

Lighting India

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Vol. 13 No. 4

July-August 2018



The Visitor Experience



Lighting Design Principles



Stage Lighting

Are LED imports a threat?

A closer look at India's LED imports and position of organised firms.



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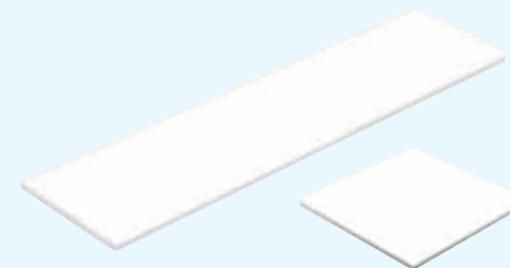
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OLED modules

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Lighting industry has come of age and LED is driving the industry all over the world. Industry body Electric Lamp and Component Manufacturers' Association (ELCOMA) reports that the Indian LED lighting market has grown from Rs 500 crore in 2010 to over Rs 10,000 crore currently. Going forward, LED lighting is set to extend the momentum thanks to the government's push towards adoption of LEDs and their general consumer popularity.

However, the growing demand for LED lighting has also led to an increase in sales of unsafe and illegal products. According to a recent Nielsen study conducted across 4 major Indian cities –

New Delhi, Mumbai, Ahmedabad and Hyderabad; 76 per cent of LED bulb brands and 71 per cent of LED downlighter brands surveyed across 200 electrical retail outlets were found to be non-compliant with desired consumer safety standards. Here we take a closer look at how the Indian market is impacted due to imports of spurious and non-branded LED products.

Further, as per a new research report by Global Market Insights, the market share for smart lighting market is expected to cross US\$ 24 billion by 2024 driven by worldwide initiatives for smart city development and the growing popularity of home and building automation systems in residential, commercial, and industrial sectors. India remains among the top destinations for smart lighting solutions due to increasing focus on energy efficiency and smart city development. Here we present you a range of articles that cover varied aspects 'smart' lighting.

Of all the digital transformation technologies, the Internet of Things (IoT) is the most disruptive. This time we discuss the changing role of the lighting designers in the age of the IoT. As the industry transits from being solely focussed on architectural lighting design to incorporating the smart features of the IoT, the author describes how Lighting Design of Things or LDoT will transform the lighting space. I hope you'll enjoy reading these interesting articles, as always.

In October, New Delhi will open its doors for Light India 2018 – one of the largest shows on lighting. Taking place during 11-13 October, the show will bring together the key players in the lighting industry from across the globe to showcase their latest technologies and innovations. Lighting India, being the media partner for this international event, will bring an event special supplement. We invite your company to participate in this special issue.

For more details on this, please write me at miyer@charypublications.in

Publisher & Editor-in-Chief

Directors

Pravita Iyer
Mahadevan Iyer

Publisher & Editor-In-Chief

Mahadevan Iyer
miyer@charypublications.in

Group Editor

Subhajit Roy
subhajit@charypublications.in

Editorial Co-ordinator

Nafisa Kaisar
nafisa@charypublications.in

Advertising Department

Director - Advertisement
Pravita Iyer
pravita@charypublications.in

Advertising Manager

Nafisa Kaisar
nafisa@charypublications.in

Advertising Executive

Sonali Pugaokar
mktg@charypublications.in

Design

Nilesh Nimkar
charydesign@charypublications.in

Subscription Department

Priyanka Alugade
sub@charypublications.in

Accounts Department

Dattakumar Barge
Bhakti Thakkar
accounts@charypublications.in

Digital Department

Ronak Parekh
dgmarketing@charypublications.in

Lighting India is also available online on www.lightingindia.in. For online enquiries contact at: dgmarketing@charypublications.in

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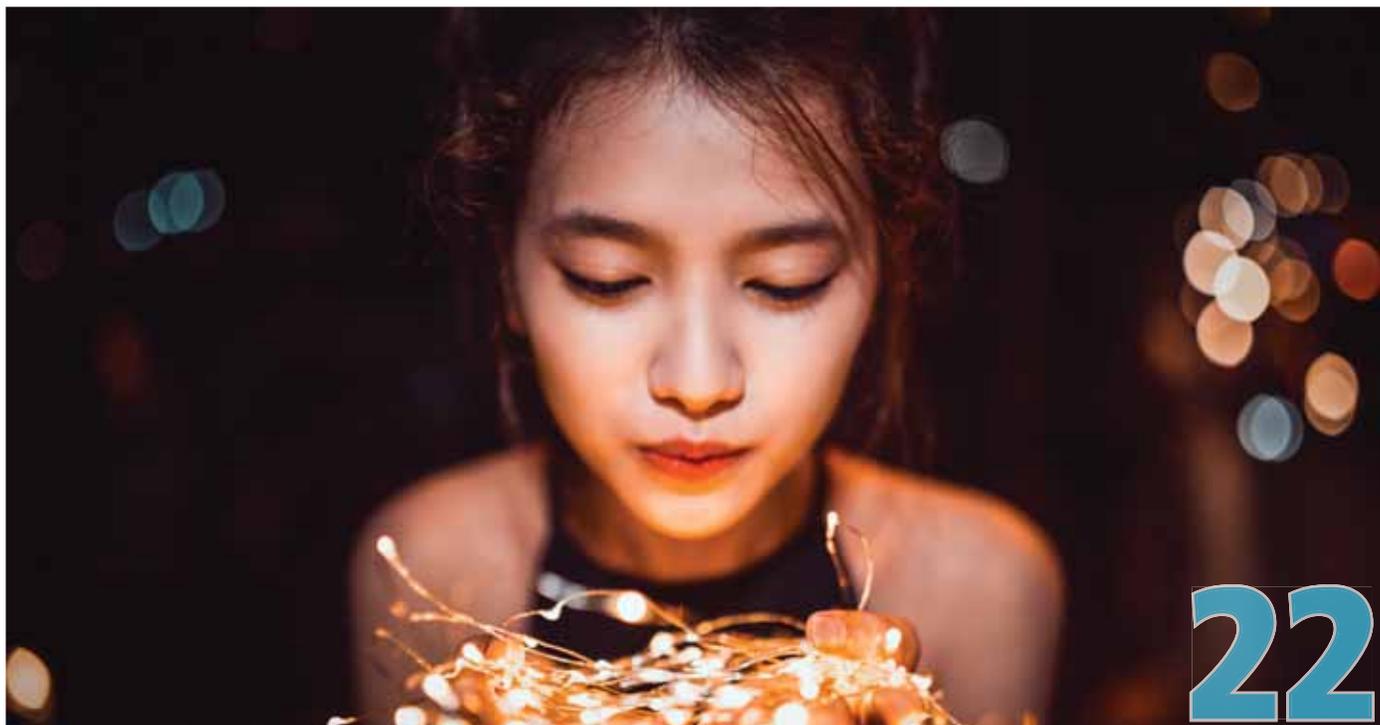
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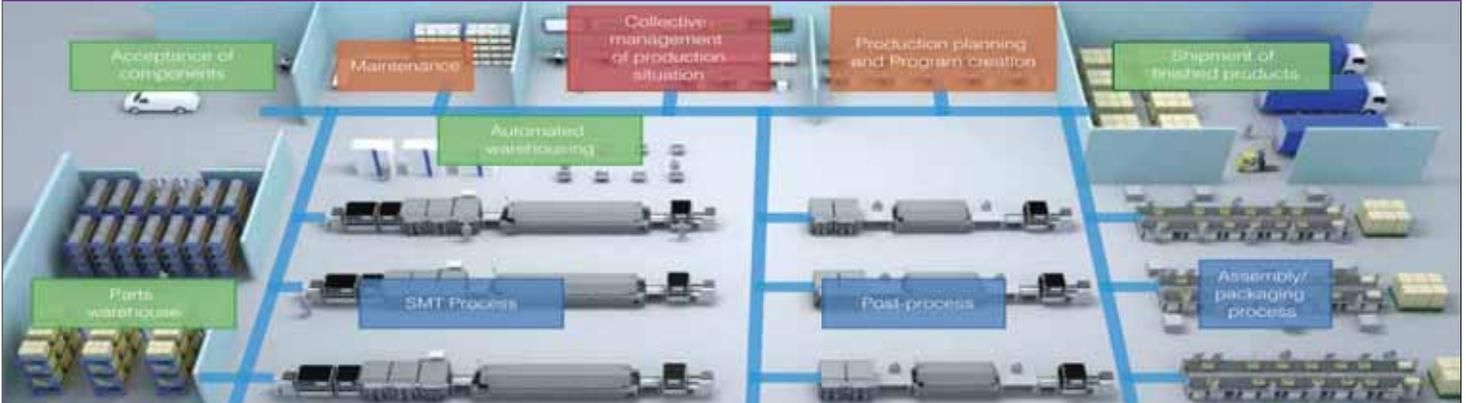
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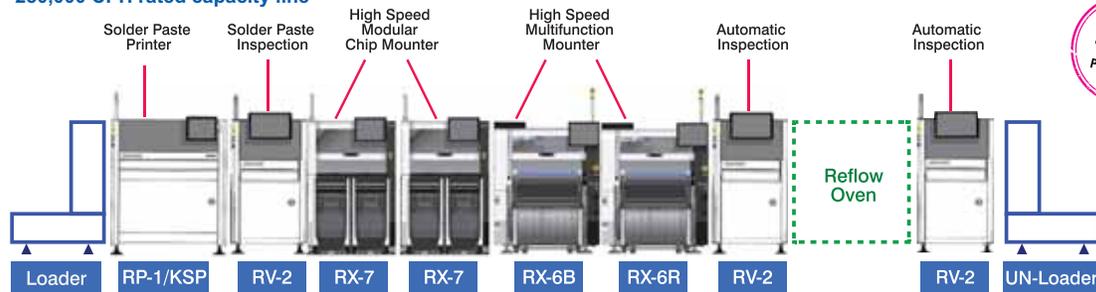
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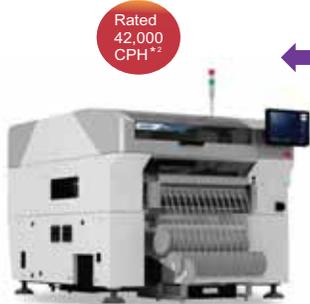
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The Many Shades of Stage Lighting

Stage lighting is an integral ingredient in the field of performing arts. It conveys emotion, mood, setting, energy and many other important elements on the stage and colour is one of the most impacting attributes of lighting. Here we introduce you to a few recent successful, world-class projects that cover the different elements of stage lighting.

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department

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- **Rajesh Naik**
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Legrand launches new range of ACBs for efficient protection

Legrand introduces its new range of Air Circuit Breakers (ACBs)-DMX SP with its assembly line in Sinnar, Nasik. The new range of DMX-SP is packed with benefits of protection, high mechanical and electrical endurance. It is perfect ACB across applications in commercial, residential, medium-scale industries, hospitals, malls and hotels.

Legrand Group in India has been a significant player in the power business since 2002 and has a range of power products including - ACBs, MCCBs,



Busbars, capacitors, control-gear and modular devices. "With the new assembly line in Sinnar for the ACB development, Legrand India takes one step forward to Make in India project and its commitment to the power business. Legrand globally has its manufacturing facilities in 90 countries out of which 15 are in India," the company states.

Speaking on this occasion, Jean Charles Thuard, CEO, Legrand India said, "The new range of DMX SP is optimised, smart and efficient. These ACBs are manufactured with the strong understanding of the Indian market and with the leverage of the Group legacy we had an opportunity to introduce the new range designed in India."

Sameer Saxena, Director-Marketing, Legrand India said, "DMX-SP ACB's launch in our Sinnar, Nasik factory has enabled to look into the customer needs and give more emphasis to their demands." ■

New nLight AIR Adapter enables management from a single point

Acuity Brands, Inc. announced the launch of a new nLight AIR wireless lighting controls adapter that can unite both wireless and wired lighting controls devices and systems. The resulting nLight AIR platform can also connect with an nLight ECLYPSE controller, optionally leveraging BACnet/IP and WiFi networks to seamlessly integrate lighting controls with other building management systems to help create an intelligent, connected building.

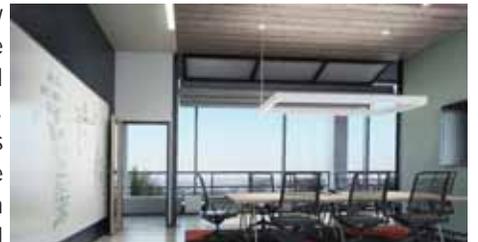
The AIR adapter easily penetrates through obstructions common in commercial buildings and enhances wireless coverage in large indoor and outdoor spaces. Featuring a 900MHz communication frequency, a single AIR adapter can connect up to 750 nLight AIR control devices, with signal penetration testing available upon request.

"Building managers can now create a hybrid wired and wireless lighting controls system for building renovations and manage those controls from one point," said Trevor Palmer, Senior Vice President, Distributed Lighting Networks, Acuity Brands Lighting. "For example, a new wireless lighting control system for a parking lot or deck can be connected to a building's existing wired lighting control system. A 'single pane of glass' can then be used to view and manage the integrated system." ■



Eaton improves building energy efficiency with advanced LED technology

Power management company Eaton announced the expansion of its architectural connected lighting product offering, providing new options for architects and designers looking to increase building operating efficiency through controls and data. The second generation of Eaton's Neo-Ray Define



recessed and perimeter slot linear luminaires delivers uniform lines of illumination for architects and designers. In addition, Eaton has added two new Corelite products to its architectural portfolio: Corelite Hugo and Corelite Continua.

The Define series by Neo-Ray provides architects and designers with minimalist and simple luminaires for virtually any architectural environment. Powered by Eaton's advanced linear LED technology, the Neo-Ray Define recessed and perimeter slot linear luminaires allow architects and designers to customise a space with standard trims that fit a variety of different architectural ceiling types. Designers can define their spaces with a selection of five different apertures, specifiable to the nearest inch, and can integrate corners and transitions seamlessly without ordering custom fixtures.

Neo-Ray Define can be integrated with Eaton's connected lighting systems, including WaveLinx Wireless Connected Lighting System, Distributed Low-Voltage Power System and LumaWatt Pro Wireless Connected Lighting System powered by Enlighted. ■



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Orient Electric gets BEE 5-Star rating for its LED bulbs

Orient Electric Limited, a part of the diversified \$ 1.8 billion CK Birla Group, has become the first Indian lighting brand to have been awarded 5-Star rating for its 9W LED bulb by BEE (Bureau of Energy Efficiency).

Puneet Dhawan, Sr. Vice President and Business Head, Lighting, Orient Electric said, "We are proud to be amongst the first to have certified BEE 5-Star rated LED bulbs. We have always been a firm supporter of BEE's star labelling for LED bulbs as it helps to assure the consumer in terms of light output and energy savings. Also, we



were the pioneers to introduce and market BEE 3-Star rated bulbs way back in 2016 and this norm has now been made mandatory for all. In our consistent endeavour to provide value to consumers, we have now voluntarily adopted BEE 5-Star rating for high demand 9W LED bulbs."

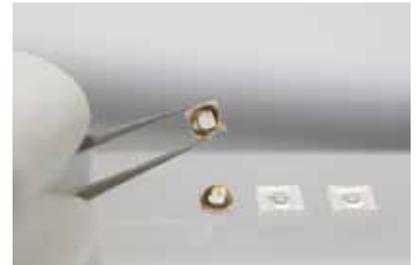
He further added, "Our LED lighting business has grown 8 times in just 2 years. We are today one of the largest LED bulb manufacturers in the country in the non-OEM category and a preferred supplier to many government institutions. Our products are at par with global standards in terms of quality as well as cost."

Orient Electric has a fully-integrated manufacturing set-up for making electronic drivers, LED modules and finished bulbs, various LED luminaires e.g. streetlights, floodlights, industrial highbay lights and indoor lights backed up by a fully-integrated in-house R&D team and competence centre. ■

LG Innotek introduces 'Visible Disinfection Lighting' solution

LG Innotek announced 'Visible Disinfection Lighting', which is a functional light source that gives the effect of sterilisation by sunlight with the indoor light. The LED realises the effect of eco-friendly sterilisation, that is, the method used to dry household goods and blankets under the sun, in indoor spaces conveniently and safely at any time.

Bacteria have a characteristic that they become extinct when exposed to sunlight for a long time. It is because of a material called 'porphyrin' inside of bacteria which destroys its cells by reacting with certain wavelengths of sunlight. LG Innotek created 'Visible Disinfection Lighting' by maximising the use of the 405nm wavelength to which porphyrin reacts most actively, with its unique LED light extraction technology.



Using LG Innotek's 'Visible Disinfection Lighting' one can easily sterilise an indoor space without having to use any chemicals. According to the result of the sterilization power test on Hygienic Light LED by Korea Conformity Laboratories (KCL), 99.9 per cent of escherichia coli get killed.

Especially, since this product does not harm the human body, its sterilisation function can be used with any worries in places where many people pass by such as kitchens or restrooms. The product is verified that it does not have any negative effect on the eyes or skin, from the Photobiological Safety Standard (IEC62471) of International Electrotechnical Commission, an international standard for electrical technology.

Also, 'Visible Disinfection Lighting' of LG Innotek can optimise the sterilisation power according to the indoor conditions in the same way as how one controls the brightness of the light.

LG Innotek has already installed this product in the coffin rooms of funeral halls and waste storage rooms in Yonsei University Severance Hospital Seoul as a trial. The product has received positive responses as it enhances the sterilisation effect and gives a psychological relief at the same time. ■

Orange Plus launches new suspended linear lights

Orange Plus introduces the new generation of custom LED lights - 'suspended linear lights' customised as per the requirements. Easy to install, low glare with excellent uniform lighting along with a high level of corrosion resistance, these are ideal for large scale ceiling suspensions for the latest, modern commercial installations.

"Bringing the perfect confluence of luxury and functionality, the LED solutions are both cost-effective and energy-efficient. With 36W to 72W energy consumption, the lights also save electricity and remain cool. The suspended linear lights bring 120-degree beam angle, enabling even distribution of light," the company claims.

Speaking on the newest addition, the company's joint managing director Mahesh Bellad says, "Our newest LED solutions, breaks the monotony of the ceiling element, bringing the focal point to lights. Designed exclusively for the offices, arenas, showrooms and art galleries the lights, are compliant to formal set ups, adding a touch of elegance to every room." ■





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He further added, "Our LED lighting business has grown 8 times in just 2 years. We are today one of the largest LED bulb manufacturers in the country in the non-OEM category and a preferred supplier to many government institutions. Over the last 3 years, we have focused most of our investments on new product development, quality enhancement and automation, indigenising components and expanding production capacities. Our products are at par with global standards in terms of quality as well as cost"

BEE, under its labelling program for LED bulbs, considers luminous efficacy ■

Selux Group to undergo strategic restructuring in Europe

With its professional lighting solutions, the Selux Group announce that it will in future be concentrating on its successful exterior business within Europe. To enhance its innovative strength, the international Selux Group will be focussing its activities on its successful exterior applications area. "Selux can look back on more than 70 years of operating experience, with around 500 staff members in 13 countries, as well as production sites in Germany, France and the USA," a statement issued by the company said.

Selux Corporation in the USA will continue unchanged with its successful activity in interior and exterior business.

In Europe the focus will be on the successful exterior business segment, creating smart lighting for the smart city applications of tomorrow. The heart of this restructuring will be intelligent networking of urban lighting as an open, modular infrastructure. Selux products like the new Lif light column with its innovative, smart elements point the way forward – as does its Smart Parking area in Berlin, where customers can experience Selux smart lighting already today live and in person. ■



Products like the Lif provide optimal prerequisites for the integration of smart functions.

Current by GE Partners with Nokia to unleash smart city technology across Canada

Nokia announced tie up with Current, powered by GE to bring cutting edge smart city technology to cities across Canada. The two companies have announced a commercial partnership that will help Canadian cities improve operational infrastructure and expand new services to citizens.

Under the terms of the agreement, Nokia will gain access to Current by GE's CityIQ platform technology across Canada. The system will repurpose outdoor street lighting into digital infrastructure that collects data and distributes valuable insights to cities via Nokia's safe and secure communications networks.

The combined digital solution is expected to help cities gain new operational insights and will enable app development—using a 'horizontal' platform that can support a wide variety of apps simultaneously—that can address common challenges like parking and traffic management, public safety enhancements and weather and air quality monitoring.

Shawn Sparling, Head of Canada Enterprise Sales for Nokia said, "Responsive, flexible technology is key to creating smarter cities while enabling a safer and more sustainable environment. The agreement with Current by GE is a key milestone in our efforts to build a rich and diverse ecosystem of leading suppliers to ensure the delivery of best-in-class solutions for our customers." ■





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Smart streetlight controls to power energy efficiency in Edinburgh

As part of the City of Edinburgh's energy efficiency program, around 64,000 LED lights smart streetlight controls are being deployed. UK wireless technology developer Telensa has been selected for supplying of its smart streetlight controls. The deployment is already underway and is expected to complete by the end of 2020.



Telensa PLANet is a wireless central management system (CMS) that enables centralised remote control of the city's lighting. It consists of wireless nodes connecting individual lights, dedicated wireless connectivity, and a central management application.

PLANet provides real-time monitoring to identify and track faults, which will cut the number of residents' complaints about broken street lights and remove the need for street lighting staff to undertake night-time patrols to identify faulty lights. It also measures actual energy consumption, submitting information directly to the Meter Administrator and increasing the accuracy of energy billing.

The system pays for itself in reduced energy and maintenance costs, improves quality of service, and enables streetlight poles to act as hubs for smart city sensors. With more than 1.5 million lights connected, Telensa PLANet is the world's most popular connected streetlight system. ■

IALD announces call for entries for 2019 awards

The International Association of Lighting Designers (IALD) has announced the opening of registration and entry process for its 36th Annual IALD International Lighting Design Awards. The early deadline for entering the awards program is 2nd October and the final deadline is 5th November.

The IALD Awards program is designed to elevate the profile of lighting designers by recognizing exceptional architectural lighting design around the globe. Projects that win IALD awards are remarkable examples of the many ways in which users experience spaces—as a result of lighting and of the visual atmospheres created by quality designs.

The award-winning projects will be announced on Wednesday, 22 May 2019 at the 2019 IALD Education Trust Benefit Dinner and 36th Annual IALD International Lighting Design Awards Presentation in Philadelphia, PA USA.

Any individual lighting designer or lighting design firm may enter a project for an award; awards will be granted only to the team or teams that performed the design of the architectural lighting for the project. The project must be a permanent architectural lighting design solution for which construction was completed after 1 June 2017. Projects entered last year can be resubmitted, as long as they adhere to the date requirements. ■



Osram to sale of its luminaires business

German lighting group Osram has put the luminaires part of its professional lighting business up for sale so it can focus on fast-growing high-tech businesses.

"Thanks to numerous measures, the earnings position of the Lighting Solutions business unit has stabilised significantly, therefore allowing us to initiate an organised sales process. This will result in a more strategic focus with regards to applications with high growth potential," said Olaf Berlien, CEO of OSRAM Licht AG.

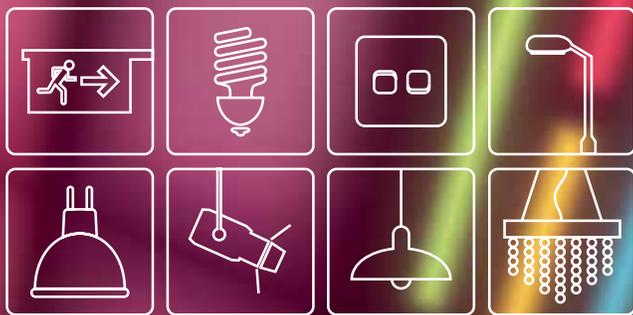
"Talks will be held with interested parties for the luminaires business. The management board will provide an update on the progress of strategic plans for the company at the Capital Markets Day in November," a statement issued by the company said.

As part of its strategic realignment, Osram is refining its positioning with an increased focus on the growth markets in high-tech fields. The financial figures of the Lighting Solutions (LS) business unit, combined with the contribution of the Digital Systems business unit, are captured within the Lighting Solutions & Systems (LSS) reporting segment. The largest LS location is Traunreut, Germany, where luminaires e.g. for industrial and commercial sites and street and stadium lighting are produced. ■

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IEEMA appoints Harish Agarwal as President



Harish Agarwal

Indian Electrical & Electronics Manufacturers' Association (IEEMA) - the apex association of the Indian electrical equipment manufacturing industry, has announced appointment of Harish Agarwal as President IEEMA for 2018-19. He will take the leadership role during the IEEMA Annual Convention and AGM to be held on 15th September. The theme of Annual Convention this year is 'Go Global'.

Agarwal is the CEO of Supreme & Co. Pvt Ltd. He is also a member of important industry bodies like CIGRE, IEEE, ASM International Materials Engineering Institute, CBIP - executive committee, Project Steering Committee of 1,200 KV National Test Station, Bina, Project steering committee of smart city pilot project, Pondicherry and IEEMA Eastern Region Committee.

"The association believes that Mr. Agarwal's outstanding professional credentials and extensive international experience make him exceptionally well placed to provide leadership to IEEMA at this important juncture. He is well-known in the industry for his work with utilities and across electrical equipment spectrum and people management," said Sunil Misra, Director General, IEEMA.

IEEMA also announced the appointment of Vice Presidents for the year 2018-19. R.K. Chugh has a diverse set of business experiences in the fields of Power Transmission and Distribution (T&D) and Automation and Drives (A&D). Chugh is currently the Business Head for Digital Grid for South Asia in Energy Management division of Siemens and also Location Head for Gurgaon. Vipul Ray is the Managing Director of Elemex Control Pvt Ltd. ■

Anolis appoints Peer Oestergaard as Sales Director



Peer Oestergaard

Architectural LED lighting manufacturer Anolis has appointed Peer Oestergaard as Sales Director. Peer will be managing and co-ordinating Anolis sales teams globally and ensuring that the brand continues to proactively build its profile, visibility and reputation for quality and innovative products and excellent service worldwide.

Anolis Director Tim Van den Eede said, "We are delighted to have someone of Peer's calibre and talent on-board. His personality, approach to business and smart outlook is the perfect match for us, and we share the same core visions for taking Anolis to the next level of operation."

Based in the Czech Republic, all Anolis products are designed and produced in Europe. The brand is currently undergoing restructuring and positing itself for long term future expansion and the development of new and ground-breaking product lines.

Peer lives in Denmark and will be travelling

extensively in his new role at Anolis. He brings a wealth of experience and many skills to the Anolis team, having most recently co-ordinated complex international business for two other very well-known architectural or architainment lighting brands.

He has been a professional lighting practitioner since the late 1980s, and has always had a keen interest in architecture and the way dynamic lighting can transform and bring alive spaces, objects and environments - from art works to industrial, commercial and residential buildings - in all types of scenarios.

"I am lucky enough to have worked on lighting some truly landmark projects worldwide over the years," enthuses Peer, also admitting that, when young, he originally dreamed about being an architect ... and then became fascinated by lighting! So, he has been fortunate enough to become involved in architecture via another - different - equally creative and stimulating route! ■

Cree names Neill Reynolds as CFO

Cree, Inc. announces the appointment of Neill Reynolds as chief financial officer (CFO), effective 27th August. Reynolds will succeed Mike McDevitt at that time, per the transition plan announced in June.

Reynolds brings extensive executive financial and industry leadership experience to Cree. He joins from NXP Semiconductors N.V., where he serves as senior vice president of finance, strategy and procurement. At NXP, Reynolds has led global teams to develop and drive profitability initiatives to expand profit margins and deliver on growth objectives.

Prior to NXP, his career includes more than 15 years as a finance leader with international technology companies

including General Electric, where he held CFO positions in various businesses and served on management teams that consistently delivered profit enhancements for global industrial and manufacturing businesses, spanning multiple technology industries.

"Neill is an exceptional leader with vast experience within the markets Cree serves," said Gregg Lowe, CEO of Cree. "We believe that Neill's industry knowledge will help position Cree for continued success and support our growth plans. We thank Mike for his substantial contributions to Cree's success over the past 16 years and are grateful for his support during the transition." Reynolds holds a bachelor's degree from Boston College. ■

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QolorFLEX LED dimmers used in award-winning project

City Theatrical announces that QolorFLEX 4x2.5A Dimmers are providing the dimming control for the award-winning starry sky ceiling feature at the George S. and Dolores Doré Eccles Theater, a Broadway-style urban performing arts center in Salt Lake City, Utah. The theatre's ceiling feature was recently awarded a citation at the 2018 IESNYC Lumen Awards for its unique, three-dimensional effects that capture the look of the Utah night sky.

"City Theatrical's QolorFLEX 4x2.5A Dimmers were our choice for Eccles Theater's starry sky feature lighting for some important reasons," said Francesca Bettridge, Principal of Cline Bettridge Bernstein Lighting Design



(CBBLD) and lighting design lead for the project. "The dimmers have the best dimming range for a low voltage DC product, there are lots of options for setting curve and dimming cycle rates, and we had great support from City Theatrical throughout the project – so necessary for a successful project."

The QolorFLEX 4x2.5A Dimmers are installed at 120 feet above the ground across 78 metal frames in the theatre's ceiling. They are set up in nine different dimmable zones to allow for random control and cross-fading of the hundreds of tiny, star-like, low voltage LED lights, which are installed as two-layered LED strings over the same metal frames in the ceiling. ■

SCHOTT wins Red Dot Design and German Innovation Awards

SCHOTT LuminaLine came away the winner in the Materials category despite competition from 5,600 entries out of 55 countries, winning over a jury of 40 internationally recognised design experts. LuminaLine is also one of the final three nominees for the Red Dot: Luminary, the highest award presented in the Red Dot Design Award for design concepts. LuminaLine had previously prevailed as the German Innovation Award Winner 2018.

According to Stephan Schabacker, Director of Sales Automotive at SCHOTT Lighting and Imaging, it is no coincidence that SCHOTT LuminaLine received both an innovation and design award. "LuminaLine is a particularly



reddot award 2018
best of the best

strong concept because this component can be used in so many ways, both as a versatile design element and as a resilient component for particularly harsh environments. LuminaLine has its own aesthetics in both the illuminated and non-illuminated state and is easy to recycle as a glass component."

LuminaLine is technically based on a glass composite whose luminance is bundled by a fiber optic – the soul. This creates an interplay of light and transparency that makes new designs possible. From a functional perspective, LuminaLine is also suitable for using concentrated homogeneous light for industrial and medical applications. ■

Tata Power-DDL adjudged 'Industry Leader'

Tata Power Delhi Distribution (Tata Power-DDL) has been adjudged as the 'Industry Leader' for crossing landmark score of 650-plus in its Tata Business Excellence Model (TBEM) assessment 2017. The award was presented by Ratan Tata, Chairman Emeritus, Tata Sons and N. Chandrasekaran, Chairman, Tata Sons to Praveer Sinha, Chairman, Tata Power-DDL and CEO & MD, Tata Power and Sanjay Banga, CEO, Tata Power-DDL at the JRD QV Award function held recently at the National Centre for Performing Arts (NCPA) in Mumbai.



The Tata Business Excellence Model (TBEM) matrix has been conceived to deliver strategic direction and drive business improvements at the Tata Group. Aimed at enabling Tata Group companies capture the best global business processes and practices, the model invests Tata Group companies with the

inherent dynamism to evolve and keep pace with ever-changing business performance parameters.

With this recognition, Tata Power-DDL has now joined the elite club of Tata Group Companies with 650-plus score, the others being Tata Steel and TCS. ■

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Himanshu Joshi
M: +91 85869 26107
E: himanshu.joshi@india.messefrankfurt.com

Circadian lighting helps nurses 'sleep better'

A recent study on nurses from two Danish hospitals has reaffirmed that avoiding blue frequency light at night can help with sleep.



In most hospitals, the light and noise levels are typically constant around the clock. Even at night, when the body needs darkness and rest, the light is on. The same lighting around the clock can have negative consequences for staff working in changing shifts. They experience challenges of maintaining a normal circadian rhythm, waking state, cognitive skills and a good mood, and their attention weakens. Research also shows that wrong lighting at night can increase stress levels and reduce well-being and job satisfaction.

However, a recent study on nurses from two Danish hospitals has reaffirmed that avoiding blue frequency light at night can help with sleep.

The survey was conducted at Aarhus University Hospital and Copenhagen University Hospital by the Aarhus-based lighting company Chromaviso in 2013 on developing circadian lighting adapted to the complex hospital environment. Among other things, this includes the challenge of reconciling the various considerations at night, where the body's circadian rhythm needs darkness, while there is a need for light for the work.

Effect on staff

The effect of circadian lighting on staff has been examined in a pilot study with 26 nurses distributed in an intensive care and a rehabilitation department with Circadian Lighting, and a control department with ordinary lighting. A criterion for inclusion in the study was that the nurses had at least one

weekly night shift. The staff kept a diary and filled in questionnaires regarding sleep pattern, work and well-being. The questionnaire focused particularly on staff working in changing shifts and reflected the complex environment.

"We have received differing statements in the study, and therefore, the results are not clear-cut. However, there is a tendency for nurses who have been exposed to Circadian Lighting to generally experience better sleep, as they fall asleep more easily and their sleep is calmer. They generally find it easier to wake up in the morning and feel more rested after three days in

Circadian Lighting, compared to the control group," explains the clinical nursing specialist and PhD Leanne Langhorn, Aarhus University Hospital. Due to the size of the study, it has not been possible to achieve significance of the results. The results support other research showing a connection between lighting, sleep, energy and mood.

"Other new studies show that it usually takes at least four days to get back to normal circadian rhythm after night shifts. Our project indicates that Circadian Lighting might be able to reduce this time. It would certainly be interesting to examine this further," says Leanne Langhorn. The study also suggests a number of other benefits of Circadian Lighting. For instance, a behaviour-regulating effect due to the dimmed light at night.

"Circadian Lighting has generally had a positive effect on the working environment and the behaviour among the staff. In the department with Circadian Lighting, they are more aware of maintaining a natural and regular circadian rhythm with light and activity during the day and darkness, quiet and rest at night. In intensive care, the Circadian Lighting has resulted in the most obvious positive response, which can be explained by previously having the light on and activity around the clock here. In the rehabilitation department, the light is usually off at night," says Leanne Langhorn.

The night lighting is without the blue tones, and therefore, it does not disrupt the body's circadian rhythm, while the staff still has light for their work.



"Most members of the staff are very positive towards the night lighting. However, there have been a few that feel tired in the evening, because they need the stimulation from the white light. Therefore, they have turned on one of the white light settings in another room as needed," explains development nurse Lone Mathiesen, Copenhagen University Hospital.

"The right lighting is an important safety factor, including in connection with observation, medication and documentation. Here, the feedback from our project supports other research showing that the lighting can reduce errors," explains Leanne Langhorn.

Holistic and adapted

Circadian lighting is based on a clinically documented light protocol that is adapted to the natural circadian rhythm.

Furthermore, each bed has activity-based light settings that the staff can use when the situation requires it. Such as a soothing light or a minimally disrupting, delimited white light for a specific task at night. The solution at Aarhus University Hospital is adapted to the neurointensive care environment, and at Copenhagen University Hospital, it is adapted to the neurological rehabilitation.

"The circadian lighting ensures balance between consideration for the circadian rhythm of the body and the staff's need for good work light. This is a holistic solution that contributes to the staff's working environment, well-being and health. Further studies with a larger number of nurses and over a longer period of time should be carried out in order to gain more strength and have more perspectives examined," explains Leanne Langhorn. ■

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Are LED imports a threat?

– Subhajit Roy, Group Editor

The Indian market is being flooded with spurious and non-branded LED products. Here we take a closer look at India's LED imports and position of organised firms.

Buoyed by strong socio-economic growth and favourable government policies, the lighting industry in India is witnessing exponential growth year-on-year. Reports suggest that the Indian lighting industry will continue to grow at a higher rate per annum, ranging between 13 per cent and 15 per cent until 2020. As the demand for a smart,

connected lifestyle and energy-efficient products is increasing, the Indian LED lighting industry is expected to grow further.

As per a study conducted by ELCOMA (Electric Lamp and Component Manufacturers' Association), the Indian LED lighting market has grown from Rs 500 crore in 2010 to over Rs 10,000 crore currently. It constitutes over 45 per cent of the



Chennai Street Lighting Project (Photo Courtesy - Philips Lighting India)

overall Rs 22,000 crore lighting industry in India, comprising of all categories like GLS, FTL, CFL and other lamps. "Given the government's push towards adoption of LEDs and their general consumer popularity, LED lighting will constitute a majority share of the total lighting market in the next few years," said Sumit Joshi, Vice Chairman and Managing Director, Philips Lighting India.

However, he cautioned that the growing demand for LED lighting has also led to an increase in sales of unsafe and illegal products being used in households and offices by Indian consumers, endangering many. This, in Joshi's opinion, is a very disturbing trend as these non-compliant manufacturers undertake various cost-cutting mechanisms, making them unsafe to use, less energy efficient and cheaper than compliant products.

Ajay Saraf, Business Head - Professional Lighting, Havells India Ltd also opines that, a few unorganised and non-branded players see this as an opportunity to sell their spurious and fake products which pose a serious threat not just to organised industry and government's various initiatives but to end-consumers as well due to safety hazards. In this scenario, Saraf suggests, it is important for the government to act against these spurious and non-branded products in order to safeguard the interest of the consumer.

According to a recent Nielsen study conducted across 4 major Indian cities – New Delhi, Mumbai, Ahmedabad and Hyderabad; 76 per cent of LED bulb brands and 71 per cent of LED downlighter brands surveyed across 200 electrical retail outlets were found to be non-compliant with consumer safety standards, as prescribed and mandated for lighting products by the Bureau of Indian Standards (BIS) and Ministry of Electronics and Information Technology, Government of India. Not only are three-fourths of LED bulbs sold non-compliant, spurious and non-branded, but the market share for these products is steadily increasing. This continues to be

“...it is important for the government to act against the spurious and non-branded products for safeguarding consumer safety and protecting the industry revenues against these companies.



Sumit Joshi

Vice Chairman and Managing Director, Philips Lighting India

a major concern for compliant lighting manufacturers in the country.

Furthermore, according to the report, 48 per cent of LED bulb brands have no mention of the manufacturer's address and 31 per cent brands do not even have a manufacturer's name. Hence these brands are also violating Indian legal metrology regulations and are being manufactured illegally.

Joshi believes that these spurious products not only pose a serious safety hazard for consumers but also cause significant loss in tax revenues for the Government of India, as they are illegally manufactured and sold.

Wipro Lighting believes that the spurious and non-branded LED products are not good for the consumers and for the industry as spurious materials are not following any specified quality parameters and flouting safety standards.

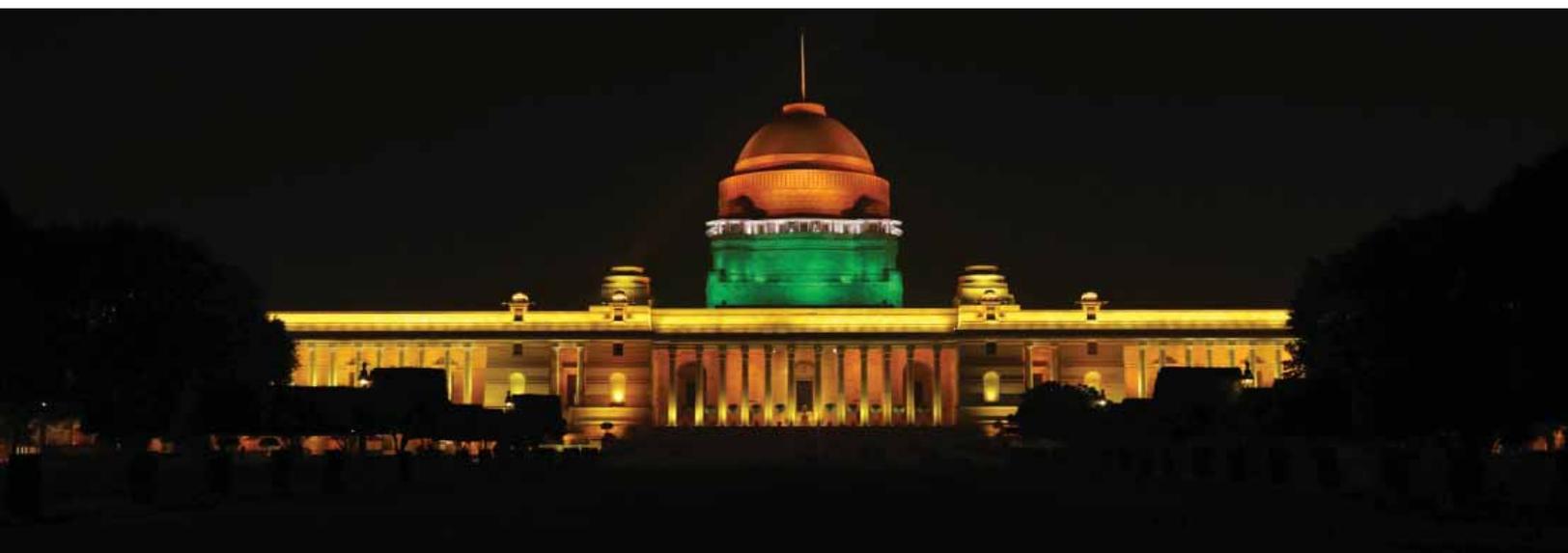
"Non-branded LEDs consume more energy, have a much shorter life and low lumen output. In the long-term consumer

“The staggering numbers are also a blot on the PM's 'Make in India' campaign, since most of these are low quality Chinese imports.



Tushar Gupta

Executive Director, NTL Lemnis



Rashtrapati Bhavan Dynamic LED Facade Lighting using Philips Color Kinetics (Photo Courtesy - Philips Lighting India)



Vijaywada Railway Station Project (Photo Courtesy - Philips Lighting India)

“Spurious and non-branded players bring bad name to the industry. Consumer tends to get an overall negative impression about the performance and reliability of LED lights.”



Sanjay Gupta

Sr. VP & Business Head, Consumer Lighting and Switches, Wipro Consumer Care and Lighting

ends up spending more money buying a non-branded LED product as he has to use more lights for the same light output,” comments Sanjay Gupta, Senior Vice President and Business Head, Consumer Lighting and Switches, Wipro Consumer Care and Lighting.

“With the coming of BEE (standards) on LED lamps, the performance parameter of the products also needs to meet with the designed standard. Hence, not just the safety but the products has to comply with the performance standard which in turn will help in checking the influx of spurious quality products in the market,” observes Tushar Gupta, Executive Director, NTL Lemnis.

Light makers concerned over “spurious” LED products

Industry’s reputation is in stake

Quality is and will remain a big issue in the context of spurious and fake LEDs and unfortunately the whole industry suffers when fakes flood the market. Explaining the direct impact of market being flooded with spurious and non-branded LED products on the industry performance, Sanjay Gupta of Wipro said, “Spurious and non-branded players bring bad name to the industry. Consumer tends to get an overall negative impression about the performance and reliability of LED lights.”

Tushar Gupta of NTL Lemnis also observes, “With low quality, the market loses faith in the new technology and the whole industry is impacted. The loss of reputation and belief of people in Indian consumers in Indian manufacturing is also shaken.”

Saraf of Havells India said, “Unbranded, low-quality products are denting the industry’s image and causing loss of business by delivering substandard products to the consumers while charging a premium.”

However, as per Saraf, at Havells India, the loss of business on account of spurious LED products poses no direct challenge to the company or on its performance due to the high levels of consumer awareness and the collective efforts of all stakeholders.

May derail the energy efficiency campaign

Experts urges that the government should take strict action against low-quality products that do not adhere to safety standards prescribed by BIS and BEE and systems should be put in place so that distributors and retailers are not allowed to sell them. “Any potential mishaps due to these LED bulbs have the potential to derail the energy efficiency campaign run by the government and do massive damage to the industry per se,” Tushar Gupta of NTL Lemnis points out.

A blot on the PM’s ‘Make in India’?

The ‘Make in India’ initiative launched by Prime Minister Narendra Modi in 2014 was expected provide a boost to the domestic LED industry. However, dumping of spurious and non-branded LED products may hit ‘Make in India’. In this context, Tushar Gupta of NTL Lemnis observes, “The staggering numbers are also a blot on the PM’s ‘Make in India’ campaign, since most of these are low quality Chinese



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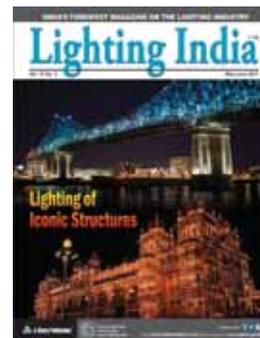
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North and South Block Dynamic LED Facade Lighting using Philips Color Kinetics (Photo Courtesy - Philips Lighting India)

imports. In order to ensure that only quality products are available in the market, the government should immediately ensure that the procurement for EESL and government bodies is from Indian manufacturing only."

Against the 'ease of doing' business

The non-branded LED products are a serious safety threat to not just consumers, but also for organised and compliant market players and government programs as they negatively impact government's tax revenue collections, which would have otherwise been contributed by the formal sector. Hence, according to Sumit Joshi Phillips Lighting India, they are defeating the investment objectives for companies and go against the 'ease of doing' business philosophy of the government of the day.

Sanjay Gupta of Wipro comments: "The spurious and non-branded players are of direct threat to the organised players in the industry as the industry invests in developing and maintaining the quality parameter and invests in adhering to all legal compliances to meet the product specification."

Counter-strategy

Tighten quality controls

To improve the level playing field in the market and to bring the confidence among the consumers for the adoption of LED products, the government has tried to implement number of policies that will help in increasing the performance of the products and also increase the adoption of LED products.

Some of the steps taken by the government are putting Compulsory Registration Scheme (CRO) for BIS adherence for LED products, implementation of BEE (Energy Rating). "We expect the government to ensure strict adherence of these measures so that consumer does not gets a substandard product. At Wipro, we believe that such steps will bring parity in the industry and help in promoting energy efficient LED products," said Sanjay Gupta of Wipro whereas Ajay Saraf of Havells India opines, "In order to curb spurious LED lights, the

“In order to curb spurious LED lights, the government should tighten quality controls for consumer and capital goods and keep a strict vigilance over cheap imports from China.



Ajay Saraf

Business Head - Professional Lighting, Havells India Ltd

government should tighten quality controls for consumer and capital goods and keep a strict vigilance over cheap imports from China."

Strengthen compliance process

LED lighting continues to constitute a majority share of the total lighting market, and this is poised to grow over the next few years. Given this scenario, according to Sumit Joshi of Philips Lighting India, it is important for the government to act against the spurious and non-branded products for safeguarding consumer safety and protecting the industry revenues against these companies.

He adds, "In order to combat the growing supply of the spurious LED lights, the Indian lighting industry unanimously recommends a need for stronger enforcement for compliance to these safety standards prescribed and mandated by the Bureau of Indian Standards and Ministry of Electronics and Information Technology, Government of India."

Today, BIS and BEE together focus on safety as well as the performance standards, but the compliance process is very weak. Tushar Gupta of NTL Lemnis observes that there are no performance standards that are mandatory and this could turn out to be the Achilles heel of the most energy-efficient lighting source. He firmly believes that the time has come to strengthen the safety and performance standards of BIS and make them mandatory. He adds, "We think that time has come, when some sort of anti-dumping duty should also be imposed on these imports so that the Indian consumers do not suffer." ■

The Visitor Experience

How lighting can be used as a tool to enhance the visitor experience in cultural buildings, respecting visual and conservational factors while also meeting new challenges posed by changing human behaviour and modern architectural approaches.

Cultural buildings and museums are built to share knowledge and cultures with the general public. These institutions bring together and present pieces of art and performances in a way that enables an appropriate and authentic visitor experience. The perception of the objects shown is clearly a fundamental part of this experience, as

interactions between the exhibits and their surroundings shape the perception of the observer. Architectural and focussed lighting play an important role in helping to reveal the true meanings of these objects and spaces.

In addition, cultural buildings and museums are also built to preserve valuable goods and resources for the future of





Museo del Duomo (Milan)



for society and, more often than not, a landmark in the cityscape.

The growing number of temporary exhibitions and events also demonstrate this growing trend. These cultural offerings shape the social life of a city and can further boost the appeal of a museum or performance space.

The structure and layout of these buildings are naturally built around the visitors and the artworks that they come to experience. As a result, light has to adapt its qualities to reflect these parameters and fulfil the needs of the user.

Why do people go to museums?

Although these buildings are primarily intended to share and preserve works of art, we now have to ask ourselves a key question: Why do people visit museums? These places often have a long history, having started out as private art collections before being opened to the public from around the end of the 18th century. Nowadays there are thousands of museums with specific architecture and particular ways of exhibiting arts. This evolution demonstrates how the architectural language of these places has changed, along with the nature of visitor behaviour.

People normally go to museums to be enriched by the information that these places seek to present. Individuals

want to improve their knowledge by studying exhibits and learning about artists, history and everything that a museum may contain.

As we are currently experiencing a period of social and technological change, there are also other reasons besides the ones mentioned above. There is often an emotional aspect, incorporating feelings such as love. People regularly want to impress their loved ones in front of a piece of art by showing and sharing their specific knowledge.

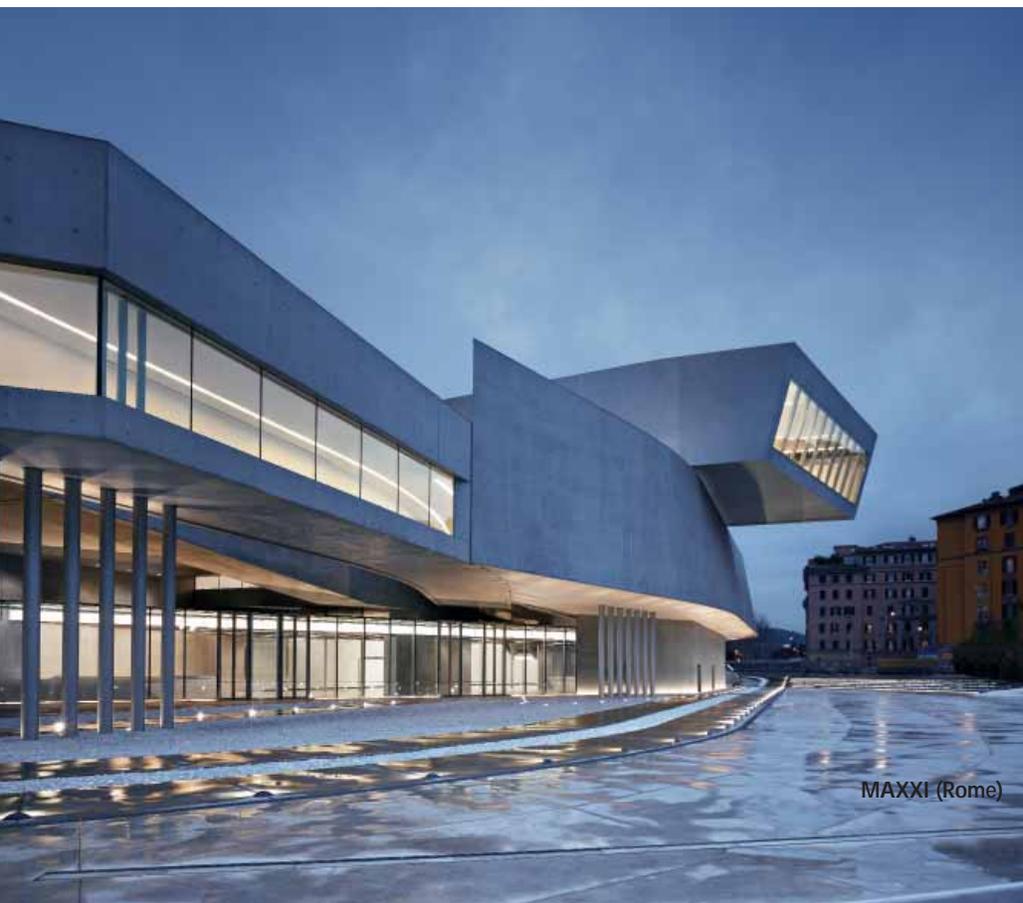
Being part of a community is another reason, with a trend towards enjoying art with others. Indeed, the status associated with being a member of a certain association can make people feel integrated into a cultural community.

Alongside solid cultural reasons for visiting a museum, church or exhibition centre, it therefore seems to fair to conclude that people now recognise these kinds of places as social meeting points in which (or outside which) they like to spend time. This aspect has led to a change in expectations. For example, the results of a recent survey showed that 47 per cent of the visitors to the Tate Modern go there for social reasons.

Then there are museums like the Guggenheim in Bilbao or the MAXXI in Rome (and many others), where the "archi-stars" have taken an almost sculptural approach to designing the



Selfie/picture in front of paintings (from Kunst Historisches Museum, Vienna)



MAXXI (Rome)

buildings, changing the character of a neighbourhood or an entire city and at times even establishing the architecture as the main reason for people to visit.

A contemporary cultural building has become an object to be shaped and crafted by architects, who sometimes take on the role of a sculptor and create their own piece of art to contain other artworks. Visiting these places from an architectural point of view, both outside and inside, and seeing the way they interplay with daily life and interact with outdoor public spaces has indeed itself become a fascinating experience. That is why these buildings increasingly have a social and visual impact on urban life, during the day and at night.

The visitor experience

Given the fact that visitors want to feel enriched by their experience in a



Städel Museum



Liebighaus (outside)

cultural building, it is possible to imagine a journey that starts outside and leads right up to the artwork.

Perception of the building

Light already starts to play a key role outside the building, sending a message to visitors about what is inside, focussing on architectural details or enhancing the impression of exhibits that may be visible from the exterior.

Perception of the architecture

Tailored architectural lighting can significantly help the visitor to move through the space and appreciate the art with high visual quality, balancing the contrast of luminance between different surfaces and tuning the colours to maintain material and structural authenticity.

Connectivity

A lighting system can support individuals as they navigate through the space, transmitting information to their personal devices and helping to create a customised visitor experience. A “digital connection” between the museum archives and the visitor can help to share more knowledge and “unknown” artworks via multimedia devices.

Perception of the artwork

In a world of globalisation, standing in front of “the real thing” is a rare and unique experience. That is why light plays a fundamental role in experiencing art, enabling the visitor to feel and interpret the message sent by the original creator via his or her work and simultaneously respecting the history of the exhibit and the environment in which it is presented..



Kunst Historisches Museum (art history museum), Vienna

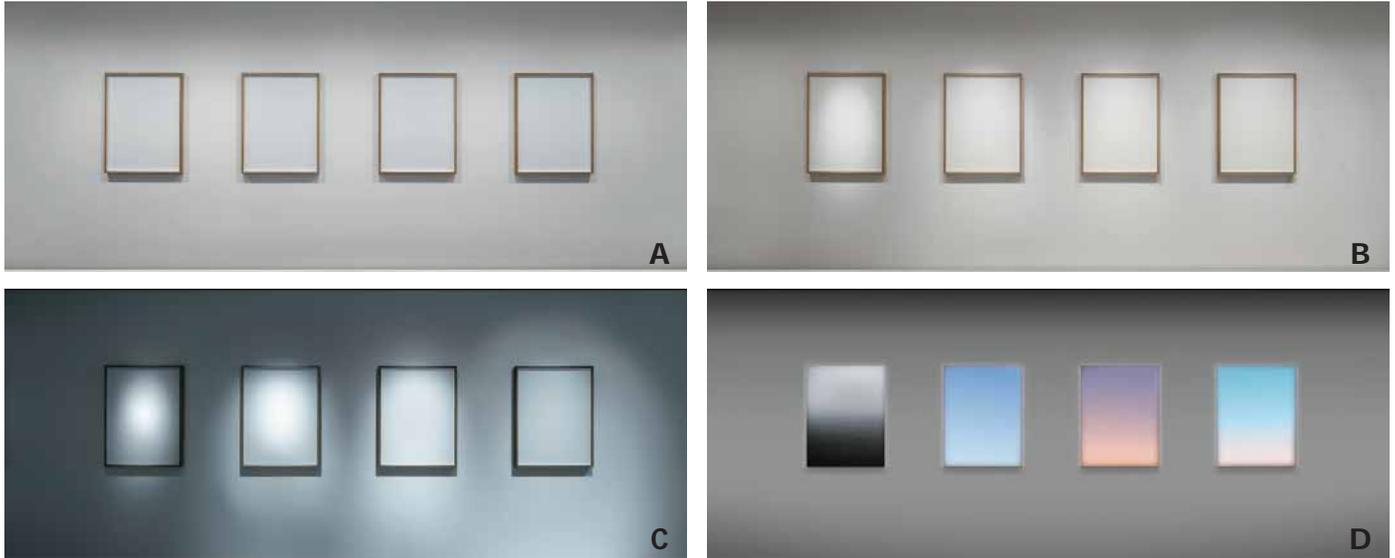
The visit comes to an end when the people, inspired and enriched by the art that they have just experienced, exit the building with fresh knowledge in their cultural rucksacks.

Active light in museums

The aim of the art and culture lighting application is to enable visitors to perceive arts and cultures in the best possible way, helping people feel enriched after cultural visits. Active light in museums focuses on visual comfort

and preserving sensitive materials, while at the same time taking all conservational and visual aspects into account. This creates a unique experience, emphasising the appreciation of art and architecture, as well as underlining the importance of a dynamic and precise lighting system.

As a premium partner in the art and culture sector, Zumtobel can make this possible by providing specific lighting solutions tailored around works of art



Possible ways to illuminate a painting: from soft and homogenous to sharp and focussed. a) Wallwasher. b) Wallwasher and spotlights (with different beam angles). c) Spotlights (with different beam angles). d) Wallwasher and picture-framing.



The National Maritime Museum (Amsterdam). An interactive lighting solution allows visitors to learn about a specific part of the painting by combining touch-screens (on the tables) and focus lighting (on the painting).

and their surroundings, adopting sensitive approaches with an extremely high quality of light and using innovative technologies to maintain, manage and interact with the lighting system.

BLE (Bluetooth Low Energy) devices integrated into the LED module improve the way individual fittings or groups of luminaires can be remotely controlled. This enables exhibitions to be managed in a simpler and more efficient way, while also supporting the conservation

of individual pieces through a network of sensors. In addition, the possibility to dim the luminous flux down to a flicker-free level of 1 per cent is vital for sensitive materials that have to be appreciated with very low lux levels.

The Zumtobel portfolio for the illumination of art and culture applications offers a complete toolbox of flexible lighting instruments with a wide range of optical solutions for every kind of exhibit. The miniaturisation of

these devices and the ability to adapt to a variety of architectural situations help designers integrate the lighting system effectively and discreetly into the architecture.

Finally, the state-of-the-art lighting solutions and the high quality of the light sources mean that museums can safely preserve artworks and accurately reveal their original artistic message – both now and for generations to come. ■
Courtesy - Zumtobel

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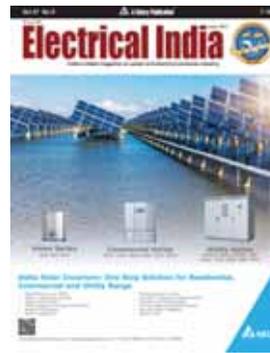
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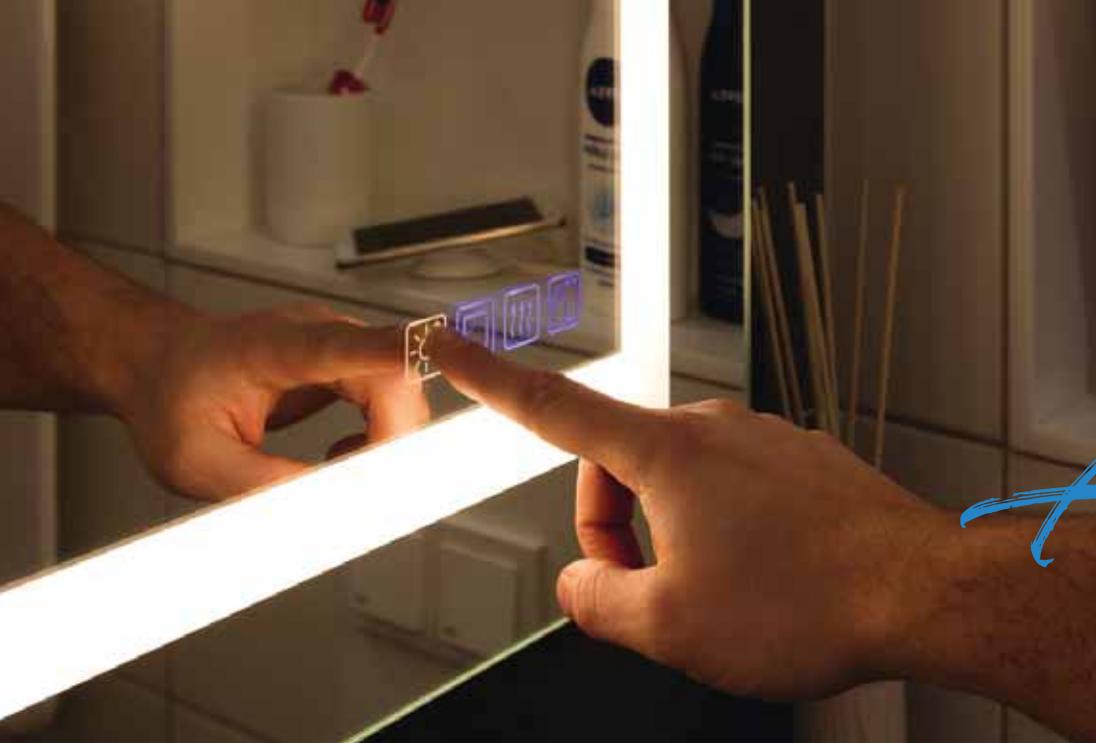
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Aquasys Light Mirror



Give your designs the perfect touch in the bath, vanity or closet areas with Häfele's New Aquasys Light Mirror. Beautifully designed, the mirror adds value, functionality and style to any interior space.

The versatile mirror comes fully assembled and unites the functions of make-up lighting, room lighting, mood lighting, demister (prevents condensation on the mirror during and after a shower) and sound system in an elegant design.

The front light, in natural and warm white, equipped with a memory function offers excellent colour trueness that exceeds the market colour rendering indexes making it very suitable as a make-up light. All functions are controlled via touch keys that are integrated into the mirror.

The easy-to-install, IP44-rated mirror comes fully-assembled with a mounting track for installation. With the option to rotate the mirror by 90 degrees, it's the perfect fit for any interior décor or style. ■

Credit: Häfele India



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Make life safer

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- Outdoor lighting

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- Superior robustness and long lifetime



Applications

- Street and tunnel lighting
- Architectural lighting
- Professional spot lights for shop and museums lighting

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- Available with CRI 70,80,90
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- Very low thermal resistance
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Applications

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- Tunnel lighting
- Architectural lighting
- Low, high bay
- Path lighting

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- Very low thermal resistance
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Applications

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- Street light
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8 key lighting design principles for energy-efficiency

Featuring the basic lighting designing design principles that enable a houseowner reaping the benefits of effective lighting as well as energy efficiency by reducing the electricity bill and saving money.

There are plentiful ways to light up your house, office or any other interior place. Lighting can be simple or designer but should be a part of a design plan. Efficient lighting also supports the goal of energy efficiency, reducing the electricity bill and saving money. However, one should not expect to simply install various energy-efficient fixtures and save bundles in energy costs; the biggest energy savings come as part of an effort to improve the performance of the entire house, including increasing insulation, installing high performance and sizeable windows, sealing air leaks, sealing supply and return ductwork (in case of ducting), and

installing a high efficiency air-conditioner and furnace.

Benefits will definitely increase when all these improvements are considered together during the planning and design stage or later in the existing homes. For instance, it is a common known fact that more efficient lighting always reduces the air-conditioning load. If you are focusing on lighting, consider replacing old appliances with energy-efficient ones: The most efficient appliances in the market are labelled with Energy Star showcasing one to Five-Star ratings (higher the star, higher is their energy efficiency).

While preparing the lighting strategy, you choose depends



Image 1: Picture showing well-lit kids play/common area in a house



Image 2: Pictures showing change of colours in a same bedroom with different light fixtures





Image 4: Picture showing a well illuminated common or drawing room area with use of concealed lights

on the level of remodelling you are doing, following few basic key design principles will definitely help:

1. Focus your effort on rooms used most

Improving the lighting in the rooms/areas which are utilised maximum throughout the day like in maximum cases bedrooms, kitchen etc. will definitely make a lot of difference. Every household has different activities happening depends upon many factors. For instance, a two-bedroom house with only two members and both are working will utilise the bedrooms and kitchen mainly for the five or six working days of a week, that too after their working hours. In the same way a five-bedroom house with seven members with two housewives and two kids will utilise the lobby or drawing room area on a regular basis throughout the day. So, while developing the lighting strategy, it is important to focus on the rooms or areas which are probable to utilise more depends on the activities. Refer image 1 for a photograph showing the regular use kids play or common area in a house; beautifully lit throughout with minimum utilisation of artificial lights.

2. Replace existing Light Fixtures

Most existing homes have incandescent or hot-intensity fixtures. Replace them with dedicated, hard-wired fluorescents or LED for betterment. If you use screw-ins, they may be switched back to incandescent when the bulb burns out, losing the energy efficiency benefits. Generally hard-wired fixtures and LEDs have better aesthetics and light quality, too. As shown in image 2, one can see the difference in colours of a same room just by replacing the light fixtures.

3. Layer lighting for maximum impact

To produce dramatic effects, design ambient, task and accent lighting in any area, ambient lighting provides general room illumination and may also reduce the need for additional portable lighting. Task lighting sometimes helps home owners to see better where they need it. For instance, cove lighting under upper cabinets in the kitchen to help lighting the kitchen during preparation of meals. Accent lighting adds sparkle by focusing on an architectural detail such as a fireplace or on photos or artwork or something else.



Image 5: Picture showing the use and benefits of motion sensor lighting

See image 3 for a picture showcasing the only desired light in the activity area of a kitchen during preparation of meals.

4. Consider the room's function and its form

No matter where you start, consider which activities are most important for your room. Perhaps the easiest place to begin in any house is the kitchen. As stated above, under-cabinet lighting provides task lighting. When there is space above kitchen cabinets, between cabinet and ceiling, it's easy to mount inexpensive strip lights to provide excellent, glare-free light for the entire kitchen. A recessed downlight over a kitchen area will accent the area, and at the same time help the user to see better when performing kitchen tasks and provide ambient light.

For the family room or lobby area, one can use a combination of ambient, track and portable lighting. In the washroom, both appearance and safety are important. At the appearance, light from either side of the looking mirror, as well as from the top, should not be there to avoid shadows inside the washroom.

5. Use concealed light sources

By using concealed light sources, one can notice the illuminated floors, walls and ceiling of the room instead of the direct glare of light bulbs. Concealed light sources help eliminate direct glare from lamps. Concealed lights can be utilised in the common areas or bedrooms also for better light efficiency. Refer image 4 for a picture showing well illuminated common room with the help of concealed light sources.

6. Use fluorescents or LED lights

According to a research, fluorescents use 25 per cent to 35 per cent of the energy used by incandescent to give the same light output and last up to 10,000 hours, compared with 1,000 for the typical incandescent bulb. Using a combination of fluorescents and incandescent lamps is likely to be less efficient than using all fluorescents or LEDs.

Most people associate fluorescents with the harsh, bluish lighting typically found in garages and basements. But for a nice, crisp light quality, as good as incandescent, choose fluorescents with a colour temperature of 3,000-degree Kelvin.

7. Limit the number of different light sources

Always try to avoid multiple types of lights in the house which will directly affect the energy utilisation in the house. For linear fluorescents or LED, use two different ones (3-foot or 4-foot length) and for CFLs use 15, 26 and 32 watts. This makes it easier for home owners to replace the lamps without much difficulty.

8. Consider control

Always consider the controls such as photo sensors, occupancy sensors, dimmers and remote controls which may help to reduce energy by ensuring that lights are only used when needed. Nowadays, automatic sensors are widely utilised to save energy but is costly than the other systems. One can choose wisely after considering short-term and long-term effects and benefits. Refer image 5 which showcasing the benefits of motion sensor lighting in the home by lighten up during activity time only.

By applying these few key basic design principles during planning a house and also in the existing homes, the house owner can reap the benefits of effective lighting as well as energy efficiency by reducing the electricity bill and saving money in short- or long-term. ■



Ashish Batra

Architect-cum-Urban Planner,
LEA Associates South Asia Pvt Ltd (LASA),
Muscat, Oman



Redefining Lighting in the Digital Age

Completely automated smart streetlight solutions with individual control and monitoring compatible with various communication protocols are most apt and one of the most robust and reliable solutions for smart city platforms.

Rajesh Naik, Vice President – Lighting, Crompton Greaves Consumer Electricals Ltd

Digitisation has already started transforming the lighting domain. CGCEL, one of India's leading suppliers of consumer electrical goods, lighting and lighting automation, is embracing digitisation to improve product performance. Here's an interview with Rajesh Naik, Vice President – Lighting, Crompton Greaves Consumer Electricals Ltd:

Q How digitisation is evolving the future of lighting?

A Digitisation is encompassing almost all aspects of the lighting domain. With the conversion to LEDs as the light source and LED being a solid-state device, various elements and functionalities which were hitherto impossible can now be digitised. The scope covers digital control of light output, light source wattage, colour temperature, health monitoring functions, mood lighting controls and improved energy efficiency. It covers not only product but also provision of options to the customer on application and solutions.

Q What are your recent initiatives in the 'digital age'?

A Crompton has launched series of products and solutions with many more in the pipeline; leveraging the digital

aspect. The series of dimmable and colour changing products like the Power Ray and Magic Ray have been launched with the best-in-class technology.

The dynamic LED façade lighting solutions was recently executed to light up the iconic BMC headquarters in Mumbai, using Crompton RGBW luminaires with programmable controller that can be remotely controlled. This is a testimony to onset of digitisation. Completely automated smart streetlight solutions with individual control and monitoring compatible with various communication protocols are most apt and one of the most robust and reliable solutions for smart city platforms.

Q How are you adapting the PoE (Power over Ethernet) technology?

A We are adapting PoE technology depending on the customer needs.

Q Why do you feel that the future of lighting is in LED?

A The energy efficiency story of the shift from conventional to LED lights is evident. The improvements in the LED



New lighting by Crompton redefines the iconic Brihanmumbai Municipal Corporation Headquarters

technology bring in the potential of energy savings ranging from 50-70 per cent. Thus, leading to reduction in carbon footprints in this energy starved economy and proving to be a boon. Apart from this, the various other benefits of LED lights like - much longer life, reduced maintenance costs and mercury free add to the story. But going forward, this would be just the hygiene factor and with intelligence and controls built into the solutions, the benefits and uses would be possibly limitless.

Q What are some of your latest product innovations in the field of LED?

A Crompton is the pioneer in launching the first 5-Star LED Bulb 'LYOR' in Indian market. Effective May 2018, it has become mandatory to have a star-rated bulb as per BEE guidelines (minimum 2-Star). However, we at Crompton have taken the voluntary step to introduce the country's first 5-Star lamp in the market. We have also launched highly energy efficient products with more than 120 lumens per watt in professional luminaires for both indoor and outdoor fixtures, without compromising on the robustness or reliability of the products.

Various connected lighting solutions in consumer, indoor and outdoor professional lighting like the streetlight automation systems, the dynamic facade lighting, the colour changing battens, dimming battens, lamps and professional luminaires are also some of the latest solutions in the offerings.

Q How the market has evolved post flourishing of e-commerce?

A E-commerce has become a very key channel for lighting industry. It has opened-up and enhanced the avenues to reach the end-consumer and is playing a critical role in the growth of the industry. It has its own challenges, but

we are completely geared up and optimistic on ecommerce channel.

Q How do you look at the Indian market being flooded with spurious and non-branded LED products?

A This is an area of grave concern for the lighting industry. This menace is very detrimental to the local industry and the "Make in India" plan of the GOI. We as a part of the ELCOMA are taking it up very strongly. These spurious products do not comply to the quality and safety standards and nor do they comply to the mandatory packaging commodity and other applicable laws. Availability and use of such products with questionable quality and reliability is not only detrimental to the industry but could cast a slur on the LED technology itself.

Q What are its direct impact on the industry performance and in turn your business?

A As explained earlier, a large portion of the unorganised market consisting of such spurious LED products has a direct impact on the industry and its growth. The compliance to mandatory norms and safety and performance standards of such products is questionable and this in turn impacts the business of all the organised players.

Q What are the steps to be taken by the government to curb spurious LED lights?

A Government has taken certain steps such as making the compulsory registration scheme (CRS) mandatory for all the LED products under various IS standards covering safety of the products. The packaging commodity law is also very stringent. However, industry believes that actions to curb the non-compliance needs to be enhanced to discourage such spurious LED lights. ■

Creativity Unlimited



The Black Steel (TBS) – the brainchild of Prateek Singh, a New Delhi based retail and design professional endeavours to become a pioneering catalyst in industrial décor. He aims to change one's space aesthetics by leveraging the unique charm of industrial lamps and décor products. Prateek Singh, Founder of TBS speaks to Lighting India about his illustrating journey so far.



What led you to the lighting industry?

Lighting to me is a story. A story that fortifies one's style and personality in his/her space. I have worked in diverse verticals of retail and wholesale consumer goods and strongly feel that in every visible square inch the most important factor that amplifies the interior dynamics is the right lighting.

It was of great interest to me when I used to work on designs of lamps and furniture. But I used to get distracted from other categories and think of working on a new lamp design. Other than my deep interest in lighting, which was a cascading effect, I saw a huge potential in the industry primarily because it is unexplored and understated. Majority of the customers would delegate this task to their interior designers or architects. Hence, there are handful of players and designers who specialise specifically in this category.

Could you tell us about your initial days when you started off?

I was completely blank when I assembled my first lamp in the summer of 2015 and was elated when it lit. But since I started from scratch, I literally got tossed off from places didn't even imagine.

Bootstrapped with no industry experience, lack of IT knowledge and no employees it was certainly one of the biggest challenges I faced while starting an e-commerce business. It was difficult to negotiate with suppliers or manufacturers to work on low numbers and match my thought process of implementing the right design.



Today, with over 700 happy customers, theblacksteel.com takes pride in successfully delivering commercial and luxury residential projects to the best properties in the world. We are very selective with our product range and this is why our customer opt us over others.

What drove you to start your own business?

There were two important factors here. It is a bit unfair to do a comparative analysis but after working for 7 years in the service industry, one's decision making ability and entrepreneurial spirit gets pushed down to some extent. I synergised this as a bounce effect to start something of my own.

Secondly, I was very keen in industrial style of interiors. Prior to starting my business, I went online to search for industrial lamps and I was very surprised to see there are no domestic e-commerce platforms where I can order from. I felt there was a huge gap and if there is a chance that someone can bring such products to India, then why shouldn't I make it happen?

Could you talk about few of your key projects?

For residential projects, we have worked with international and domestic clients to offer them all sorts of variations. Apart from India, we have successfully fulfilled residential projects in Europe, US, and Canada. The longest distance that our product has travelled is 14,655 kms to a customer in Ciudad De Mexico.

For commercial projects, we have worked with hotel chains, retail brands, restaurants and corporate offices. There is a lot of back and forth since the units are high and we can't afford to go wrong with the design aesthetic and quality. We have in-house QC team that is taking care of every single piece

moving out of the factory and ensures that every product is top notch in every aspect.

We have worked with many major players in the industry and we are meticulous in delivering what our customers expect from us.

What inspires you to pursue specific projects?

Every individual I've met has a precise and innovative requirement about the lamp they want and this is my driving force. Back when my career started, I was surrounded with fashion and lifestyle products. From selling world's best polo T-shirts to working in luxury watch-making conglomerates, I learnt, there is a huge detailed process that followed in designing, manufacturing and sales of a product.

I think I was lucky to be a part of such a thorough process. It encouraged me to create something that will be an extension to my customer's persona. There is a clear inclination towards intricate craftsmanship and our customers would continue to notice that in future.

Can you explain a bit about the creative process related to lighting for various sectors that you do?

We are currently working on 8 collections featuring about 10-15 designs per collection. On the offering is a mix of in-house designs and a thoughtfully curated e-commerce webstore. More than 60 per cent of our products are designed in-house and because we do not have technical expertise to manufacture few products, we source it. For example, Filament Edison bulbs which are a very important element in our designs but considering we cannot manufacture, we curate a collection of bulbs for our customers to shortlist.

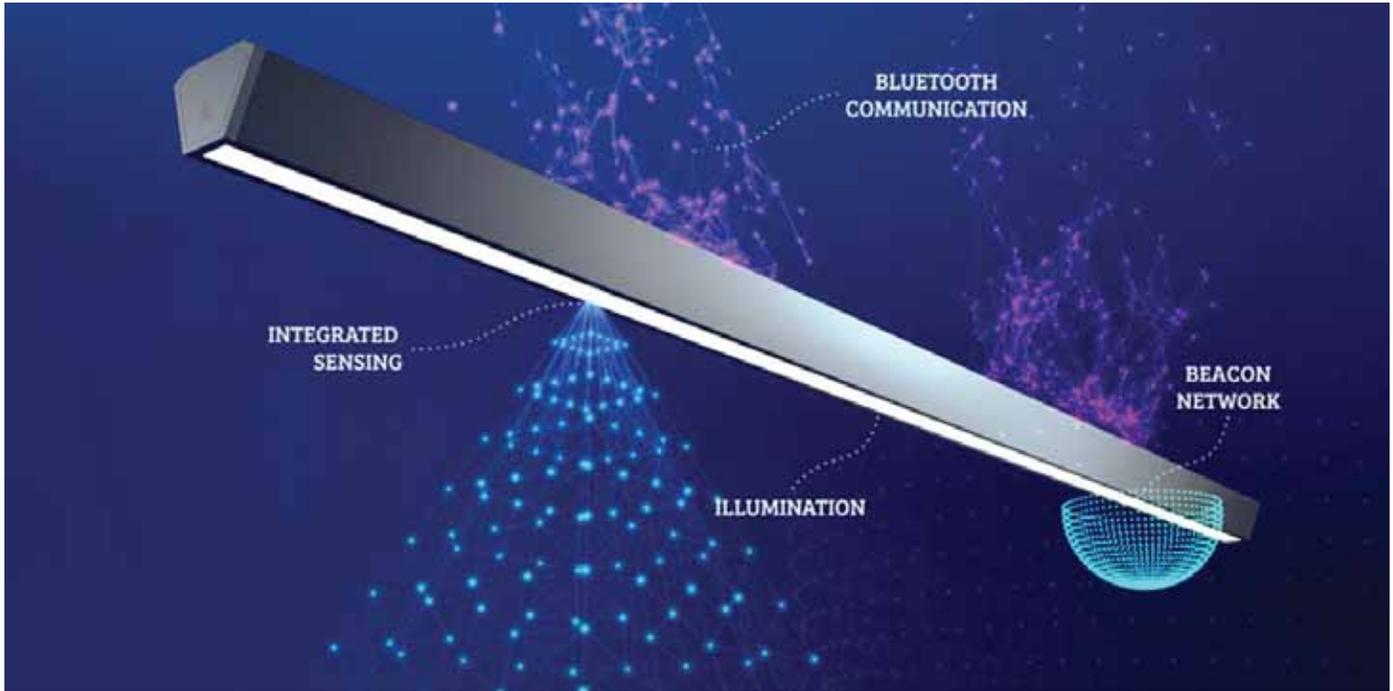
It is the popularity of our in-house designed products that is making most of the sales and by the end of this fiscal we are planning to decrease the curated collection as much as possible.

Any message for the budding lighting designers?

As aspiring lighting designer, be unlimited with your creativity because customers embrace designs that stand out. Be bold enough to say 'no' if you aren't sure about delivering the requirement. You will be respected for an unfulfilled no, and not for a failed yes. ■

Lighting Design of Things

The changing role of the lighting designer in the age of the IoT – from a lighting designer's perspective.



Multifunctional lighting

It is tough to explain how the Internet of Things or IoT will impact on the way we design with light and how it may change the role of the lighting designer. However, one thing is for sure, there are many new and wonderful features and services that can now be incorporated into lighting. Time has come to welcome the Lighting Design of Things or LDoT. As the industry transits from being solely focussed on architectural lighting design to incorporating the smart features of the IoT, here we discuss how LDoT will transform the lighting space.

Transitioning

One of the definitions of a successful lighting design is that the illuminated space, in addition to being both appealing and functional, should meet the needs of its intended occupants without causing discomfort. What does that look like in today's world where the human response maybe prompted by the data collected through smart IoT features integrated into the lighting? Moreover, how the lighting (IoT) collects data?

Amalgamation of lighting and the IoT

To answer the question on why lighting is the right platform for sensor applications, Bluetooth communication, beacon

networking and data analytics, we need to take a look around us. Let's say you wanted to roll out a dense network of thousands of wireless smart nodes in places such as an office building, a hospital or an airport. The cost of installing such hardware to a power supply would be exorbitant. Considering that lights are everywhere and already powered, it is easy to understand why lighting today is being treated as a primary host for mesh-connected data infrastructures.

The gap and the opportunity

Intelligent lighting control, predictive management, space and occupancy analytics, beacon networking and asset tracking, amongst others, are popping up as IoT driven applications that lighting designers know very little about. It has been observed that so called 'smart consultants' are being given the preference over lighting designers to design the IoT infrastructure including the lighting. It is obviously detrimental to lighting design if IoT specialists with no real knowledge of proper lighting design, start to dictate where lighting points should go and, in the process, compromise the potential integrity of the lighting design and compliance to lighting standards. This reveals that there is a big divide and disconnect between lighting designers and the smart IoT



Retail example of space occupancy analytics

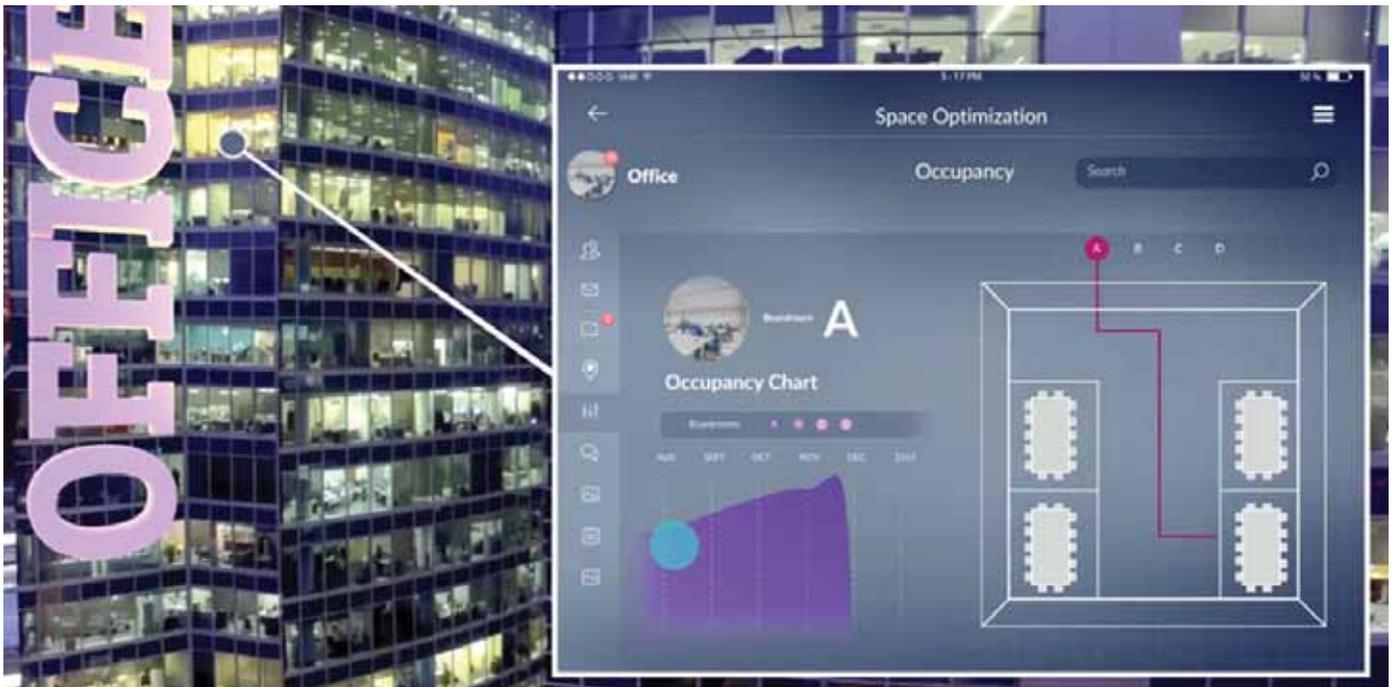
world. To resolve this problem, global lighting design firm Klaasen Lighting Design (KLD) has created a LDoT (Lighting Design of Things) platform which puts the lighting designer right back at the centre of lighting design by taking on the role of facilitator and integrator of IoT features and functions within the lighting design process. This move is being considered as the birth of a new breed of lighting consultant — the Lighting Designer of Things.

KLD's new LDoT platform enables to connect leading IoT

players with developers, property owners, operators, data system providers and other key project designers.

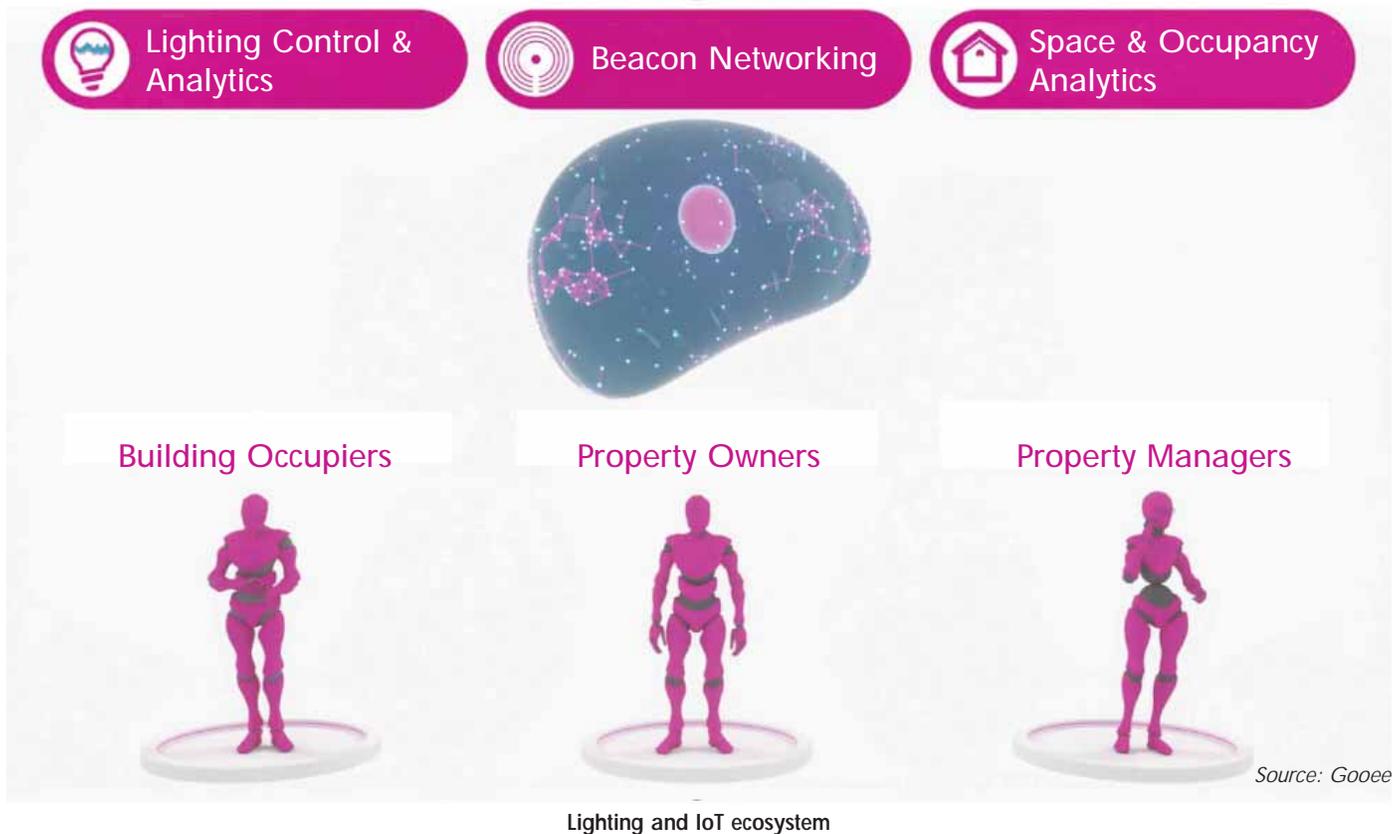
Looking forward

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Picture Courtesy: Gooee



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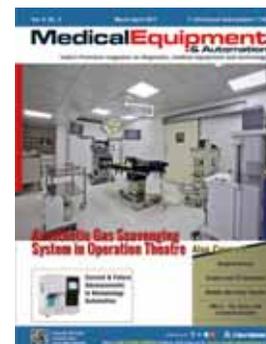


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The Many Shades Stage Lighting



Stage lighting is an integral ingredient in the field of performing arts. It conveys emotion, mood, setting, energy and many other important elements on the stage and colour is one of the most impacting attributes of lighting. Here we introduce you to a few recent successful, world-class projects that cover the different elements of stage lighting.

Robe is Mega Beautiful

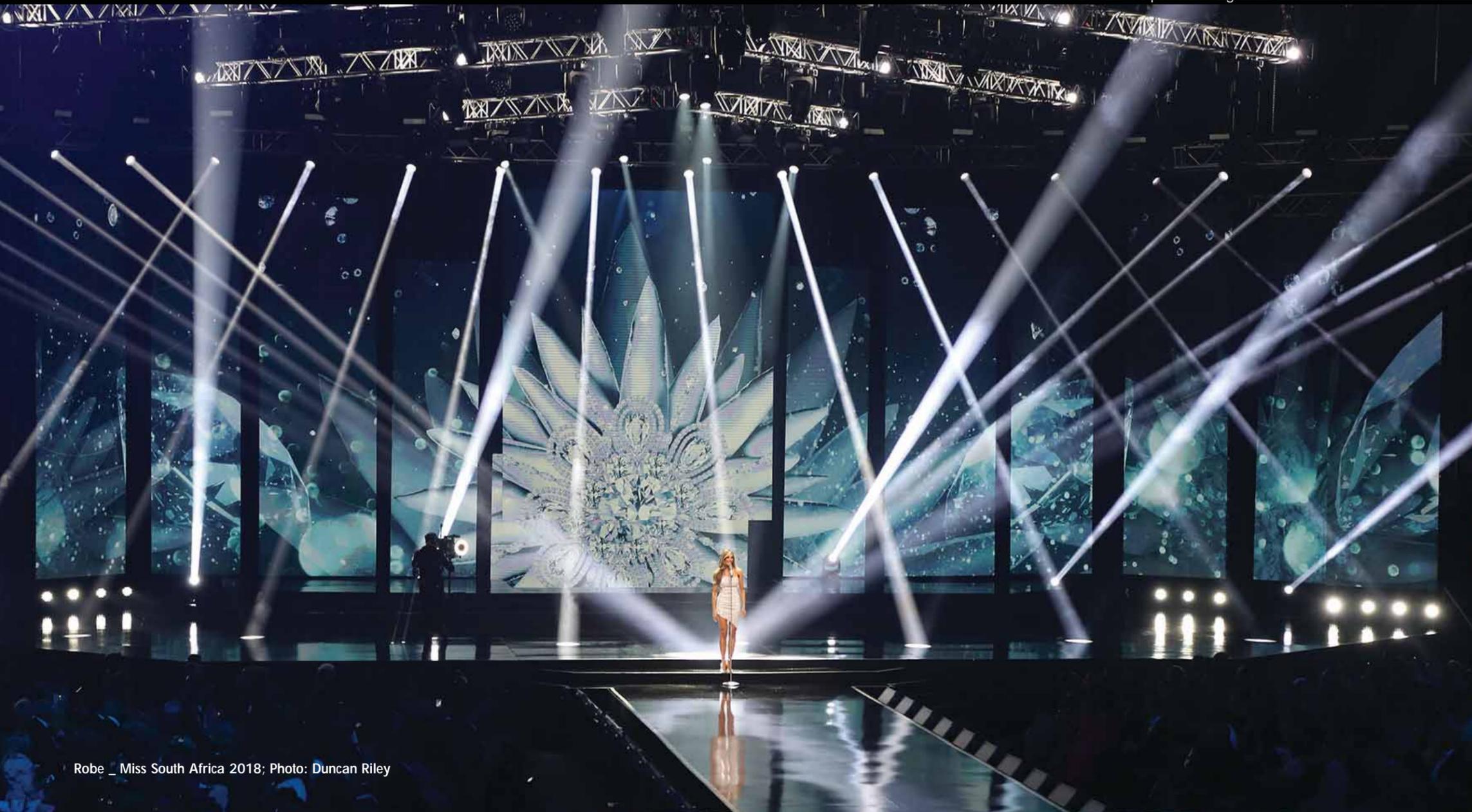
Joshua Cutts is someone who knows how to make things – stages, sets people – look beautiful, and 2018 was the fourth time he has lit the Miss South Africa beauty pageant event, which this year selected the country's delegates for the

two highest profile global beauty contests – Miss Universe and Miss World.

The show was staged for the first time at the new Sun Arena venue at Times Square in Pretoria, and Josh chose to illuminate the show with a substantial Robe moving light rig



Robe _ Miss South Africa 2018; Photo: Duncan Riley



Robe _ Miss South Africa 2018; Photo: Duncan Riley

However, the stars of the show were the 24 x MegaPointes! These were positioned for maximum impact on a truss running across the back of the stage just above the LED columns.

"They are totally awesome," proclaimed Josh with great enthusiasm, "The beams are so powerful they sliced straight through the ambient light coming off the screens, and I could create fantastic in-air effects utilising the gobo wheels and prisms."

Visual Licks for Forth Valley Blues Festival

The soul-stirring power of blues music knows no national boundaries. Memphis may be over 10,000 miles away, but every year, the town of Forth (population 700) resonates with sounds reminiscent of Beal Street as it plays host to the Forth Valley Blues Festival. This year, the thousands of visitors who descended on the event were treated to an impressive display of blues virtuosity by artists like Mark Seymour of Hunters & Collectors fame and Guitar Extravaganza featuring Kevin Borich, Phil Emmanuel and Tim Gaze.

Setting an appropriately evocative mood for the festival was an intensely powerful and richly textured lightshow designed by Michael Westcott that featured CHAUVET Professional Maverick MK2 Spot fixtures, supplied by Show Systems Australia.

Westcott flew eight of the 440W moving LED fixtures over the festival's main stage, half on upstage truss and half on midstage truss. Controlling the fixtures via sACN and drawing on features like their 3-facet prism and slot-and-lock gobo wheels, he used them to create overlapping patterns that added a sense of depth to the stage. Varying these patterns helped him create a continuous flow of unique looks.

"Given that there are 14 bands performing on the main stage over a 48-hour period, it can be a challenge to keep each band looking fresh and unique without recycling the same looks and dynamics over and over again," said Westcott. "Thankfully with the Maverick's armament of



Chauvet _ Forth Valley Blues Festival; Photo: Tim McLaren and Anne Ponsonby



Chauvet _ Forth Valley Blues Festival;
Photo: Tim McLaren and Anne Ponsonby

features we always had another trick up our sleeve. The wide zoom (13-degree – 37-degree) was particularly useful in helping us vary the looks we created.”

Westcott was also impressed with the output of the Maverick fixtures. “The intensity ensured that I could easily make an impact on stage,” he said. “We turned up our lighting volume to match particularly powerful parts of the musical performances.”

Richard Kay Goes Rogue For Alphaville

Like many who grew up on rock, the members of German supergroup Alphaville always dreamed of playing at the legendary club. The synth-pop stars, who have multiple Top Ten hits in Europe to their credit, got their wish recently when they journeyed to the US and performed two Whisky a Go Go shows over the Memorial Day Weekend. Supporting their high-energy performance with an endless stream of fresh looks were eight CHAUVET Professional Rogue R1 FX-B LED fixtures.

“This was a dream come true not only for Alphaville, but also for many of their diehard fans in the US,” said Richard Kay, who has been with the band as its lighting designer since 1998 and has toured 91 countries with them.

“I had to fit five musicians comfortably on this stage with a fixed drum riser,” continued Kay. “Plus, since Alphaville is very video oriented (the group won

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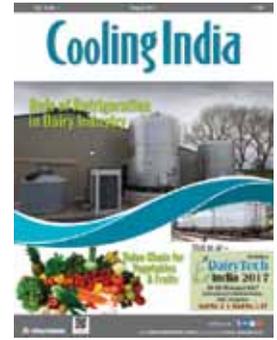
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Guido Karp for Alphaville USA; Photo: Guido Karp

an Academy Award for a short film it made), we needed to have our entire back wall covered with 3mm video panels, three screens measuring 9'x9'. That also took up some room, so any fixture we added to our floor package had to make sense to justify the space."

Complicating matters for Kay was the 15' trim of the venue's house rig, which limited what he could hang from a floor package. "Luckily, Whisky had just added four CHAUVET DJ Intimidator Spots and some flat spots to the house rig," said Kay. "That served as a good foundation. Then it became a question of which fixtures to add for eye candy? The Rogue FX-Bs were my obvious choice, because I could do so many different things with them without taking up a lot of valuable space. They were my main show fixtures."

Drawing on the infinite pan and tilt rotation of the Rogue R1 FX-B's five individually controlled moving heads, Kay relied on the compact fixture to create "loads of geometric patterns," as well as ripple effects, sweeps and downstage light curtains. Thanks to the output of the fixtures, he was also able to have them serve as blinders.

Kay mounted his eight Rogue R1 FX-B fixtures vertically on two towers that were placed between the three video walls in the rig. He positioned the fixtures at heights from 2'-9" off the deck. "This configuration ensured that I got every band member from head to toe with any lateral sweeps I did," he said. "The pan function is impressive. I first saw the FX-B at a festival in Poland, and I asked the LD to set up some presets for me. It was evident from the first scenes that this fixture was great: lots of clearly defined beams of saturated color. It was a perfect labyrinth of moving beams. End of discussion!"

In addition to creating engaging looks for the live audience at Whisky a Go Go, Kay's design worked well as lighting for the live stream video of the band's performance.

Barrett Hall gets dynamic with Maverick MK Pyxis

The future was on full display in Manhattan early this May during Digital Content NewFronts, a week-long showcase for media buyers of the latest digital and video creations from the leading names in entertainment, news and information technology. A must-see venue for the executives who descended on New York for the event was Pier 26, where Oath, a division of Verizon that reaches over one billion people worldwide through its digital media brands, introduced an exciting array of new content.

Hosted by Jamie Foxx, Oath Digital Content NewFronts offered guests a smorgasbord of live entertainment options to go along with the chance to preview upcoming productions from brands like Yahoo and Huffington Post. Taking place on two main stages, along with a half dozen smaller satellite units, the evening event featured performances by stars like DJ Irie, Broadway dancers, bucket drummers and other artists. Adding to the magical atmosphere on the pier was a lively and colourful lighting design created by Barrett Hall that featured CHAUVET Professional Maverick and Nexus fixtures, supplied by WorldStage.

"This project came about for me through First, a global creative agency that produced the event," said Hall, owner of Magic Hour East. "I've had the pleasure of working with First in the past, so I was excited about this opportunity to help



Caption; Photo: ???



create a large-scale immersive and illuminated environment. Having everything from musical acts to theatrical style performances filling an entire pier over the Hudson made it quite unique!

At the heart of Hall's lighting design was the Maverick MK Pyxis, which features a 60W RGBW center beam, surrounded by a ring of nine 15W RGBW LEDs. Hall outlined the base of the event's two-story DJ booth with 25 of the moving beam/wash fixtures.

"We used the outer ring of pixels to get a lot of visible colour shifts and movement around the entire DJ booth," said Hall. "This turned the booth itself into an energised scenic element. Having chase sequences on the outer ring of the fixtures created a nice visual around the booth and conveyed a sense of excitement. Then having the punch of the center beams gave us great options for ballyhoo moments. It was like having two fixtures in one."

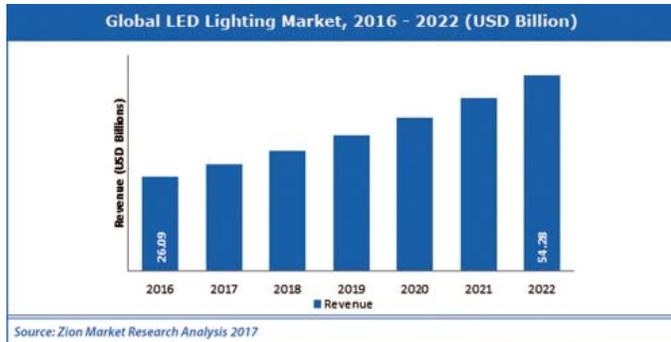
Setting a glittering tone throughout the venue and underscoring the significance of the event were the 32 Maverick MK2 Wash fixtures that were positioned on the truss towers that lined both sides of the 1,000' long pier. Drawing on the wide 7-degree to 49-degree zoom range of this RGBW LED moving wash, Hall used it for a variety of functions, from truss toning to stage washing.

"There were 14 large truss towers in all, and rather than try to mask them, we decided to tone them," said Hall. "We selected the Mavericks, because we wanted something that would be bright, but would also give us the option to pan and tilt away from the truss and allow us to wash saturated colours across the pier."

Hall also used 30 Nexus 4x4 LED panels to create a dynamic backdrop on one of the performance stages. Hanging the panels in a checkerboard pattern, he had them do double duty as static scenic elements and blinders. ■

LED lighting market to surpass global industry \$54.28 bn by 2022: ZMR Report

Developing infrastructure of roads, upcoming development projects, the booming construction industry in developing countries such as China, India, and Indonesia are expected to create massive demand for LED lighting for residential as well as outdoor application.



The global LED lighting market accounted for US\$ 26.09 billion in 2016 and is expected to reach USD 54.28 billion by 2022, growing at a CAGR of around 13 per cent between 2017 and 2022, reports Zion Market Research.

LED is a semiconductor device that emits visible light when an electric current passes through it. The light is not mostly bright, but in most LEDs it is monochromatic, occurring at a single wavelength. The output from a LED can range from red (at a wavelength of around 700 nanometers) to blue-violet (near 400 nanometers). LEDs are comprised of compound semiconductor materials which are made up of elements from group III and group V of the periodic table.

The LED lighting market is primarily driven by benefits offered by LED lights over incandescent and fluorescent lamps. In additions, the energy efficiency of LED lights, higher brightness, and a longer lifespan are some of the major reason offers tremendous market opportunities for LED lighting in coming years. Continuous new product introduction by manufacturers such as Phillips and GE with innovative technology is attracting the customer attention globally. However, the high production cost is expected to have an adverse impact on the LED lighting market. Nonetheless, screen and display backlighting market development are likely to open new doors for the LED lighting demand.

Based on application, LED lighting market is classified into residential, architectural and outdoor. Increasing use of LED lighting for outdoor application such as roadways, traffic lights, tunnels, parking lots, and garages is expected to provide significant growth opportunities in coming years. Residential application segment was the largest application for the market accounting for more than 40% share of total market 2016. The architectural application includes both functional and

decorative lighting. Decorative LEDs are used to light up pools, gardens, fountains, and statues. The functional application includes landscaping and building facades.

According to the report titled "LED lighting Market for Residential, Architectural and Outdoor Applications: Global Industry Perspective, Comprehensive Analysis, and Forecast, 2016 - 2022", LED lighting market is dominated by some of the key participants such as Cooper Industries Plc, Osram Opto, Cree Incorporation, Zumtobel AG, Toshiba Corporation, Philips Electronics N.V., Digital Lumens, Inc. and GE lightings.

Europe held the largest share of the global LED lighting market and is set to continue to dominate the world marketplace within the forecast period, the report said. This growth is mainly attributed to the rising demand for outdoor application paired with stringent energy efficiency regulation. The significant demand for LED lighting for a residential purpose such as lighting for bathrooms, hallways, dining rooms, and kitchens is the major factor to surge the market growth in this region. Implementation of the EU Green Paper can lead to new opportunities for the European LED market in near futures. Europe accounted for over 31 per cent of the market share in 2016.

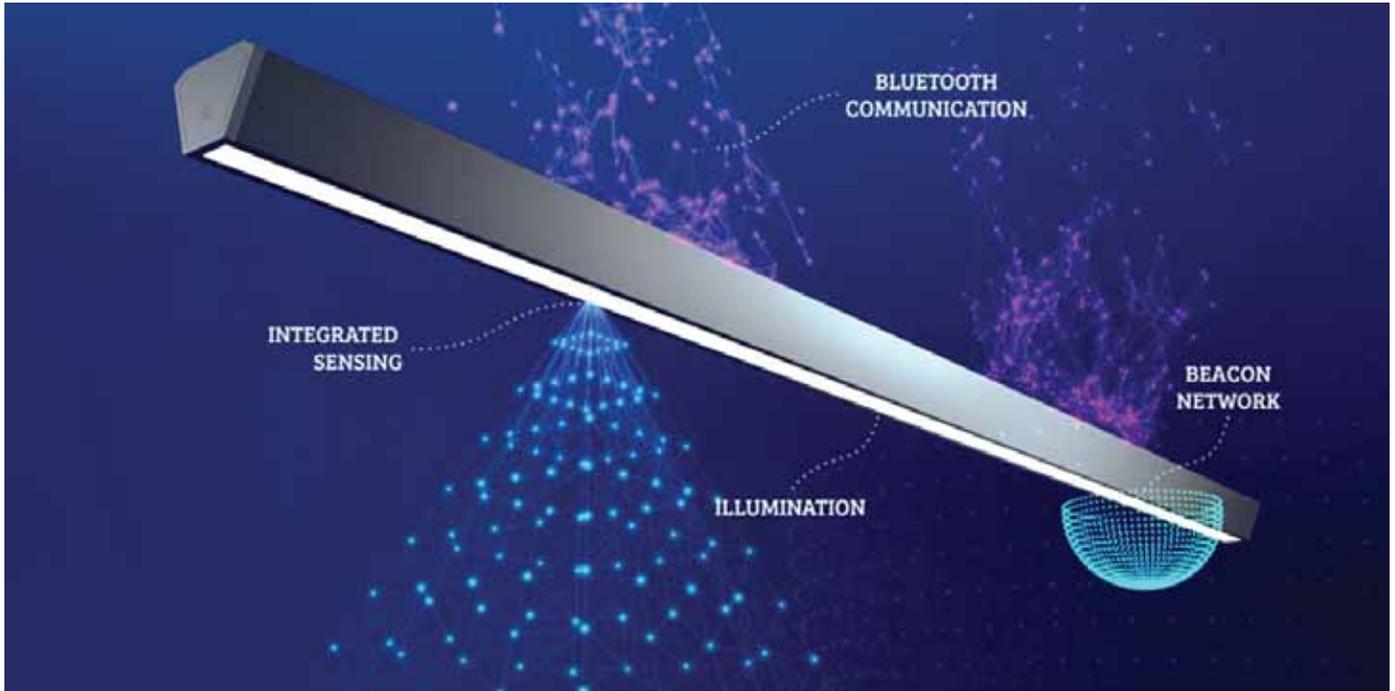
North America is another leading regional market for LED lighting and is expected to witness noteworthy growth in the near future. Regulation over energy efficient product and high disposal income will help to drive demand for LED lighting for architectural application. U.S. is expected to be one of the lucrative markets for LED lighting manufactures.

Asia Pacific is considered to be the fastest growing market for LED lighting and expected to hold significant market share in years to come. Developing infrastructure of roads, upcoming development projects, the booming construction industry in developing countries such as China, India, and Indonesia are expected to create massive demand for LED lighting for residential as well as outdoor application. It will include roadways, traffic lights, tunnels, parking lots and garages, lighting in bathrooms, hallways, dining rooms, and kitchens.

Latin America is comparatively new and is still open to new companies and brands. Brazil will take control of the leadership role in LED lighting implementation. It is aggressively picking up on the deployment of government-installed LED-based streetlights. The Middle East and Africa are also forecasted to show significant growth in the coming years. U.A.E. and Saudi Arabia are predicted to hold a noticeable market share in the near future. ■

Lighting Design of Things

The changing role of the lighting designer in the age of the IoT – from a lighting designer's perspective.



Multifunctional lighting

It is tough to explain how the Internet of Things or IoT will impact on the way we design with light and how it may change the role of the lighting designer. However, one thing is for sure, there are many new and wonderful features and services that can now be incorporated into lighting. Time has come to welcome the Lighting Design of Things or LDoT. As the industry transits from being solely focussed on architectural lighting design to incorporating the smart features of the IoT, here we discuss how LDoT will transform the lighting space.

Transitioning

One of the definitions of a successful lighting design is that the illuminated space, in addition to being both appealing and functional, should meet the needs of its intended occupants without causing discomfort. What does that look like in today's world where the human response maybe prompted by the data collected through smart IoT features integrated into the lighting? Moreover, how the lighting (IoT) collects data?

Amalgamation of lighting and the IoT

To answer the question on why lighting is the right platform for sensor applications, Bluetooth communication, beacon

networking and data analytics, we need to take a look around us. Let's say you wanted to roll out a dense network of thousands of wireless smart nodes in places such as an office building, a hospital or an airport. The cost of installing such hardware to a power supply would be exorbitant. Considering that lights are everywhere and already powered, it is easy to understand why lighting today is being treated as a primary host for mesh-connected data infrastructures.

The gap and the opportunity

Intelligent lighting control, predictive management, space and occupancy analytics, beacon networking and asset tracking, amongst others, are popping up as IoT driven applications that lighting designers know very little about. It has been observed that so called 'smart consultants' are being given the preference over lighting designers to design the IoT infrastructure including the lighting. It is obviously detrimental to lighting design if IoT specialists with no real knowledge of proper lighting design, start to dictate where lighting points should go and, in the process, compromise the potential integrity of the lighting design and compliance to lighting standards. This reveals that there is a big divide and disconnect between lighting designers and the smart IoT



Retail example of space occupancy analytics

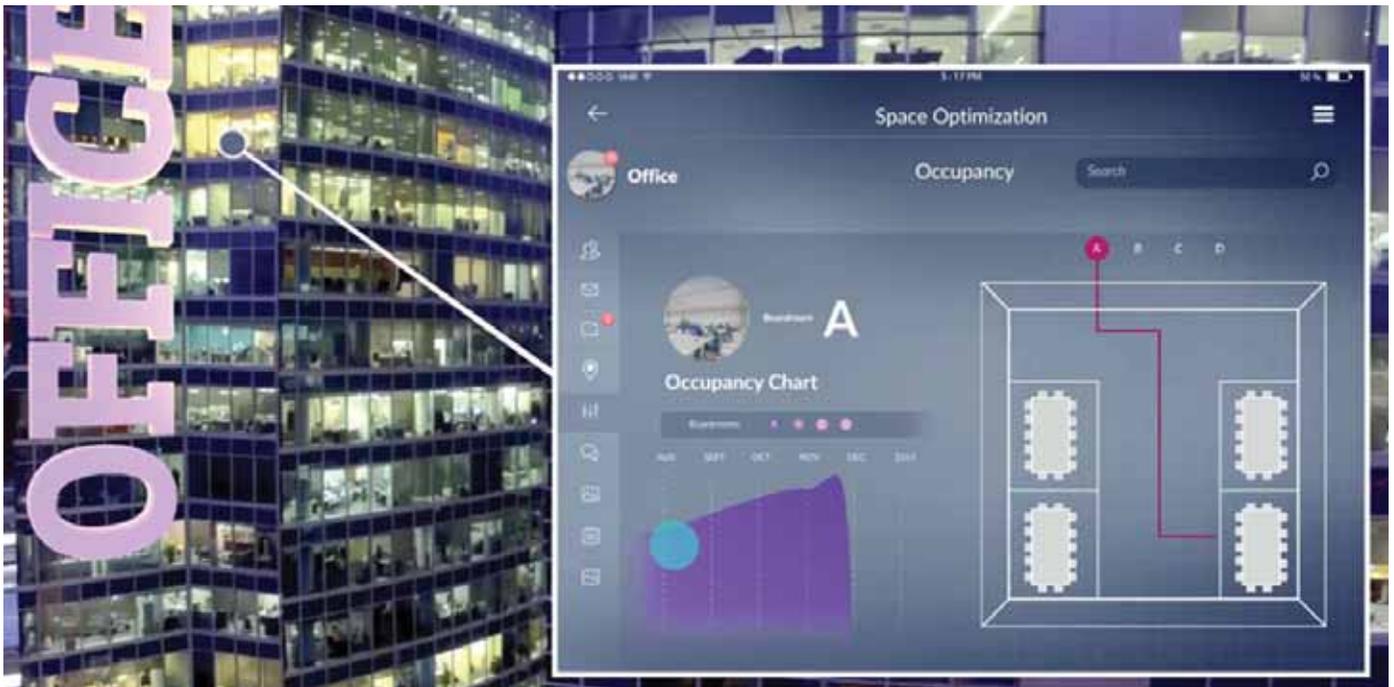
world. To resolve this problem, global lighting design firm Klaasen Lighting Design (KLD) has created a LDoT (Lighting Design of Things) platform which puts the lighting designer right back at the centre of lighting design by taking on the role of facilitator and integrator of IoT features and functions within the lighting design process. This move is being considered as the birth of a new breed of lighting consultant — the Lighting Designer of Things.

KLD's new LDoT platform enables to connect leading IoT

players with developers, property owners, operators, data system providers and other key project designers.

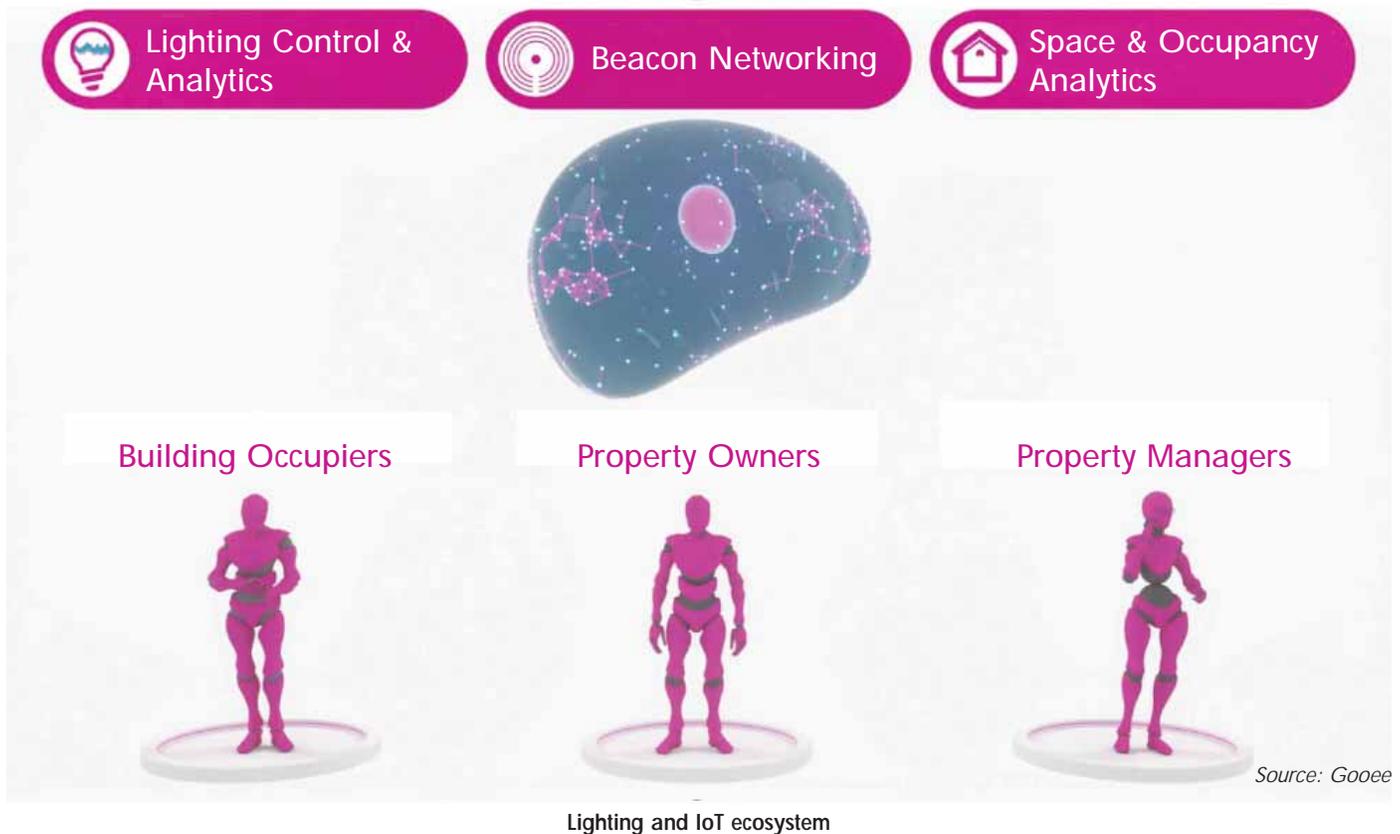
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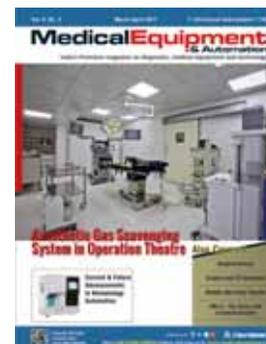


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All Roads Lead To Hong Kong

Around 3,100 exhibitors from around the world will participate International Lighting Fair (Autumn Edition) and International Outdoor and Tech Light Expo.



The 20th Hong Kong International Lighting Fair (Autumn Edition) will be staged from 27 to 30 October 2018 at the Hong Kong Convention and Exhibition Centre. The Hong Kong International Outdoor and Tech Light Expo will also see its third edition from 26 to 29 October 2018 at the AsiaWorld-Expo. The two lighting events expect close to 3,100 exhibitors from around the world. Last year, close to 69,000 global buyers attended both fairs. The two fairs together form the world's largest lighting marketplace with enormous business opportunities, informs Rajesh Bhagat, South Asia Consultant, Hong Kong TRADE Development Council (HKTDC).

The famed Hall of Aurora at the Lighting Fair (Autumn

Edition) will bring top-notch branded collections of lighting accessories and applications under one roof, leading brands include BJB, LEDUS, MEGAMAN and VIRIBRIGHT. The Smart Home Gallery will make its debut this year to display smart home lighting products from renowned brands such as Yeelight/Xiaomi, Philips, Opplé, Tmall Genie AI Union and Tuya.

The Smart Lighting & Solutions zone will showcase the latest lighting designs, software, management systems and control panels. The popular LED & Green Lighting zone will display a wide array of energy-efficient lighting for commercial uses, whereas the Residential Lighting zone will gather functional and decorative domestic lighting products.

The Outdoor & Tech Light Expo showcases lighting products by various applications to facilitate sourcing for buyers. The Exterior Lighting Solutions & Systems zone will highlight high-performance and energy-efficient lighting systems and technologies. The Outdoor & Public Lighting and Outdoor Advertising Lighting zones will be home to lighting solutions for public spaces and promotional uses respectively.

The Technical & Professional Lighting zone will cover lighting equipment for warehouses and studios. The Horticultural Lighting zone will make its debut this year, showcasing grow lights for plants in farms, domestic landscaping and public parks.

During both fairs, a diverse fair programme of networking receptions and buyer forums will be held for industry players to expand their professional networks and learn first-hand about market developments. Seminars on smart street lights, testing and certification services as well as horticultural lighting will also be held to reveal the industry's latest trends. ■



Reliability of LED Drivers

The Key to Success

A reliable LED driver must be equipped with thermal foldback capability; this feature enhances the thermal management and will increase operating life of the LED driver incredibly.

Picture Courtesy: www.thedreamcreators.co.in



This image is for representation purpose only

LED lighting with its extraordinary visual performance (users' viewing experience) and eye-catching energy savings is an excellent lighting option when compared to traditional lighting options.

Today, LEDs have become even more efficient than earlier generations, providing 25-30 per cent energy savings compared to CFLs and up to 80 per cent savings compared to incandescent bulbs. Along with energy savings, the other reason driving the switch to LED-based lighting is the significantly longer lifespan of the LEDs.

Worldwide, LED lighting market is growing at accelerated pace. These efficient LEDs need compatible LED drivers. The market expects highly reliable, energy efficient, protective and differentiated LED driver products at competitive prices.

Keeping these tough design

challenges in mind, Power Nucleus has worked with Infineon to effectively meet and exceed the market expectations from LED drivers.

In the beginning, the lighting industry had promised consumers a new, affordable light source (LED) with low energy consumption and a long life. Unfortunately, the industry's focus on cutting cost to the extent of sacrificing

quality meant that the market was soon flooded with poor quality and low-cost products. To fulfil the initial promise to consumers, a design revolution for a high-quality product at low costs needs to be the top priority for the LED lighting industry.

The strongest need for efficient and reliable LED drivers comes from customers serving the street lighting segment, where the cost of lamp replacement is sometimes higher than the cost of LED drivers itself. They also need to provide 5 to 7 years of warranty on their products. These factors are considered during the design stage and selection of components and topology. ICL5101 from Infineon is a resonant controller which offers great features to develop efficient LED drivers. Few of its key features include:

- Universal input from 80 to 305V
- Ultra-fast time to light < 200ms
- Secondary side-controlled PFC+LLC or PFC+LCC (CV/CC)
- Fully integrated 650V HB driver stage
- Supported outdoor use by extended temperature range (-) 40 to (+) 125-degree C

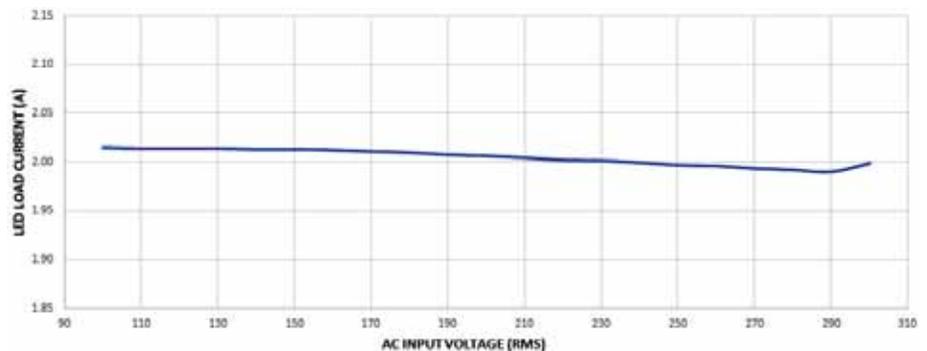


Figure 1: Constant current performance of 150W LED Driver

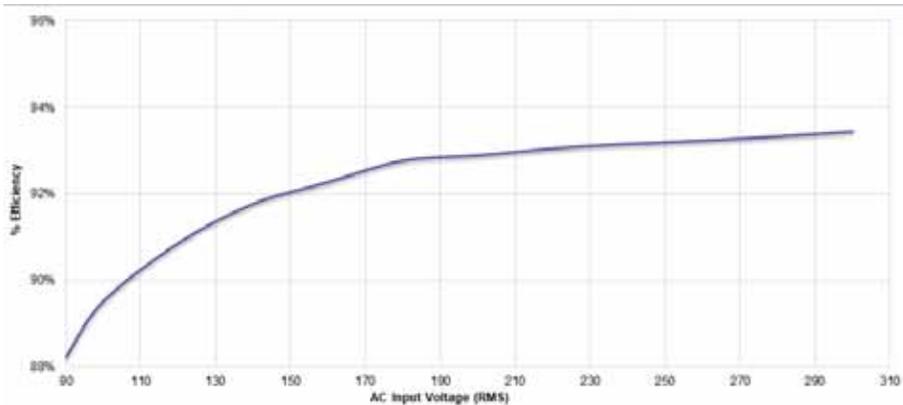


Figure 2: System efficiency of 150W LED driver

- High power quality with PFC >0.99 / THD <10 per cent
- Highest efficiency up to 94 per cent in resonant topology
- Protection: OCP / OVP / OLP / short output
- Saturation control during start-up
- Adjustable ext. temperature protection.

Constant current or constant voltage or both

LEDs are driven with DC voltage or current. Almost all LED drivers are simple AC-DC power supplies. That being the case, why is it important to term a power supply as LED driver? Let's understand a little bit of background of the LEDs.

You can drive the LEDs with constant voltage (CV). There are many CV drivers available in the market, but without some kind of output current limit. With CV drivers, the problem lies with LEDs heating up, whereby the forward voltage drops and the current passing through the LED increases. Higher current leads to more heat generated from the LED. Without the forward current limit, the LED will fail due to the high heat at its junction. This type of failure is known as thermal runaway.

The LED light output is proportional to the forward current flowing through it. This means, any variation in the LED current will vary the light output as well. This is why driving the LEDs in CV mode results in LED lifetime issues. The learning from this is that the LEDs should be driven with constant current

(CC) which guarantees a constant light output from the LEDs. Accurate and ripple-free constant LED current is recommended to produce excellent, flicker-free light output.

For a robust and reliable LED driver, we need both constant current (CC) and constant voltage (CV) operation capability.

Let's assume that the LED load is disconnected for some reason, or in case of installation, wherein the input

power to the LED driver is on and no LED current flows; since the driver is configured in the constant current mode, it will drive up the output voltage, high enough to damage the output circuits including output capacitors.

This is known as open load condition, when driver output voltage must be limited to a safe value when the LED current is lower or when there is no load. This requires the driver to operate at constant voltage.

Drive towards high efficiency (efficacy matters)

Many system integrators, LED lighting contractors and even the governments have started to demand for more lumens per watt (>120 lm/W). More lumens per watt means more energy savings.

There are several ways to achieve this. For example, one can use very high efficiency LEDs at a higher cost. The

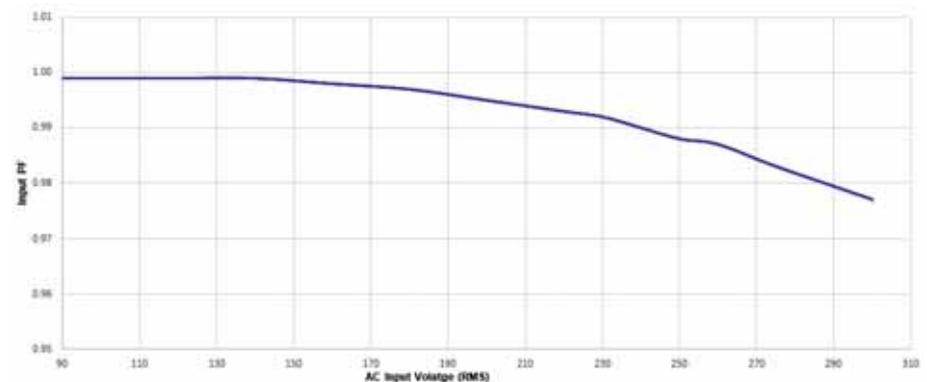


Figure 3: Input power factor w.r.t. input voltage of 150W LED driver

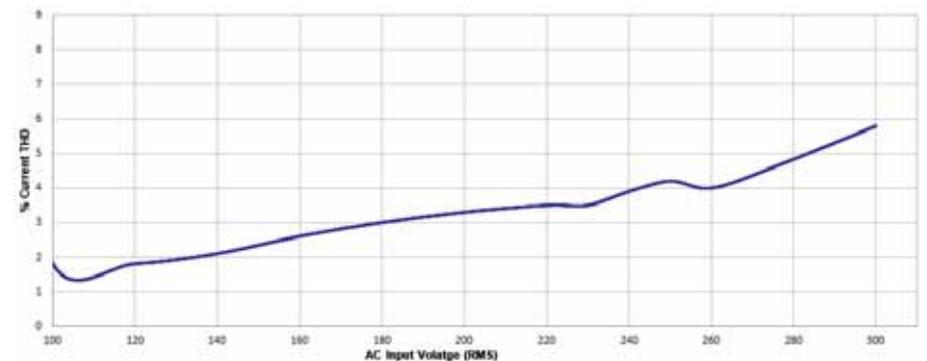


Figure 4: Input current THD performance of 150W LED driver

Picture & specification of 150W LED driver

- Input voltage range 90-305Vac
- Vout < 85- 110V@1.44A and configurable
- Efficiency > 93%
- PFC > 0.97, THD <6%
- EMI pre-compliance
- Protection:
 - OCP – Over load
 - OVP – Over voltage
 - OLP – Open loop
 - OTP – Over temp
- 5KV Surge
- IPA60R280P6 Mosfet used on PFC and LLC
- Output ripple < 10%



better way is to build highly efficient LED driver, so that:

- It meets one's efficacy demands easily.
- Relaxes thermal management requirements which helps to meet more serviceable life from the driver.

Now, let's take a look as to what it takes to develop high efficiency LED drivers:

- Right power conversion topology selection for the given power rating of the LED driver.
- Knowledge about the selection of power semiconductors incl. MOSFETs, input-output diodes with optimum derating, without impacting the cost of the product.
- Deep knowledge about the magnetic components design for various power topologies (LLC converter, PFC converter, Flyback converters, interleaved converters). Many a times, this is the real cause of overall

poor efficiency of the LED driver. A power designer expert will be able to handle with great care and do a wonderful job.

- Control the converter in such a way that it operates at minimum losses. The best way of doing it is to have zero voltage switching (LLC) or quasi resonant operation which helps to maximise the product life and at a lower cost.
- Also, the selection of aluminium electrolytic capacitors. These must be rated for high load life (>8,000 hours) at maximum operating temperature.

Advantages of selecting LLC topology

- Zero voltage switching (soft switching) helps to lower switching losses and improve system efficiency.
- Due to lower switching losses, the design can operate at higher frequency which can result into

smaller magnetic components and reduction in board size i.e., increase in power density.

- Soft switching over wide load range – high efficiency at lower loads.
- Soft switching enables less EMI – Lower EMI component cost.
- Half bridge switching enables usage of 600V MOSFETs, unlike 800V MOSFETs in Flyback topology.
- Lower VRRM (reverse voltage) of output diode due to lower stress in soft switching topologies.

High efficiency in LED drivers is achieved by using Infineon's power semiconductors and combo - LLC Controller IC ICL5101.

Thermal management

While high power LEDs are running, the lighting fixture temperature can be quite high under some conditions. As the drivers are generally enclosed within the fixtures, the LED driver's electronics is most likely to be exposed to the same temperature. If the LED drivers continue to operate at such high temperatures, their serviceable lifetimes will be degraded significantly. The high-quality drivers enable intelligent adaptive temperature protection. The output current of the LED driver starts to drop when the thermal limit is exceeded until the thermal is within operating range again and the driver delivers the full current.

To achieve this excellent requirement, the thermal foldback feature is implemented in all LED drivers designed by Power Nucleus LED Drivers. ■

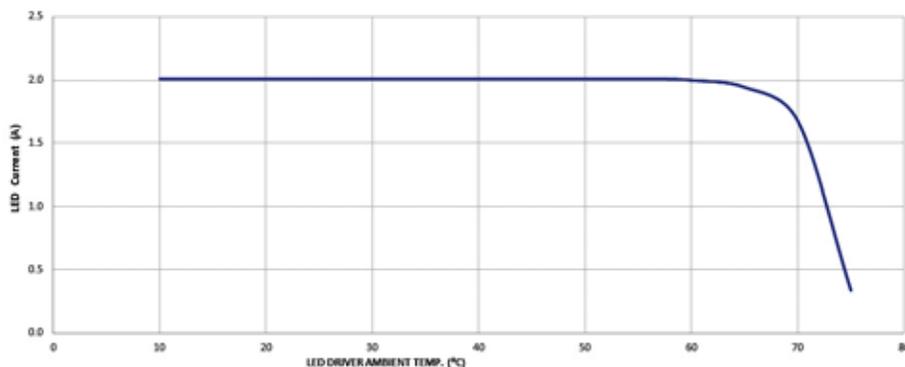


Figure 5: Thermal foldback performance of 150W LED driver



Dinesh Kumar

CEO
Power Nucleus India
Pvt. Ltd.



Harsh Savant

Staff Engineer for Power
Management and
Multimarket (PMM)
Division,
Infineon Technologies
India)

Event Calendar

LED CHINA 2018

Venue: Shanghai New International Expo Centre, Shanghai
Date: 19 - 21 September 2018
Website: www.ledchina-sh.com

Light India 2018

Venue: Pragati Maidan, New Delhi
Date: 11 - 13 October 2018
Website: www.light-india.in

HKTDC Lighting Fair Autumn Edition

Venue: Hong kong Convention & Exhibition Centre
Date: 27 - 30 October 2018
Website: www.hktdc.com

LED Expo, Delhi

Venue: India Exposition Mart Ltd. Greater Noida, Delhi
Date: 6 - 8 December 2018
Website: www.theledexpo.com

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Intrinsically Safe True

KUSAM-MECO, the pioneers of Digital Multimeters & Clampmeters in India have introduced for FIRST TIME a new Intrinsically safe True RMS Digital Multimeter with PC Interface Model KM 822sEX. It has high transient protection of 12 KV (1.2/50µS) lightning surge. It has a 4 digit 10,000 counts large easy to read, backlight Dual display. EX marking on meter i.e. Ex ib I Mb, Ex ib IIC Gb, SAEEx MS/09-291X, Ex ib falls under Zone 1 which is an area where flammable gas can occur in normal operating conditions.

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DC/AC Voltage :60mV ~ 1000V; DC/AC Current : 600micro A ~ 10A; Resistance : 0.1Ohm ~ 60MOhms; Frequency : 5Hz ~ 1MHz Capacitance : 60nF ~ 20mF. It also has Diode, Continuity, Duty Cycle Function.

In addition it features Splash/Drop Proof, Intrinsically Safe, Beep-Jack Audible & Visible Input Warning, Relative Zero Mode, Data Hold, Ex rating-Ex ib I/IIC T6. It has (optional) PC interface for downloading the data in computer via USB cable & Software.

These meters comply to IEC SANS 600790:2000 & IEC SANS 60079-11:1999, which is for Electrical apparatus for



explosive gas atmospheres. Part 0 (general requirements) & part 1 (intrinsic). The approved explosive protection rating of this equipment is suitable for use in Zone1 hazardous area. Group I (coal mines) underground & Group II (surface).

Safety: It has Double insulation per IEC61010-1 2nd Ed., EN61010-1 2nd Ed., UL61010-1 2nd Ed. & CAN/CSA C22.2 No. 61010.1-0.92 to Category IV 1000Vac & Vdc. For Voltage, Ampere, Milli Ampere & Micro Ampere ranges , the safety category is IV1000Vac & Vdc. It has Fuse protection for micro Ampere & milli Ampere 0.44A/1000Vac & Vdc, IR10kA or better, F Fuse. For Ampere ranges, the fuse protection is 11A/1000Vac & Vdc, IR20kA or better, F Fuse. For Voltage range fuse protection is 1050Vrms, 1450Vpeak. Milli Volts, Ohms & others fuse protection is 600Vdc & Vac rms.

It features a rugged fire retardant casing, Protective Holster with probe holder & Tilt Stand. It is powered by one 9V battery no. NEDA 1604G, IEC6F22. Standard Accessories supplied are User Manual, Battery, Test lead & Carrying case. PC Software is optional. ■

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What's New at Lighting India

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