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From the President's desk

Seasons greetings. It is going to be festive season during the coming months and every festival will naturally be associated with lights in some way or other. Let me, at the outset, wish you all a nice and enjoyable time. At last, the GST has seen the light of the day. Naturally the teething troubles and criticisms will be there. But, in the long run I am sure we will all be happy with one nation one tax regime. Except for the 28% level taxation for FTL / CFL / T5 lamps / high power discharge lamps, the lighting industry is generally happy with the GST implementation.

Our brand building exercise for ISLE is yet to pick up to the required level. The last Governing Body Meeting in Mumbai by the sidelines of a technical seminar organised by the Mumbai State Centre was a clear proof that if we make concerted efforts, things will happen. Mumbai State centre now stands rejuvenated to meet the challenges of the forthcoming International Lighting Exhibition Lii 2018 in January 2018 in Mumbai. Similarly, the Hyderabad local centre has now an elected body in place and we are sure that they will come out of the red and take forward the centre to greater heights.

All of you may be aware of the forthcoming International event of ISLE viz., Lii 2018. It needs to be stressed again that unless we consider it as a commitment to make the Lii successful in our own interest of ISLE, we cannot expect the event to be a grand success. I would like to appeal to you to bestow your personal efforts to book stalls for Lii 2018 and bring in participants for the technical seminar.

I would also like to mention that, our members who are expected to make Lii Magazine a viable one, shall come out with interesting articles and advertisements so that it can self support.

Again wishing you all a happy festival season.

Dilip Kumbhat
President, ISLE

Hong Kong International Lighting Fair (Autumn Edition), Hong Kong International Outdoor & Tech Light Expo World's Largest Lighting Marketplace to Create New Opportunities

4 August 2017 – The 19th HKTDC Hong Kong International Lighting Fair (Autumn Edition) will be staged from 27 to 30 October 2017 at the Hong Kong Convention and Exhibition Centre (HKCEC). The HKTDC Hong Kong International Outdoor and Tech Light Expo will also see its second edition from 26 to 29 October 2017 at the AsiaWorld-Expo.

Last year, the two lighting events featured more than 3,000 exhibitors from 37 countries and regions, and over 50,000 global buyers, forming the world's largest lighting marketplace with enormous business opportunities, and an ideal platform to tap into the international market.

Worldwide Lighting Brands Shine

At the Lighting Fair (Autumn Edition), the Hall of Aurora comes to the limelight with top-notch brands around the globe presenting sophisticated collections of lighting accessories and applications. Buyers can browse a wide array of worldwide lighting brands, including BJB, BLAUPUNKT, PHILIPS, LEDUS, MEGAMAN and VIRIBRIGHT etc.

High Demand for Green Lighting

Consumers share growing concerns on environmental-friendliness and prefer energy-efficient, environmentally friendly and longer lasting products. Australia, the United States, the Chinese mainland and the European Union have phased out the sale of incandescent light bulbs that cannot meet the minimum energy efficiency requirements. The demand for energy-efficient LED lighting products therefore remains keen.

The LED & Green Lighting zone at the Lighting Fair (Autumn Edition) displays a wide array of energy-efficient lighting for commercial and residential uses. Last year, this zone attracted over 1,000 exhibitors and was the biggest in scale at the fair.

Smart Lighting for a Brighter Future

In response to the rising concepts of smart city and smart home, the industry has been proactive in developing cutting-edge smart lighting systems for residential, industrial and commercial uses to keep up with the technological trend. At the Lighting Fair (Autumn Edition), the Smart Lighting & Solutions zone showcases latest lighting designs, software, management systems and control panels.

Other highlighted zones include Commercial Lighting, Household Lighting and many more. Related product zones are grouped together in the fairground to facilitate buyers to find their preferred products and exhibitors efficiently.

Outdoor & Tech Light Expo Breeds Splendid Opportunities

The HKTDC Hong Kong International Outdoor & Tech Light Expo, launched in 2016, returns this year to showcase lighting for outdoor, professional, industrial and advertising uses, as well as lighting solutions and systems that are newly added to the fair. In line with the smart lighting trend, the Expo also features the inaugural Lighting Solutions and Systems zone that incorporates multiple technologies of energy-efficient and cost-cutting lighting systems and solutions.

Multiple Events to Promote Industry Exchange

A series of seminars and forums will be held during the fairs for industry players to keep abreast of the latest technological trends, market developments, and testing and certification information, as well as to exchange professional insights for strategic

business planning. Networking receptions will also take place to facilitate bond-building among the industry.

The Hong Kong International Outdoor & Tech Light Expo will be held alongside the Eco Expo Asia at the AsiaWorld-Expo from 26 to 29 October 2017. The three concurrent fairs offer a one-stop trading platform for exhibitors and buyers, facilitating cross-sector collaboration and maximising sourcing opportunities. A complimentary shuttle bus service will run between the HKCEC and the AsiaWorld-Expo during the fair period.

HKTDC Hong Kong International Lighting Fair (Autumn Edition) 2017
Date: 27-30 October 2017
Venue: Hong Kong Convention & Exhibition Centre

Exhibit Categories : LED Essentials (New), Commercial Lighting, Household Lighting, LED & Green Lighting, Smart Lighting & Solutions, Testing & Certification, Trade Service & Publication
Fair Website: **www.hktdc.com/hklightingfairae**

HKTDC Hong Kong International Outdoor & Tech Light Expo 2017
Date: 26-29 October 2017
Venue: AsiaWorld-Expo
Exhibit Categories: Lighting Solutions and Systems (New), Outdoor Lighting, Professional and Industrial Lighting, Advertising Lighting
Fair Website: **www.hktdc.com/hkotlexpo**

Eco Expo Asia 2017
Date: 26-29 October 2017
Venue: AsiaWorld-Expo
Fair Website: www.ecoexpoasia.com

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Established in 1966, the Hong Kong Trade Development Council (HKTDC) is a statutory body dedicated to creating opportunities for Hong Kong's businesses. With more than 40 offices globally, including 13 on the Chinese mainland, the HKTDC promotes Hong Kong as a platform for doing business with China, Asia and the world. With 50 years of experience, the HKTDC organises international exhibitions, conferences and business missions to provide companies, particularly SMEs, with business opportunities on the mainland and in international markets, while providing business insights and information via trade publications, research reports and digital channels including the media room. For more information.

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Christchurch Pedestrian Crossing Lighting Upgrade

Mr. Yunyu Zhu
Lighting Design Engineer, Connetics Ltd,
Christchurch, New Zealand

Introduction

In July 2015, Christchurch City Council decided to carry out a lighting upgrade project, to replace the 125 W mercury vapour (MV) and some 150 W metal halide (MH) luminaires with new LED luminaires, at 23 pedestrian crossings. As a cost effective approach, existing columns and cable positions were to be utilised.

Determining factors for the lighting upgrade were:

- *Safety consideration*

Existing MV and MH luminaires failed to achieve required pedestrian crossing lighting standards, which lead to potential risk to drivers and pedestrians using the crossing points.

- *Energy efficiency and maintenance consideration*

Existing luminaires were identified as uneconomic to operate and maintain, due to age and energy consumption, compared with more efficient LED products available and affordable in the market; also, MV lamps are becoming obsolete which makes it unable to maintain them in the future.

Design Criteria

The pedestrian crossings are on Category V roads or busy Category P roads, therefore in accordance with AS/NZS 1158, Part 4: lighting of pedestrian crossings, "X1" was selected as the applicable lighting standard for this design1. The required illuminance values are shown in the Table 1 below (an excerpt of table 3.5 from AS/NZS 1158, Part 4).

Table 1. Values of light technical parameters (LTP) for New Zealand Pedestrian Crossings2

Lighting subcategory	Point horizontal illuminance - Marked crossing (Eph)	Point horizontal illuminance - Surrounds (Eph)	Point vertical illuminance - Marked crossing (Epv)	Glare control and UWLR
X1	30 lux (measured on road surface)	10 lux (measured on pathway surface)	20 lux (measured 1m above road surface)	See Clause 3.3.5

Pedestrian crossing layout

Instead of a separate design for each crossing, the Council requested the use of three models to represent all crossings, due to the fact that all crossings fell into one of the following dimension group:

- 11m (length) × 5m (width)
- 10m (length) × 5m (width)
- 7m (length) × 5m (width)

Design analysis

Illuminance calculations

In order to provide a clear presentation, the horizontal and vertical calculations exported from lighting design software, AGI32 (vesion : 16.3.13), are shown individually in the plan and side views shown in Figures 2 and 3. The values are maintained illuminances. All the values shown in Figure 2 and 3 indicate the crossing is compliant with the Standard's requirements for Subcategory X1.

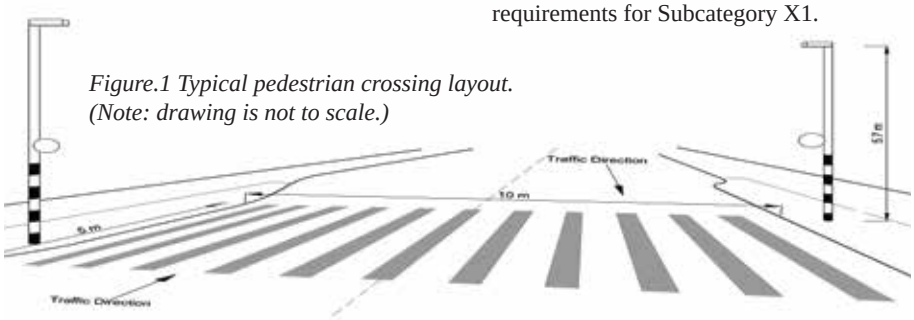

Figure.1 Typical pedestrian crossing layout.
(Note: drawing is not to scale.)

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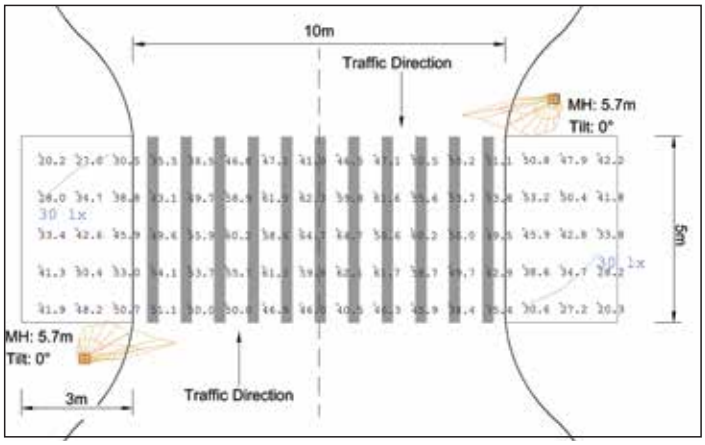


Figure 2. Within the marked crossing area (10m × 5m), all the horizontal illuminances were greater than 30 lux while within the surrounding areas (5m × 3m), all values were greater than 20 lux.

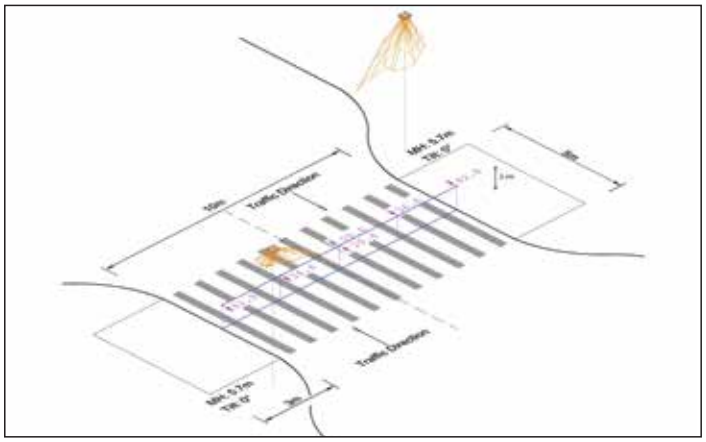
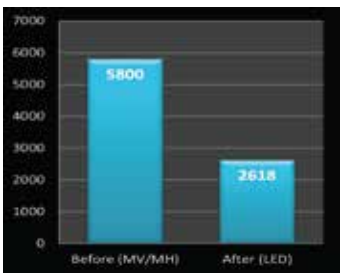


Figure 3. Vertical illuminance calculations. The magenta arrow indicates calculation point direction. At each calculation point (1m above road surface) on the vertical plane (10m × 1m), all vertical luminances were above 20 lux, with the lowest calculated value being 20.6 lux occurring at the mid-point of the crossing (furthest from the light source) which was expected.

Energy savings

As the result of the combined lighting upgrades, a reduction in energy consumption of 55% was achieved (see Table 2). This would save 12,775 kWh of energy annually, which would add up to 255,510 kWh over twenty years' time - the luminaire life expectancy.

Table 2. Reduction in energy consumption (combined installations)

Project Stage	Luminaire Type	Luminaire Quantity	Total Wattage (W)
Before Upgrading	125 W MV	44	
	150 W MH	2	
After Upgrading	55 W LED	42	
	77 W LED	4	

Other considerations

Glare control and Upward Waste Light Ratio (UWLR)

As part of luminaire assessment process, glare control and UWLR were important considerations, addressed by mounting the luminaires at zero degrees and selecting luminaires with special optics designed for pedestrian crossings.

Minimum Approach Sight Distance

Table 3 is an excerpt of Table 15.1 from the New Zealand Transport Agency (NZTA) Pedestrian Planning and Design Guide3. It gives an indication "how far" away a driver should be able to see a person on the pedestrian crossing in order to stop the vehicle safely. Highlighted values in Table 3 shows that the minimum approach sight distance for a New Zealand urban road with 50 km/h speed limit is 40 m, under emergency braking and with adequate skid resistance.

Installation comparison

Before upgrading

Figures 4, 5 and 6 show a pedestrian using a crossing with its original lighting. The crossing is on a Category P3 road (local) with 50 km/h speed limit and a minimum approach sight distance 40 m.

The photographs were taken at 10:14 pm on Tuesday, 20th October 2015. The weather was fine with an ambient temperature of 10 °C, relative humidity of 70% and good visibility. The viewer point was approximately 25 m from the crossing. No illuminance measurements were taken of the existing lighting. The following comments are a visual appraisal of the seeing conditions at the crossing.

The horizontal illumination revealed the crossing markings on surface; they were distinguishable by road users. There was limited surround illumination (horizontal

Table 3. Minimum Approach Sight Distance3

Speed (km/h)	Approach Sight Distance (m)		
	Rural		Urban
	Normal R=2.5s	Alerted R=2s	R=1.5s
10	N/A	6	5
20		14	11
30		23	19
40		35	30
50		45	40
60		65	55
70		85	70
80	115	105	95

R = Driver's reaction speed

and vertical) to the crossing; a pedestrian at the verge of the crossing was difficult to see and might not be noticed by drivers viewing from a safe stopping distance (see Figures 4 & 6).

The pedestrian became perceivable at the middle of crossing (see Figure 5). However, the pedestrian was not well lit with poor vertical illumination and little contrast with the background and providing limited advance warning4 to drivers.

Figure 4. Before: a pedestrian at the start of the crossing.

Figure 5. Before: a pedestrian at the middle of the crossing.

Figure 6. Before: a pedestrian at the end of the crossing.

After upgrading

Figures 7, 8 and 9 show photographs of the same crossing after relighting. They were taken at 9:57 pm on Saturday, 16th July 2016. The weather was chilly with ambient temperature of 4 °C with a relative humidity of 93% and a good visibility.

The horizontal and vertical illuminances were designed to meet the requirements of AS/NZS 1158. The lighting on the crossing, including markings and surrounds, was significantly improved. A pedestrian was clearly visible to an approaching motorist and provided effective advance warning4. The sharp cut-off of back light at the boundary line indicated the good control of light spill onto adjacent properties1.

Figure 7. After: a pedestrian at the start of the crossing.

Figure 8. After: a pedestrian at the middle of the crossing.

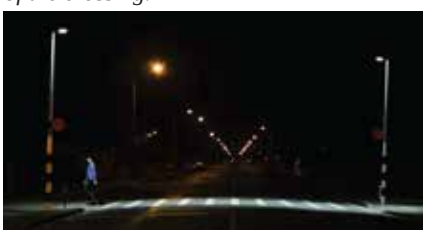


Figure 9. After: a pedestrian at the end of the crossing.

Conclusions

At the time of project completion, positive comments were received from both client and road users, regarding the dramatic improvement of the pedestrian crossing lighting. Compliant pedestrian crossing lighting will enable the road users to use the crossing safely and comfortably. This could help to reduce pedestrian/vehicle conflicts on the crossing4. With the utilisation of LEDs, significant lighting improvement as well as savings on energy consumption and maintenance can be achieved for the asset owner. This could also lead to reduced greenhouse gas production making our lighting systems more environment friendly1, 5.

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2. AS/NZ 1158 Lighting for Roads and Public Spaces, 2015.
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Energy Efficient POLICE TRAINING SCHOOL at Tasgaon, Sangli, MAHARASHTRA

Architect Pramod Chaugule

The process of architectural design involves the interaction of diverse nature of parameters which have varying magnitudes. Buildings designed today create severe ecological and economical problems which demand heating, cooling, ventilation and lighting systems; resulting in depletion of environmental resources.

An architect has to asses these parameters and make decisions which respond to economical and ecological contexts creating a satisfactory environment. Architect can bring in the energy efficiency and cost effectiveness in his design, moreover as renowned Architect Laurie Baker said ‘use of local materials with consideration to local climate and participation of local people would lead to A Holistic Design’.

The Police Training Campus designed by Architect Pramod Chaugule adopts this integrated approach to building designs in order to reduce the consumption of energy resources.

Approach

The proposed PTC campus is situated near a village named Turchi, at Tasgaon in Sangli district. The original site was a barren land with no vegetation and uneven slopes spread out over an area of about 25 hectors the current built up space is 172753 sq.m.

Infrastructural amenities provided include roads, culverts, water storage tanks, street lighting, landscaping, plantations, ponds for rain water harvesting, lake for recreational purposes, SIBF for recycling water, islands, etc.

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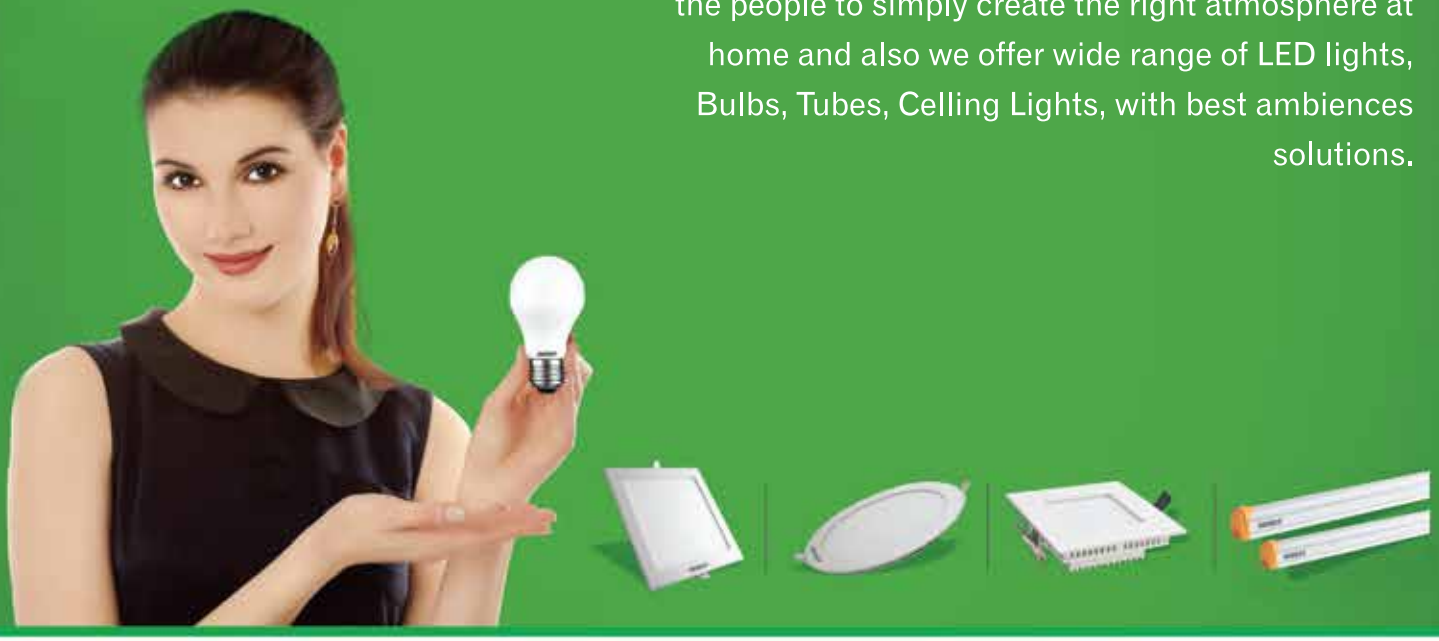

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Main Gate PTS Turchi (Tasgaon)

Master Planning

A building, if considered a part of nature, can be designed to an utmost use by taking into consideration different climatic parameters such as sun, light, temperature, humidity, rainfall and landscapes.

The climatic conditions of the site were thoroughly studied and the structures were designed accordingly.

The area is planned with the concept of 'GURUKUL', which essentially depicts the relation between student and teacher in eco-friendly surroundings. Here, the comforts of trainee cadets are highly considered.
Entrance Gate

At the entrance stands a simply designed elegant gate with two verticals and a horizontal slab, which is intersected by a black free flowing wired form. The materials used for the structures are of grey, white and black colors which stand out against the blue sky backdrop.

Training Centre

The structures stand amidst lush greenery and consist of training school, hostel, R.P.I. Office, mess building. All the buildings complement the greenery through simple forms and organic colors.

The building plans are uncomplicated and functional with easy circulation. They have excellent natural lighting and ventilation. The external facade displays earthy colors with splashes of yellow and brown along with grey basalt stone, which is locally sourced.

Hostel Buildings

The planning considers the contour topography, terrain and eco-systems giving maximum benefits to users. The efficiency in construction is maintained by reducing the cost of construction with volume and weight of materials. Apart from basalt, other regional materials like natural stones like kadappah, granite, marble, sandstone, gokak stone, alkud sand are used.

These are low energy intensive materials. Pre-cast frames with fly ash are used in interiors for WC and baths, whilst natural stones are used for flooring over 80% of the area, further reducing the cost.

RPI Office

Factors like daylight, wind and sun are considered for designing appropriate light and ventilation in order to reduce conventional energy demand. Air conditioners are not used anywhere in the project.

The circulation efficiency is optimized by centrally managing roads and pedestrians. Walkways for all buildings and infrastructure take minimum length for circulation. Lawns and ample trees are provided in between paving for comfort from heat transfer. The aggregate corridors and passages are provided for utility lines to maximize extra space.

Mess Building

Numerous such energy saving aspects are incorporated in the project. Rain water harvesting, SIBF system for water recycling and solar PV hybrid system for internal lighting and street lighting, biogas plant for cooking and solar heaters for water heating are some of the highlights of the project.
The recycled water is used for plantations and landscaping with additional benefits of creating the pleasant atmosphere at lake front.

School Building, PTS, Turchi

Hostel Building, PTS, Turchi

Renewable energies are put to optimum use in project where for general lighting, 15 W CFL lamps are provided with wind generator and hybrid power pack system is used. As for street lighting, solar modules backed with solar batteries are provided.

For cooking purpose, in mess and staff quarters for 700 people, the biomass and fuel cells are generated by applying biogas plant. Reduction of water usage is achieved by recycling of water and air pollution is reduced by planting trees.

Cadets, for their physical training have been provided with ample grounds for badminton, hockey, volleyball and kho-kho along with an athletic track that goes around the football field.

For recreational purposes, an auditorium and an open amphitheatre is provide. A shopping centre is also included to satisfy the day-to-day needs. The residential area is situated at one corner of the site, it houses the staff quarters and Principal and Vice Principal residences. The whole area is

surrounded by beautiful plantations and lawns. Student's hostel and office buildings are near the ground area.

Mess Building, PTS, Turchi

Mess Building, Police Training School (Tasgaon)

Firing range is provided at the other corner of the plot, adjacent to the lagoon created by harvesting rain watering another artificially created lake; which add in beautifying and purifying the surroundings.

Several ancillary buildings like classrooms, health centre and mess are situated at convenient distance from hostel buildings for the comfort of cadets.

The project has a relatively modest budget of Rs. 14,000 / sq.m. The comfort conditions are optimized and energy savings are also due with effective use of nature. The campus is environmentally responsible, profitable and healthy to live and work.

After neglecting and damaging the ecology for so long, we have now started realizing the importance of environment and the ill effects of destroying it. Need for energy and environment conscious building design has become the need of the hour which is duly fulfilled in the said project.

SUSTAINABILITY & LIGHTING POLLUTION

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Governing Body Member of ISLE
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ABSTRACT

There is more to Lighting than meets the Eye……..

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment. Today's environmental problems, like air pollution are largely a consequence of the unsustainable consumption of natural resources and the mismanagement of waste product.

Almost everybody is aware of pollution due to industries or due to automobiles. But very few are aware of pollution due to lights. The main cause of pollution due to lights is the ignorance of the users regarding the Right Light for Right Application. Lighting Pollution causes damage to the environment and health of not only human beings, but also of animals, birds and plants.

Keywords : Sustainability, Lighting Pollution

1. WHAT IS SUSTAINABILITY ?

Sustainability is based on a simple Principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to make sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment. Sustainability has emerged as a result of significant concerns about the unintended social, environmental, and economic consequences of rapid population growth, economic growth and consumption of our natural resources.

What is Sustainable Development ?

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Based on two underlying premises -

- Symbiotic Relationship Between the Consumer Human Race
- The Producer Natural System and Compatibility between Ecology & Economy

Now let us look at the 2 vital elements of Sustainability for the Sustainable Development of the Society -

Economical Sustainability

- It's about understanding that economic growth is only sustainable, if it simultaneously improves our quality of life and the environment, e.g. Voluntary giving, Profit sharing etc.
- Economic Sustainability focuses on the importance of stable economic growth.

Environmental Sustainability

Sustainable development is maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we and future generations depend.

- Today's environmental problems like air pollution, are largely a consequence of the unsustainable consumption of natural resources and the mismanagement of waste product.
- Sustainable development is maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we and future generations depend.

2. LIGHTING POLLUTION

Almost everybody is aware of pollution due to industries or due to automobiles. However, very few are aware of pollution due to lights. In recent years, specifically in the developing world, awareness about pollution due to lights has gained much significance. The main cause of pollution due to lights is over-illumination and the use of inefficient light sources. It has got a significant effect on the health of not only human beings, but also on animals and plants. This is one of the main reasons why many countries have decided to ban the manufacture, sale and use of incandescent bulbs. The electric bulb developed by Edison converts only 10% of the energy consumed to illumination or light; the remaining 90% causes heating of the atmosphere. The main cause of pollution due to lights is the ignorance of the users regarding the right type of light sources for the right application. Thus, there is an urgent need for creating awareness by spreading the knowledge of light sources through academic courses, seminars, conferences and debate among the public.

Light Sources and Luminaires

Light pollution (also known as photo pollution, luminous pollution) refers to light that is considered annoying, wasteful or harmful. It also causes damage to the environment and health, as do other forms of pollution such as air pollution, noise pollution, water pollution and soil contamination. Light pollution is a broad term that refers to multiple problems, all of which are caused by inefficient,

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unappealing or avoidable use of artificial light.

Causes Of Lighting Pollution

Light pollution is fallout of the industrialized civilization. Its sources include lighting of building exteriors and interiors, advertising, commercial, properties, offices, factories, streetlights and illuminated sporting venues. It is most severe in the highly industrialized and densely populated areas of North America, Europe and Japan, but even relatively smaller amounts of light can become noticeable and create problems. In India, it is visible in the commercial areas of the metro cities, namely, Mumbai, Kolkata, Chennai and Delhi.

2.1 Light Trespass

Light trespass occurs when unwanted light enters one's property, for instance, by shining over a neighbor's fence. A common light trespass problem occurs when strong light enters the window of one's home from outside, causing problems such as sleep deprivation or blocking of an evening view. Light trespass is particularly problematic for amateur astronomers, whose ability to observe the night sky from their property is likely to be inhibited by any stray light from nearby sources. Mostly, major optical astronomical observatories are surrounded by zones of strictly enforced restrictions on light emissions.

2.2 Over- Illumination

Over-illumination is the excessive use of light. It is observed that over 30% of all energy consumed by the commercial, industrial and residential sectors is used for lighting. Energy audits of existing buildings demonstrate that the lighting component of residential, commercial and industrial energy usage accounts for about 20 to 40%. Again, energy audit data demonstrate that about 30 to 60% of the energy consumed for lighting goes wasted.

Causes of Over-illumination

- Not using timers, occupancy sensors or other controls to extinguish lighting when not needed.
- Improper design, especially of workplaces, specifying higher levels of light than needed for a given task.
- Incorrect choice of fixtures or light bulbs, which do not direct light into areas as needed.
- Improper selection of hardware that consumes more energy than needed to accomplish the lighting task.
- Insufficient training of building managers and occupants to use lighting systems efficiently.
- Inadequate lighting maintenance resulting in increased stray light and energy costs.

2.3 Glare

Glare is often the result of excessive contrast between bright and dark areas in the field of view. For example, glare can be associated with directly viewing the filament of an unshielded light. Light shining into the eyes of pedestrians and drivers can obscure night vision for up to an hour after exposure. Glare is particularly an issue in road safety, as bright and/or badly shielded lights along the roads may partially blind drivers or pedestrians unexpectedly and thus contribute to accidents.

2.4 Sky Glow

Sky glow refers to the glow effect that can be seen over densely populated areas. It is a combination of the light reflected from what it has illuminated and all the badly directed light in that area refracted by the surrounding atmosphere. Rayleigh Scattering, which makes the sky appear blue during daytime, also affects the light that comes from the earth into the sky, which is then redirected to become sky glow, seen from the ground. Sky glow is particularly irritating for astronomers, because it reduces contrast in the night sky to the extent where it may become impossible to see even the brightest stars.

2.5 Ignorance

Among several things that are taken for granted, lighting is one. Providing illumination by providing fixtures and light sources is considered to be the simplest of tasks. Quite often no scientific study is carried out before any such projects, causing some or the other effects enumerated above. Being a neglected topic, in majority of the countries there are no legislations curbing the present practices leading to pollution due to lighting.

3. EFFECTS OF LIGHTING POLLUTION

3.1 Energy Wastage

Lighting is responsible for one-fourth of all the energy consumed worldwide, and case studies have shown that several forms of over-illumination constitute energy wastage, including non-beneficial upward direction of nighttime lighting.

3.2 Effects on Human Health and Psychology

Medical research on the effects of excessive light on human body suggests that a variety of adverse health effects may be caused by light pollution or excessive light exposure, and some lighting design textbooks use human health as an explicit criterion for proper interior lighting. Health effects of over-illumination or improper spectral composition of light may include increased incidence of headache, worker fatigue, medically defined stress, decrease in sexual function and increase in anxiety. Common levels of fluorescent lighting in offices are sufficient to elevate blood pressure by about eight points. There is some evidence that lengthy daily exposure to moderately high lighting leads to diminished sexual performance. Several published studies also suggest a link between exposure to light at night and the risk of breast cancer, due to suppression of the normal nocturnal production of melatonin.

3.3 Disruption of Ecosystems

Life exists with natural patterns of light and shade, so disruption of those patterns influences many aspects of animal behaviour. Light pollution can confuse animal navigation, alter competitive interactions and influence animal physiology. For example, lepidopterists and entomologists have documented that nighttime light may interfere with the ability of moths and other nocturnal insects to navigate. Night-blooming flowers that depend on moths for pollination may be affected by night lighting, as there is no replacement pollinator that would not be affected by the artificial light. This can lead to species decline of plants that are unable to reproduce and change an area's long-term ecology. Migrating birds can be

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LED Neon Flex


LED Neon Flex


IP20 / IP54 / IP67 LED Strip

Underwater Luminaires


Recessed LED Pool light


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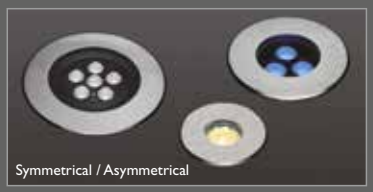
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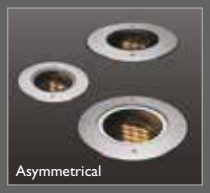
Pathfinders


Sudo Mini - Beam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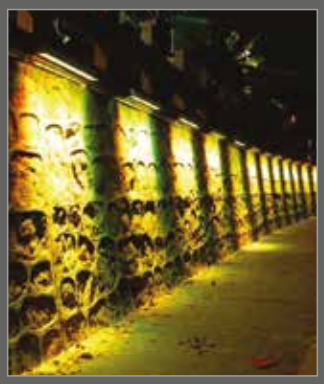
Drive Over

Linear Wall Washers

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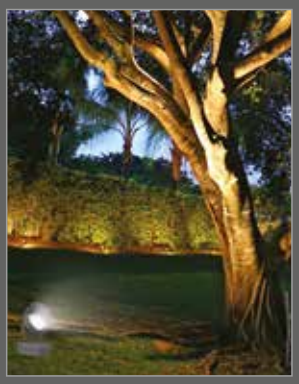

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disoriented by the lights on tall structures/towers. The number of birds killed after being attracted to tall towers range from 4 to 5 million per year or even more. Other well-known casualties of light pollution include sea turtle hatchlings emerging from nests on beaches. Nocturnal frogs and salamanders are also affected by light pollution. Since they are nocturnal, they wake up when there is no light. Light pollution may cause salamanders to emerge from concealment later than normal, giving them less time to mate and reproduce.

3.4 Diminution of Safety

It is generally agreed that many people require light to feel safe at night, but campaigners for the reduction of light pollution often claim that badly or inappropriately installed lighting can lead to a reduction in safety if measured objectively, and that, at the very least, it is wrong to assume that simply increasing the nighttime lighting will lead to improved safety. The International Dark Sky Association claims that badly installed artificial lights can create a deeper contrast of shadows in which criminals might hide.

3.5 Effect on Astronomy

Sky glow reduces the contrast between stars and galaxies in the sky and the sky itself, making it more difficult to detect fainter objects.

4. MEASURES FOR REDUCING LIGHTING POLLUTION

4.1 Possible Solutions

Reducing light pollution implies many things, such as reducing sky glow, reducing glare and reducing light trespass. The method for best reducing light pollution, therefore, depends on exactly what the problem is in any given instance. Possible solutions include -

- Utilizing light sources of the minimum intensity necessary to accomplish the light's purpose.
- Turning lights off using a timer or an occupancy sensor, or manually when not needed.
- Improving lighting fixtures, so that they direct their light more accurately towards where it is needed, and with less side effects.
- Adjusting the type of lights used, so that the light waves emitted are those that are less likely to cause severe light pollution problems.
- Evaluating the existing lighting plans and re-designing some or all of the plans depending on whether the existing amount of lighting is actually needed.

4.2 Improving Lighting Fixtures

A flat-lens luminaire, which is a full-cutoff fixture, may be effective in reducing light pollution. It ensures that light is only directed below the horizontal, which means less light is wasted through directing it outwards and upwards.

4.3 Use of Appropriate Energy- Efficient Light Sources

Several types of light sources exist, each having different properties that determine its appropriateness for certain tasks, particularly efficiency and spectral power distribution. It is often the case that inappropriate light sources have been selected for a task, either due to ignorance or because more sophisticated light sources were unavailable at the time of installation. Badly chosen light sources often contribute to light pollution unnecessarily. Some types of light sources, in the order of their energy efficiency are listed in Table 1.

Table 1 : Properties of Light Sources (Typical Values)

Type of Light Source	Color Rendering Index (CRI)	Efficiency (Lumen per Watt)	Estimated Life (Hrs)
LED (Light Emitting Diode)	Close to daylight (90)	80 - 100	50,000
CFL (Compact Fluorescent Lamp)	Close to daylight (95)	45 - 60	8,000
TFL Slim with Electronic Ballast	Close to daylight (95)	90 - 95	15,000
Low Pressure Sodium	Yellow (25)	80 - 200	15,000
High Pressure Sodium	Pink/Amber-white (60)	90 - 130	15,000
Metal Halide	Bluish-white/White (80)	60 -120	10,000
Mercury Vapour	Blue-greenish White (45)	13 - 48	5,000
Incandescent	Yellow / White (90)	8 - 25	1,000

4.4 Awareness Programmes

To create awareness among users, designers, architects, consultants, law makers and manufacturers, there is a need for arranging educative programs by NGOs.

4.5 Phasing Out of Incandescent Light Bulbs

Governments around the world have passed measures to phase out incandescent light bulbs for general lighting in favor of more energy-efficient lighting alternatives. Phase-out regulations effectively ban the manufacture, importation or sale of Incandescent Light Bulbs for general lighting. Brazil and Venezuela started the controversial phase-out in 2005 and the European Union, Switzerland, and Australia started to phase them out in 2009. Likewise, other nations are implementing new energy standards or have scheduled phase-outs: Argentina, and Russia in 2012, and the United States, Canada, Mexico, Malaysia and South Korea in 2014. In India, not a complete ban, but through the Ujala Scheme decided to replace 770 million incandescent light bulbs with LED bulbs by 2019. This is expected to reduce energy consumption by over 100 billion kWh annually and reduce annual electricity bills by ₹400 billion (US$6.2 billion). As of April 2017, 229 million LED bulbs had been distributed across the country. The states of Tamil Nadu, Kerala and Karnataka in India have banned the use of incandescent bulbs in government departments, public sector undertakings, various boards, cooperative institutions, local bodies, and institutions running on government aid.

5. CONCLUSION

The issue of pollution due to lighting is integral with energy conservation. Energy Conservation advocates that light pollution must be addressed by changing the habits of society, so that lighting is used more

efficiently, with less wastage. All these issues are linked with ignorance of the users and the lighting providers. The long-lasting success of all such initiatives and projects for Save Electricity-n-Environment (SEE) lies in creating awareness in the following ways :

1. Spreading the message through lighting education by different type/level of educational/awareness programs
2. Creating awareness about the cost–benefit analysis of the use of energy-efficient light sources
3. Removing ignorance of the users about the benefits of switching over to such energy-efficient light sources
4. Encouraging NGOs / Institutes to embark upon awareness programs on lighting for the benefit of society.

The above measures shall result in the following benefits -

1. Saving of a precious source of energy, namely, electricity
2. Saving in energy bill for the common man, and thus improving economic status
3. Saving environment from light pollution due to the use of inefficient light sources
4. Saving mankind from the harmful effects of global warming
5. On the employment front, such awareness will generate employment opportunities in Industry / Academics / Institutes, thus improving the Socio-Economic status of individuals.
6. Companies/manufacturers will be able to expand their business because of the easy availability of competent, educated manpower, thus improving the economy of the country
7. It will help government to frame policies on different types of educational / awareness programs on lighting.

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Message of Condolence

Mrs. Chandra Banerjee
Born: 17th October, 1949
Died: 22nd August, 2017

Mrs.Chandra Banerjee embodied the spirit of determination and an unyielding joy for life.

She was born in Kolkata in 1949 and studied at St. John's Diocesan School, Kolkata. She then went on to get a Bachelor's degree in Architecture from Jadavpur University in 1971.

She joined Central PWD in 1978 and worked there for 25+ years. During her career, she designed several renowned buildings across the country including the Income Tax and Revenue offices among many more, and always helped her colleagues grow in their own careers. She was ahead of her times and built her own house with fly ash bricks (a new age concept for that time). She finally retired from CPWD in the year 2006 as a Senior Architect.

She was a very senior and active Fellow member of Indian Society of Lighting Engineers. She was always present in various functions, Seminars, meetings, etc of ISLE. She was Election officer more than once and also invited Executive committee member of ISLE, Calcutta State Centre. We will really miss such an active and lively member.

She was also a Fellow of the Council of Architecture, India and held the post of President at The Jadavpur University Alumni Association of Architecture Department. She was active in every way, travelling to multiple countries despite of her health issues, and always believed in living life to the fullest. Her presence will be missed dearly. She is survived by her husband, Partha; two sons (Debdan, Ritoban); daughters-in-law (Paromeeta, Sreetama) and grand-daughter (Neerja).

The 10th Asia Lighting Conference held in Shanghai, China on 17 - 18 August, 2017.

Mr. Kamal Sethia
Chairman / Kolkata State Centre
ISLE

The Asia Lighting Conference (ALC) was formerly known as the Lighting Conference of China, Japan, and Korea (CJK). The 10th ALC this year was the first conference since its name was officially changed to ALC. In the past, ALC has attracted a lot of young scholars to attend the conference. 10th ALC, in the era of human-centric lighting, attracted over 300 delegates. It is good platform to attract more research scholars for achievements and innovation for all to exchange and share.

The 10th ALC was attended by our Mr. Kamal Sethia, Chairman, ISLE CSC & Mr. Dipayan Nath, ISLE Member. There were 67 papers and 97 posters presented by various Lighting Experts, Professors & Scholars. I made an oral presentation on LIGHT POLLUTION.

Mr Dipayan Nath made an excellent presentation on A New Outdoor Sports Lighting Designing Methodology for Selection of Aiming Angles by Using Heuristic Algorithm.

The next conference of ALC / 11th Asia Lighting Conference will be held in Kobe, Japan on 13 - 14th September 2018.

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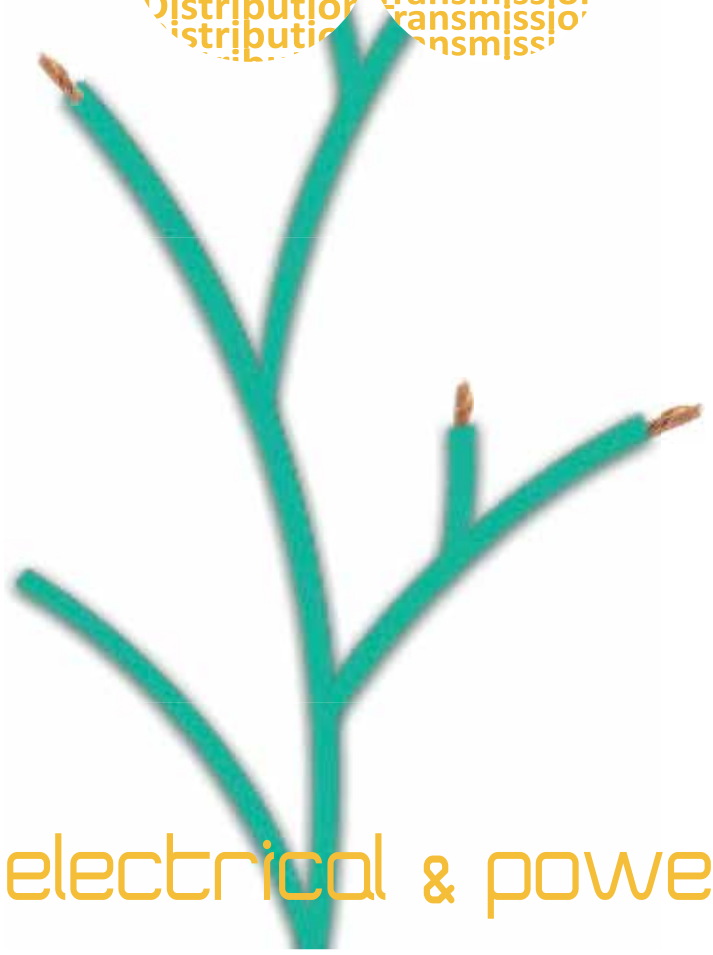

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FAÇADE LIGHTING - An Efficient & Smart Lighting Impact.

Mr. Nishit Mehrish
Principal Lighting Consultant
VISIVE
VISIVE LIGHTING DESIGN

"Modernity is not a question of date but of outlook".
In present world outlook has got a great meaning and great deal. It can be adjudged looking at the people admiring the astonishments and efficient looking objects or any admiration. Great gestures gear us up from hearing from others, and, even, personally, feelings come out as such words "What an appearance? What a beauty? What a structure? Now, in the same way, what a façade? Here, FAÇADE is not only an engineering or technically fulfilled word, but, creates a value by lighting it up enabling to have a look in day and night.

Façade, the word comes from French 'Façade' and Italian word 'Facciata' (means face or frontage), ultimately, from post classical Latin word 'Facia'. Any structure or building has got a significant value on its frontage only, but, classically speaking, it is valued and highlighted more when it is equally illuminated.

These days, Lighting has got its own importance. Right from personal speech of remarking 'Kya light maar raha hai' to unspoken standing structures, such as ; Trees, Buildings, Monuments and Technically-Designed temporary Felicitations have attained and achieved various, numerously-designed illuminating effects throwing 'lights' to people's outlook. The light has given us various modes of life. It has shown us from a small streak to ultra-voluptuous vastness.

The chapter opens up of light from Façade Lighting which is key point of any illuminance, not necessarily illuminated the whole frontage, it may be highlighted any particular space in showing, charming and attracting the whole structure as such. Well, it all depends on a Lighting Designer to decide how to shape the effects and specify the space. Also, remember, one can save a great deal of energy by highlighting certain points of the building or structure rather than flooding the whole façade with uniform light.

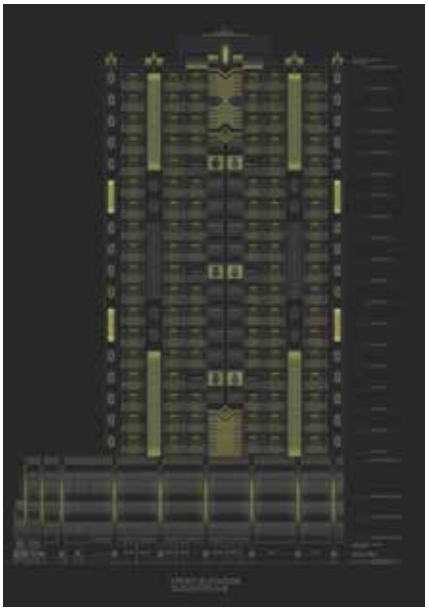
People are attracted in the night watching the illuminated areas of façade, mainly, creating attention, communicating emotions and conveying messages. Intelligent lighting control systems supplement illumination turning it into a complete solution that meets any

requirement from discreetly illuminated memorials through to facades that carry media messages. However, nowadays, Lighting solutions also need to be sustainable, save resources and prevent unnecessary light pollution. Improperly used night time lighting can have an extravagant negative impact on environment. Stray light untoward the proper impact and emanating out-of-bounds the structure consumes unnecessary energy and adds light pollution. Moreover, such lighting disrupts the biological process of creatures that are sensitive to light. Façade Lighting must, therefore, get to grips with ecological compatibility issues. Therefore, it is regulated publicly the system of IGBC (International Green Building Council) which regulates the proper and limited illuminance considering the negativity or pollution.

Today, Lighting on the Buildings, Structures and Monuments etc., etc., is shown in the manner as day and all safety majors and economic conditions with sustainability are taken into care of and be ensured despite the darkness. Images are attracted for the large number of tourist boosting revenues and enhance prestige and also gives an economic incentive to gentrify Real Estate and upgrades property usage.

Architectural Façade Lighting:-

The state-of-art of the architecture plays a pivot role in a façade lighting but the proper contents and uses of illumination play an



additional role for the prominence. Cutting edge façade lighting can illuminate architectural highlights and even design fascinating Color and light effects on exterior façades that attract attention. Professional façade lighting is of particular importance for Hotels, Museums, Art Galleries and Public Buildings of all kinds. Presently many Architects and Lighting Designers rely on proper lighting systems for outdoor applications because they realise the power of those systems which can brink the structure as whole.

Emotional Façade Lighting:-

Emotional Lighting reflects the ideological features of the architectural design effecting the minds of the people rather than embellishing the same. Proper lighting design on to any structure can speak the language of its own art. The illuminance has the perfection on to any architectural shape and creates its beauty more. Creative Lighting elements invite the onlooker to contemplate and linger and provide an interestingly varied atmosphere. There is a close interrelationship between Color and light and materials which can fulfil various tasks, it can simply follow functional dictates but can also convey emotionality and aesthetic appeal.

Interactive Façade Lighting:-

Interactive Lighting Solutions convey information's that goes beyond the mere appearance of a facade. They provide numerous references for presenting brands and messages, media content such as; text, images and animations can be projected onto the controllable canvas of pixels and screens. Media façade lighting gets noticed and draws attention to itself, besides companies, local authorities have also discovered the advantages of communicative lighting for marketing purposes and are using media facades as modern landmarks.

Role of Lighting in Varied Consumptions.

In today's world more and more artificial lighting is being used. We can still find a widespread use of fuel based lighting in the developing countries, but, nowadays, the situation is changing and the demand of electric based lighting is growing. The maximum percentage of electric lighting is being used in the world consuming the minimum percentage of electricity. Therefore, improvement in energy efficient lighting should be kept in consideration for any progress and development. When the technologies change considering the development, the lifestyle and behaviour of consumers impact on the global energy consumption and indirectly on environment. Every technology, including the more innovative and trendy ones, has its own limitations and its full potential is mainly related to specific application field.

Conventional lighting is well established in the industry and has a proven track record in terms of quality, reliability and value for money. It consists of different lamp technologies (including Halogen, Fluorescent, Compact Fluorescent Integrated and Non-Integrated, Compact High Intensity Discharge, High Intensity Mercury / Sodium Vapour and incandescent), as well as the corresponding luminaires, lighting electronics and starters.

Unique Lighting fixtures complement and accentuate the architecture and interior

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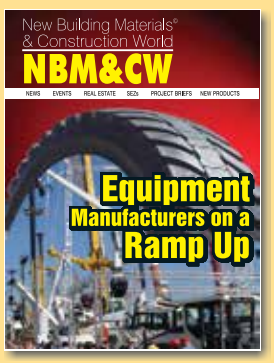

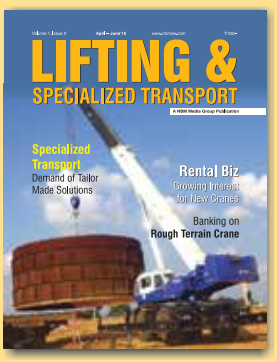

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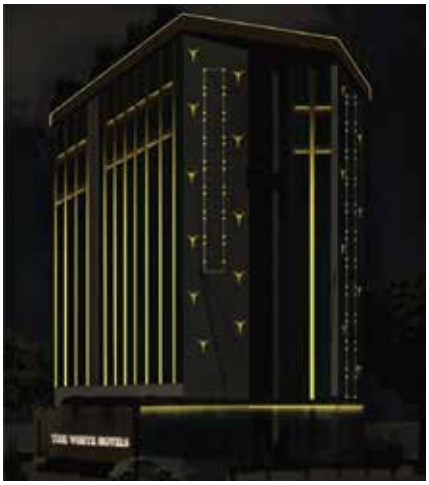


design of the space, striving to combine a legacy of super craftsmanship with modern shapes, inspirations and materials, from chandeliers to sconces, many other such ornamental fixtures feature designs ranging from traditional and contemporary lighting. Meticulous craftsmanship utilizes quality material including Hand-Blown & Mouth Blown Venetian Glass, Ceramics and Metals in an extensive array of finishes. Traditional lighting is mostly seen in Luxury Hotels, Sophisticated Resorts, Theme Parks and Historical Monuments etc.etc.

The past few decades have brought a continuing and rapidly evolving sequence of technological revolutions, particularly in the Lighting scenario, which has dramatically changed many aspects of our daily lives. The developing race among manufacturers of **light emitting diodes (LEDs)** promises to produce, literally, the most visible and far-reaching transition to date. Recent advances in the design and manufacture of these miniature semiconductor devices may result in the obsolescence of the common light bulb, perhaps the most ubiquitous device utilized by modern society.

Solid-state lighting (SSL) is commonly referring to lighting with **Light-Emitting Diodes (LED), Organic Light-Emitting Diodes (OLED)** and **Light-Emitting Polymers (LEP).** At the moment there is still no official definition for solid-state lighting, the expression "solid-state" refers to the Semiconductor crystal where charge carriers (electrons and holes) are flowing and originate photons (i.e., light) after radiative recombination. The history of commercially available LEDs started in the early 1960`s with the first red LED with peak emission at 650 nm .The semiconductor material utilised was GaAsP (Gallium Arsenide Phosphide). Since then, the LEDs have developed fast over the past four decades. Modern LED components cover peak wavelength regions from the ultraviolet to the infrared region.

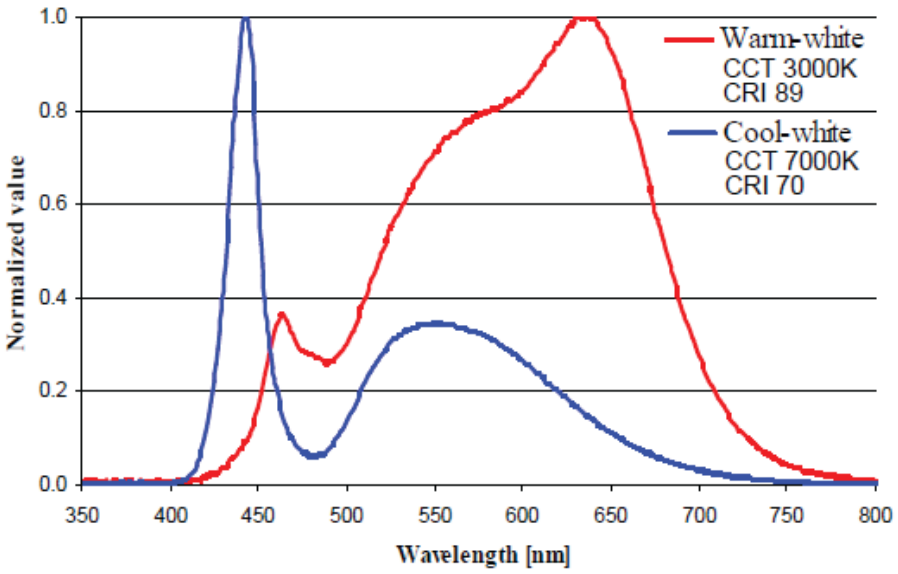
White LEDs can be realised by mixing the emission of different colored LEDs or by the utilisation of phosphors. Phosphor-converted white LEDs are usually based on blue or ultraviolet LEDs. Depending on the properties of the phosphor layer or layers utilised, white light of different qualities can be realised. The typical spectrum for phosphor-converted warm- and cool-white LEDs at CCTs of 3000K and 7000K, respectively are shown below;

Color-mixing by combining the emission of different colored LEDs is another approach to provide white light. Usually only two colored LEDs are needed to produce white light. However, to achieve High Color rendering properties, at least three colored LEDs are usually required. Below represents the main approaches to create white light.

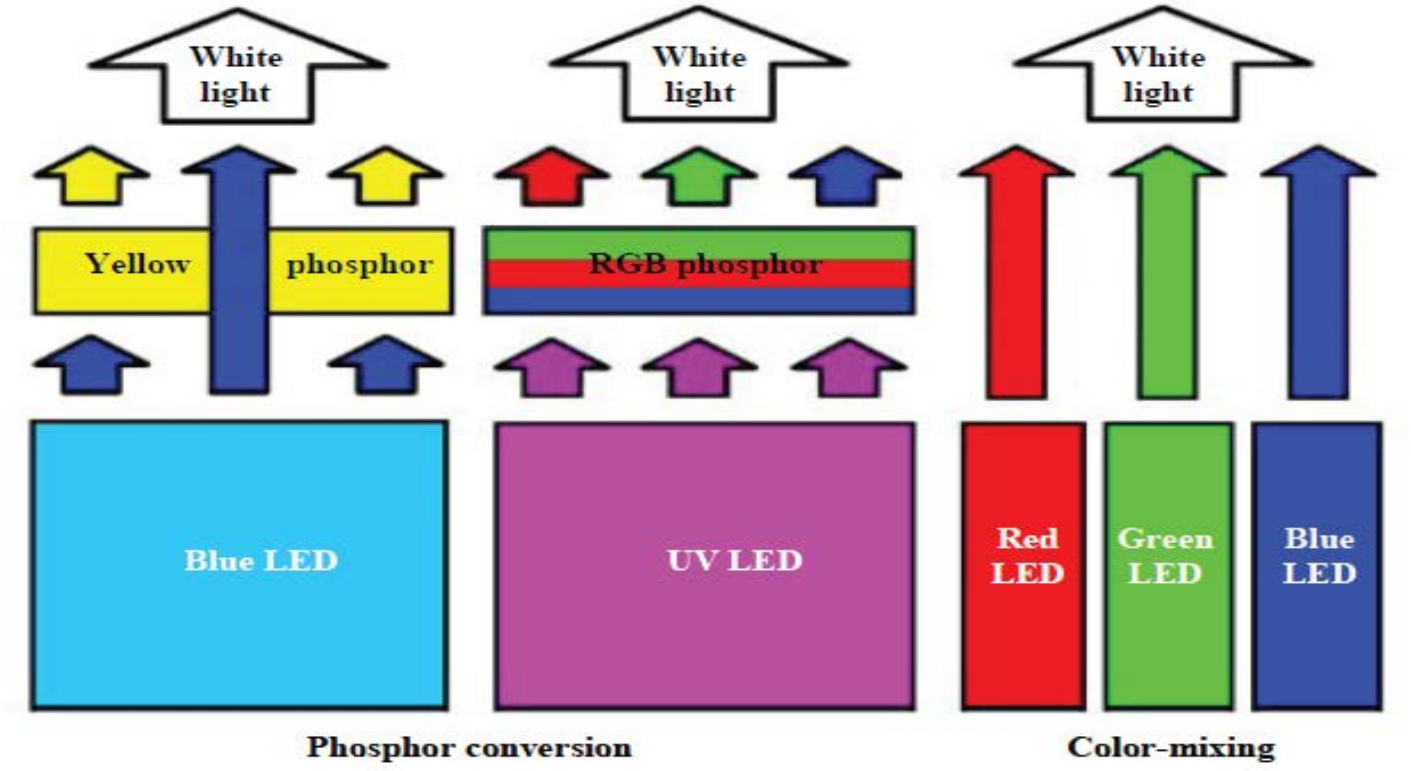
LED is characterised by its constant current (IF) and constant voltage (VF). LEDs are called current-controlled devices. Several parameters are used to characterise LEDs optically. The main parameters depending on the LED type (i.e., colored or white LED) are the **Spectral Power Distribution (SPD), Spatial Light Distribution, Viewing Angle, Color Rendering Index (CRI), Correlated Color Temperature (CCT), Peak Wavelength, Dominant Wavelength, Luminous Flux, Luminous Intensity and Luminous Efficacy.** The electrical and optical performance of an LED is interrelated with its thermal characteristics.

Architectural & Façade Lighting: - Attractive Solution Thanks to LED.

LED architectural lighting presents every façade in the perfect light. No matter whether you require conventional façade design which brings out certain architectural elements on dynamic façade lighting that catches the eyes. LED modules and luminaries stand out thanks to their superior efficiency and extreme Color stability, delivering energy efficiency and durability. In order to operate exterior lighting safely and cost-efficiently all year round in the harshest weather conditions. Use of all the advantages of state-of-the-art LED lighting technology to create effective



Typical spectral power distribution curves for phosphor-converted warm - and cool-white LEDs at 3000K and 7000K CCT, respectively.



Schematic representation of the two main approaches to create white light using LEDs.

shades of white and most varied Color effects on the facades with the correct light intensity.

Central Control Unit (CCU) allows to achieve an excellent and dynamic combinations of natural and artificial light for maximum efficiency in the architectural and façade lighting. LED Drivers are also ideal to set constant and pre-defined brightness levels that adapt changing lighting conditions. LEDs allow spectral, spatial and temporal control of the light emitted. These features have been unobtainable with conventional light sources. Dynamic light sequences are activated via the remote control, smart phones, control touch-pad or even a motion sensors.

Nowadays the applications involving LEDs are innumerable and make the cities and societies more beautiful improving the quality of life and the application varieties impose as clear demand on design of controllable LED drivers. At luminaire level, controllers and drivers are becoming indispensable components. LED solutions are preferred for all kinds of illuminated letters, lighted building facades or media facades showing images. As the LED technology continues to evolve, the possibilities for new and more intelligent products or systems based on intelligent controllers and drivers is expected to grow.

A Brief Profile of Mr. Nishit Mehrish

Began my Design Consultancy with ALBA STUDIO in Mumbai only and toiled for three to four years as Technical Head and pursued through Literature of Lighting with well-known writer's Such as; ERCO Handbook of Lighting Design, Sage Russell - Lighting Design Books, Owen Ransen - Candela, Lumens & Lux and Fundamentals of Lighting Design by various Thinkers, etc.,

This study, thereby, made my experiences to design in illuminance in various structures of Residential, Commercial and other Hospitality sectors in interior & exterior scenarious, also, pertaining to Interior Design. Now, personally, practising of Lighting Design and created a pedestal of prominence working under some well-known architects and builders who have been the most helpful Guide for going through success independently for the Eight to Nine years. My main aim and forte stands at an energy saving and economic solutions for Lighting Projects.

Illumination Audit - Perspectives & Prospects

Dr.Prakash Barjatia being felicitated-Along with Faculty Members of Modern CoE

Visualizing the need of various Electrical Audits, not only for Saving the Energy, but also to help curbing of Environmental Pollution, Department of Electrical Engineering of Modern College of Engineering, Pune planned a 7-Days Faculty Development Program on Enhanced Learning Through Various Electrical Audits from 24th April to 30th April 2017 at their College. This Program was supported by ISLE, Pune Local Centre. Highlighting the importance of Right Type of Lighting to save fast depleting natural resources and thus to help in maintaining Sustainability was taken by Er.(Dr.) Prakash Barjatia, GB Member of ISLE. To supplement the subject, another half day session on a Case Study and Hands-on-Training was taken by Er.Rohit Sharma, Energy Auditor & Director of SaveEn India, Pune. Both these sessions were well appreciated by 52 Participants / Faculty Members from 11 Colleges of Maharashtra. Concluding the sessions, HOD-Electrical Engg. Deptt. and Vice Princpal of College, Prof.Neelima Kulkarni, thanked ISLE and appreciated the efforts made by Dr.Barjatia and Er.Rohit Sharma for conducting the Sessions. As a token of appreciation, they were presented with Saplings to make the Environment Sustainable.

Felicitation of Faculty Members by Prof.Neelima Kulkarni, Vice-Principal & HOD-Electrical Engg. Deptt.

Gp.Photo

Er.Rohit Sharma making Presentation

Hands-On Practicals being carried out

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1201 3RD AVE PUBLIC SPACES RENOVATION, Seattle

A commercial tower's entryway and lobby, defined by dark, rich wood and stone finishes, has been relighted to attract new tenants. The building's original single height entry doors were enlarged to double height for enhanced daylight penetration, and the dark stone entryways are now illuminated by glowing portals made from thin marble slabs, which are backlit by dimmable LED panels controlled via a DMX system. The illuminated portals are preset to run on a program that balances lighting levels with changing interior and exterior light throughout the day. Marble panels are removable, which makes the LED panels easily accessible for maintenance.

Inside, a few carefully placed downlights result in a contemporary design that meets energy codes. Custom decorative LED fixtures supplement daylight and illumination from downlights, and bring out the warmth of original wooden finishes. To eliminate the need for additional downlighting, task lighting was integrated into reception desks. A custom LED pendant over the main reception desk draws attention and assists in way finding as visitors head toward the elevator lobbies, now energized by long-life linear LEDs.

DESIGNERS
ERICA VOSS,
KIMBERLY TAYLOR,
CJ BROCKWAY - NBBJ
PHOTOGRAPHY
© SEAN AIRHART

Germany Visit - Report by Chairman Rajasthan State Centre

Mr. R.S.Saxena
Chairman
Rajasthan State Centre, ISLE

Indian Deligation with Energy Minister Shri.Pyush Goyal On 01 June 2017 at Munich.

A trip to Germany from 28th may to 4th June 2017 was undertaken with a delegation from India, regarding sustainability in sports, solarizing soccer and cricket. Higher officials of various cricket associations, government officials from IREDA,MNRE,SECI, GIZ,Clean max,Tata power solar etc took part in the delegation.

Mr.R.S.Saxena (Chairman ISLE RSC), Dr. Manoj Gupta (Provost, Poornima University) and executive member / education ISLE RSC participated in the delegation.

During Indo - Germany energy dialogue and business round table on PV roof top market development held on 1st June at ICM hall, Inter Solar Europe, Honorable Minister Shri. Piyush Goyal, Minister of State for power, coal, new & renewable energy and mines Government of India delivered the key note address & Dr. Ashwini kumar M.D of SECI discussed regarding the promotion of schemes for solar rooftop and energy storage in India.

Visit to various stadiums electrified by solar such as Opel arena Mainz, solar park ,car port wind farm, fritz Walter stadium, stadium in Sinsheim at Rhein - neckar-arena, stadium at Munich and a Guided tour to the solar rooftop plant on top of hall B of the inter solar trade fair Munich were organised. The power plant of IMW is running for 19 years how and feeds into the grid around 18 million units. Professional guided tour through trade fair visiting companies, solar association institute and capacity development providers with special interest for investment in India were also organised. With 40 GW of grid connected solar rooftop installation (as a part of India's overall solar target of 100 GW by 2022), as also with off grid applications, India has an enormous potential in the upcoming years. In this context, joint efforts between Germany & India can enhance the solar installation capacity in India, and help to achieve the target within stipulated time frame. It was really a very good study cum business tour to know the state of art German technology.

The GST effects

Analysing how GST rates will affect the electrical equipment industry in India.

Goods and Service Tax (GST) which has come into force from 1st July has revolutionised the way India pay the taxes. It is expected to give a major boost to make easier business operations. The One Nation, One Tax has been designed to tax transforms India into a single market. The dawn of GST, celebrated in a way similar to the dawn of independence for India is by itself an indicator of the extraordinary expectations from GST in the years to come. This article describes how GST rates will affect the electrical equipment industry in India.

A big booster for organised sector

The manufacturing sector has been a chief market driver for many developing economies across the world.Gautam Seth, Joint Managing Director, HPL Electric and Power Ltd believes that the new GST regime would craft a transformative shift from a complex multi-layered indirect taxation system to all inclusive indirect taxation system. He adds, "GST will be a big booster for the organised sector by enabling a common tax regime. This taxation regime will reduce competitiveness of the unorganised sector by ensuring standardised taxation rates for all, helping the organised players significantly."

Making business operations simpler

While explaining how the GST rates will affect electrical equipment industry, Rajeev Sharma, Head - Corporate Services and Strategic Planning, Mitsubishi Electric India Pvt Ltd says, "For the Indian electric and electronic industry, GST is expected to give a major boost since it will make business operations simpler in the longer run."

According to Rajiv Kumar, Director–Marketing, Electrical Sector - India, Eaton Power Quality Pvt Ltd, the overall impact of GST should be positive. He observes, "With the simplified tax structure, input costs for manufacturing are expected to be generally lower and reduction in logistics costs due to enablement of warehouse consolidation can together result in lower manufacturing cost. The OEMs will be able to pass this cost reduction to customers through price reduction which should drive increased demand."

Ease of doing business

After removal of check post, Octroi and other bottlenecks, the transportation of goods will be faster and the freight will also come down, Dilip Kumbhat, CEO, K-Lite Industries observes. He adds, "Elimination of C forms is a great relief and the price parity for interstate sales are good features."

According to Sharma of Mitsubishi Electric India, "As higher than optimal time is consumed per transportation, logistics costs incurred in India is approximately 1.5 times compared to the global benchmarks. With the introduction of GST, India will become a seamless market without any difference between inter-state or intra-state sales. This will essentially disrupt the existing ineptitude and facilitate structural re-engineering of the logistics network. Service providers would be incentivised to leverage hub-andspoke supply chain networks by operating large central warehouses and remodelling transportation routes. We assume that this will be resulting to some reduction in logistics and warehousing cost. This will indirectly affect

> We are afraid that filing of GST related documents on 10th, 15th and 20th of every month looks cumbersome including the ITC process.
>
> Dilip Kumbhat, CEO, K-Lite Industries

costs and prices reduction will happen as a trickledown effect in the mid-term."

Kunwar Sachdev, Managing Director, Su-Kam said, "GST is one of the biggest reforms implemented by Central Government. The reform will have a positive impact in cash flow due to change in rate of taxes. Credit of Input taxes is now available against supply of solar goods - this would improve cash flows and EBITDA. Some of the other benefits of GST are removal of cascading effect of taxes, reduction in purchase cost which would have a positive impact to EBITDA subject to negotiations with the vendors and abolition of multiple forms like 'C' form, 'F' Form, CST which was an unnecessary cost for the industry and shall boost inter-state trade directly with the customers. The reform would also be a step forward in moving towards a common market."

> The new GST regime is likely to benefit the lighting as well as electrical sector significantly through an overall reduction in tax rates.
>
> Avinash Khemka, Chief Manager, ICAI

> GST is one of the biggest reforms implemented by Central Government. The reform will have a positive impact in cash flow due to change in rate of taxes.
>
> Kunwar Sachdev, Managing Director, Su-Kam

Will benefit manufacturers using electrical machinery

The price of commercial electrical machinery is expected to stay neutral, believes Avinash Khemka, Chief Manager at International Copper Association India (ICAI). He briefs, "Handlooms used in the handicraft industry are the only machinery charged at 'nil' rate of tax under GST. Most of the electrical machinery was charged tax at a similar rate to the rate declared under GST."

Equipment which come under renewable energy segment such as biogas plant, solar water heater, pumps, panels etc. will be attracting 5 per cent GST. While equipment like pumps, dairy machinery, and nuclear power generation elements will be around 12 per cent and motors, generators, transformers, boilers and turbines machinery is around 18 per cent.

> GST will be a big booster for the organised sector by enabling a common tax regime.
>
> Gautam Seth, Joint MD, HPL Electric and Power Ltd

Khemka notes, "Though not much of variation is observed for the end consumers, the manufacturers using electrical machinery will benefit from the availability of input tax credit on the services used which was not available under VAT."

Let's wait and watch

The electric and electronic items have been majorly placed in the 28 per cent tax slab. According to Sharma, the new tax slab is 1-2 per cent more than the tax slab used earlier which will keep the prices unchanged. However, he observes, "Once we start getting back input credit from the freshly purchased raw material, operational business expenses etc, which would happen down the line in two to three months, then we would be in a better position to decide our pricing strategy."

Lukewarm response from LED industry

In the lighting industry, the tax structures under GST are LED lighting at 12 per cent and conventional lighting including CFL/FTL is 28 per cent.

Energy efficiency and saving being the mantras for a decade, some of the states like Uttar Pradesh levied zero tax on LED fittings and in most of other states the tax was just 5 per cent. Similarly, in most of the states, the VAT for the energy efficient CFL lamps was around 12-13 per cent. Now the GST for LED fittings is fixed at 12 per cent and for CFL it is 28 per cent.

"With a composition of lighting industry at around 60 per cent in organised sector that are subject to Excise Duty (ED) and Value Added Tax (VAT) and the balance 40 per cent in unorganised sector without ED, it is difficult to make inferences about the immediate future," observes Kumbhat of K-Lite Industries.

> GST is expected to give a major boost since it will make business operations simpler in the longer run.
>
> Rajeev Sharma, Head - Corporate Services and Strategic Planning, Mitsubishi Electric India Pvt Ltd

He adds, "The tax hikes are likely to increase the prices of conventional lighting products. This may not be acceptable to a majority of consumers who are yet to migrate to LED fixtures. Their argument will be: why CFL, which is energy efficient, was taken to 28 per cent. In fact most of the persons we are interacting, feel that the LED should have been under the 5 per cent GST bracket and CFL/ FTL in 12 per cent bracket. High pressure lamps can be at 28 per cent."

However, Khemka from ICAI notes, "The new GST regime is likely to benefit the lighting as well as electrical sector significantly through an overall reduction in tax rates."

> With the simplified tax structure, input costs for manufacturing are expected to be generally lower.
>
> Rajiv Kumar, Director– Marketing, Electrical Sector – India, Eaton Power Quality

Threat to 'Make in India'!

Even though, there will be a lot of benefits of GST in the long term, we can expect short-term negative impact too. In case of lighting industry, both fixtures and the components have been kept in the same bracket at 12 per cent as compared to 6 per cent customs duty on components earlier. "Importing components like MCPCB / diodes and LED drivers might rise as the taxes would be roughly the same in both cases. In turn such a shift towards import

will not encourage the 'Make in India' concept," Kumbhat opines.

Pain points

Kumbhat also points out, "We are afraid that filing of GST related documents on 10th, 15th and 20th of every month looks cumbersome including the ITC process. We are hopeful that the system, with the guidance of tax officials, will take care of the immediate problems seriously and also look forward to revision of GST for LED and other energy saving CFL and T5 lamps."

Conclusion

Experts observed that the success of GST will depend on how effectively the government is able to enforce the new tax system. "Simplified tax structure and unified market will improve operational efficiencies," concludes Kumbhat.

Note : This article, by courtesy is reproduced from Electrical & Power Review, August 2017 issue.

Escape Cinemas, Chennai, India

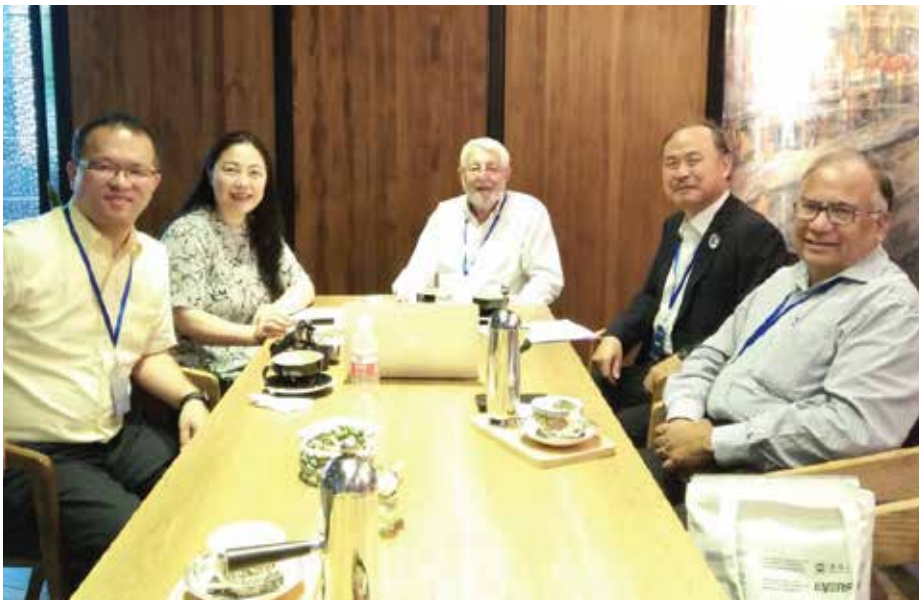
Lux Pacifica 2018 Conference in Japan - Intimation

Lux Pacifica Board meeting was held on 18.08.2017, in Shanghai, China,. It was attended by Prof. Warren Julian (Chairman), Prof. Motoharu Takao (Japan), Dr. Hao Luoxi (China), Prof. Hoon Kim (Korea), Meer Young Cho (Korea), and Mr.Kamal Sethia (India),

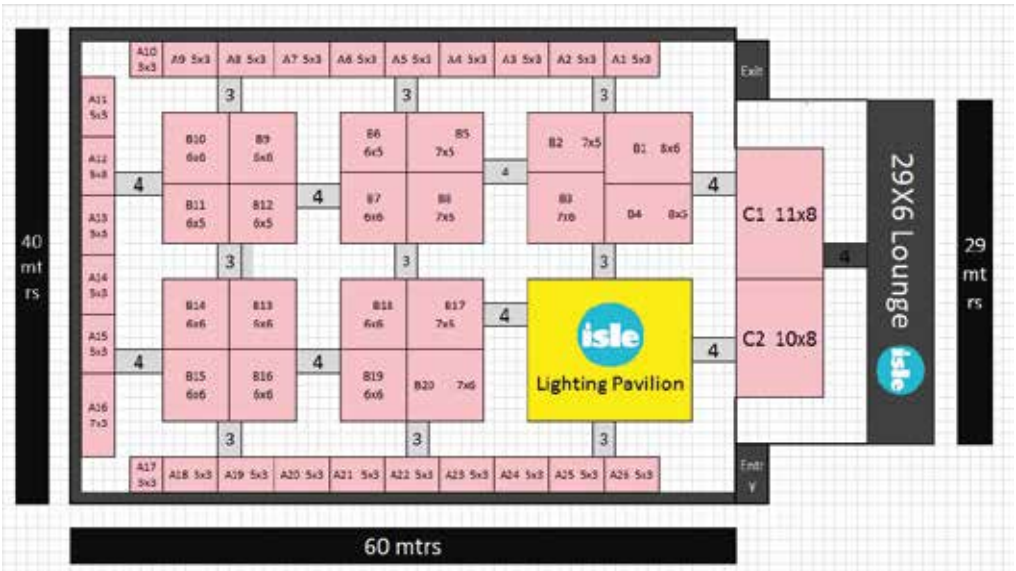
It was reconfirmed that the next Lux Pacifica 2018 (8th Lux Pacifica Conference) will be held in Tokai University, Takanawa Campus, Tokyo, Japan from 6th to 8th March, 2018. From Airport it is 19 mints to the venue & nearest metro station is Shinagawa street (Keikyn Line).

Theme of Lux Pacifica 2018 : Life & lighting. At the same time, there will be a LED lighting exhibition, which is "LED & Lighting Show of JAPAN", from 6th to 9th March, 2018.

As discussed in the board meeting, the 9th Lux Pacifica 2019 / 2020 will be held in Bangkok / Korea. The next Lux Pacifica Board meeting decided to be held on 5th March 2018 at the venue of 8th Lux Pacifica Conference.



Hyderabad
10-12 November 2017,
Hitex Exhibition Centre



Goa, 8-10 December 2017,
Dr.Shayam Prasad Mukherjee Stadium

BusinessLine

CONSTRUCTION ARCHITECTURE INTERIOR

EXPO 2017

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THE BUILD & DESIGN EXHIBITION 2017

From office blocks to high-raised constructions; from residential buildings to embassies; the number of forthcoming infrastructure and construction projects across India is vast and wide-ranging. CAI (Construction Architecture & Interior) 2016 is the ideal opportunity for your organisation to access major developers, contractors and clients procuring work. This is a Build & Design Exhibition of ingenious designs and construction facets. CAI brings to you an amalgamation of exquisitely informative collection of modern technologies and materials in the field of the construction, architecture and interior designing. Carefully assessed and thoughtfully put together, the event provides an excellent platform to exhibit your products and services, amongst the best business market and helpful for people planning to add new designs and features to their living space. From top quality exhibits, to insightful demonstrations and more, you will discover thousands of smart, stylish and cost-effective ways to design, build or renovate.

THE REACH NETWORKING OPPORTUNITIES WITH INDUSTRY PEERS

- Architects & Planners.
- Purchase Managers of Relevant Companies.
- Structural & Civil Engineers, Lighting Consultants.
- Universities, Colleges, Research Institutions & Others.
- Air Conditioning Consultants, Mechanical & Electrical Engineers.
- Industry Professionals, Real Estate Developers, Interior Designers.
- Alumini Associations of Architectural, Engineering & Interior Designing Academies.
- Building Contractors, Project Managers, Consulting Engineers, Hospitality Airport & Metro Authorities.
- Manufacturers of Building Material & Components, Government Agencies / Building Authorities

MAKING AN IMPRESSION CREATING A UNIQUE ATTITUDE TOWARDS PROMOTING CAI

A special 4 page feature - The Hindu (Main Edition) will publish a special four page feature during the show where all the participants will be showcased on.

Exclusive ads in Dailies - The Hindustan Times, The Hindu, Indian Express, Deccan Chronicle, Hindu Tamil, Daily Thanthi, Dinamalar, Dinakaran, Eenadu, Andhra Joythi, Sakshi, Etemaad, Inquilab, Rajasthan Patrika, Punjab Kesari, O Herald, Gomantak Marathi, Dainik Jagran, Mid-day, Hindi Milap & Siyasat.

Focused and direct campaigning amongst the associations relevant to the expo in terms of support and participation.

PROMOTIONAL CAMPAIGN CREATING AWARENESS THROUGH MASS MEDIA

- Bus Back panels
- TV & Radio campaign
- Onsite and Offsite BTL promotions.
- Billboards & Pole Banners to be put up across strategic locations in the city.
- Online promotions through Trade Websites, E-mailers, E-newsletters & VIP Special Invites
- Exclusive ads in Construction, Architecture & Design related magazines from across the country.
- Personalised invite to professionals from the field (Builders, Architecture, Interior-Design, Construction, Engineering, Various Associations)

EXHIBITS

THERE WILL BE REPRESENTATIVES FROM ALL THE MAJOR INDUSTRIES & SECTORS INCLUDING:-

Sand, Bricks, Steel & Concrete, Roofing & Cladding, Glass & Facades, Elevators & Escalators. Electrical Cables & Wires, Switches & Switch Gears, Architectural Lightings, Ceilings. Construction Equipments & Earth Moving Equipments, Drilling Tools, Concrete Mixer Etc. Air Conditioning, Wooden Veneers & Floorings, Hardware & Fittings, Coatings & Chemicals. Doors & Windows, Wall Paper, Paints & Adhesives, Fountains, Blinds, Cleaning Aids. Textured Walls & Surfaced Coatings, Prefab Structures, Mesh, Gardening & Landscaping. Bath Fittings, Sanitaryware, Tiles & Ceramics, Engineered Marble & Granite, Plumbing. Swimming Pools & Jacuzzis, Solar Products, Fire Safety & Security, Paver Blocks & Kerb Stones. Modular Kitchens, International Furniture, Construction & Building Materials' Websites.

ABOUT THE ORGANIZER

I Ads & Events, with its expert team ensures seamless execution of exhibitions (both B2B & B2C) with our creative ideas along with the highest standard of quality and customer satisfaction. Whether the event is corporate or social, I Ads and Events incorporate planning from themes, venue selection, design layouts, celebrity appearances and concerts with the ultimate goal of making your specific event an elegant, unique and memorable experience.

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Lii 2018

LIGHT INDIA INTERNATIONAL

Bombay Exhibition Centre, Mumbai, India

info@Lii.co.in www.Lii.co.in

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Exclusive full day seminar on Smart Lighting - 20th Jan, 2018

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iads & events

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indian society of lighting engineers

The Indian Society of Lighting Engineers has great pleasure in presenting the LIGHT INDIA INTERNATIONAL 2018, at Bombay Exhibition Centre, Mumbai, India during 19-21 January 2018.

The 2.4 billion dollar lighting Industry in India is witnessing a double digit growth in recent years, thanks to the emphasis being given on infrastructure development by the Central and State Governments and the growing awareness of the importance of appropriate lighting in day to day applications. With the increased investments in the Infrastructural sectors, the lighting industry is poised for rapid development. Smart city concepts have thrown open many avenues and lighting plays a critical role.

The lighting industry in India is on a globalization drive and is now providing the Indian consumers a variety of lighting products sourced domestically as well as from overseas. In the context of the reduced import duty regime in India, the globalization drive is gaining momentum.

The growing living standards in India are finding expressions in the lighting industry in many ways. The country is in the midst of an unprecedented growth in industrial and infrastructure facilities.

The Light India International 2018 will publicise the developments taking place in the lighting industry and provide excellent marketing opportunities for all the products and services covered by the lighting industry.

EXHIBIT PROFILE - LED LIGHTING FOR

- Airport & Runway lighting
- Architectural lighting
- Building Lighting
- Casino & Disco Lighting
- City Beautification & Smart City lighting
- Decorative Lighting
- Environmental / Landscape lighting
- Industrial lighting
- Intelligent lighting
- IT, Publications, consultancy services relating to lighting industry
- LED lighting products & components
- Lighting accessories and controls
- Lighting with non-conventional energy
- Power saving solutions
- Railway / Metro lighting
- Refineries / Mines lighting
- Residential, commercial, retail lighting
- Security lighting
- Speciality lighting
- Stage Lighting
- Street lighting
- Testing, measuring instruments
- Tunnel Lighting
- Underwater & Fountain Lighting

LII 2018
LIGHT INDIA INTERNATIONAL
Bombay Exhibition Centre, Mumbai, India
Info@Lii.co.in www.Lii.co.in

VISITOR PROFILE

Light India International will be mainly a B2B event. The fair will be open to public in the evenings.

The Business Visitors Include –

- Architects
- Building Contractors & Engineers
- Construction Companies
- Corporates
- Electricity Board
- End Users
- Government Planning & Development departments
- Home Lighting Solution Seekers
- Hospitals
- Hoteliers / Hospitality Industry
- Interior Designers
- IT Companies
- Lighting & LED Industry Professionals
- Lighting Consultants
- Lighting Dealers
- Lighting Fixture Manufacturers
- Municipal Corporations
- Real Estate Developers
- Retail Space Designers
- Signage Industry
- Stage Lighting
- Suppliers of Equipment Material to the LED Industry

ADVERTISING & PUBLICITY

An effective ad campaign during and prior to the event will be run in different media.

- Advertisements in national newspapers and industrial journals will be published well ahead, which would flash highlights and previews of the event.
- TV commercials
- Hoardings & Banners across the city.
- Direct mailers and special invitations will be sent to decision - makers and key personnel and professionals related to the industry.

LIGHTING FACADE

Gallery for Innovative Product Launch

- Innovative Lighting Projects - Models
- Featured Design Solution & Applications
- Showcasing State of the Art Technology - Luminaires

FAIR DIRECTORY

A well designed directory, comprising comprehensive information about all the participants will be distributed to industry delegations, government officials, OEMs and project officials. The directory would serve the purpose of a Buyer's Guide / Resource Directory.

STALLS

Modular in construction as per international standards. In terms of features, facilities and aesthetics, the stalls will be in a well-lit ambience. Standard modules with fascia would measure 9 sq.mtrs. However, larger modules can be made available on request.

WHY EXHIBIT?

- LED Expo provides an excellent opportunity for you to meet your target clients on a personal level for effective marketing.
- LED Expo is an excellent platform to launch & showcase your products to Government bodies, retailers, hoteliers, architects, project managers, signage specialists, lighting industry professionals & many more.
- LED Expo gives you the chance to promote your brand to an international audience.
- LED Expo provides access to important decision makers from the industry and useful market insights found nowhere else.
- LED Expo provides a conducive environment to help you make the right connections from across Asia.

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indian society of lighting engineers

FOR THE EXHIBITORS, LIGHT INDIA INTERNATIONAL PRESENTS OPPORTUNITY TO

- Present your products and services to potential buyers / dealers / customers.
- Introduce latest technical know-how in lighting industry, energy efficiency and renewable energy
- Launch new products in the midst of media, industry professionals
- Increase brand awareness
- Explore investment opportunities
- Locate partners for joint ventures and tie-ups

WHO SHOULD PARTICIPATE ?

- Manufacturers, importers, agents, dealers in lighting industry
- R&D institutions, Testing & Measuring instruments manufacturers
- Government Departments, Electric Utilities, Non Conventional Energy, Transport, Housing, Industrial Development Agency.
- NGO's engaged in energy development
- Publishers, Service providers, Lighting consultants & Lighting design software companies

EVENT ORGANISERS i ads & events

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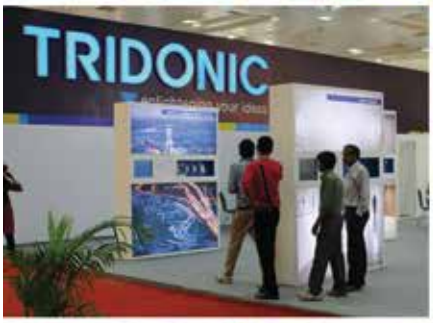
i ads & event expert team ensures seamless execution of exhibitions (both B2B & B2C) with our creative ideas along with the highest standard of quality and customer satisfaction. Whether the event in corporate or social, I Ads and Events incorporate planning from themes, venue selection, design layouts, celebrity appearances and concerts with the ultimate goal of making your specific event an elegant, unique and memorable experience.

Glimpses of Lii 2011



Glimpses of Lii 2013

Glimpses of Lii 2015


Lii 2011
LIGHT INDIA INTERNATIONAL
Lii 2013
LIGHT INDIA INTERNATIONAL
Lii 2015
LIGHT INDIA INTERNATIONAL


Lii 2011
Prof. Warren Julian
Seminar on "Green Lighting Concepts


Lii 2013
Dr. K.Rosaiah,
Governor of Tamil Nadu
Inaugural Function of Lii 2013


Lii 2015
Mr.Amit Mitra,
Minister - Kolkata
Inaugural Function of Lii 2015


Mr.Thomas Patzelt
Prof.Wendy Davis
Mr.Wout Van Bommel
Prof. Dionyz Gasparovsky
Ms.Prof. Yu Akizuki
Dr. Partha S. Dutta
Arch.Pramod Chaugule

Speakers

"VALIDATION MEET FOR QUALIFICATION PACK FOR DOMESTIC ELECTRICIAN"

ISLE CSC organized jointly with Electronics Sector Skills Council of India (ESSCI : Government of India), one day Workshop on "Validation meet for Qualification Pack for Domestic Electrician" on Tuesday, the 16th May, 2017 from 11.00 am to 03.30 pm) in Dr. B R Ambedkar Hall, 2nd Floor, Nizam Palace, Kolkata 700020 (photo of the workshop is enclosed).

The course content / presentation (hard copy) was handed over to all the 21 participants, who were mostly Electrical Contractors.

Under NSDC and Ministry of Skills Development and Entrepreneurship, these National level Qualifications are being developed for roll-out across technical training institutes in India, both in the private and public sector. The standards are detailed competency based standards, outlining practical outcomes and knowledge requirements for every job role across the sector. Existing workers in these roles will be allowed to acquire these qualifications through an RPL (Recognition of Prior Learning) scheme as well.

This was a very interesting interactive Workshop, where a very positive feedback received from the participants was noted down by ESSCI., who would incorporate the following points in the future proceedings:

1. Understanding of electrical circuits viz, single phase, three phase, balanced and unbalanced system, phase sequence, etc.
2. Knowledge of electrical parameters viz, Voltage, Current, frequency, power factor, load, etc.
3. Knowledge of understanding and use of various electrical instruments.
4. Knowledge of different hand tools required for execution of work.
5. Understanding and reading electrical circuit diagrams.
6. Knowledge in determination of load in the proposed network.
7. Knowledge of electrical equipment viz, Switchgears, Transformers, Low tension circuit breakers, cables, MCCBs, MCBs, ELCCBs, RCCVs, capacitor banks etc.
8. Knowledge in determination of load for individual electrical gadgets.
9. Technique in laying and termination of LT power and control cables.
10. Installation of earthing system of the entire electrical installation.
11. Knowledge of overall electrical safety rules and regulations.
12. Knowledge of drawing single line electrical network after installation, i.e., “As Built Drawing”
13. Knowledge of submission of test form for new connections.
14. Knowledge of periodic maintenance of electrical equipment.

ILE

The Institution of Lighting Engineers

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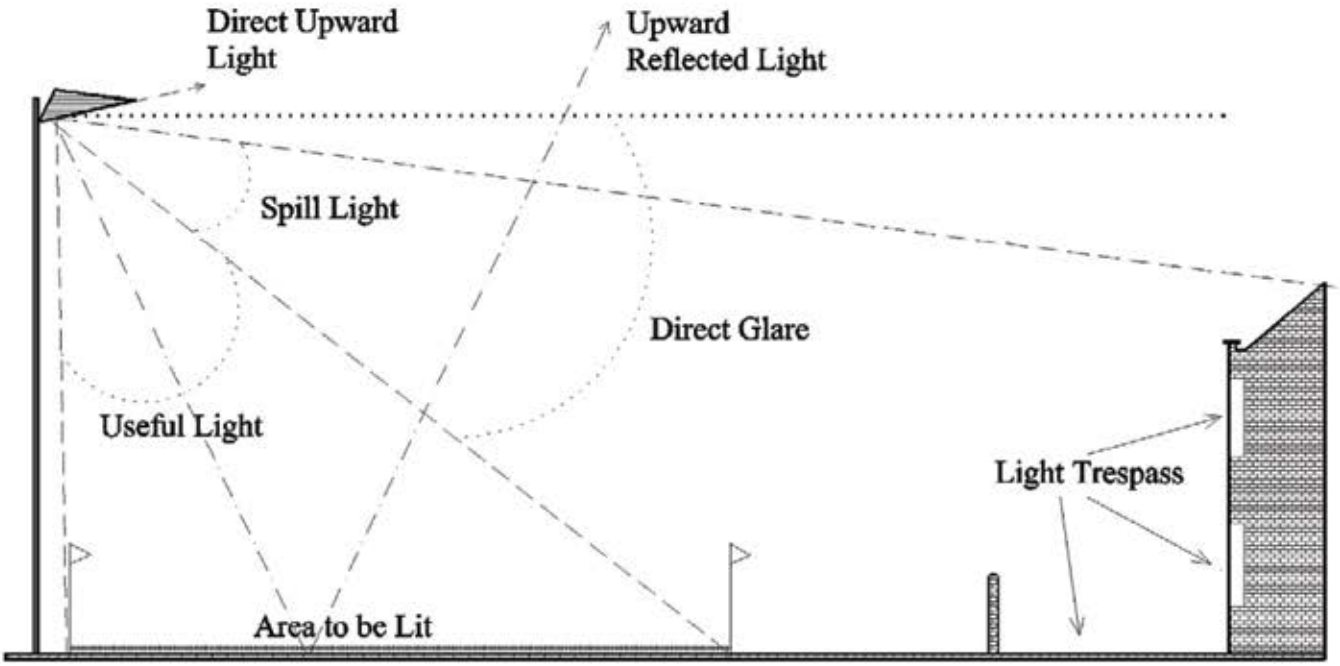
GUIDANCE NOTES FOR THE REDUCTION OF LIGHT POLLUTION

ALL LIVING THINGS adjust their behaviour according to natural light. Man's invention of artificial light has done much to safeguard and enhance our night-time environment but, if not properly controlled, **obtrusive light** (commonly referred to as light pollution) can present serious physiological and ecological problems.



Light pollution, whether it keeps you awake through a bedroom window or impedes your view of the night sky, is a form of pollution and could be substantially reduced without detriment to the lighting task.

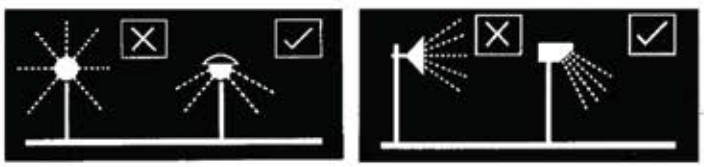
Sky glow, the brightening of the night sky above our towns and cities, **Glare**, the uncomfortable brightness of a light source when viewed against a dark background, and **Light Trespass**, the spilling of light beyond the boundary of the property on which the light source is located, are all forms of obtrusive light. This is not only a nuisance, it wastes electricity and thereby large sums of money, but more importantly it helps destroys the Earth's finite energy resources, resulting in the unnecessary emissions of greenhouse gases.

Listed below are some easy ways to reduce the problems of unnecessary, obtrusive light:

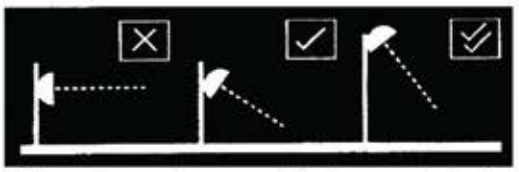
[Al] Do not "over" light. This is a major cause of light pollution and is a waste of money. There are published Standards for most lighting tasks. Organisations from which full details of these standards can be obtained are given on the last page of this leaflet.

[A2] Switch off lights when not required for safety, security or enhancement of the night-time scene. In this respect one can introduce the concept of a curfew, i.e. a period in which more restrictive controls are applied to obtrusive light. In all new developments there is scope for Local Planning Authorities (LPA's) to impose conditions relating to curfew hours in determining planning applications. For instance, the LPA may determine that non- essential lighting, such as decorative floodlighting, should be switched off between 23.00hours and dawn. In the case of new non-residential developments, LPA's are encouraged to impose such curfews. In determining applications for illuminated advertisements, it is recommended that LPA's impose similar curfew hours. The attachment of domestic security and decorative lighting to residential buildings often does not require planning permission. However, as the floodlights are operational throughout the night it is considered that the after curfew levels of lighting control shown in Table 1 should be used at all times.

[A3] Use specifically designed lighting equipment that minimises the upward spread of light near to, or above the horizontal. Care should be taken when selecting luminaires to ensure that the units chosen will reduce spill light and glare to a minimum. The use of luminaires with double-asymmetric beams designed so that the front glazing is kept at or near parallel to the surface being lit will assist in the reduction of glare provided the units are correctly aimed. Similarly, modern well-controlled projector type luminaires, which can be aimed very precisely, can give an excellent cut-off beyond the lit area so reducing spill light and glare.



[A4] Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is kept below 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare. In areas with low ambient lighting levels, glare can be very obtrusive and extra care should be taken when positioning and aiming lighting equipment. When lighting vertical structures such as advertising signs direct light downwards, wherever possible, to illuminate them not upwards. If there is no alternative to up lighting, then the use of shields, baffles and louvres will help reduce spill light around and over the structure to a minimum.



[A5] For road lighting installations, light near to and above the horizontal should be minimised to reduce glare and visual intrusion (Note ULRs in Table 1). The use of full horizontal cut off luminaires installed at 0° uplift will minimise visual intrusion within the landscape as well as upward light. However in many urban locations luminaires fitted with a shallow bowl providing good control of light near to and above the horizontal can a provide a satisfactory solution whilst maximising the spacing of the luminaires.

ENVIRONMENTAL ZONES:

It is recommended that in their Development Plans, Local Planning Authorities specify the following environmental zones for exterior lighting control.

Category	Examples
E1: Intrinsically dark areas	National Parks, Areas of Outstanding Natural Beauty, etc
E2: Low district brightness areas	Rural or small village locations
E3: Medium district brightness areas	Small town centres or urban locations
E4: High district brightness areas	Town/city centres with high levels of night-time activity

Where an area to be lit lies on the boundary of two zones or can be observed from another zone, the obtrusive light limitation values used should be those applicable to the most rigorous zone.

TABLE 1 – OBTRUSIVE LIGHT LIMITATIONS FOR EXTERIOR LIGHTING INSTALLATIONS

Environmental Zone	Sky Glow ULR [Max %]	Light into Windows E_v [Lux] (1)		Source Intensity I [kcd] (2)		Building Luminance Before curfew (3)	
		Before curfew	After curfew	Before curfew	After curfew	Average, L [cd/m^2]	Maximum L [cd/m^2]
E1	0	2	1*	0	0	0	0
E2	2.5	5	1	20	0.5	5	10
E3	5.0	10	2	30	1.0	10	60
E4	15.0	25	5	30	2.5	25	150

Where: **ULR = Upward Light Ratio of the Installation** and is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky. (formerly UWLR)

E_v = Vertical Illuminance in Lux normal to glazing

I = Light Intensity in Candelas

L = Luminance in Candelas per Square Metre

Notes:

(1) **Light Into Windows** – These values are suggested maximums and need to take account of existing light trespass at the point of measurement.

* Acceptable from public road lighting installations **ONLY.**

(2) **Source Intensity –** This applies to each source in the potentially obtrusive direction, *outside* of the area being lit. The figures given are for general guidance only and for some large sports lighting applications with limited mounting heights, may be difficult to achieve. If the aforementioned recommendations are followed then it should be possible to further lower these figures.

(3) **Building Luminance** – This should be limited to avoid over lighting, and relate to the general district brightness. In this reference building luminance is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent floodlights or floodlights fixed to the building but used to light an adjacent area.

These limitations may be supplemented by a Local Planning Authorities own planning guidance for exterior lighting installations and you are therefore recommended to check with the Local Planning Authority before designing or installing any exterior lighting.

RELEVANT PUBLICATIONS AND STANDARDS:

British Standards:	BS 5489	Road Lighting.
Countryside Commission/DOE		Lighting in the Countryside: Towards good practice (1997) *(Out of Print)*
CIBSE Lighting Guides:	LC1	Code for interior lighting (1994)
	LG1	The Industrial Environment (1989)
	LG4	Sports (1990)
	LG6	The Exterior Environment (1992)
CIE Publications:	01	Guide lines for minimizing Urban Sky Glow near Astronomical Observatories (1980)
	83	Guide for the lighting of sports events for colour television and film systems (1989)
	92	Guide for floodlighting (1992)
	115	Recommendations for the lighting of roads for motor and pedestrian traffic (1995)
	126	Guidelines for minimizing Skyglow (1997)
	129	Guide for lighting exterior work areas (1998)
	136	Guide to the lighting of urban areas (2000)
Department of Transport		Road Lighting and the Environment (1993) *(Out of Print)*
ILE Technical Reports:	TR 5	Brightness of Illuminated Advertisements (1991)
	CP 2	Lasers, Festival and Entertainment Lighting Code (1995)
	TR24	A Practical Guide to the Development of a Public Lighting Policy for Local Authorities (1999)
		Domestic Security Lighting, Friend or Foe
ILE/CIBSE		Lighting the Environment - A guide to good urban lighting

USEFUL ADDRESSES:

British Astronomical Association (BAA)
Burlington House
Piccadilly
London, WIV 9AG
Tel: 020 7734 4145

British Standards Institution (BSI)
389 Chiswick High Road
London, W4 4AL
Tel: 020 8996 9001
Fax: 020 8996 7001

Commission for Architecture and the Built Environment (CABE)
The Tower Block, 16th Floor
11 York Road,
London, SE1 7NX
Tel: 020 7960 2400

Council for the Protection of Rural England (CPRE)
Warwick House
25 Buckingham Palace Road
London, SW1W OPP
Tel: 020 7976 6433
Fax: 020 7976 6373

English Heritage
23 Savile Row
London, W1X 1AB
Tel: 020 7973 3000

International Commission on Illumination (CIE)
Central Bureau
Kegelgasse 27
A-1030 Wien, AUSTRIA
Tel: (00l) 431 714 3187
Fax: (001) 431 713 0838

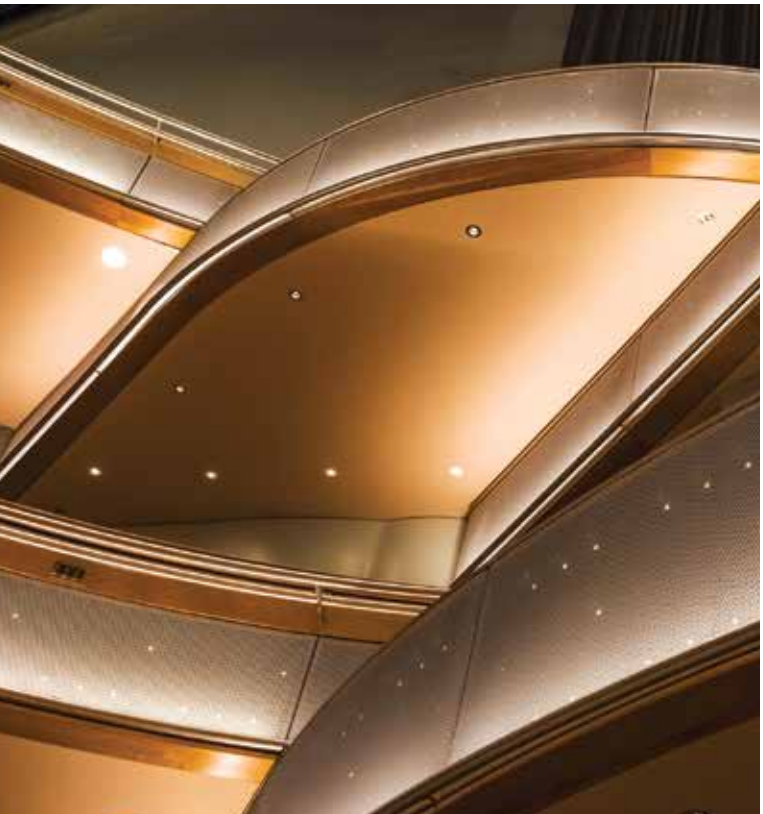
Lighting Industry Federation (LIF)
207 Balham High Road,
London, SW17 7BQ
Tel: 020 8675 5432
Fax: 020 8673 5880

Royal Town Planning Institute (RTPI)
41 Botolph Lane,
London,EC3R 8DL
Tel: 020 7636 9107

Society of Light and Lighting
222 Balham High Road,
London, SWI2 9BS
Tel: 020 8675 5211,
Fax: 020 8675 5449

Sports England
16 Upper Woburn Place
London, WC1H 0QP
Tel: 020 7273 1500

The Countryside Agency
Dacre House, 19 Dacre Street
London, SW1H 0DH
Tel: 020 7340 2900
Fax: 020 7340 2911



HANCHER AUDITORIUM, IOWA CITY, USA

The owner of the Hancher Auditorium included a challenge in their brief to replace a beloved institution destroyed by flooding: “Give us something we’ve never seen before.” Cline Bettridge Bernstein’s design highlights the pastoral setting reflected in the architecture while creating a breathtaking experience for patrons.

A custom light fixture with a dropped lens lights the wood ceiling and describes the form of the building inside and out, dissolving barriers between interior and exterior. It achieves three purposes: its form and layout recalls a modern marquee, announcing the building’s purpose as a theater; it creates rivulets of light relating to the river below; and it gives the building presence by allowing it to glow from within, circumventing ordinances prohibiting façade lighting. The apparent ease of the downlight pattern in the wood ceiling belies the considerable challenge of making the geometries work from every angle.

The lighting in the soaring atrium accentuates the space’s height and gives it scale. The core wall is outlined with grazers in shielded, solite-lensed slots. This detail, repeated twice more, breaks up the massive surface. The elevator core is lit top-to-bottom with the same detail. The glowing design of the coatcheck and concession desks also masks considerable detailing.

Each is evenly illuminated by one high-output linear fixture, easily accessible through the toekick. At the atrium ceiling, cove lighting and custom bracket-mounted fixtures illuminate curving skylights, preserving them as sources of light at night.

Within the theater itself, monumental custom fixtures create an awe-inspiring ceiling, while ingenious front-of-balcony lights make the house sparkle and glow. Giant custom rings of light, varying from 8' to 55' in diameter, create the ceiling plane against a dark blue painted slab. Partial arcs of these fixtures adjacent to the perimeter walls create the illusion that the lighting extends beyond the theater – again, dissolving boundaries and barriers between spaces and creating a dynamic, engaging experience. The rings feature glowing lenses and decorative illuminated points that can be programmed to sparkle and chase.
One judge called it "A beautiful, elegant solution for a theater design, seamlessly blending with the architecture."

At balcony fronts, grids of LEDs arrayed along vertical surfaces are programmed to sparkle behind perforated metal screens. These, in turn, are frontlit by custom curving LED rails. This combination of lighting effects gives the balcony fronts depth and movement.

"Wonderful compositions, layers of light, commitment to concept, and energy savings," one judge wrote. "This is a space that celebrates anticipation. Nice twist on an old recessed downlight idea."

The lighting celebrates the rebirth of this cultural hub, and indeed creates a facility unlike any the community has ever experienced.

Credits:
LIGHTING DESIGN
Francesca Bettridge, IALD
Michael Hennes
Nira Wattanachote
Glenn Fujimura
Cline Bettridge Bernstein Lighting Design
PHOTOGRAPHY
© Jeff Goldberg/Esto
© Bill Adams

NARITA INTERNATIONAL AIRPORT SECOND PASSENGER TERMINAL BUILDING, Narita, Japan

In preparation for the 2020 Olympic Games, an international airport has been redesigned to accommodate more visitors. Now, as guests travel from the arrival concourse to the second terminal's main building, a window off ers an uninterrupted view of the destination. Indirect fixtures close to the floor, integrated into a curved spandrel wall that functions as a reflector, illuminate the concourse ceiling, which guides passengers without detracting from the view. In the lounge, skylights containing Japanese paper-like panels and full-color LED fixtures do not block natural light during the day, but illuminate curtain panels uniformly at night,

changing colors slowly depending on season and time. White LED fixtures supplement natural light and dimming controls enhance energy savings. The satellite-side departure concourse leaves a final impression as well: fixtures embedded in the ceiling illuminate a relief wall evoking traditional soil walls, while custom directional fixtures, arranged along the sides of the concourse, emphasize the wall's shadows.

DESIGNERS

YOICHI TAKAOKA - NARITA INTERNATIONAL AIRPORT CORPORATION; SHINJI KANEUCHI, HIROAKI MIWA - NIKKEN SEKKEI LTD.; KOUHEI HASHIGUCHI, SAKI MIYAI, KEN KATAYAMA - NIKKEN SPACE DESIGN LTD.; KAZOU KOBAYASHI, TAISUKE UEDA - PANASONIC CORPORATION; TAKASHI MAEDA - AZUSA SEKKEI

PHOTOGRAPHY

BLUE BARN, Omaha, NE

The mission statement for the Blue Barn Theatre proclaims that it "exists to enhance the cultural life of Omaha, NE, by producing professionally executed, boundary-breaking Dr. plays that ignite a passion for the art form." The lighting design concept carried forth this message of igniting passion. Warm CCT lighting illuminates the weathered, corten steel façade, giving the warm-hued material a tone resembling candlelight. All lighting is controlled through a dimming system with timeclock allowing light levels to be fine tuned and automated. Internally adjustable recessed luminaires were used underneath the multi-faceted, uneven front canopy allowing light to be directed where needed regardless of the canopy's angle.

For a back porch, where free outdoor performances are held, blue uplighting creates a beacon that expresses the spirit of the Blue Barn to the neighborhood. The cool hue of the blue lighting is in sharp contrast to the warm lighting used for the rest of the building. All sources were LED due to quality of light color, reduced energy use and low maintenance. Luminaires with precise optics were selected and carefully aimed to minimize spill light and preserve the night sky.

DESIGNERS
ANDREW LANG,
STEVE GOLLEHON - MORRISSEY ENGINEERING;
JEFFREY DAY - MIN I DAY
PHOTOGRAPHY
© TOM KESSLER

Seminar On “IOT AND BEYOND : FUTURE TRENDS OF THE INDUSTRY”

Mr. Kamal Sethia
Chairman / Kolkata State Centre
ISLE

The above seminar was jointly organised by the Electrical Engineering department of Jadavpur University, Kolkata and Isle, Calcutta State Centre on 29th August 2017 at Seminar Hall of Electrical Engineering department.

The seminar was attended by students and faculty members of Jadavpur University, Asansol Engineering College, Isle members. The attendants were more than 60.

Prof. Saswati Mazumdar, Jadavpur University, in her welcome address elucidated the need of such highly educative programmes which will benefit the students engaged in their research work.

Mr. Kamal Sethia, Chairman, Isle, Calcutta State Centre welcomed the august gathering and explicated the roll of Isle in the field of illumination and electrical engineering and also expounded the recent and forthcoming events of Isle. He requested the students to become members of Isle and take active part in the various activities. He also mentioned about next Lii 2018 to be held in Mumbai from 19 to 21 January, 2018 and Lux Pacifica 2018 to be held in Japan in April 2017 and requested them to present papers.

In his deliberation, Mr. George Lin, Director, Taipei world trade centre, Taiwan, posted in Kolkata, briefly narrated the various trade related activities of Taiwan and new business opportunities in India.

Mr. Tapan Chatterjee, Dy. Director, Indian Chambers of Commerce, Kolkata, in his brief address pronounced the present activities of the chambers including the present Indian Railway project for up-gradation of existing lighting system to LED.

Prof. Suddhasatwa Chakraborty of Jadavpur University presented an excellent lecture on Scope of IoT and advanced computing techniques in the field of Illumination Engineering. The presentation comprised of research work on the human centric lights, effects of various luminaries at different intensity on human, Development of modern sensors associated with such research work, etc. The presentation was an eye opener and highly enlightening for the lighting professionals.

Mr. Sounak Dey, Scientist, Research and Innovation, Tata Consultancy Services, Kolkata, presented a power point presentation on “IoT and beyond: future trends of the industry”. The presentation was basically on the modern trends in IT sectors in the field of data management and its application in the field of communication system, social networking, medical sciences, automation engineering, evaluation and development of modern robots with introduction of human sense.

The seminar was concluded with a vote of thanks by Mr. Tapan Kumar Ghosal, Hon. Secretary, Isle, Calcutta State Centre.

HARBIN OPERA HOUSE, HARBIN, CHINA

Harbin, China, known as “the ice city,” now houses an expansive, impressive opera house. Responding to the surrounding frozen landscape, the design team worked with the motto of “lighting the rhythm of the frozen music.”

Set amongst the northern city’s untamed wilderness and frigid climate, the building boasts a crystal-like purity and transparency, blending in with nature and the topography. The challenge of the lighting design was in finding ways to reveal the purity and clarity of the space while enriching the visitor’s experience of both the space and the music within.

The team devised three ways of lighting the main atrium in one piece of roof, developing a hierarchy. At the lobby entrance, a “welcome mat” of light; in the middle, a super indirect light; and on the wooden shell at the end of the lobby, a vertical glow. All light fittings are completely hidden in the architecture, creating a pleasant rhythm of light unobstructed by technical details, and unplagued by hot spots or sharp corners. The wooden shell is a focal point of the lobby; washed lighting from above gives the whole lobby a warm inviting atmosphere. On the canopy outside, spotlights were placed in slots, directing light on the ground to avoid reflection and allow people inside to see out.

To create a twinkling effect on the pyramidal glass roof, the designer selected a quarter of each faceted unit, attaching it with dotted film.

Sunlight adds a twinkle to each pyramidic unit, creating different glass reflections throughout the day. At night, the filmed glass is grazed from below by LED light bars, seeming to glow from within and attracting visitor attention from far away. In the big theater, the architect called for a glowing “diamond” for the owner’s VIP area above the mezzanine. Custom RGB LED fixtures are hidden behind the acrylic diamond panel and transition from starry white to warm amber, changing according to the event or the seasons.

The starry, twinkling diamond approach is repeated in the corridor connecting the basement parking plaza and the main lobby: fiber optic lighting minimizes visual impact but creates a dreamy, starry grand entrance at the steps.

“This team generated incredible lighting solutions to accompany an incredible piece of sculptural architecture,” one judge wrote of the project. “Just WOW,” wrote another.

Within the smaller theater, guests are reminded of the exterior of the building by the panoramic window behind the stage. This seamless connection to the outdoors mimics the gleaming ripple effect of the lake outside. The gleaming ripples of light on the walls are created by narrow-beam in-ground fixtures, carefully placed at the aisles along the walls. The irregular wall texture works with the light to create drama, rhythm, and pleasing shadows.

To achieve purity in the space, it was important to designers that guests see the light and not the fixtures. The concept designer worked with a software expert and an industrial designer. Together, this team calculated the illumination of each space, while making expert recommendations on where fixtures might be hidden. Through their efforts, visitors can explore the beauty of the space without awareness of any lighting fixtures.

“This is a breathtaking lighting integration and a stunning technical achievement,” another judge wrote. “The lighting design could not support the architecture any better. The audacity of the design amazes.”

A Concept rendering ---------- “Lighting the rhythm of the frozen music”

Credits:

LIGHTING DESIGN

Dongning Wang, IALD, Yansong Ma, Qun Dang,
Hayano Yosuke, Huiying Liu Wei Guo,Ge Zhu, Qiang Chen,
Yang Chen, Xiao Xia, Cheng Zhang,
Junjie Wang Beijing United Artists Lighting Design Corp Ltd

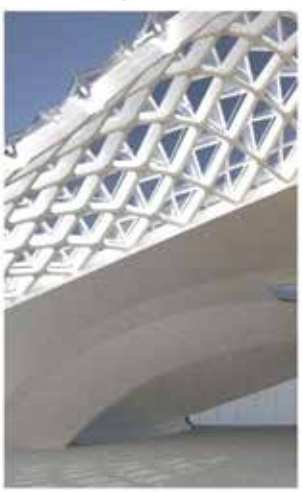
PHOTOGRAPHY

© Hufton+Crow
© Adam Mørk

Three ways of lighting the main atrium in one piece of roof: entrance (‘Welcome light mat’), the middle (‘Super indirect light’) and wooden shell (‘Vertical glow’), enhances rhythmic ambient atmosphere.

1 Welcoming light mat

2 Super indirect light



3 Vertical glow

Rendering credit : MAD

Evaluating the Lifetime Behavior of LED Systems

The path to a sustainable luminaire business model

One of the strongest propositions of power Light Emitting Diodes (LEDs) is their long lumen maintenance—their ability to continue producing light output for many years of use, in contrast to most conventional light sources, which force users to go through repeated and frequent failure-and-replacement cycles. The market perception of an LED's reliability is reinforced by the widespread practice among lighting manufacturers of offering long warranties on their LED luminaires.

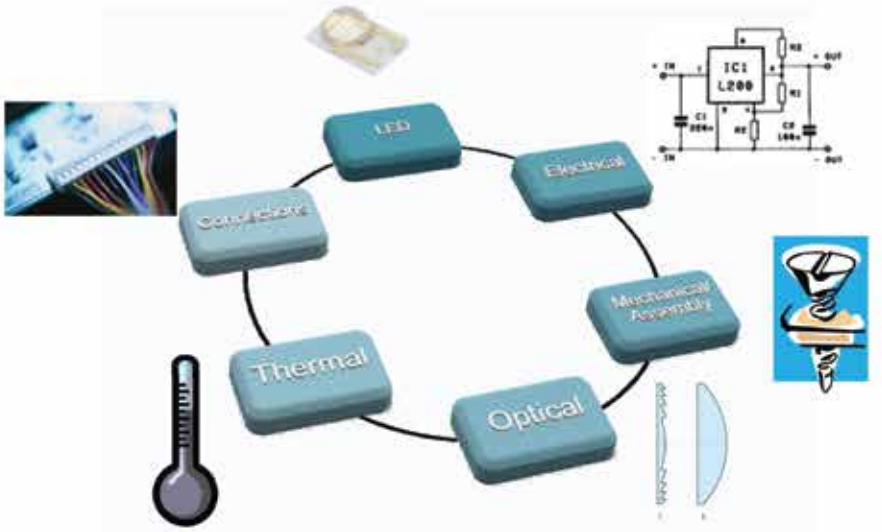
Product testing regimes specified by industry standards make it possible for LED manufacturers to analyze lumen maintenance of a single LED, with great confidence, under virtually any operating condition. The most notable of these is IES LM-80 (LM-80), which is an "approved method for measuring lumen depreciation of solid-state (LED) light sources, arrays and modules," according to the U.S. Department of Energy (U.S. DOE). The U.S. DOE goes on to state that LM-80 "Does not cover measurement of luminaires" and that it "Does not provide methods for estimation of life." However, luminaire manufacturers have not had access to any additional information about LED behavior that would allow them to better understand and predict the "lifetime" behavior of the LEDs in their solutions. As a result, for some, lumen maintenance data has become a proxy for luminaire lifetime, which was clearly not the intent of LM-80 and is not an accurate assessment of luminaire lifetime.

Using lumen maintenance data that describes how a single LED behaves can create unplanned business risks and potentially affect end-customer experiences with LED solutions. What is now known and understood is that an array of LEDs behaves differently than a single LED. Additionally, it is possible to account for the extremely slim chance that a quality power LED will fail completely. Luminaire manufacturers are also learning how to better account for the lifetime behavior of the many other components that are used including drivers, optics, mechanical fixings and housings. Each of these is also a factor in determining the lifetime of a luminaire (see Figure 1).

Fortunately, responsible LED luminaire manufacturers are beginning to incorporate more detailed analysis and utilize the methods and tools that are covered in this paper so that they can more accurately project and report lifetime behavior.

For Consideration

To specify an LED array for 50,000 hours of operation while another system component is rated for just 25,000 hours raises engineering and manufacturing costs and does not maximize commercial opportunity.



$$R_{SYSTEM} = R_{ELECTRICAL} * R_{CONNECTIONS} * R_{LEDS} * R_{OPTICAL} * R_{THERMAL} * R_{MECHANICAL}$$

Figure 1. LED system reliability.

Failure to truly understand the factors that determine reliability and use them to set an appropriate warranty period can result in either a higher than expected rate of claim against the warranty, or cause a product to be over-specified, potentially increasing the manufacturer's bill of materials unnecessarily.

The wider risk to the lighting industry is that, if reliability data are not properly understood and used, end user satisfaction with LED luminaires could be affected as their performance over time fails to meet the marketing claims. This in turn could affect demand for this highly efficient lighting technology, and slow the adoption of a class of products that will deliver enormous environmental benefit through reduced power consumption.

As an LED manufacturer, Lumileds cannot address the reliability of all the components in an LED system—no LED manufacturer can. LUXEON power LED reliability is, however, well understood and with this information, Lumileds has introduced a new concept for expressing the performance over time of power LEDs. Data sets, backed by product tests of long duration and already in the public domain, provide forecasts of lumen maintenance behavior, and separately of the catastrophic failure rates of our LEDs.

Lumileds is the first to combine this information about lumen maintenance and catastrophic failure rates in a robust predictive model that shows the probability of any given string of LEDs falling below any given threshold for light output. With this information, luminaire manufacturers can design for reliability and align market promises with solution performance.

Designing for reliability also helps luminaire manufacturers to offer warranties that are backed by valid forecasts of operating lifetime—provided these forecasts also take account of the probability of failure of the other components in the luminaire, and not just the LEDs.

To successfully proceed, there are important concepts that must be understood by users if they are to use LED manufacturers' reliability data as the basis for their luminaire warranties.

Luminaire manufacturers should also understand the methods and practices adopted by their LED supplier for testing and modeling the performance over time of their products. LED manufacturers should be able to show how robust are the raw data on which their predictive models are based—and industry-standard specifications represent the minimum with which testing regimes should comply.

They should also be clear about the predictive models they use to extrapolate lumen maintenance performance at any combination of drive current and temperature from their test cells.

Finally, they should show how the lumen maintenance and catastrophic failure predictive models for a single LED can be applied to arrays of LEDs, so that manufacturers can know the probability of lumen maintenance failure of any given array.

The 'failure' modes of power LEDs, and their impacts on luminaire reliability

The concept of 'lumen maintenance' is well understood in the LED lighting industry: the light output from power LEDs is highest when new, and declines gradually over time. A common specification for power LEDs is for 70% lumen maintenance (that is, output at 70% of its peak) after 50,000 hours of operation.

All reputable power LED manufacturers conduct long-term performance testing of each variant of their products, and publish lumen maintenance data separately for each of these variants. A study of different lumen maintenance data sets from different manufacturers will reveal differences in their products' performance. This is not surprising as there are stark differences between LEDs in terms of:

- the precise chemical make-up of the semiconductor and optical system [encapsulant and primary lens]
- structure of the LED die
- the chemical makeup and implementation of phosphor conversion
- the mechanical structure of the device
- the materials used and device's thermal performance
- the materials used and consistency and quality of the LED manufacturing process

In combination, these factors result in significant differences in LED performance both when new and over time. Power LEDs are not generic devices and will vary in all performance aspects from manufacturer to manufacturer. Indeed, lumen maintenance is a competitive battleground for LED manufacturers, as customers demand LEDs that sustain lumen output over longer periods, and under more stressful conditions (that is, higher temperature and higher drive current).

An LED can be said to have 'failed' when its light output falls below a threshold expressed as a percentage of peak output. In this lumen maintenance 'failure' mode, of course, an LED is still producing light, but not at the specified level.

But lumen maintenance is not the only failure mode of power LEDs: they can also fail catastrophically, just like a conventional light bulb, and just like every other electronic or semiconductor product. In the case of a product such as the LUXEON Rebel from Lumileds, the rate of this so-called 'catastrophic failure' is extremely low, so low that the myth that LEDs never fail is still widely believed. Nonetheless, should a catastrophic failure occur, it could be of material significance depending on system design and the nature of the application.

In fact, there are a number of reasons why luminaire manufacturers should take account of catastrophic LED failure rates when designing a fixture. Perhaps the most obvious is that a catastrophic LED failure might leave a dark spot in an array. This could lead the user to the conclusion that the fixture is malfunctioning, even if a photometric examination showed that light output is still at or above its specified level.

Second, the concept of lumen maintenance has already been rehearsed above; any catastrophic failure, which eliminates the light output of an LED, will add to the decline over time in a lighting system's output.

Third, and less obviously, a catastrophic failure in an individual LED can cause instant failure in a complete luminaire or section of a luminaire. In part, this depends on whether an LED fails electrically 'open' or fails electrically 'short'. If it fails open, the power supply is cut off from every LED in the failed LED's string (in other words, to every other LED connected in series with the failed device), and the whole string goes dark. When an LED fails 'short', on the other hand, current continues to flow through the string allowing the luminaire to continue functioning.

LEDs like InGaN LUXEON Rebel LEDs can only fail short as there are no bond wires. When a device fails short, metal ions can still pass directly from anode to cathode, maintaining the integrity of the LED string's electrical circuit. It should be noted at this point that the catastrophic failure rate of LUXEON Rebel LEDs is extremely low.

A common "open" failure is due to a broken wire bond. Wire bonds are a feature commonly found in other power LEDs which therefore have two possible failure modes, "open" and "short."

Luminaire designers should also be aware of the risks inherent in connecting LEDs in parallel with each other, or in parallel strings, rather than in series. In a parallel topology, an electrical short of a single LED will cause the forward current to increase

through some or all of the good LEDs. This increased forward current places additional electrical and thermal stress on the remaining LEDs. This in turn will cause them to fail faster than would have been predicted under normal operating conditions.

Additional failures cause the forward current to increase further and further, producing a cascade effect that leads to an accelerating series of failures.

For Consideration

Minimizing the number of failure modes that must be accounted for in the engineering process can save time, reduce costs and simplify the design for reliability process.

A luminaire should always be designed in accordance with good electrical practice for LED systems, that is:

- Use a current source to drive the LEDs
- Avoid the implementation of parallel connections between LEDs or between LED strings. All LEDs should be connected in series or in smaller strings of series connected LEDs, each with its own current source.

Provided these design for reliability practices are followed, the remaining LEDs in a string will continue to emit light as specified, even after one or more LEDs in the string have failed short.

Long-term LED performance testing: the foundation of reliability data

The long-term performance of LEDs, then, is affected by the rate of lumen maintenance and by the incidence of catastrophic failures; in combination, these two effects lead to a reduction in light output over time across a population of LEDs.

So the industry's critical need is for a trusted process that allows for more accurate predictions of system performance and for higher confidence in the engineering and business decisions associated with a luminaire.

But the user's confidence in such a model, and in the data that lie behind it, is a factor of the thoroughness of product testing carried out by the LED manufacturer. Therefore we start with a description of:

- how Lumileds reliability models are derived from its tests
- what the raw test results tell users about LED behavior
- how lighting system designers can use this knowledge

How reliability models are derived

Each luminaire designer needs to know the predicted long-term performance of their chosen LED under the specific conditions existing in their design. There is an infinite number of such conditions, so LED manufacturers cannot test for all possible conditions.

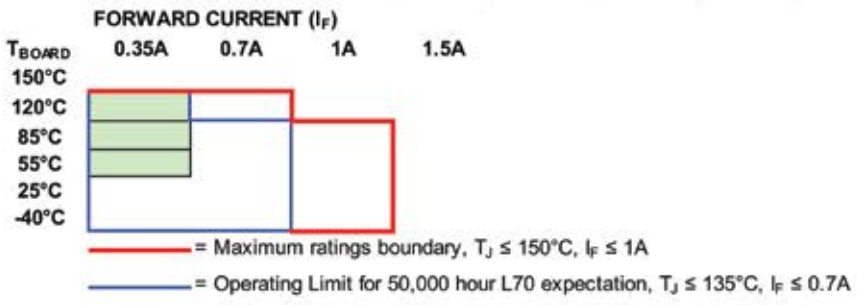


Figure 2. Cells needed for LM-80-08 specification.

All LED reliability models are therefore the result of extrapolation from a base set of data. The extrapolation occurs in two dimensions: operating conditions (drive current, and board/junction temperature); and time.

Lumileds datasheets show 'maximum' ratings for its LUXEON Rebel LEDs; users should not operate the LEDs beyond these limits. In Figure 2, the vertical scale refers to the temperature of the reliability stress board, which is approximately the same as the thermal pad temperature, T_S, and air temperature, T_A, surrounding the individual LEDs. Lumileds drives the individual LEDs on the reliability stress board with current sources. The horizontal scale refers to the forward current of the individual LEDs. Note that the heavy red line shows the boundary for the maximum ratings for the LUXEON Rebel ($T_J \leq 150C$, $I_F \leq 1A$). Lumileds also provides recommended' levels below these maximum ratings—up to this 'recommended' threshold; LUXEON Rebel LEDs offer typical lumen maintenance of at least 50,000 hours. Note that the lightweight blue line shows the boundary for recommended operation for the LUXEON Rebel ($T_J \leq 135C$, $I_F \leq 0.7A$).

Lumen maintenance model

To enable accurate extrapolation of lumen maintenance for any operating conditions, Lumileds tests at certain specific conditions. Three of these conditions are specified by the LM-80-08 standard for LED product testing, as defined by independent industry body IESNA (see Figure 2). Lumileds LM-80-08 reports (as of March 2010) are based on data from these three cells and from three additional cells, in order to make the extrapolation model even more robust (see Figure 3). Note that cell "Y" is a higher operating condition than the recommended operating conditions.

To support Lumileds lumen maintenance model's accuracy, further highly stressed cells can be added to the test set (see Figure 4). Note that cells "Y" are higher operating conditions than the recommended operating conditions. Note that cell "X" is a higher operating condition than the maximum ratings.

The lumen maintenance of an LED must also extrapolate into the future. Again, LM-80-08 specifies a minimum of 6,000 hours of testing. The ENERGY STAR® Manufacturer's Guide (September 2009) requires a minimum of 25 samples. Lumileds bases its lumen maintenance model on data from tests considerably longer in duration, and from a much larger sample size, than those specified by LM-80-08 and ENERGY STAR. In addition, Lumileds extrapolates lumen maintenance behavior using the same 'exponential extrapolation' model, as used by ENERGY STAR to predict the 6,000 hour limit points. By contrast, some LED suppliers use proprietary models that flatter the performance of their devices. The long-term lumen maintenance of a LUXEON Rebel can then be plotted on a graph. Figure 5 shows an example of a lumen maintenance graph produced in accordance with LM-80-08.

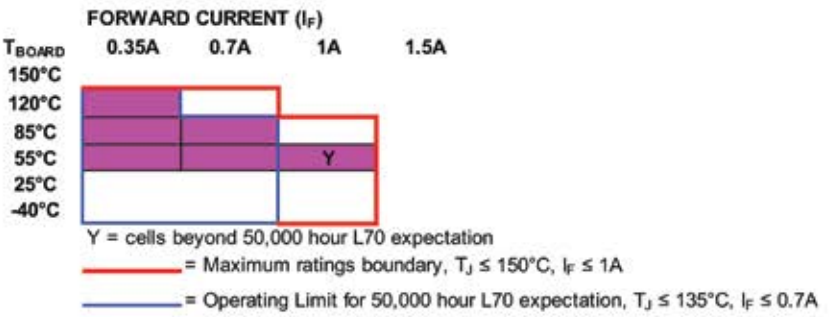


Figure 3. Cells used in Lumileds LM-80 Test Report.

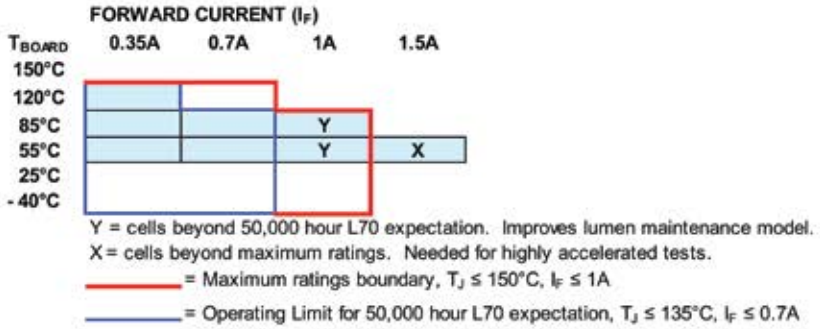


Figure 4. Cells used in Lumileds lumen maintenance model example.

EVENT CALENDAR

BusinessLine

cai CONSTRUCTION ARCHITECTURE INTERIOR-2017

HYDERABAD	GOA
10-12 November 2017, Hitex Exhibition Centre Technical Seminar 9th November	8-10 December 2017, Dr.Shayam Prasad Mukherjee Stadium

Concurrent show on Lighting & Technical Seminar at Chennai & Hyderabad

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China International Lighting & Intelligent Application Expo 2017

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Illuminating a world of business opportunities

27 - 30 October 2017
Hong Kong Convention and Exhibition Centre

LED Specifier Summit

14-15 November 2017
Navy Pier, Festival Hall A,
Chicago

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GERMANY

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Lumileds testing regime goes far beyond the requirements of industry standards in an effort to give users of LUXEON Rebel products the most robust and accurate forecasts of their lumen maintenance performance available in the industry.

As stated in the introduction, it is common-but inappropriate-practice for luminaire manufacturers to use LM-80-08 lumen maintenance ratings to define the operating lifetime of a complete luminaire.

But an extrapolation of the rating only produces the average (median) lumen maintenance of a single LED under stated operating conditions—in Figure 5, the red curve shows median performance for a LUXEON Rebel LED at 85°C, 0.35A. This median performance of a single LED ignores a spread of results from best to worst across a population of LEDs. A lumen maintenance rating based on the median result for a single LED overstates the lumen maintenance performance of 50% of LEDs, and understates the performance of the rest.

For Consideration

What we see in the data from thousands of hours of testing is the degree that temperature, current, and time affects lumen maintenance. We know for Cool White LUXEON Rebel that drive current has a strong relationship to lumen maintenance and ambient temperature has a very low correlation to lumen maintenance. These relationships vary from product family to product family and from manufacturer to manufacturer. Some manufacturers report a strong correlation between ambient temperature and lumen maintenance, which should be clearly seen in their data. Extensive reliability testing has shown that air temperature has minimal impact on the lumen maintenance of the InGaN LUXEON Rebel family.

The industry-standard LM-80-08 lumen maintenance reports in use today therefore do not provide all of the necessary information that luminaire manufacturers need in order to predict the lumen maintenance behavior of a population of LEDs.

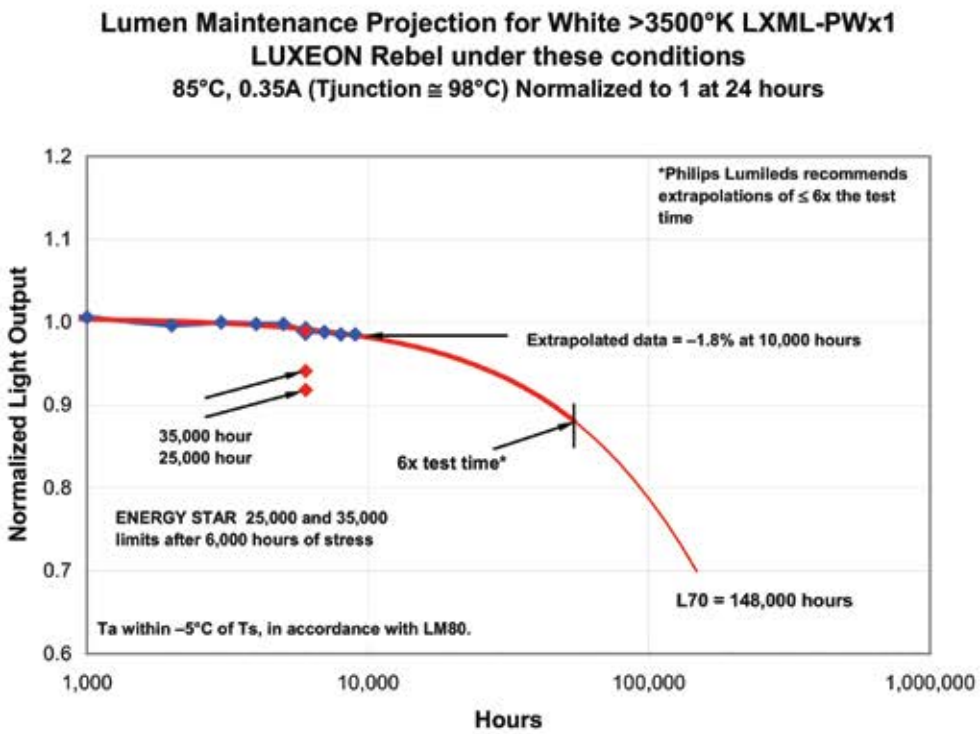

Figure 5. Long-term lumen maintenance data and L70 extrapolation.

While LM-80-08 does not require information about the spread in lumen maintenance behavior across a population of LEDs, Lumileds can derive this information from the tests described above. And this information can be expressed as a probability that a single LUXEON Rebel LED's lumen maintenance will cross a given threshold after a given operating time at a given set of operating conditions. An example of such a probability curve is shown in Figure 6.

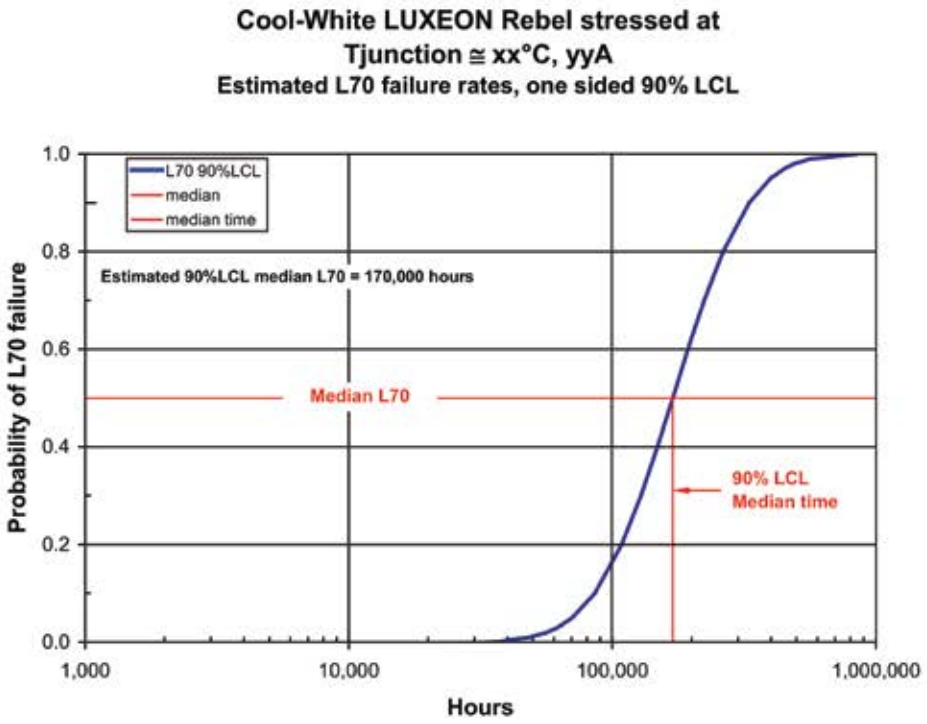

Figure 6. Lumen maintenance distribution from lumen maintenance model.

Now the luminaire manufacturer knows not just what the median lumen maintenance performance of a white LUXEON Rebel will be, but what the lumen maintenance of, for instance, the lowest 10% of white LUXEON Rebel LEDs will be.

Industry-standard reliability software then plots the trend lines between the actual results observed under the specific test conditions, enabling the prediction of lumen maintenance for any combination of drive current and temperature.

Catastrophic Failure Model

LED reliability, though, is not just a question of lumen maintenance. And while industry practice, as exemplified by the LM-80-08 standard, has focused on the production of lumen maintenance ratings for power LEDs, no such standard procedure exists for testing for catastrophic failure.

Lumileds has therefore created a testing procedure that can be employed by any LED manufacturer and which Lumileds is currently using for LUXEON Rebel LEDs. This uses the cells in the lumen maintenance-testing regime (see Figure 4 above), and adds more highly stressed conditions. (These conditions include exceeding the device's maximum 150°C temperature and maximum 1A current ratings.) The result is to force catastrophic failures at an accelerated rate in order to build a robust predictive catastrophic failure model (see Figure 7).

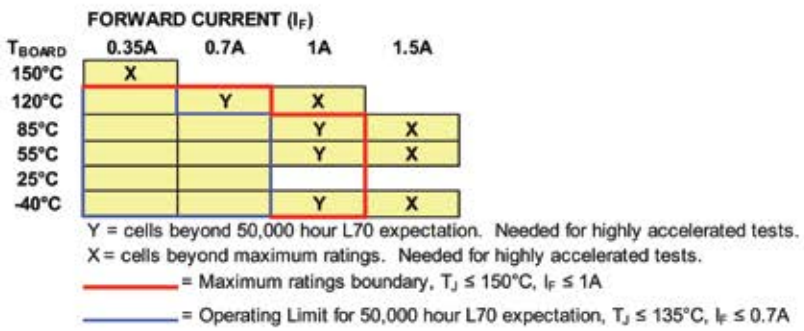

Figure 7. Cells used in Lumileds catastrophic failure model example.

This test set includes cells operating beyond the 'recommended' level and beyond the 'maximum' level. The data from these highly stressed conditions help to provide a greater degree of confidence in the extrapolations of the LEDs' performance at normal operating levels. Note that cells "Y" are higher operating conditions than the recommended operating conditions. Note that cells "X" are higher operating conditions than the maximum ratings.

As with the lumen maintenance model, the observed catastrophic failures in the test cells are fed into a standard reliability software package in order to develop a catastrophic failure rate model for a single LED with temperature and drive-current acceleration factors

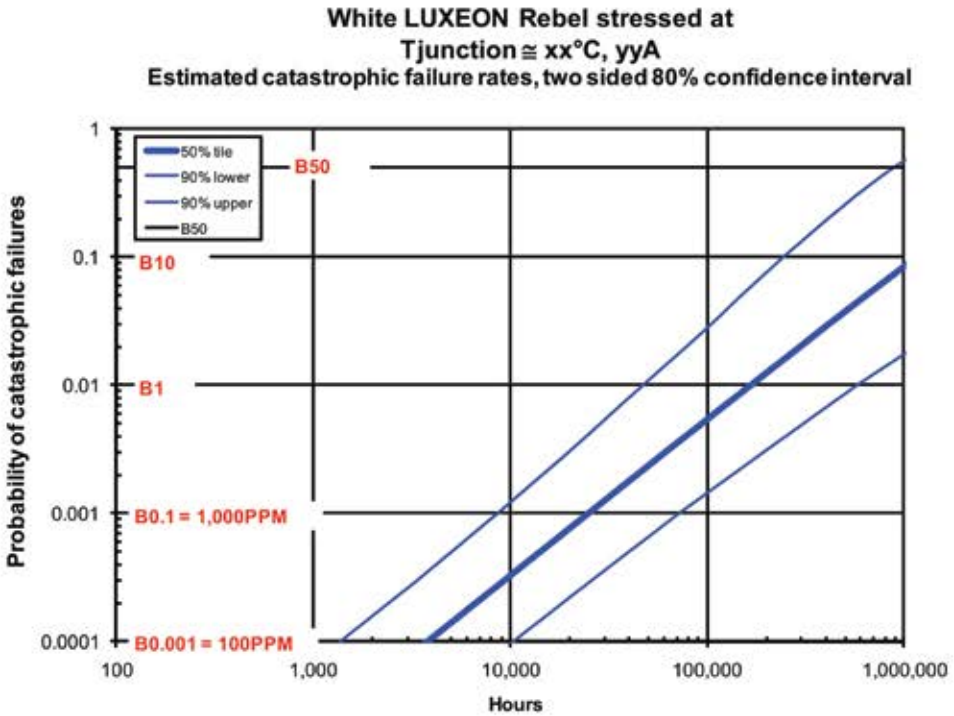

Figure 8. Catastrophic failure distribution from catastrophic failure model.

Now that we have a catastrophic failure model, we can estimate the probability that a single LED will fail at any given stress condition. This estimate can be expressed by means of a graph such as the one shown in Figure 8. Just as with lumen maintenance, the median figure (B50) for only catastrophic failure is not the most useful piece of information for luminaire manufacturers.

Note that there are three blue lines. The heavy blue line shows the estimated catastrophic failure rates based on the actual tests.

The catastrophic failure model also estimates the confidence interval. If this experiment was repeated, the failure rate model will vary slightly. Lumileds believes that if this experiment were done 10 times, then in 8 of 10 times, that the results would fall within the band shown in Figure 8. The line on the left represents the statistical estimate under which nine in every 10 times, the predicted time to failure would be better. This line is called the 90% Lower Confidence Level (or worst case). The line on the right represents the statistical estimate where one in 10 times, the predicted time to failure would be better. This line represents the 90% Upper Confidence Level (or best case).

Lumileds recommends the use of the more conservative 90% lower confidence line.

What the models tell manufacturers about LED behavior over time

Figure 9 shows examples of the lumen maintenance behavior of cool-white LUXEON Rebel LEDs, as predicted by the lumen maintenance model, when subject to different drive currents. Figure 10 shows examples of the lumen maintenance behavior of the LEDs when subject to different temperatures.

It is clear from this example for Cool-White LUXEON Rebel that additional temperature stress does very little to impair lumen maintenance. However, in this example for Cool-White LUXEON Rebel that increases in drive current cause much more marked declines in lumen output over time

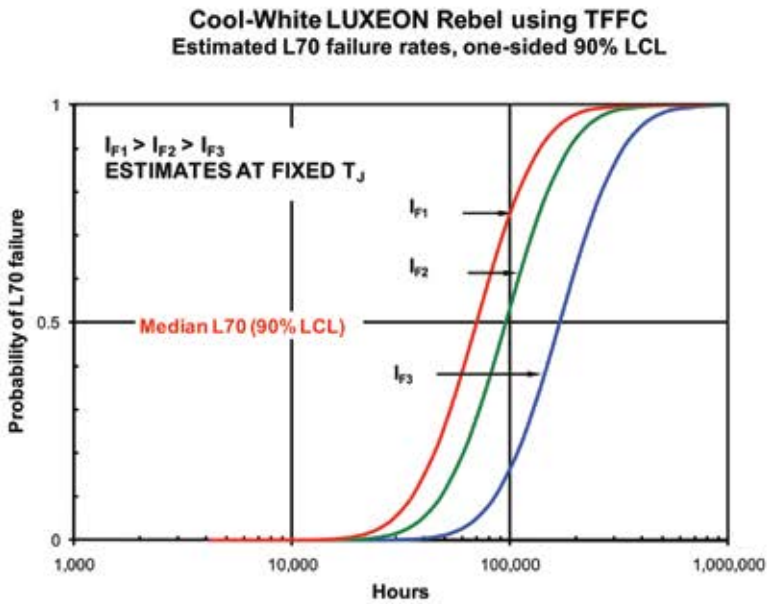

Figure 9. Impact of varying forward current in lumen maintenance model.

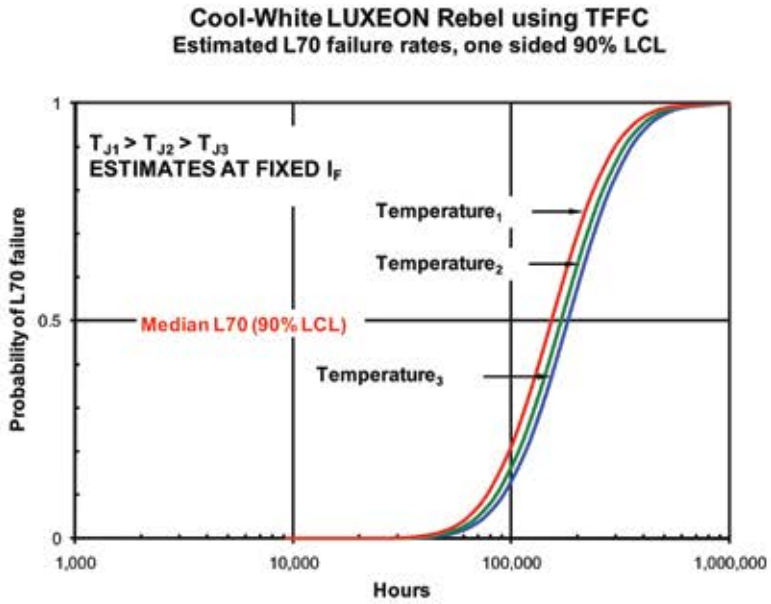

Figure 10. Impact of varying junction temperature in lumen maintenance model.

As shown by this example, drive current has a large impact on lumen maintenance and temperature has only a small impact on lumen maintenance. However, it is important to talk to your LED manufacturer, as it may be different for other product families and LEDs from other manufacturers. Extensive reliability testing has shown that air temperature has minimal impact on the lumen maintenance of the InGaN LUXEON Rebel family.

Figure 11 shows examples of the catastrophic failure behavior of cool-white LUXEON Rebel LEDs as predicted by the catastrophic failure model, when subject to three different forward currents. All three lines represent the worst-case 90% lower confidence limits. The curve moves to the left, showing a higher rate of catastrophic failure, at higher drive currents.

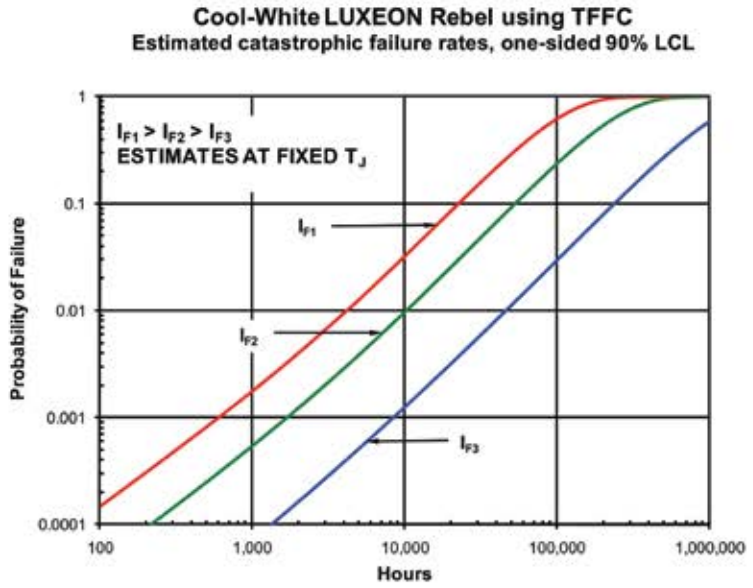

Figure 11. Impact of varying forward current in catastrophic failure model.

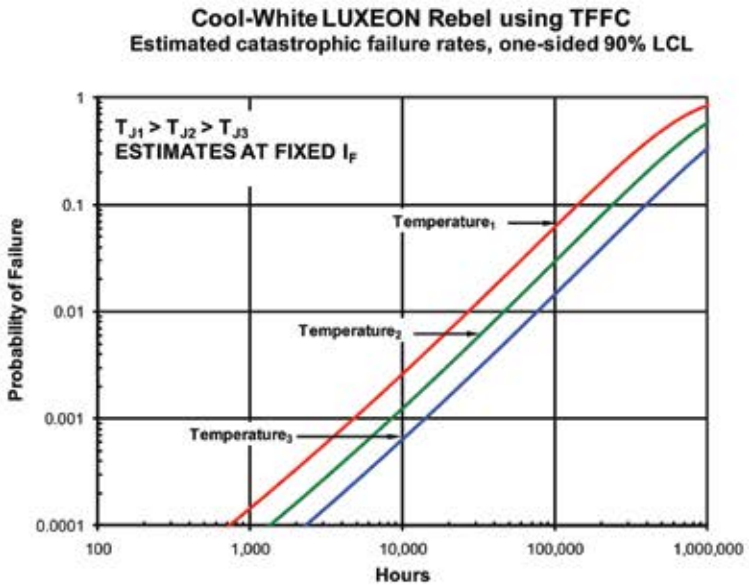

Figure 12. Impact of varying junction temperature in catastrophic failure model.

Figure 12 by contrast shows examples of catastrophic failure behavior of cool-white LUXEON Rebel under different temperature conditions. The curves move to the left, showing that temperature also affects the catastrophic failure rate.

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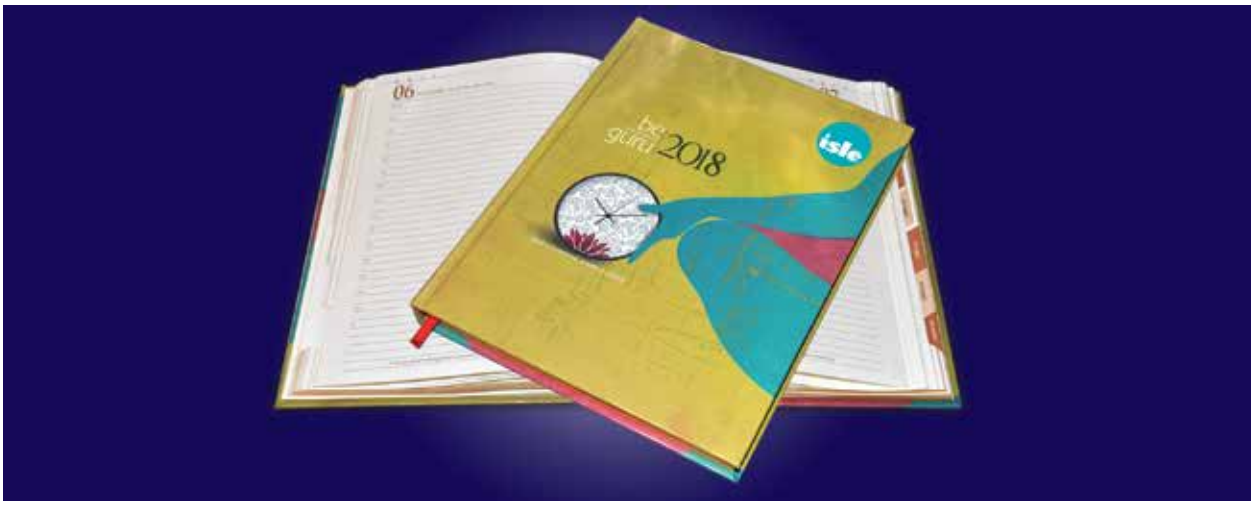

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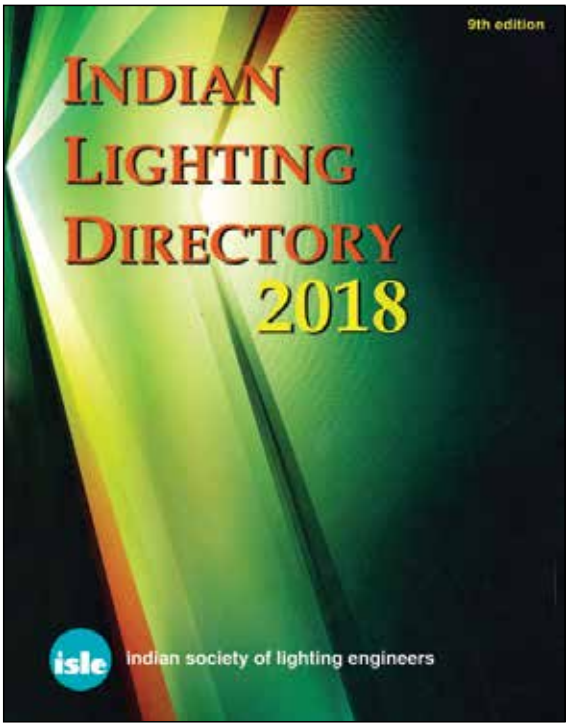

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In fact, reducing the junction temperature by 10°C extends the estimated time to failure by a factor of >1.2. Thus, good thermal management reduces catastrophic failure rates. Lowering the drive current also helps to reduce catastrophic failure rates.

This knowledge can be applied by luminaire manufacturers to tune their designs to their customers' requirements. Manufacturers can choose the drive current supplied to LEDs, and they can control junction temperature at the LED via thermal management.

Predicting the probability of failure of an LED array

So far, we have shown that lumen maintenance and catastrophic failures are two different kinds of LED behavior: they have different effects on a luminaire's visual appearance and on its performance; and the operating conditions in a luminaire affect the behaviors differently.

This means that luminaire designers need to be able to refer to discrete predictions for lumen maintenance and for catastrophic failure rates.

But as observed above, the rate of lumen maintenance and catastrophic failures combine to produce a decline in system light output over time. So as well as being expressed as discrete values, lumen maintenance and catastrophic failure rates also need to be expressed in combination.

It is possible to combine the two values to produce a probability of a single LED failing either through passing a lumen maintenance threshold, or through catastrophic failure. Such a probability curve is shown in Figure 13.

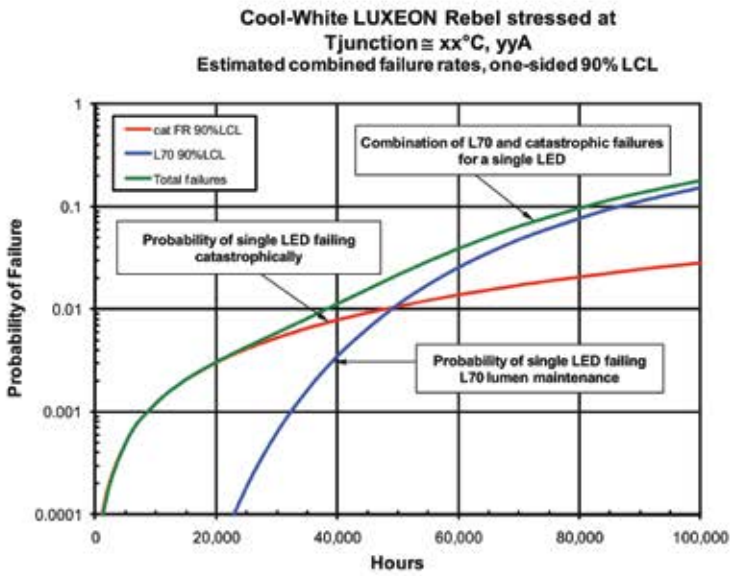


Figure 13. Combined lumen maintenance and catastrophic failure model.

But an LED light might contain an array or string of multiple LEDs. So the luminaire manufacturer needs to know how long the light can operate before the complete array's lumen output has fallen below its specified minimum (expressed as an Lxx figure for the complete array, where xx is a percentage of the array's peak light output). Decline in the array's output to Lxx will result from a combination of catastrophic failures in some LEDs, and gradual decline in output—the lumen maintenance effect—in the rest.

If all LEDs across all luminaires were assumed to fail at the same rate, the curve in Figure 13 could be used to predict the probability of failure of a complete array for any given operating conditions and Lxx threshold.

This is not what actually happens in reality. This is perhaps best illustrated by reference to a gambling analogy. Imagine you are holding a hand of 10 cards, which is known to contain one ace. Draw one card from the hand: the probability that it is an ace is 10%.

Now imagine you hold 60 hands of 10 cards, each hand containing one ace. Drawing one card from each of the 60 hands, the

probability that you will draw 6 aces is, in fact, 56%. There is a chance that you will draw no aces. There is even a one-in-thousand (0.001%) chance that you will draw 18 aces.

This gambling analogy describes a statistical concept known as 'binomial distribution', and it applies to the way failures are distributed within groups of LEDs, just as much as to the way in which aces are dealt from hands of cards.

Assume, for a single LED, a 10% probability of catastrophic failure under given operating conditions (the equivalent of one ace in a hand of 10 cards). A luminaire manufacturer uses this LED in luminaires that each contains an array of 60 LEDs (the 60 hands of cards above). Because failures follow a binomial distribution pattern, a 10% failure rate at the level of the individual LED does not mean that every one of the manufacturer's luminaires will have six failures—just as there is not a 100% probability of drawing 6 aces from the 60 hands of cards.

In fact, the gambling analogy shows that it's likely that 56% of the manufacturer's luminaires will contain 6 failures. Some of the arrays will contain none. One in every 1,000 luminaires will contain 18 failures.

It is now clear that using the combined Lxx failure model for a single LED (the graph in Figure 13) as a proxy for the probability of failure of a complete array of LEDs is flawed.

Fortunately, the semiconductor industry, the automotive industry and others have proven the validity of a practice known as the 'Monte Carlo method' to accurately predict the probability of system failure based on known component failure rates.

The Monte Carlo method works this way. Assume that a luminaire contains an array of 32 LEDs, used at given operating conditions that produce a probability x of catastrophic failure and a probability y of lumen maintenance failure. Each LED in the array could be characterized by two numbers: the time to catastrophic failure and the time to L70 light output. Thus, for each LED, it is possible to calculate the light output as a function of time by using the exponential light output model. At the time of catastrophic failure, the light output abruptly goes to 0. Then the system light output is simply the sum of the light output curves for each of the LEDs in the array. So the time to system Lxx occurs when the combined light output falls below this limit.

Now take a random sample of 32 LEDs: as the deck-of-cards example above shows, the sample might contain no catastrophic failures, one catastrophic failure, or more than one catastrophic failure. It might also contain a preponderance of high-performing LEDs in lumen maintenance terms, or a preponderance of low-performing LEDs—there is a distribution of lumen maintenance performance, as Figure 6 above shows. This particular random sample of 32 LEDs, with its combination of catastrophic failures and lumen maintenance, will cross the manufacturer's chosen Lxx threshold after a certain number of operating hours.

But if you take another random sample of 32 LEDs, the Lxx threshold could be crossed earlier or sooner, since the number of catastrophic failures could be different (as our deck-of-cards example again shows), and the preponderance of higher- or lower-performing LEDs (in lumen maintenance terms) could also be different.

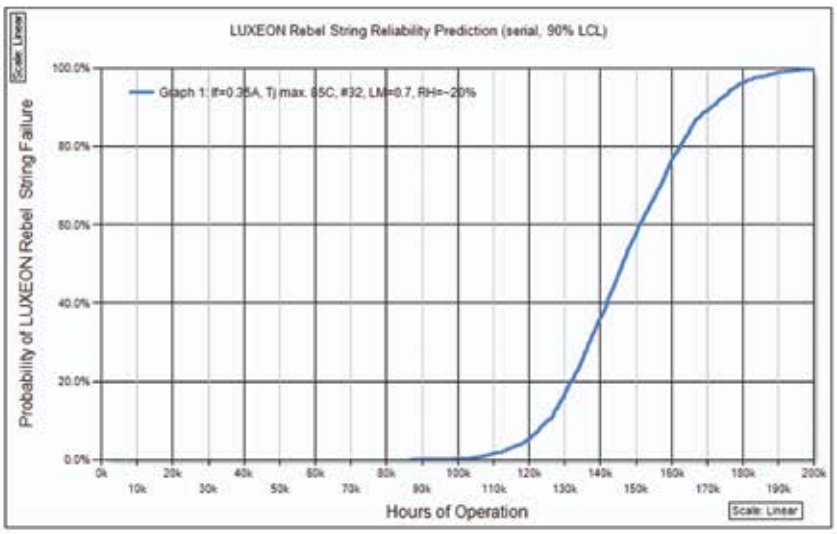


Figure 14. Monte Carlo simulation for a 32-LED system.

In fact, every random sample of 32 LEDs will perform slightly differently, producing a spread of performance across the population of 32-LED luminaires.

What the Monte Carlo method does is to take many such random samples of 32 LEDs, and plot for each one the point at which it crosses the system Lxx threshold. The curve joining these many points provides a model for predicting the probability of system Lxx failure. This curve can be displayed graphically (see Figure 14).

This graph, then, predicts the probability that any given combination of 32 LEDs will fail in terms of system light output—the combination of lumen maintenance failures and catastrophic failures—at the given operating conditions. This shows a spread of outcomes, from the worst performing array to the best performing array. A luminaire manufacturer can use this information to help determine, for instance, a sustainable warranty period based on a known number of LED array failures at the warranty's expiration.

And because Lumileds models for lumen maintenance and for catastrophic failure predict LED behavior for any combination of drive current and junction temperature, the model can determine the probability of system Lxx failure for any operating condition (within the data sheet range) and for arrays of any number of LEDs.

This system reliability approach:

- provides a comprehensive picture of LED performance at the system (luminaire) level. Unlike LED reliability measures commonly published today, it shows for any given set of operating conditions and size of luminaire how the worst luminaire will perform, how the best will perform, and the spread between them.
- informs investment and risk-management decisions. It enables luminaire manufacturers to accurately predict the percentage of units that will fail to survive their warranty period. Previous reliability models that model only for median performance place large, unforeseeable risks on the luminaire manufacturer, because they do not show how far short of median performance any individual luminaire is likely to fall.
- enables luminaire manufacturers to quickly and easily optimize designs for reliability and cost. The simplicity of the approach allows users to quickly evaluate many different choices for drive current, temperature, system size and light-output target. Designers can, for instance, avoid over-specifying systems that would maintain system light output for much longer than use-case assessments suggest was necessary.

We started with the assertion that the current lighting industry practice of taking LED lumen maintenance ratings as a proxy for a luminaire's lifetime rating was flawed. Figure 15 is an example that shows the potential commercial impact of this practice.

At a drive condition of 0.35A and a junction temperature of 85°C, the LEDs have a median L70 of 176,000 hours. Note from the lower left graph that there is a 15% probability of L70 lumen maintenance failure at 100,000 hours. So the manufacturer might set 100,000 hours as the warranty duration. As shown by the lower right graph, the catastrophic failure model shows that the LEDs when driven at 0.35A and at a junction temperature of 85°C have a probability of catastrophic failure of about 2% at around 100,000 hours. And in this example, the system failure probability curve produced by the Monte Carlo method shows that luminaires will perform better than individual LED lumen maintenance suggests—there will in fact be no system failures at 100,000 hours.

But the same approach when applied to a luminaire in which the LED junction temperature is 135°C is commercially disastrous. At a drive condition of 0.35A and a junction temperature of 135°C, the LEDs have a median L70 of 150,000 hours. Note from the lower left graph that there is a 20% probability of L70 lumen maintenance failures at 100,000 hours. So the manufacturer might set 100,000 hours as the warranty duration.

But Figure 16 shows that at the system level—rather than at the level of a single LED—that 30% of the arrays will have failed at 100,000 hours. As shown above in the lower right graph, the catastrophic failure model shows that the LEDs when driven at 0.35A and at a junction temperature of 135°C have a probability of catastrophic failure of about 8% at around 100,000 hours. This example shows that high operating temperatures are a strong driver for catastrophic failures, and these are the main reason that system light output rapidly drops below L70. The manufacturer now faces the commercially disastrous prospect of replacing a number of luminaires.

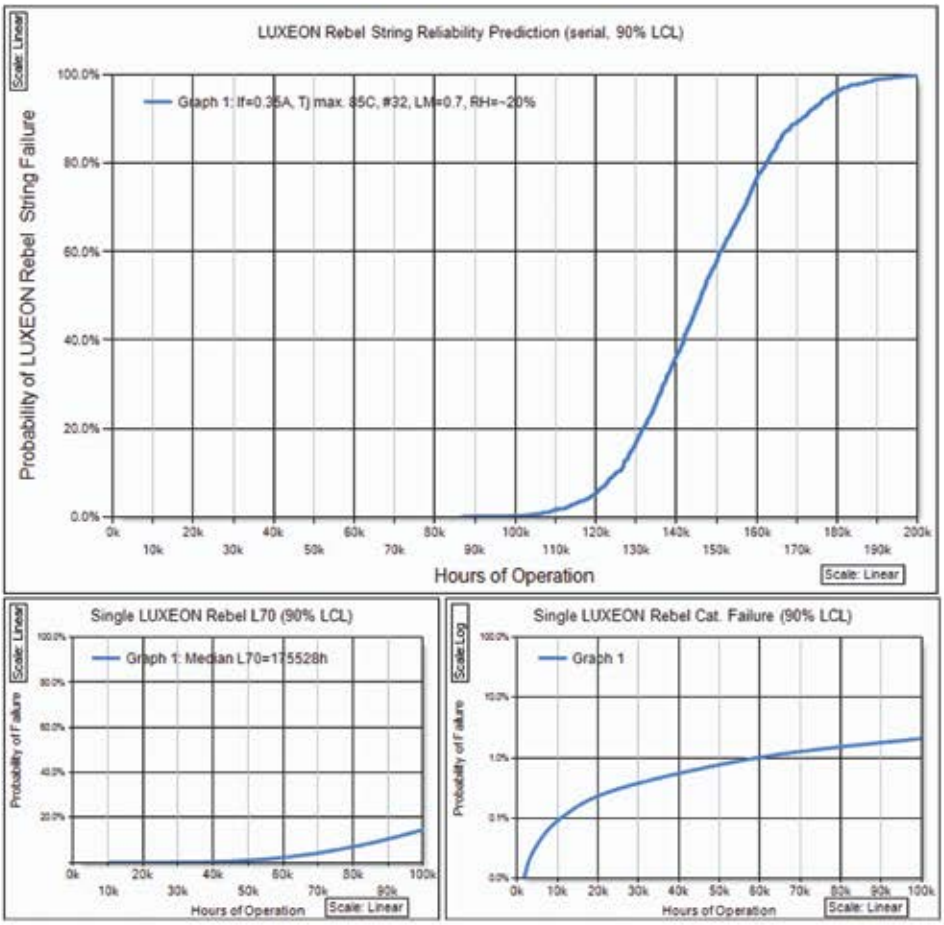


Figure 15. Top graph shows Monte Carlo simulation of 32-LED system. Bottom graphs show lumen maintenance and catastrophic failure models for LED component.

All components of a luminaire affect system reliability. This approach predicts the long-term performance of arrays of LEDs. But the reliability of a luminaire is actually affected by the reliability of every single component it contains, including the LED array, but also the mechanical, electrical and optical parts. The weakest link breaks the chain, and in fact a luminaire is only as reliable as its least reliable component.

Experience shows that this is very rarely an array of LUXEON Rebel LEDs. The common causes of failure in LED lights are:

- driver module, which can either fail catastrophically or can cause the drive current to change over time
- electrical connections and solder joints, which tend to fail open, thus causing a complete string of LEDs to go dark
- secondary optics, which can degrade over time, reducing light output. (The rate of degradation is a function of the materials choices made by the luminaire manufacturer.) Light path changes also affect system light output, and weather and other environmental factors can affect the light path.
- inconsistencies of manufacturing (missing screws, etc.) can impair a thermal interface (thus increasing the system's thermal resistance) or a light path (thus reducing system light output).

Any increase in thermal resistance will affect junction temperature, which is a crucial factor in LED component reliability.

Analysis of the reliability of each of these components in a system, and the time-to-failure of each across a population of luminaires, should be carried out in the same way as for LEDs.

Such analysis should then be fed back into the LED selection and system design process, to ensure that the LED sub-system is not over-specified. For instance, for a given design, assume that the best-performing 95% of LED arrays will reach the Lxx threshold after 150,000 hours or longer. Assume again that analysis of the driver module shows that 5% of the modules will have failed after 50,000 hours, and as a result the manufacturer decides to warranty the luminaire for no more than 50,000 hours of operation.

The LED sub-system has therefore been specified to emit light, in 95% of the units manufactured, for at least 100,000 hours longer than the product's warranty requires.

The luminaire designer can then choose to perform 'what if?' analysis, to reduce the amount of over-specification of the LED sub-system. Achieving a better match of the LED array's predicted time-to-failure to that of the weakest component in the system can help to reduce the manufacturer's bill-of-materials cost and produce a luminaire that is more fit for purpose.

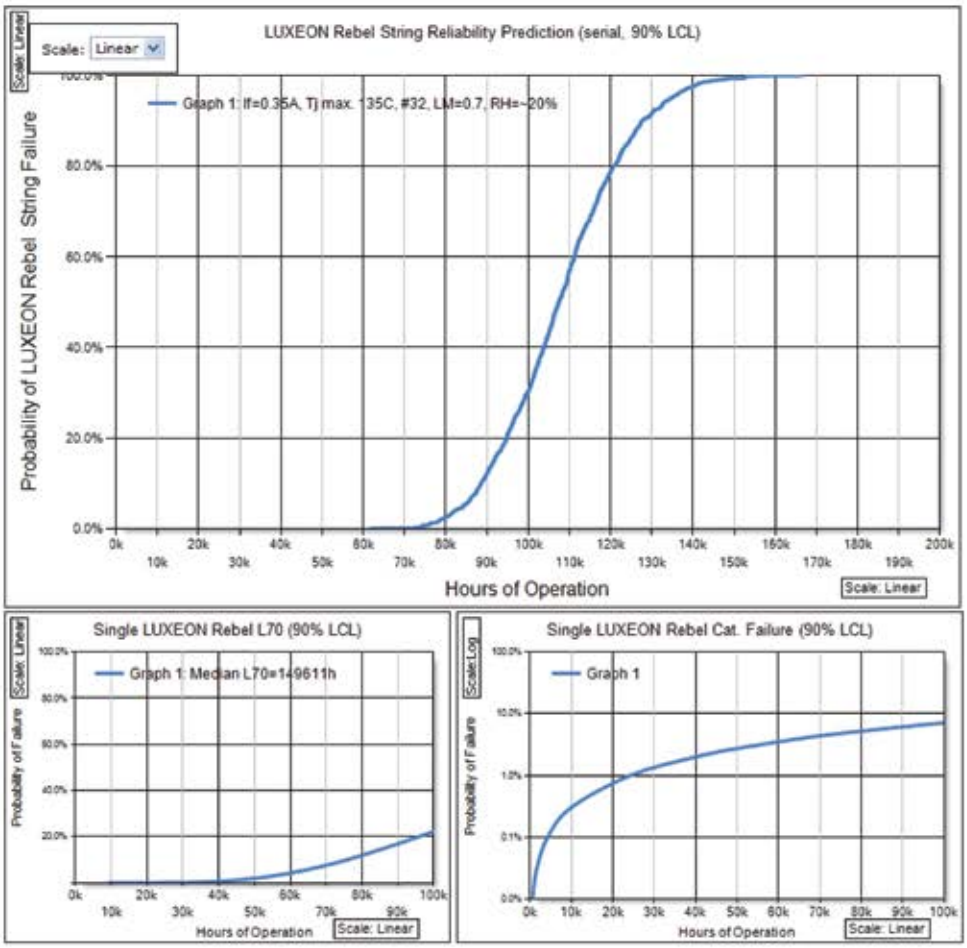


Figure 16. Top graph shows Monte Carlo simulation of 32-LED system. Bottom graphs show lumen maintenance and catastrophic failure models for LED component.

An LED based luminaire or solution is a complex system comprised of many components each with their own behavior and expected performance over time. Because of the familiar lighting paradigm, light sources are usually considered to be the weakest link in the system and therefore garner the most attention. This is, in no small part, why standards activity has focused primarily on LEDs to date and because of this, LED manufacturers have a significant amount of data regarding the lumen maintenance and failure rates and modes of failure. It should be clear, however that in the new lighting paradigm, the light source, LED, is probably not the weakest link but in fact just one of a number of components whose lifetime must be understood. We hope that through our evaluation and explanation of both lumen maintenance and failure rates, the reader's understanding of LED lifetime is better understood along with the following concepts; Lumen maintenance is not a proxy for LED lifetime, the lifetime of an LED system is based on achieving minimum levels of light output, and lastly, by designing for reliability, luminaire manufacturers can maximized design, minimize costs and appropriately warranty their systems.

The purpose of this paper was to draw attention to the many aspects of LED reliability and not to convey specific data. Any charts in this white paper are for a specific LED technology only and can change at any point in time. Work with your Lumileds Sales Representative or Lumileds Technical Support Manager to tailor reliability predictions to your specific application.

ISLE MPSC has completed its 7 years of uninterrupted monthly programmes

The 85th programme in which Ms. Priyanka Mishra Wadhwani an Interior designer from Bhopal spoke on the subject "Interior Ambience with Lighting as a tool". The programme was well attended and was followed by the Inauguration of the new lighting show room of Ravishing Homes by the Chairman ISLE.

Ms. Priyanka dwelt on the various types of fittings viz. uplighters, downlighters, cove lights, indirect and direct lights. She amply illustrated each type with photographs of her own works. It was interesting for the learned audience to take a different angle on lighting. Jaquar M.D. Mr. Ranbir Mehra was present on the occasion.

New Domestic Electric Wiring.

Mr. Tapan Kumar Ghosal
Hon'ble Secretary
Calcutta State Centre / ISLE

This article may not be befitted for the illumination engineering platform but it has a major role on the part of the domestic wiring installation which is also a part of the illumination. Recently we, ISLE, Calcutta State Centre, have jointly organized a workshop for the Kolkata based electricians on "Validation Meet for Qualification Pack for Domestic Electrician" with ESSCI and NSDC (Ministry of Skills Development and Entrepreneurship) on 16th May 2017, where Mr. Rajeev Ashtaputre, representative from ESSCI, delivered his presentation on National level Qualifications being developed for roll-out across technical training institutes in India, both in the private and public sector.

It reveals that imparting proper knowledge and guidance to the electricians is an essential part for maintaining quality and trouble free operation of electrical wiring installation. This article shall briefly illustrate the salient features of the workmanship in installation of domestic wiring.

The domestic wiring has a great role considering its safety, smooth and uninterrupted operation. Proper selection of the installation materials with latest Indian / international standards, is extremely imperative.

Wiring installation for domestic appliances viz, Computers, Telephones, CCTV accessories, captive and non-conventional sources etc, are also part of the installation along with common electrical household gadgets viz ,lights, fans, TV, music systems, Refrigerators, Ac, Microwave, Washing machines, Geysers, Mixer, grinders, iron, cooking ranges etc.

For new domestic wiring many a time it has been observed that due to lack of knowledge and inadequate experience of the wireman, installation work is carried out in a shabby manner, without having proper planning, using inferior quality of wiring materials and poor workmanship.

The consumers / owner of the house are been suffered to a great extent after completion of the work. Without having proper knowledge in calculating the total load and load distribution of the installation, proper selection of cables, wires, earth system, protecting devices viz, MCCBs, MCBs, fuses, main and sub-distribution boards etc, the new installation cannot safe guard or protect the installation.

The errors during the installation of domestic wiring are of the following nature:

Main distribution board

1. It's usually observed that the wireman failed to understand the importance of proper earth / grounding system to protect the entire installation.

2. Wireman usually uses the system earth connection from the earth provided by supply agency. This may leads to non-availability of earth in case of discontinuation of earth of the supply agency resulting in damage of the electrical devices during fault conditions. It is mandatory to install separate earth in the consumer's premises, and should be installed depending upon soil resistance and the installation must be carried out as per the relevant Indian standards.

3. No separate and dedicated earth system for electronic devices viz computers and other sophisticated electronic devices.

4. No lightning arrestors to safe guard the entire buildings and electrical / electronic devices.

5. Wrong selection of cables / wires and the quality of the materials.

6. Poor workmanship inside the main power distribution board comprising inadequate space and quality of wirings.

7. Wrong selection of current and time ratings of MCCBs, MCBs, ELCBs, RCCVs and their qualities and reliability.

8. Poor wiring installation in the main distribution box comprising MCCBs, MCBs,

9. Poor neutral / earth joints provided by the supply agency.

10. Poor termination work inside the main distribution board by twisting wires without using proper termination lugs.

11. Laying of wires are not in a proper manner, hanging hazardously without use of flexible pipes to cover the wires and then properly dressed.

12. Joining of wires using adhesive tapes inside main distribution board, results in fire hazards during short circuit conditions.

13. Wrong selection of wall for fixing the main distribution board.

14. Fixing and housing the switchgears directly on a piece of wooden plank without housing them in proper housing box.

15. No proper protection for the meter room from rain and other natural calamities resulting in short circuiting and fire hazardous.

16. Non usage of terminal blocks suitable to current ratings to terminate the wires from the distributor's meter to MCCBs/ MCBs and from MCCBs/ MCBs to outgoing feeders in the main power distribution board.

17. Wrong way of cutting wires without using wire cutter.

18. Connection of wire without removing the insulated portion of the wire.

19. Tightening of wires without proper hand tools.
20. No checking of proper tightening of wires leading to lose connection in the circuits.

21. No firefighting devices inside the meter room.

22. No testing for checking insulation resistance, earth resistance, loose connection in the circuit after the installation.

Sub distribution boards.

1. Inadequate planning in selection of number of sub distribution boards with requisite number of MCBs.

2. Lack of knowledge in distribution of load in a three phase system, resulting in unbalancing of the system and unnecessary over loading in a particular phase / phases, causes nuisance tripping.

3. Wrong selection of MCC leads to over loading and unnecessary interruption of supply.

4. Due to wrong selection of load distribution in the network possibility of over loading persists.

5. Mixing of power load with load of fan, light and other small load is a common mistake on the part of the wireman results in unnecessary tripping and sometimes the gadgets with very low current are damaged due overloading, since the main MCB controlling the entire power are of higher rating.

6. Connection of phase, neutral and earth wires are not in proper manner.

7. Wrong selection of switch boards for different types of load.

8. Inadequate capacity of wires compare to the respective load.

9. Inferior quality of materials viz MCBs, fuses, switches, wires, and other materials are being used during the installation.

10. In some installations the wireman either fail or ignore to install all power gadgets with separate MCB/ Power socked. No light, fans and other small appliances should be connected with the power circuits.
11. Domestic pump motors must be installed with separate MCB and motor controller as per the specification of the manufacturers. The installation must have a separate earth connection.

12. The other power load viz, Geyser, washing machine, Micro wave, Refrigerators, AC etc, should be installed depending upon their rated current. However separate earth for this power load must be maintained.

13. Many wiremen are not aware of the safety in using of three pin lockable type pug and socket instead of non-lockable type. This is extremely important considering the safety aspects.

14. The tripping operation of MCBs, ELCBs, RCCVs installed in the circuits depend on the healthy earth supply in the system. Many a cases these protective devices are failed to operate in absence of adequate and proper earth.

15. In many cases the performance of MCBs, ELCBs, and RCCVs are not being tested after installation. Especially non operation of RCCV during electrocution shall not save the human life, for the purpose it has been installed.

16. It's a common mistake on the part of the wireman regarding protection co-ordination. The tripping current and time setting in the protecting MCB shall depend upon the total current rating of all the electrical appliances. Current and time setting must be set accordingly in the main, sub-mains and the fuse ratings of the individual switch boards.

In case of fault in any circuit the same shall be tripped without any interruption of power in the other circuits. Non adherence to this co-ordination may leads to unnecessary tripping of the entire or part of the installation without tripping the faulty appliance resulting in damage to the appliance.

17. It's a common practice of the wireman to use the same earth system for the computers and other sophisticated electronic devices along with the other electrical gadgets. This shall cause severe damage to the devices during fault conditions.

Back-up power and other sophisticated devices.

The above installation may also consist of back-up power, viz, DG sets, Inverters, UPS, Solar and other non-conventional source of power. The installation must be trouble free while incorporating the other source in the main circuit. Special care must be taken to isolate the main source through a proper rating on load Change Over Switch before switching on these sources.

The installation of such additional power source must be carried out by an authorized representative of the manufactures.

For other devices viz, TV, Telephone, CC TV, special cables with associated terminal connection as per the specification of the service provider shall be carried out. Laying of these cables shall be carried out separately and should not mix with the supply mains. The remote control devices for TV, AC, Fan, Lamps etc, are also being incorporated in the domestic installation.

However the installation and commissioning of these items should be carried out by the authorized respective of the manufacturers.

Responsibilities of the consumer / owner for entrusting the wiring installation.

The wireman alone cannot be blamed for faulty and bad workmanship of the domestic electrical wiring. The consumer / owner are also responsible for a smooth and safe electrical installation. The consumer must be aware about the following points before they entrust the work to a workman:

1. They should entrust the work to a qualified and licensed wireman having adequate experience in execution of the similar nature of work. If necessary they can also visit the site / premises where similar nature of work being executed by the wireman and ask the consumer / owner about the performance, tenure of trouble free operation, and nature of problems presently they are experiencing, nature of services being provided by the wireman

after execution of the work.

2. They should not allow the wireman to purchase any wiring materials, MCCB, MCB, RCCV, switches, house hold electrical materials / gadgets etc, and the same should be procured by the consumer directly from reputed manufacturers as per BEE star rated and other relevant Indian standards.

3. They should spend time to watch the execution as much as possible.

4. They should insist the wireman to conduct the relevant tests after completion of the work and before commissioning of the installation and obtain the test certificate.

About the author

Tapan Kumar Ghosal

Graduate in Electrical Engineering from National Institute of Technology, Calicut. FIE Institution of Engineers (India), Chartered Engineer, Institution of Engineers (India), Fellow member of Indian Society of Value Management, Fellow member indian society of lighting engineers (ISLE), presently he is the Hon'ble Secretary, Calcutta State Centre of ISLE.

Served M/S.Andrew Yule & Co, Kolkata, in the field of Project Engineer.

Retired from CESC ltd, Kolkata, after serving 37 years in the field of Power Engineering, Distribution system, Project Management, Energy Management, Energy Audit, Loss control etc, Former advisor Howrah Municipal Corporation, Former faculty member, Indian School of Energy Studies, Jadavpur University, Kolkata.

Author of many technical papers published in Technical Institutions.

Presently engaged in Energy audit for various Industries.

Honouring Heritage with Light

Isaac Theatre Royal Christchurch

5 August 2015

To Whom it May Concern,

Re:Lighting - Isaac Theatre Royal Facade

The initial concept to light the 1908 heritage facade of the iconic Isaac Theatre Royal was formulated in mid-2010 by Richard McGowan of Warren & Mahoney Architects. Richard engaged Kevin Cawley as the Lighting Designer for the project.

The plans were approved by the board of the Theatre Royal Charitable Foundation before the devastating 2011 earthquakes. The concept and brief was to give the facade a face-lift making it elegant and visually stunning for all occasions, whilst respecting the heritage fabric and complimenting the unique architecture. The Lighting design that Kevin came up with was more than could have been imagined.

Kevin's background is as a theatrical lighting designer. He had worked in our theatre designing productions on our stage, so we were very fortunate to have a designer that not only new the building but also had the knowledge of how a theatre works.

With this in mind Kevin bought together a creative team to create stunning effects for a facade. The design allows us to create scenes that not only pay respect to the heritage and architecture of the building, but also creates personalised light shows for whatever production is playing at the time.

Fortunately the theatre's facade and stage house were spared after the devastation. Our brand new iconic Isaac Theatre Royal has been rebuilt and restored back to its former glory. We congratulate Kevin on his design and we are delighted with the result. This is a fine example of Kevin's dedication to the Christchurch rebuild and its community.

We are delighted to endorse Kevin's entry to the IES Lighting Awards.

Neil Cox
Chief Executive
Isaac Theatre Royal / Theatre Royal Charitable Foundation

Isaac Theatre Royal

This project was a unique and rare opportunity for theatrically trained lighting designer Kevin Cawley. He had lit productions in the ITR in the past, and now he could those same theatrical talents on the facade. In our earthquakes the facade was damaged, but not destroyed. Thanks to Neil Cox and his team and their tireless work we have our theatre back to the same as it was before. It's stunning your would think it's a refurbishment not an entire rebuild.

Concept

The use of light and shadow on this type of historical architecture was most important but not original. The key to this design was to use a theatrical production process, detailed focusing, then plotting or setting different scenes for every occasion and that was original. Several lighting acts will show this wonderful piece of historical architecture in its beauty, splendor and glory.

Inspiration

We took inspiration from the theatrical production process detailing what we do in the theatre. We tell a story to convey emotion and create moments of theatrical wonderment. This is what we needed the facade to do in all the acts. The theatre needed to speak for itself. 1. Look at my splendor 2.Look at what i do 3.Entertain and enjoy yourself.

Solution

1.Facade in Rust (veranda 30%) nothing on in the theatre

Act 1.Scene 1 This is when nothing is happening in the theatre. We created a stunning excellent mix of warm colours carefully crafully crafted to accentuate the masonry of the facade.

Act 1.Scene 2 Under the Veranda

Just a subtle 5K to light the walkway with 4K up light on four column for contrast.

2.Facade in Steel Blue (veranda 50%)(Foyer on) in rehearsal

Act 2.Scene 1 This is where a production is in rehearsal.

There is a hint on the facade of what is to come in the following weeks. The light plotting for this depends on the theme and nature of the production.

Act 2.Scene 2 Under the veranda.

The foyer is illuminated and we now add 4K down lights to the mix to increase the light intensity (things are about to happen)...

Solution continued

3.Facade in a colour choice from Matt (veranda 30%) Opening night

Act 3.Scene 1 Its opening night so all the facade is now performing to its maximum again depending on the theme and nature of the production. (There may be colour and movement if appropriate)

Act 3.Scene 1 Under the veranda. Along with all the 4 and 5K we now have 4 large custom built chandlers and festoons (proclaiming this is it).

To achieve this design we used Philips Colour Kinetics LED fittings so extremely energy efficient and to program the effects we spent many hours in a programing suite. The total system is computer controlled and all fittings are individually addressed to give us total control. When you have total control you can achieve total visual comfort. There was a short fall with the budget so funds had to be raised. All parties took this into consideration.

Summary

All of my lighting design is only as good as the people operating it. I was so fortunate to have one of the best lighting programmers I have worked with, Matt Mard.Matt, like myself, comes from the theatre so it is such a pleasure to hand this over to him, as he understands how great lighting design speaks to the people. Another ray of hope for the Christchurch community to have our Isaac Theatre Royal back.

Acknowledgments

Neil Cox (General Manager, Isaac Theatre Royal)
Richard McGowan (Principal Warren & Mahoney)
Vanessa Carswell (Associate Warren & Mahoney)
Iain Nicholls (Associate Warren & Mahoney)
Matthias Mard (Technical Manager Isaac Theatre Royal)
Allan Stephenson (Philips Lighting Specification Consultant)
Morgann Le Bars (Philips Systems Engineer)

ENERGY AND ENVIRONMENTAL LIGHTING DESIGN AWARD,
Sponsored by OSRAM SYLVANIA

NOAA INOUYE REGIONAL CENTER, Honolulu

The 350,000-sq ft research campus features two repurposed historic airplane hangars linked by a modern building. The design embraces the owner's core values of "science, service and stewardship," while addressing a diverse range of space types that range from laboratories, a library and offices, to collaboration and conference facilities, dining, and public exhibit space. First, the atrium lobby connects both airplane hangars and includes accent lighting for public exhibits. Auditorium lighting includes preset architectural dimming with A/V interface. Ambient and accent light fixtures are concealed

between wood ceiling slats to focus observer attention on the speaker. The dining hall, meanwhile, includes flexible overhead lighting for informal presentations and features custom acrylic “jellyfish” chandeliers internally illuminated by blue LED grazers. A mesh of skylights was inserted into the historic hangar ceilings to provide daylight autonomy in office areas.

The project is LEED-Gold certified with energy use from lighting measuring 30 percent below the IES/ASHRAE 90.1 baseline. Site lighting design minimizes light trespass and focuses user attention out at the adjacent ocean and mountain views.

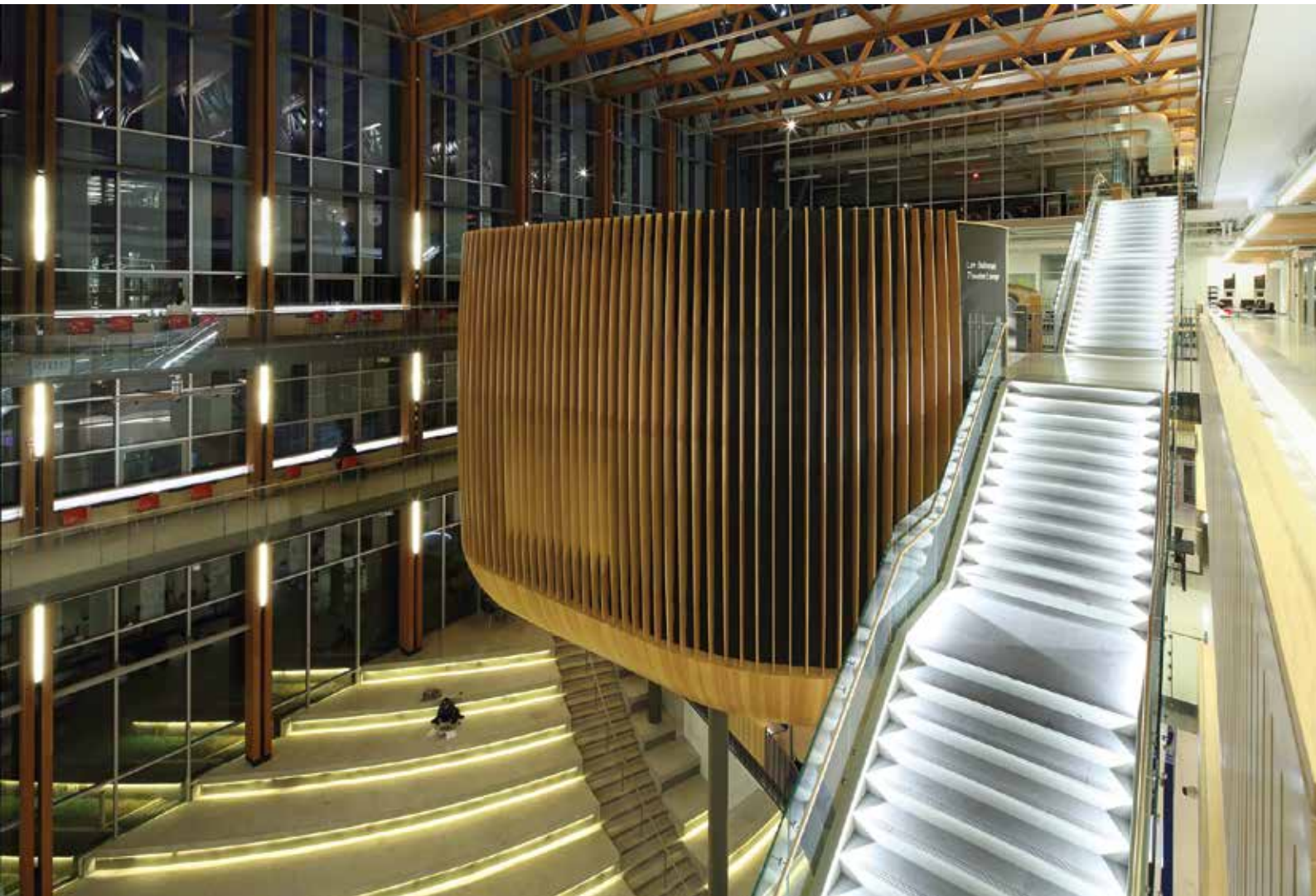
DESIGNERS
JAY WRATTEN, NICOLE HAMMER, HEATHER MABLEY - WSP PARSONS BRINCKERHOFF
PHOTOGRAPHY
© ALAN KARCHMER

THE EDWIN F. GUTH MEMORIAL AWARD FOR INTERIOR LIGHTING DESIGN

DESIGNERS
SUNNY GHATAURAH, ANDY SU, DOUG MCMILLAN, AMIR TAVAKOLI - AES ENGINEERING
PHOTOGRAPHY
© EMA PETER

UBC STUDENT UNION BUILDING, Vancouver, British Columbia

Designers played on the idea of "illuminance vs. luminance" by highlighting architectural elements in a large, open space with full-height windows and clean ceilings. Warm, 3000K luminaires light the atrium's exposed wood, while the egress path and stairs are illuminated at 4000K to draw the eye to the exit. High contrast ratios create visual separation, add drama and provide wayfinding. An anti-glare, side-mounted, recessed continuous LED channel with an accessible driver, integrated into the staircase, illuminates the space underneath it. Behind the scenes, a corridor with four-story boomerang-shaped wood columns that support metal panels is illuminated by 400W metal halide fixtures located at the top and bottom of the boomerang, which graze the metal panel with light. Glare shields on luminaires balance high wattage for visual comfort, sustaining the clean, open feeling despite multi-directional pathways throughout. Dimmers, controls and daylight controls optimize lighting levels, which helped the project achieve LEED Platinum certification.



LED Industry Meet in Delhi

- Organised by ESSCI and supported by ISLE / Delhi State Centre

A select group of industries were invited by ESCII with regard to the skill development approaches for LED industry and other stakeholders.

The meet was attended by the following groups :

1. From the Big, Medium and Small industry delegates	35 nos
2. From the testing laboratories delegates	4 nos
3. From start up industry delegates	6 nos
4. Other users from GMR, Airport , MES,. Delhi Metro, NDMC etc.,	6 nos

There were nine lecture sessions by relevant experts from Delhi as well as outside faculty and interactive discussions.

ISLE - Pune & JES - Pune Join Hands for ECO-FRIENDLY LIGHTING FOR JAIN INSTALLATIONS


Inside of Temple after Implementation

Jainism is not only a Religion but A Way of Life. A human being lives in Society and Environment. Jain Agamas (Holy Books) are very conscious about preserving environment. Jain sacred texts have large volumes that point to environment. Lord Mahavira knew effects of global warming and depicted clearly that the earth would be too hot at the end of the Pancham Kaal (fifth time cycle). The time frame he has given is 21000 years after him. He suggested global warming solutions and pathway to stop global warming. Jainism depicts a lot about climate change issues that is to take place in future and suggested to act reasonably for sustainable development.

Jainism says that five elements of nature; Prithvi (land, soil, stones etc), Jal (Water resources), Agni (Fire), Vayu (Air) and Vanaspati (Vegetation, trees and plants) are living creatures and must be treated as living beings. This basic concept of Jainism is unique. No other religion in the world has depicted nature in this manner. Lord Mahavira told this 2,600 years back !!!. No scientist before Jagadish Chandra Bose could conceive and prove life in green trees and plants, essential part of environment. This very concept of Jainism restricts its followers (Jains) to harm any creature. This concept also limits their consumption and help protecting environment.

Electricity is generated by using natural resources viz. Coal, Water, Diesel, Nuclear etc.- most of them are categorized in Jain Philosophy as living creatures and treated as living beings. As such promoting Eco-Friendly Lighting will lead to saving in Energy and thus saving Natural Resources – Sources for Energy Production. Further depletion and contamination of natural resources are the main cause of present day problems in environmental and sustainable development. Due to above, electricity is also going to be costlier day-by-day. Considering the above, it was proposed by Jain Engineers Society – Pune Chapter in association with Indian Society of Lighting Engineers (ISLE) – Pune Local Centre to take up the subject activity at Jain Installations (Temples, Hostels, Community Centers etc.) located in and around Pune. This is proposed in 3 Stages -

STAGE-1 : Conduct of Lighting Audit, Analysis of Audit Report and Recommendations to the Trust / Organisation for implementation.

STAGE-2 : If desired and agreed by Trustees, undertaking implementation.

STAGE-3 : Extending the Scope for Installation / Use of Solar System.

The First such Lighting Audit was completed at Shri Shantinath Dig. Khandelwal Jain Mandir, popularly known as Paras Khaja Dig. Jain Temple, Ravivar Peth, Pune on 18 May, 2017 by Er.Vinit Jain Pahade. For the purpose, equipments and guidance was obtained from Er.Rohit Sharma, Energy Auditor & Director of M/s. Save-En-India, Pune by Er.(Dr.) Prakash Jain Badjatya, Governing Body Member of ISLE, who is also Founder Patron of Jain Engineers Society-Pune Chapter. Subsequently, Technical & Commercial Proposal was submitted on 01 Jun, 2017 to the Trustees of the Temple through Er.Sunil Jain Katariya, Secretary – JES : PC, who is not only instrumental in initiating and convincing Trustees of the Temple for this Project, but who also financed the total cost of the Project. As such Stage – 2 of the project has been completed successfully. Proposal for Stage – 3 for the installation of Solar is being worked out and will be submitted to Trustees for consideration.

Er.Vinit Pahade, Er.(Dr.)Barjatia, Trustee Mr.&Mrs.Jaykumar Kasliwal and Mr.&Mrs.Sunil Katariya

CIE Topical Conference - Smart Lighting

Tutorials on Colour Vision and Healthful Lighting

Dear Colleagues,

CIE is pleased to invite you to the first of the new CIE Topical Conference Series, “CIE 2018 Smart Lighting” and associated tutorials on “Colour Vision and Healthful Lighting”, which will be held from April 24-28, 2018 in Taipei and hosted by the CIE Associate National Committee of Chinese Taipei.

The CIE Topical Conference series is the successor to the CIE Lighting Quality and Energy Efficiency conference series, which ran from 2010 to 2016. The CIE Topical Conference provides forum for discussions on new research and educational opportunities in focused topics in general lighting or other topics related to CIE Divisions. The focus topics of these conferences should reflect a strong interest and need in the region as well as general international needs for education, research and discussion. The conference acts as a gathering of experts and learners from all over the world as well as from the region, in order that existing synergies can be developed further and new connections begun.

This first conference will focus on Smart Lighting, an area that is expected to bring significant energy savings and many other benefits. This topic needs scientific and technical inputs in order to progress development of technologies with confidence in regards to lighting quality, comfort, and safety. We hope to hear many ideas and developments and discover what CIE can do to aid future progress on this topic.

Associated with the conference there will be tutorial workshops on “Colour Vision”, “Road Lighting” and “Healthful Lighting”, these will introduce fundamentals and facilitate discussions on future research needs in these important areas.

Well-known local manufacturers maintain the second largest share of global LED chips production, and the entire local supply chain remains a world leader in the LED industry. Taipei is an easy living city with metro system, Chinese Cuisine, and famous sightseeing places like Taipei 101, National Palace Museum, Chiang Kai Shek Memorial Hall, etc.

The CIE Associate National Committee of Chinese Taipei are pleased to welcome all of you to the CIE 2018 Topical Conference and look forward to meeting you in Taipei.

Dr. Yoshi Ohno
President, CIE

Dr .Jia-Ruey Duann
President, CIE ANC Chinese Taipei

The website for CIE 2018 is now open (taipei2018.cie.co.at). More information will be added in due course. Some information currently available:

- Conference Topics
- Key Dates

Abstract Submission Now Available : Abstracts can be uploaded on the CIE 2018 website!

Seminar on ELECTRICAL AS SOCIAL ENGINEERING AND CONSERVATION

The 87th uninterrupted monthly seminar was held on 2nd July at the Acropolis college of Engineering - Indore. Mr.Mahesh Aggrawal C.E.O. of Ms.Technocom gave a lecture on **"ELECTRICAL AS SOCIAL ENGINEERING AND CONSERVATION".** The Guest of Honour was Dr.Shamsher Singh and the compeering was done by Mr. Shailendra Kulkarni. The vote of thanks was proposed by Mr. Ashok Dubey the hon.Secy. The programme was followed by tree plantation with the help of N.S.S.Students.

IALD Awards 2017
Award of Excellence

BARNEYS NEW YORK, NY, USA

For the Barneys New York flagship store, Cooley Monato Studio created a lighting design that allows the spaces to feel cohesive, spacious and dynamic despite challenging existing conditions such as large floor expanses, irregular column grids, and low ceiling heights. The brand's contemporary and elegant identity is expressed through a rich material palette accentuated entirely by LED lighting.

The dramatic spiral stair at the center of the store is a functional sculpture, leading customer flow to all floors. Lighting the stair was a delicate collaboration in which lighting designer and architect agreed that the stair's architecture could not be upstaged. Continuously lit, sinuous, hand rail coves follow the spiral at both stair walls, welcoming customers and leading them to other floors. Small, low wattage, in-grade uplights at the stair treads provide a subtle glow to the underside plane, softly enhancing its contours.

"The level of attention to detail, as well as the construction, is impressive, especially on the breathtaking staircase," one judge commented.

Apertures in the ceiling were specifically placed, not tied to a rigid grid and always keeping flexibility in mind. By using recessed, regressed, beveled trims, the ceiling apertures practically disappear from view. Millwork lighting allows for reduced energy use by lighting product from a close proximity.

Below-ground cosmetics, skincare, fragrance, and barbershop areas feature high color rendering lights in the ceiling to illuminate the array of products while lighting faces uniformly and without glare. The subtleties of the custom perimeter mural walls become apparent as their edges catch light

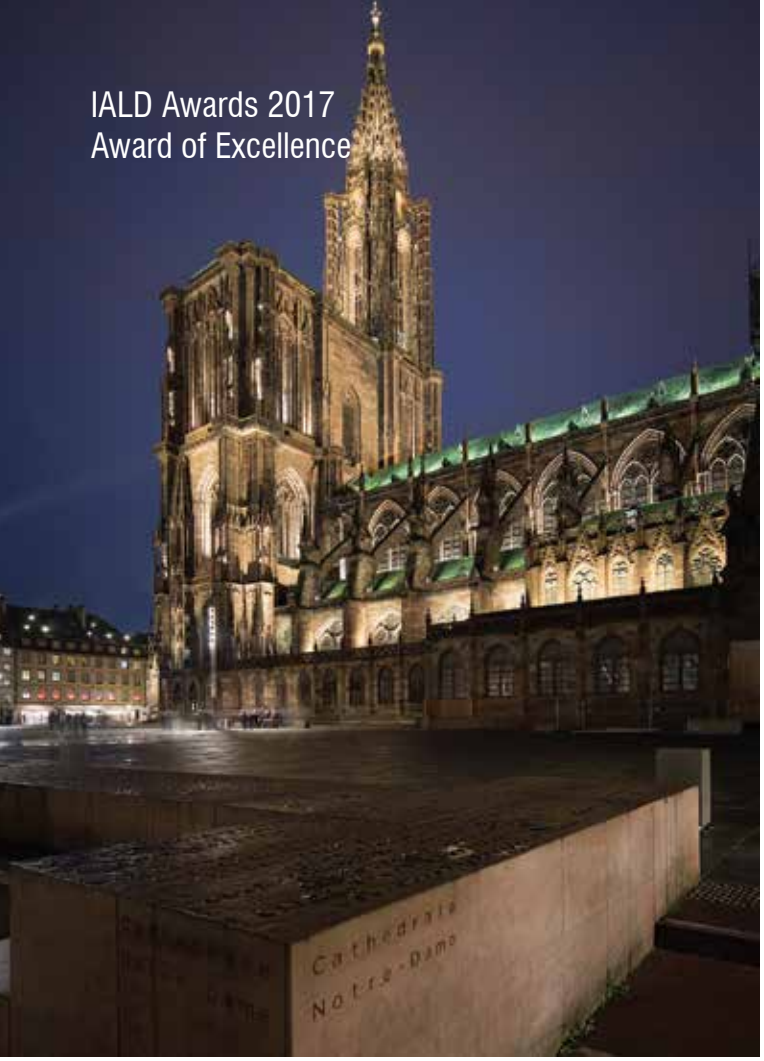
from strategically positioned grazers above, providing ambient light and adding to the perception of brightness even below-grade.

The Men's and Women's floors have distinctive, curved, illuminated ceiling pop-up coves (nicknamed 'amoebas') to provide ambient light, visual interest, and a little breathing room to the low ceilings. Accent light fixtures on the ceiling provide light that bounces off the glossy metal, organically-shaped display tops to create beautiful golden patterns above. Lit mirrors in the fitting rooms provide shoppers with even illumination while trying on clothes.

The warm light in the restaurant is dimmable and capable of creating various dining experiences. Light grazes and highlights rosewood feature walls, as well as the vertical surfaces of the bar area, providing bright planes for ambiance. A 36-foot mural painting is evenly lit from above, and light cove 'amoebas' break up the ceiling throughout.

Judges were impressed by the project's attention to detail, and the way the variety of design moments worked cohesively throughout the project. As one judge wrote, "Barneys New York is a beautiful example of elegant simplicity."

Credits:
LIGHTING DESIGN
Emily Monato, Associate IALD
Yusun Hwang
Carol Castillo-Kuberski
Cooley Monato Studio
PHOTOGRAPHY
© Scott Frances



CATHEDRALE NOTRE - DAME DE STRASBOURG, STRASBOURG, FRANCE

Considered one of the greatest masterpieces of gothic architecture, the iconic Strasbourg Cathedral revels in its newfound splendor. Six hundred LED projectors create warm accent lighting and highlights that contrast beautifully with the cast and modeled shadows, resulting in an overall glow and a peaceful illumination.

As a UNESCO protected site, the team from L'Acte Lumière was required to present, account for and share their choices with the validation committee, which included the building owner, funders and contracting authorities from the city, as well as the heritage foundation. Designers were required to complete a manifest stating their commitment to qualitative light as they revealed the architectural magnificence of this iconic Gothic cathedral.

After deep consideration of the sacred and iconographic facets and meanings of the structure, designers chose a precise and calculated balance of shadow and light to illuminate its presence. The brown and yellow sandstone comprised rich gradients of red and purples, corresponding to R8 - R9 CRI. This is a difficult color to render in high quality diodes, so designers selected a 2700K fixture with a short chromatic distortion to ensure quality light. This solution infuses a global ambient luminescence onto the structure, allowing the deep colors of the sandstone and its intricate details to be revealed.

Focal glow and highlights were used to enhance the architecture and reveal detailed layers of masonry, like illuminated text. Dynamic white LED luminaires, soft gradients, and subtle tints were used to create two distinct nightscapes throughout the whole of the elevation.

Fourteen km of cable and 400 light sources are installed on the building. The entire installation was completed without any drilling into the stone, only in mortar joints. Bespoke clamping sleeves, collars, fixture corsets and luminaires were painted onsite with an accurate color match to the stone. As a result of these considerations, the entire installation can be removed without any damage to the structure, which was a key requirement of the heritage committee. None of the luminaries, except those in ground, are visible from the exterior. This results in a balanced, quiet "chiseled light," and a magnificent poetic glow of the building.

The Strasbourg Cathedral is, as one judge wrote, "a beautiful balance of highlighting and shadow" and an "impressive technical solution." A bridge between the earth and sky, an icon of darkness and light, a monument that ignites the imagination and reveals the passion of its builders.

Credits:

LIGHTING DESIGN
Jean-Yves Soetinck
L'Acte Lumière

PHOTOGRAPHY
© Xavier Boymond
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Index to Advertisers

Examine the heated question of chip-scale packaging in the LED industry

JOHN CAFFERKEY discusses the growing popularity of CSP LEDs for general lighting and how thermal management solutions need to adapt to keep pace.

The primary reason LEDs are sold as a packaged product is to protect the fragile bare die from damage. Standardized packaging also makes it far easier for manufacturers to work with LEDs on production lines. However, there is another consideration: LEDs are only around 40% efficient, which means 60% of the power that goes into an LED will come out as heat. As with any electronic device, too much heat can cause serious damage so it needs removing as quickly as possible. This is where thermal management comes in. As LEDs increase in power while shrinking in size, thermal management becomes a critical aspect of LED packaging. The solid-state lighting (SSL) industry has long dealt with the thermal challenges of mid- and high-power LEDs, but the latest move to a chip-scale package (CSP) has introduced all new thermal design challenges.

LED package evolution

Early LEDs used through-hole packaging. The die was mounted onto an anvil and post structure and covered in an epoxy lens. The negative and positive anvil and post were then pushed through holes drilled in a printed-circuit board (PCB) and soldered into place. This type of package was ubiquitous throughout the early development of LEDs and is still used for applications such as power indicators today.

Full story at the following link :

http://www.ledsmagazine.com/articles/print/volume-14/issue-6/features/developer-forum/examine-the-heated-question-of-chip-scale-packaging-in-the-led-industry.html

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Plastic light diffusion systems match LED lighting needs

GABI BAR and **MOIRA NIR** explain how to select thermoplastic compounds for SSL optical systems and how to measure the important transmission and diffusion parameters.

In recent years, lighting manufacturers and developers have moved away from traditional light sources and to LED-based solid-state lighting (SSL) technology. While LEDs offer many benefits such as excellent energy efficiency, the point sources also present some problems in general-illumination applications - glare, for instance. So in LED lighting developments, engineers must design lens systems and covers that are optimized in terms of their light diffusion properties to eliminate the LED glare issue.

Glass and transparent plastics, especially acrylic resins, have long been used in the lighting industry for various aesthetic and functional purposes in optics design. But as the lighting market moves increasingly to LED technology, requirements for high light diffusion have spurred lens and cover manufacturers to devote much of their activity to developing suitable plastic solutions.

Full story available at the following link:
http://www.ledsmagazine.com/articles/print/volume-14/issue-6/features/ssl-design/plastic-light-diffusion-systems-match-led-lighting-needs.html

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http://www.ledsmagazine.com/articles/print/volume-14/issue-6/features/ssl-design/plastic-light-diffusion-systems-match-led-lighting-needs.html

Requirements for Compulsory Registration - BIS

NEW NOTIFICATION

To be Published in Gazette of India : Extraordinary
[Part II, Section 3, sub-section (ii)]
Ministry of Electronics and Information Technology

S.O. (E): In exercise of the power conferred by clause 10 (1)(p) of the Bureau of Indian Standards Act.1986 (63 of 1986) and in pursuance of clause (fa) of the rule 13 of the Bureau of Indian Standards Rules, 1987 the Central Government, hereby includes the following products to the Schedule of the Electronics and Information Technology Goods (Requirements for Compulsory Registration) Order, 2012, namely:-

S.No (1)	Product (2)	Indian Standard Number (3)	Title of Indian Standard (4)
31	Recessed LED Luminaires	IS 10322 (Part 5 / Section 2) : 2012	Luminaires Part 5 : Particular Requirements Section 2 Recessed Luminaires
32	LED Luminaires for Road and Street lighting	IS 10322 (Part 5 / Section 3) : 2012	Luminaires Part 5 : Particular Requirements Section 3 Luminaires for Road and Street lighting
33	LED Flood Lights	IS 10322 (Part 5 / Section 5) : 2013	Luminaires Part 5 : Particular Requirements Section 5 Flood Lights
34	LED Hand Lamps	IS 10322 (Part 5 / Section 6) : 2013	Luminaires Part 5 : Particular Requirements Section 6 Hamp Lamps
35	LED Lighting Chains	IS 10322 (Part 5 / Section 7) : 2013	Luminaires Part 5 : Particular Requirements Section 7 Lighting Chains
36	LED Luminaires for Emergency Lighting	IS 10322 (Part 5 / Section 8) : 2013	Luminaires Part 5 : Particular Requirements Section 8 Luminaires for Emergency Lighting
37	UPS / Inverters of rating ≤ 10kVA	IS 16242 (Part 1) : 2014	General and Safety Requirements for UPS
38	Plasma / LCD / LED Television of screen size up-to 32”	IS 616 : 2012	Audio, Video and Similar Electronic Apparatus - Safety Requirements
39	Visual Display Units, Video Monitors of screen size up-to 32”	IS 13252 (Part 1) : 2010	Information Technology Equipment - Safety General Requirements
40	CCTV Cameras / CCTV Recorders	IS 13252 (Part 1) : 2010	Information Technology Equipment - Safety General Requirements
41	Adapters for household and similar electrical appliances	IS 302 (Part 1) : 2008	Safety of Household and Similar Electrical Appliances Part 1 General Requirements
42	USB driven Barcode readers, Barcode scanners, Iris scanners, Optical fingerprint scanners	IS 13252 (Part 1) : 2010	Information Technology Equipment - Safety General Requirements
43	Smart watches	IS 13252 (Part 1) : 2010	Information Technology Equipment - Safety General Requirements

2. The provisions of “Electronics and Information Technology Goods (Requirements for Compulsory Registration) Order, 2012” shall apply on the items added by virtue of this Order to the schedule of the said Order on the expiry of six months from the date of publication of this notification in the official Gazette.

3. For all the goods mentioned in the schedule, the latest standards as published & notified by BIS from time to time would apply on expiry of six months from the date of notification of such standards by BIS. For goods already registered till such time, the surveillance testing as and when carried would be as per the latest standards. Further, renewal of registration would be done to the latest standards as per the provisions of the Compulsory Registration Scheme on expiry of validity of registration cycle.

Note : The Principal Order was published in the Gazette of India, Extraordinary vide S.O.number 2357(E), dated 3rd October, 2012 and subsequently amended vide S.O.2034(E) dated 5th July, 2013 S.O.3022(E) dated 4th October, 2013, S.O. 2905(E) dated 13th November, 2014, S.O.345(E) dated 3rd February, 2016 S.O.638(E) dated 10th Februrary, 2016 adn S.O.3509(E) dated 24th October, 2016.

Welcome to new members - isle

Name	Membership No.	Grade	State Centre
Regulavalasa Gowrisankara Rao	F.0875	Fellow	Chennai
Bijendra Kumar	F.0876(L)	Fellow (Life)	Delhi
Pravin Jivraj Jain	F.0877(L)	Fellow (Life)	Mumbai
Enugurthi Srinivasa Chary	F.0878(L)	Fellow (Life)	Chennai (HLC)
Vijayakumar Gupta Kopuri	F.0879(L)	Fellow (Life)	Chennai (HLC)
Arnab Bose	F.0880(L)	Fellow (Life)	Calcutta
Amit Wadhwa	F.0881(L)	Fellow (Life)	Delhi
Atul Kumar Gupta	F.0882(L)	Fellow (Life)	Delhi
Yasa Linga Reddy	F.0883(L)	Fellow (Life)	Chennai (HLC)
Krishan Gopla Sharma	F.0884(L)	Fellow (Life)	Rajasthan
Ajay Kishan Umargekar	F.0885	Fellow	Mumbai
Durairajulu Sriramulu	F.0886	Fellow	Chennai
Arvind Garg	F.0887	Fellow	Delhi
Harmandeep Singh Ahluwalia	F.0888(L)	Fellow (Life)	Delhi
A. Muthukumarasamy	M.2062(L)	Member (Life)	Chennai
Sudhir Ghanshyam Patil	M.2063	Member	Mumbai (PLC)
Shashibhushan Subhash Agrawal	M.2064(L)	Member (Life)	Mumbai (PLC)
Dinesh Kumar	M.2065(L)	Member (Life)	Calcutta
Arindam Bhattacharyya	M.2066(L)	Member (Life)	Calcutta
Indrajit Banerjee	M.2067(L)	Member (Life))	Calcutta
Joyeeta Bhattacharjee	M.2068(L)	Member (Life)	Calcutta
Saswata Chakraborty	M.2069(L)	Member (Life)	Calcutta
Rakesh Kumar Bhargava	M.2070(L)	Member (Life)	Delhi
Senthil Bownraja	M.2071	Member	Chennai
K. Surendra Bohra	M.2072(L)	Member (Life)	Chennai
Abhishek Singh	M.2073(L)	Member (Life)	Rajasthan
Biswarup Modak	M.2074(L)	Member (Life)	Calcutta
Sanjib Paul	M.2075(L)	Member (Life)	Calcutta
Ajay Balgotra	M.2076(L)	Member (Life)	Delhi
Dipayan Nath	M.2077(L)	Member (Life)	Calcutta
Harsh Vardhan	M.2078(L)	Member (Life)	Delhi
Parthasarathi Satvaya	M.2079(L)	Member (Life)	Calcutta
Sayantanu Dutta	A.1356(L)	Associate (Life)	Calcutta
Seema Choudhary	A.1357(L)	Associate (Life)	Rajasthan
Satish Kumar Choudhary	S.2436	Student	Calcutta
Soumyashish Bose	S.2437	Student	Calcutta
Rounak Mukherjee	S.2438	Student	Calcutta
Priyanshu Barnwal	S.2439	Student	Calcutta
Saurav Pandey	S.2440	Student	Calcutta
Priyanka Kumari	S.2441	Student	Calcutta
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