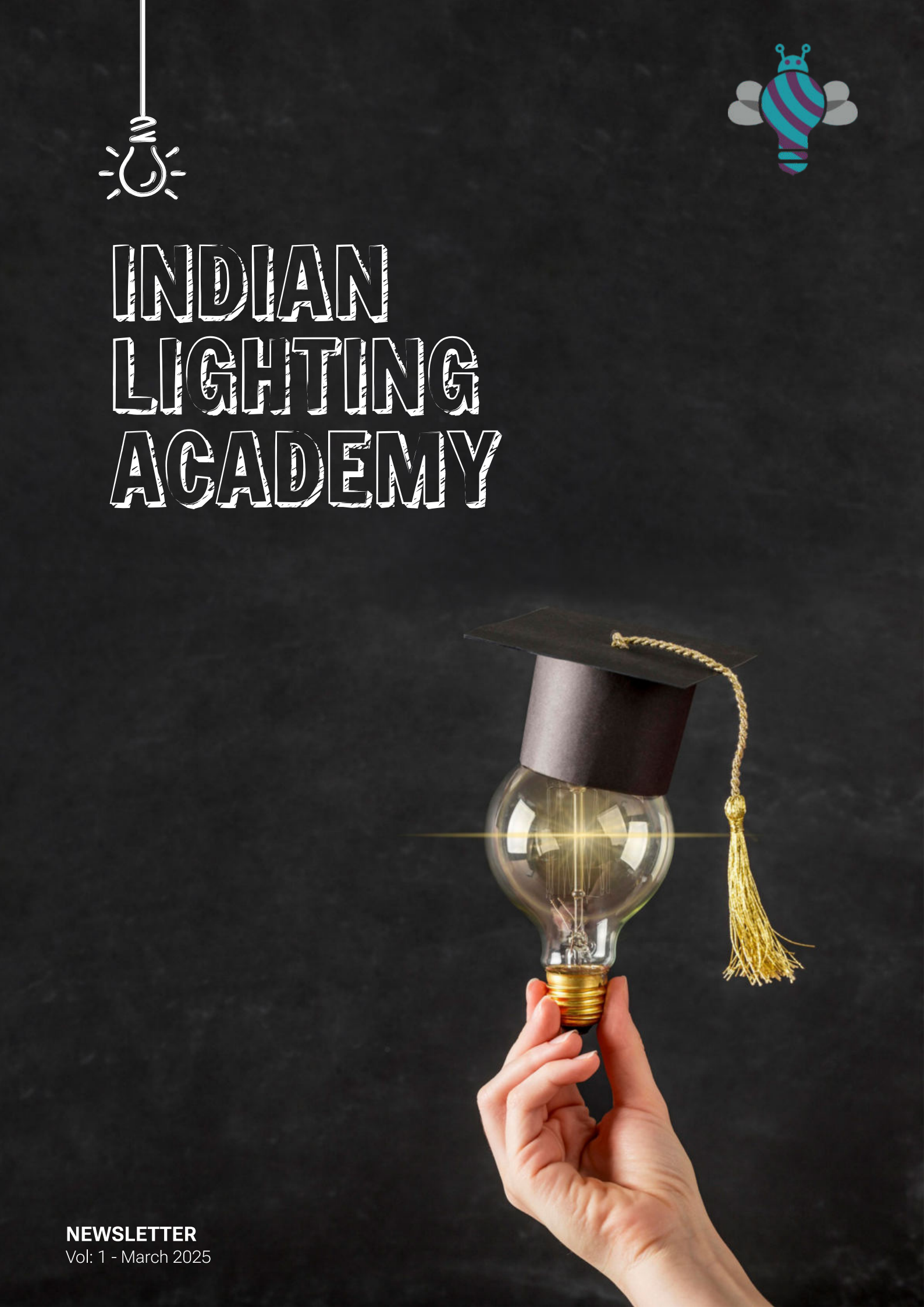
INDIAN LIGHTING ACADEMY



NEWSLETTER
Vol: 1 - March 2025

from the desk of

Biju John

Lighting the Path to Greater Business Opportunities!

Hello Friends,

Welcome to the world of unlimited opportunities at Indian Lighting Academy (ILA), a Revolutionary Business Networking Platform for Lighting entrepreneurs.

The lighting industry is undergoing rapid transformations, driven by innovation, sustainability, and the growing demand for energy-efficient solutions. However, amid these advancements, businesses often struggle with finding the right suppliers, liquidating surplus inventory, bidding for projects, and expanding their reach in a highly competitive market. This is where our Lighting Business Networking Platform, ILA comes in an exclusive and thriving group that has successfully connected 1000+ lighting manufacturers and suppliers for seamless business interactions.

As the founder of this group, I take immense pride in witnessing how this initiative has empowered businesses, fostered collaborations, and created real business opportunities. What started as a simple idea to bring industry professionals together has evolved into a dynamic, result-oriented platform that facilitates networking, business growth, and industry knowledge sharing.

This group is more than just a chat space—it is a powerful ecosystem where members can:

- Discover Reliable Suppliers – Get direct access to trusted manufacturers and suppliers.
- Promote Products & Services – Showcase your latest innovations, solutions, and special offers.
- Liquidate Surplus Inventory – Convert excess stock into revenue efficiently.
- Participate in Bidding Opportunities – Gain access to projects and tenders within the network.
- Engage in Business Networking – Build strategic partnerships for long-term success.

The industry has highly appreciated this initiative, and the overwhelming response from members further reinforces the need for such a collaborative platform. It is not just a group—it is a movement, a revolution in the way the lighting industry connects and thrives.

Taking this initiative a step further, I am thrilled to announce the launch of our first-ever Lighting Business Newsletter—a knowledge-driven digital publication that will serve as a valuable resource for industry professionals.

We tried our best to collect the features and articles which includes,

- Technical Articles – Gain deep insights into the latest trends, innovations, and advancements in lighting.
- Business Insights – Learn strategies to grow

your business and stay ahead in the competitive market.

- Case Studies – Real-world success stories that offer practical lessons and inspiration.
- Exclusive Advertisements – Promote your brand and products to a targeted audience.

This bi-directional platform is designed to empower members by providing unmatched visibility, credibility, and market access. It is not just about reading industry updates—it is about leveraging the platform to position yourself as a thought leader, explore new business opportunities, and strengthen your brand presence.

Your Ideas Can Shape the Future – Let's Elevate This Platform Together!

The success of this platform is a testament to the collective power of our members. To take it to the next level, I invite each one of you to share your innovative ideas, feedback, and suggestions on how we can further enhance this community.

- What new features or initiatives would you like to see?
- How can we improve business networking within the group?
- What challenges can we address together as an industry?

Your insights and recommendations are invaluable, and I am committed to making this platform even stronger, more impactful, and beneficial for all members. Let's collaborate, innovate, and shape the future of business networking in the lighting industry!

Make the Best Use of This Platform – The Future is Bright!

The lighting industry thrives on innovation, collaboration, and adaptability. This platform is built on the same foundation—to create an ecosystem where everyone benefits, grows, and succeeds together.

I urge every member to actively participate, contribute, and leverage the full potential of this group and newsletter. Share your expertise, network with industry leaders, and turn opportunities into real business success.

Together, let's illuminate the path to a brighter, more connected, and prosperous future!

Welcome to the future of business networking in the lighting industry!

Biju John

Founder, Indian Lighting Academy

Content

TECHNICAL

BUSINESS

CASE STUDY

OFFICE LIGHTING:
A Balance between Efficiency & Well-Being

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Dario Piermatteo is a Field Application Manager at Khatod Optoelectronic, specializing in innovative optical solutions. With over a decade of expertise in lighting and optoelectronic components, he combines technical knowledge with market insights. A Biomedical Engineering graduate with training in Strategic Marketing, he excels in product development using injection molding, extrusion, and casting. His work advances Khatod's mission of delivering high-quality optical solutions.

Most of our waking hours are spent in closed spaces and the only light we see is artificial. This is especially true in office lighting, where we not only spend a great amount of time, but also perform demanding tasks. In these spaces we long for natural light to give us a boost in the day-by-day activities, and often, the only light we get is at dawn, dusk, or coming from a window.

Office lighting has a great goal: it must mimic natural light in all its aspects. This is a starting point for luminaire makers: to put the Sun in a small box and have it switched on and off at will. A challenging task.

Luckily, optics can support this challenge.

Sun light and white light

The Sun is Earth's primary light source, and as human beings, we naturally evolved our vision to match the Sun's spectral emission. The Color Rendering Index is giving exactly 100 only under natural daylight, and CCTs are changing throughout the day. In the past, when Neon Light was used, there could be only a fixed CCT for the whole working day. The same tendency has been found in the initial moments of the LED.

Today, LEDs in multiple CCTs are available in the market, PCBs are relatively cost-effective, and control systems like DALI are well available and affordable. This allows for tuning white LEDs throughout the day. Starting from a CCT of around 2700K in the morning, the LEDs can rise in CCT up to 6500K during midday and drop back to around 2000K in the evening. It is one of the key features of or well-being: perceive the subtle changes in color, steady and constantly, and allow our body to feel the passage of time.

Optics must comply with perfect color-mixing ability, to allow Tunable White and a smooth passage between each color temperature. Only so, the illusion of being outside, while working

on a PC, can be created.

Glare – what to do?

Except if you look directly in to the Sun, it will naturally occur to you, that whatever is sunlight has absolutely no glare. That seems to be almost impossible if you think that at midday you have a staggering 100.000 lux around you: no luminaire is capable of doing it. Understanding however how nature works, will help us make better lights.

The Sun spreads over the sky and allows for very diffused illumination. Spreading its candlepower over a very big surface lowers the sky's luminance close to zero. The ideal source for an office must be low-glaring, and therefore cover the full ceiling and spread a lot of light, shouldn't it? This idea often clashes with design requirements, power supplies and other needs in the building. The trend for luminaires is then to go smaller and smaller in dimensions, which would actually increase luminance and therefore glare.

In this case as well, optics play huge roles, when complying to UGR as defined in EN 12464-1, which in its latest update also includes uniformity as a must. Optics should lower the luminance over angles of 65° to obtain the desired UGR of 19 in office spaces. Pushing the boundaries of a UGR of 16, a more comfortable office environment is created.

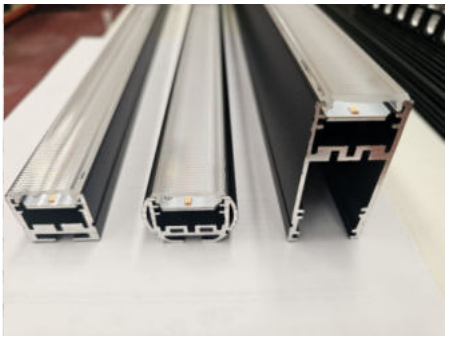
UGR and efficiency

One may think, that UGR is a direct enemy of energy efficiency: if we should reduce the luminance over the angles of 65°, then we have an immediate reference of spacing of luminaires, a direct amount of luminaires and an absolute power to drive them. Well, not quite.

It is true that luminance on angles above 65° should be lowered, so whatever luminaire should stay in a total beam width of 130° maximum. The real fact is that optics are working towards shaping the light in this 130° cone, allowing for powers and light to be modeled around the target areas, caring for max uniformity. As true as it is, that there is an UGR standard, so much is there a human perception and a complexity in every space. Scattering of light on surfaces brings greater value to uniformity and to well-being, that the sole UGR score. So whenever there is an efficiency problem, there is an efficiency solution: allow the designer to take leverage of the environment, its scattering properties and its materials. It will create the perfect efficiency balance.

Optics and Research

Khatod has long stayed in the optics business, to understand the impact of sunlight in office spaces and share this knowledge to everyone willing to participate in this vision: our core product for offices ANDROMEDA, includes the above 3 key concepts in a slim linear shape. Equipped with 14 optics, it allows space for up to 28 LEDs, has color mixing capabilities and strikes a perfect UGR 16 at 4.000 lm per meter – the highest on the market.



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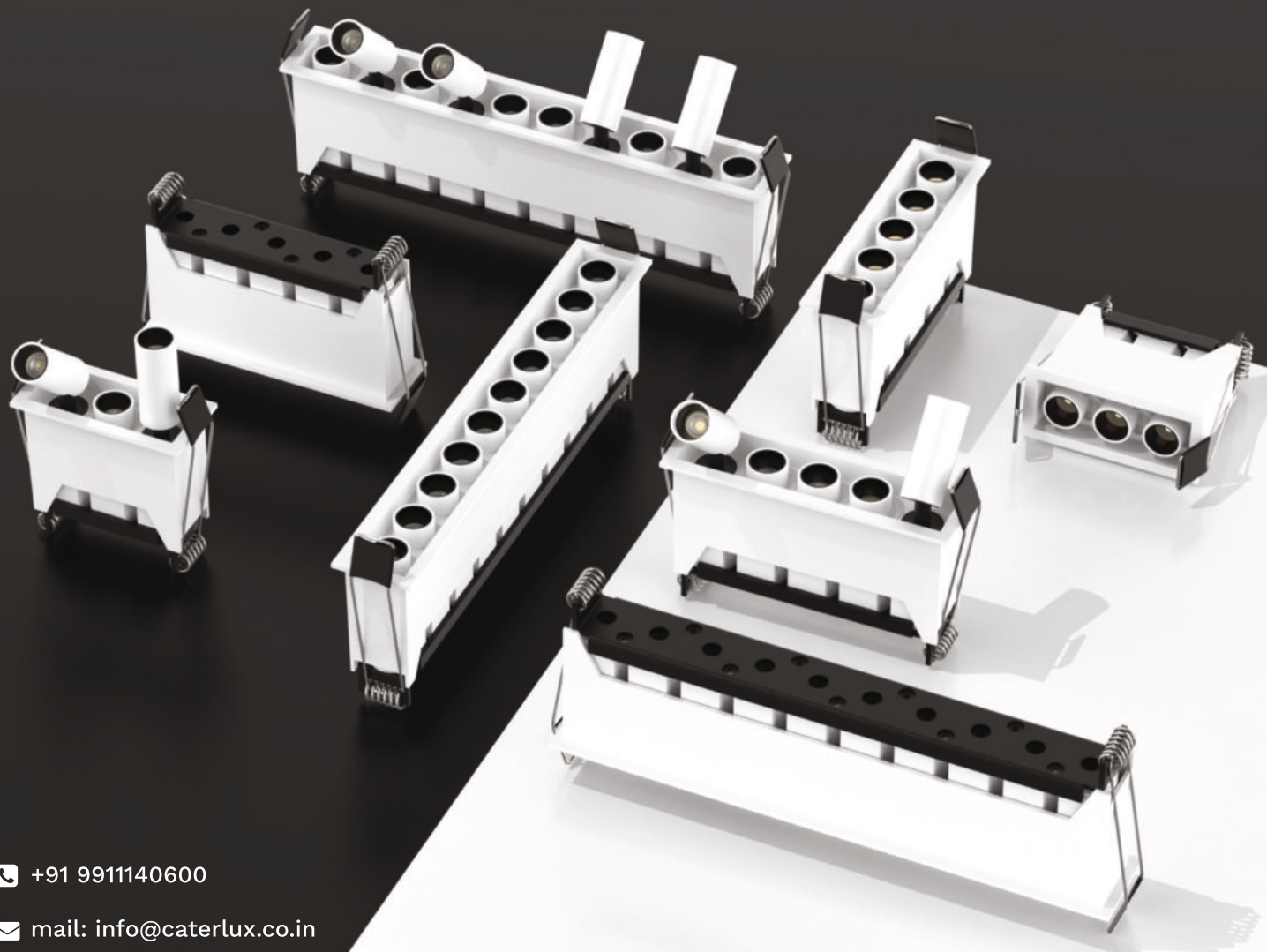

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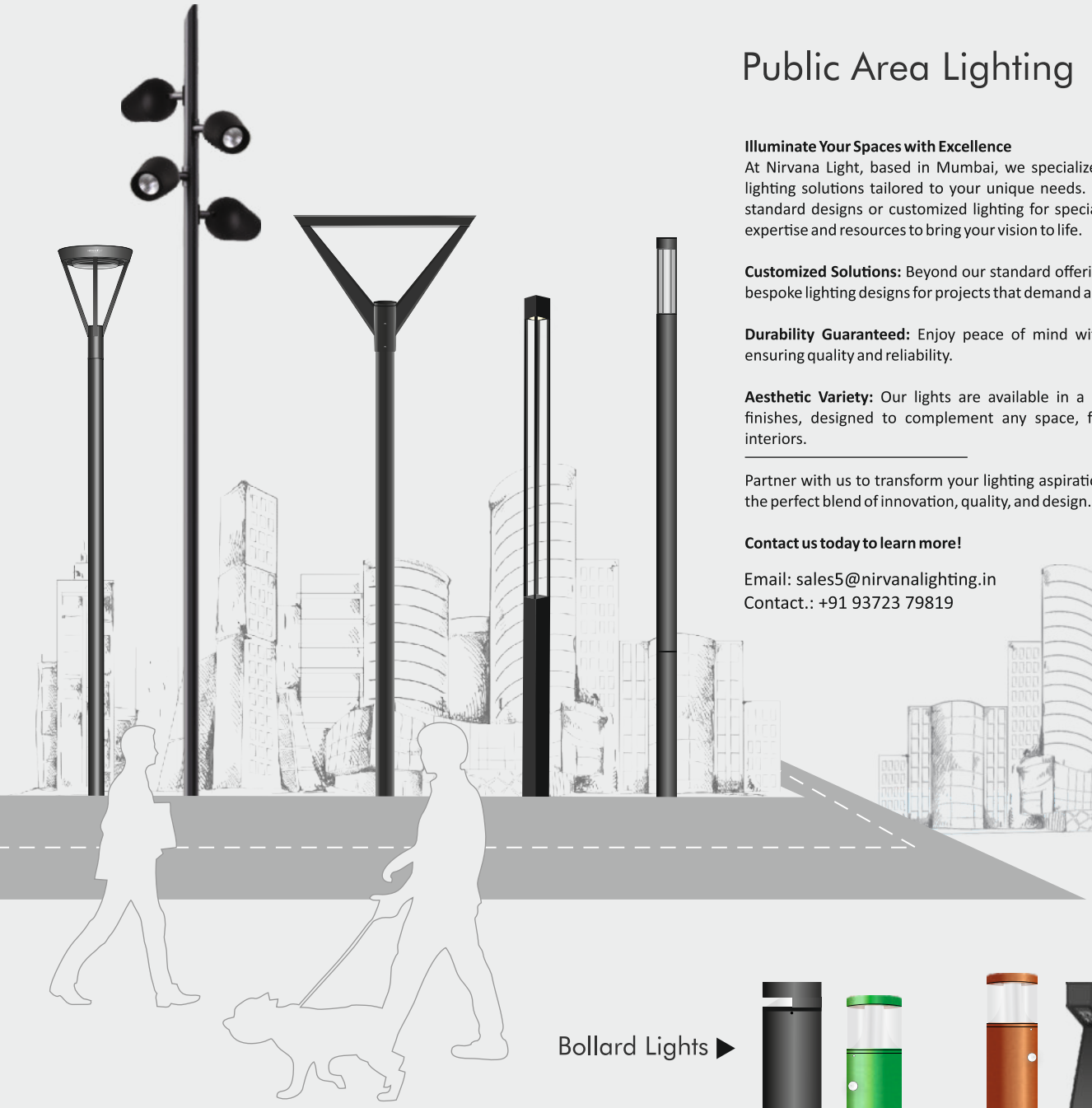

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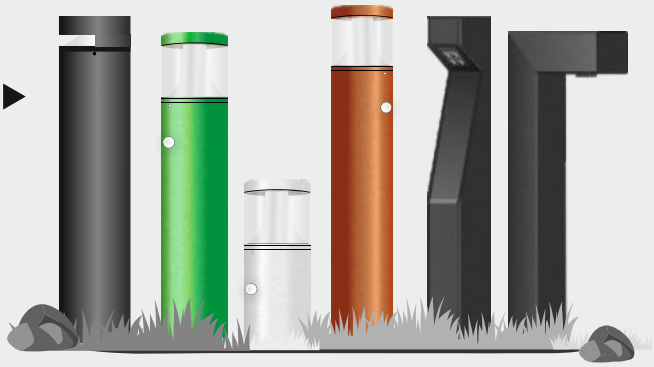

◀ Garden Lights

Made In India

Compliance to the Illumination levels: Market Opportunity

Satish Nanadikar
Director: Qixing Technologies, Pune
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A Proactive and Creative Marketing Professional with 4 decades of experience in Components as well as Lighting Domain. Majority of experience on Industrial Lighting with A Demonstrated Record of Achievements in Conceiving & Implementing Innovative Business Development Ideas to Explore Market, Create Niche Segments & Formulate Product Strategies.

This article is focused on to Industrial/commercial office applications (mainly industrial) where risks of noncompliance is very high.

Compliance to the illumination levels , in today's world it has become more critical than ever before. On one side we have LED technology offering the sophistication , user friendly interface and energy efficient solutions like dimming controls etc. while on the other side for all of us , SCREEN TIME for TV , Mobile etc are increasing. Supply side Competition has increased and as result lot of low quality lamps are also in the market.

Its observed that often the design for illumination is done quite quickly at the initial stage of the project , but unfortunately decision on LED fittings is taken at the end of the when the budgets for the project are almost finished and then project manager is forced to compromise on the lighting installations. (either in cost / quality / qty). One more factor is that unless the LED fittings are installed , no other work related to plant and machinery installation can start. This puts more pressure on the project team to complete the LED installation in hurried manner creating chance for compromise on the installation.

The illumination design is always made meticulously as per desired standards, Lamp locations, control group for switching etc. and is very well planned. However, by the time, project is completed and handed over to the production team, few other issues come up, such as machine layout is revised, workstation locations altered, but the lamp are already installed at designed locations and this does not match with such revisions. Some other structures like Air ducting, cable trays etc.. are added, further effecting the direct illumination at the work area. If the project is taking long time for

completion due to various reasons such as more number of workshops , complicated machinery installation etc., it takes long time to actually hand over the facility to production . By that time, much of the lamp life is already over, Illumination levels are on the border of required standards or sometimes even below the desired standard (partially due to the compromised lighting cost !!)

While a lot of attention is given during the initial design and installation stage, the compliance to the illumination levels often ignored at later stages when the facility actually starts running with full capacity.

This happens due to various reasons such as

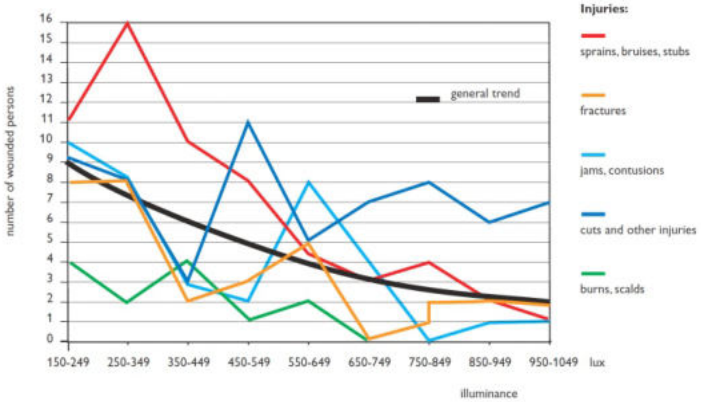
- Production priority: When the plant is running with full capacity , No body wants to stop / hold production for changing – repairing the lights .
- Temporary solution: Due to pressure from operators and (then in turn HR dept) the maintenance manager , put an additional flood light on a nearby location. This can become unsafe and create "possibility of accident". For example, typically such flood light is placed on nearby pillar at low height which is reachable by a normal ladder. This illuminates the work area but GLARE of flood light installed can make the operator / fork lift driver blind for few seconds and its enough to cause accident.
- Maintenance cost: The budgets for maintenance are always on lower side and mainly allocated for plant machinery . Somehow repairing / changing the lights does not get enough budget. Then temporary solutions are implemented !!
- Ignorance of illumination levels : Operating people/workers are ignorant about what is the LUX level they are supposed to work !! Many facilities don't even have a LUX meter to measure the LUX level on regular basis.
- Human EYE: It is the most magical sensing organ in our body. It can work under extreme conditions. Even in full dark or full sun light one is able to see and work. The drop in the LUX levels is not SUDDEN phenomenon. It happens gradually and such gradual drop is NOT sensed by daily operators. It needs someone outsider/auditor to point this out.

Risks of Non Compliance :

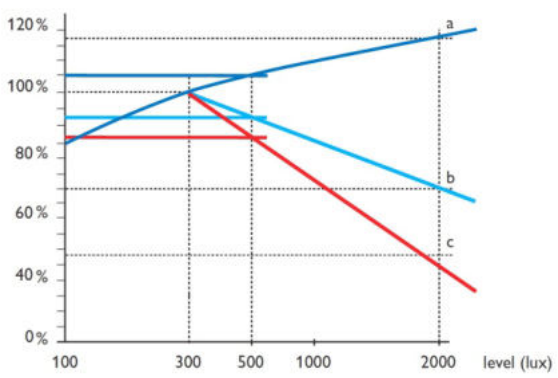
Noncompliance to the illumination level , cost anything from a simple injury, loss of vision (eye site) to human life.

Although LED has become a "symbol" of "Energy efficient Plant", the total electrical load of lighting is much less. (less than 5% in many plants or if I may say even in commercial offices) So even if the lights are kept OFF, the saving is negligible w.r.t. total electrical load. But in spite of this fact , still illumination levels are compromised at the cost of human health and safety.

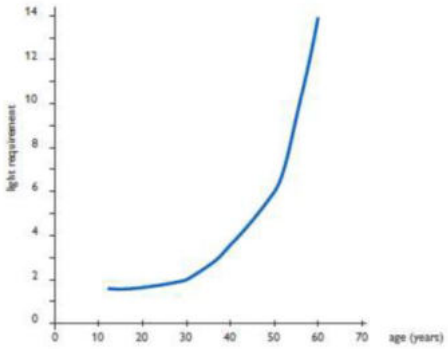
Maintaining the Illumination level is very important. It is directly related to Safety and productivity. Please see following data taken from Philips handbook on Industrial Lighting.



Graph - 1



Graph - 2



Graph - 3

Graph -1: X axis: illumination level Y axis: Number of wounds/accidents
Graph -2: X axis: illumination level Y Axis: Number of Rejects & accidents
Graph -3: X axis: Age of the worker Y axis: Light required to read

Safety audits includes a report on illumination levels buts unfortunately the discrepancies in LUX levels are resolved by some temporary cheap solutions due to the urgency.

In few countries there are financial penalties for not maintaining the LUX levels. But apart from penalties, such plants / offices are running a great risk by playing with the employee's EYE SITE (VISION). By continuously working under poor lighting conditions be it lower lux levels , wrong colour temperature, flickering lights, Over a long period EYE SITE is badly affected. In addition , the AGE factor of the employee also plays important role. More the age , higher is the LUX level required.

In recent days , SCREEN TIME is increased. Mobile screens / TV screens, has occupied much of our life. Our eyes are exposed to much higher stress level like never before. This makes it more critical for the plants / offices to inspect and maintain the LUX levels.

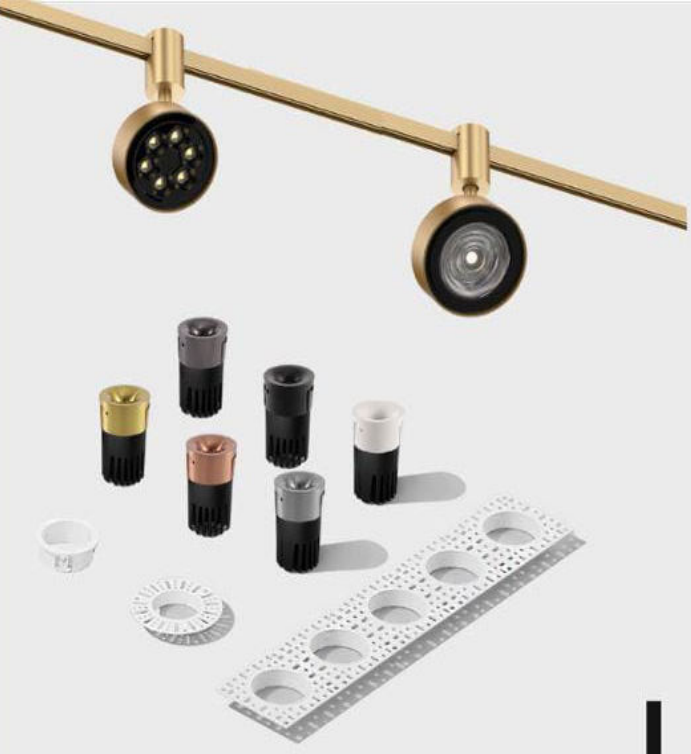
How does this situation can become a MARKETING opportunity ??

Gone are the days when sales communication was based on LED's energy efficiency compared with conventional technologies (CFL, HPSV, MHL lamps). Now, the need is to talk/communicate the importance of LUX level and more importantly the maintenance of these LUX levels.

Lights manufacturing community now has to start spreading the awareness and educating the "end users", the operators / office people about LUX levels and importance of maintaining them up to the desired mark.

There is also great need for re-visiting the LUX LEVEL STANDARDS. The standard made in 70's are still in use. We are going through a period , where human eye is exposed to long hours of screen time, glared lighting , pollution affecting the eyes , the LUX levels at work place certainly needs a revision. Can lighting manufacturing community work together for this noble cause and save EYE SITE of our work force ?

Such collective initiative would increase the awareness about "working in good lighting conditions" can be a pleasant thing. It would make one's life safe and more productive at the work place and of course it would increase the DEMAND !!



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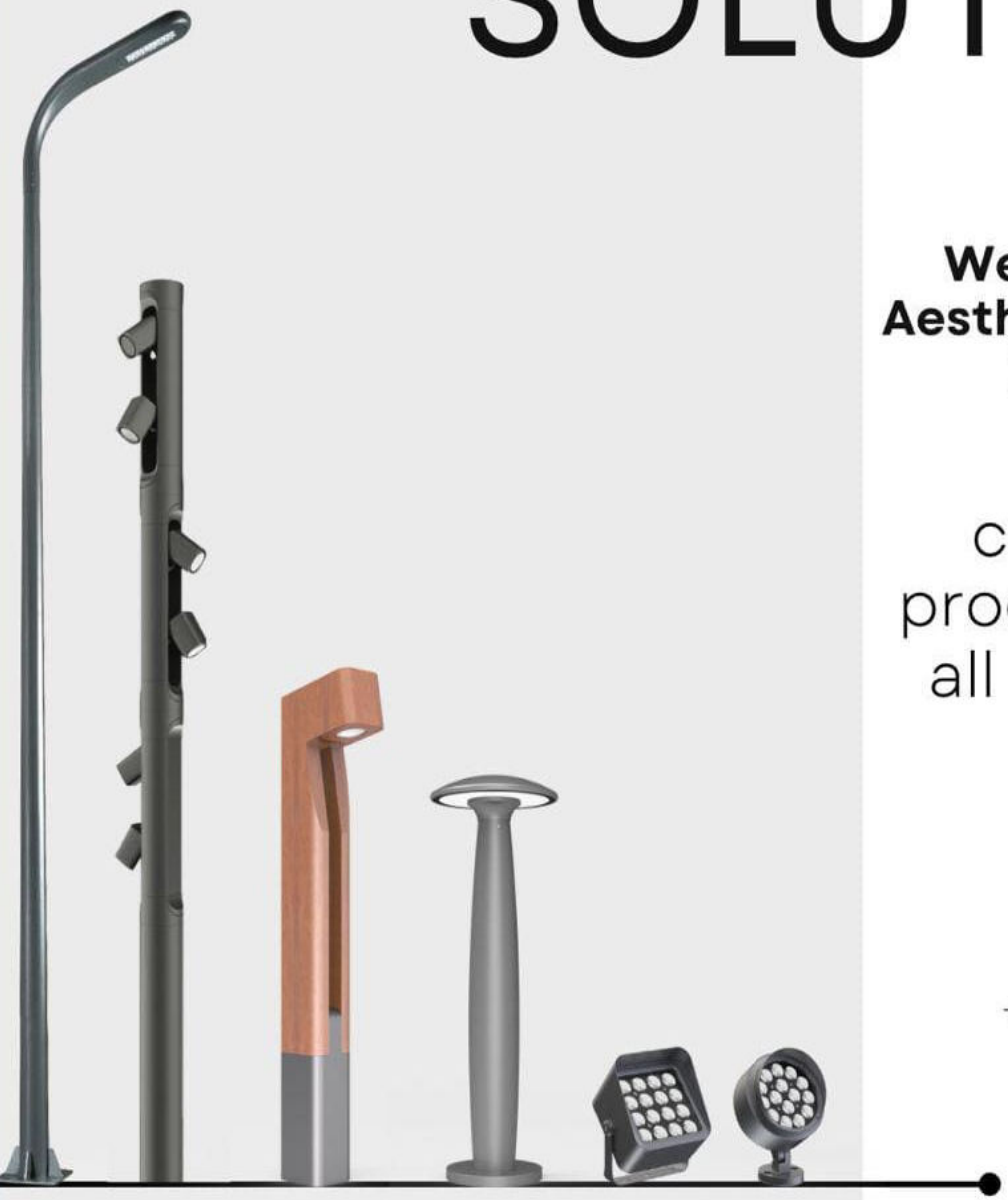

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LEDs can easily be integrated into a circuit design provided that certain design rules are observed.

Some Simple Design Guidelines:

LED lamps are relatively simple to work with – requiring no ignition voltage to start, and generating no nasty spikes or surges. Observing some simple rules of thumb, however, will improve the efficiency of the lamp and prolong its life.

Applications with exacting requirements in terms of light wavelength or other performance can also be readily addressed, provided that some specific characteristics of LED operation are recognised by the designer.

Driving LED light sources

LEDs are semiconductors with light-emitting junctions designed to use low-voltage, constant current DC power to produce light. LEDs have polarity and, therefore, current only flows in one direction. Driving LEDs is relatively simple and, unlike fluorescent or discharge lamps, they do not require an ignition voltage to start. Too little current and voltage will result in little or no light, and too much current and voltage can damage the light-emitting junction of the LED diode.

If you refer to the data sheet

It can be seen that, for a given temperature, a small change in forward voltage produces a disproportionately large change in forward current. In addition, the forward voltage required to achieve a desired light output can vary with LED die size, LED die material, LED die lot variations, and temperature.

As LEDs heat up, the forward voltage drops and the current passing through the LED increases. The increased current generates additional heating of the junction. If nothing limits the current, the junction will fail due to the heat.

This phenomenon is referred to as thermal runaway.

By driving LED light sources with a regulated constant-current power supply the light output variation and lifetime issues resulting from voltage variation and voltage changes can be eliminated. Therefore, constant current drivers are generally recommended for powering LED light sources.

For some applications, current-limiting devices such as resistors can be an inexpensive alternative to constant-current drivers for restricting current flow. However, there are many trade-offs. First, resistors generate heat and, therefore, waste power. The heat generated by resistors needs to be dissipated.

In addition, voltage changes from supply voltage variations will translate into changes in light output, and with resistors alone there is no protection for the LEDs to prevent damage from high voltage. A few applications, such as portable lighting, may tolerate these trade-offs but, for most applications resistors are not recommended.

Light output of LED light sources increases with increasing drive current. However the efficiency, expressed in lumens per watt, is adversely affected.

LED lamps normally have a "Test" current listed on the product data sheets. This Test current is provided as a reference point for other technical information provided. Drive currents may be chosen at any current up to the maximum recommended current for the specific LED light source used. Driving LED light sources above the maximum recommended currents may result in lower lumen maintenance or, with excessive currents, catastrophic failure.

Temperature effects

Performance characteristics of LED light sources are specified for a rated current and for an LED die junction temperature of 25°C. Since most LEDs operate well above 25°C, these values should be considered for reference only and the light output should be based on the anticipated operating temperatures.

The light output from an LED light source decreases with increasing LED die junction temperature. Higher LED die junction temperatures, resulting from increased power dissipation or changes in ambient temperature, can have a significant effect on light output.

So it is always better to drive the LED at least 10% lower than the maximum specified current.

Red and amber die manufactured from the AlGaInP (aluminium indium gallium phosphorus) material system are more sensitive to temperature effects than blue and green InGaN (indium gallium nitride)-based devices.

Therefore, it is important to consider the effects of temperature when designing for specific light output or efficacy levels, and to maximize the thermal management of the system.

In addition to affecting light output, temperature also has an effect on the dominant and peak wavelength. LED die wavelength characteristics are commonly reported at 25°C junction temperatures. With increasing LED die junction temperatures resulting from higher drive currents or ambient conditions, wavelengths typically increase in from 0.03 to 0.13 nm/°C, depending on die type.

Temperature variation can also cause slight shifts in colour temperature for LED white light sources. Applications requiring specific wavelengths or colour temperature should take this effect into account when designing drive conditions and heat sinking.

Electrical design

Driving single LED light sources in non-dimming applications is relatively simple. A constant-current driver is chosen to deliver the desired current, with enough forward voltage output to accommodate the maximum input voltage of the LED source. LED light sources are not designed to be driven with a reverse voltage.

Driving multiple LED light sources with one driver is generally done with the LEDs arranged in series strings to avoid uneven light levels resulting from voltage variations. When selecting a series string driver, the output voltage should be high enough to accommodate the sum of the maximum input voltages of LED light sources.

Dimming and PWM

Dimming LEDs is most commonly done either by lowering the current, or through a technique called Pulsed Width Modulation (PWM).

LEDs have a very quick response time (~20 nanoseconds), and instantaneously reach full light output. Therefore, many of the undesirable effects resulting from varying current levels, such as wavelength shift or forward voltage changes, can be minimized by driving the light engine at its rated current and rapidly switching that current on and off. This technique, known as PWM, is the best way to achieve stable results for applications that require dimming to less than 40% of rated current. By keeping the current at the rated level and varying the ratio of the pulse "on" time versus the time from pulse to pulse (commonly referred to as the duty cycle), the brightness can be lowered. The human eye can not detect individual light pulses at a rate greater than 200 cycles per second and averages the light intensity thereby perceiving a lower level of light.

Thermal design

With increasing power there is increased thermal load and more heat to dissipate. Higher temperatures of the LED light sources can result in reduced lumen maintenance and shorten useful life. When designing a new system, a heat sink should be selected with sufficient cooling capacity to keep the die junction below 85°C.

If designing around an existing heat sink the maximum operating current for a given heat sink design is the lower of (1) The maximum rated current for the LED light source, or (2) The current to maintain the LED die junction temperature below the maximum specified temperature. LEDs generally must be operated at or below a junction temperature of 85°C.

Conclusion

Drive the led with less than rated voltage and current.

When making series parallel connection the maximum voltage of LED string should not exceed 56 volt for long durability.

Some drivers available in the market uses very high voltage string going up to 180-200 volt DC

As u all know the dieelectic used the aluminum PCB has a breakdown voltage of 1KV as per the data sheet of pcb manufacturer.

But this is at a given junction temperature.

During the prolonged use these dieelectic breaks and burn the junction of the LED resulting in failure of the luminaries.

So care must be taken to restrict the string voltage to 56/64 volt maximum.

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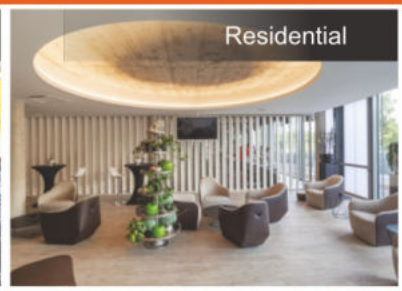

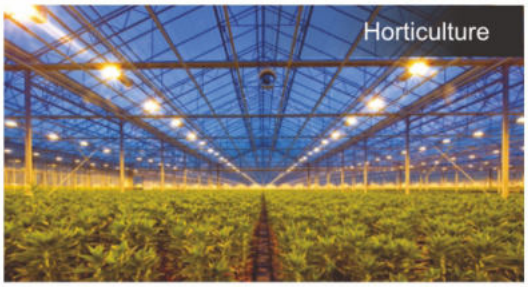

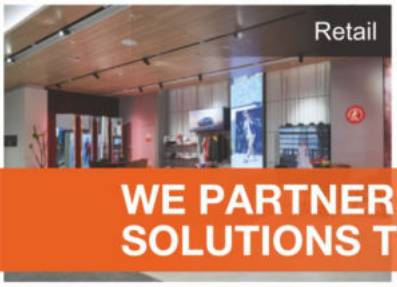

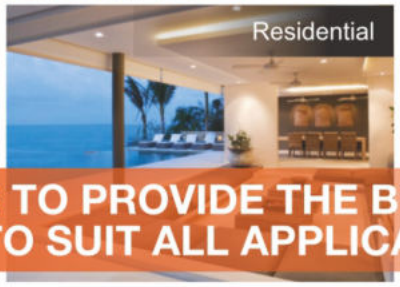

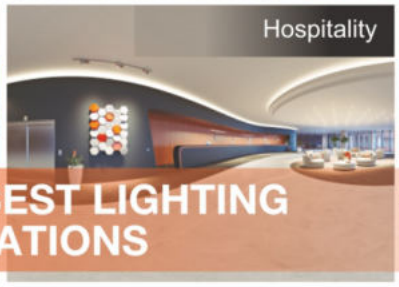

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Technical Outlook on Connected Outdoor Infrastructure: The Future of IoT in Public Spaces

With over 10 years of experience in the connected outdoor lighting sector in India, Akshay Rawane leads the Smart Lighting Business at Jiothings Ltd. His career includes significant contributions at industry giants such as Havells, Schreder, and Bajaj, where he has gained deep expertise in smart and energy-efficient lighting solutions.

Akshay is known for his strategic leadership in driving innovation and technological advancements in the outdoor lighting domain. His experience spans product development, business growth, and market expansion, focusing on integrating cutting-edge IoT and smart technologies to deliver sustainable lighting solutions.

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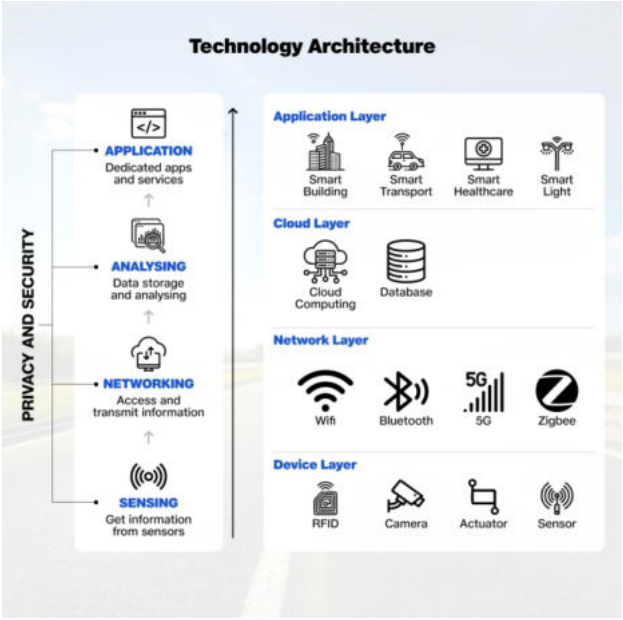
The Internet of Things (IoT) is no longer a futuristic concept—it's rapidly becoming an integral part of the infrastructure that underpins our cities, transport networks, and public services. As urbanisation increases, so does the demand for smarter, more efficient, and sustainable management of outdoor infrastructure. This article delves into the technical architecture and evolving solutions for connected outdoor infrastructure, focusing on the network layers, performance, security, and safety concerns, and offering a glimpse into the future of IoT in public spaces.



Network Architecture for Connected Outdoor Infrastructure

Connected outdoor infrastructure depends on a robust and flexible IoT network architecture that spans across multiple layers of technology to ensure reliable, real-time performance. The architecture is typically broken down into five key components, each with distinct roles and interdependencies:

1. **IoT Devices and Sensors:** The foundation of any connected outdoor system begins with IoT-enabled devices such as sensors, cameras, and actuators that monitor environmental factors, traffic, air quality, and infrastructure health. For instance, outdoor temperature sensors, smart streetlights, and air pollution monitors are examples of devices collecting data to improve public services and safety.
2. **Connectivity Layer:** Communication is vital for outdoor IoT devices to relay data and interact with control systems. This layer comprises various connectivity technologies, each tailored to specific needs:
   a. **LPWAN (Low Power Wide Area** Network): LPWAN technologies such as LoRaWAN and NB-IoT are designed for low-power, long-range communication. These are ideal for remote, large-scale deployments such as smart street lighting, waste management systems, or environmental monitoring.
   b. **Cellular Networks (5G/LTE):** For high-bandwidth applications like connected vehicles, smart transportation systems, and real-time video surveillance, cellular networks like 5G provide high-speed data transfer and low latency.
   c. **Wi-Fi and Bluetooth:** Short-range communication protocols are still relevant in urban outdoor settings for device-to-device communication in local environments such as smart parks or community spaces.
3. **Edge Computing Layer:** The edge computing layer processes data closer to the source, allowing IoT devices to make real-time decisions without relying on cloud-based processing. For instance, streetlights equipped with motion sensors may automatically adjust their brightness without sending data back to the cloud, improving response times and reducing bandwidth usage.
4. **Cloud and Data Processing Layer:** Cloud platforms provide centralised storage, analysis, and management of data from distributed IoT devices. Data from outdoor sensors is transmitted to the cloud where machine learning and AI algorithms analyse trends, make predictions, and trigger automated actions. The cloud layer supports the scalability needed for large deployments across cities or regions.
5. **Application Layer:** The application layer is the user interface that allows stakeholders—whether city planners, utility companies, or transportation authorities—to interact with the system. This layer includes dashboards for monitoring real-time data, issuing commands, and generating reports.
   Performance, Security, and Safety: Critical Considerations
   The effectiveness of connected outdoor infrastructure relies not only on the proper design of each layer but also on addressing the critical aspects of performance, security, and safety at every stage of the IoT solution.

Smart Lighting Technology Benchmarking

		Cellular technologies		Non-Cellular technologies		
Category	**Features**	**NB-IoT**	**GPRS**	**LoRa**	**ZigBee**	**RF Mesh**
Business	Low CapEx	Yes	Yes	No	No	No
	Low Total Cost of Ownership	Yes	Yes	Moderate	Moderate	No
	Future-proof tech	Yes	No	Yes	Yes	No
Technology	Scalability (# of devices)	100,000 devices per network	52,000 devices per network	50,000 devices per network	65,000 devices per network	32 devices per network
	Max data speed	200 Kbps	115 Kbps	50 Kbps	250 Kbps	10 Kbps
	Low latency	Yes	No	Yes	Moderate	No
	High security	Yes	Moderate	Moderate	Yes	Moderate
	High range	Yes	Moderate	Yes	No	No
	Global standard	Yes	Yes	No	Yes	No
	Ease in FOTA	Yes	Yes	No	Yes	No
Operations	Easy Deployment	Yes	Yes	No	No	No
	No vendor lock-in	Yes	Yes	No	No	No
	High Quality of service (QoS)	Yes	No	Yes	Moderate	No
	Ease in diagnostic complexity	Yes	Yes	No	No	No

Yes Moderate No

Performance Optimisation

Connected outdoor infrastructure must support high-performance requirements, particularly in environments where real-time decision-making is essential:

- Low Latency: In traffic management or public safety applications, the system must respond instantly to inputs. For example, connected traffic signals need to adjust based on real-time vehicle flow, requiring a low-latency network connection between devices and cloud platforms.
- Scalability: As cities grow, IoT networks must scale efficiently. The architecture must support the integration of additional devices and handle the growing volume of data without sacrificing performance.
- Data Throughput: Applications like smart video surveillance or autonomous vehicles demand high throughput to manage large volumes of data in real-time.

Security and Data Protection

Outdoor IoT solutions are often deployed in public spaces, making them vulnerable to cyber threats. Ensuring robust security across all layers is paramount:

- Device Security: Physical devices can be tampered with or hijacked. Using encrypted communication, secure boot processes, and tamper-resistant hardware ensures that devices are secure from the outset.
- Data Encryption: All data transmitted between IoT devices, edge devices, and cloud platforms must be encrypted to prevent interception or unauthorised access. TLS/SSL encryption is standard for securing communication.
- Authentication and Authorisation: Proper user authentication mechanisms are required to ensure that only authorised personnel can access the system, especially in critical applications like emergency services or transportation networks.

Safety Considerations

Outdoor IoT systems have direct implications for public safety, making it essential to monitor and address potential risks:

- System Redundancy: In critical infrastructure, such as smart lighting or traffic systems, backup mechanisms must be in place to ensure continuity in case of failure. Redundant connectivity or power sources can ensure that these systems remain operational even during failures.
- Real-time Monitoring: Outdoor IoT systems must be capable of real-time anomaly detection. For example, monitoring bridges for structural health can help identify cracks or instability before they pose a danger to the public.

The Future of Connected Solutions in Outdoor Infrastructure

As the IoT landscape continues to evolve, connected outdoor infrastructure is poised to play an increasingly important role in the development of smart cities, transportation, and public services. The potential benefits include enhanced operational efficiency, improved safety, and better quality of life for citizens. Let's explore some future use cases:

1. Smart Cities

Connected outdoor infrastructure in smart cities will rely on IoT to create adaptive and efficient environments. Systems will automatically adjust based on real-time data, optimising energy use, reducing traffic congestion, and improving waste management.

Example: In smart city initiatives, intelligent traffic lights and smart parking solutions are reducing congestion and improving vehicle flow, leading to lower carbon footprints and better urban mobility.

2. Connected Transportation

Smart transportation solutions are set to transform how we move. IoT-enabled vehicles and infrastructure will communicate to provide seamless and safer transportation experiences. Connected vehicles will alert traffic systems about their arrival, enabling real-time route optimisation.

Example: Autonomous vehicles in urban environments will rely on high-speed 5G networks and V2X (Vehicle-to-Everything) communication, ensuring smooth, safe, and coordinated traffic management.

3. Connected Outdoor Lighting: A Smart Solution for Energy Efficiency

One of the most impactful examples of connected outdoor infrastructure is smart street lighting. By using IoT-enabled sensors and NB-IoT or 5G connectivity, streetlights can adapt to the surrounding environment in real-time. These systems automatically adjust their brightness based on factors like pedestrian

movement, ambient light levels, or weather conditions. Additionally, connected streetlights can send alerts for maintenance needs, reducing downtime and improving efficiency.

Example: In cities like Vadodara, Naya Raipur, and Ludhiana smart streetlight solutions are being implemented where lights automatically adjust as per user preference. These systems help conserve energy and reduce operational costs by ensuring that lights are only at full brightness when needed. Moreover, the system can alert authorities when lights are malfunctioning, enabling quick repairs and enhancing safety.

4. Disaster Management and Public Safety

Connected outdoor infrastructure can play a critical role in disaster prevention and management. IoT sensors will monitor infrastructure integrity (e.g., dams, bridges) and environmental conditions (e.g., earthquakes, floods) to provide real-time data that can trigger early warnings and inform emergency responses.

Example: In flood-prone areas, IoT-enabled sensors embedded in riverbanks or storm drains can detect rising water levels and send automatic alerts to local authorities, facilitating prompt evacuation and resource mobilisation.

5. Sustainability and Environmental Monitoring

Outdoor IoT infrastructure can help track environmental conditions such as air quality, pollution levels, and water quality in real-time. By leveraging this data, cities can enact policies that help reduce pollution, improve green spaces, and monitor resource usage.

Example: Smart waste management solutions are equipped with IoT sensors that monitor fill levels in trash bins, ensuring optimal waste collection schedules, reducing unnecessary carbon emissions, and improving recycling rates.

Conslusion

The future of connected outdoor infrastructure lies in the seamless integration of advanced IoT technologies to create more efficient, sustainable, and safe environments. By leveraging cutting-edge connectivity, edge computing, and cloud platforms, the transformation of public spaces and infrastructure is underway globally.

India, with its rapidly growing urban population and a surge in smart city initiatives, is poised to

be a leader in this sector. The country's strong presence in NB-IoT, 4G, and the upcoming 5G network deployment positions it as a global hub for innovative IoT solutions. India's robust telecommunications infrastructure ensures that cities, both large and small, can support large-scale, high-performance IoT applications in outdoor infrastructure, ranging from smart street lighting to environmental monitoring and connected transportation.

The government's push toward digitalisation, along with strategic initiatives such as the Smart Cities Mission, is accelerating the adoption of connected solutions across India. With a large-scale rollout of NB-IoT and 5G networks, Indian cities are benefiting from low-power, long-range connectivity for IoT devices, enabling real-time data transfer and improving the efficiency of outdoor infrastructure. These advancements are enabling cities like Vadodara, Naya Raipur and Ludhiana to embrace smart solutions, transforming them into models for sustainability, safety, and enhanced public services.

As India continues to invest in next-generation connectivity and smart technologies, the country will lead the way in shaping the future of outdoor infrastructure, setting a global standard for innovation, scalability, and sustainability in connected solutions.

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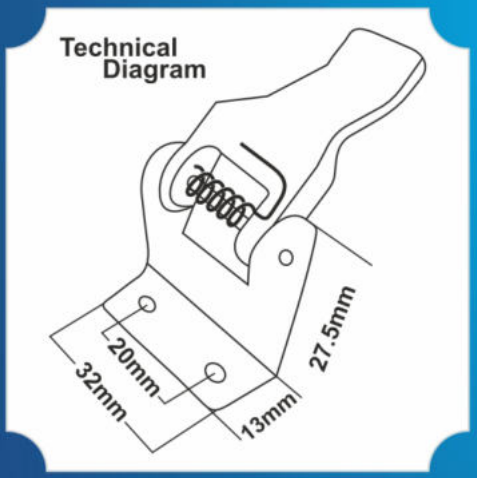

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DVRS Sastry is a seasoned professional with more than 30 years experience in the lighting industry. He has held significant roles, including serving as Technical Expert in the area Product Development and Technology at Bajaj Electricals Ltd. And Crompton Greaves Ltd.. Currently, he is working as Technical Expert in area of Lighting in an EPC company having global foot print across the world.

The Make in India initiative was launched in 2014 to transform India into a global manufacturing hub. This initiative has not only boosted manufacturing in the country but has also increased employment opportunities for millions of people. The lighting sector is one of the many industries that have been able to leverage the Make in India initiative for maximum employment and expansion in the country. According to a report by ResearchAndMarkets.com, the Indian lighting market is expected to grow at a CAGR of 12.7% during the period of 2021-2026. The demand for energy-efficient lighting products is on the rise due to the increasing need for sustainable development. The government has also been promoting the use of energy-efficient lighting products to reduce the country's carbon footprint. The lighting industry in India has completed a long journey. LED lighting has changed the dynamics of lighting industry.

The Make in India initiative has provided an excellent opportunity for the lighting sector to cater to the growing demand for energy-efficient lighting products. The government has introduced various schemes and incentives to promote the manufacturing of energy-efficient lighting products in the country. These schemes have not only boosted the manufacturing of lighting products but also increased employment opportunities in the sector This is due to the increasing demand for energy-efficient lighting products in the country. In this article, we will explore how the LED lighting sector is leveraging Make in India for maximum

employment and to expand the sector:

Lighting technologies have completed a long journey. In 2007 , it was indicated that lighting for general illumination accounts for more than 8% of the world's primary energy consumption. However, the technology used in traditional lighting (e.g., incandescent, fluorescent, and high-intensity discharge lamps) is not very efficient and converts less than 25% of the input energy into useful light. Solid-state lighting (SSL) is a rapidly developing technology whose efficiency of converting electricity into white light may reach 50% in the next few years. Additionally, this technology will be used in many applications such as Visible Light Communication (VLC). The above reasons force researchers to find cost-effective energy-saving solutions, and over the years, the Light-emitting diode (LED), which is a form of SSL become part of our daily lives.

LED is driving a significant transformation in the lighting industry by offering enhanced energy efficiency, durability, design flexibility, and advanced features. As technology continues to evolve, LED lighting is likely to play an increasingly central role in shaping the future of lighting. Moreover, LED lights have found applications in various technologies beyond traditional illumination. The characteristics of LEDs, such as their energy efficiency, compact size, and ability to emit light of different colours, make them suitable for a wide range of applications.

In case, we become particular towards the domestic scenario, the manufacturing of LED lighting products in India has gained momentum in recent years due to the increasing demand for energy-efficient and eco-friendly lighting solutions. The Indian government's initiatives to promote the use of LED lighting and reduce energy consumption have further boosted the LED industry. Overall, the manufacturing of LED lighting products in India is a dynamic and growing sector, driven by a combination of government support, market demand, and a focus on quality and innovation. The industry's continued development contributes to energy conservation, environmental sustainability, and the creation of employment opportunities in the country.

2. Self-reliance India in manufacturing of LED lighting

2.1. Domestic Manufacturing

2.2. Energy Efficiency

2.3. Reducing Imports

2.4. Incentives and Subsidies

2.5. Research and Development

2.6. Skill Development

2.7. Safety and Quality Standards

2.8. Export Promotion

3.1 Increased employment opportunities

3.2 Reduced Dependence on Imports

3.3 Technological advancement

3.4 Increase in the use of LED lighting products

3.5 Reduction in the cost of LED lighting products

4. Challenges in the way of self-reliance in LED lighting

While India has made significant strides in promoting self-reliance in the manufacturing of LED lighting, there are several challenges that the country is facing in achieving full self-sufficiency in this sector. We may broadly segregate the challenges into two categories, general challenges and technological challenges.

4.1. General challenges:

- Heavy Dependence on Imports
- Global Competition
- R&D Investment
- Quality Control and Standards
- Supply Chain Challenges
- Cost of Production
- Infrastructure and Power Supply
- Economic Uncertainties
- Environmental Regulations
- Scale and Volume
- Skills Shortage
- Lack of Integrated Ecosystem

3.2. Technological Challenges:

- Component Availability
- Technological Innovation
- Quality Control

- Efficiency and Heat Management
- Colour Consistency
- Smart Lighting Integration
- Environmental Considerations
- Testing and Certification
- Energy Efficiency
- Miniaturization and Form Factors
- Harmonizing with Power Supply
- Customization and Specialized Products

5. Applications of LEDs are beyond lighting

The typical properties of LED lights like their energy efficiency, compact size, and ability to emit light of different colours, make them suitable for a wide range of applications [10]. The versatility of LED technology and its integration into various fields contribute to advancements in efficiency, performance, and functionality across different industries. In this connection, some notable examples are given below:

5.1. Electronic Displays

5.2. Backlighting for Screens

5.3. Automotive Lighting

5.4. Traffic Lights and Signals

5.5. Medical Devices

5.6. Horticulture Lighting

5.7. Street Lighting

5.8. UV-C Disinfection

5.9. Consumer Electronics

5.10 Phototherapy in Medicine

5.11. Communication Systems (Li-Fi):

6. Futuristic technology in LED lighting

OLED Lighting

Li-Fi (Light Fidelity):

Quantum Dots:

- Human-Centric Lighting
- LiDAR and Gesture Control
- UV-C LED Disinfection
- Li-Fi Indoor Positioning
- Integration with IoT
- 3D Printing of Light Fixtures
- Energy Harvesting LEDs
- Nanotechnology
- Solar-Powered LEDs

7. Way forward

Despite these challenges, India's initiatives and policies aimed at promoting self-reliance in LED manufacturing are making progress. The government and industry stakeholders are working together to address these issues and create an environment conducive to domestic LED manufacturing and innovation.

A recent report indicates that with the support of the government in the form of ambitious national Semiconductor projects and initiatives of industry, India is going to penetrate the global market of the semiconductor industry. According to the reporting, India makes strides in semiconductor manufacturing with small, and inexpensive LED driver chips.

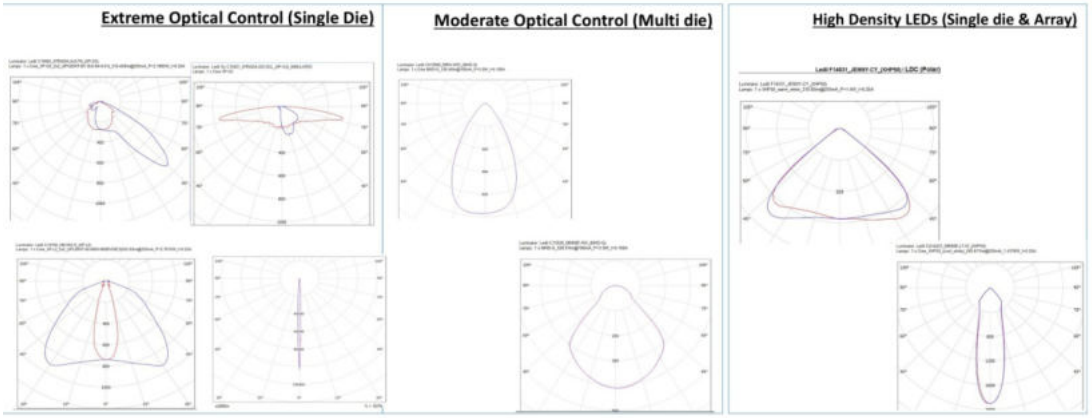
To overcome these technological challenges and promote self-reliance in LED manufacturing, India needs to invest in research and development, encourage collaboration between industry and academia, and provide incentives for the development of innovative technologies and processes. Additionally, fostering a supportive ecosystem that includes specialized suppliers and testing facilities can help Indian LED manufacturers stay competitive and technologically advanced.

The futuristic technologies in LED lighting are expected to offer improved energy efficiency, innovative designs, and enhanced functionality for a wide range of applications, from residential lighting to smart cities and beyond. As technology continues to advance, LED lighting is likely to become even more versatile and integrated into our daily lives.

In Conclusion:

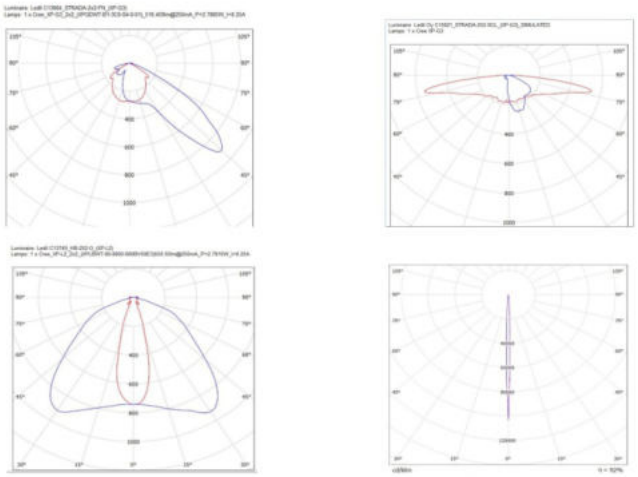
In conclusion, by prioritizing the adoption and rigorous implementation of key advancements—namely, optimized LED and optics selection, the integration of new-generation beam control technologies, and the utilization of cutting-edge driver solutions—the Indian luminaire industry possesses the potential to achieve parity with global leaders in the lighting sector and establish a competitive presence in the international market.

How to achieve higher installation efficiency : Right LED+ Right Optics



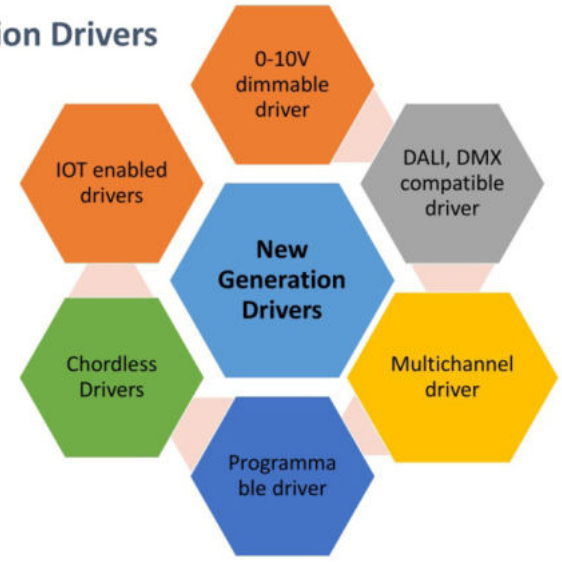
- Both symmetric, double symmetric, narrow beam and wide beam street light possible
- Various symmetric beam options possible
- Symmetric and asymmetric beam options available with suitable optics

New Generation Beam Controls



Employing different beam options optimized for specific project

New Generation Drivers



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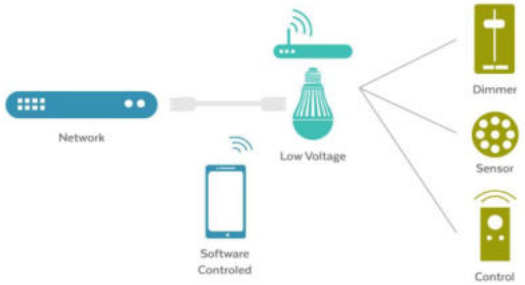

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Lighting Terminology: A Beginner's Guide

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Anil Parmar is the CEO and Managing Director of SunAnshul Technologies Private Limited. He began his career in 1988 with an offshore assignment at ONGC and has since worked with esteemed organizations such as Xerox, Hewlett-Packard, and Wipro.

Throughout his career, he has managed various portfolios, ranging from technical roles to techno-commercial positions. In 2016, he founded SunAnshul Technologies Private Limited, an ISO 9001:2015 certified, MSME-registered startup recognized by the Government of India.

Choosing the right lighting can sometimes feel confusing, especially with so many technical terms like lumens, lux, CRI, and CCT. But don't worry—this guide will explain these words in simple language, so you can choose the perfect lighting for home, office, or any other space.

What Are Lumens?

A lumen (lm) is a standard unit that measures the total amount of visible light emitted by a source in all directions. It tells us how much light a bulb produces, regardless of its focus or distribution. The concept of lumens is derived from the relationship between light intensity, area, and human perception of brightness. The lumen unit is adjusted to match how the human eye perceives brightness. Not all light wavelengths (colours) are seen equally by the human eye. The human eye is most sensitive to green light at a wavelength of 555 nm. This wavelength contributes the most to the perceived brightness.

The higher the lumens, the brighter the light. Think of lumens as the "amount" of light a bulb gives. So, when buying bulbs, it is better to check lumens instead of watts. Watts only tell you how much electricity the bulb uses, not how bright it is!

What Is Lux, and How Is It Different from Lumens?

While lumens measure the total amount of light a bulb produces, lux measures how much of that light actually reaches a surface. Lux is lumens per sq meter area.

- **Lumens:** The total light a bulb gives off, no matter where it goes.
- **Lux:** The amount of light hitting a specific area (like a desk or table).

Lux is useful when you are thinking about how well-lit a particular space will be, like a reading corner or a workspace. To improve lux in a space, you can use more lumens fixture or move the light source closer to the area or use the light fixture having secondary optics which focusses only desired area.

What Is CCT?

CCT stands for Correlated Colour Temperature. It tells us what colour the light will look—warm yellow, cool white, or something in between. This is measured in Kelvin (K).

Here is a simple guide:

- **Warm Light (2,700K–3,000K):** This is soft, yellowish light, like the kind from candles or older bulbs. It feels cozy and relaxing, so it's great for bedrooms or living rooms.
- **Neutral Light (3,500K–4,100K):** This is balanced light, not too yellow or too white. It works well in kitchens and bathrooms.
- **Cool Light (5,000K–6,500K):** This looks like daylight—bright and white. It is good for offices, garages, warehouses, sports or places where you need to focus.

Choosing the right CCT helps set the mood of your space. For example, warm light makes a room feel comfortable, while cool light helps you stay alert.

What Is CRI?

CRI stands for Colour Rendering Index. It measures how well a light shows the true colours of things, like how your clothes, walls, or food look under the light. CRI is scored from 0 to 100:

- **90 or Above:** The colours look very real and vibrant. This is great for art studios, kitchens, or makeup rooms.
- **70 to 89:** Colours still look good. This is fine for most homes and offices.
- **Below 70:** Colours can look dull or not quite right. These lights are usually older or cheaper options.

If you want everything to look bright and natural, go for a light with a high CRI.

How to Choose the Right Lighting?

Now that you know the terms, here are some tips to help you pick the best lighting:

1. **Think about the purpose.** For studying or working, choose bright (high-lumen) and cool light. For relaxing, go with soft (low-lumen) and warm light.
2. **Match the colour to the mood.** Use warm light to make a room cozy, neutral light for clear vision, and cool light for focus.
3. **Check the CRI.** If colours matter—like in a kitchen or dressing room—choose a bulb with a CRI of 90 or higher.
4. **Consider lux for task lighting.** If a surface feels dim, check how much light is actually reaching it and adjust the fixture's placement or brightness.

What's Next?

Understanding lumens, lux, CCT, and CRI makes lighting simple and helps you choose lights that fit your needs perfectly. In our next blog, I will talk about how lighting impacts our daily lives, including how it keeps us safe, comfortable, and productive. Stay tuned!

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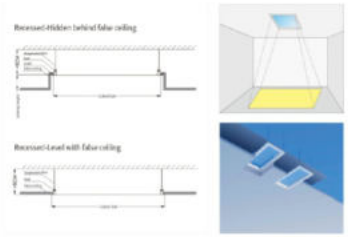


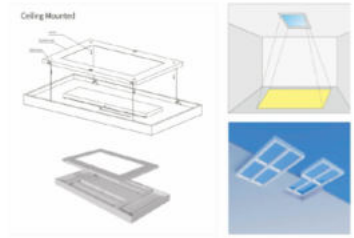
Specification

Ultra-thin (PT Series)		
Installation	/	Recessed
Luminous Flux	>2500Lm	
Power	40W	
Voltage	100-240V	
Color Temperature	2180-7500K	
Control	Mesh/0-5/Dali/0-10V	
Frame Color	Pear?White	
CRI	90Ra	
Lifespan	30000H	
Certificate	CCC CE ROHS	
Dimension (MM)	L582*W282*H36	
Cutout Size (MM)	Used in combination with keel	
Sky Size(MM)	L527*W227	
Net Weight	2.6KG	

Maximum customized size for keel is 2.4x3.0m
Combination from 2pcs and up to 40pcs

The data of power, current and lumens output is calculated at 12:00 under auto mode.

SKYLIGHT - SURFACE

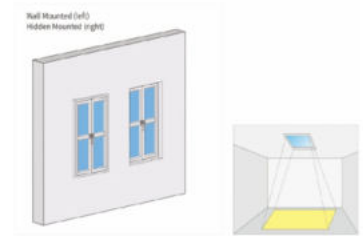


Specification

Ultra-thin (PS Series)	
Installation	Ceiling mounted
Luminous Flux	>2000Lm
Power	36W
Voltage	180-240V
Color Temperature	2100-7500K
Control	Mesh/0-5/Dali/0-10V
Frame Color	White
CRI	95Ra
Lifespan	30000H
Certificate	CCC CE ROHS
Dimension (MM)	L1200*W600*H78
Sky Size(MM)	4"(L527*W227)
Net Weight	26KG

The data of power, current and lumens output is calculated at 12:00 under auto mode.

SKYLIGHT - WINDOW

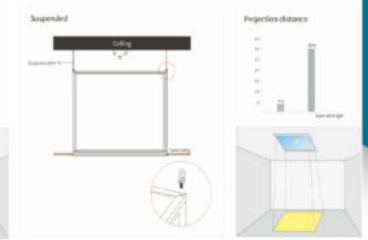


Specification

Ultra-thin (PS Series)	
Installation	Wall Mounted
Luminous Flux	>1000Lm
Power	16W
Voltage	180-240V
Color Temperature	2100-7500K
Control	Mesh/0-5/Dali/0-10V
Frame Color	White
CRI	95Ra
Lifespan	30000H
Certificate	CCC CE ROHS
Dimension (MM)	L1332*W791*H66
Sky Size(MM)	4"(L527*W227)
Net Weight	30KG

The data of power, current and lumens output is calculated at 12:00 under auto mode.

SKYLIGHT - SUNLIKE



Specification

Sun Type (S series)					
Luminous Flux	>20000Lm	>20000Lm	>20000Lm	>20000Lm	>3000Lm
Power	530W	600W	530W	600W	120W
Control	0-10V				Mesh/5.0
Color Temperature	5560K				2700-6500K
Projection distance	>30M				4M
Installation	Suspended				
Voltage	100-240V				
CRI	95Ra				
Lifespan	30000H				
Certificate	CCC CE ROHS				
Net Weight	30KG	30KG	30KG	30KG	12KG
Dimension (MM)	Ø600*H180	Ø1200*H600	L606*W606*H450	L1332*W894*H800	Ø600*H180
Cutout Size (MM)	Ø585	Ø1185	L585*W585	L1325*W525	Ø585
Sky Size (MM)	Ø600	Ø1200	L596*W560	L1140*W640	Ø560

The data of power, current and lumens output is calculated at 12:00 under auto mode.

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SKYLIGHT

LED LIGHTS

Dimming Technologies in Lighting

for Smart & Intelligent Luminaires

Biju John

Lighting control has evolved significantly over the years, and dimming technologies have become an integral part of modern lighting solutions. Whether it's for energy efficiency, human-centric lighting, or aesthetic preferences, dimmable LED drivers and control protocols play a crucial role in providing the desired illumination levels.

This article explores various dimming technologies used in LED drivers, including industry-standard protocols and communication methods for dimming luminaires in smart lighting systems.

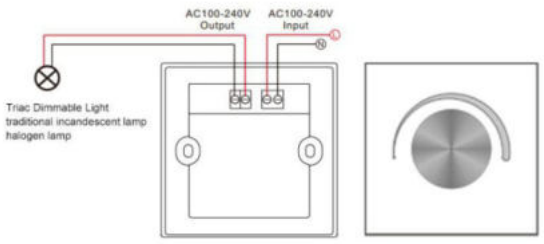
Types of Dimmable LED Drivers

LED drivers control the power supply to LEDs, and dimmable drivers allow adjustable brightness while maintaining efficiency and performance. Below are the most commonly used dimming technologies in LED drivers:

1. TRIAC Dimmable Drivers

- **Technology:** Phase-cut dimming (leading-edge or trailing-edge)
- **Common Use:** Residential and retrofit applications
- **Compatibility:** Works with traditional wall dimmers
- **Limitation:** Limited dimming range, may cause flickering if not matched properly

TRIAC Dimming 1: Control TRIAC-enabled lamps through a TRIAC dimmer



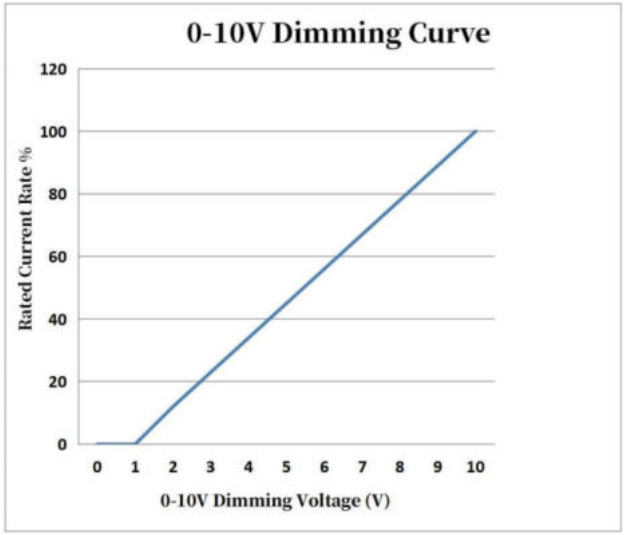
TRIAC (Triode for Alternating Current) dimming is one of the oldest dimming technologies. It is commonly found in AC phase-cut dimming systems, making it ideal for use with existing wall dimmers in homes. However, it has limitations in terms of compatibility with modern LED drivers, which may lead to flickering or buzzing if not designed properly.

2. Analogue 0-10V Dimmable Drivers

- **Technology:** Uses a 0 to 10V DC signal to adjust brightness
- **Common Use:** Commercial, industrial lighting
- **Compatibility:** Requires a separate control circuit
- **Limitation:** No two-way communication; limited control

The 0-10V dimming system operates by sending a low-voltage signal (0V for off, 10V for full brightness). It is simple and reliable but lacks advanced features such as two-way communication and scene-setting capabilities.

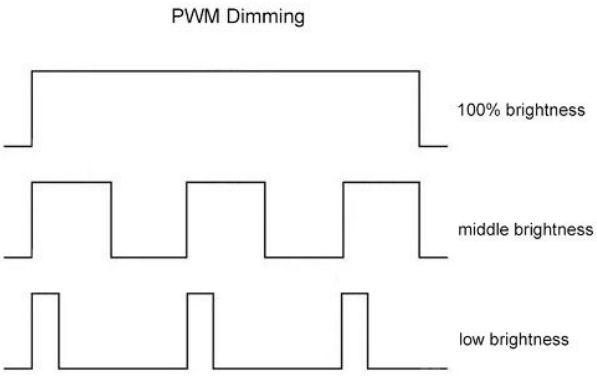
3. PWM (Pulse Width Modulation) Dimmable Drivers



- **Technology:** Adjusts LED brightness by switching the current ON/OFF rapidly
- **Common Use:** Architectural, high-end lighting applications
- **Compatibility:** Works with digital control

systems

- **Limitation:** Requires specialized drivers; may introduce EMI (Electromagnetic Interference)



PWM dimming is one of the most precise methods for dimming LEDs. It controls brightness by varying the duty cycle of the current, ensuring consistent color temperature and brightness levels. However, improper PWM dimming may cause visible flicker and electromagnetic interference (EMI) in sensitive environments.

4. DALI (Digital Addressable Lighting Interface) Dimmable Drivers

- **Technology:** Digital two-way communication
- **Common Use:** Commercial, office, smart lighting
- **Compatibility:** Requires a DALI controller
- **Limitation:** More expensive than analogue dimming

DALI (Digital Addressable Lighting Interface) is an international standard (IEC 62386) that allows advanced individual control of each luminaire in a lighting system. It supports scene-setting, automation, and energy-saving features.

DALI 1.0 vs DALI 2.0: Key Differences

Feature	DALI 1.0	DALI 2.0
Compatibility	Limited	Backward-compatible, improved interoperability
Sensors & Input Devices	Not standardized	Supports sensors, switches, controllers
Certification	No unified standard	Official DiiA certification

DALI 2.0 enhances interoperability, ensuring different manufacturers' products work together seamlessly. It also supports integrated sensors for intelligent lighting solutions.

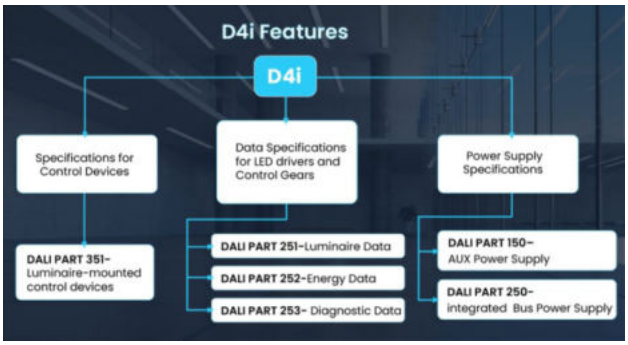
DALI DT6 vs DT8: Understanding the Difference

DALI Type	Function	Application
DALI DT6	Controls single-channel dimming	Standard LED drivers
DALI DT8	Controls color temperature and tunable white	Human-centric lighting, RGBW applications

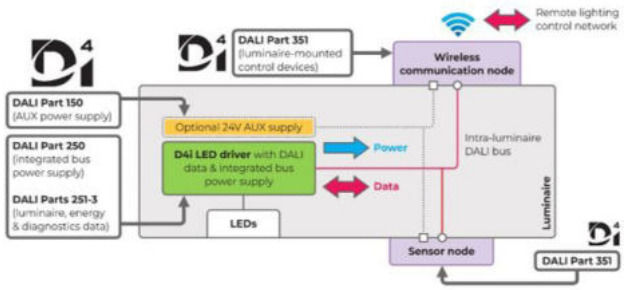
DALI DT8 enables Tunable White and RGB control within a single address, reducing complexity in smart lighting applications.

D4i – Smart DALI for IoT Lighting

D4i is an extension of DALI specifically designed for IoT (Internet of Things) applications. It allows:



- Built-in power monitoring
- Wireless connectivity options
- Interoperability with smart city infrastructure



D4i is crucial for smart lighting in cities and buildings, where data analytics and remote control are essential.

DALI+ – Wireless DALI for Future Applications

DALI+ is an upcoming standard that enables wireless DALI communication, making it ideal for retrofit projects where rewiring is difficult. It works over Thread or Bluetooth Mesh networks, bridging the gap between wired and wireless lighting control.

Protocols for Wireless Dimming of Luminaires

Apart from wired dimming methods, several wireless protocols are widely used to control luminaires in smart buildings and homes.

Protocol	Frequency	Key Features
BLE (Bluetooth Low Energy)	2.4 Ghz	Low power, mobile app control
RF (Radio Frequency)	Varies	Short-range communication
Wi-Fi	2.4 GHz/5 Ghz	High-speed, cloud integration
Z-Wave	908 MHz/868 Mhz	Mesh networking, energy-efficient
Zigbee	2.4 Ghz	Scalable, ideal for large networks
LoRaWAN (Long Range Wide Area Network)	Sub-GHz	Suitable for IoT-based smart lighting
NB-IoT (Narrowband IoT)	Cellular network	Best for city-wide smart lighting

Dimming technologies have transformed lighting control from simple manual adjustments to advanced smart automation. Choosing the right dimmable LED driver and wireless dimming protocol depends on the application—whether it's a home, office, retail store, or smart city infrastructure.

The future of lighting control will continue to evolve with AI-driven adaptive lighting, IoT-based smart lighting, and wireless connectivity. For businesses and lighting professionals, staying ahead of these trends is essential for delivering high-performance lighting solutions.

The world is shifting towards intelligent lighting—are you ready to make the move?

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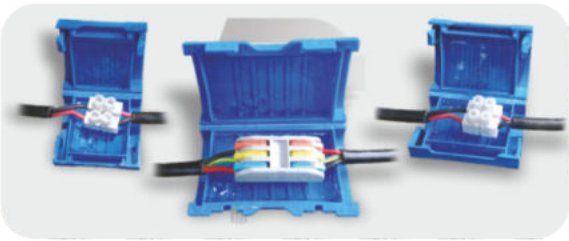
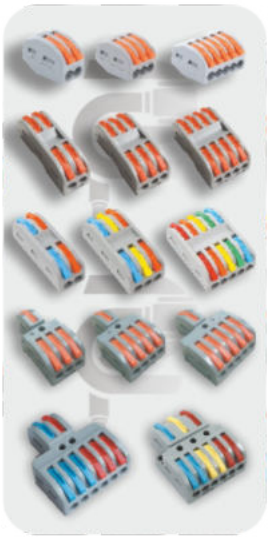


Waterproof Gel Connectors

Waterproof Wire Connector



Quick Connectors

Screw-On Wire Connectors

Closed-End Wire Connectors

Waterproof Screw Wire Connector

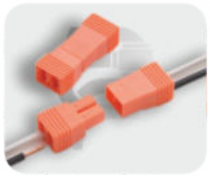
Wire Socket Tool

Male/Female Wire Connector

Loop In Loop Out Connector

Releasable Wire Connector

Push-In Wire Connectors



Luminaire Disconnect

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Easy-Link Lighting Connectors

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Lighting: A Risky Game for MSMEs?

Biju John is a prominent figure in the Indian lighting industry, with over 30 years of experience. He is the founder and director of iTvis Innovations Pvt Ltd, which is currently part of the GreatWhite group through a strategic merger and acquisition. Popularly known as a trendsetter, he is recognized for his techno-commercial leadership and entrepreneurial skills, contributing significantly to the growth of the lighting sector in India.

Biju John
+91 90118 40148
john@itvisinnovations.com

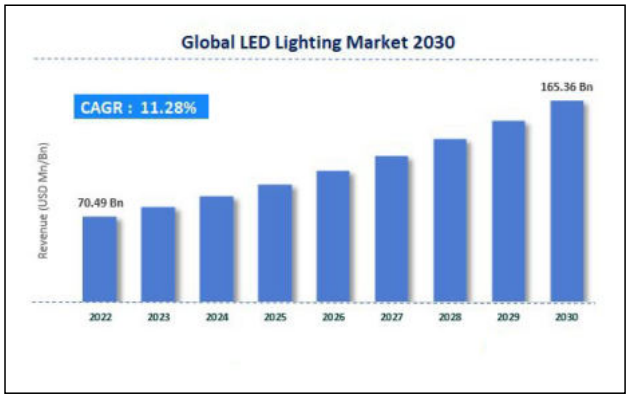
The Misleading Perception

At first glance, the title "Lighting: A Risky Game for MSMEs?" might seem counterintuitive, especially given the vibrant growth of the lighting industry. However, this provocative statement aims to challenge the conventional approaches prevalent among many Micro, Small, and Medium Enterprises (MSMEs) in India's lighting sector. While the global lighting market is projected to grow from USD 154.27 billion in 2024 to USD 367.88 billion by 2032, exhibiting a CAGR of 11.5% during the forecast period, and the Indian lighting market is expected to register a CAGR of 15.7% during the forecast period (2025-2030), a significant number of MSMEs are not capitalizing on this potential. The reason? Many are entrenched in me-too businesses, leading to fierce price wars and, ultimately, unsustainable operations.

The Pitfall of Me-Too Ventures

In the quest to establish a foothold, numerous MSMEs adopt business models that mirror existing players, offering similar products without distinct value propositions. This me-too strategy results in:

Intense Price Competition: With multiple players offering indistinguishable products, the primary differentiator becomes price, leading to diminishing profit margins.



Market Saturation: The influx of homogeneous products saturates the market, making it challenging for any single entity to stand out.

Stagnant Growth: Without innovation or unique selling points, businesses struggle to attract and

retain customers, leading to a plateau in growth.

Embracing Innovation in a VUCA World

In today's Volatile, Uncertain, Complex, and Ambiguous (VUCA) environment, staying abreast of industry trends is not just advantageous—it's imperative. The lighting industry is experiencing rapid disruptions, and MSMEs must pivot to align with these changes. Key areas of focus include:

Transition to Advanced Luminaires: Moving beyond basic fixtures to high-efficacy, flicker-free, and glare-free luminaires enhances product appeal and meets evolving consumer demands.

Adoption of Smart and Intelligent Lighting: Integrating controllable and self-operating features caters to the growing demand for smart homes and offices.

Incorporation of Renewable Energy Solutions: Solar lighting and other sustainable options not only reduce environmental impact but also appeal to the eco-conscious consumer segment.

Diversifying the Product Portfolio: The Four Baskets Strategy

To navigate the complexities of the market and ensure sustainable growth, MSMEs should consider structuring their product offerings into four distinct baskets:

Emerging Basket (Latest Technology Products):

Characteristics: Cutting-edge products that leverage the latest technological advancements.

Strategy: Engage with industry experts for training and development. This basket promises high profitability and positions the business as an innovator.

Approach: Prioritize technical sales and continuous learning. Collaborate with technology partners and invest in upskilling the sales force to effectively communicate the benefits of advanced products.

Growth Basket (Products with Unique Selling Propositions):

Characteristics: Differentiated products that stand out from competitors.

Strategy: Invest in research and development to innovate and design unique offerings. This approach reduces competition and allows for healthier profit margins.

Approach: Allocate resources to innovation and design. Protect intellectual property to maintain a competitive edge and consider niche marketing to reach targeted customer segments.

Core Basket (Volume Selling Products):

Characteristics: Standard products with consistent demand.

Strategy: Focus on scaling operations, building relationships with key accounts, and optimizing supply chains to offer competitive pricing. While margins may be thinner, the volume compensates, supporting overheads and contributing to the top line.

Approach: Streamline operations to achieve cost leadership. Develop strong distribution networks and consider bulk deals or long-term contracts to secure steady revenue streams.

Legacy Basket (Me-Too Products):

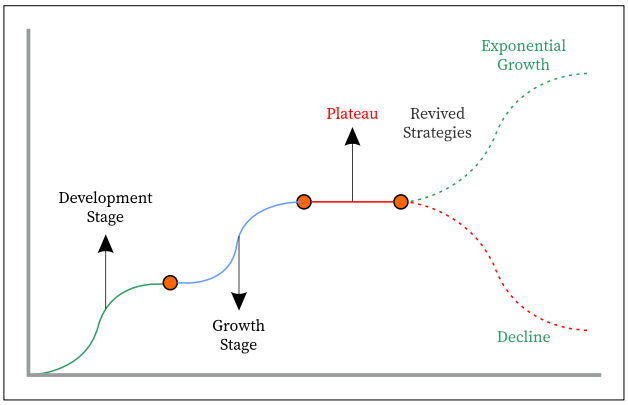
Characteristics: Basic products similar to those offered by competitors.

Strategy: Maintain these offerings to provide a comprehensive product range, ensuring clients find all they need under one roof. However, minimize reliance on this basket to avoid price wars.

Approach: Limit inventory to reduce holding costs. Use these products as add-ons or bundle them with other offerings to provide value without eroding margins.

Navigating the Business Growth Lifecycle

Understanding the typical stages of business growth can help entrepreneurs anticipate challenges and adapt strategies accordingly:



Build:

Focus: Establishing the business foundation, developing products, and entering the market.

Action: Invest in market research to identify gaps and opportunities. Build a skilled team and establish efficient operational processes.

Grow:

Focus: Expanding market presence, increasing sales, and scaling operations.

Action: Diversify the product portfolio (utilizing the four baskets strategy), enhance marketing efforts, and explore new market segments.

Plateau:

Focus: Growth stabilizes, and the business faces saturation.

Action: Re-evaluate business models, invest in innovation, and seek feedback to identify areas for improvement. Consider strategic partnerships or diversification to reignite growth.

Decline or Renew:

Focus: The business either experiences a downturn or revitalizes growth.

Action: For renewal, embrace change, adopt new technologies, and adapt to market trends. For decline, assess the feasibility of turnaround strategies or consider exit options.

Embrace Change or Risk Obsolescence

The provocative assertion that "Lighting: A Risky Game for MSMEs?" serves as a cautionary reminder: for entrepreneurs resistant to change, the lighting industry can indeed be unforgiving. However, for those willing to innovate, diversify, and adapt to emerging trends, the opportunities are boundless. By moving away from "me-too" strategies and embracing a dynamic, trend-aligned approach, MSMEs can not only survive but thrive in this ever-evolving landscape.

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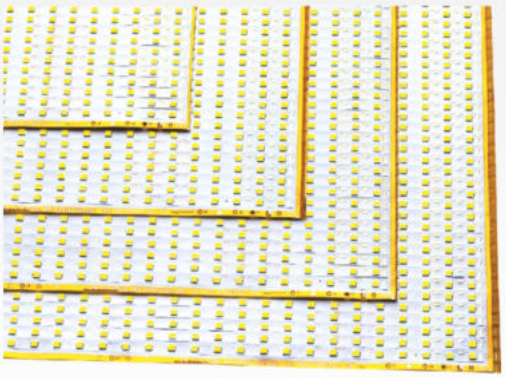
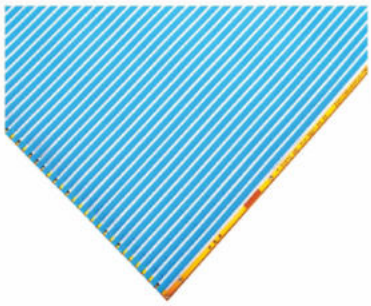
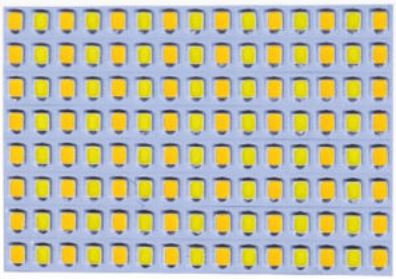


6W / 8W	288mm / 331mm
12W / 15W	436mm / 525mm
18W / 22W	591mm / 726mm
12W(5")	366mm / 436mm
18W(7")	500mm / 610mm
24W / 30W	414mm / 507mm

With Blue Thermal Tape
for better heat conductivity

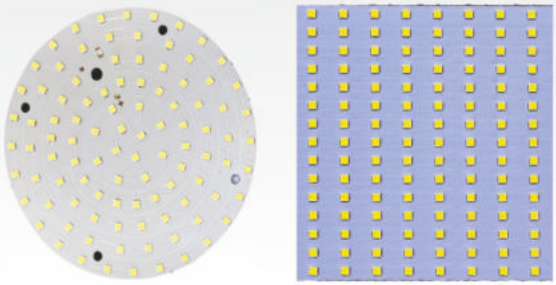


3 in 1 Flexible PCB
For Slim Panel Light



6W	288mm /331mm
11W/12W	366mm
12W	438mm / 525mm
18W	591mm / 726mm

PC Panel MC PCB



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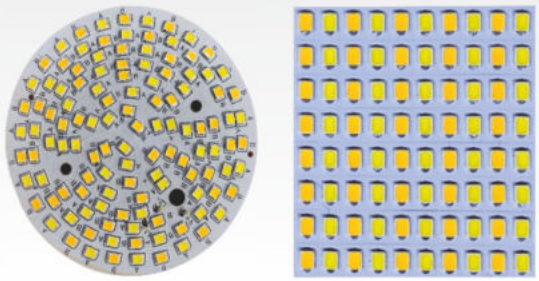
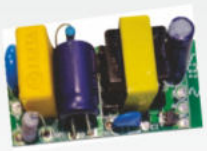


3 in 1 MCPCB

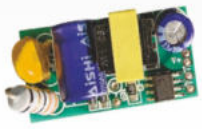
4" - 8W - 84mm
5" - 12W - 113mm
6" - 15W - 132mm
8" - 22W - 187mm

8W
Input : 90-265V
Output : 40-68V - 120mA
Surge : 2.5Kv

8-24W
Input : 90-265V
Output : 24-80V - 280mA
Power Fector : >0.9
Surge : 4Kv



4-7W 3 in 1
Input : 90-265V
Output : 10-25V - 280mA
Surge : 2.5Kv



8W 3 in 1
Input : 90-265V
Output : 40-68V - 120mA
Surge : 2.5Kv

12-15W 3 in 1
Input : 90-265V
Output : 90V - 190mA
Surge : 2.5Kv

8-24W 3 in 1
Input : 90-265V
Output : 24-80V - 280mA
Surge : 2.5Kv

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The Importance of Business Planning For Every Business, Big or Small

Mangesh Khisty is a visionary entrepreneur with over 31 years of experience, including 26 years in Professional Lighting, known for transforming businesses through strategic leadership. As VP & Business Head at Eveready Professional Lighting, he established a strong foundation and secured major industry orders. At Bajaj Electricals, he rebranded the Luminaire Division, launched the sub-brand ".nxt," and grew revenue from ₹270 Cr to ₹440 Cr. With leadership roles at Philips, SONY, and Pentair, he has expertise in strategic planning, P&L management, and business transformation. Now, through his start-up, he combines traditional business ethics with modern technology to help MSMEs grow into professional organizations.

Mangesh Khisty
Contact: +91 7738004076
Email: mangesh.onecx@gmail.com

Business planning is a critical process for every business, whether it is a large conglomerate or a small or a medium individually run enterprise. However, many small businesses often do not recognize the importance of this or even lack the required knowledge and resources to effectively engage in business planning.

The Necessity of Business Planning

In a small business setup, the absence of a robust business plan can lead to confusion, mismanagement, and missed opportunities. A well-thought-out business plan serves as a roadmap, guiding the business through various phases of growth and helping in making informed decisions.

The Journey of Business Planning

A robust system, checks, and controls are required to remain on track with the business plan. Understanding the business landscape and knowing when to pivot is crucial. When critical pivoting decisions are needed, they must be made with substantial thought. A well-prepared "Plan B" should be in place, conceived during the initial business planning process.

Key Components of a Business Plan

A comprehensive business plan should cover the following elements:

Define the Purpose

The first step in the business planning process is

to define the purpose of your business. Why does this business exist? Who are the customers you plan to serve, and why have you chosen this customer segment?

Long-Term Vision and Mid-Term Mission

Once the purpose is clear, you should develop a long-term vision and a mid-term mission. The vision provides direction and inspiration for future growth, while the mission outlines the steps needed to achieve this vision.

Action Planning

With the help of your team, mentors, and coaches, start bringing granularity to the entire thought process by disseminating information into action planning. Actions should be planned under the categories of What, When, Who, and How.

Support from Critical Business Functions

Each action should be supported by collateral agreements and action subsets from critical business functions such as Sales, Marketing, Finance, Manufacturing, Supply Chain, and People Functions.

Breaking Down Targets

Actions are then broken down into targets, which are mapped and measured over periods such as weeks, months, and quarters. This ensures that tasks are manageable and progress can be tracked.

Measurement and Improvement

"Mind it, that what is not measured, can never be improved." Regular measurement and evaluation of tasks ensure continuous improvement and alignment with the business plan.

Visibility and Ownership

All plans should be consolidated into a single sheet to provide clear visibility and ownership. Such plans require agreements and buy-in from all stakeholders. Execution preparation must start before the new financial year begins.

Business Balance Score Card (BBSC)

While there are numerous templates available for business planning, one simple and effective template to use is the Business Balance Score Card (BBSC). The BBSC helps in tracking and managing performance across different business functions.

Conclusion

Business planning is not just a formality; it is a crucial process that can determine the success or failure of a business. By defining the purpose, setting clear goals, planning actions, and regularly measuring progress, businesses can navigate the complexities of the market and achieve sustainable growth. Whether you are a large conglomerate or a small individually run enterprise, investing time and resources in business planning is essential for your success.

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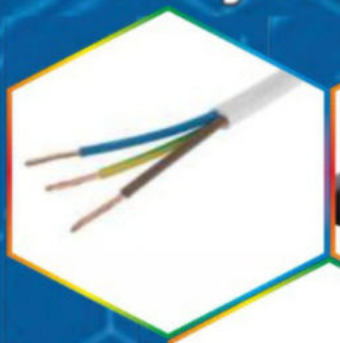

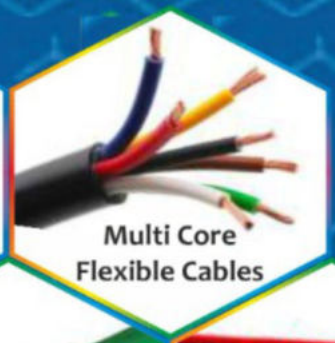

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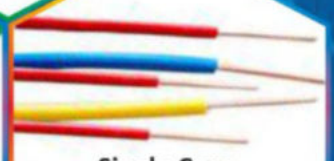

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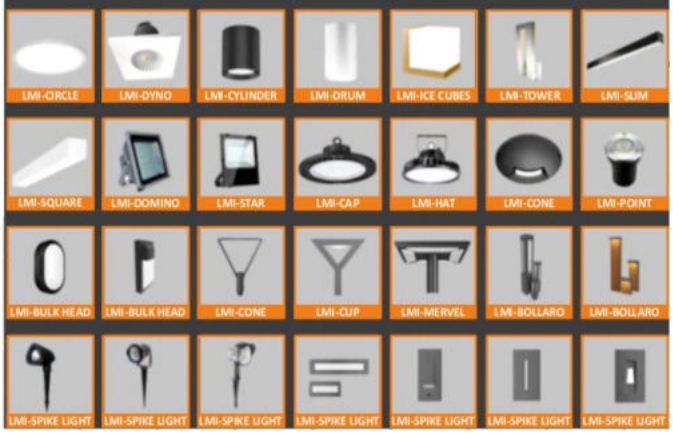

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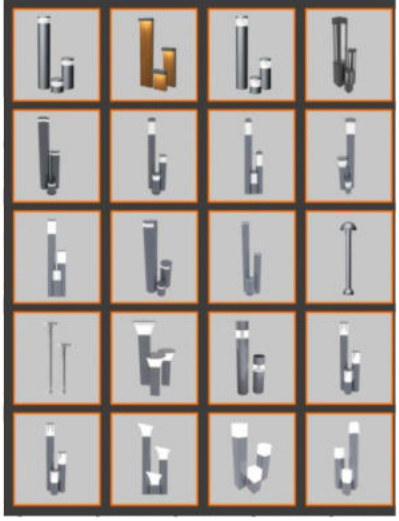

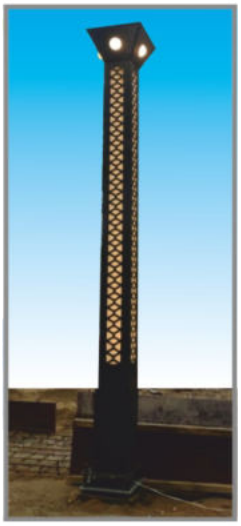

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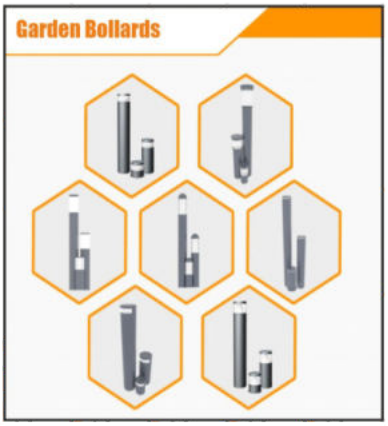
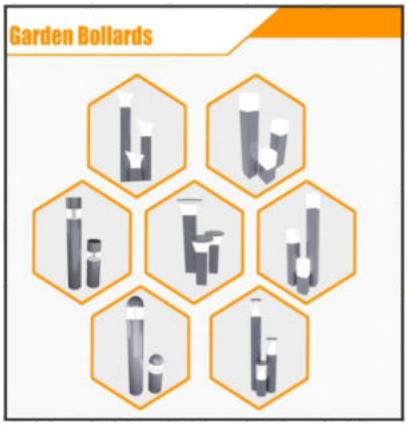


Modular LED Post Top Lights

Step Lights

Garden Bollards



Spike Lights

Modular LED Wall Fittings

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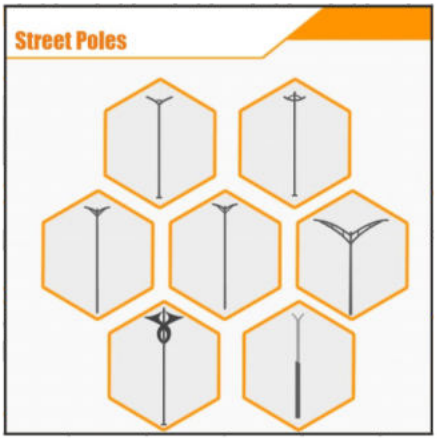

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Winning Strategy

Amit Sheth
M.D. Focus Lighting

Amit Sheth is the Managing Director and a key figure in Focus Lighting & Fixtures Limited, a company he has played a crucial role in since its inception. Mr. Sheth specializes in marketing and has been instrumental in market development, brand development, and product innovation. He has launched several new product concepts, including human-centric lighting and smart lighting controls. Under his leadership, Focus Lighting has expanded into various segments like home lighting and infrastructure lighting, focusing on innovative technologies like IoT.

We have been in this industry since 2000, and based on my experience, I would like to share my thoughts with this group. We Indians are hardworking and put immense effort into our businesses, working approximately 10 hours a day, six days a week. However, don't you feel that we do not receive the returns on our investment and hard work? If you agree, the question is—why?

Please don't take me wrong, but despite our efforts, why are we not recognized? Why do most Indian brands struggle to expand beyond regional markets, let alone establish a presence at a pan-India level or internationally? What makes European brands more successful than Indian brands when the effort is the same?

Let me share my perspective—some may agree, while others may not.

One major reason is that traders import large volumes from China instead of supporting small Indian manufacturers. Their common justification is that China offers better pricing, quality, and design. While this might be true to some extent, it is not entirely accurate. For example, India manufactures the cheapest bulbs in the world, more cost-effective than China. This proves that with large volumes, costs can be reduced. Additionally, if manufacturers are pushed to improve quality, those who are serious about staying in business will meet the required standards. It's also important to note that today, labor costs in India are among the lowest globally.

Another concern is the lack of innovative design among Indian manufacturers and traders. Looking through various catalogs, I find that most products are similar, with no

differentiation. Are we short of ideas, or are we just looking for shortcuts? The market is flooded with cheap copies from OEMs and manufacturers. How can we stand out? The only way left is to compete on price, which eventually reduces margins and makes growth unsustainable. We have some of the best minds in the country, and we must think big—design our own unique products instead of copying European brands or importing cheap replicas from China.

Technology is another neglected area. No one is discussing innovations in lighting quality, glare reduction, and technological advancements. Without innovation, our industry risks stagnation. I may sound negative to some, but as industry members, we must elevate ourselves.

India is one of the fastest-growing economies in the world, and our purchasing power is increasing. We must develop smart, intelligent, and technically advanced products, uplift our quality to international standards, and think globally. However, this cannot happen overnight. First, we must be confident in what we are doing—differentiating ourselves in ways others cannot. It is a slow and challenging process, but it paves the way for sustainable growth, both locally and internationally.

I apologize if my views have offended anyone, but I strongly believe this is the way forward.

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Striking the Right Balance

BS Praveen
Director
Uniglobus Electricals & Electronics Pvt Ltd
(President, Electronics BU, Polycab India Ltd),
Halol, Gujarat

B S Praveen is a seasoned leader with over 30 years of global experience in manufacturing, electronics, and engineering across India, Australia, and Taiwan. As Managing Director, he has led electronics manufacturing units for 13 years and co-founded Uniglobus in 2021 for the Polycab group. With expertise in operations, brand building, and product development, he blends international insights with Indian market dynamics. An IIT-Madras and IIT-BHU graduate with an MBA from RMIT Melbourne, he has held key roles at BHEL, Eicher, Autoliv, BAG (Trilux Germany), and Polycab.

Like many other industries in India, Lighting industry also faces the challenge of right balance between Product quality and and Product price. It is relatively easier to make a very good quality product, with higher price, or a very low priced product with low quality. But either of these strategies don't work in the long run, if you are wanting sustained profitable growth. Only high quality (high priced products) will not sell enough volumes for you to be able to grow; and with low priced products (with low quality), you will start loosing customers after initial growth, due to quality issues. So the mantra for long term profitable growth is 'Appropriate Quality at Affordable Price' – although it is easier said than done.

So, how do some companies do it and some struggle. Some companies who have got this mantra right keep going on for years and years not only in terms of growth of sales, but also giving good profits to their shareholders. But a vast majority struggles – they keep tilting from this side to that side, or in many cases keep switching their business lines, because of failure in one particular business line, and in certain cases, completely shut down.

A good comparison of striking this balance of quality and price can be made with riding a two wheeler. You find it almost impossible to balance

a two wheeler when it is standing, but when it is moving even a child is able to balance with no extraordinary skills needed. The difference is that while moving, by tilting the front wheel slightly to the right or the left, you keep correcting the out of balance constantly, and you achieve an ongoing balance – in other words you are making micro-adjustments and keep countering the sideways forces that are encountered from the environment without loosing your balance completely. You can't do that in a standing two wheeler as you don't have the capability to do that micro-balancing using the turning of the front wheel.

So, between quality and price too there is this regular micro-balancing necessary. The expectation of 'Appropriate Quality' keeps changing from time to time, and from customer set to customer set (or market to market). And similarly the expectation of 'Affordable Pricing' also keeps changing with time, as new players enter (or old ones exit), with new technology coming in, new ideas coming in to the market. If you are unaware of these changes, or you are not able to 'micro-balance' quickly, you loose your balance (or fall down, as in a two wheeler).

You can't always say that you make the 'Best Quality' (which will not, obviously, come at the Affordable Price). Because sooner rather than later someone will come with slightly lower quality, and still meet the needs of most customers (i.e. more Appropriate quality), at a lower price and customers will move towards that. Similarly, you cannot always say that you make the 'Lowest Price' product (which will have some dissatisfaction in terms of quality for customers). Because someone else will make

products eliminating those dissatisfactions, at a minimal price increase (but still within affordable range that customers are willing to pay to get rid of that dissatisfaction, and customers will move towards that).

So, you need to constantly keep researching the market, the competitors (both domestic and international); and parallely keep working on new ideas to improve your product or lower prices for the same quality. This means investment in Market Research and Product Research. Unfortunately, very few companies do this and most of the companies try to do catch-up after someone has done something and depending on their speed of catch-up, they keep lagging behind. And some don't even realize these changes and never even catch-up and face more severe consequences.

Let me give you some examples of these from the Lighting Industry and some possible areas where we can look for solutions.

Change from fluorescent to LED technology is the biggest example of this phenomenon. We have all seen how, many large companies went out of lighting business altogether, and how, so many others (lot of them small companies) came into lighting. Here the quality of light increased and the price dropped.

Within LED itself there have been numerous changes in business models. The range and pricing of quality widened vastly – meaning, the gap between best and lowest quality increased and so did their pricing gap. This meant that different product ranges for different customer groups. On one hand you have very high quality and durable LED lights at higher prices, which go to high end customers or projects (eg. NHAI, or some large projects etc.); and on the other hand you have low quality, low durability products and lower prices which are preferred by other customers, and other projects, typically like the village panchayats etc. With earlier technology this gap was not as wide. So, now the lighting manufacturers and their products are also divided among these lines.

Coming to some of the nitty-gritties I am giving below some examples in a typical luminaire of what all you can do to achieve this micro-balance (and Chinese seem to be better in this game than us, whom most of us keep following).

Examples of quality Vs cost adjustments in a typical luminaire:

- Al quality for luminaire housing: The extremes are use the best quality Aluminium of LM grade, or use complete scrap Aluminium. But to strike the right balance, you need to see what grade of Al will be the most appropriate for your requirement. You need to see what is the difference in heat conductivity of various grades, what is the difference in their strengths, what is the mouldability difference (due to which you can achieve right balance between the thickness and height of the fins to get optimal heat dissipation). But without deep dive and

research into all these factors, and assessing things from the basics, you will only end up copying this or that (generally Chinese) product. But this can only be done if your organization does some trials with new ideas, and has an environment where people can make suggestions without hesitation.

- Which LED to use – Now there are numerous brands, quality, and efficacy (Lm/W) LED's available. In terms of Appropriate Price, we can work out the cost per lumen of various LED's driven at various percentages (compared to it's maximum capacity) and pick which will be the most appropriate one to use. Then we can check what life and warranty are needed and pick the appropriate brand and type of LED. All this can be done effectively, if all this data is prepared and available to the luminaire designer ready to use. Otherwise we may just go and use certain LED because everyone is using for that application, without understanding the 'why' of it – which is unfortunately happening in most of Indian industry.
- PCB thickness – Which PCB thickness will be most appropriate from a cost, heat dissipation, electrical resistance and mechanical point of view. Not just going by saying 1.6 is better quality than 1.2 or 1, or thinking that everyone is using this, so we should also do so. These kind of things also need some kind of experimentation and be prepared with some data in advance, so that when it is time to pick, we are not picking anything in a rush, or just copying someone.
- Potting material – which potting material is best for your drivers, and is it always necessary to pot, or can we do without potting – will the heat dissipation still be ok without potting etc. Quite often, we just go by our normal processes without sufficient deep thinking, and without asking these questions or doing trials to assess these results. If we let these questions be asked in the organization, and experiments be done and be ready with data, we can optimize on these matters.
- Driver Housing – Is there a housing needed at all for the LED driver, which is sitting inside a luminaire cavity, which itself might be IP protected. Can you just put a heat-shrink sleeve and achieve the same results. Again, try these things out before rejecting these ideas.

There could be numerous such ideas that can help you with this micro-balancing. There could also be more ideas with regard to resolving certain un-expressed customer needs, which might show up when you do deep dive into customer needs or market studies. These ideas will help you put in more features in your products, for which a customer is more than willing to pay. This will also help you differentiate from others – albeit in the short term, before others copy it.

The core aspects from a management point of view, relevant to Organization Heads for doing this balance successfully, is to create an environment where people are encouraged to not only express, but also try out new ideas. Locate such people in your organization (because they may also be rare to find), and give them the right environment to bring and try out these ideas. At the same time keep naysayers at bay,

especially if they are at senior levels of your organization – they may demotivate people with new ideas. Have structured VAVE exercises, where cost Vs value is assessed for various products and modifications done accordingly.

Unfortunately, from where I see, this is not particularly a strength of the Indian Lighting Industry, that's why even minor improvements are observed in our markets, only after someone in China or the West have done it. There is not so much of a shortage of talent in India, but there is definitely a shortage of this kind of environment and culture – of thinking and trying out something new.

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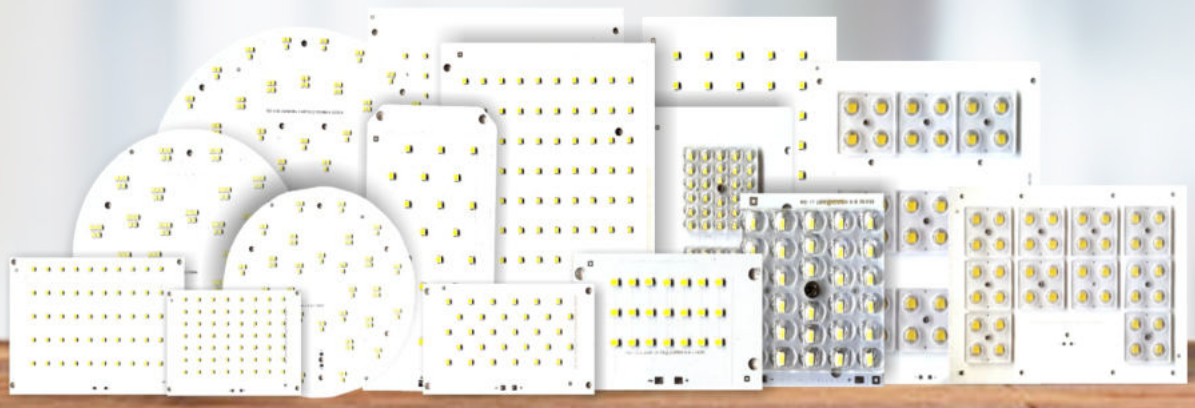

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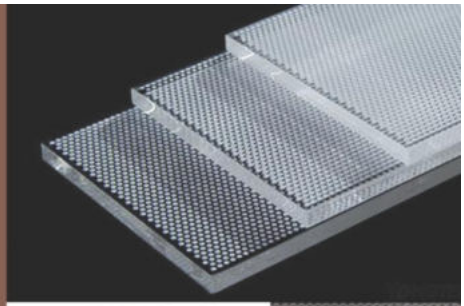

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Changing the way NEXA Shines

NEWMAT India helped MSIL Nexa elevate their showroom experience with improved backlighting, eliminating prior LED issues.

Targeting a premium customer experience, Maruti Suzuki envisioned a completely revamped design language for their NEXA showrooms. The team formulated a car delivery experience for the customers and left no stone unturned to elevate the grandeur at the delivery area.

The design consists of a delivery area with premium lacquered finished walls, adorned by a huge seamless 5m x 2.5m NEWMAT translucent stretch ceiling for a voluminous lighting experience.

When the initial Nexa showrooms were constructed in 2015, they raised the bar for the Indian automobile industry. Nexa offered plush interiors, exceptional lighting, and a customer experience the Indian market wasn't expecting. This success was largely due to the aesthetic aspect of the design, which was new to the target audience and shattered the general perception of MSIL as an entry-level car manufacturer.

To maintain these high standards, MSIL implemented regular and strict audits. They developed a network of capable vendors to ensure any maintenance needs could be met for their showrooms across the country. With a vast network of professionally trained installers across India, NEWMAT India was uniquely positioned to take on the task of supplying and installing the stretch ceiling systems for these showrooms.

While NEWMAT's translucent stretch ceilings initially provided MSIL Nexa showrooms with a stunning visual experience, we encountered some challenges with early LED strip technology a few years ago. Some showrooms experienced black patches or lines due to LED failure. We swiftly addressed this by servicing over 110 showrooms within 60 days back in 2018.

Learning from this, we partnered with industry-leading lighting experts to develop a more robust solution using long-life LED modules. This new standard was implemented across all new Nexa showrooms starting in 2018.

Today, with over 550 Nexa showrooms across India, our confidence in this enhanced system is so strong that we offer a 5-year warranty with free maintenance on all NEWMAT stretch ceiling LEDs. This commitment to quality and ongoing support ensures that Nexa showrooms continue to provide a premium customer experience for years to come.

This experience with MSIL Nexa has been invaluable. The logistical challenges of coordinating installations and maintenance across a vast network of showrooms have enabled us to develop robust processes and systems. This has allowed us to streamline our operations, ensuring we can efficiently serve customers in every corner of the country, no matter the scale or complexity of the project. Today, we can proudly say that if there's a NEXA showroom around you, there's an 75% chance it's got a NEWMAT Stretch Ceiling System installed!

Building on our success with Nexa, NEWMAT India strives to be the most reliable stretch ceiling provider in the Indian Subcontinent. We've leveraged our expertise to partner with other leading automobile companies like:

- Kia
- Honda
- Nissan
- Tata
- Hyundai

Delivering exceptional stretch ceiling solutions for their showrooms. All our products are manufactured at our state-of-the-art facility at NEWMAT SAS, France, and we are committed to providing optimal and practical stretch ceiling

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SmartHome Expo 2025

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Jio World Convention Centre,
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LED expo NEW DELHI

November 27 to 29, 2025
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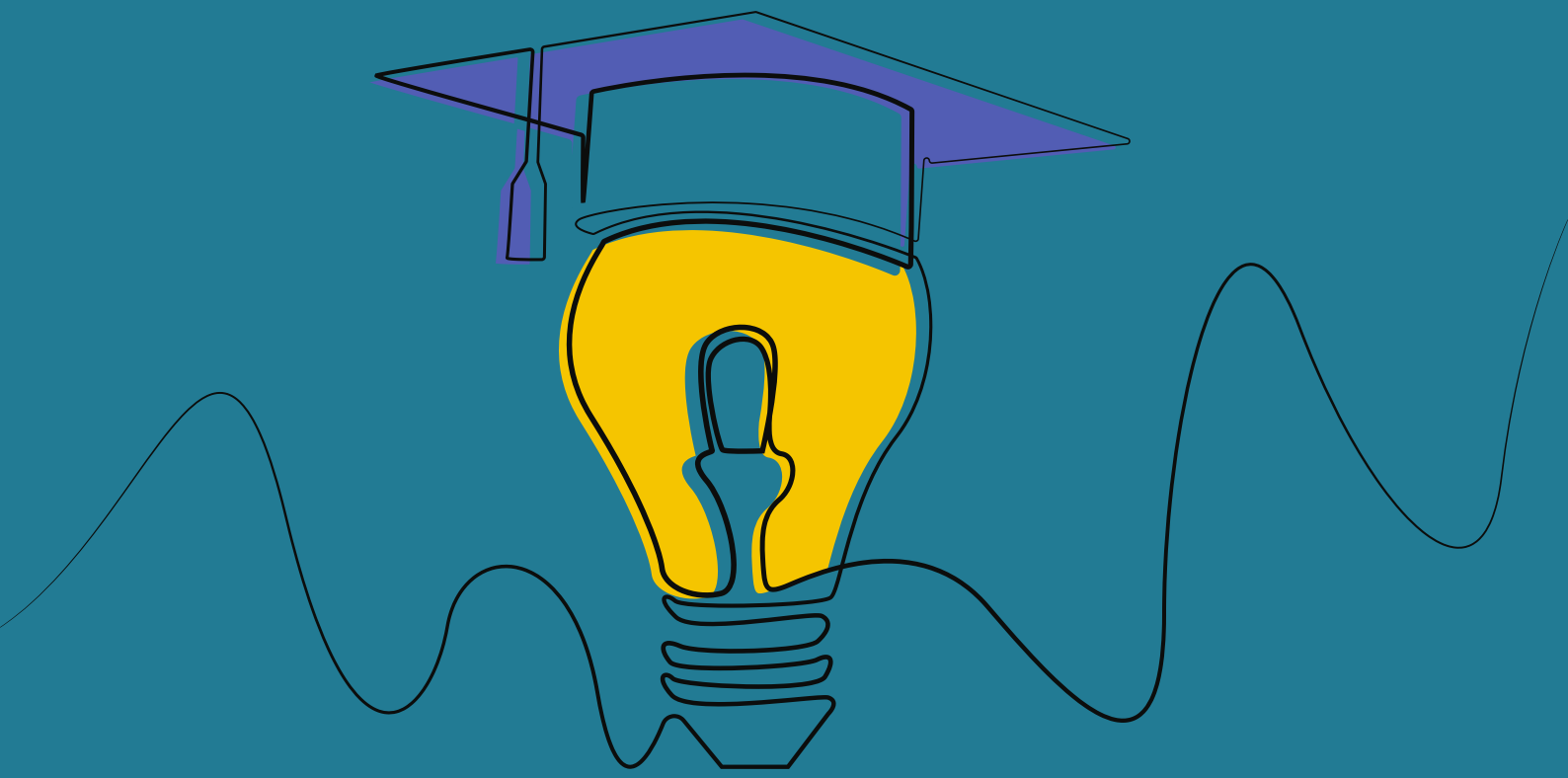
Dwarka, New Delhi.



Indian Lighting Academy