INDIA'S FOREMOST MAGAZINE ON THE LIGHTING INDUSTRY

Lighting India

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Vol. 12 No. 2 March-April 2017

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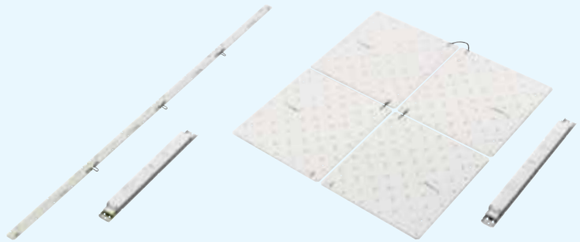

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for fluorescent lamps

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for fluorescent lamps

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Controls

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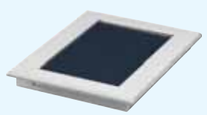

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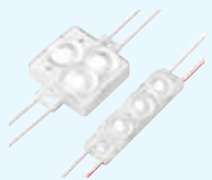

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TALEXcontrol

Time to repalce all street lights to LEDs

Hello and welcome once again to *Lighting India*, the oldest magazine in India exclusively on the lighting industry.

Immediately after taking over the as the prime minister, Narendra Modi, led from the front in tackling the energy issue by stressing importance on generating more power from renewable to reducing energy losses. The power ministry announced that the government will replace all street lights in the country with LED bulbs in next 24 months. This was in line with the power ministry's motto of providing energy efficiency and dependable energy in the country. Efforts were being made to replace all domestic bulbs into LED under the Domestic Efficient Lighting Programme. After all the underlying logic being that conserving power is more economical than producing more.

The lighting industry consumes almost 18-20% of the power generated in the country. This can be brought down by about 30% if we just convert all the street lights in the country to LEDs. As mentioned above, a step in the right direction has been taken. Nearly four crore street lights have to be changed to LED lights. Hopefully, the NDA government will meet the set target by March 2019. A strong initiative will definitely make this possible. Incidentally, the same year when Mr Modi took charge, a small suburbs in Washington, replaced about 1,000 high pressure sodium lights with energy efficient LED lights and saved nearly 60% energy in just that municipal area.

The government should also think about installing not just LED lamps but more modern wireless monitoring and control systems for street lights. The beginning can be done at least in major cities or in the 100 smart cities that is being planned.

Once again this year, Lighting India was present at the Spring edition of Hong Kong Lighting Fair this month. Like always, *Lighting India* was the only Indian magazine invited from the country. More details of the event will be covered in the next issue. Meanwhile, we have culled some very informative and interesting articles on LED street lighting and emerging applications of LED lighting systems. As always, there are some beautiful lighting projects that are covered in this issue - one of them being the Cathedral of Our Lady in Belgium and the old market square around Antwerp, which has been beautifully lit using LED wash fixtures that have been strategically placed on balconies of a UNESCO protected tower.

Hope you enjoy reading this issue as much as we in the editorial and design team have to bring this to you. Until next time, happy reading and do send in your comments to me at miyer@charypublications.in

Mahadevan.

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Working on projects in India, I have come across some of my toughest challenges budget-wise, but at the same time I have found Indian clients some of the most reasonable, approachable and intelligent...

articles

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Chauvet acquires ChamSys

Chauvet & Sons LLC has completed the acquisition of ChamSys Ltd., the Southampton, UK-based designer and manufacturer of lighting controllers. ChamSys provides Chauvet a strong presence in the controller market that complements its CHAUVET Professional lighting fixtures and LED video panels.

ChamSys will continue to operate as an independent business unit from its facility in Southampton, UK. ChamSys founders Chris Kennedy and George McDuff will remain as Managing Directors of the company and, together with Sales Director Tony Cameron, will continue to lead its current staff of software and hardware engineers, operations, sales and support teams.

The ChamSys industry standard MagicQ series of lighting control products will continue to be sold by the company's current network of distributors, except in the USA, where Chauvet will sell and support ChamSys products from its Sunrise, Florida, headquarters. The CHAUVET Professional sales team will assume responsibility for ChamSys sales in the USA. They will have the full-time support of Phil Watson, former CEO of ChamSys, Inc. who has been named ChamSys USA Director.

ChamSys, Managing Director, Chris Kennedy echoed his enthusiasm and said, "Chauvet and ChamSys share similar cultures, a strong sense of respect for our customers, an appreciation of our staffs and a powerful drive to be the best in our markets. This partnership is clearly a logical step for both companies. We deeply appreciate that Chauvet is committed to building on our 14-year heritage so that ChamSys becomes even stronger in the future." ■

Bihlermed debuted Surgilight, flexible surgical lighting solution, at Aaos 2017

BihlerMED, a well known provider of medical illumination technology and devices, in partnership with View Medical, introduced the Surgilight surgical lighting system at the annual meeting of the American Association of Orthopedic Surgeons (AAOS 2017), at the San Diego Convention Centre, on March 14-18. Attendees had the opportunity to experience demonstrations of the lighting device in person at BihlerMED Booth #4914.


Dan Coppersmith

Dan Coppersmith, Sales and Marketing Manager for BihlerMED, said, "AAOS 2017 is the ideal place and time to introduce Surgilight, considering the critical importance that precision lighting plays in today's orthopedic procedures."

Surgilight provides versatile and safe illumination, which can be focused on specific surgical procedures. The device overcomes the limitations of traditional overhead surgical lighting by allowing the LED light source to be precisely directed above the patient via a long, flexible and maneuverable shaft. Overhead mounting is easily achieved by replacing the light handle; mounting to side rail clamps is another essential option. The result is the safe illumination of a precise surgical area from virtually any angle.

Coppersmith explained, "When surgeons are working with overhead lighting, their head and hands often create unwanted shadows. With Surgilight's highly maneuverable and adjustable illumination, shadows are quickly and easily mitigated." ■

Eaton, Enlighted deliver connected lighting for Smart Commercial and Industrial Buildings

Power management company Eaton revealed collaboration with Internet of Things (IoT) leader Enlighted to accelerate the deployment of advanced sensory networks in commercial and industrial buildings. By integrating Enlighted's hardware, software, services and broader capabilities with Eaton's lighting-emitting diode (LED) lighting and controls portfolio, the two companies aim to dramatically increase the adoption of connected lighting solutions by providing simplified solutions that are readily deployable. There is strong synergy between the lighting industry and the IoT industry, and connected lighting is one of the fastest and most economical paths to deploying IoT in commercial buildings.

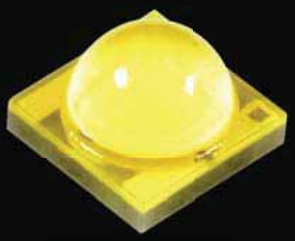

Kraig Kasler

With Enlighted's technology directly integrated into Eaton's portfolio, including products with the company's advanced WaveStream LED technology, the LumaWatt Pro Connected Lighting System powered by Enlighted is designed to deliver a highly advanced connected lighting solution. Enterprise customers can take advantage of the advanced IoT capabilities to acquire actionable, granular data on lighting energy use and performance, space utilisation, asset tracking, HVAC and more. In addition to the LumaWatt Pro line expansion, the collaboration will allow data from Eaton's lighting controls systems to be connected to Enlighted's IoT applications, such as spacE (space utilisation) and airE (HVAC optimisation).

Kraig Kasler, President, Eaton's Lighting Division, said, "This is a transformational moment for the lighting industry as the worlds of IoT and lighting are coming together to lay the foundation for brilliant buildings through connected lighting. Lighting systems customers are demanding sophisticated controls to optimise their energy costs while looking to give their buildings advanced IoT-based sensory systems. These systems yield profound insight into a building's operations, changing the way building owners and operators manage their assets and business processes." ■

MLS

MLS INDIA is a subsidiary of MLS Co. Ltd. which was founded in 1997 and is one of the largest manufacturers & suppliers of SMD & DIP LEDs. MLS was one of the earliest LED manufacturers and light-source provider for various kinds of lighting products. Headquartered in Zhongshan City of China, with a workforce of more than 12000 employees, MLS has fully-integrated, world class facilities supported by the most advanced technologies. A wide choice of LM80 certified MLS LEDs are available in Warm white, Natural White and Cool White CCTs. Lamp manufacturers using MLS LEDs can bid for all BEE, EESL, Municipal Corporation and Government Tenders & BIS based LED projects with our 2835, 3030 and 3535 LEDs. MLS also has a wide range of Color LEDs available in 3014, 2835 and 5050 packages.



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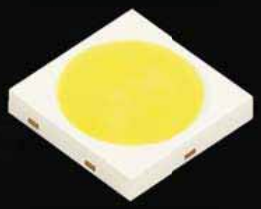

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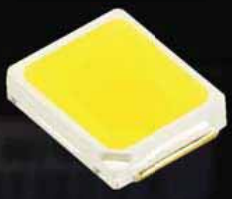

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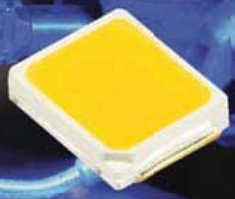

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LSI Industries acquires Atlas Lighting Products

LSI Industries Inc. has completed the acquisition of all the capital stock of Atlas Lighting Products, Inc., a Burlington, N.C. manufacturer of high-quality LED lighting products sold into the electrical distribution market. For the fiscal year ended December 25, 2016, Atlas' revenues were $56.5 million, and operating income was $8.8 million after adding back adjustments of private company expenses estimated to be $3.6 million. Similarly, adjusted EBITDA is estimated to have been approximately $9.7 million. Net of cash, Atlas' balance sheet was debt-free at December 25, 2016. Founded in 1992, Atlas has operated as an S Corporation since its formation.


Dennis W. Wells

The terms of the agreement include a cash payment of $96.9 million, plus 200,000 five-year warrants to purchase LSI's common stock at an exercise price of $9.95, for a total consideration of $97.5 million. Funding will be provided by a combination of cash on hand and $66 million from a new $100 million commercial bank facility provided by PNC Bank.

Dennis W. Wells, Chief Executive Officer and President, said, "I am very excited to announce the acquisition of Atlas Lighting Products. This highly strategic acquisition, the largest in LSI's history, will immediately broaden our lighting product offering, expand our sourcing capabilities, improve our profit margins, and provide significant revenue and cost synergies." ■

H.E. Williams, Igor team up in PoE Partnership

H.E. Williams, Inc. has chosen Igor, Inc. as a preferred provider for their turnkey PoE lighting solution. In surveying multiple PoE providers, Igor's technical support, matured hardware and software capabilities stood out to Williams.

Advancements in technology and pricing have set the stage for PoE to be a successful controls option of the future, as evidenced by the growing global momentum of PoE via large network gear providers and VARS. Igor's PoE plug-and-play software platform enables Williams to be one of the first independent lighting manufacturers to release a turn-key PoE solution that complements their portfolio of LED lighting products. With a shared vision for the future of lighting, Igor and Williams know that this partnership will provide tremendous and immediate value to their customers.


Steve L'Heureux

Steve L'Heureux, CEO of Igor, said, "This is a true industry inflection point. PoE is a proven and trusted technology and is increasingly in-demand as connected lighting solutions gain industry adoption. It really benefits everyone – the designers can create unique lighting experiences, the installation costs are dramatically lower, the occupants experience an optimised lighting experience and the business owners realise dramatically reduced energy costs from day one." ■

Leviton achieves 20-Year milestone in BUILDER Magazine Brand Use Study

Leviton is being recognised as the 'Brand Used Most' in the lighting controls and switches category by BUILDER magazine's 2017 Brand Use Study. Leviton has been the recipient of BUILDER's prestigious 'Brand Used Most' category for 20 consecutive years, also placing first in 2017 in the 'Brand Familiarity' and 'Brand Used in Past 2 Years' categories.

This recognition is a part of BUILDER's yearly, in-depth survey, sponsored by Hanley Wood that studies how builders rate the products they are using in terms of quality, familiarity and opinion.


Jay Sherman

Leviton offers a wide variety of innovative lighting controls that combine contemporary design and state-of-the-art technology. These include universal dimmers, fan speed controls, occupancy sensors, timer switches and more; many of which can now be controlled via smartphone app or tablet for added convenience. Leviton lighting controls provide precise, dependable control and complement any residential or commercial application, while offering the potential for significant energy savings.

Jay Sherman, Director of Marketing, Residential, said, "Leviton is honoured to be recognised by builders around the country as the most preferred brand for lighting controls and switches for the past two decades. Builder satisfaction is a priority at Leviton, and it's a pleasure to consistently receive an award that showcases this. We look forward to continuing to provide builders and other professionals with a brand that they know best and use most." ■

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#Features may vary from product to product.

Fans • Home Appliances • Lighting • Switchgear

TPDDL launches energy efficient LED Lighting & Five Star Fans under UJALA Scheme

TATA Power-DDL (TPDDL) in association with Energy Efficiency Services Limited (EESL) launched the energy efficient LED lighting and Ceiling Fan under UJALA Scheme for its customers. Under this, LED lighting products and BEE 5 Star Ceiling Fans would be offered to the consumers at special discounted rates (e.g. LED 9W Bulb @ Rs. 65/- per piece, 20W LED Tube Light @ Rs. 230/- per piece, and BEE 5 star rated Ceiling Fan @ Rs. 1150/- per piece).


Praveer Sinha

TATA Power-DDL's main intent behind promoting the UJALA Scheme is to increase the penetration of energy efficient LED lighting products and ceiling fans among its customer base which will result in energy saving and reduction in electricity bills. The energy efficient products will provide competitive pricing and warranty to its patrons. Furthermore, this will build efficient load management and will increase awareness about energy efficient technologies.

Praveer Sinha, CEO&MD, TATA Power-DDL, said, "We at Tata Power – DDL have always been frontrunners in adopting and promoting energy efficient solutions among our consumers and are proud to be associated with Government of India's UJALA Scheme. Adoption of energy efficient lighting at domestic level will result in substantial saving of energy across the nation. I believe our customers will avail this scheme in large numbers." ■

Luceco becomes Lighting Industry Academy ambassador

Luceco has recently become a Lighting Industry Academy Ambassador, supporting the Academy's vision to reach its full potential by promoting the importance of education and skills across the lighting community. Luceco join other major industry players who champion the Academy as a home for learning and career development.

The LIA is the largest trade association in Europe serving the UK Lighting Industry and is dedicated to promoting best practice throughout the sector, also assisting with technical support, laboratory testing services, staff development and networking opportunities.

The Academy adopts a collaborative approach, offering a central point of access for lighting related learning and assurance of a consistent quality and with its Ambassadors support, will bring skills and learning to the whole lighting community, creating opportunities, and developing the lighting community for a bright and exciting future. ■

TALQ Consortium releases Beta version test tools

The TALQ Consortium, developers of the global standard interface for smart outdoor lighting networks, have just released the formal beta version of the entire TALQ Test Suite for its members. With this test tool companies can now start testing their smart lighting solutions for multi-vendor interoperability. The Test Suite will allow first products to be TALQ certified later this year – ensuring interoperability without the expense and delay of plug fests. Furthermore the tool enables the Consortium to work on extending the TALQ Standard to other smart city applications.

TALQ pass through test tool certification

Cities and municipalities, when planning long-term investments like street lighting, always try to choose future-proof and interoperable solutions that will not constrain their future investment decisions. That is why, in 2012, the TALQ Consortium was founded to develop a global interface standard to connect and manage heterogeneous street lighting networks from many different hardware and software vendors. The TALQ Specification focuses on the so-called 'application layer' of the interface protocol, allowing maximum freedom for outdoor lighting manufacturers to develop optimized solutions within an interoperable framework. The TALQ Interface is built on standard internet protocols and security standards, such as XML/HTTP and Transport Layer Security, and is independent of connectivity technology.

In addition to the technical specifications, a rigorous test procedure and intelligent test tool have been developed to ensure TALQ-compliant products provide the highest level of interoperability. The beta version of this complete TALQ Test Suite is now available to all TALQ member companies. ■

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VOLT Lighting launches New Landscape Lighting Downlights

VOLT Lighting, leading factory-direct manufacturer of landscape lighting products, announces a new series of low voltage downlights – The Woodsman. These lights, developed by VOLT engineers in their Innovation Laboratory, feature many new and unique innovations.

Michael Caselnova Jr., VOLT Director of Marketing and Product Development, describes why these new products were developed, "In the realm of landscape lighting, downlights produce important and compelling effects. Moonlighting is one of these. By installing downlights high into trees and projecting their light through leaves and branches, a moonlighting effect is produced. Our challenge was to create a series of lights that can be safely and easily installed high into a tree."

Several new features address the challenge that Caselnova describes. The first of these focuses on ease of installation. Unlike other downlights that are relatively large and heavy, the Woodsman are compact and lightweight. This makes them easy to handle at the top of a ladder.

Another feature that eases installation is the construction of the new fixture mount. It has a tripod shape that offsets the luminaire several inches from the tree bark. The installer first attaches the mount to the tree. Then, the fixture slides into the mount. A simple hand-tightened retainer ring secures the light in place. Compared to older style mounts, this new system is faster, easier and safer. In addition, the offset mount prevents mold growth to protect the health of the tree. ■

EVERLINE LED T5HO Tubes expands Linear LED Upgrade Options

Universal Lighting Technologies, well known in lighting and a member of the Panasonic Group, is expanding its linear LED options with EVERLINE T5HO LED Tubes. Installers who are focused on light levels or energy savings can choose from two available power levels – 25.5W and 22.5W – as a direct replacement option for F54T5HO fluorescent lamps.

The new T5HO tubes, which increase energy savings by more than 50 % versus standard F54T5HO fluorescent lamps, are compatible with most Programmed Start ballasts. The tubes are easy to install and offer less maintenance than traditional fluorescent, with a 50,000+ hour lifetime at L70. The tubes offer excellent light quality with a Colour Rendering Index (CRI) of 82 and correlated colour temperatures of 4000K and 5000K. A seamless glass design ensures no aging, discoloration or bowing from aging plastic tubes. The wide 240-degree beam angle eliminates dark zones ensuring uniformity and accuracy of light output.

Greg Bennorth, Director of product management for Universal's EVERLINE LED Tubes, said, "For installers who want to upgrade their T5HO fluorescent fixtures to LED technology, the EVERLINE LED T5HO Tubes provide energy savings and application flexibility with easy direct-tosocket installation. Additionally, these T5HO tubes offer instant on at full light output, even in cold ambient temperatures." ■

Varroc Lighting systems opens new electronics development centre

Varroc Lighting Systems opened its Electronics Development Centre in Nový Jičín, Czech Republic. The new research and prototype laboratory can house up to 100 electrical engineers and will serve as the company's global research and development hub. The $1 million investment will improve the development and innovations of electronic components for major automakers.

Electronics centre opening

The 3,280-square foot facility includes in-house EMC laboratory for measurements of electromagnetic compatibility in an anechoic chamber. Varroc obtained funding from the 2016 Support for Science and Research in the Moravian-Silesian Region subsidy program for building the EMC lab.

Todd C. Morgan, Vice President, Varroc Lighting Systems, said, "The number of electronic components in the automotive lighting segment is growing rapidly and Varroc has to respond to this trend. The newly opened Electronics Development Centre will allow our engineers to develop, innovate and test new electronics products and software without having to outsource external lab services, and we will also be able to respond to our customers' requirements more flexibly." ■

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Barn Light USA bolsters sales team with New Manager

Beverly F. Dahl

Barn Light USA, the commercial division of Barn Light Electric, has hired Beverly F. Dahl as its Sales Manager. An expert in managing and securing national accounts, Dahl will assist in the continued growth of this American lighting manufacturer. Dahl, a New York native living in California, brings a wealth of national sales experience in the lighting industry to the table.

Known for a vast collection of vintage-inspired products, Barn Light USA connects architects, designers, and commercial industry professionals directly to high-quality lighting tailored to their specific production needs. All products are manufactured, assembled, and shipped by Barn Light Electric in Titusville, Florida. Local sales representatives guide professionals through the process of placing bulk orders, understanding the variety of customisation options, and applying for trade accounts. Personal reps communicate directly with the manufacturer to ensure commercial customers receive detailed specifications and superior lighting products for their construction and design projects.

John LaCorte, Vice President for Barn Light USA, said, "With her extensive knowledge of the industry and her strong desire to exceed customer expectations, I know Beverly will be an invaluable and immediate asset to our team." ■

Recolight appoints Francesca Cameron to develop the Recolight network

Francesca Cameron

Recolight has appointed Francesca Cameron to develop the Recolight collection network. This new position has been created to promote the free lamp collection and recycling service offered by Recolight, the specialist WEEE compliance scheme for the lighting industry. With many collectors of large quantities of waste lamps still paying for lamp recycling, Recolight sees this as an important role to help them benefit from large cost savings.

Nigel Harvey, CEO of Recolight, said, "We see this position as instrumental in giving more companies access to a free lamp recycling service". ■

Inventronics appoints New Director of Product Management

Pablo Bonnin

Inventronics welcome Greg Andrews as the company's Director of Product Management. In this newly created role Greg will play a key role in all aspects of product management including support of the global sales partners.

Greg Andrews comes with a wealth of experience within the industry, having spent the last seven years at Thomas Research Products (Hubbell) where Greg played an instrumental role in their sales and marketing success. Greg also comes to Inventronics with over 20 years' experience in sales, marketing and product management in the lighting industry with companies such as Philips, OSRAM and Juno.

Greg's industry knowledge has already made him a key addition to the Inventronics family and his appointment is a sign of Inventronics commitment to being a leading company in the SSL lighting industry. Inventronics new innovations and increasing demand from its customers has led it to look for an addition to the team who will provide exceptional service.

Marshall Miles, Vice President of Business Development, said, "I am very pleased to have him join our team and welcome his wealth of managerial and industry experience".

"I am thrilled to have this opportunity to join a world-class global supplier of LED drivers with design, engineering and manufacturing excellence that is second-to-none", said Greg. ■

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Echelon wins LEDs Magazine Sapphire Award

LEDs Magazine has named Internet of Things (IoT) pioneer Echelon Corporation a 2017 Sapphire Awards winner for its Lumewave by Echelon PL-RF Gateway in the 'Smart and Connected SSL Technologies' category.

The Echelon gateway is the only commercially-available outdoor control solution that seamlessly integrates two of the most widely used lighting control connectivity technologies—powerline and wireless—to provide flexibility, reduce deployment costs and ease maintenance. City-wide deployments in Bellingham, WA and Cambridge, MA are utilising this solution to intelligently manage their diverse LED streetlighting systems. The award-winning gateway enables the customer to mix and match connectivity options allowing Bellingham to control 500 decorative fixtures along with 3,100 cobra head fixtures. Similarly, Cambridge is coordinating control of more than 7,000 fixtures. Customers have the flexibility to control widely diverse lighting types across their city landscapes so they can provide comfort and safety to their residents, while achieving energy efficiency goals.

The winners were announced at the Awards Gala held March 1 at Strategies in Light and The LED Show 2017. The Sapphire Awards are the first in the lighting industry to recognise true technology stars in the LED-based Solid-State Lighting (SSL) market from an enabling-technology and elegance-of-design perspective. Manufacturers submit information which is used by the Sapphire Awards panel to rank products/solutions based on their unique technology or application thereof, innovation, ease of use, efficiency, reliability and contribution to profitability. The Sapphire Awards relies on independent judges chosen from industry and consultancy roles to ensure that all entries are fairly evaluated by multiple experts. ■

LEDs Magazine announces Heliospectra as 2017 Sapphire Award Finalist

Heliospectra AB (publ), a well known leader in intelligent lighting technology for controlled plant growth environments, revealed that the company has been selected as a finalist in the horticulture lighting category for the third annual Sapphire Awards. Heliospectra's LX60 lighting solution was one of more than 100 entries evaluated by LEDs Magazine and a panel of esteemed lighting industry leaders.

Ali Ahmadian, CEO for Heliospectra, said, "Heliospectra combines state of the art lighting design with plant science expertise to create real time, data-driven lighting solutions. The LX60 series combined with Heliospectra's lighting strategies enable commercial crop producers to achieve consistently high yields and high quality produce year round."

Heliospectra customers use the full light spectrum to improve cultivation methods and accelerate the growth cycles of a diverse variety of plants and vegetables. By increasing the number of harvest cycles achieved each year, customers also accelerate time to market which increases revenue and sustains their businesses' profitability. ■

Lumilow wins Business of the Month award

Lumilow Lighting has won Mid Yorks Chamber of Commerce's 'Business of the Month' award for January. The company's victory means the firm will automatically be entered into the chamber's 'Business of the Year' awards later in 2017.

Despite being the 'new kid' in the lighting industry, Lumilow has quickly become the trusted lighting supplier for a number of big name brands and venues, including Leeds Bradford Airport, Morrisons, HSS Hire and Westfield Shopping Centre Bradford.

Andy Chell, Managing Director, Lumilow, said, "The judges commended us on our growth to date and commitment to the local region. I want to continue our local emphasis and deliver the most sustainable solutions to bring growth to Lumilow and the region. We look forward with relish to the Business of the Year challenge. It's one I feel sure we stand a decent chance of taking home too."■


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Grow Lights market to be worth 5.11 Billion US$ by 2022

The leading players operating in the grow lights market include Royal Philips (Netherlands), General Electric Company (U.S.), Osram LichtAG (Germany), Gavita Holland B.V. (Netherlands), LumiGrow, Inc. (U.S.), Heliospectra AB (Sweden)...

According to a report by MarketsandMarkets, the overall grow lights market is expected to be valued at USD 5.11 Billion by 2022, growing at a CAGR of 11.86 % between 2017 and 2022. The key factors driving the growth of the market include growth in indoor farming practices, government initiatives to encourage the adoption of solid state lighting (SSL) technology such as LED, and rising demand for energy-efficient and long lasting grow lights technology.

Retrofit installations to lead the grow lights market in the coming years

Retrofit installations held a major share of the grow lights market than new installations in 2016. Retrofitting is generally performed in grow lights when the light intensity drops below the desired levels after regular usage, or when grow lights suffer any failure or damage during operations. Growers may retrofit their old grow lights with new ones of any technology to ensure that their plants get the required amount of light to grow. Hence, when the light intensity decreases, the grow lights are required to be retrofitted immediately. The introduction of new grow light technologies such as LED, plasma, and induction has provided the growers with more options to choose from, while retrofitting their grow light systems. LED grow lights offer variable spectrums that make them suitable for a large number of plants. As a result, this technology is being preferred by the growers for most of the applications.

Market for vertical farming to witness a high growth in the near future

Vertical farming is an emerging application for grow lights, which is quite similar to indoor farming. The main difference between the two is that indoor farming is carried out on a single level, whereas vertical farms have two or more levels of growing equipment. Vertical farming allows the growing of more number of plants within a single enclosed structure, with the use of artificial lightings and Controlled Environment Agriculture (CEA) methods.

These plant factories can be built to produce fruits and vegetables throughout the year, within urban establishments. As a result, the city dwellers can get fresh produce at competitive prices, and it can also become a source of revenue from unused real-estate. Consequently, the market for vertical farming applications is expected to exhibit a high growth in the coming years.

Europe held the largest share of the grow lights market in 2016

Europe was the leading market for grow lights in 2016. Within Europe, the Netherlands is a leading exporter of horticultural produce, grown within its numerous automated commercial greenhouses. The concept of vertical farming is also gaining popularity in Europe. The rising population in Europe is a major driver for the increasing need to practice indoor horticulture in this region. Also, the severe cold in winters and insufficient sunlight in parts of Europe mandates indoor growing with the help of artificial lightings.

Some of the major companies such as Royal Philips (Netherlands) and Osram Licht AG (Germany) are also responsible for the dynamic growth of the grow lights market in Europe. This region has always been at the forefront at utilising artificial lighting to accelerate the growth of plants in greenhouses.

The leading players operating in the grow lights market include Royal Philips (Netherlands), General Electric Company (U.S.), Osram LichtAG (Germany), Gavita Holland B.V. (Netherlands), LumiGrow, Inc. (U.S.), Heliospectra AB (Sweden), Iwasaki Electric Co., Ltd. (Japan), Illumitex, Inc. (U.S.), Hortilux Schreder B.V. (Netherlands), and Sunlight Supply, Inc. (U.S.) ■

Source: www.marketsandmarkets.com

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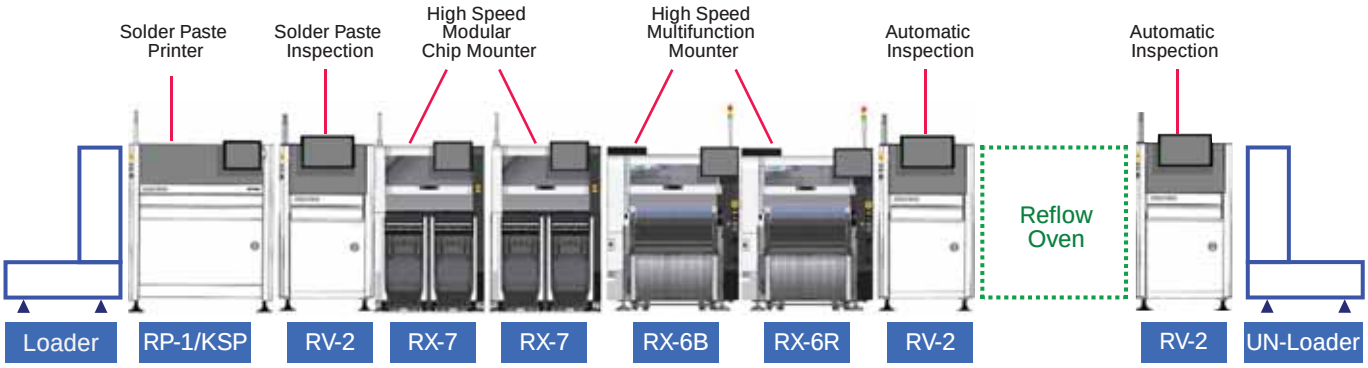

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The new Scriptus range of luminaires fulfils all functional and aesthetic standards for Human Centric Lighting. The separately controllable direct and indirect distribution light units guarantee users high levels of individuality for personal settings and maximum visual comfort. In addition to 3000K and 4000K light colours, versions with Tunable White (TW) are also available. Blue light distribution can be individually set across the course of the day via the separately controllable TW white component in the direct and indirect components. In the indirect component for example this simulates the actual spectral course of daylight and in the direct component also allows the light atmosphere to be individually selected. Light scenes can be individually defined for groups, or each workplace, or can be manually controlled. Scriptus therefore provides biologically effective, dynamic white light with a brightness sequence and light colour sequence according to the course of daylight, thereby supporting the natural biological rhythm for increased well-being and improved performance capacity.

The multi-level MLA (Multi-Lens Array) optical system in the luminaire ensures optimum glare elimination and high visual comfort. With a UGR value of up to ≤ 16 the luminaire complies with criteria for illuminating DSE workstations, and far beyond normative requirements. To ideally illuminate differing office arrangements, Scriptus is available as a surface-mounted or suspended version with various lengths and lumen levels. The luminaire is equipped as standard with a DALI control unit and on request with integrated daylight and motion sensors. A Lightify Pro version is also available for wireless, app-based light control.

HCL solutions from Osram Lighting Solutions combine artificial light with natural daylight and focus on the visual perception of people, the basis being to provide optimum support for the specific visual task in compliance with defined standards. HCL solutions also enable lighting to be individually adapted to the circadian rhythm in accordance with personal preferences via specific planning and individual control of the light colour and intensity. The light has an activating, relaxing or neutral impact. This biologically emotional effect is supplemented by optimally integrating the lighting solution into the overall architectural context, as the interplay of the luminaire with the room is essential for the well-being of people. ■

Source: www.osram-group.de

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The Power of Great Ideas: Creative Usage of LEDs

Working on projects in India I have come across some of my toughest challenges budget-wise, but at the same time I have found Indian clients some of the most reasonable, approachable and intelligent...

As a lighting designer, originally from the UK theatre, film and television lighting industry and having been working on prestigious architectural lighting projects globally since 1994. I firmly believe that the limiter to creativity does not have to be the budget, the limiters to creativity are the ideas, if we have a tight budget then we have to have better ideas. However we do this, whether by taking a less is more approachable, getting big bangs for our buck or by choosing our battles, selecting the areas where there can be no compromise.

Dramatic effect in nature. Arches National Park, Utah USA
Image- Per Fasmer

Project Trempo, Norwegian light art
Image- Arne Gronsdal

Working on projects in India I have come across some of my toughest challenges budget-wise, but at the same time I have found Indian clients some of the most reasonable, approachable and intelligent that I have encountered globally when it comes to discussing key design budget elements of a project and find that they are accessible to being educated with regards to areas of no compromise and establishing a value to the design decisions.

I feel that both clients and architects are more confused than ever with the array of LED lighting products on offer, from very high end US and European products to dubious quality products from Asia and everything in between (disclaimer: the author knows of quality products from Asia and by no means believes that every product manufactured in Asia is dubious). When do we use which product with honesty and fairness to both client and projects?

We have to be courageous and have integrity as lighting designers for there are some battles that we cannot lose. When lighting facades or exterior projects we have to control the junction temperature of the LED diodes or we will have swift failure, especially in low or high extreme ambient temperatures; failure to do so will result in product failures and a façade that resembles a mouth full of gapped teeth.

This is definitely an area where clients need protecting from themselves and where I feel as designers we should undertake any value engineering services ourselves so that we make informed design decisions that are best for the client in the long term. I understand the need to save money, this is very much the case in The Middle East market currently as oil revenue falls and likewise project budgets, but design crucial decisions must be taken by people qualified to make the technical and budget decisions required.

All this said, whether we are on tight budgets or not we have a duty as designers to deliver both technical and artistic excellence and that is where I would like to concentrate this article as an inspiration to us all.

So let's explore some little known yet creative projects, both internally and externally, that touch and inspire and at the same time do not break the bank.

Just outside Bergen in Norway an aluminium factory wanted to make a statement with a light art piece that highlighted their capabilities as aluminium suppliers and fabricators.

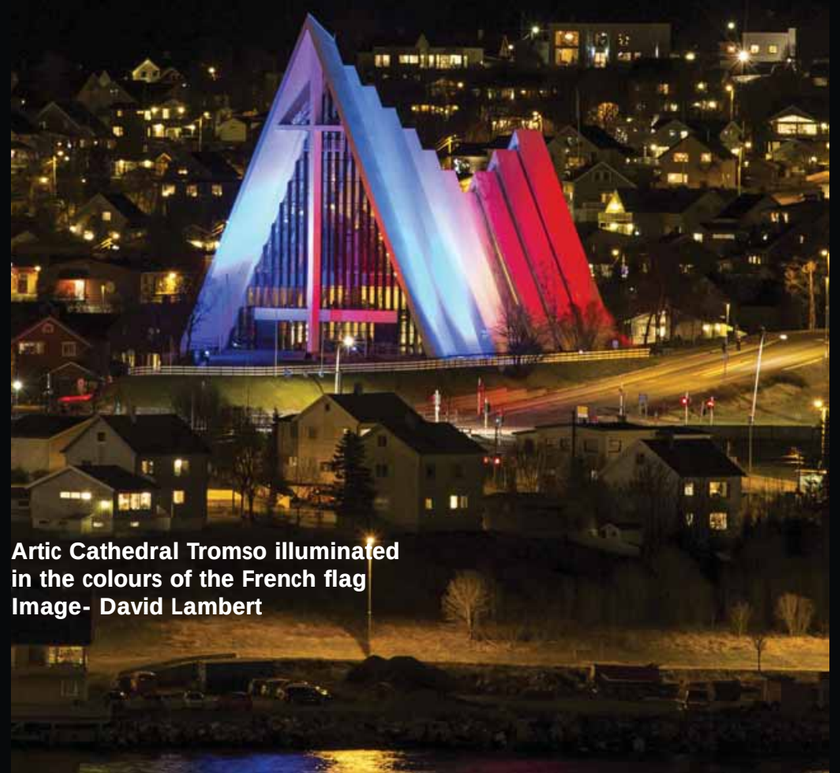
Artic Cathedral Tromso illuminated in the colours of the French flag
Image- David Lambert

An aluminium framework was erected and a sail fabric inner stretched within the frame, the effect is amazing for the cost of a few RGB colour changing floodlights. I am sure that you will agree that this iconic artwork is a welcome addition to the local nightscape.

It is obvious but worth pointing out on this Norwegian project that high quality luminaires are essential as we are dealing with ambient temperatures of minus thirty degree Celsius and often extreme weather conditions.

As lighting and in today's world visual designer's we should look for inspiration around every corner. Nature is a huge inspiration for me as is art and light art, combine the two as on this rock arch in Utah and we have motivation and the duty to look at buildings as simply and as sculpturally as this installation.

When lighting building façades, we have several factors to consider, how the building looks from afar,



Artic Cathedral Tromso illuminated in the colours of the French flag
Image- David Lambert

Lazarides Gallery
Image- Lazarides

LED engines that are space enabled so that they can act as a security guard in museums and galleries ready to activate screens and protection if the clients get too close to expensive exhibits or that can transmit commentary direct to mobile devices with information of the artworks themselves.

It is our responsibility as designers to stay up to date with available technology and its appropriate usage, but at the same time to realise that the days of sticking a light under every tree are gone.

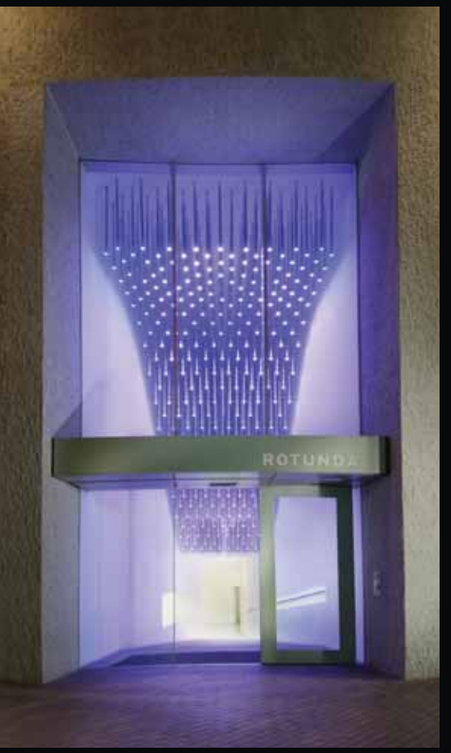
We do not have to limit our creative ideas to the outside of buildings as there is plenty of scope for creativity within the internal space. Hospitality projects, retail projects and nowadays even commercial and residential projects, especially in communal spaces, are more dramatic or atmospheric giving free reign to the imagination.

It is a given the sense of drama within museum and gallery spaces,

Window display Harvey Nicholls, London.
Image- David Gilbey

coming from the theatre this has given me immense professional enjoyment and satisfaction working on such projects, seeing such theatre creep into retail and hospitality projects is a joy. Department store windows displays are becoming an art form in themselves and sometimes invitations to fantasy worlds.

Drama aplenty at The Paramount Hotel Riyadh
Image- UMAYA Lighting



The diminishing size of the light source enabled by LED technology allows us to seamlessly incorporate lighting into the architecture or to make lighting a statement piece within the architecture.

The large LED feature light inside Snohetta's Olso Opera House reads as a moonlight figure within the space and is both moody and evocative.

The Paramount Hotel in Riyadh Kingdom of Saudi Arabia is somewhat surprising for such a conservative market, but it highlights the demand of an assortment of hotel styles and formats globally. This funky, modern boutique style has theatre aplenty with a vertical media screen, film set like lights, illuminated slots and the sand dune feature lighting.

The individual bedrooms at The Paramount reflect the style of this boutique hotel and serve as an example of how rooms can be both comfortable and exciting at the same time.

At the entrance lobby of The Rotunda Building in Birmingham, UK. The custom LEDs incorporated in aluminium poles provide a marvelous sculptural element that delineates the space and accentuates the high ceiling within the lobby. A relatively inexpensive idea that makes a real architectural impact.

This article deliberately uses very strong visual images and is designed to be both inspiring and thought provoking. We have the technology these days to be unendingly creative but we have an extra responsibility to harness our creativity so that we respect the neighborhood and neighboring buildings, we must respect our clients budgets but at the same time we must employ our ideas to get the very best value for money and most importantly we must balance the artistry and the technical.

Great design and responsible, whole project and strategic thinking will allow us to conform to every green building code and energy initiative and at the same time deliver beauty for the world to admire. ■

David Gilbey
Associate Lighting Designer
UMAYA Lighting Design

A Practical view on Progress of LED in Street Lighting Application

While the world is moving rapidly to LED-based lighting technology, the plight of the luminaire maker particularly in the context of street lighting is still not over. This is because unlike the traditional light sources, LED light is highly directional and hence calls for more emphasis on refractor optic rather than reflector optic in case of street light design since it demands a more stringent and complex photometric characteristic. The article has chronicled the progress made in LED lighting components specifically in areas such as secondary optics and thermal management which are the two key factors responsible for success of LED street lights. The paper is based on practical difficulties encountered in switching over from traditional light sources to LED in street lighting design.

Although it was established long back that solid state diodes can emit light it had to wait several years before it could be molded and perfected to be used as a new generation light source. Over the last decade LED as a greener light source has made significant progress. Application to general lighting, in particular, has gained momentum with the development of AlGaInP high power LED. But the dominance of LED in much sought after street lighting segment is yet to be established. There are three major barriers, which researchers all over the world are trying to solve in order to make LED streetlight a viable alternative to the traditional streetlights.

1. Like its conventional counterpart LED light source is not a stand-alone type. Hence, if there is failure or problem in a particular streetlight luminaire, servicing or replacement becomes a remote possibility.
2. Optical design considerations, which has to meet complex photometric distribution for different street lighting installation.
3. Thermal management of high power LEDs used Street lights.

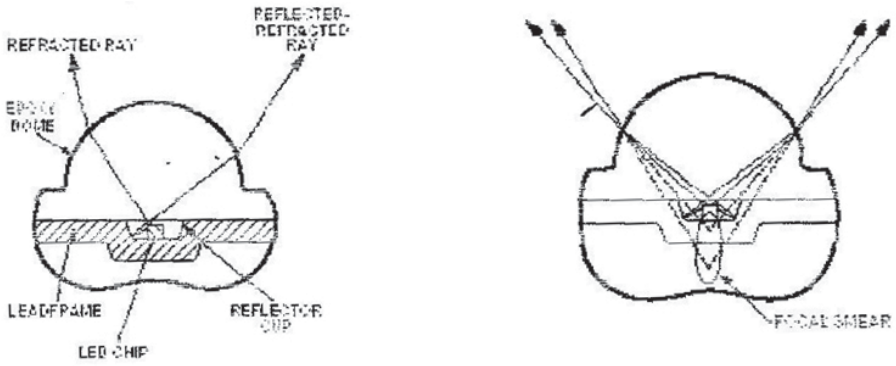


Figure 1: Illustrations show reflector-refractor optic for a typical LED package and concept of FOCAL SMEAR which makes the chip an extended source of light

Development towards LED in General Lighting

In the first place in order to overcome the drawbacks of LED in street lighting application many major LED manufacturers like Philips, Osram, Cree, and Bridgelux have developed LED modules. An LED module is a single unit in which light source, heat sink, optic and driver electronics are integrated. Although such modular approach is the future of LED Lighting, a breakthrough will happen only when the portfolio of traditional HID lamp and luminaire is broadened by addition of LED module and luminaire. For street lighting application the next generation VLED optical module has created interest because of optical precision of VLED which is highly desirable in street lighting design. These modules are available in square or round shape and include 64 emitters (75 system watt), 80 emitters (94 system watt), and 120 emitters (141 system watt). Despite such remarkable developments there are still no standards for LED light engine and power supplies. This compels Luminaire manufacturers to develop customised products around a given light engine. This makes replacement a difficult task as LED systems are typically hardwired into a luminaire.

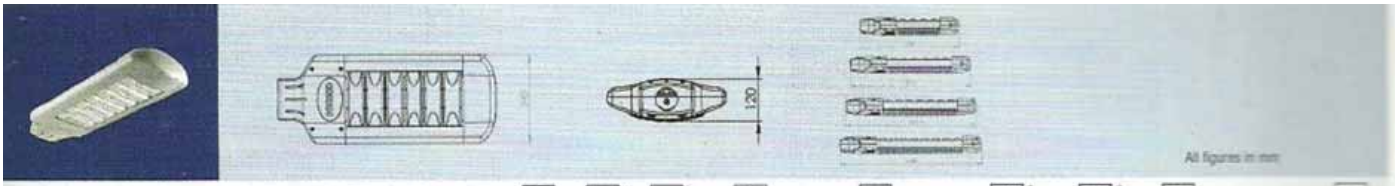
Optic

Optic Design consideration is another complex and critical entity in LED street lighting. This is because a LED chip is very small in size and is virtually a point source emitting light in one direction only. So it needs integration of reflector-refractor optic to make use of the physical size of a chip. It is treated as an extended source while designing the reflector cup and epoxy dome for refraction. This makes the light come from different directions. This primary optic is included in the LED package. To modify the output beam of LED so as to meet the desired photometric application there is need for designing and modeling of secondary optic. Secondary optics is used to spread the incoming light (diverging optics) or provide collimated beam (collimating optics). Normally Pillow Lens is used for diverging optics, whereas collimating lens come in two main varieties – reflecting or refracting. Reflecting elements are typically metalised cavities with a straight or parabolic profile. Refracting elements are plano convex, dual convex and Fresnel (collapsed plano convex) lenses. Apart from these conventional spherical lenses, other more efficient lens designs such as hyperbolic planar, spheroelliptic and free form lenses are also available. Another class of lens exist which

combine both refraction and total internal reflection (TIR) and is referred as reflective-refractive or catadioptric lens. These lenses are powerful and most efficient. Like refractor designs, there are many efficient reflector designs available. They are parabolic reflectors, linear parabolic reflector and on-imaging compound parabolic reflectors (CPC). The reflector material used widely for LED is normally vacuum metalised ABS plastic. Optical design is critical in case of street lighting luminaire as it calls for high precision design and development of optimum optic combination to meet the desired photometric characteristic.

Thermal Management

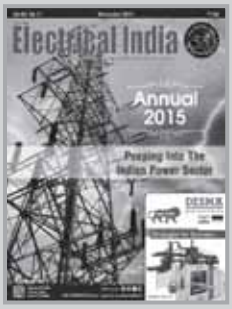
Thermal Management plays a major role in sustaining the efficiency of a street light luminaire and the declared rated life of the LED module. Although LED has become popular as a cold radiator, on the contrary like any other semiconductors a large portion of electric energy (70%-80%) is converted into heat. That is why unlike the traditional light sources which are basically thermal radiators, cooling or thermal management becomes absolutely imperative in case of LED to maintain the efficiency which is radiated luminous flux to applied electrical energy. Hence, if thermal technical boundary conditions are adhered to a white radiating high efficiency high



Product Reference	Product Number		W*	lm*	lm/W	tq		K*		
High Power Modular Street Light										
KIT HP MSL4 GR W4F765-L130X75	4008321**586827**	60	89	6000	67-76	>50,000 hrs	75x130	6500	700x343x120	1
KIT HP MSL6 GR W4F765-L130X76	4008321**586834**	90	133	9000	68-77	>50,000 hrs	75x130	6500	850x343x120	1
KIT HP MSL7 GR W4F765-L130X77	4008321**586841**	105	156	10500	67-76	>50,000 hrs	75x130	6500	926x343x120	1
KIT HP MSL8 GR W4F765-L130X78	4008321**586858**	120	177	12000	68-77	>50,000 hrs	75x130	6500	1000x343x120	1

* All the technical parameters apply to the entire module. In view of the complex manufacturing process for light-emitting diodes, the typical values given above for the technical LED parameters are merely statistical values that do not necessarily correspond to the actual technical parameters of an individual product; individual products may vary from the typical values.

Figure 2: Osram Technical Data for High Power LED Module used in their street light luminaire



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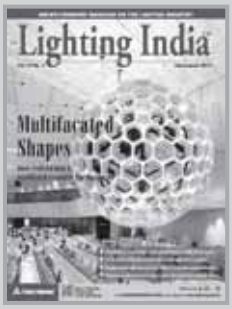

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power LEDs can work trouble free and last its rated average life. Be it SMT design in PLCC housing, hexagonal or octagonal designs, COB (Cup on Board), MCOB (multiple Chip on Board) optimal thermal management is necessary to achieve highest possible luminous flux for high performance LEDs for lighting purpose. The ambient temperature and the chip temperature directly influence the efficiency and life span of an LED. It has been observed that increased electrical power for achieving higher luminous flux causes big temperature difference and shortens life span considerably. This also adversely affects the synthetic materials used for the enclosures and lenses (epoxy, resin, silicon etc) resulting in cloudiness on the lenses. Since the optimal heat engineering interpretation for definite cooling is extremely complex, there are several methods adopted to dissipate the heat away from the junction. The possibilities available are artificial surface magnification of the LED assembly contact zone; PCB (conductor paths, metal clad PCB); heat sinks either glued or soldered on to the PCB or mounted separately. The cooling path follows two partial path – 1) Junction to contact pins to the ambient air. But for high power high performance LEDs used in street lights these methods are not that reliable particularly in India where outside air temperature varies considerably. Here design of appropriate Heat Sinks become necessary after taking into account the thermal criteria for calculating the thermal resistance of the system and consideration of the mounting situation. In one of the recent installations of 80W LED streetlight in India the side plates of the luminaire were made from extruded aluminium and designed to serve as a heat sink for dissipating heat to the air. The module, whether it is 60W, 80W or 120W can be directly connected to the side plates. Another milestone in heat sink connection to LED has been achieved through solder mounting connection by means of reflow or IR soldering.

Conclusions

Since thermal management is most critical to LED performance LED system manufacturers all over the world are trying to address this challenge by seeking out improved heat sink designs, high efficiency circuit boards, high thermal conductivity enclosures and other thermal design techniques. The most recent development is CAD-embedded thermal and fluid simulation software which enables design engineers to diagnose thermal problems, evaluate alternative designs, and iterate rapidly to an optimal solution.

The rapid pace of development in LED lighting will hopefully overcome the barriers soon in order to meet performance, lifetime and cost requirements for creating a demand for greener street lights. ■

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Biswajit Sengupta

Chartered Engineer, Fellow of Indian Society of Lighting Engineers (FISLE), Calcutta

"India has become an attractive market for both domestic as well as international LED players"

HPL has a largest market share in the market for electricity energy meters in the country, with one of the widest portfolios of meters and the fifth largest market share for LED lamps. The company is also the oldest manufacturer of LV switchgears in India. It has an established presence in the market for CFLs, with increasing focus on manufacture and supply of LED lamps, and wires and cables. Lighting India in conversation with **Gautam Seth, Joint Managing Director, HPL Electric & Power Ltd**...

Q According to you, how is the domestic LED lighting market flourishing and what are its drivers?

A The LED lighting market is witnessing an aggressive growth as the new technology has become more widely accepted in the market, supported by energy cost savings and CO2 concerns and driven by legislative changes. The deteriorating power situation across the country and limited budget allocation for starting power projects have directed the Government's focus towards 'energy conservation and efficiency' and LED lighting can play an important role in achieving this objective. There has also been a significant development of replacement products for traditional bulbs / lamps, where the LED replacement product has been specifically designed to fit the original luminaire, thereby broadening the scope for LED market growth. Moreover, rising government support and introduction of innovative LED lighting products by manufacturers has resulted in reduction in prices of these products, thereby offering consumers with more options to choose from, according to their needs and preferences.

Adding to this, the growing interest in intelligent and smart lighting is expected to change market dynamics with the announcement for the establishment of smart cities, which will increase demand for LED lighting, based on intelligent and connected infrastructure. Further, under the 'Make in India' initiative, 100% foreign investment under the automatic route has been permitted in construction, operation, and maintenance in specified rail infrastructure projects, which is expected to fuel demand for LED products for local consumption.

Q How does your R&D centres contribute in bringing out LED drivers?

A Our company is one of the few manufacturers in the country that has pretty much backward integrated state-of-the-art manufacturing. We have two manufacturing facilities in Gurgaon, and one each in Kundli, Sonepat, Jabli and Gharaunda. Our company has R&D centres in Gurgaon and Kundli, which are approved by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology. These have in-house tool rooms and testing facilities and are manned by 105 engineers. We have become very strong in electronics manufacturing due to our 20-year experience in meter manufacturing. This has become our backbone to bring out LED drivers, PCBs and the entire electronics that go into lighting.

Q How will the government's flagship Domestic Efficient Lighting Programme (DELP) and Street Light National Programme (SLNP), increase LEDs in the coming years?

A With relatively low LED light penetration and huge untapped opportunity, India has become an attractive

market for both domestic as well as international LED players. The market has witnessed a phenomenal growth over the past few years and the trend is expected to continue in the coming years. Government initiatives are playing an extremely vital role in increasing LED adoption across the country. Under its Domestic Efficient Lighting Programme (DELP), the government procures LED bulbs through competitive bidding and provides those to consumers at much competitive rates. Such schemes are expected to hugely increase LED adoption in the coming years. Prices of LED bulbs have reduced by more than 75 per cent in the last 6-8 months due to the various programmes of Energy Efficiency Services Ltd (EESL), a public sector entity under the Ministry of Power. The national programme is expected to stimulate the market further and push retail prices below Rs 150.

Q Currently, what is the proportion of LED and CFL? What was the scenario last year?

A The GDP in India is forecasted to be 7.62% between 2016 and 2020, driving economic growth and improving spending capacity of consumers. The growing interest in newer technologies and solutions, increasing awareness created by LED suppliers through product promotion and advertising is expected to increase adoption of LEDs. The Indian LED lighting market is expected to reach ` 31,010 crores in 2020, growing at a CAGR of 62% between 2016 and 2020. The Government of India's increased interest in converting existing street lights into LED is expected to further increase demand for LEDs in coming years. The CFL market in India was estimated at ` 3,500 crores during fiscal 2015. The market witnessed a growth in the rate of approximately 6% as compared to fiscal 2014. A widespread increase in adoption of LED across various lighting applications has brought down growth prospects of CFLs in India.

Q Can you mention your prime customers?

A We sell our products to institutional, non-institutional and corporate customers, including to developers of residential, commercial and industrial building projects, panel builders and OEMs. We believe that we have an established relationship with several institutional customers and we supply our products to various Governmental Agencies also.

Q What opportunities do you see for the company in the Lighting industry this year?

A Usage of energy efficient products such as LED lighting products is expected to grow in the coming years. The global LED lighting market is expected to cross revenues of ` 150,000 crores in fiscal year 2015 with a market penetration of over 30% in the overall general lighting market space. The global LED lighting market is likely to grow at a CAGR of over 40% until 2020. The trend is replicating in India, with the Indian LED lighting market expected to reach ` 31,010 crores in 2020, growing at a CAGR of 62% between 2016 and 2020.
Considering the strong growth potential, the market for LED lighting products holds immense potential in India and a key focus area for us at HPL. We have a ready range of high-quality LED lighting solutions with a strong focus on energy savings, be it commercial or domestic requirement. We command a good hold in the market for LED products and hope to continue this trend in future as well, supported by innovative products and latest technology.

Q Do you have any plans to expand your lighting portfolio anytime soon?

A Be it commercial or domestic requirement, HPL has a ready range of high-quality LED lighting solutions with a strong focus on energy savings. The product range is divided into four groups that include Consumer Lighting, Commercial, Industrial Lighting and Outdoor Lighting, with each group boasting of a wide range of innovative products to choose from. Each one of these products has been designed for reliability, safety and high optical efficiencies—HPL range of LED Luminaires uses well-designed heat sinks to enable longer life with proper heat dissipation. Considering the fact that LED is an advanced light source, HPL has designed and developed these products with different combination of wattages which can be used to enhance the decor of the interior along with energy savings in homes, commercial complexes, offices, shopping plazas, conference rooms amongst other areas.

> "Be it commercial or domestic requirement, HPL has a ready range of high-quality LED lighting solutions with a strong focus on energy savings"

Q Can you tell us about your pan-India distribution network?

A We sell our products to institutional, non-institutional and corporate customers, including to developers of residential, commercial and industrial building projects, panel builders and OEMs, primarily through a network of over 2,700 authorised dealers or distributors, from their warehouses located in 21 states and union territories in India that are managed by their carrying and forwarding agents. HPL authorised dealers or distributors further sell their products to over 18,000 retailers in India. Further, we have over 90 branch offices and representative offices across India, as on March 31, 2016, which carry out marketing activities. ■

New lighting ideas for the retail sector

One of the new products from BÄRO at this year's EuroShop is the new XR luminaire series. The spotlights, semi-recessed and suspended luminaires are particularly compact without any compromises on the lighting technology. They boast lots of new technical features, for example hybrid LED optics with silicone lens and reflector. The new power adapter of the spotlight series has been designed so that both today's and also future sensor/communication technology can be easily integrated.

As a further new product the suspended wide-area luminaire from the TX series will be presented. With different light distribution patterns it is suited to both efficient shelf lighting in retail premises and also to the dazzle-free illumination of checkout areas, for example.

Lighting expertise that can be experienced

But the trade fair stand not only provides a stage for BÄRO's product innovations; it also enables the company's expertise and philosophy to be experienced.

J. Manuel von Möller, BÄRO CEO, said, "Light colours and lighting that optimises the inherent colours of products are focus topics at our stand." Describing the concept, he further added by saying, "Our 'Walk of Light' enables visitors to directly experience the fascinating effect of spectral lighting tailored to products."

With an unparalleled wide range of standard and special light colours BÄRO offers the retail sector tools not only for creating a customised light balance, but also for developing a characteristic colour harmony for every project.

Made-to-measure lighting solutions

BÄRO also devotes lots of space to 'BÄRO tailor-made' at the EuroShop. This name stands for all the different ways of modifying standard products to meet customer requirements and the development of fully customised lighting solutions. The spectrum ranges from exclusive metal surfaces for Pendiro ID and IC suspended luminaires to fabric shades and special luminaires with BÄRO technology. With BÄRO tailor-made the company is responding to the trend towards increasingly customised brand presentations and salesrooms. In addition, customised suspended luminaires in particular add a contemporary, homely touch to retail architecture – for example in lounge zones or in-store eating areas.

Prepared for networking

One main theme at this year's EuroShop is the increasing networking of technical systems in the retail sector. Here, too, BÄRO is well-prepared. J. Manuel von Möller said, "When we talk to our retail customers we find that their specific planning focus is still on the classic tasks of presenting premises and products with light."

"But it goes without saying that we develop our luminaire hardware in such a way that the integration of future, networked functions is already possible and we remain in close dialogue with customers and planners regarding the direction of future developments, what makes sense and what is desirable," he further added. ■

Source: www.euroshop-tradefair.com

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Emerging Applications of LED Lighting Systems

LED's are different to standard lighting. They don't really burn out and stop working like a standard light; moreover the lighting diodes emit lower output levels over a very long period of time and become less bright...

Light Emitting Diodes (LED) are the latest and most exciting technological advancement in the lighting industry. LEDs are small, solid light bulbs which are extremely energy efficient and long lasting. LEDs operate differently than traditional incandescent light bulbs. LED's are different to standard lighting. They don't really burn out and stop working like a standard light, moreover the lighting diodes emit lower output levels over a very long period of time and become less bright. A number of benefits associated with LED lights can be summarised as:

Long Life

LED bulbs and diodes have an outstanding operational life time expectation of sometimes up to 100000 hours.

Energy Efficiency

LED are today's most efficient way of illumination and lighting, with an estimated energy efficiency of 80%-90%

when compared to traditional lighting and conventional light bulbs.

Ecologically Friendly

Most conventional fluorescent lighting bulbs contain a multitude of materials like e.g mercury that are dangerous for the environment. LED lights contain no toxic materials and are 100% recyclable, and will help to reduce carbon footprint by up to a third. The long operational life time span of LED light bulb can save material and production.

Durable Quality

LEDs are extremely durable and built with sturdy components that are highly rugged and can withstand even the roughest conditions. Because LED lights are resistant to shock, vibrations and external impacts, they make great outdoor lighting systems for rough conditions and exposure to weather, wind, rain or even external vandalism, traffic related public exposure and construction or manufacturing sites.

Zero UV Emissions

LED illumination produces little infrared light and close to no UV emissions. Because of this, LED lighting is highly suitable not only for goods and materials that are sensitive to heat due to the benefit of little radiated heat emission, but also for illumination of UV sensitive objects or materials such a in museums, art galleries, archeological sites etc.

Design Flexibility

LEDs can be combined in any shape to produce highly efficient illumination. Individual LEDs can be dimmed, resulting in a dynamic control of light, colour and distribution. Well-designed LED illumination systems can achieve fantastic lighting effects, not only for the eye but also for the mood and the mind. LED mood illumination is already being used in airplanes, classrooms and many more locations and we can expect to see a lot more LED mood illumination in our daily lives within the next few years.

Operational in Extremely Cold or Hot Temperatures

LED are ideal for operation under cold and low outdoor temperature settings. LED illumination operates well also in cold settings, such as for outdoor winter settings, freezer rooms etc.

Light Dispersement

LED is designed to focus its light and can be directed to a specific location without the use of an external reflector, achieving a higher application efficiency than conventional lighting. Well-designed LED illumination systems are able to deliver light more efficiently to the desired location.

Instant Lighting & Frequent Switching

LEDs can be turned on/off many times. LED lights brighten up immediately when powered on, which has great advantages for infrastructure projects such as e.g traffic and signal lights. Also, LED lights can switched off and on frequently and without affecting the LED's lifetime or light emission.

Low-Voltage

LED lighting can run on low-voltage power supply. This makes it easy to use LED lighting also in outdoor settings, by connecting an external solar-energy source and is a big advantage when it comes to using LED technology in remote or rural areas.

Challenges towards LEDs

Cost: LEDs are currently more expensive, price per lumen, on an initial capital cost basis, than more

Some of the applications of LED lighting systems are:

- Street and Outdoor Lighting
- Architectural Lighting
- Down Lights
- Retrofit Lighting
- Retail and Shop Lighting
- Accent Lighting
- Horticultural Lighting
- Portable Lighting
- LED virtual sky
- Solar-powered led car sunroof
- Bionic led contact lens
- LED light strips
- LED wallpaper
- Sunshine in a bottle
- LED eyelashes

conventional lighting technologies. However, when considering the total cost of ownership (including energy and maintenance costs), LEDs far surpass incandescent or halogen sources and begin to threaten compact fluorescent lamps.

Performance hurdles: LED performance largely depends on correctly engineering the fixture to manage the heat generated by the LED, which causes deterioration of the LED chip itself. Over-driving the LED or not engineering the product to manage heat in high ambient temperatures may result in overheating of the LED package, eventually leading to device failure. Adequate heat-sinking is required to maintain long life. The most common design of a heat sink is a metal device with many fins, which conducts the heat away from the LED.

Required input: LEDs must be supplied with the correct voltage and current at a constant flow. This requires some electronics expertise to design the electronic drivers.

Colour characteristics: LED's can shift colour due to age and temperature. Also two different white LED will have two different colour characteristics, which affect how the light is perceived.

Growing applications

LEDs have been commercially available since the 1960's, but in recent years there have been remarkable improvements in their performance. These technology developments have enabled the use of LEDs in a variety of colored and white lighting applications. Colored LEDs have already become the technology of choice for traffic signals, much of interior and exterior vehicle lighting, signage of various types often as a replacement for neon, and other areas. LEDs are expected to become the dominant technology for most colored lighting applications. LEDs are beginning to penetrate white lighting markets such as flashlights and localised task lighting. LEDs were first used for signal lighting, such as in a dashboard and later in tail lamps. In the past few years several companies have developed high power LEDs which are extremely bright and can now be used in applications that require a high light output, such as street lighting and task lighting referred to as "lighting class LEDs."

LEDs can be used as point sources, or can be used with light guides of various types to provide distributed illumination. LED lighting has established brand new experience through special lighting, cosmopolitan night scenes, indoor decoration lighting and display engineering. Regarding colour presentation, lighting control, environmental protection, and energy-saving, it has clear advantages over traditional neon lights, incandescent lights, tungsten-halogen lights, and fluorescent lights. With further improvement LEDs have the potential to become an important technology for large area general illumination. White LED products already have performance of over 30 lumens/watt which is nearly 3x better than incandescents. White LEDs with outputs of more than 100 lumens are already available commercially, and higher power devices can be expected in the near future. However, LED needs to cut the price and finds breakthroughs in high-end digital intelligent products to penetrate the general market and enhance application levels. In this process, LED lighting will gradually replace traditional lighting in high-end application areas.

LEDs are fast becoming the light source of choice for so many general lighting applications. LED-based products are poised to replace legacy light sources in virtually all general lighting applications indoors and out while also finding substantial use in many other places ranging from automotive headlamps to life-science applications such as horticulture and maintain a strong presence in backlight and display.

Smart Lighting System

With the improvement of material and spiritual life, people nowadays have more demands to

lighting. It is no longer just about lighting. Besides energy-saving, more and more people are using lights to create a harmonious, homey and comfortable environment. Smart lighting is developed based on this concept. Different lighting can create different atmosphere. Romantic, relaxed, sparkling, enjoyable, and comfortable feelings can all be created by lights. If it is possible to control indoor lighting through digital systems, residents would have more lighting variations at their will. The combination of lighting design and intelligent technology can fulfill many people's dreams. Digital intelligent lighting is an important component of smart living. Experts predict that in the near future, smart lighting will replace ordinary lighting and become the industry mainstream. In order to present different effects, smart lighting with traditional lights will need lots of lights, which increases costs. Moreover, it is difficult to integrate harmoniously with construction materials and interior design. Smart lighting system is turned on and off constantly, which will increase the impact to lights and reduce their life time. Current smart lighting systems only have regional lighting and timer functions. Colour, setting and brightness control are not yet realised, so it is still far from our expectation. Traditional lights, including incandescent lights, fluorescent lights and energy-saving lights, cannot be applied to digital control due to technical deficiencies. LED lighting can maintain lumen efficiency and light colour parameter in a larger sink current range, so it can materialise digital control. Because LED is mixing RED, GREEN, and BLUE colour through electronic control systems, or changing different colors in a rhythm to create a colorful and dynamic atmosphere. This effect is impossible with traditional lighting. When chips are built in lighting, which reduce the thickness and weight of lights and it successfully integrate lighting and construction materials. When lights are off, people even forget the existence of them, but they are also omnipresent. Compared with traditional lights, new LED lights pack chips directly into circuit boards with cooler, which reduce size and cost and increase steadiness.

Emerging applications of UV LEDs

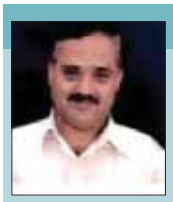
While technology barriers remain in manufacturing UV LEDs, especially at shorter wavelengths, a number of potential high-volume applications are driving interest among packaged LED manufacturers. While visible-spectrum LEDs have penetrated into TV and mobile backlighting, automotive, general lighting, signage, and other markets, ultraviolet (UV) LEDs are just beginning to replace incumbent UV sources in diverse applications, including curing, counterfeit detection, medical, sensing, printing, and water/air disinfection. The cost of UV LEDs has dropped significantly during the past several years through improvements in architectures and manufacturing technologies. However, when compared to the price of white LEDs, UV prices are still much higher and fewer manufacturers supply UV LEDs - although volumes are high for these suppliers. As a result, more and more white-light LED manufacturers are attempting to enter this field. The highest penetration and usage of UV LEDs today is in curing applications, but other applications such as water and air disinfection are increasing their reliance on UV LEDs as the technology evolves. This growth is expected to continue in the next five years and new potential applications will emerge.

Other applications

- The use of LED technology in supplemental lighting and the impact on chemical plant growth regulators
- The photoperiodic response of plants to LEDs
- The use of LEDs as sole-source lighting in plug propagation
- Growing hops in a greenhouse under LEDs

The Future of LEDs

LEDs continue to get brighter, more efficient and cheaper. Some predict a 2 or 3 times improvement in efficiency and brightness before the decade is over with significant price decreases. Whether these predictions are true or not remains to be seen, but what is certain is that this technology is getting popular among masses with its basic advantages and possible use in emerging & exotic applications ensuring a bright future for LED technology. Currently, almost every aspect of LED technology from substrates to systems applications is undergoing rapid technical evolution, so projections about future system level applications are highly speculative, and this assessment presumes that solutions to long standing LED issues like droop and poor green/yellow performance will ultimately be found. Future system level applications will also be tightly convolved with the system level incorporation of new types of light sensors and embedded processing capabilities so that feedback loops between the light source, the environment and the control system can be closed. Future systems level applications will also be tightly convolved the development of new features and services needed to extend business revenue models of lighting companies as the progress in LED system reliability drives future applications in lighting to the point that bulb/socket commodity business models begin to fail, and business models based on the offering of new lighting features and services are developed. Possible future LED lighting systems applications will emerge with changing trends in lighting related human health, communications, and display technologies. ■



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Brand Communication With Light

How can brand values such as quality and innovation be communicated with light? How can an inviting, premium atmosphere in a prestigious showroom be created – and provide orientation for customers at the same time? The qualitatively planned lighting concept in the new showroom of Otto Wulff Projektentwicklung, implemented with ERCO LED lighting tools, functions using concise visual hierarchies of perception...

OttoWulffShowroom, Hamburg

Creating values and maintaining values is the philosophy of the Otto Wulff GmbH, a construction company with a history starting in 1932. Firmly rooted in Hamburg, the company currently employs around 300 people and conducts business in the sectors of structural engineering, industrial and reinforced concrete construction and the restoration of old buildings. Its subsidiary OWP Otto Wulff Projektentwicklung GmbH is active in the new construction and renovation of real estate in the city of Hamburg, and now also in Berlin. As a developer, OWP implements housing construction and commercial projects of various sizes from concept to handover. The Otto Wulff Group therefore brings together the complete spectrum of construction disciplines under a single canopy and views itself as a brand committed to quality based on expertise, experience and performance. The new showroom at the company headquarters in Billstedt, Germany was intended to emphasise this claim to being a leader in its field and here constructors and investors can get a good impression of the high-quality construction work of Otto Wulff. The showroom also offers samples for selecting appropriate interior design features for individual projects.

Showroom lighting with ERCO

Timm+Goullon Architects designed an elegant and modern flat-roof building with an inviting glass facade; Dirk Hollweg from lux100 provided the professional lighting design services.

Hollweg explained his design approach by saying, "50 % of the interior design consists of light – the lighting concept must therefore reflect 50 % of the 3-D experience of a brand. In the case of the new showroom for Otto Wulff Projektentwicklung, the lighting design helps with selection discussions and sales agreements by providing a positive atmosphere. The light has an inviting, high quality character that communicates the leadership approach of Otto Wulff."

Hollweg's lighting design also provides guidance for customers in the 250 square metre showroom. The

space is split into a variety of areas – a reception, waiting area, sales and meeting rooms, an area for sampling and selecting materials, a world of living and a bathroom exhibition. Dirk Hollweg's design is based on visual perception hierarchies: bright-dark contrasts or graduations in brightness establish a sense of drama, specifically emphasise individual areas in the space and enable these to visually come to the foreground. Other less brightly illuminated areas are more discreet and blend into the background.

"Light allows me to order and classify, and that creates excitement and at the same time communicates the quality approach of the Otto Wulff brand," said Hollweg, who used 3000K luminaires throughout the showroom, because 'warm, directed light has a high quality appearance whereas cool, indirect light tends to be sober, functional and frequently boring.' His qualitative approach to lighting design structures the space, emphasises individual zones and sets specific highlights 'like the sun's rays' with spotlights. The result: a superior and highly inviting atmosphere throughout the showroom.

Orientation with the aid of light: bright zones attract visitors

Individual areas are illuminated in a differentiated way to guide visitors specifically through the exhibition. "Customers tend to move automatically to where it's brighter," explained the lighting designer. As a consequence, the wall panel with a striking Otto Wulff logo at eye-level seen by visitors in the entrance area is very brightly and uniformly illuminated with a 24W Optec wallwasher, transforming it into a central eye-catcher. A reception desk is situated on the right-hand side above which two decorative Starpoint 8W pendant luminaires with extra wide flood light distribution were installed. The wall area to the rear displays a 'welcome' greeting highlighted with a recessed Compact wallwasher. This area is illuminated significantly brighter than the opposite waiting area, giving visitors a clear signal to go towards the right. The lighting is unobtrusive in the waiting area to the left – an Optec spotlight with spot light distribution illuminates a side table next to the sofa like a small island in the space, two Compact lens wallwashers illuminate the picture behind the sofa and a decorative task light adds a cosy touch.

The sales-promoting impact of light: influencing the focus of customers

The tables in both meeting rooms are specifically highlighted with light where consultants present designs and planning details as well as individual project information. "This makes customers focus their attention on the sales discussion," explained Dirk Hollweg. In each case only a single Skim recessed spotlight uniformly illuminates the tabletop without glare. A decorative task light positioned at eye-level on the shelf to the side also emphasises the high quality appeal of the interior. The lighting design works with concise hierarchies of perception here as well: the focus with brightness and therefore attention is clearly on the tabletops, whilst other areas in the space blend more into the background. "Rooms or spaces that are too uniformly illuminated create stress," stated the lighting designer. A living situation is simulated in the rear area of the showroom where decorative pendant luminaires and floorstanding uplights create a cosy atmosphere. "An Optec spotlight with just 6W and narrow spot distribution also creates a campfire effect on the lowcoffee table where people gather as they did in earlier times around a campfire. Another Optec spotlight sets a spot of light on the picture above the sideboard," informed the designer. 6W Optec with spot distribution also accent individual products in the bathroom exhibition.

Maximum natural colour rendering of the exhibited building materials: ERCO LED lighting tools with 3000K

A further important area in the new showroom is dedicated to the display and selection of sample units and materials. The product display on the side wall in the centre of the showroom can be equipped with a selection of door hinges, window handles, light switches, tiles, wood samples and similar objects. "A 24W Optec wallwasher provides high lumen output from above," said Dirk Hollweg, "and close to the products to ensure optimum presentation without shadowing or glare. Customers don't cast shadows on the products they're looking at." The selection of materials and accessories for the various Otto Wulff construction projects is diverse, and the spectrum of colours and textures equally so. As such, the rendering of colours and materials as true as possible to nature was a further essential factor in the lighting design. The ERCO LED lighting tools installed in 3000K warm white feature outstanding colour rendering and achieve true-to-life material appearances (RA ≥ 90).

The new Otto Wulff Projektentwicklung showroom in Hamburg demonstrates how innate brand values such as quality and the spirit of innovation can be communicated with the aid of light. The photometric advantages of ERCO lighting tools, for example excellent colour rendering and consistent quality of light, also complement the diverse design options made available by high-precision ERCO lenses. ■

Photography: Frieder Blickle

Credits

www.erco.com

Cathedral of Our Lady
Belgium beautified

This is the second consecutive year that S2 RENT has illuminated Antwerp's old marketsquare for Christmas. Based on the stunning results the company has achieved in 2015 and 2016, it seems that the city is strengthening its cherished holiday tradition...

Every December, visitors from throughout Europe visit the old market square of Belgium's largest city to enjoy one of the continent's most tradition-rich and colourful Christmas festivals. Adding to the warm Yuletide ambiance is the glowing lighting display that adorns the gothic buildings surrounding the square. At the heart of this panorama of light is the magnificent 123-meter-tall Cathedral of Our Lady illuminated by 50 CHAUVET Professional COLORado 1-Quad IP fixtures.

Supplied by S2 RENT, the LED wash fixtures were positioned on the balconies of the tower, a UNESCO protected site that has stood proudly in the centre of the Antwerp since 1521. According to Joery Gysen, Production Director at S2 RENT, the COLORado fixtures were an essential part of his company's vision for transforming the historic tower into the centrepiece of the square's Christmas lighting display.

He said, "The COLORados were placed on the four facades of the tower to create an all- encompassing fairy tale-like illumination, both on their own and when used along with video mapping shows. In both cases, the tower becomes a magical Christmas visual aesthetic."

Due to the high output and consistent colour temperature of the COLORado fixtures, Gysen and his team were able to cover the window recess (each totaling 72 square metres) with ease. In keeping with the Christmas visual theme of the market square, they were able to exploit the deep saturated colours of the COLORado fixtures to give the tower a memorably festive appearance.

Gysen explained, "The COLORado fixtures produce extremely vivid, powerful and equally displaced lighting. We were able to position the COLORados on the tower safe in the knowledge that the output would be large enough to cover the whole surface area. During the shows, we utilised the fixture's warm white and pastel colour output to support the visual projections."

Given that the installation lasts roughly one whole month, reliability was of upmost importance for Gysen in his choice of fixture. Due to IP66 protection housing, the COLORado fixtures have proven to be solid outdoor workhorses.

This is the second consecutive year that S2 RENT has illuminated Antwerp's old marketsquare for Christmas. Based on the stunning results the company has achieved in 2015 and 2016, it seems that the city is strengthening its cherished holiday tradition. With some help from CHAUVET Professional, the Cathedral of Our Lady remains the unmistakable scenic focal point of this warm and welcoming celebration. ■

Source: www.chauvetprofessional.co.uk

"LED products are going to grow not only in India but in the world"

LED lighting is a flourishing industry with a number of companies inflowing into manufacturing. These companies exhaustively study to know the type of manufacturing equipment needed in this industry, the selection parameters for such equipment and the latest launches in this category. Since, **Juki India Pvt Ltd** has been in the SMT division for quite a long time, Lighting India interview's **Praveen Madaan**, **Country Head India (SMT Division), Adviser Sales & Marketing (SEA) SMT Division** and shares his insights with its readers...

Q Do you think the LED manufacturing is slowly gathering pace in India? Can you share your views about it?

A Yes, I do agree. LED manufacturing is becoming very popular because of its' simple assembly process. Since the price of LED lighting products are going down and customers are considering doing everything under one roof i.e. design to final product to have better control of quality and profit margins.

Q Can you tell us about your Indian customers?

A We have 60% customers who are doing LED lighting manufacturing and half of them have complete setup design to final assembly. Some of them are original equipment manufacturers and some of them are manufacturing under their own brand. Since the production volumes are increasing, most of them are considering to expand their production volumes. Most of our customers are very successful because they bought our machines, which is not only for LED light assembly but also can manufacture any other electronics SMT board. This gives them comfort feeling and better ROI.

Q How is the response for your new product, AOI RV-2-3D in Indian as well as International markets?

A JUKI 3D AOI machine was launched in Apex Show 2017 in USA. The response is very good because of its features of UV coating inspection and easy to fine tune the programs and parameters as per the customer's requirements. We have already sold and installed few machines.

Q According to you, how important it is to understand the production procedure of LED lights to find out the type of manufacturing equipment that would be required?

A It is very important to understand the production procedure in any kind of electronics manufacturing. We offer cost effective solution to our customers so that they can run the machines effectively to get better ROI.

Q Can you tell us about the SMT market in India for LED products?

A LED products are going to grow not only in India but in the world because of its advantage in terms of cost, efficiency, ease of manufacturability, longer life etc.

Q Before buying any SMT manufacturing equipment, what must a buyer consider?

A Buyer must consider the products design, their volume, supplier's installation base, local service & spares support, capability of the service team, machines performance and flexibility to produce other products in addition to LED PCBA's. ■

LED Bollards from K-Lite

Efficient and cost-effective LED bollards with rotationally symmetrical illumination for ground surfaces. The photometric design of these luminaires is based on LED integrated with K-Lite's precision reflector module. Consistent implementation of a new technological development combined with the highest technical and structural quality has resulted in this state of art luminaires. These luminaires are characterised by their high luminous efficiency, extremely long service life and the uniformity of the degree of illuminance.

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Application: For the illumination of footpaths, entrance areas, driveway, private and public areas.

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- Finished with 60 micron thick polyester based powder coating for uniform deposition and excellent finish.
- CREE / OSRAM / NICHIA make LEDs, which are internationally recognised brands with higher lumen output are used for better illumination and longevity. ■

Source: www.klite.in

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Several Others…

"Our LEDs are energy-efficient with extremely lower maintenance cost"

Surya Roshni is one of the most respected and trusted brands for lighting and steel pipe products in India. The lighting division of the company stands out as one of the leading brands in the lighting industry. Lighting India talks to **B. Raju, Managing Director, Surya Roshni Ltd.** about the **Lighting Industry**, the company and other peripherals...

Q How do you rank Surya Roshni in the Lighting Industry?

A Surya Roshni entered into the lighting arena in the year 1984 with a dream of 'lighting every city every home'. The company has always been known for its conventional lighting. Over three decades down the line, it has been appraised as one of the leading brands in the country's lighting industry. Today, Surya's LED product basket comprises of products manufactured in-house by the backward integration process, adding credibility to the brand's stature as being synonymous to lighting.

Q Can you talk about the recent order that the company has received from Energy Efficiency Services Limited (EESL)?

A The new order comprises of Fan, LED Lamps and Street Lights with a total value of Rs. approx. 100 Cr.

Q How do you cater to the ever-changing requirements of customer?

A Surya Roshni is constantly meeting the customer's requirements and guarantees quality of its products to all the valued customers by selecting the best suppliers- which meet the global quality norms. Our supplier selection process is stringent. Components are verified and the prior inspections are done before the manufacturing process starts. The controlling takes place during manufacturing, which continuously monitors the quality of each and every product. We keep on getting customer feedback constantly and accordingly further improvements are made.

Q Energy conservation is the new mantra due to the country's looming power crisis. How has the LED of Surya, helped in reducing the energy consumption?

A We, at Surya Roshni, manufacture all the LED products in-house. The LEDs manufactured by us are energy-efficient with extremely lower maintenance cost, high brightness, soothing light effect, high-power factor, wide operating voltage range, operation in extreme temperatures- which ensure energy savings and comes with the facilitation of a remarkable lifespan. The group, manufactures quality LED products with a world class manufacturing infrastructure, at its fully integrated plants in Kashipur (Uttarakhand) and Gwalior (Madhya Pradesh), supported by Surya Technology & Innovation Centre (STIC) at Noida – an advanced state-of-the-art lighting laboratory and research centre with specific focus on LED.

Q There are reports that your company is planning to invest about Rs. 50 crore in R&D for LED products. Could you elaborate?

A We have made over 50 Crore investment. The LED lamps assembly process is equipped with automatic head assembly machines at Gwalior Plant. These machines are developed in-house by competent team members with an innovative approach. It is the most production friendly and deliver the best quality of products.

Surya Roshni established PCB Assembly Unit at Gwalior & Kashipur plants with state-of-the-art automatic component insertion machines for both types of Axial and SMD components. We have a world class setup having Surface Mount Technology (SMT)/ AI machines of FUJI/JUKI/Yamaha for assembly of driver/MCPCBs for LED lamps/T-8 LED Tube Lights and Street Lights. All the SMT machines are fine pitch machines being used to insert chip components of all packages using SMT. These machines are used for mounting chip components for CFL and LED driver/ MCPCBs. We are adhering to the best quality practices to deliver a zero defect product so as to meet our customer's expectations.

Q Could you tell us to which countries does Surya Roshni export its lighting products?

A Presently, the company is exporting its lighting products to around 44 countries worldwide. Major countries are United Kingdom, Brazil, Mexico, China, Vietnam, Indonesia, Ukraine, Philippines, Egypt, Oman, Qatar, United Arab Emirates, Sudan, Saudi Arabia, Algeria, Nigeria, Thailand, Zambia, etc.

Q Can you talk about the future export plans?

A Surya started exporting LED products to few countries in this financial year. We will try to increase the sales volume and exporting of LED products to more countries. Special emphasis on the export of LED Street Lights/ Panels will be given during this financial year. We just started exporting LED Lamps in SKD condition to different lamp manufacturers. Soon exporting of LED Filament Lamps and LED Tube lights in Glass to European & US Markets. ■

71 Fenchurch Street Gets Refurbished

Uplighting of the stone perimeter wall enhances the feeling of enclosure and privacy, with the softly uplit foliage creating an illuminated canopy overhead. Warm white light is used throughout in contrast to the cool white interior glow from the offices.

71 Fenchurch Street is an architecturally significant glass and steel medium rise office building that has recently undergone a refurbishment led by Fletcher Priest Architects (FPA). Lighting design studio Speirs + Major were commissioned to develop a new lighting approach for the exterior entrance, courtyard and main reception, the centrepiece of which is an installation of beautifully integrated bespoke pendants in the lobby atrium.

The renowned building is set within a sensitive conservation area adjacent to a number of listed buildings. Owned by technical and business services organisation Lloyd's Register, it was purpose designed by Richard Rogers Partnership (now Rogers Stirk Harbour + Partners) and completed in 2000. From the street the entrance is through an archway set into the façade. Warm uplighting to the arch improves the visibility of the entrance and frames the silhouette of a mature tree to provide an enticing view to the building beyond. Within the courtyard light and darkness are carefully balanced to create a sense of place.

Uplighting of the stone perimeter wall enhances the feeling of enclosure and privacy, with the softly uplit foliage creating an illuminated canopy overhead. Warm white light is used throughout in contrast to the cool white interior glow from the offices. Lighting is neatly integrated into benches and stairs, leading visitors through to the reception lobby.

The interior lighting concept was developed to improve both the arrival experience and first impressions, while responding to the volume, rhythm and geometry of the architecture.

For the general lighting of the reception atrium, Speirs + Major recommended a new suspended element. All parties agreed that though introducing such a prominent feature into an architecturally significant building required careful consideration it would bring a welcome sense of human scale and add character to the space.

Further layers of lighting provide highlights to selected features. The wall behind the reception desk has been uplit to form a backdrop, and an array of custom designed suspended direct/indirect lighting systems draws attention to the vaulted ceilings, replacing the redundant original services arrangements. The scheme is finished off with a pair of floor lamps placed within the single height seating zones, to evoke a more domestic ambience.

The design process for developing the bespoke pendants was necessarily rigorous. It was crucial that the form be complementary to the architecture, sitting comfortably and harmoniously within the space. To begin, Speirs+ Major studied the grids inherent in the building geometry. From this the preferred spatial nodes were identified, from which the square-ended form of the pendants were extruded by 3.2m - in alignment with the

height of a single floor. A blue finish to the interior makes subtle reference to the maritime heritage of Lloyd's Register.

The space between the forms was considered as important as the forms themselves, and perfect alignment in the X, Y and Z-axes was critical. Developed in collaboration with manufacturer Mike Stoane Lighting, numerous tests were carried out and a full-scale mock-up was conducted on site to assess the lighting effect and the scale of the pendants, while resolving a myriad of technical issues.

The final solution sees the pendants elegantly suspended from a primary frame that can be raised and lowered by motorised winches for maintenance. The lit effect on the floor can be varied from a strong grid to a softly dappled pattern, bringing out the natural grain and warm colour of the new wooden flooring in contrast to the cool crispness of the original architecture.

Two further products were developed for the lighting of the vaulted ceilings. Working with the existing chilled beam luminaires, a bespoke LED cassette was developed to replace the existing fluorescent light source. A complimentary suspended direct/indirect luminaire provides the lighting where there is no chilled beam, achieving an improved and consistent quality of light across all the vaults. ■

Source: www.speirsandmajor.com

Making the Amazing Beautiful

Philips Entertainment Lighting's theatrical control system orchestrates nighttime illumination of natural wonder...

Philips Lighting revealed that its control systems are managing the new stunning colour illumination of the landmark 167 feet (50.9 m) high Niagara Falls, the world's most famous waterfalls located on the border of both US and Canada.

The systems from Philips Entertainment Lighting form the centrepiece of the recently opened LED upgrade. Two Philips Strand Lighting NEO consoles, used widely in theatrical lighting, control 1,400 third-party colour LED luminaires for the 'Niagara Falls Illumination Enhancement Project.' The luminaires, grouped in 350 controllable zones, enable lighting effects, such as sunrise, sunset and the Aurora Borealis, to be played on the 600,000 US gallons (271,247 litres) of water cascading over the falls every second.

The goal of the Niagara Falls Illumination Board is to enhance the visitor experience and gain energy efficiencies and longevity from the LED lighting. The $4 million upgrade of the previous Xenon lighting system will provide a 60% energy saving and the crisp, clear illumination will be up to 4–14 times brighter as the original system depending on which of the 18,000 available colours are projected. A consortium of companies implemented the project: ECCO Electric Ltd, Salex Inc, Mulvey & Banani Lighting Inc, Sceneworks and Stanley Electric. The illumination was unveiled to the public on December 1, 2016.

Colin Kavanagh, General Manager of Philips Entertainment Lighting, said, "This was a challenging and ambitious project for one of the top 10 most visited tourist attractions in the world. The beautiful nighttime spectacle we helped create underlines the dependability and flexibility of our control systems and software to do more than just stage shows and concerts."

Why they chose Philips Strand Lighting NEO

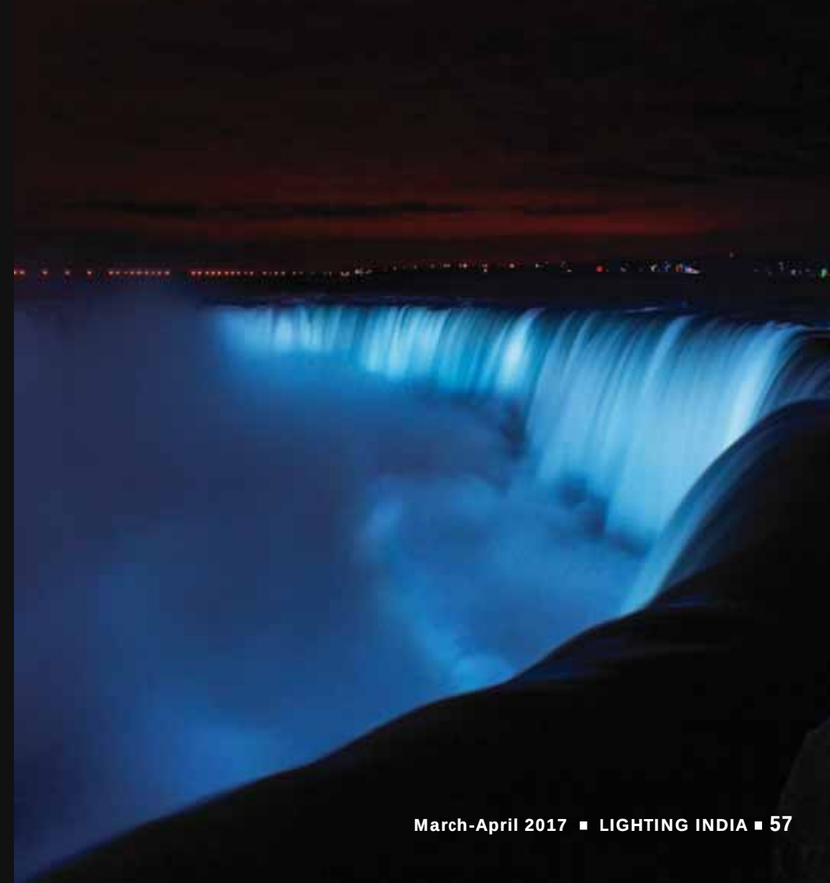
Alan McIntosh, Senior Lighting Designer at Mulvey and Banani Lighting, said, "From the onset of the project we knew that we were going to need a robust theatrical lighting controller with an effects engine capable of producing the natural, fluid moments we desired."

Ron Foley of Sceneworks recommended the Philips Strand Lighting NEO consoles, "We knew the NEO would be the ideal control platform for the unique requirements of this monumental project. We required individual DMX control of the fixtures and a simple touch screen operator interfaces so that volunteer operators could manage the display without the need for training on the console."

Philips Entertainment Lighting designed custom software features to further improve the efficiency and the ease of programming of the NEO console.

Further, McIntosh said, "I was impressed with the custom 'paint box' program the developers added in for the project. The simple but effective solution added dramatic trailing effects to some of the looks we designed. The software's Channel Matrix system allowed the lighting plot to be laid out in exactly the same way on screen. This gave the team the ability to quickly select a particular area of the falls and adjust the colour by drawing a window around them on the touchscreen." ■

Source: www.lighting.philips.com



LED Expo Mumbai 2017
– to be larger than ever before

Opening next month, LED Expo will bring some of the leading LED technology manufacturers from 11 – 13 May to Mumbai, to promote widespread penetration of LED lights throughout the country...

A still from LED Expo 2015

Larger than ever before, the Mumbai edition marks a 22% increase in number of exhibitors and 39% increase in international participation. Overall, this edition of LED Expo 2017 will be 28% bigger than the last Mumbai edition covering 7200 sqms of exhibition space and featuring more than 200 exhibiting companies from India, China, Hong Kong, Korea and Taiwan.

Power Minister Piyush Goyal recently announced that the government's promotion of Light Emitting Diodes (LED) will help reduce carbon dioxide emissions by 80 million tonnes per annum and save around Rs 40,000 crore in power bills annually. Lighting alone accounts for approximately 20% of the total electricity consumption in India. When the required amount of light can be regulated more accurately using energy-efficient LEDs and smart lighting, as much as 30-40 % of the energy required for lighting could be saved.

The government is already promoting the adoption of LED-based products to save power and running costs across public sectors and an increasing trend in the adoption by private and industrial sectors has been witnessed in the last few months coupled with a noticeable rise in participation at LED Expo every year – both from exhibitors and visitors.

Products in display from LED Expo 2015

Organised by Messe Frankfurt Trade Fairs India Pvt Ltd, the platform will present a dazzling display of LED lighting products, signages and displays, LED components, chips, accessories, raw materials, manufacturing equipment and allied products to Indian corporate, private and government sectors in the upcoming edition. Many of these brands have chosen the platform to launch, demonstrate or announce their entry into new LED product segments.

The LED Summit on day two of the fair is also expected to pull in regulatory bodies and sector players together to cover exciting trends in LEDs. At the 16th edition of this international exhibition on LED lighting products and technologies in India, special emphasis has been given to the needs of buyers and trade visitors through a new well-structured exhibition format wherein a hall-wise product segmentation of the various products and applications of LEDs will allow visitors to see leading brands in the same segment together and compare prices and value additions.

Various ministries and government bodies including Ministry of Electronics & Information Technology, Department of Industrial Policy and Promotion, Ministry of Commerce & Industry, as well as Maharashtra Energy Development Agency, Brihanmumbai Electric Supply and Transport Undertaking, Electronic Industries Association of India, Solar Energy Society of India, Indian Building Congress and the apex body of the Lighting manufacturers - ELCOMA (Electric Lamp & Component Manufacturers Association) have announced strong support to this platform which promotes energy saving lighting and LED technologies for the country. ■

For further information: www.theledexpo.com

The Most Influential & Comprehensive Lighting and LED event in Asia returns

The 'THINKLIGHT' show concept was a resounding success and will continue to develop at the 2017 show under the theme 'The convergent future'. In the LED era, lighting carries wider capabilities that extend pass basic on/off and dimming functions. The totality of lighting has moved beyond the scope of illumination and the industry is witnessing the creation of a future that converges different sectors and elements that revolve around human wellbeing...

As the lighting sector evolves, the Guangzhou International Lighting Exhibition (GILE) continues to work towards exposing the market's untapped potential. The 22nd edition is scheduled to take place from 9 – 12 June 2017 at the China Import and Export Fair Complex in Guangzhou, China. Stemming from this year's 'THINKLIGHT: The Convergent Future' show theme, a two-part 2017 concurrent event programme will be made up of The Convergent Future Forum and THINKLIGHT Forum.

Commenting on the all-encompassing event programme, Ms Lucia Wong, Deputy General Manager of Messe Frankfurt (Shanghai) Co Ltd, said, "Lighting has crossed over into a modern world – one in which circuits, semiconductors and the internet are all integrated as a whole. Such changes have led to a shift in the way lighting is perceived and also in the way business is conducted. With these factors in mind, the expo's 2017 event programme is strategically designed to not only focus on lighting concepts and LED technology, but also to gather professionals from different sectors to discuss the convergence of various industries, technologies and devices. The GILE platform aims to provide new market insights to lighting experts so they may discover fresh business opportunities from both within and outside of traditional industry scopes."

The Convergent Future Forum to address industry convergence

The Convergent Future Forum, to be held opposite Hall 4.1 in Area A along the Pearl Promenade, will explore two major trends surrounding convergence in the lighting industry. They include the intersection of LED technology and the Internet of Things (IoT) as well as embedded digital art in architectural spaces. A few specific subtopics are:

Lighting & IoT

Given that the IoT has been a key driver in the lighting industry's reform, the forum will cover ways the IoT has been bridging various aspects of the industry from technological and application viewpoints. Having a sturdy foundation in LED and lighting management, the IoT movement has created a myriad of possibilities for future LED lighting

applications. Subjects to be examined in the technology sessions include:

- Communication protocols for lighting control
- Smart lighting solutions and IoT platforms
- Smart lighting solutions and big data
- Smart dimming and IoT

Modern lighting is creating new value for consumers as it transforms commercial, industrial, city and residential spaces. The forum's application sessions will discuss a number of ways IoT technologies can be integrated into lighting. Subjects include:

- A high-tech makeover in street lighting
- IoT in commercial buildings: Connected lighting and beyond
- Residential lighting: Towards intelligent living

Lighting & digital art

Starting from a purely artistic form, digital art has transformed and is revitalising exhibitions, indoor spaces, architecture and entire cityscapes. The forum will explore the convergence of lighting and digital art from design and technological perspectives to unveil how the interactive nature of the newest forms of media facades are redefining public areas. Featured subjects include:

- Have media facades become our modern urban monuments?
- The colour and lighting technologies for media facades

THINKLIGHT Forum to discuss the concepts, quality and applications of lighting

The THINKLIGHT Forum, to be held opposite Hall 2.1 in Area A along the Pearl Promenade, will take it back to the basic concepts of lighting in city and commercial spaces. Subtopics to be addressed include the quality of light, specifically aspects such as colour, vision, comfort and composition. Additionally, embedded lighting, or the direct implantation of LEDs into architectural materials such as walls, floors and ceilings, will also be covered. These discussions will jumpstart the creation of aesthetically pleasing spatial applications with new approaches to design, specifications and fabrication.

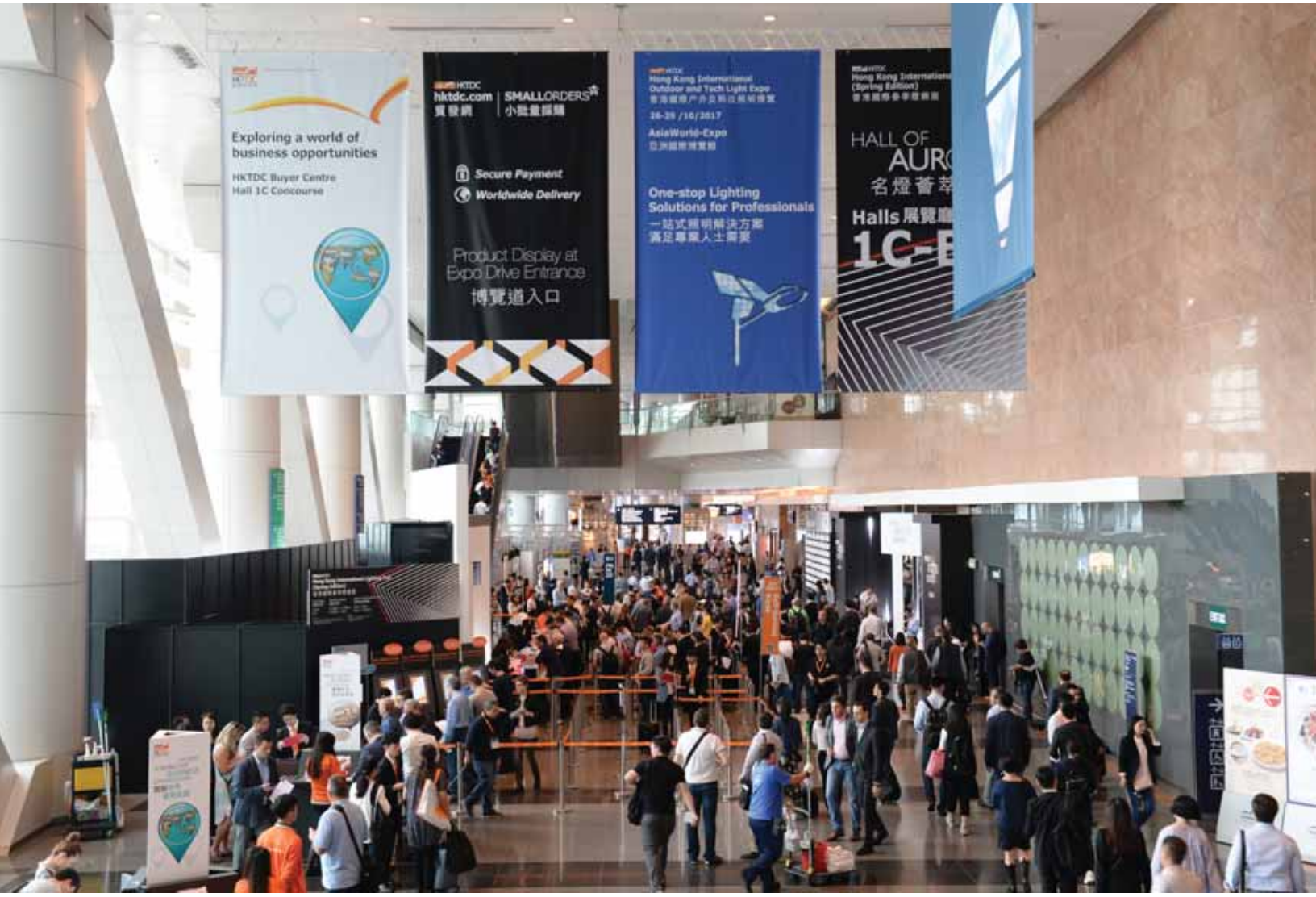
Another subject will be human-centric lighting. The ability to create appropriate lighting characteristics that sync with users' circadian rhythms is a hot-button industry trend that manufacturers have their eyes on as an area of investment. Moreover, the forum will cover topics addressing new applications of UV LEDs and horticultural sectors.

Ms Wong added by saying, "As in the past, GILE remains a breeding ground for new market ideas. The concurrent event programme has and will continue to expose and explore topics of concern and interest to lighting designers, manufacturers and professionals worldwide. We invite experts in their field to expand their knowledge, exchange ideas and network on a platform whose influence extends far beyond domestic borders." ■

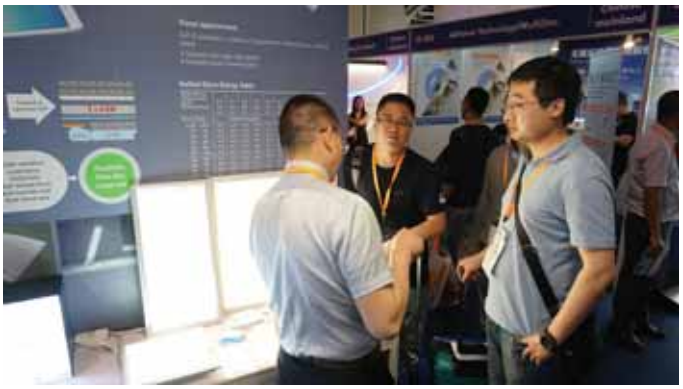
For further information, please log on to: www.light.messefrankfurt.com.cn

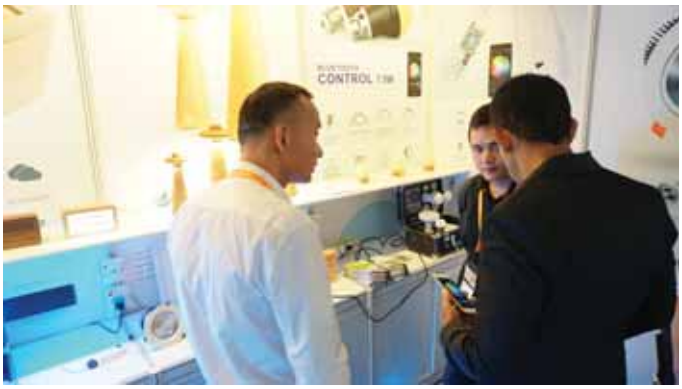
HKTDC Spring Edition predicts bright future for LED, Green & Smart Lighting

The HKTDC commissioned the independent on-site survey during the fair, interviewing more than 373 exhibitors and buyers about their views regarding industry prospects. LED and green lighting has been a focus for global buyers due to declining prices, higher energy efficiency, longer life expectancy as well as growing environmental awareness. 92% of respondents say they believe 'smart city and smart home' technology will drive development of the lighting industry in the next two years...



The ninth Hong Kong International Lighting Fair (Spring Edition) welcomed close to 21,000 buyers from 115 countries and regions, up 5.8 % over last year





Buyers visiting the new 'Smart Lighting & Solutions' zone introduced this year to showcase the latest smart lighting systems, remote controls and products

The ninth Hong Kong International Lighting Fair (Spring Edition), organised by the Hong Kong Trade Development Council (HKTDC), was a four-day fair (6-9 April) welcoming a record of 1,340 exhibitors from 13 countries and regions and having close to 21,000 buyers from 115 countries and regions, a 5.8 % increase over the previous year.

HKTDC Acting Executive Director, Benjamin Chau, said, "We saw brisk trading and networking at the Spring Lighting Fair. Buyers from European, US and Asian markets were actively engaged in sourcing, with buyer attendance from the United States, Australia, Germany, the United Kingdom, Canada, Japan, the Philippines and Thailand recording double-digit increases – bringing more business opportunities for exhibitors."

Chau noted that a fairground survey indicated that the industry was optimistic about the lighting market's outlook for the coming year, with expectations of persistent demand for smart lighting and substantial growth in LED and green lighting sectors. A new 'Smart Lighting & Solutions' zone was introduced this year to showcase the latest smart lighting systems, remote controls and products, while 'LED and Green Lighting' remained the fair's largest thematic zone, attracting more than 450 suppliers. These zones offered quality products catering to the latest market needs.

A presentation at one of a range of buyer forums held at the fair to discuss the latest trends in the global lighting industry

The HKTDC commissioned the independent on-site survey during the fair, interviewing more than 373 exhibitors and buyers about their views regarding industry prospects. The survey found that 95 % of respondents expect overall sales of products to increase or remain unchanged this year, up 31 % points from last year.

As for product trends, respondents consider lighting accessories, parts & components to be the product sector with the highest growth (38%), followed by LED & green lighting (18%), household lighting (18%) and smart lighting & solutions (9%). Among traditional markets, respondents are most optimistic about North America, Western Europe and Hong Kong. As for emerging markets, respondents believe the Chinese mainland, ASEAN countries, the Middle East and Latin America have the best growth prospects this year.

Persistent demand seen for smart lighting

Ninety two per cent of respondents say they believe 'smart city and smart home' technology will drive development of the lighting industry in the next two years. The highest growth potential is seen in household lighting systems that can be controlled by smart phone/tablet applications, and in smart lighting systems primarily with energy-saving purposes for household/industrial/commercial applications.

Muhammed Noufel, General Manager of Bella Nova Trading FZE, said, "Smart lighting is favoured by the new generation in GCC (Gulf Cooperation Council) countries because young people like novelty and they can use mobile apps to control lighting effects and achieve home automation."

The buyer from the United Arab Emirates also said his company had identified many new suppliers through the fair, and planned to buy US$50,000-100,000 worth of LED lighting products from them.

LED and green lighting in spotlight

LED and green lighting has been a focus for global buyers due to declining prices, higher energy efficiency, longer life expectancy as well as growing environmental awareness. The survey found that the respondents expect indoor household

The Hall of Aurora featured 200 renowned brands showcasing a wide range of lighting products and technologies with unique design and excellent functionality

lighting (28%), indoor office and commercial lighting (21%) and outdoor lighting (18%) to be the LED application categories with the highest growth potential for the next two years.

Fair exhibitor Hangzhou Sky-Lighting Co Ltd was promoting its eco-friendly LED filament bulbs at the show, where it had met with buyers from Europe who were very interested in its products. Europe and the Middle East were the exhibitor's largest markets, "We are keen to expand into new markets such as Japan and the US through the fair. The Spring Lighting Fair provides an ideal platform for us to look for quality buyers," said Sales Manager, Lu Lu.

Albert Huang, Operation Director of US exhibitor Jaykal LED Solutions Inc said both the spring and autumn editions of the Lighting Fair provide a good platform for his company to introduce new products. He added that its solar streetlights had attracted strong interest from buyers from such regions as Africa and South America. The company runs a Chinese mainland factory that manufactures high-quality LED lighting products for industrial and commercial applications.

Maria Cabrera, CEO North America for Swiss LED USA, was visiting the fair for the third time. She found at least eight potential suppliers of household lighting and two potential suppliers of hotel lighting products from the Chinese mainland and Vietnam. Cabrera said she plans to buy US$500,000 worth of lighting products from these new suppliers and would soon confirm orders with the hotel lighting suppliers.

Highly Effective Marketing and Sourcing Platform

Mable Fang, Lighting Consultant for Epistar Industrial (Hong Kong) Co Ltd – an exhibitor which has joined the fair for many years – said the show was an important platform to promote the company among international buyers and to look for new prospects. "We have received enquiries from many buyers including those from Europe, the Middle East, Southeast Asia and the US. We expect that at least two to three new buyers will buy our products," she said.

Argentine buyer Fernando Pache Brussoni, Director of Urulamp, appreciated the scale of this year's Spring Lighting Fair. "The LED industry is developing quickly. The fair brings together a lot of suppliers and new products, which allows us to grasp the latest trends. So far, we have found new models of flood lights and street lights, and already identified four to five new suppliers from the Chinese mainland. We'll buy their products after checking their quality and prices," he said. ■

Further Information: www.hktdc.com

A survey of fair participants indicates that industry players expect indoor household lighting (28%), indoor office & commercial lighting (21%) and outdoor lighting (18%) to be the LED application categories that have the highest growth in the next two years

Kwality Photonics unveils high performance Medium Power LEDs

Kwality Photonics, an ISO 9001:2008 certified company, is India's largest manufacturer of LED & LED segmented displays. Kwality LED components can be found in products manufactured in a very broad range of industries. High reliability, high brightness, low power consumption and full colour range make Kwality's LEDs a major player in lighting, signage as well as automotive applications. With a strong R&D department in place, the company has more new products in pipeline for release.

The company has been successfully launching low cost LEDs in various new packages. Recently, it has released high performance Medium Power LEDs KLSL5630W 150mA LEDs in 65/70Lumens output that deliver exceptional brightness-thanks to the specially designed lead frame profile and improved heat dissipation of the device.

Kwality LM80 test compliant LEDs across full range of Power LEDs. Kwality's High Power KLHP3535, Medium Power KLSL5630&2835 and Low Power 3014 & 3528 LEDs now enable one to bid for all EESL, Government Tenders & BIS based LED indents.

Kwality's surface-mount Medium Power SMD LED family of 2835W, 5630W & 3030W are now a de-facto industry standard. The wide choice of Kwality PolyWa KLHP3535W350mA, KLSL5630W150mA, KLSL2835W60mA, KLSL3014W30mA & KLSL3228W20mA together can meet every possible design requirement, be it street lights, tube lights, retrofit bulbs, panel lights, high bay lights, flood lights, down lights. Due to huge cost advantage of Kwality SMD LEDs, even streetlights are being lit with these medium power LEDs. ■

Email: www.kwalityphotonics.com

Inventronics releases LED driver series specifically designed for Indian Market

Inventronics is a global company that operates on a local scale in the communities it does business in. It works closely with customers to ensure it provides the correct driver for any application. Inventronics is pleased to announce the release of a 60W series of constant-current LED drivers created specifically to handle the challenging power conditions in the Indian market.

The new EDC series offers a high level of protective functions including Input Over Voltage Protection (IOVP) and Input Under Voltage Protection (IUVP). This helps protect against poor power quality supplied to the LED driver, which then protects the luminaire, resulting in less maintenance costs. The new EDC-060S105STM is certified to BIS standards facilitating safety certification for the end user. Inventronics understands the struggles of the Indian electronic designer and offers a high level of market leading input protection capable of handling voltage swells up to 440Vac for up to 48 hours. The EDC series provides an IP66 rating and is equipped with a compact metal case enabling them to protect against dust and particles and a high level of protection against water and humidity.

The EDC-060S105STM series includes 3 models of constant-current drivers that can supply up to 60W at output currents from 700 to 1050mA with a full-load efficiency up to 90%. The calculated lifetimes of these drivers are 112,000 hours at 75°C. They operate from 140-305 Vac, are suitable for Class I Luminaires and have a Total Harmonic Distortion (THD) under 10% which reduces the pollution of the power grid. Production quantities of the EDC-060S105STM are available now. ■

Email: www.inventronics-co.com

KUSAM-MECO introduces new Power Clamp Meter

KUSAM-MECO has introduced a New TRMS 3 Phase Power Clamp Meter Model 2745 with Harmonics measurements upto 25th Harmonics (Level & %THD), besides measuring ACV, Hz, KW, KVA, KVAR, PF, 'INRUSH' Current. The Clampmeter has Triple display for KW, V,A at a time for easy read out. It has 4 digit LCD display with maximum 9999 reading. It can take conductor of Dia 46.5mm.

It measures Power parameters for 1 phase 2 wire, 1 phase 3 wire, 3 phase 3 wire, 3 phase 4 wire systems. It can measure the PF of each phase & total P.F.

It can measure Active Power upto 600KW, Apparent Power upto 600KVA, Reactive Power upto 600KVAR all with (±2.0%+5 digit) accuracy. Power Factor is (-)1.000 to 0.000; 0.000 to 1.000. AC Current measurement upto 1000A with (1.5% +10 digit) accuracy & AC Voltage upto 600V with (1% +5 digit) accuracy & the Frequency measuring range is 400Hz with (0.5% +5digit) accuracy. It also has HOLD, PEAK, MAX and MIN, Harmonic measurement function & also Balanced load system function. The sampling Speed is 1 time per second. It meets IEC61010-1Approval. Over-voltage CAT III 600V Safety Standard.

AC current having a fundamental waveform and harmonics can be measured over this range '45Hz to 65Hz'.This meter operates on 9V battery. It has Auto Power Off function which increases battery life. It is supplied with Carrying Case, Test Leads & Operating Manual. ■

Email: www.kusamelectrical.com

Xicato unveils XIM Gen4 Smart Lighting Module

Xicato, an established manufacturer and thought leader in intelligent, connected light sources, introduces XIM Gen4, its 4th generation intelligent module. This module integrates Bluetooth Low Energy (also known as BLE or Bluetooth Smart) wireless communication, beacon capability and fully featured light control with the industry's tightest specification light source. It is the first time in the lighting industry that this much technology has been integrated into such a small module, measuring only Ø50mm x 20mm.

Xicato also brings in the immediate availability of license-free Windows and iOS software for commissioning and control of the XIM lighting network. XIMtroller control software is now available free from the Apple iTunes App Store. The Windows Control Panel software is available for download by contacting Xicato.

Xicato has included Bluetooth beacon functionality in its light module. Apple iBeacon, Google Eddystone, and/or Alt beacons enable location-aware guest services like indoor navigation and rich content delivered directly to mobile smartphones and tablets. With a phone or Windows PC, it is possible to directly retrieve real-time and historical data such as operating hours and temperature from Xicato's intelligent modules. ■

Website: www.xicato.com

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