

# PROGRESS REPORT

The IES Progress Committee's mission is to keep in touch with developments in the art and science of lighting throughout the world and prepare a yearly report of achievements for the Society. Acceptance is based on an impartial judging process used by the committee to evaluate each submission on its uniqueness, innovation and significance to the lighting industry. There were 171 submittals in 2020; 82 were accepted into the report.

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# 2020 PROGRESS REPORT

## LED REPLACEMENT LAMPS



From **Green Creative** is a 20,000 lumen LED retrofit lamp intended to replace 400-W metal halide lamps in high bay applications. What makes this product unique is its integrated multi-function photosensor and occupancy sensor. Additional benefits include an ambient temperature rating of up to 50 deg (C) and a thermal protection circuit.



Another offering from **Green Creative** is a new PS-30 shaped LED retrofit lamp with the industry's highest output of 5,000 lumens. The manufacturer also claims to have conducted extensive thermal testing, including enclosed fixtures with up to a 45 deg (C) ambient.



The Refine series of LED PAR 30 and PAR 38 lamps from **Green Creative** are the industry's highest efficacy, longest life products with high color rendering. All lamps in this family have a color rendering index of greater than 95, an R9 value greater than 50 and an Rf rating of 93 plus, and carry a 50,000-hour life rating.



**Philips** True Force Type B high bay lamps are included in the Report for being the first to achieve 25,000 lumens, offering fixture output comparable to 400-W metal halide lamps. At 152 lumens per watt, they are also the most efficacious lamps of their type, and available in 4000K and 5000K color temperatures.



**Active Grow** adds to their offering of LED grow lights with the industry's first T5 HO Ballast Bypass Horticultural Lamps. The lamps feature the unique Active Grow Sun White Pro spectrum formulated to promote healthy vegetative growth, root development, tight internodal spacing and photochemical production in plants. The lamps are available in 4-ft lengths rated at 25 watts.

## LED CHIPS AND MODULES



**LEDdynamics** introduces PERFEKTLIGHT, a tunable white LED technology that corrects correlated color temperature drift. It employs pointed and precise amounts of green light to correct CCT along a non-linear path onto the Planckian Locus, eliminating hue error and improving efficacy and CRI, allowing the use of tunable white LEDs with accurate CCT.

**LED Linear's** Nexus UHD flex tape is the first of its kind to employ chip scale package LEDs. The results are a lower profile than standard LED tape and a wider beam angle of 160 deg versus 120 deg for previous products. It has a rated life of greater than 60,000 hours L90, a CRI of 95, and is available in color temperatures ranging from 2200K to 5000K.





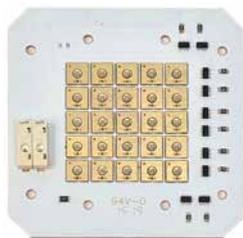
**Nichia America Corporation** introduces the industry's first two-in-one tunable white LED chip. Until now, tunable white light engines incorporated combinations of discrete white LED chips. This new design combines 2700K and 6500K LED chips into a single package, mixing colors internally, thus reducing mixing distance and yielding the potential to reduce light fixture depth.



**Bridgelux** Generation 8 V Series chip-on-board LEDs achieve improvements in efficacy of up to 185 lumens per watt at 3000K with 80 CRI. Efficacies of 200 lumens per watt are achieved at other color points, representing up to a 30% improvement per light-emitting surface. These high-performance LEDs are available in sizes ranging from 8 to 29 millimeters.

### Bolb Incorporated

introduces their 6060 UVC LED built with a novel and patented UVC-transparent hole-supplying layer which does not suffer voltage tradeoff and allows packaged UVC LEDs. These LEDs achieve 100 milliwatt output power at 250 milliamps, while maintaining L70 lifetime of 3,000 hours at a case temperature of 38 deg (C).



**Q-Tran's** SW-HE LED tape offers the industry's highest tape efficacy of up to 180 lumens per watt at 4000K and highest output of up to 1,145 lumens per foot. It achieves the same output and efficacy metrics in dry and wet listed versions, and is available in a range of static white color temperatures.



**Maiman and Associates** introduces the Omega 35 Plus, the industry's smallest chip-on-board LED holder with a built-in DC-to-DC driver. It delivers up to 10 watts of output power in a 35-millimeter diameter by 6-millimeter high round form factor. Omega 35 supports 0-10V, DALI and DMX wired dimming protocols as well as Bluetooth mesh.

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## LUMINAIRES - DOWNLIGHTS



The INNOFIT from **Green Creative** delivers 130 lumens per watt, which qualifies it as the highest efficacy selectable lumen retrofit downlight family in the market. Providing lumen output options of 800, 1,100 or 1,500 lumens, the INNOFIT retrofits into existing commercial housings, is accessible from below the ceiling, and can accommodate ½ to 2-in. ceiling thicknesses.



From **Cooper Lighting Solutions**, the HALO LCR is the first light commercial downlight retrofit family to offer 2-, 4-, 6- and 8-in. aperture luminaires with five selectable CCT options. With a 95 LPW baseline, the HALO LRC family is available in configurations that deliver up to 5,000 lumens, or 108 LPW, at 90 plus CRI.

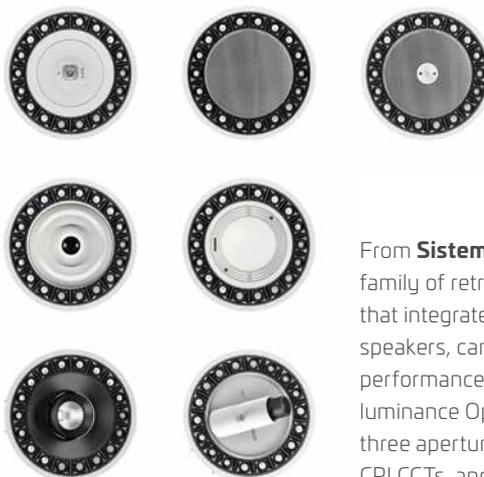
Also from **Cooper Lighting Solutions**, the HALO RA Direct Mount series is claimed to have the highest lumen output and longest life. The 4-in. RA Direct Mount delivers up to 95.4 LPW, while the 6-in. version achieves up to 93.6 LPW. Both versions' modules offer 70,000-hour LED life and provide ultimate flexibility with five selectable color temperatures from 2700K to 5000K using a switch on the junction box.



The Field Adjustable Performance Downlight series from **RAB Lighting** is the first to offer both field-selectable lumens up to 3,000 while providing three field selectable CCTs at 90 CRI. Delivering 100 LPW, the series is available in apertures of 6, 8 or 9.5 in., and is the first field selectable downlight to offer an integral emergency battery option.

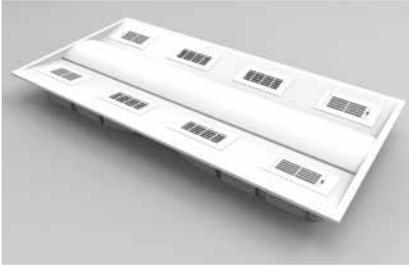


Also from **RAB Lighting**, the Field Adjustable Edge-Lit Wafer is the first of its kind with field adjustable CCT. This super slim edge-lit downlight is available in aperture sizes of 4 or 6 in., can be ordered with smooth or baffle trims, and the CCT is field selectable for 3000K, 3500K or 4000K. It is dimmable down to 5%, listed for wet locations, certified airtight, IC rated and can be fitted with an integral emergency battery.



From **Sistemalux/ iGuzzini USA**, the Blade R is the first family of retrofit or new construction recessed downlights that integrates occupancy sensors, daylight sensors, speakers, cameras and smoke detectors together with high-performance outer ring light modules. Equipped with low luminance Opti Beam technology, the Blade R is available in three aperture sizes, can be ordered with four different 90 CRI CCTs, and lumen packages up to 3,800 lumens.

## TROFFERS



From **Aleddra** comes the ViraPure Troffer Pro Plus Generation 2 which is 40% lighter than the Generation 1 version. Now both the 2-by-2 and 2-by-4 ViraPure Pro Plus Gen 2 models are about the same weight as standard troffers and yet provide air-circulation for capturing airborne microbials. This allows for the eradication and decomposition of trapped microbials using the UV-activated photocatalyst coating.



The Swish Edge from **RAB Lighting** is the first square center-basket troffer to offer field-selectable outputs and integral occupancy sensing, including a sealed microwave sensor option. With field settings of 19, 29, 39 and 49 watts, the Swish Edge delivers up to 4,240 lumens for the 4-ft version, and 6,016 lumens for the 8-ft version while both are rated for a 100,000-hour life.



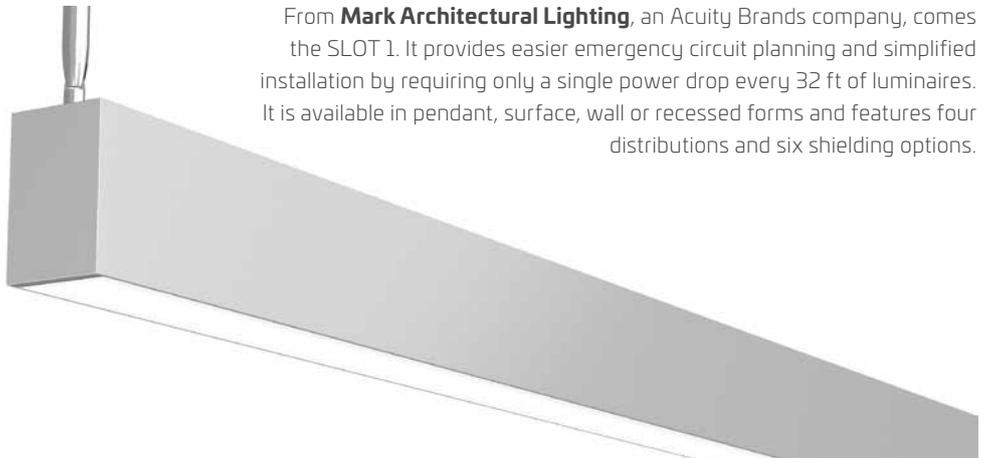
Also from **RAB Lighting**, the Swish FA is the first curved center basket troffer to offer four field-selectable outputs, three field-selectable CCTs and integral occupancy sensing, including a sealed microwave sensor option. It is also the first curved center basket troffer to offer an integral emergency battery backup option.

## LINEAR



Color Kinetics from **Signify** offers the Graze Compact, which at 1.77-in. high by 1.66-in. wide is the smallest cross-section exterior linear grazing luminaire in the market. Graze Compact IntelliHue utilizes Color Kinetics technology to produce millions of saturated colors, pastels and high-quality white light in the same luminaire.

From **Mark Architectural Lighting**, an Acuity Brands company, comes the SLOT 1. It provides easier emergency circuit planning and simplified installation by requiring only a single power drop every 32 ft of luminaires. It is available in pendant, surface, wall or recessed forms and features four distributions and six shielding options.



The Zenlite Louvre from **Precise LED, Inc.** is the only micro louver linear product designed for installation in the thickness of drywall. The 24V DC fixture is 3.46-ft wide by 0.82-in. thick, delivers up to 409 lumens per foot, is available in multiple CCT options, offers three beam spreads, and is available in multiple dimming options down to 0.1%.

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The BrytDyt from **Archlit** is the only linear 5/8-in. drywall mount, semi-recessed fixture with integral driver. It uses the smallest indirect adjustable high efficiency LED module for wall or ceiling mount, and uses a proprietary diffuser and special film to hide the dots on the LED board. The BrytDyt delivers 500 lumens at 3.1 watts per ft up to 1,700 lumens at 12 watts per ft. Aiming angles of 15, 30, or 45 deg are available from the factory, or are adjustable on-site through interchangeable brackets.



From **eLumigen**, the CRI C1D2 LED Fixture is the first LED light source replacement fixture for paint booth, inspection and stamping applications. Designed to replace traditional 4- and 8-ft linear fluorescent sources, it has a 95 CRI rating for absolute color critical requirements. These fixtures are certified Class 1, Division 2 and carry a IK10 impact rating.



**Finelite, Inc.** introduces the HPX series, which is the only 2.5-in. true square profile luminaire that features an integral driver design that delivers up to 2,057 lumens per ft and up to 125 LPW. Available in pendant direct, pendant indirect/direct and surface mount, the HPX can be tailored from 2-ft to 12-ft sections in 1-in. increments, and can be supplied with numerous CRI, CCT, dimming and controls options. It has the longest lifetime of all micro shape luminaires at over 100,000 hours to L90.



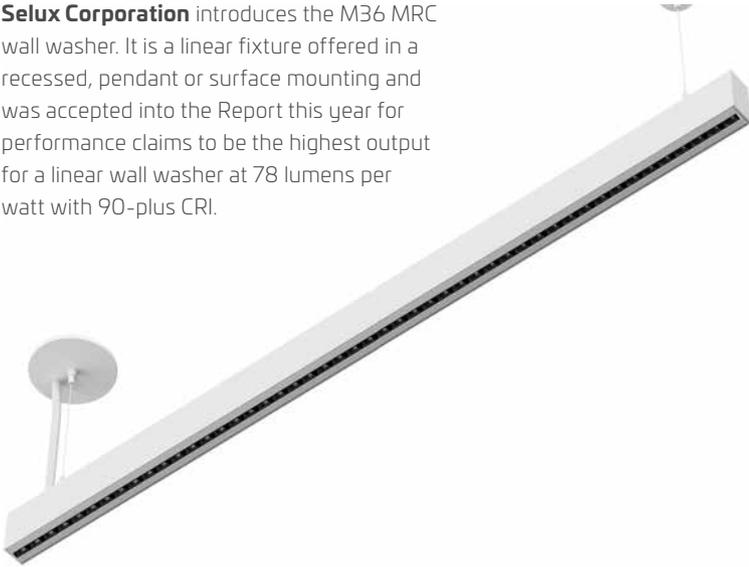
From **A-Light**, an Acuity Brands company, the Aloft series features a swivel joiner that brings a new dimension to architectural lighting by allowing designers to create unique luminaire configurations while still being easily adjustable and fine tuned once installed in the field. The innovative constant voltage plug-and-play system is divided into segments that can be easily combined, removed and rearranged in the field as needed. The full 360-deg rotation of the light segments, offered in 4 light output options up to 920 lumens per ft, can be locked in place at any angle to offer precise and unique illumination patterns to exactly tailor the light levels.



At 1.65-in. wide by 3.25-in. high the BW 165 from **Birchwood Lighting** is the smallest profile suspended linear direct/indirect luminaire with an integral driver delivering 1,000 lumens per ft. Available in standard, high-output or customizable lumen packages, the BW 165 is offered in multiple CRI and CCT options and dimming options down to as low as 0.1%.

## WALL-WASH LUMINAIRES

**Selux Corporation** introduces the M36 MRC wall washer. It is a linear fixture offered in a recessed, pendant or surface mounting and was accepted into the Report this year for performance claims to be the highest output for a linear wall washer at 78 lumens per watt with 90-plus CRI.



## TRACK



The Palco LV framing projector, part of the Beamer family from **Sistemalux**, is a micro framing projector, as small as  $\frac{3}{4}$ -in., and up to 1- $\frac{1}{2}$  in. diameter for mounting on a 48V track. It features innovative miniature optics with no color distortion or beam edge aberration, having high lumen outputs in a miniaturized package not seen before.

## SUSPENDED LUMINAIRES



New from **Meteor Lighting** is the Dot Series, an architectural family of micro-cylinders. It is recognized as having the highest output downlight cylinder in a 1.5-in. diameter aperture housing with up to 800 delivered lumens. Additional housing sizes and lumen outputs are available.



Continuing with cylinders, **Acuity** Gotham's EVO cylinder was accepted into the Report this year for having the largest combination of features and options available in a 2-in. cylinder family. It is available in open or lensed downlight, open or lensed wall wash, and double wash optics.

**ETC** introduces the ArcSystem Navis 100 series of downlights featuring field changeable TIR optics, with a CAT

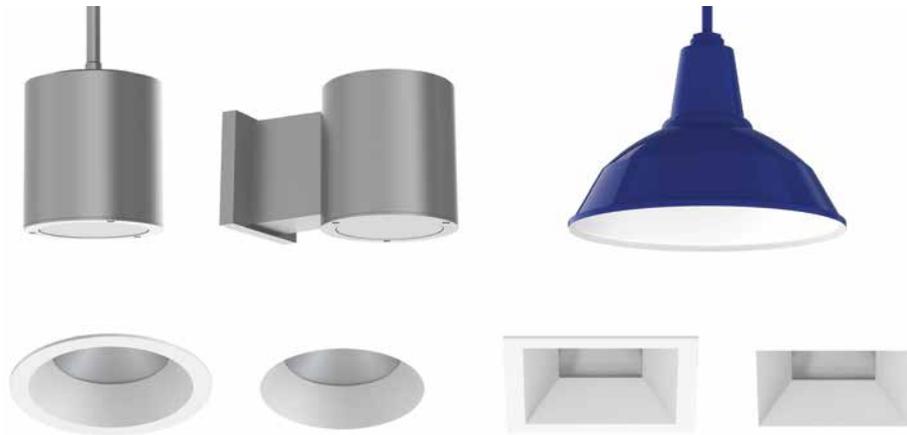


6 connection option. It can be converted to either a recessed downlight, wall wash, pendant or surface-mount in the field while maintaining UL and CE compliance. A 360-deg rotation and 30-deg tilt can be accomplished without breaking the ceiling plane.



The **Eureka** Outline is the first-to-market projector with a continuous ring of direct-view LED rings without any pixilation. It has the highest lumens per square inch with 1,245 lumens at only 3.5-in. diameter.

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New from **Spectrum Lighting Inc.**, comes the Envirolight Series luminaires, listed as wildlife friendly for sea turtles. This is being recognized as the first to market with a dual-circuit luminaire family of shielded cylinder, recessed, and RLM shaded fixtures with dedicated LED sources in amber and white at 3000K and 80 CRI. The fixtures are also available in static single circuit, single color, amber or white LED.

The Sequence Mini from **Visa Lighting** is claimed to be the smallest diameter luminous cylinder with integrated performance downlight. The 2-in. diameter luminaire is available in multiple lengths, from 12 to 72 in., with options for delivered downlight up to 1,600 lumens in three different optical packages.



## SURFACE MOUNT



**Lucifer Lighting** introduced the Stellr luminaire, a surface or pendant mounted decorative LED fixture utilizing wave guide technology, and two separately controlled lighting sources to provide both volumetric illumination as well as directional lighting. Each source is tunable and can be changed to four different static white CCTs with the option of warm-dimming.

## COVE LUMINAIRES



The iO Covio from **Cooper Lighting Solutions** leads the industry with its small housing size for a line voltage cove light. It is available in three different outputs up to 1,500 lumens per ft, and leads the industry in efficacy. It is rated for indoor and outdoor use, and carries an IP66 rating.

## HIGH BAY

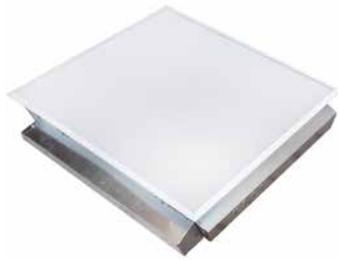


New from **Dialight** is the Reliant high bay. It is recognized as having the highest lumen package on the market at up to 72,000 lumens. The fixture is the first to utilize Dialight's halogen-free polycarbonate housing for enhanced durability and resilience against mechanical impact in an industrial environment.

## OTHER INDOOR LUMINAIRES



The Virtual Sun, Model A7 from **Innerscene** is an ultra-realistic artificial skylight with variable CCT and 3D display technology, allowing images to appear to be as far away as infinity to look more realistic, like actual skylights with dynamic sun or moon appearances. The fixture is much smaller and lighter than previous artificial skylight products on the market at only 73 pounds with a shallower depth of only 10 in.



**GE Current, a Daintree Company** has introduced the LBU Disinfection luminaire. This fixture provides disinfection lighting in areas where both conventional light is needed and people are present. The product utilizes a UV-A 365 nanometer LED source and meets the IEC photobiological safety standard 62471. This is the highest efficacy anti-microbial troffer submitted to the Committee.



**Puro Lighting's** Helo fixture features pulsed xenon UV disinfection lighting. The luminaire can be ceiling or wall mounted and utilizes UV-C, UV-B and UV-A to kill bacteria and inactivate viruses. It can be programmed manually, and includes PIR sensors or integration into building automation systems through BACnet. It is currently being installed in a pilot program with the New York transit agency to battle COVID-19.



The SmartDiffuser Circadian Lighting Recipes from **Nano-Lit** features the first quantum dot lighting product which is programmed to support circadian rhythms for well-being and productivity. Light Recipes are designed by circadian scientists for a wide range of environments including offices, universities and healthcare.

## OUTDOOR ACCENT LUMINAIRES



**Traxon Technologies** Pro Point Kontour linear façade highlighting luminaire is recognized for its capacity to build 1,000-ft run lengths of white illumination from a single 277V feed. Also available in RGB and RGBW, addressing is customizable and can be ordered in 1-, 2-, 4- and 8-ft segments to form continuous linear runs.

## GARAGE LUMINAIRES



**Kim Lighting's** PGL 8 is the only edge-lit parking garage luminaire with a drop lens to feature a standard upright, which brightens space and eliminates "cave effect" for improved luminaire/ceiling contrast. The luminaire is significantly shallower than comparable edge-lit luminaires and features a speed mount system that reduces installation time.

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## ROADWAY



TunnelView luminaire by **Signify** is the first tunnel product to offer SR options and an SR sensor connector. It features nine optical distribution options for tunnel and underpass applications, and it ships with a service tag, a unique QR based ID system that ensures product support throughout its lifetime.

## LUMINAIRES

**Ephesus Lighting** has introduced its Lumadapt 8 luminaire, which has added wireless AirMesh controls for CCT, beam angle and RGBA dynamic scenes, giving user control from any internet capable device via LAN, Wi-Fi and/or cellular data. It also offers real-time health and status data through a user interface.



LUMASPORT 8/16 luminaire line by **Cooper Lighting Solutions**, is the first sports lighting luminaire with redundant power. A dual driver topology combines the wattage of both power sources to produce the full output of the fixture. Should one driver become non-operational, the fixture retains full functionality at 60% of full output. This feature still allows for full controls functionality and keeps all luminaire light sources illuminated.

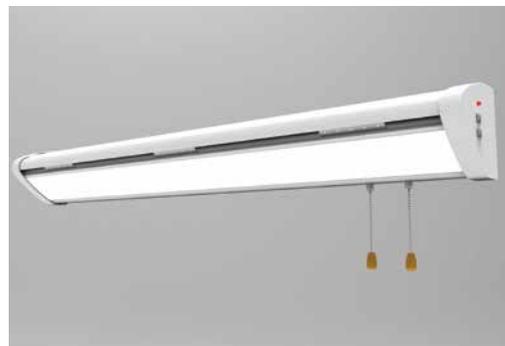


## MEDIA/SIGN LUMINAIRES



Media Wall Paper has been submitted by **Traxon Technologies, an OSRAM Business**. MWP is the first curve-cuttable RGB media product. MWP is the only RGB light panel available that is flexible and field-cuttable, with individual pixel control. The LED panel is easily cuttable in single-pixel increments to create custom shapes and coordinate with architectural details.

## MEDICAL LUMINAIRES



**Aleddra** introduces an overbed light that combines antiviral capability with tunable white modality. The fixture incorporates UV-C and UV-A emission with built-in safety mechanisms to aid in disinfection, and also features pull switch controlled tunable direct and indirect lighting with variable color temperatures.

### New Star

**Lighting** has introduced the LumaNique Series of overbed fixtures. LumaNique is the industry's only six-function architectural healthcare luminaire that uses internal chambers to separate functions that can be individually controlled for multiple applications. It is also the first six-function architectural healthcare luminaire that is 4-in. deep.



## POWER SUPPLIES AND DRIVERS



The Bodine BSL06M5 LED emergency driver by **Signify** is the first LED emergency driver that installs directly on a Jbox, a new installation method for EM drivers. This unit is 4.21 by 3.00 by 1.18 in., and it meets Title 20 California Energy Commission efficiency standards.



OPTOTRONIC Programmable OTi200W outdoor LED driver by **OSRAM** is the industry's first high wattage outdoor EFT protected LED driver with auxiliary power output, constant lumen maintenance, EOL, soft start and dim-to-off programmability features. One click programming through the OPTOTRONIC programmer allows OEMs to configure the output current with 1 milliamp resolution. Also fully customizable by the OEM is an OSRAM proprietary feature called AstroDIM.



**OSRAM's** OPTOTRONIC Programmable Outdoor LED Driver with Dexal Technology is the industry's first DALI 2.0 outdoor dimming driver with EFT protection. It also offers constant lumen maintenance, EOL and soft-start programmability.



**Electronic Theatre Controls** new F-Drive is the first of its kind rack-mounted driver solution with various features, such as hot-swappable output cards, allowing change or replacement without compromising power to the rest of the lighting system. F-Drive is the only LED driver solution capable of driving both proprietary ETC technology at the same time as third-party constant current and constant voltage luminaires.

### OSRAM Digital Systems

submitted the OPTOTRONIC Programmable High Wattage Compact LED Driver as the industry's first indoor EFT protected LED driver. It offers protection against line voltage on 0-10V dimming wires, and the output is custom programmable with 1 milliamp resolution to match LED load and maximize performance. Programming does not require the driver to be AC powered. Its output power is rated up to 95 watts.



Vesta® Flex has been introduced by **Bridgelux**. Compatible with traditional wired 0-10V and DALI2 controls, and four different wireless control options, Vesta Flex enables luminaire manufacturers to rapidly respond to project-based installations, and can quickly expand as new control systems become available.



**Signify** has added the Xitanium Duravolt driver family. This series of indoor, industrial and outdoor LED drivers are designed to survive the loss of neutral drop neutral and floating neutral, withstanding up to 527 volts. A programmable driver thermal limit and internal sensor protect luminaires from unforeseen high temperatures by automatically lowering the power to the LED when excessive heat is sensed at the driver.

# 2020 PROGRESS REPORT

## CONTROLS - WIRELESS



The Lightcloud Phase Dimmer from **RAB Lighting** is the first and only all-in-one wireless dimmer which dims a TRIAC, ELV, or MVL compatible load and can recall scenes. It is also the first all-in-one dimmer with a plenum rating and utility grade metering for TRIAC loads. The dimmer has a maximum LED load of 450 watts, and features a line-of-sight wireless range of 1,000 ft or 100 ft with obstructions.

## LIFE SAFETY



The Si-36 Emergency Lighting Micro Inverter by **Assurance Emergency Lighting** is the first to offer Power Share Technology. During a power outage, the Si-36 automatically supplies battery-sourced line voltage to the driver as well as 3 volts to the zero-to-10 volt dimming input of the driver for a period of up to 90 minutes, allowing emergency backup for multiple fixtures up to 120 watts total.

### Signify

submitted the Bodine GTDU Upgraded Generator Transfer Device as the first generator transfer device that is dual listed to UL 1008 and UL 924. The GTDU also offers the smallest form factor for a UL 1008 device at 6.59 by 2.32 by 1.5 in. The device is 24V DC fire alarm override capable.



The Gen4 Self-Diagnosis Emergency T8 Lamp by **Aleddra** is the first of its kind that uses a built-in microprocessor to automate the 30-second monthly test and 90-minute annual test of the emergency T8 without any maintenance labor. The microprocessor in the Gen4 starts its monthly and annual clocks after 48 hours of use.



### Electronic Theatre Controls

submitted the Master Phase Loss Detector 2. It is the first detector to offer multiple assignable and field configurable inputs and outputs. It is also the first detector in the market that can accept a wide variety of input/output configurations. The factory can build to user specifications, but the unit is also field-modifiable, and input/output modules can be added or removed while maintaining the UL listing.



## ACCESSORIES



### LensVector

has submitted its S2F Series, an extension to their 48- and 65-millimeter dynamic beam shaping lenses that were approved in our 2017 Report. S2F Series now offers a smaller, 35 millimeter lens that can fit a wider range of spot and track luminaires, making dynamic beam shaping more broadly available.



**Hubbell Lighting** has introduced SpectraSAFE™, the first scalable, cloud-based and wireless video security solution for interior commercial and industrial building applications which seamlessly integrates into luminaires. The camera module includes a high-resolution full HD camera, IR emitter for low/no light conditions, microphone and speaker for two-way audio communication, as well as mobile and web-based applications.

## LIGHTING SYSTEMS



Trellix Locate from **Cooper Lighting** is the industry's first UL2900-1 certified, lighting-based location system can run on an on-premise server to maintain security and privacy. A connected lighting system incorporating a combination of occupancy, accelerometers and BLE based triangulation, Trellix Locate can determine the location of an asset or a person, providing the first lighting-based location system offering room-based accuracy in real time.



The **Kirlin Company's** InfraLED Pro luminaires combine remote control aiming capability in patient exam luminaires. Available in a wide assortment of fixture aperture sizes and beam angles with a tilt angle of up to 60 deg and 360-deg rotation, they offer flexibility to address very specific examination needs.

## SOLAR

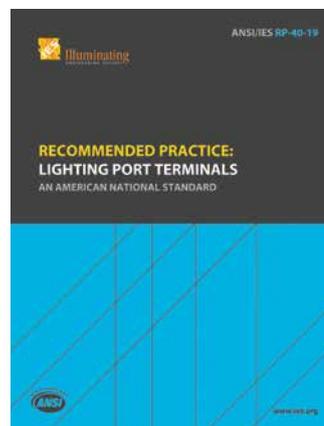
Solera Solar Lighting's Hybrid 365 from **Light Efficient Design** is the first family of solar LED area light fixtures in North America that uses both solar power and line voltage. The fixture is primarily powered by solar and is backed up by the grid. It is designed to overcome the short falls of off-grid solar LED to guarantee 365 nights of light per year.



## PUBLICATIONS



The **IES** has published two new Recommended Practices, four new Technical Memoranda and two new Learning Modules this year. RP-39-19, *Recommended Practice for Off-Roadway Sign Luminance*, provides guidelines only for the lighting of signs that are located off the right of way of roadways and, as such, are not regulated by a federal, state, provincial or local jurisdiction—and includes internally and externally illuminated, and electronic, signs.

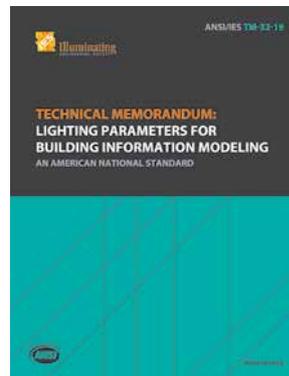


RP-40-19, *Recommended Practice for Lighting Port Terminals*, provides design recommendations for the illumination of a cargo handling terminal from a permanently installed lighting system.

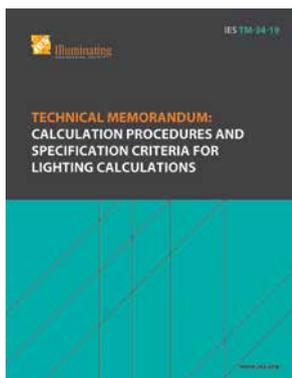
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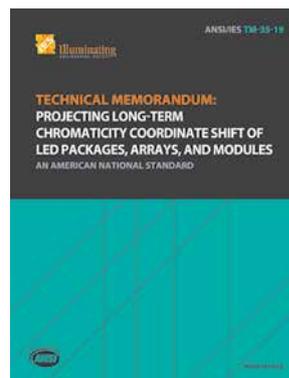
TM-21-19, *Technical Memorandum: Projecting Long-Term Lumen, Photon, and Radiant Flux Maintenance of LED Light Sources*, recommends a method of projecting the flux maintenance of LED light sources from the data obtained by IES LM-80-15 testing.



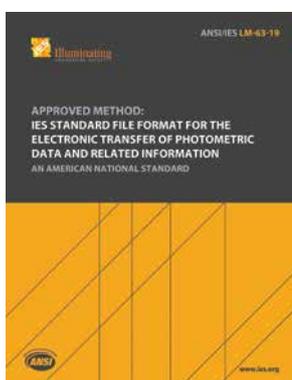
TM-32-19, *Technical Memorandum: Lighting Parameters for Building Information Modeling*, recommends a standardization of parameters used in luminaire BIM content.



TM-34-19, *Technical Memorandum: Calculation Procedures and Specification Criteria for Lighting Calculations*, establishes consistent methods for specification of criteria, precision of calculations, and comparisons of calculations to criteria.



TM-35-19, *Technical Memorandum: Projecting Long-Term Chromaticity Coordinate Shift of LED Packages, Arrays, and Modules*, provides recommendations for projecting long-term chromaticity coordinate stability of LED sources.



LM-63-19, *Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information*, describes the standard data system and how to build a file using this system, and it addresses formats specifically for data transfer, storage and retrieval.

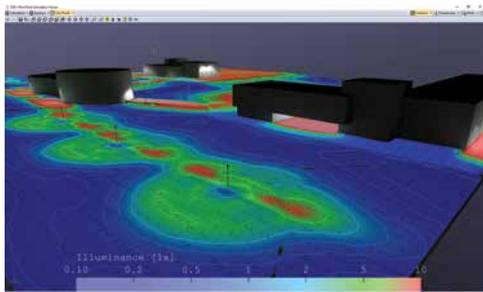


LM-75-19, *Approved Method: Guide to Goniometer Measurements and Types, and Photometric Coordinate Systems*, provides definitions of spherical coordinate systems and goniophotometer types used to measure light sources.

## DESIGN TOOLS



From **SunTracker Technologies** comes the first of its kind conversion tool, Cerise Photo. This software tool can bulk convert IES LM-63 and EULUMDAT to IES TM-33/UNI11733. It enables the capability to merge spectral power distribution data using CSV spreadsheets or IES TM-27 spectral data files.



**Lighting Analysts** has added additional features to their ElumTools software featuring the ability to produce accurate 3-D analysis for topography, multi-level garages, stairs and elaborate façades. This is the first lighting software to be able to place calculation points on irregular surfaces.



The Durian Artificial Sky from **Nitter-Betanit** was recognized in the Report as the first affordable immersive daylight simulators. The unique artificial sky enables easy and fast daylight studies with simulations of any type of sky condition, and it provides a simple graphical user interface.



**Cooper Lighting Solutions** was recognized in the Report for their submission of the Light Architect Augmented Reality App. This is the first VR calculation tool that imports photos and renderings and provides IES light level calculations, as well as acoustic and UV calculations that include dosage and exposure time.

In addition to the standards listed previously, the **IES** has developed The eLearning Portal. It is a new approach to consolidating lighting education tools in a personalized site with on demand content with CEUs.



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