America.

"Now more than ever, driver satisfaction, safety and comfort are essential to our customers' success," he added. "Giving drivers a vehicle ... with the latest safety features, productivity enhancements, and creature comforts was a priority."

Volvo Trucks North America is also deploying LED headlamps for its new VNR regional-focused family of trucks and its retooled VNL Series. Both are equipped with automotive-quality LED headlights that increase visibility and decrease "light spill-over" onto oncoming traffic, the OEM said, "making the road safer for everybody."

Optronics' Johnson pointed out that many trends in the automotive industry end up influencing the safety, comfort

## MAKING LIGHTS 'SMARTER'

Truck and trailer lights must be fully functioning at all times. If conducted diligently, pre- and post-trip inspections can identify lighting issues; however, outages that occur while on the road may not be known about until much later—often after law enforcement personnel spot said outage and pull a tractor-trailer off the road for inspection.

Simply knowing a problem exists so it can be addressed immediately is definitely a great advantage, according to Grote's Kevin Cornelius. Thus, cue the demand for a "smart" lighting system.

The Guardian Smart Trailer System designed by Grote can be integrated into a trailer's wiring harness system at the nose box to deliver real-time status of the entire trailer lighting system and work with any type of lamp. Sensors, which continuously monitor voltage and current passing through the wire harness, can differentiate notable or sudden changes from those that are gradual and could be caused by lights warming up or ambient temperature conditions.

According to Cornelius, the same sensors can also be used to measure temperature, humidity, pressure, or other factors

as part of what he calls a "bumper-to-bumper" solution for monitoring a wide range of tractor-trailer functions.

A new feature of the Guardian system now being pilot tested ahead of a planned April 2018 commercial release is a "geofence" feature that will automatically upload trailer lighting and electrical system information and send alerts for priority attention as needed.

Geofencing allows a virtual geographic boundary to be drawn around a specific location, such as a facility or repair depot. Cornelius explained that when the geofence is crossed and there is a lamp or light outage on the truck or trailer, the system can automatically trigger a warning via email or text message to appropriate personnel.

"This approach could even allow for automatic electronic ordering of replacement lamps, if desired," he added. "The ability to proactively identify and resolve any lighting, electrical, or other tractor-trailer issues will only grow as this kind of real-time monitoring system becomes more sophisticated," Cornelius explained. "In the trucking industry, access to this type of information is going to reduce CSA violations."



## EQUIPMENT

and styling decisions of commercial vehicle manufacturers, and LED lighting is becoming one of those trends in his view.

"We are having a different kind of conversation with OEMs and fleets today, and that conversation is about brand differentiation," Johnson said. "Longevity and warranty used to be the hot topic, but now style is on the minds of a lot of folks, too."

### LONGEVITY IS STILL A BIG DEAL

LED lights have been around in the trucking space for over 25 years. Only in the last five years have they become the standard offering on most tractors and trailers, barring a few exceptions, according to Truck-Lite's Van Riper.

"We still see the container chassis market sticking to incandescent bulbs but largely due to theft issues," he said. "Other than that segment, LEDs are pretty much the standard package."

Optronics' Johnson noted that LEDs were first introduced to the commercial vehicle industry in 1989, and though LEDs were comparatively expensive in the early stages, prices have fallen as popularity and sales volumes increased over the years.

"Price decreases essentially follow the principles of Haitz's Law, which forecasts that with the passing of each decade, the cost per lumen will fall by a factor of ten, while conversely, the amount of light generated by each LED package will in

turn increase by a factor of 20," he noted. Haitz's Law is basically the LED version of the more commonly known Moore's Law for computing power, Johnson said.

Named after Gordon E. Moore, a cofounder of Fairchild Semiconductor and Intel, the so-called Moore's Law is the observation he made in 1965 that the number of transistors in a dense integrated circuit, or "chip," will double approximately every two years, meaning computer power will thus double every two years.

"To use a lighting analogy, I like to say that we are entering the twilight of the incandescent era in vehicle lighting," Optronics' Johnson explained. "I can't see why any OEM would now offer any incandescent lighting on a vehicle or why any fleet would try to spec it."

And while style and illumination are issues gaining more importance where vehicle lighting is concerned, Truck-Lite's Van Riper said longevity remains a bedrock desire among fleets.

"We continue working on the potential to make truck and trailer lights last the life of the vehicle. That remains our goal," he explained. "We've coined the term 'fit and forget' when it comes to lighting. But that means we need to keep working on

ways to prevent corrosion and reduce the impact of physical damage, which is more of a problem on the trailer side."

Optronics' Johnson said corrosion inevitably occurs whenever and wherever moisture gains access to a vehicle's electrical and power delivery system.

"A breach in the system can happen in cables, wiring junction boxes, and virtually anywhere a component does not remain watertight. Some

system problems are more obvious than others and thus easier to spot early and correct," he explained.

While a cracked lamp connection, cable and wire abrasions, a broken lamp housing or lens are "easy to see," Johnson stressed that issues such as temperature extremes can also attack an electrical system in places that remain out of sight.

"We can't change the physics of the real world," he noted. "Commercial vehicles operate in a wide variety of environments and are constantly exposed to corrosion-causing moisture. Therefore, if any system breach takes place, the naturally occurring corrosion process will inevitably begin to take its course."

To that end, Truck-Lite's Van Riper said that the design of the lights and the electrical systems supporting them need to be well thought out. "Selecting a good connector is really important," he said. "It does add cost to the [lighting] system, but getting that good seal prevents a lot more problems down the road."

Johnson noted that several years ago Optronics began converting LED lamp



**Top: Freightliner Cascadia sport "full LED system" headlamps**



**Bottom: Peterbilt's Class 8 models feature Optronics' SuperLamp LED**



**Volvo is switching to LED headlamps on its new VNL tractor (at right).**



# FOUR WAYS TO MAKE YOUR TRAILER LIGHTS LAST LONGER

Optronics' Brett Johnson offers advice to fleets on how to protect their trailer lighting systems to reduce the need for repairs and prevent failures while on the road:

**1. ON DAY ONE OF OWNERSHIP, CHECK FOR UNPROTECTED WIRING AND CONNECTORS:** "Moisture and corrosion can attack a system before the vehicle is even in service," he said. Johnson suggests checking to see if OEMs have designed the system with unprotected wiring and connectors in high-moisture and impact-prone areas, such as above or behind tires. "If you find vulnerabilities, consider applying ancillary protective coverings like boots, plastic looms, moldings or tubing," he said. "These types of precautions will not only protect against high-pressure moisture exposure, but will reduce the potential of damage by rocks and other road debris. The extra protection will also alleviate system stress due to ice accumulation on wiring and connection points."

**2. CONDUCT PRETRIP INSPECTIONS EVERY TIME, WITHOUT FAIL, NO EXCUSES:** "One of the most critical steps a fleet can take is to train their drivers on how to perform effective pretrip inspections," Johnson said. "Before getting behind the wheel, your driver must make the call as to whether the lighting and electrical system is in sufficient condition for safe operation—and their ability to make a truly professional assessment reflects upon the fleet and its internal maintenance practices."

While no legal guidelines exist, a good rule of thumb for inspections is that they should take about 30 to 50 minutes to conduct. The reality is that time is quite literally money, and there will always be pressure to make the pretrip inspection as short as possible, Johnson warned—that's why training and efficiency play such a crucial role.

"Though many don't realize it, violations can result from defective reflectors and conspicuity tape may be deemed in

violation because of cracks and dirt," he added. "Conspicuity tape can also degrade over time and its reflective qualities may be diminished as well."

**3. REMAIN VIGILANT FOR SIGNS OF CORROSION:** Like everything else in life, electrical systems grow old. With age comes increased fragility making systems more susceptible to damage, corrosion and ultimately failure. A vehicle's operating environment is a significant factor, and drivers, maintenance crews and fleets need to pay special attention to vehicles operating in challenging conditions.

The constant physical forces applied to vehicles when driving on the road take their toll on all components, including lights, wiring and harness systems, he stressed. Maintenance professionals will often see small cracks developing in outer insulation due to the constant flexing of cables. Abrasions may also occur on any wire and cable insulation that makes contact with metal surfaces. The observance of cracks is a danger sign; once the protective surface is compromised in any way, water and road chemicals will start to attack. In fact, the simple flexing and movement

of wires can literally pump moisture throughout a vehicle's electrical system.

**4. PLANNED MAINTENANCE IS MISSION CRITICAL:** A trailer's electrical system should be protected from moisture using dielectric grease. In the case of a modular system, connectors are designed with reservoirs to hold the water-resistant grease. Connections are weak links in the chain of protection, and connectors that once were properly sealed with dielectric grease may loosen over time, causing the silicone oils in the grease to dry out. Cables that accumulate ice and road debris may be visibly degraded where the cable and connector merge. During planned maintenance, a fleet's maintenance crew should regularly inspect a system's connectors and replenish the grease as needed.



Regularly check trailer light wiring and insulation for cracks.

designs to solid-state, surface-mount device (SMD) construction, which eliminates lead exposure via direct-mounting to the circuit board.

"The electronic circuitry inside most LED lamps is vulnerable to ambient factors such as transient voltage, electromagnetic interference, and electrostatic discharge. These conditions can occur in, on and around a vehicle," he explained.

SMD blocks those effects, and its design allows an LED to continue func-

tioning even if a lamp's circuit board is completely submerged in water.

"We've made great progress. More than 90% of our LED lamps are built using SMD, including older models that we've re-engineered," Johnson said.

Optronics took a step in the "longevity" arena in 2015, when it unveiled its SuperLamp design, he noted. The design was five years in the making and is now a standard feature on Peterbilt's Class 8 trucks.

Johnson said the coating on the SuperLamp resists 45 specific chemical agents, including petroleum distillates such as coolant ethylene and coolant propylene, diesel fuel, battery fluid, brake fluid, transmission fluid, organic solvents, methanol, detergents, cleaners, and urea (the chemical found in diesel exhaust fluid).

"It's all about taking vehicle lighting to a new level of corrosion protection and electrical system integrity," he said. ■