#### INDIA'S FOREMOST MAGAZINE ON THE LIGHTING INDUSTRY



The issue draws focus on industrial lighting solutions for industries & factories, emergency lighting and security lighting

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#### LED solutions

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**Emergency lighting units** 



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#### Solutions



**Tunable White** Module, Driver and Controls



**sceneCOM** Automatic lighting control



**basicDIM Wireless** Wireless light control



**Outdoor** Citizen-Centric Lighting



### From the Publisher's Desk

#### Focusing on the transformation in industrial lighting

Even two decades back, the lathe machine operators working round-the-clock used to toil a lot to rightly fix the job on machine beyond the sunny hours of the day. The common scene even in the ultra-modern workshops was – either a very tall and flexible or adjustable, multi-lever table lamp or a hanging luminaire with a high power GLS lamp focusing on the chucks and jaws. Well, it goes without saying that often the guality of the output used to suffer not because of the low precision of the machine but simply because of the improper lighting to watch the area of operation. Lights above the acid dilutor tanks used to burst being engulfed by moisture during addition of water for acid dilution. Also, filament- or discharge- based continuous or flash indicators used to draw a notable amount of current increasing the local temperature and overall electric charges.

Advent of LED has sorted out many such technical issues, which has added to the reliability of operations – and at the same time enhanced safety of the operators and other industrial equipment around. It is not only the case of ambient or task lighting in the industry. Today, LED-based luminaires are also being used on panels, especially they have carved a niche for visual signals either as a part of a panel mount indicator or as a standalone strobe in a hazardous area or as an embedded part in the body of a machine. Thus, today LEDs are finding versatile use in industries.

The current issue of Lighting India is dedicated to Industrial Lighting. As we all know that the expanse of the term 'Industry' is ever increasing, and in one issue everything cannot be covered, we have attempted to cover some of the sectors or segments where application of the LED-based emerging lighting systems is highly pronounced and promising.

So, wish you all a happy reading!

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Publisher & Editor-In-Chief

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## Advanced Innovation

iovative production efficiency improvement in your entire factory

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## Zero 88, iLight joint venture to streamline manufacturing

With both brands now operating under the same umbrella of Cooper Lighting Solutions, the recent development will help the parent company supply complementary products to capture more share in the market.

ero 88 and iLight UK entertainment and architectural lighting control manufacturers respectively have consolidated and streamlined the production facilities and processes at their shared factory in Cwmbran, Wales. This is to boost efficiency and ensure complete acquiescence with post-COVID-19



work directives related to social distancing and general hygiene. Products from both brands – Zero 88 and iLight are fully designed and manufactured in the UK.

Furthermore, with both brands now operating under the Cooper Lighting Solutions umbrella, this recent reorganisation offers complimentary ranges of lighting control solutions for a diversity of projects, scenarios and applications. Having an entirely integrated workspace in Cwmbran means Zero 88 and iLight product volumes can quickly and easily be ramped up and custom projects can be undertaken more cost-effectively, offering all clients better value and service.

Jon Hole, Product Marketing Manager, comments: "All our hardware, firmware and software design and developments in-house equal a large investment in our facilities, local community and the future."

#### Bridgelux rolls out natural humancentric lighting

**B**ridgelux has recently made available the Vesta product line commercially, adding full natural spectrum white point options to the industry's largest portfolio of tunable white solutions. Vesta Thrive, the winner of a 2020 LightFair Innovation Award, leverages patented Thrive technology to deliver the closest spectral match to natural light available in an easy to use tunable white solution.



As part of the transition to human centric lighting, there is increasing demand for 'natural' light sources. The evolution of the human species has conditioned us to thrive in daylight hours by the light of the sun, and after dusk, in the warm glow of fire. Vesta Thrive enables the development of luminaires that not only deliver natural full spectrum lighting, but also allow new opportunities to personalize lighting, tailoring our environment to individual preferences or taskoriented needs.

# Zumtobel Group's operation profits double

In line with the proposal by the Management and Supervisory Boards, Zumtobel Group in its recent General Meeting has approved the distribution of a EUR 0.10 dividend per share for the 2019/20 financial year. The dividend will be paid on 31 July 2020.

he Zumtobel Group reached several important milestones during the 2019/20 financial year despite the COVID-19 pandemic. After two years of losses, the company is again generating solid earnings. Adjusted Group EBIT nearly doubled to EUR 53.9 million despite a slight decline in revenues due to the Covid-19 crisis.

Alfred Felder, CEO, Zumtobel Group said: "The improvement in earnings shows that we are on the right course and can now enjoy the first fruits of the strategy we have consistently followed since 2018. The Zumtobel Group now has a considerably stronger position, which represents an advantage, especially under the current exceptional circumstances." He added: "However, the company has been in an extreme situation since the beginning of March due to the global spread of COVID-19. We reacted auickly to the decline in revenues and put effective crisis management in place. Our central goal at present is to steer the company safely through the crisis."

The Zumtobel Group generated revenue growth of 1.5% up to and including February, meaning the first 10 months of 2019/20, but the worldwide restrictions to contain the pandemic led to a year-on-year decline of 2.6% to EUR 1,131.3 million (FX-adjusted: minus 3.1%) for the full financial year.

Group EBIT, adjusted for special effects, grew by 95% to EUR 53.9 million in 2019/20 (2018/19: EUR 27.6 million). The adjusted EBIT margin increased from 2.4% to 4.8% and now lies at the upper end of the forecast 3% to 5% target range



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NEWS

## Signify's UV-C light to inactivate corona virus

When the entire world is passing through an unstable phase because of highly contagious COVID 19, and looking for ways to get rid of the virus, the lighting industry is also coming forward to contribute to the mission. Perhaps Netherlands-based 'Signify' has set the best example in this direction. The well-known lighting company is increasing its UV-C lighting production capacity – and expanding its UV-C product portfolio. The company is leveraging more than 35 years of expertise in UV-C lighting to address the growing global need for the disinfection of air, surfaces and objects.

By increasing capacity and widening the UV-C portfolio, Signify is helping keep people safe in a world that's adjusting to a new normal. Its UV-C lighting is well-proven and trusted as an effective disinfectant. This was recently validated in a laboratory test by Boston University, showing that Signify's UV-C light sources inactivate the virus that causes COVID-19 in a matter of seconds. This is crucial as it comes at a time when organisations are seeking ways to continue operations and provide service in a safe environment.

Signify's new UV-C product range includes luminaires and chambers for a wide variety of professional applications. Parts of the range are UV-C fixtures which are ideal for the deep disinfection of surfaces in offices, schools and restrooms. They are equipped with sensors and controls to ensure that they only operate when people and animals are present.

Other products include mobile, freestanding UV-C luminaires that can be wheeled into a hotel room or used to disinfect surfaces on public transport such as buses and trains.

For the disinfection of objects, Signify has launched a range of safe and quick-to-use UV-C disinfection chambers.

## Growth predicted for LED lights in hazardous zones

he oil & gas industry is potentially one of the most hazardous industry sectors where chances of explosions are too high. Based on this sector, Reportlinker's recent report "Global Hazardous Location LED Lights Industry" projects that the Hazardous Location LED Lights market worldwide is to grow by US\$356. 8 Million, driven by a compounded growth of 10.9%.



The shifting dynamics supporting this growth makes it

critical for businesses in this space to keep abreast of the changing pulse of the market. Poised to reach over US\$ 224.3 Million by the year 2025, Oil & Gas will bring in healthy gains adding significant momentum to global growth.

Drawing attention to the developed world, the survey states that the United States will maintain a 12.6% growth momentum. While within Europe, which continues to remain an important element in the world economy, Germany will add over US\$15.5 Million to the region's size and clout in the next 5 to 6 years. Over US\$16.6 Million worth of projected demand in the region will come from the rest of European markets. In Japan, Oil & Gas will reach a market size of US\$20.7 Million by the close of the analysis period.

#### Perfect lighting mood offered for camping tents

Comfortable camping with Tridonic lighting technology. Adria Homes offer freedom, pure luxury and the perfect mood lighting.



Appropriate lighting moods are created by Tridonic technology. Various Tridonic LED drivers to provide general and decorative lighting – both functional and attractive.

**Glamp lamps:** Together with the Slovenian lighting manufacturer ETT Lighting, Tridonic produced the ideal solution to meet the general and decorative lighting requirements for the mobile units. Jernej Jazbec, Purchasing and Logistics Manager, Adria said: "We have been working with ETT Lighting for years as a reliable partner and supplier of Tridonic products. Most of our mobile homes and tents are now equipped with Tridonic drivers."

LCBU 10W 12V BASIC phase-cut SR dimmable drivers for LED strip lights are used for decorative effects and indirect lighting. LEDs with Tridonic LC 13W 300mA fixC C SNC drivers built into the walls or ceiling provide general lighting. Both of these driver series have overload, short circuit and no-load protection. LED panels for additional general lighting in the mobile units are equipped with LC 75W 100-400mA flexC lp EXC constant-current LED drivers for linear and area lighting, which allow the desired increase in the maximum ambient temperature (Ta). EM ready2apply BASIC drivers are used for emergency lighting. The complete kit includes the electronics, LED module, heat sink, optics and battery.

#### Kenall's launched cleanroom luminaires

Kenall's new cleanroom luminar SimpleSeal CSERO and CSERI eliminates glare providing energy-effeciency.



Image by MagicDesk from Pixabay

enall is expanding its offering of sealed, high-performance cleanroom luminaires with the NEW SimpleSeal CSERO and CSERI. These fixtures are engineered to protect the integrity of all makes of cleanrooms, creating bright, evenly-diffused light to improve worker comfort and boost productivity. The luminaires are also designed to dramatically reduce the cost of ownership via unparalleled energy efficiency and industry-leading efficacy (as high as 172 lumens per watt).

Tim Stevens, Product Manager, Kenall elaborated on the benefits: "Only nine CSERO or CSERI fixtures using 837W are required to light a 30' x 30' space, rather than 20 competitor fixtures using 1,498W. Fewer luminaires leave more room in the ceiling for HEPA filters and other mechanicals. save installation and maintenance labor, and reduce ceiling penetrations and potential air leak points." He added: "In relighting projects, these luminaires can save building owners 42% more energy versus competitive offerings. As a result, we can eliminate glare and provide better energy efficiency, regardless of whether the project is new construction or existing space."

The SimpleSeal CSERO is an overlapping-door, IP-66 rated luminaire with a broad range of lumen packages (2,600L – 21,000L). It is appropriate for use in the most stringently-controlled cleanrooms, including Biosafety Lab (BSL) 3-4. The SimpleSeal CSERI has matching lumens, an inset-door and an IP-65 rating, making it appropriate for BSL 1-2.

#### Eaton receives 2020 CIO 100 award

Eaton has been recognized for its comprehensive strategy to leverage augmented reality, driving internal productivity across its manufacturing sites.

PiDG's 2020 CIO 100 award. For more than 30 years, the CIO 100 awards have recognized innovative organizations around the world that exemplify the highest level of operational and strategic excellence in information technology (IT).

Eaton was recognized for its comprehensive strategy to leverage augmented reality for driving internal productivity across its 300 global manufacturing sites, product engineering and field service teams.

Bill Blausey, Senior Vice President and Chief Information Officer, Eaton said: "This award validates our commitment to digitalization and our efforts to adopt emerging technology—like augmented reality—that improves efficiencies throughout our operations. As a result of this initiative, our team was able to improve production output and quality, reduce time to market for new product introductions and improve our competitiveness. We're looking forward to deploying this technology on a broader scale in 2020."

The annual CIO 100 Awards celebrate 100 organizations and the teams within them that are using IT in innovative ways to deliver business value by creating competitive advantage, optimizing business processes, enabling growth or improving relationships with customers.

## Savant will continue to use GE brand mark on its products

Savant Systems, Inc. has completed acquisition of GE Lighting including a long-term license of GE brand.

Savant Systems, Inc. announced that it has completed the acquisition of GE Lighting from GE, creating GE Lighting, a Savant company.

Bill Lacey, President and CEO of GE Lighting, a Savant Company said: "For more than a century we've been bringing the future to light as part of GE and today we couldn't be more excited to continue our journey as part of Savant. Savant is committed to continued investment and



Photo by Scott Graham on Unsplash

innovation in the lamp and fixture space and their deep knowledge and expertise in home automation will help our business accelerate delivery of bold smart home innovation at retail."

The headquarters for GE Lighting, a Savant company, will remain at historic NELA Park in East Cleveland, Ohio and Bill Lacey will continue in his current capacity. Under a long-term licensing agreement, GE Lighting, a Savant company will continue using the GE brand on its products moving forward.

Robert Madonna, Chairman of Savant and GE Lighting, a Savant company said: "We are committed to ensuring that Lighting's long history of industry leadership continues while bringing exceptional value and reliability to retail partners and consumers. This acquisition has moved our company significantly toward our goal of becoming the number one intelligent lighting and smart home company worldwide."

NEWS

#### Kenall launched two new wallmount luminaires

Kenall's two new wall-mount luminaires Mighty Mac WCBS and WCBHS fixtures introduce an unprecedented level of security for both staff and inmates.



Evenall Manufacturing introduced a series of four Mighty Mac correctional luminaires that are virtually impenetrable, with no access points of any kind specifically created to keep staff and inmates safe, these luminaires are impervious to vandalism and contraband concealment. The series is now

Image by Beulah Matemera from Pixabay

expanding to include two new wall-mount luminaires; the dual-aperture Mighty Mac WCBS and the single-aperture WCBHS.

Tim Stevens, Kenall Product Manager, Kenall said: "We were asked to create a unique luminaire that prevented access unless completely removed. The engineers came through for the correctional community. The progress made in LED technology in recent years minimizes lighting maintenance and this, in turn, dramatically reduces inmate disruption, which protects everyone's well-being."

#### **Creating the perfect lighting**

RCO with its Eclipse product range targets applications with the highest standards such as prestigious museums, art galleries and exclusive retail projects. With 28,000 product variants, the new system of spotlights already includes an exceptionally wide range of solutions for individual lighting tasks. But Eclipse also stays flexible in its application thanks to a modular concept with the optics and



Eclipse spotlights from ERCO

accessories - a decisive advantage, especially when used extensively in display and exhibition lighting. This gives lighting designers and practitioners the opportunity of modifying properties such as light distribution, light colour and visual comfort to the specific task precisely, simply and at the same time reversibly.

The key to the flexibility of Eclipse is the modular design of the complete system. The optics, in the form of lens units, can be replaced with one hand without tools and exchanged for optics with different characteristics. The secure twist-and-lock interface between the luminaire body and lens unit is continued as an accessory connection at the front of the lens units and accessories. In this way, lens units and up to three accessories can be combined- providing almost unlimited combinations for modifying the light distribution, the spectral composition of the light and for improved visual comfort.

#### Dialight's upgrade ensures flexible insulation for the industrial market

The upgrades to the Vigilant and SafeSite Area Light - light-weight design, small size, long-life performance, and convenient installation make it the ideal solution for any indoor or outdoor industrial application.

Dialight announced the availability of new upgrades to the Vigilant and SafeSite Area Light. The new Universal Mounting Adapter (UMA) sold as an accessory allows the greatest stock flexibility ever offered to distributors by Dialight for oil and gas, petrochemical, mining, manufacturing and heavy industrial applications...

Offering unparalleled ease of installation and significant time and cost savings, distributors and customers can now configure stock on-site using the UMA with the base Area Light model. Making an upgrade from virtually any existing system fast and simple, users can choose from one of 5 mounting brackets, including wall mount, 45° wall mount, 45° stanchion mount, conveyor mount (horizontal pole), and the newly released ceiling mount. Alternatively, choose one of Dialight's full suite of retrofit adapter kits for existing products including Eaton's Crouse-Hinds - Champ; GE Lighting Solutions - Filter-Gard; Holophane Petrolux II, III; Thomas & Betts Hazlux; Appleton Mercmaster III; Appleton Mercmaster II; and the Killark Certilite & Certilite.

The Vigilant and SafeSite Area Lights offer high efficiency, stainless steel hardware – including secondary retention tabs for added installation security – and up to 143 lumens per watt, with 3,000 up to 9,000-lumen models available. Each fixture includes a single, purpose-built, in-house designed, driver and are fully potted and sealed for increased ingress protection and vibration resistance. The Area Lights are rated to IP66, 67, 69 and NEMA 4X ingress protection.

# ENLIVENING THE ARCHITECTURE

Proper lighting not only illuminates a building but also enhances and uplifts the mood of the people present. However, lighting up an architecture without overdoing it is a challenge.

> Recently, a webinar was organized by ASSOCHAM on "Importance of Architectural Lighting in Creating a Surreal Experience." The webinar highlighted how light can be best used to depict human emotions and sentiments and how it can bring life or a dramatic look to architecture in the night.

The panellists in the webinar were Ar. Vinit Khanna, Principal Architect, Space Ace; Shakti Leekha, Sr. GM & Head, Marketing -Illumination Bajaj Electronics Ltd.; Prof. Charanjit Shah, Sr. Advisor, ASSOCHAM Council for GEM Chairman, Smart Habitat Founding Principal, Creative Group, New Delhi; Vinayak Diwan, Director, Lightbook; Harmeet Singh Issar, Founding Partner & Director, DesignMatrix, Ar. Amit Gupta, Founding Partner, Studio Symbiosis; and Er. Bikramjiet Kukreja, Principal Consultant, V Consulting.

The webinar started with an introduction delivered by Prof. Charanjit Shah in which he said, "Lighting is an essential element of any building project and is responsible for changing the mood, emotions and sentiments of the person." however he added, "Lighting should not be overdone."

Ar. Khaana spoke about the key ingredients of successful lighting design. He said, "Lighting is the fourth dimension of architecture as everyone says. It brings out the emotions and sentiments of a person. It is a difficult yet interesting subject. It gives life and different perspective to the architectural space we live in. The visual quality, the special quality and the need of the space are to be analysed to give a specific kind of look that's required."

Ar. Gupta showed a presentation of some of his projects displaying the day and night view of each. He also highlighted a very important aspect of lighting, saying, "Lighting should be embedded in the design itself and that will enhance and impact the project."

Harmeet also spoke on lighting design via a presentation. He said, "Lighting design is architecture, interiors, landscape revealed..." It is about setting up the context and vision of a project. One needs to try and exhibit the architecture in the night bringing the identity of a building or project. Lighting design is about playing with light fixture and studying the colour temperatures. Light is one of the most economical ways of decorating an architecture.

Er. Kukreja presented how sustainability and conservation in lighting can be maintained. He highlighted buildings waste light energy, are overlit, lights are left on in vacant spaces or after operational hours and daylight is not taken under account. He revealed some of the energy-saving strategies such as dimming, high-end turning, occupancy/ vacancy sensing, daylight harvesting, scheduling, controllable window treatments, personal dimming control and system integration.

Leekha presented a case study on two projects done by Bajaj respectively at Chhatrapati Shivaji Maharaj Terminus (CSTM), Mumbai and Bogibeel Bridge, Assam.

# The light hew lights

A notable increase in values in terms of energy efficiency and output power is the great achievement from the EKOLAS research project.

odern industries like car manufacturing units or medical technology-based units have of late started using state-of-the-art laser technology as one of the indispensable components of their operations. The EffiLAS (Efficient High-Performance Laser Beam Sources) Association has taken up the noble job of securing and further expanding Germany's leading technological and economic position in photonics. As far as the laser light sources are concerned, they are targeting at further optimizing various parameters like performance and energy efficiency.

Osram Opto Semiconductors has worked on various assignments in the EffiLAS' joint project EKOLAS along with their partners Laserline, Heraeus, Fraunhofer ILT, Fiberware and Welser Profile.

#### The target

The fundamental objective was to develop highly efficient infrared laser bars with outstanding output powers and to demonstrate them in industrial materials processing.

#### The background

About 10 years ago, the best laser bars achieved a power of 200 watts with an efficiency of about 63%. Five years later, an output of 250 watts at an efficiency of no less than 60% was expected to be the limit of what could be achieved with the existing technologies. Conversion efficiency and cooling limited the output power of lasers at that time.

#### The new standard

The EKOLAS project, which was completed in February 2020, led to an infrared laser bar with an impressive



maximum output of 400 watts in continuous-wave operation. With an output of 300 watts, the bar sets a new standard with an efficiency of about 70% in the wavelengths of 1000 and 1020 nanometres.

#### The new experience

By definition, Epitaxy means a type of crystal growth or material deposition in which new crystalline layers are formed with a well-defined orientation with respect to the crystalline substrate. The project partners were able to draw on experience gained in other ventures under the EffiLAS umbrella organization including an understanding of materials science and simulation in the field of epitaxy, as well as fundamental expertise in chip and facet technologies.

Narrating his complacence, Sebastian Hein, EKOLAS Project Manager at Osram Opto Semiconductors, said, "We are very excited to achieve, and in some cases even exceed, all of our targets in this project. The key to success was the development of innovative software tools for simulating the electro-optical properties of the lasers, which take into account the thermal distribution, temperaturedependent material properties and mode-dependent wave propagation in the resonator. These tools considerably accelerated and simplified the necessary test runs, making a fundamental contribution to the results of the project."

#### The course ahead

The newly gained knowledge from the simulation of certain processes can now be transferred to other product groups and wavelengths in the range between 800 and 1060 nm. In addition to the advantages in product development, the results also strengthen and consolidate the establishment of supply chains in Germany and the rest of Europe, thereby sustainably strengthening the industrial location.

## PALLIATIVE AIRCRAFT INTERIOR ILLUMINATION

Interior lighting in an aircraft is an integral part of the ambience and passengers' comfort. New technologies are coming up to address this area. The aircraft designers, manufacturers and maintenance groups should adopt the latest offerings in the industry.

Photo credit: unsplash.com by Marvin Meyer

ircraft lighting has been a crucial factor of the overall passenger experience but often overlooked as the other interior components such as seating, inflight entertainment, or connectivity, take precedence. With the age of more-electric aircraft steadily moving towards allelectric configurations, lighting components suppliers have been innovating towards maintaining the delicate balance of product cost-effectiveness, aesthetics, and energy economy. Cabin illumination contributes significantly to the comfort of the passengers onboard, particularly on long-haul, transcontinental flights. Consistently, the technology developers conduct regular tests on the impact of light on human beings, the result of which feeds into the product design engineering nomenclature.

The aircraft lighting market has been fragmented and various suppliers have identified innovation sweet spots to excel as a technology developer. The following trends reflect the seismic hotspots of technology innovations and the associated market participants.

#### 'Logotype' mood lighting evolving as airline brand statement:

With the emergence of mood lighting i.e. color changing light to provide a more immersive passenger experience by aligning the illumination to certain conditions, carriers have been utilizing this as an avenue of the brand proposition. Innovative concepts such as fabricating artificial daylight from sunset to sunrise, dinner atmosphere, a cloudy or star-studded sky with cutting-edge simulation. This kind of interior lighting has been evolving as a symbolic tower of the brand proposition that screams the airline name with features such as designated color combinations typically used by the operator.

#### Fluidizina desian differentia to enhance retrofit viabilities:

Germany-based Diehl Aerospace has gone a step further with respect to mood lighting with its flex-illumination and flatsurface-illumination technology, under its Human-Centric Lighting (HCL) portfolio, which fluidizes the design possibilities. US-based Collins Aerospace has ramped up the retrofit attribute with lighting systems, which can be installed within the existing fluorescent fixture mounting facades with specially designed Light-Emitting Diode (LED) lighting lenses seamlessly integrating into the existing sidewalls. The company's Tapestry LED-based mood lighting system fits into the traditional fluorescent cabin lighting frames, replacing it with high Color Rendering Index (CRI) color points which can be adjusted to maximize crew and passenger comfort with respect to consistency and intensity. Consistently, Germany-based Luminator Aerospace has strategically diversified its product line to enhance the retrofit characteristics. While it has introduced a substitute for traditional fluorescent tubes with bi-colour and tri colour alternatives that can be installed in the existing aircraft structure, interior components, control interface and system wiring; it has also launched its Full Mood Lighting (RGBW) offering for more intense requirements. The systems promise enhanced modularity with the option of downloading the lighting tables as per the scene and color configurations specified by the customer airline. Also, with reduced size LED strip alternatives to fluorescent tubes, singleaisle jetliners as well as business jets can accommodate larger overhead bins.

#### Leveraging HCL to abate jet lag:

Germany-based Jetlite has directed its efforts to unlock the visual, biological and emotional benefits of light that ameliorate the passenger health, particularly in adapting the biological cycles of passengers to the destination time zone reducing the jet lag effects. Controlled consolatory light for relaxation, cooler light as a stimulant for active phases enable minimal deflection for the involuntary, biorhythmic functions. In the heart of this stress-alleviating technology lies the Jetlite controller, which, integrated with the existing cabin management system, moderates the cabin lighting automatically in line with HCL standards. Apart from the passengers, the technology promises diminution of the stress of flight attendants due to increasing workloads across time zones and associated lack of rest, effectually improving their performance.



Photo credit: unsplash.com by Note Thanun



#### Avimanyu Basu

The author is a Lead Analyst with Information Services Group (ISG) and comes with 10 years of experience in market research and consulting. He has executed several strategy consulting assignments for both public and private sector clients in APAC, Middle East and Europe in verticals like aerospace and defence, automotive and energy. Presently, most of his engagements revolve around outsourced engineering services.

Disclaimer: The views expressed in the article belong solely to the author, and not necessarily to the author's employer, organization, committee or any other group or individual.

#### Impregnating existing artifacts with luminous elements for customized visuals:

UK's AIM Altitude has integrated its lighting solutions in the buyer-furnished equipment thus, creating more modular propositions for interior illumination. While this concept of moving away from separate lighting products to a more modulated design of 'illuminating' the existing interior artifacts addresses challenges associated with space restrains, the innovation also avoids installation challenges due to complex shapes. The innovation has witnessed an encouraging response in the middle east, the Emirates-operated Boeing 777 Ghaf Tree feature panel being an example. These features have been utilized by the airlines to intensate brand awareness such as fortifying the 3D appearance of the Arabic design with proper lighting, executed for Oman Air. AIM Altitude has also implemented the feature of displaying various scenes for different flight segments for Virgin Atlantic's Airbus A350 Social Zone, making the passengers pensively aware of the local sights at the destination.

#### **Sharpening control with LED lighting:**

Germany-based Schott, another optics specialist which has been in the forefront of innovation with respect to lightings and its effects on the passenger biorhythm, focuses on replicating natural light and uses a spectrum of over 16 million colors as well as eliminating color effects' of ageing of LEDs. A unique combination of the optical light converter and an LED sensor assimilates the output of every LED, effectually removing possibilities of color drifts (light dots). The challenge of ageing LEDs impacting the overall homogeneity of the light performance was tackled by Schott with its HelioJet technology. The technology leverages four LED colors (red, green, blue, white) integrated into an optical light converter, which uses fiber optic principles. The set-up is supported by sensor management which controls the LEDs and provides a homogeneous light output over the life of the LEDs. The Heliojet has experienced a growing customer base over the years, starting with Scandinavian SAS in partnership with German MRO specialist Lufthansa Technik in 2015.

#### Implementing microLED for weight and longevity advantages:

With LEDs being installed for cabin lighting requirements for quite a few years now, the market stakeholders, specifically technology developers have been working towards bringing in more active and granular control with LEDs, without convoluting the installed electrical circuit. Enter microLED technologies - Collins Aerospace has been the first aerospace company to venture into the application of microLED technology to the cabin in the form of reading light. The company has been exploring possibilities with microLEDs and its installation in panelized lighting on flat and curved surfaces, as well as with video capabilities through embedded systems. Apart from better control, microLEDs also provide improved longevity and lightweight advantages.

#### Improving passenger health conditions:

Few companies, such as Luminator have been working towards enhancing cabin health and safety with antibacterial lighting. The lighting would neutralize harmful bacteria such as MRSA, E. coli, and salmonella, as well as yeasts and fungi. The differentiating factor is brought in by avoiding the use of UV light that may deteriorate the plastic or interior components through extended exposure. US-based start-up Vital Vio has been one of the first movers in this market. After a successful penetration of the hospitals, gyms, household and hotel industries, the company has been working with Delta Air Lines (through Delta's innovation group, The Hangar) to implement its antimicrobial LED lighting technology onboard airplanes. Furthermore, the collaboration creates opportunities for Vital Vio to extend the application of its technology to airports and lounges.

#### Enabling feedback product development workflows:

Stakeholders have established dedicated centers of excellence (CoEs) and CX labs which replicates the aircraft cabin environment, enabling the customers to readily experience the cabin illumination. Diehl's LVC (Light Verification Center), for instance, conducts lighting tests with relevant optical instruments (spectrometer, goniometer and sphere etc.). The test results, along with the passenger experience data and the operator requirements, feed into the new developments of cabin illumination in a closed-loop development model. Similarly, Collins Aerospace provides a fully simulated environment for the airline customers to experiment with the system, such as customize a cabin with their brand embossed on the seats and other monuments while Collins' consultative approach helps define the appropriate color points for each phase of flight.

#### So What?

Market participants have been keeping their nose to the grindstone for bringing in the effective convergence of optics research around human-centric lighting and the human chronobiology (around such as melatonin and cortisol levels, heart rate variability, motion data etc.). Companies like Jetlite have developed proprietary algorithms, which expedites productization of these research learnings. Impacts of jetlag on the inner clock can be reduced by controlling the aircraft's cabin lighting to provide more relaxation and activationfocused environment, considering parameters such as routes, directions and time zones. This contributes to the overall passenger experience and has the potential to pull an airline up the preference list of a frequent flier.

From an industrial standpoint, the COVID-19 pandemic has triggered ripples of uncertainty across the layers of the aviation ecosystem, initiating tectonic shifts in the entire value chain. The new aircraft demand existing so far can be expected to be sidestepped by the exponential growth of the refurbishment market, demanding a change in the ingrained strategy of the supplier network, including the lighting suppliers and technology developers. The suppliers should thus, articulate a strategy for the retrofit market, bifurcated from the conventional linefit market, for driving the next generation lighting products business. The growing market reflects significant opportunities for design firms and presents a landscape of possibilities for unleashing newer concepts like design thinking. The design excellence, once infused with an appropriate cobweb of in-house process and product best practices, would overcome the roadblock of convergence between design and product deployment, which has been historically encountered by most product manufacturers across industries.

Overall, the airline industry has been traditionally driven by passenger experience and expected to be more so, in the post-COVID era. With a range of restrictions in place while flying, as well as during the time spent at the airport, the horizon of passenger experience has increased a few fold and the airlines should triangulate specific areas of focus and develop a collaborative blueprint to address the requirements and gain market share.

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Photo credit: unsplash.com by Alev Takil



KEY ELEMENTS OF DUSTRIAL GHING

The role of lighting is changing fast at all spheres of life. In the case of industries, it is now serving as a key component of transformation by establishing connection and communication among the components in the workshop. ctive Light in the industry is as unique and dynamic as the employees, the processes and the layout of different production halls. Human Centric Lighting puts the focus of the lighting design firmly on the individual. Biological, emotional and visual needs are fully supported by a blend of active light and additional workplace-oriented lighting for work during the day and the night. This approach also facilitates accurate working and improved quality. Best solutions for industrial lighting with activity-based lighting use innovative sensor technology to automatically adapt to the specific industrial situation.



Image 1: Industrial Lighting (Picture reference: litlightingsolutions.com)

#### **Elements of Industrial Lighting**

There are four key elements of industrial lighting as discussed below: Adaptability: In these days of increasing digitalisation, more and more work processes run completely automatically. Due to the digitalisation of industries, where man and machine communicate directly with one another using intelligent digital systems, is within reach. As an active part, the light will work as a connecting element; for instance, to collect data or to aid navigation. **Productivity:** The job market is influenced by high education standards and qualifications, as well as by demographic changes. Companies have to respond to these changes and adapt their lighting to suit increasingly complex work processes, diverse visual tasks and the individual needs of employees.

**Reliability:** Thanks to the wide range of environmental conditions in industrial facilities and production areas, lighting systems need to be both reliable and application-specific. The industrial projects demand reliable and resistant products that are optimised to meet individual application requirements and customer needs rather than some uniform solutions.

**Efficiency:** Resources are becoming more and more scarce. The direct outcome of this phenomenon is steadily raising the overall energy costs. This calls for a rethink – particularly in environments in which luminaires are almost constantly in use. The combination of LED luminaires and lighting control systems provides an energy- efficient solution that cuts both energy and maintenance costs.

#### **Adaptability: Lighting Connects**

Production processes in industrial companies are now changing at increasingly shorter intervals. The same industrial working space regularly has to satisfy different visual requirements and utilisation mechanisms. The lighting system inside should have a high degree of flexibility so that it can be quickly adapted to various layout changes as per the requirements.

Adaptability can be further enhanced by using sensors. Motion sensor and sensitive lighting zones can be changed with a simple click of the button. Time-consuming repositioning of sensors is, therefore, a thing of the past. Digitisation of the industries has the potential to optimise industrial processes in terms of adaptability and productivity even further in the future. In this context, lighting can play a significant role. For example, the level of illuminance automatically adapts to the task at hand and therefore always provides the perfect lighting conditions. Furthermore, connecting communication and machines and systems and products can further increase productivity in the form of reduced production times, data analysis or lower error rates.



Image 2: Lighting in Textile Industry (Picture reference: redoygroup.com)

#### **Productivity: Lighting is Human Centric**

The demands on workers will noticeably increase in the future. Routine functions will become more and more automated, while increasingly complex tasks that demand manual intervention will require appropriately trained employees. Beyond that, there is the issue of democratic change. Shifting age patterns in the workforce bring about new workplace requirements. Good light quality is the basic requirement for the well-being of employees, helping to make sure that they are motivated and can concentrate sufficiently to deal with such highly complex tasks.

This increases performance and markedly lowers error rates. In addition to its visual and emotional effect, light at the workplace is also important in terms of biology. Light with shortwave, blue spectral components has an activating effect, whereas warm-white light has a relaxing influence. Biologically effective lighting can provide long-term support in terms of employee health, particularly in production areas without natural daylight or for night-shift operations.

#### **Reliability: Lighting is resistant**

Industrial and manufacturing enterprises are extremely diverse and characterised by very different environmental conditions. No single solution can meet the demands of every industrial application. Identifying the prevailing environmental influences therefore plays a significant role when selecting the right lighting.

The technical components of a luminaire should be protected against overheating in the case of very high temperatures. During intensive cleaning processes and in chemically polluted ambient atmospheres, special attention must be paid to the right choice of material in order to provide resistance against the substances present in the application. Application-specific standards and guidelines often contain lighting related requirements that have to be fulfilled. Checklists can provide an overview and record the existing general conditions in an industrial project as comprehensively as possible.

#### **Efficiency: Light is more than efficient**

Energy requirements in industries and related areas are especially high due to long operating and production times; sometimes 24X7. This has a negative impact on the carbon footprint and often leads to higher energy costs. Selecting the right lighting and controls system therefore contributes significantly to an optimised use of energy resources.

Advanced electronic control gear with a dimming function can cut power consumption by up to 25%. The smart use of motion and other sensors offers the possibility to further decrease the need for artificial light by 20 to 40%. Smartly controlled time management lighting systems ensure that the lighting is only switched on when it is really needed in any particular area. Daylight sensors will change the intensity of luminaires depending on the amount of daylight available, thereby guaranteeing a constant level of lighting and saving energy and cost.

#### Conclusion

Industries are made up of many diverse areas, from heavy



Image 3: Lighting in Food Processing Industry (Picture reference: accessfixtures.com)

industry to clean-room applications. Industrial lighting has to satisfy a number of requirements and obey with the appropriate standards depending on the type of industry.

- Large halls and long operating hours require energy efficient lighting solutions with minimal maintenance costs for instance in Logistics.
- Lighting must be capable of providing optimal support in complicated assembly and body work for instance in automobile industry.
- Hygiene standards place high demands on the quality of the lighting for instance in Food processing industries.
- Clean rooms in particular require special construction features and materials for instance in Pharmaceutical and Chemical industries.
- High degrees of protection are essential in

atmospheres with increased dust and/or fibre accumulation for instance in wood, paper and textile industries.

• Intelligent lighting management and LED luminaires improve safety and boost energy efficiency for instance in parking area or building in industries.

Well balanced levels of illumination are essential in establishing safe and productive working conditions. Production and other industrial units should take into account lighting in the industrial work place very seriously. Optimizing the industrial lighting requires consideration of environmental, economic and type of work task considerations. The benefits of proper and efficient lighting include greater productivity and accuracy, improved security and safety, and improved working environment for workers.



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# BRINGING CONVENIENCE TO HOME

A growing internet penetration and Internet of Things (IoT) gaining more prominence with smart devices such as Google Home and Amazon Alexa, traditional way of living is getting a modern makeover – at the flick of a button!

Switches are intrinsic features of a building's electrical system. While initially switches were quite functional, helping users to control electrical equipment in the room, today they have evolved exponentially to become technologically advanced devices. From being plugged into wireless technology and being controlled remotely from a smartphone to sporting programmable dimmers and timers with mood setting switching option, there are wide arrays of technological innovations to choose from.

Conventionally, for any automation product, there is a need for pre planning from the initiation stage. However, with the innovation in products enabled with IoT technology, we can automate a home at any given point in time. This is because these products are designed for retrofit installation i.e., they can be snapped into our existing switch plates without any change in structural and wiring change. Another benefit of these products is that they help customers upgrade to home automation at an affordable cost.

As consumer propensity to install smart home solutions continues to grow, let's have a look at some new and upcoming trends that are redefining wiring devices usage.



Photo credit: unsplash.com by Sebastian Scholz (Nuki)

#### Make your existing products Smart:

IoT in consumer durable product is much in vogue, but what about products which are not IoT enabled? To address this need, there are plug and play smart sockets which will help one monitor and operate any equipment intelligently. For instance, with a water heater or air-conditioner powered by a smart socket, one can remotely control or switch off the device through an app, thereby eliminating potential dangers and saving energy.

#### Smart manoeuvring with motion sensors

Visiting restrooms or kitchens during night-time can often be trouble-some, especially for the elderly and children. Foot-lamps with motion sensors can sense movement of the user and lit up pathways accordingly. Convenient, responsive and functional, these devices help residents avoid undue obstructions or accidents easily.

#### Save energy with smart sensors

Many smart switches come with sensors and the option of scheduling lighting as per room occupancy. While sensors detect movement and turn on lights automatically, scheduling allows you to set a vacation mode that keeps few lights on. Both features help in conserving energy drastically. Smart switches thus impart greater control in the hands of homeowners. These sensor also exhibit features of day light harvesting.

#### The advantage of an USB charger – on your switchboard

Over the past decade, we have seen a proliferation of smart phones, laptops and smart home assistants. Most of these devices are hooked on to USB chargers (2.1 for fast charging) for a lion's share of the day to avoid being drained of battery. Today, it is imperative to integrate USB ports in switchboards that can recharge gadgets faster with AC supply, while ensuring seamless connectivity always. Not to mention, this also eliminates the hassle of carrying separate charging adaptors while at home or office.

#### Enhance connectivity with wireless doorbells

Wireless remote doorbells, available in multiple DIY tunes, have a wide-ranging access and are highly utilitarian in large, multi-floored houses. Even for incapacitated patients in home care, these devices bring many benefits as he can call for help with the help of a remote at any point in time. With integration of camera, smartphone integration and hi-definition video, one can also monitor callers with more scrutiny.

However, it is also essential to ensure safety by ensuring the right switch for the right electrical load. For example, in the kitchen, the wiring & switch/socket specification of a microwave is 16Amp whereas it is 6Amp for a refrigerator. Also, to ensure child safety, all sockets must be fitted with safety shutters to avoid any unfortunate incidents. Electrical switch plates are often susceptible to be the birthing ground for bacteria and germs, as they are exposed to rampant usage. Hence, to reduce chances of infections, anti-bacterial, anti-fungal switch plates can maintain hygiene and well-being for the entire family. ROHS compliant electrical switches, made with green and recyclable material, ensure longevity and helps contribute our bit for a greener and more sustainable environment. Smart switches amplify the smart home ecosystem. As the market continues to evolve and Indians inch towards a more connected lifestyle, faster uptake of evolved, modernized and IoT-enabled switchgear will re-shape modern living.



**Vivek Yadav,** Senior Vice President, Havells India Ltd.

## Philosophical lighting with a blend of energy-efficiency

Anuj Dhir, Vice President and Business Head, Wipro Lighting speaks to Lighting India content team on his company's aim of being the market leader in Green Building Solutions.

#### Please elaborate on your indoor and outdoor LED lighting range in the B2B space.

Wipro is a proud leader of modern workspace lighting that helps create interiors that are sophisticated, stylish and most importantly, productive. Our 'Right Light Philosophy' acts as food to create, facilitate the explosion of new ideas. **Cleanroom Lighting:** We have more than 20 years of experience, dedicated team of cleanroom lighting specialists, products which conform to international standards, developed using the latest technology adapting to meet the changing needs of the industry. Application areas of our products include major pharmaceutical companies, food and beverages factories, and electronics and semiconductor industries.

Photo credit: unsplash.com by Naveed J

**Industry Lighting:** In the industrial sector our luminaires have been designed for energy efficiency & high performance. We adopt a consultative approach to

lighting. Our products find applications in all general types of lighting with a focus on productivity and safety of the employees.

Outdoor Lighting: We have superior lighting solutions for Smart Cities. Our street lights aim at precision optical design, uniform light distribution, use advance LED technology and are blend with urban designed to architecture. The focus is on enhanced safety on roads along with higher energy savings. Our Floodlights used in Infrastructure projects are functional, reliable, durable and highly energy efficient. Options of wide and narrow beam distribution give a distinctive atmosphere at the same time, help save operating costs.

#### What's your approach towards energy-efficiency? Any recent projects or innovations?

Future belongs to energy efficiency, with evolving work culture and increasing energy cost, customers are looking at energy-saving opportunities. Lighting constitutes a significant part of total energy consumption. In homes and offices, approximately 20% - 30% of the total energy consumed is due to lighting. At Wipro, we promote the development of a sustainable eco-friendly infrastructure which encourages energy conservation and promote optimum use of resources mitigating the negative

impact on the environment and people. We have designed and provided lighting solutions and products to over 55% of green buildings within the country.

Our Force Green Initiative comprises of innovation & design, usage of advanced LED technology, experience & expertise and energy optimisation techniques. Our philosophy of reduce, reuse and recycle makes us a market leader in Green Building Solutions.

Wipro Lighting is at the forefront in driving the change by offering latest technology lighting solutions using LEDs.

#### **Usage of human-centric lights**

Human-centric lighting can be pursued in all walks of life – offices, banks, healthcare segments etc. People nowadays spend most of their day indoors and are hardly exposed to natural light. Human-centric lighting helps mimic the daylight for employees working for longer durations in offices, keep their circadian rhythm in place.

With human-centric lighting in classrooms, students can concentrate better as their circadian rhythm is still in tune with the natural light.

Human-centric lighting solutions have shown tremendous results in healthcare segments. Especially patients have shown positive response and greater speed of recovery in the presence of human-centric lights.

Photo credit: Image by MagicDesk from Pixabay



#### How do you live up to greener comfortable lights?

As the world moves towards becoming greener and cleaner, energy efficiency is a key parameter to measure the performance of energy-consuming devices. This is even more so in Lighting as luminaires consume close to a quarter of all energy consumed in a building.

Reduced costs in terms of energy savings; Comfort in terms of enhanced user experience & uniform lighting; Convenience in terms of plug and play; or easy choice of scene select systems – are what customers look at while deciding a suitable lighting control system for usage.

That's why Wipro Lighting's range of eSence sensors and lighting controls are a sensible choice in homes and offices. These are perfect for use in drawing rooms, bedrooms and office spaces such as meeting rooms, executive cabins, receptions and cafeterias.

#### Key USP's for Wipro lighting products that you wish to highlight.

Innovation & Design are a way of life at Wipro Lighting. We have been a market leader in lighting for commercial spaces. We are a top choice in the market when it comes to lighting modern workspaces. We offer state-of-art lighting designs and solutions that blend well with the existing architecture and create an enriching work experience.

Our industrial lighting solutions are best-in-class, energy-efficient with innovative design to ensure longer service life with low running operating costs in industries.

Wipro is committed to the use of the latest technology and the company is focused on providing solutions which are in tune with the latest technology and future trends. The team is always looking out for innovation in products concerning the latest design trends. Our products are designed for high performance with maximum energy efficiency and offer reliable service life, thus imparting value for price to the customer.

# LED & HORTICULTURE LIGHTING

griculture is one of the oldest activities learnt by Human beings since the ancient times for their living. With the passage of time, agriculture became the most prominent activity for business. Previously, agriculture shared major portion of the GDP (Gross Domestic Products) of a country. With the revolution in Industry and Service Sector, the share of agriculture is getting depreciated year-by-year. Such data is available by World Bank for the sector contribution in GDP (%) of different countries.

For India, the contribution (%) of different sector (viz-a-viz Agriculture, Industry and Service) to GDP is provided beside for the reference (Source: Calculated from CSO data). Here, contribution of agriculture is approx. 14% of GDP whereas more than 30% population is dependent on agriculture for their living.



Traditional farming (i.e. cultivation) was developed in open farms, which was greatly influenced by factors such as farmland scarcity, depletion of natural resources at fast rate, adverse impact of climate change and global warming. Further, people have migrated to metro-cities for better job opportunities instead of investing their time and money in agriculture. All these factors adversely impact the agriculture products to a great extent and many times may cause loss to the farmer.

Due to above reasons and to cope with losses, agriculture under controlled environment is the emerging technology. Green Houses and Plant factories are such kind of manifestations which are gaining popularity very fast.

#### **Definition of "Horticulture"-**

The origin of the term "Horticulture" lies in two Latin words hortus (meaning "garden") and cultus (which means "tilling"). Horticulture can be defined as the science or art of cultivating plants viz-a-viz fruits, vegetables, medicinal plants, flowers or ornamental plants. It is of worth mention that horticulture crops are comparatively more intensively cultivated than the field crops i.e. horticulture crops need intensive care regarding different parameters such as supply of minerals, water, sufficient & appropriate light, temperature, humidity.

Horticulture is further divided into sub-branches as discussed below –

- **Floriculture** this sub-field deals with the cultivation of floral crops. It is concerned about the growing and selling of flowers.
- Landscape Horticulture This refers to the design and alteration of land by planting material (such as trees, plants, shrubs, turfs, herbaceous perennials, etc.) and land restorations. These help in the improvement of aesthetic view and make the space more vibrant and lively. Regular maintenance is required to keep the landscaping more lively and beautiful.
- Olericulture This refers to the cultivation and selling of all types of vegetables. Vegetables are essentials part of our food which help to fulfill the requirement of vitamins and minerals of our body.
- **Pomology** This deals with the growing of fruits from rising of saplings to final products.
- Post-Harvesting Physiology The said field of horticulture is relevant to crops reaping, maintaining their quality, reducing spoilage, preservation, etc.

In India, with the advent of the new technologies and acceptance of the same as essential part of economy, there is rise in the products of horticulture. Further, government has



initiated special measures and framed policies for the encouragement in the horticulture which has resulted the rise in horticulture products.

#### Role of Light in Horticulture -

Plants prepare their own food with the help of photosynthesis process (autotrophic mode of nutrition). Leaves are termed as the food factories of plants i.e. food required for growth & development of plants is synthesized in the leaves. For the preparation of food, plants required the nutrients, water (both absorbed by roots from soil), carbon dioxide (absorbed from air through tiny pores present on the surface of leaves) and sunlight (captured by pigments on leaves).



Since, the synthesis of food occurs during sunlight, hence the process termed as "Photosynthesis" (where Photo means "light" and synthesis means to "combine"). During photosynthesis, glucose is prepared and oxygen is released in environment. The process can be shown in figure as –

The process of photosynthesis can also be represented in form of an equation:

$$6CO_2 + 6H_2O \xrightarrow{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

Many researchers and scientists have found that light plays a very important and vital role in the growth of the plants, which is briefly discussed in next paragraphs.

Light is an electro-magnetic radiation, which consists of three parts – UV Radiations, Visible Part & Infra-red radiation. Light consist of light particles called photons.

In comparison with human beings, plants have different sensitivity towards light. Humans are most sensitive to green



light, whereas plants have much broader sensitivity. This shown in the figure.



Researchers have proven that photosynthesis process is most efficient with blue and red coloured light. Regarding lighting in horticulture, one of the important factors is Photosynthetically Active Radiation (PAR), which is defined as electromagnetic radiation with range from 400 nm to 700 nm, which is used during the photosynthesis process. Horticulturalists measure PAR for both plant research and greenhouse lighting design using specialized photometers. The unit of measurement for PAR is Photosynthetic Photon Flux Density (PPFD), measured as  $\mu$ molm-2s-1. The role of light in plant growth can be explained as below –

- UV Light often stimulates the plant defence mechanism with the pigment accumulation.
- Blue light (absorbed by Cryptochromes) leads in stretching, stomata opening, dark colored leaves & flowers. 100%

blue light leads to excessive stretching.

- Green light counteracts the blue light effects.
- Far red light enhance flowering and stretching.
- Effects of Red / Far-Red ratio (R/FR) (mediated by phytochrome) is as follows –
  - High R/FR cause rapid seeding growth.
  - Low R/FR increases stretching.

Greenhouses and Plant factories faces following problems – deficiency in illumination, insufficient light intensity, light quality, change in seasons, etc. All these factors lead to serious reduction in crop output. Low light intensity adversely affects the yield and quality of horticulture. Therefore, dependency on sunlight only will not be sufficient for photosynthesis to meet the requirement of crop growth and quality. Provision of supplement lighting may be accompanied with the application of artificial lighting.

#### Benefits of using LED for Horticulture technology?

Many types of luminaries are available to supplement lighting in horticulture. Light sources used in horticulture are – Electrical discharge (fluorescent, HID, MH), and Solid-state light sources (i.e. LED, Organic LED).

LEDs offer much better and efficient technology in comparison with the conventional light sources used for lighting purposes in horticulture such as high power Metal Halide Lamps or Mercury Lamps. Usage of Conventional light sources for horticulture application, available in the market have de-merits in comparison to the LED technology.

LED technology is efficient, environment friendly and economically much better than in comparison to the conventional light sources. With the application of LED technology, the production of horticulture products can be increased further with more efficiently and environment friendly.

The merits and role of LED technology in Horticulture are discussed below –

 Highly Efficient & Reduced Operational Costs – In comparison with conventional light sources, LEDs are more efficient. More electrical energy is converted into ight energy. Hence, LED gives more photons output per kWh, thus less operational cost. Thus, LED has higher Photosynthetic Photon Flux Density (PPFD). Blue colored light is highly beneficial for plants and release of blue colored photon required more energy. A brief comparison shown in figure –

Further, due to the high efficiency (more photon output per wattage), the operational cost of LED (i.e. electricity consumption bill) has been reduced to a great extant. Higher efficiency resulted to obtain high quantum flux with fewer quantities of LEDs. This helps in reduction of installation cost.

Thus, the usage of LEDs has resulted savings on huge expenditure been incurring on paying of electricity bills for lighting.

- Reduced operational costs (upto 40% energy saving)
  - LEDs are most efficient light fixtures in terms of



illuminance output in comparison to conventional light sources.

- Increased / improved plant quality through choice in spectrum. LED technology comes with the diversified colour control with the advent of RGB type of light sources. Thus, LED technology provides the flexibility in the section of light colour desired for plant.
- Uniform Light Distribution while using conventional type of light sources, uniformity of light was a big concern, due to which light didn't reach below the canopy area and due to darkness below canopy may resulted poor growth of plants. This is improved with the application of LED technology. LED lights provide the more uniform light distribution across the plants and improve the growth.
- No / less infra-red heating Also, HID lamps were installed at higher position because of the generation of large amount of heat. Approximately 55% of electrical energy gets converted into radiation heat, which is very much harmful to plants. For the dissipation of heat, airconditioning system need to be installed inside the premises. This also causes additional burden on electricity bill. Also, due to excess heat generations, these lights could not be placed closure to the plants to brighten the portion below canopy as this may damage the plants. Whereas, LED lights produce very less heat in comparison to conventional light sources. Hence, LED can be provided below the canopy areas to brighten the areas sufficiently.
- Instant light Conventional light sources used to get time to start-up whereas LED lights illuminated instantly without losing time.



#### Conclusion

Light plays an important role in growth and development of plants. Dependency on sunlight only, resulted poor production of horticulture products. Production can be improved with the application addition light sources i.e. Plant Artificial Radiation Sources (PARS). These are essential for artificial light cultivation to replace the sunlight for plant growth in protected horticulture such as in green houses or plant factories. This will promote the development of ecological agriculture.

The lack of synchronization in Lighting designers and Horticulturalists is of big concern. Lighting designers are concerned about the lumens and illuminance whereas Horticulturalists have concerned for Photosynthetically Active Radiation (PAR) and Photosynthetic Photon Flux Density (PPFD).

To make the horticulture industry more efficient and effective, it is the essence of time and technology that lighting designers and horticulturalists need to synchronize in the same frequency.

LED technology play important role in Horticulture Lighting with efficient, uniform, lighting.

In the case of unbalance in any of these parameters may lead to drastic damage to crops and will incur huge loss in terms of financial aspect also.

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			LIGHTIN	G INDIA			
1 YEAR	6	750.00	1050.00	1250.00	750.00	1425.00	1625.00
2 YEARS	12	1350.00	1950.00	2350.00	1350.00	2625.00	3025.00
3 YEARS	18	2000.00	2900.00	3500.00	2000.00	3900.00	4500.00
5 YEARS	30	3000.00	4500.00	5500.00	3000.00	6000.00	7000.00
		MI	EDICAL EQUIPMEN	NT & AUTOMA	ATION		2
1 YEAR	6	750.00	1050.00	1250.00	750.00	1425.00	1625.00
2 YEARS	12	1350.00	1950.00	2350.00	1350.00	2625.00	3025.00
<b>3 YEARS</b>	18	2000.00	2900.00	3500.00	2000.00	3900.00	4500.00
5 YEARS	30	3000.00	4500.00	5500.00	3000.00	6000.00	7000.00
		1	UTOMATION & R	OBOTICS WO	RLD		
1 YEAR	6	1200.00	1500.00	1700.00	1200.00	1875.00	2075.00
2 YEARS	12	2160.00	2760.00	3160.00	2160.00	3435.00	3835.00
3 YEARS	18	3200.00	4100.00	4700.00	3200.00	5100.00	5700.00
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# IN LIGHT States of the second second

he year 2020 can be called the year of novel coronavirus (COVID-19), which has swept not only its city of origin, i.e. Wuhan in China but also the entire world. As a result, the world is trying to come to terms with the 'new normal' by wearing masks and gloves and by following social distancing, i.e. maintaining a minimum distance of 6 feet from each other. As an aftermath of the coronavirus pandemic, people have become even more conscious about keeping the area in and around their house clean and are disinfecting any object that enters their premises. Thus, in response to the pandemic, governments and companies across the world are taking to several sanitation practices, specifically ultraviolet (UV) light, a disinfectant which has been in use for decades in hospitals and other health care services.

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Information



Author: Prag Bhatnagar, Senior Vice President Havels India Ltd

#### **Decoding Ultraviolet light**

UV radiation can be divided into UV-A (320 to 400 nm), UV-B (280 to 320 nm) and UV-C rays (200 to 280 nm). The reason why UV radiation is effective as a disinfectant against various bacteria and viruses is it disrupts their DNA and thus prevents them from performing vital functions. Yet, not all kinds of UV light is effective for disinfection. For disinfection purposes, the optimum wavelength required is in the range of 260 nm to 275 nm and germicidal effectiveness falls exponentially with longer wavelengths.

Power intensity, wavelength and exposure duration are some of the major factors typically used to determine effectiveness of UV light against microbes. For example, on surfaces and in water, there might be several germs with differing optimal absorption wavelengths. For any given wavelength of Germicidal UV (GUV), its exposure duration and power would need to be determined in order to achieve the required level of sterilization.

While developing a product for a particular disinfection requirement, it is imperative to gauge the performance of UV LEDs under different conditions and how these conditions are related to one another. While power and wavelength are the first factors a design engineer considers, these are not the only factors to be considered. The wavelength, viewing angle and radiation pattern provide insights with respect to the usefulness of the power specified and current related information provide room for control and design of system for end of life requirements. Lastly, thermal related information such as maximum junction temperature and thermal resistance are important specifications for development of an efficient and application specific thermal management.

GUV is ideal for use in offices, hospitals, parking lots, hotels, factories and warehouses, train stations etc. to make the manual sanitisation process easier and more effective. Many companies in India will be launching a pre-tested UV product line that will include sanitization enclosures, wands, remote-controlled robots etc. applicable for both industrial and residential usage.

#### Is UV light safe for humans?

UV-C light only penetrates the upper layers of the skin and eye while the shortest wavelengths hard penetrate living cells. Hence, it may cause a slight, transitory sunburn from accidental over-exposure to the skin. Even though GUV lamps may pose a theoretical delayed hazard, incidental UV exposures would not significantly increase one's lifetime risk for cataract or skin cancer when compared with exposure to UV light from the sun on a daily basis. As a precaution, it is important to avoid entering the disinfected area after 30-40 minutes of operation of a GUV lamp. Also, one should not look directly into the disinfection lamp in order to prevent damage to the eyes. The products developed using this technology will also have to be intelligent keeping in consideration the requirements of daily usage.

#### UV to experience an accelerated usage

While some of the effects of this pandemic might be shortlived, it is certain that the emphasis on cleanliness will stay. Consumers are likely to remain conscious of hygiene and it is going to influence their purchase decisions such as where to shop, which restaurant to dine in etc. In 2018, the global UV disinfection equipment market was valued at \$1.1 billion. According to Allied Market Research, it is expected to reach \$3.4 billion by 2026. Slowly, we see an accelerated adoption of technologies like GUV not just in hospitals, health care services and public spaces but also in common households. By investing in disinfection solutions such as GUV, we would be able to ensure better protection of our health and would be able to adjust more easily to the 'new normal.'



# LIGHT FOR HOPE

The "Light for Hope" initiative was taken up to spread positivity amidst the challenging times that the world is currently passing through.

ith a view to reaching a positive message conveying a ray of hope to the boarders, locals and travellers, over 270 hotels of Marriott International across Asia Pacific – including those at Seoul, Tokyo, Shanghai, Hong Kong, Bangkok, Kuala Lumpur, Saigon, Jakarta, Maldives, Mumbai – lit up their hotel rooms to form a smiley face on the building's façade from April 9 to 30. The symbol was selected to project a happy demeanour radiating positivity, with hopes that it brings a smile to the faces of all who see it.

Focusing on the idea behind the performance, Craig S. Smith, Group President, Asia Pacific, Marriott International, said, "In times of uncertainty one thing remains certain - we are in this together, and we will come out stronger. We are all awaiting the time when we can travel again, but until then we are following the guidance from local authorities and are dedicated to continue our support for the communities our hotels are at. Through the various downturns faced over the many years, Marriott International has always stood tall by relying on the humanity of its associates. No matter where people may be, the light at Marriott International will always be on."

According to the Group, "Putting people first is at core of Marriott International. Hotels across Asia-Pacific have been going above and beyond to demonstrate the extraordinary collective power of people to help others. In these challenging and unprecedented times, associates from hotels across Asia Pacific have volunteered over 40,000 hours to serve their communities. Contributions include food donation, making of protective personal gears for front line medical staff, and securing shelter for medics and journalists."

Throughout April, guests and travellers enjoyed the "Light for Hope" initiative at select Marriott International hotels across Asia Pacific.

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#### **LED Expo Mumbai**

Date: 18 - 20 September 2020 Location: India Contact: rasheed.anwaar@india.messefrankfurt. com/ ruhi.shaikh@india.messefrankfurt.com +91 11 6676 2320 ; +91 22 6144 5914

#### Media Expo-Delhi

Date: 18 - 20 September 2020 Location: India Contact: samson.simon@india.messefrankfurt.com +91 9811653863

#### Light + Building

Date: 27 September - 02 October 2020 Location: Germany Contact: maria.hasselman@messefrankfurt.com +49 69 75 75-68 01

## VIETNAM Int'l LED/OLED & Digital Signage Show

Date: 03 - 05 September 2020 Location: Vietnam Contact: ace@exporum.com

#### Indonesia International Lighting Exhibition

Date: 25 - 26 - 28 August 2020 Location: Indonesia Contact: info@gem-indonesia.net



# WEBINAR

Organizer : Messe Frankfurt, Middle East Time: 5:30 PM (IST) Date: 19th August 2020 **Webinar Name:** The team behind the lighting design process

Company Name: Signify Time: 4:00 PM CET/10:00 AM EDT Date: 24th Septmber 2020 Webinar Name: BIOPHILIC DESIGN

Company Name: Signify Time: 4:00 PM CET/10:00 AM EDT Date: 22nd October 2020 Webinar Name: Bringing the benefits of natural light indoors



## NEW: Infineon's ICL5102 LED driver IC

High performance PFC and resonant controller for LCC / LLC



In today's fast growing lighting market universal solutions with high efficiency levels, smaller form factors, reduced cost and benchmark reliability is what customers ask for. Infineon responds with its new highly integrated combo controller IC with universal input of 90 - 305 V allowing for global designs.

The ICL5102 integrates a half-bridge controller with a PFC stage in a single DSO-16 package and impresses with a THD factor of <3.5% and a high power factor of >0.95. The resonant topology driver achieves a high efficiency up to 94% which results in more lumen output and less thermal load. Furthermore, it features an advanced burst mode for lowest standby power. Thanks to the high integration, there is less need for additional expensive components in PFC and LLC stage, bringing the overall BOM cost down. Several integrated protection features and auto restart complement the offering.

Summing up, Infineon's new ICL5102 LED driver IC enables high-performance, cost-effective designs, while keeping spending on LEDs and heat sink low at the same time.

Target applications: LED driver for professional commercial lighting, and smart lighting, street lighting for smart cities, horticulture lighting, offline AC-DC power supply, LCD TV, adapter and battery charger.

#### **Key features**

- > Universal input 90 305 V
- > Highest efficiency up to 94% by resonant topology
- > THD <3.5%, PF >0.95
- > Burst mode, low standby
- > Low BOM cost
- Combo controller IC
- 500 V MOSFETs at LLC stage
- Low cost resistors to set working points

#### Key benefits

- > Enabling global designs
- > Use from 40 300 W
- > Best-in-dass PFC and THD at full and light load
- High efficiency: more lumen output and less thermal load
- No components required to match the PFC and LLC stage
- > Integrated protection and auto restart





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