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EdSpace

I saw an interesting article on LinkedIn recently which asked the question, "Is this still the lighting industry?" The basis of the thought-leadership piece tested the theory of whether the lighting industry was shifting to become a small subset of the tech industry.

Consider this, a century ago, many railroad companies thought they were in the railroad business. They eventually failed. Those that realised they were in the transportation business succeeded. Twenty years ago, companies believed they were in the mall/shopping centre retail store business. Companies slow to adapt to online sales failed. Those that invested and adapted quickly succeeded. A number of new and nimble start-ups entered the space with no storefronts and are now great successes. Just a decade ago, companies that thought they were in the movie rental business, eventually failed. Those that realised that they were in the entertainment delivery business are now succeeding.

Most lighting product sales today are standard, no-frills fixtures. Dimming is a popular standard, but most fixtures sold and used today are not being used in applications that require or utilise high-tech features. The demand for smart fixtures is growing quickly – and someday might be a basic, standard expectation of future customers.

The world's most significant industry event, Light + Building, which has, at the time of printing, been postponed until September 2020 due to the increasing spread of the coronavirus, used to have booths that showed lighting fixtures and booths that displayed lighting controls. In recent years, it's hard to find a lighting fixture company that doesn't incorporate some sort of smart controls into its exhibit. And, one of the main themes of this year's Light + Building trade fair is 'Connecting. Pioneering. Fascinating.'

Experts present a scenario: When the street light senses that an electric car has been parked in front of the house, parking fees will be charged, charging initiated, the footpath to the dwelling illuminated dynamically, the front door opened via face recognition, lighting appropriate to the time of day switched on and the occupant's favourite music played.

In the future, application scenarios for buildings and districts will be subject only to the bounds of imagination. Beforehand, however, all electronic components must be connected digitally and speak the same language.

We continue to be inspired, amazed and impressed with the technologies that are enhancing and advancing the art and science of illumination. And while no-one is predicting the end of the lighting industry, the exciting challenges and opportunities which this technologically-rich future presents, should make for a fascinating journey.

Gregg

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INside ...

Creating a landmark in Centurion

Barloworld Automotive and Logistics Head Office, the first building to be completed in the mixed-use Irene Link precinct in Centurion, has recently been awarded a 5-Star Green Star SA Design Rating v1.1. Located along the N1 highway, lighting has been used to create a highly visible building envelope.

Owned by Abland in partnership with Giflo Developments and SOM, Irene Link is a 75 000 m^2 precinct located along the N1 highway. The development vision includes a 12 000 m^2 retail and lifestyle centre, which is scheduled to open at the end of 2020.

The sculptural, contemporary building, which was designed by Nsika Architecture & Design to accommodate 380 staff members over four floors, rests on a podium formed by two naturally ventilated basements. In contrast to Barloworld's previous offices, the building design incorporates a flexible, open plan work environment that allows for ease of churn, which is in synergy with the company's intention of being future-focused and fit-for-purpose.

A viable implementation strategy

"Resource efficiency was a major consideration for both the owners and tenant," says Simon van Helsdingen, Property Development Manager at Abland. "During the past three years, the Centurion and Irene areas have experienced regular water interruptions. And, in keeping with best green building practice worldwide, passive energy design and energy efficient mechanical systems were required from the outset. The inclusion of sustainability features meant that we could target a 5-Star rating during the design process, as opposed to the initially anticipated 4-Star rating."

The 5 860 m^2 building accommodates meeting rooms, a gym, a coffee shop and cyclist facilities for staff and visitors, among other amenities, and is enclosed in a highly transparent envelope that gives access to views over the surrounding urban context. P.W. Hattingh, project architect at Nsika Architecture & Design, says, "From the inception

of the project the design team and developers were like-minded that this project would try to achieve a high level of energy efficiency that would benefit the end-user. Best practice principals such as effective building envelope design, efficient energy use and good indoor environmental quality, were paired with commercially effective design and a viable implementation strategy". The concept was always to design a building that acknowledged its locality and communicate an architectural character that could be acknowledged in rest of the precinct, says Hattingh.

Carefully considered façade design

The concept focused on creating a simple floor plate form allowing for a high rentable ratio efficiency so that resources could be channelled into a strongly aesthetic envelope. "The superstructure, as well as the choice of façade system and glazing type, were major design consideration," Hattingh explains. "The idea was to create a permeable glass envelope that would sit lightly on a naturally ventilated basement. Time was spent to optimise the structural design in relation to the building material weight, and to create a good glazed-to- solid façade ratio. This allowed for a market-related structural design on very difficult soil conditions while also achieving optimal natural internal lighting quality with ample external views".

Both the northern and western facades are double-glazed to improve internal thermal conditions and address acoustic challenges arising from the adjacent highway. With a ratio of more than 80:20 between glass and solid façades, several shading design options were investigated. A vertical aerofoil louvre fin structure was chosen to wrap

around 42% of the building's eastern and northern envelope. The louvres act as a 'permeable jacket' to keep the building cool in summer and warm in winter. This is achieved by optimising the aerofoil fin spacing and angle of the fins for each façade orientation. This structure also provided an opportunity for a seamless lighting design on the façade of the building with recessed strip lighting to accentuate the building for passers-by.

The architects had a clear vision to create a permeable envelope that allows almost 360° views to the beautiful surrounding suburbs of Irene and Doringkloof. This façade allows for ample natural light to penetrate the inner floor plates, while the distinctive organic curves of the building's exterior envelope allow it to be viewed as a soft mass instead of a hard barrier from the highway.

Resource efficiency and lighting

In terms of energy efficiencies, a large 120 kW photovoltaic system was designed by Barloworld Power. The system is expected to reduce the building's annual energy consumption by 200 MWh. In addition, 100% of the building's light fittings are LED.

The majority of the lights have also been fitted with motion sensors and all the lights are energy efficient fittings. A Building Management System (BMS) has been incorporated into the building design to actively record and monitor services consumption such as water, electricity and HVAC. Real-time consumption is displayed on a monitoring screen that is located in the foyer of the reception area. Staff and visitors can consciously react to this display during their use of the building.

Niko Wilken from electrical engineers, Taemane

Consulting Engineers, notes that when dealing with a high profile building like this, there is always the challenge to meet the required architectural 'look and feel' versus the acceptable technical specifications while at the same time factoring in budgetary allowances and a shortened programme. "This case was no different," he says. "An early start on the designs together with continuous design workshops, over the course of the project, ensured that all the results could be met".

He points out the fact that all luminaires used for the building incorporate LED technology, which awarded the project a GreenStar Innovation point. "Our average light power density achieved was 1.08W/m²/100 lux while luminaire switching is done in zones of less than 100 m². Furthermore, all meeting rooms and executive offices are controlled with a DALI system that interfaces with the audio visual components of those spaces," he says.

The contemporary architecture of the building communicates a new vibrancy and economic growth alongside the older residential area of Irene. The architecture also contributes to the precinct's sense of place and ties into the greater urban plan for Centurion.

PROJECT TEAM
Architect: Nsika Architecture & Design
Electrical Engineer: Taemane Consulting Engineers
Sustainable Building Consultant: Solid Green Consulting
Main Contractor: WBHO
Project Manager: Abland
Landscape Management Company: Insite Landscape Architects

Illuminating two galleries

QDP Lighting & Electrical Design recently undertook the lighting design for two art galleries on entirely different ends of the spectrum.

Although the two briefs to QDP were in essence the same; simply put – to light an art gallery to highlight the exhibits being displayed with simplicity, flexibility and efficiency, the two spaces are fundamentally different, and this led to varying design approaches for each space and ultimately, a completely distinctive end product for each.

The Gallery – Val de Vie

The main goal for this gallery was to light the space and high-pitched ceiling in such a method that sufficient general, uniform light to illuminate any form and layout of art on display was obtained. "Our goal and challenge was not to break the space, or lose the enormity of the space," says QDP's Annelize Dankworth. "We opted therefore to design

the lighting as a piece of art, to complement the space and help us to achieve our lighting goals. The product was random, suspended, linear elements, providing both uplight and downlight". During the day the space has a large amount of natural light, at which time the light fittings are merely part of the 'art', but at night they light up the space holistically. "This art gallery is the more modern of the two and we felt that the lighting had to reflect this, but still be effective. A simple downlighter was introduced in the perimeter bulkhead, to soften and frame the space," she says.

A lighting challenge for this project was the fact that the space had a 6 m high pitched ceiling. Not only were the installation and logistics a problem, but achieving the correct light levels was also challenge. "We had to source fittings which offered a balance of high lumen packages, were dimmable with no glare and were also aesthetically suitable for the space, hence we opted for custom fittings".

The Marvol Gallery – Hazendal

"As opposed to The Gallery at Val de Vie where we pretty much had a clean slate, The Marvol Gallery is a heritage site with the priority being to retain and conserve the existing architecture," notes Dankworth.

The main requirement for QDP was focal lighting onto the exhibits, whilst honouring the heritage of the building and acknowledging this in a subtle way. Being built in 1781, and with its primary use then as a cattle shed, the space was very dark, enclosed with minimal natural light. "Our brief was to open up the space," she explains. The lighting design was therefore based on nondestructive methods, to preserve the integrity of the building. A simple track light system was adopted, with dim-

mable fittings of varying beams angles, accentuating the art on display. The versatility of track worked best for this space, taking into account the architecture and constantly changing display items. As a subtle backdrop to the exhibits, an LED strip was designed into floating display panels, backlighting these panels against the historic lime washed walls. To round-off the design, the exposed roof structure was softly highlighted by perimeter uplighting.

"Because of its age, this project came with vast limitations and restrictions, which we had to overcome in terms of design and the actual installation," she says. This led to the use of a track system and integrating lighting into the actual display panels, which stood proud of the architecture. The integration of the lighting into the architecture provided a subtle yet effective acknowledgement and highlighting of the heritage of the building.

Different approaches

"It was amazing to have two projects running simultaneously, with the same initial brief, but so radically different in all aspects," states Dankworth. Even though the spaces are dramatically different both required flexibility in the lighting for changing, varying displays in all areas. The importance of lighting to a gallery goes much further than just lighting the art – there are many elements to consider. Conserving art is the biggest priority, and LEDs are advantageous in this respect as the correct colour temperature, quality of light, CRI, and beam angle section is critical to ensure that the exhibit on display is correctly enhanced.

PROJECT TEAM
Lighting designers: QDP Lighting & Electrical Design
Photography:
The Marvol Gallery: Annelize Dankworth
The Gallery – Val de Vie: Christine Meintjies
Products used:
The Marvol Gallery:
- **Bellco (Larger track units)**
- **Province Lighting (Smaller track units and all LED strip lighting)**

The Gallery – Val de Vie:
- **Bellco (Perimeter downlighters)**
- **Regent Lighting (Suspended custom fittings)**

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Lighting retrofit at historic Cairo mosque

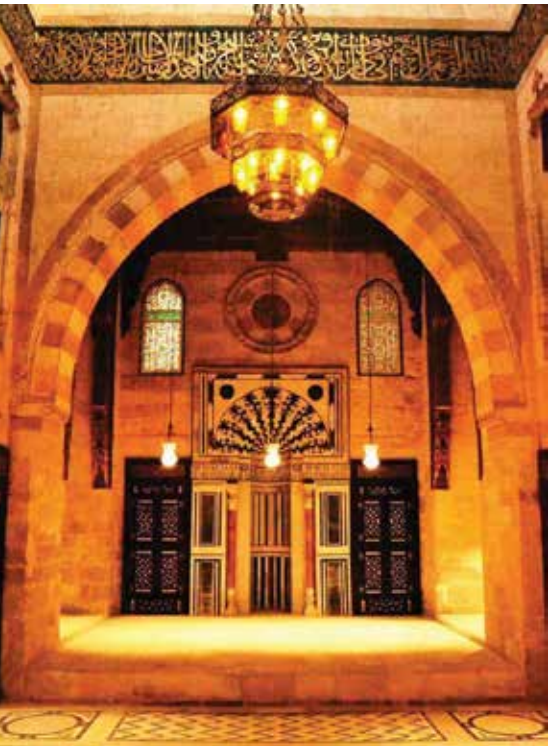
Retrofit and restoration work on the ancient Al Azhar Mosque, while retaining its grandeur, was a complex task.

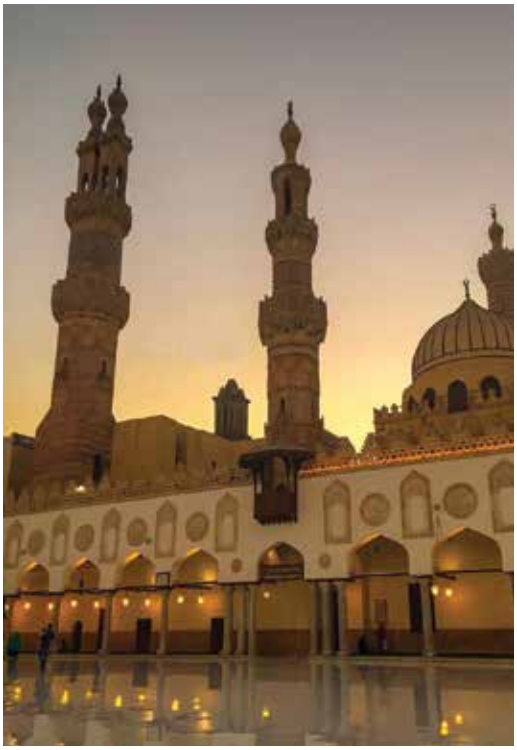
Founded in 970 AD as the centrepiece of the Fatimid Dynasty of Tunisia when it conquered Egypt, the Al Azhar Mosque is a centre of Islamic learning and teaching, and today is home to one of the oldest universities in the world, the Al Azhar University. Its head, referred to as the Grand Mufti or Grand Imam, is considered to be the highest theological authority for Muslims. At present, the university is the most prestigious location for Islamic studies worldwide, particularly Sunni theology and Sharia law.

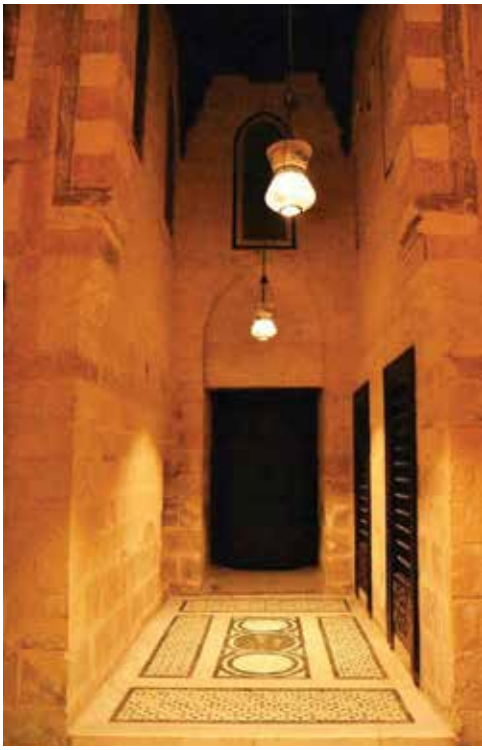
The mosque – located in El Hussein Square in Cairo – is a harmonious blend of different architectural styles, the result of over a thousand years of modifications. While the building has been architecturally remodelled and added to over the years, parts of the original structure are still intact. The mosque has five entrances, and five ancient minarets grace its construction with various cascading columns and balconies interloping on the building's sides.

The challenge

The recent development is one of the largest and most extensive restoration works to the Al Azhar Mosque over its history of over a thousand years. It was carried out over three years under the patronage of Saudi Arabia's King Salman bin Abdulaziz and included the complete transformation and modernisation of the mosque's infrastructure, including flooring, lighting, water, drainage, venti-







lation, and sound systems in accordance with the latest international standards.

The lighting retrofit requirement called for a special solution for the Meshkah lamps (glass pendant lights). Meshkah lamps are ancient lamps that are lit by oil wick or candle. They are commonly found in ancient mosques, and retaining the same look and feel with modern-day LED was the main lighting requirement. Previously, E27 incandescent bulbs were the light sources for the lamps, but LED was specified in compliance with the Egyptian Decree 692/2015, which came into force in 2016 and made LED fittings mandatory in governmental buildings.

A LED technology solution

Engineering and architectural consultants Dar Al-Handasah collaborated with contractor Al Marasem International on the project. In coordination with Netherlands-based lighting consultants Har Hollands, Debbas Egypt, in turn, supplied a tailor-made lighting package through its subsidiary VICE Lighting powered by Tridonic. The special Meshkah lamps were customised by VICE Lighting using Tridonic SLE G6 19 mm 5000 lm 3000 K LED modules driven by LC 45 W 900 mA flexC SC EXC LED drivers. Over 500 pieces were used throughout the mosque.

Inaugurated by Egyptian President Abdel Fattah al-Sisi and Saudi Crown Prince Mohammed bin Salman Abdulaziz, the Al Azhar Mosque's newly installed lighting package was able not only to retain the aesthetics the lighting designer was aiming for, but also offers at least 50 percent in energy savings. Maintenance work will also be reduced since incandescent bulbs usually last for about 1 000 hours as opposed to the LED solution, which is guaranteed to have a lifetime of 50 000 hours.

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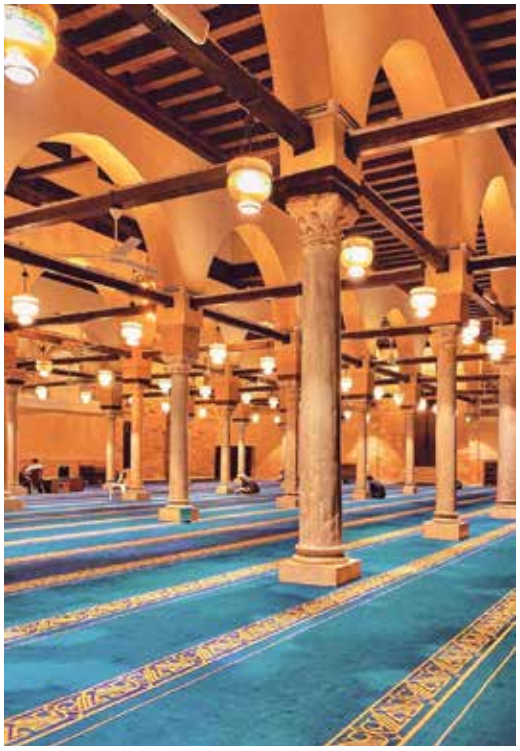

A contemporary take on a classic farmhouse

This family home features modern architectural lighting recessed into off shutter concrete soffits and concealed LED strip lighting on the exposed timber beams. A quirky approach to the decorative lighting in the bathrooms blends the old with the new.

Lighting in Design *spoke to Guy Harris of Newport Lighting, the lighting designer on the project.*

LiD: What was the brief for the lighting?
GH: The lighting needed to complement the eclectic contemporary farmhouse aesthetic and accentuate certain elements. In addition, the lighting scheme had to provide sufficient task and ambient lighting for daily family activities. The client did not want a home that was overly lit but still needed it to be practical, yet cosy for when daily tasks were complete and they wanted to relax. Minimal but strategic lighting helped achieve this, while a creative client drove the design process and ultimately the selection of fittings.

LiD: Were there different lighting requirements for the different zones/areas in the home?
GH: The kitchen and main living areas were a tricky as the soffits were off shutter concrete and accommodating recessed downlights was a challenge. A custom recessed housing was created to provide a seamless void into which the double downlights could be placed. The transformers are housed in a separate void and can be accessed if required.

A series of bedrooms, bathrooms and living areas on the first floor had an open trussed roof structure which required a different treatment. LED strip lighting was positioned on top of the beams to give a generous but diffused light to these spaces. Separately switched spotlights were added to the faces of the beams to accentuate art and wall finishes.

Bathroom lighting is always a crucial component of any lighting scheme. We had some fun with the bathrooms by adding traditional wall lights from Astro Lighting and a cluster of four LED pendants over the vanity in the guest *'en suite'*.

A nod to Victorian architecture in the hallway via a faux pressed steel ceiling is lit by concealed LED strip lighting.

LiD: What challenges did you encounter on the project and how were they overcome?
GH: The client requested minimal use of downlights so alternative means of lighting were explored. Using concealed lighting for the open truss roofs and where downlights were used, they were grouped in clusters of double or triple fittings. Glare was also a consideration, so the downlights and light sources were selected with this in mind.

LiD: How do you believe the lighting used in the project adds to the design?
GH: By setting up a dialogue between traditional and contemporary design, which was carried through from the architecture to the lighting, a timeless aesthetic has been created.

LiD: In your opinion, how important is lighting in a residential environment?
GH: Good lighting in any environment is critical. Identifying areas where specific tasks will be performed and lighting them appropriately will add to productivity and decrease fatigue and eye strain. As our homes have become areas of both work and relaxation, this needs to be considered. Areas for relaxation should be cosy and gently lit by concealed light sources and free-standing lighting.

LiD: Looking back at the completed project, what are your thoughts?
GH: Because the design was driven by the architects and client and the lighting evolved from there, the choice of fittings remains valid and up to date. With the evolution of the LED lighting, better light sources are available and the existing LEDs can be upgraded at any stage.

LiD: Which products were installed?
GH:
- Delta Light Grid in ZB – off shutter concrete soffits.
- Astro Nena and Anton wall lights main and children's en suite.
- Nordlux MIB pendants – guest *en suite.*
- Spazio Fresh all over spotlight – sides of beams.

PROJECT TEAM
Architecture & interior design: Neilmarie Architects (Neil Franks and Marie Middleton)
Lighting: Newport Lighting (Guy Harris)
Photography: Johann Lourens

Create a destination to remember

When it comes to hospitality design, creating a unique and memorable experience for every guest is key to ensuring customer loyalty.

Apart from creating an unforgettable destination, a focus on costs and sustainable solutions is important to a hotel's bottom line. With flexible modern LED lighting, hotels can welcome, guide, and entertain every visitor who walks through their doors – all the while saving on energy and operational costs. Smart lighting technology enables hospitality environments to:

Reduce costs

- Lower energy consumption with LED lighting and save even more with controls
- Manage and reduce energy use with daylight harvesting
- Automatically switch off lighting when areas are not in use

Improve the guest experience

- Design welcoming, inspiring spaces throughout the hotel
- Transform a hotel with dynamic lighting for special occasions
- Create moods to differentiate spaces with custom lighting scenes

Meet sustainability goals

- Meet sustainability targets by using LED lighting solutions
- Lower the carbon footprint with Circular Economy-ready products
- Easily adapt the space for increased revenue

Case study

Philips recently explored how light is improving the image of two established hotels in Dubai, the Intercontinental & Crowne Plaza hotels. The two hotels, which are monuments of modern hospitality, are setting a new standard for guest experiences, with eco-friendly interior lighting. However, inefficient lighting systems were resulting in high maintenance costs, along with excessive energy and heat generation. In addition, continuous failure of the façade lights was affecting the image of the hotel.

Philips got to work on a lasting solution, although replacing the old cold cathode lights was no simple operation; the project involved multiple stakeholders, and the hotel lacked the manpower to manage the operation. To help the process along, Philips put together a team of technical, design, finance and legal managers that could meet the needs of the hotel owners.

Next, the company set about installing a luxurious lighting system. Interior fixtures were replaced with a range of LED, CFL and Energy Saving halogen lamps, based on requirements for burning hours and light characteristics. As a result, the hotel interiors now have a reliable system that enchants guests. The easily-controlled lights have optimised hues and brightness, ensuring the correct atmosphere in every environment, from the welcoming reception to the relaxing restaurant area.

Outside, the hotel facades were given stunning new looks. The addition of LED I-Color Accent tubes provides eye-catching lighting that improves the appearance of both buildings. The exterior lighting is virtually maintenance free, and is easily controlled via a Philips Light System Manager, which lets the hotels change the lighting effects for special occasions. The hotels now have reputation-enhancing appearances, improved guest experience, and greatly reduced energy costs.

The hotels have set a new benchmark for green lighting in the area. The upgraded systems will save almost two million kg of CO_2 emissions from being released each year. In addition, the new lights have reduced the lighting energy bills by 80%

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Lighting for a healing environment

Lighting plays an important role in healthcare, improving both the patient experience and the staff's ability to provide the required level of care. Not only a sustainable choice, LED lighting can enhance the care environment and reduce costs by saving energy and improving operational efficiency.

Light influences our health and well-being more than we know. In clinics and hospitals, many areas exist with insufficient daylight or even none at all. This is why, especially for patients needing to spend a lot of time in hospitals, their 'inner clock' may lose its sense of balance, in turn causing restlessness.

Back in 2006, Anjali Joseph, Ph.D. published a paper, "The Impact of Light on Outcomes in Healthcare Settings" for The Center for Health Design. Her objective was to identify the mechanisms by which light impacts human health and performance and review the literature linking light (daylight and artificial light) with health outcomes in healthcare settings.

Her key findings, with which we are these days all *au fait*, were that light impacts human health and performance by enabling performance of visual tasks, controlling the body's circadian system, affecting mood and perception, and by enabling critical chemical reactions in the body. Studies show that higher light levels are linked with better performance of complex visual tasks and light requirements increase with age. By controlling the body's circadian system, light impacts outcomes in healthcare settings by reducing depression among patients, decreasing length of stay in hospitals, improving sleep and circadian rhythm, lessening agitation among dementia patients, easing pain, and improving adjustment to night-shift work among staff. The presence of windows in the workplace and access to daylight have been linked with increased satisfaction with the work environment. Further, exposure to light is critical for vitamin D metabolism in the human body. Light exposure is also used as a treatment for neonatal hyperbilirubinaemia.

She concluded that the adequate and appropriate exposure to light is critical for health and well-being of patients and staff in healthcare settings. A

combination of daylight and electric light can meet these needs. Natural light should be incorporated into lighting design in healthcare settings, not only because it is beneficial to patients and staff, but also because it is light delivered at no cost and in a form that most people prefer.

More recently, studies of 90 stroke patients in a Danish hospital indicated that LED lighting tuned to mimic the patterns of daylight can have a positive effect on depression, fatigue, anxiety, and wellbeing, although there was some amount of inconclusiveness, and lighting made no difference in cognition improvement.

The results of the observations at the Stroke Rehabilitation Unit in Copenhagen's Righospitalet from May 2014 through June 2015 were only recently published. The studies were conducted by the University of Copenhagen's departments of neurology and neurophysiology and by the hospital's department of ophthalmology, using specialty lighting from Chromaviso, based in Aarhus, Denmark.

The scientists generally tuned lighting in patient rooms to deliver the brighter and more blue-rich makeup associated with natural daylight during the mornings and afternoons. They toned down the brightness and delivered warmer spectral content in the evenings. At the same time they delivered ordinary hospital lighting to control groups.

The team worked on the hypothesis that the tuned lighting would support human circadian rhythms associated with the 24-hour cycle of day and night, whereas ordinary hospital lighting and indoor confinement deprives patients of circadian normalities and can thus cause physiological disturbances.

All patients were hospitalised for over two weeks.

In one study, focused on fatigue, they concluded that "fatigue was significantly reduced in rehabilitation patients exposed to naturalistic lighting during admission". They based their conclusion on a couple of questionnaires, one called the Multidimensional Fatigue Inventory questionnaire, and the other the Rested Statement, noting that the experimental groups reported less fatigue compared to the control group. However, by another measurement, the Pittsburgh Sleep Quality Index, "no differences were detected between groups in sleepiness or subjective sleep quality," wrote the authors, led by Anders West from the neurology department.

If those results were encouraging but mixed, the same could be said of a separate set of observations looking at a combination of depression, anxiety, wellbeing, and cognition. "Depressive

mood and anxiety was reduced, and wellbeing was increased in the (experimental) group at discharge compared to the (control group)," the authors reported.

However, "no difference was found in cognition," the authors stated. The team applied the Hamilton Depression Scale, the Major Depression Inventory, the WHO-Five Well-being Index, the Hospital Anxiety and Depression Scale, and the Montreal Cognitive Assessment to determine the results. "This study is the first to demonstrate that exposure to naturalistic light during admission may significantly improve mental health in rehabilitation patients," they concluded, adding that "further studies are needed to confirm these findings".

A move towards lighting that helps heal

Major lighting companies around the world are looking to create a more effective healing environment using the natural power of light. HealWell, for instance, from Philips, aligns patient room lighting automatically with our human circadian rhythm to help hospital patients sleep better, feel happier and heal faster.

HealWell takes an evidence-based approach to lighting with ceiling modules simulating daylight rhythms with dynamic light levels and tones while providing excellent visibility for medical examinations.

Patients can easily personalise lighting from their beds while subtle LED orientation lighting helps health workers navigate quietly. Studies show HealWell helps patients sleep more quickly and deeply, improving mood.

Benefits at a glance of specialised hospital lighting:

- Improves care outcomes with evidence-based lighting that aligns with patients' circadian rhythms.
- Improves the patient experience with lighting that's proven to improve mood plus the duration and quality of sleep.
- Supports patient comfort through localised lighting controls for personalised bedside lighting.
- Increases health worker satisfaction with patient room lighting that they can adjust instantly to suit their work task or the patient's preferences or health needs.
- Saves energy with the latest LED luminaires.
- Upgrades quickly with a complete system that's easy to install.
- Integrates with a hospital's networked lighting system, building management system or other IT-based systems to enable centralised monitoring and reporting.

International case studies

The ambition of Montefiore Private Hospital in Hove, England, was to transform an old Victorian building into a private hospital. Originally built as a furniture depository for Hannington's Department Store in the 1890s, the building was extended in the 1930s and converted to an office in the 1970s.

With its staggered floor plates (lined with asbestos), steep internal ramps, fixed service cores and dreary decor, this was going to be a complex task to achieve and presented a fascinating architectural problem.

Zumtobel, in conjunction with Hamson JPA and Nightingale Associates, had the challenging task of creating a unique lighting design that fully met the client's brief, to create the look and feel of a sophisticated modern hotel, rather than a hospital. Zumtobel's luminaires have fully achieved this brief throughout the entire building. In the reception area, tunable Arcos luminaires allow for full colour change according to the artwork on display from local artists.

In the patient rooms, Belia's discreet appearance blends into wooden panels, whilst also still being fully functional. Throughout the offices Mellow Light IV glare free, energy efficient luminaires have modernised the entire look of the administration offices. Slotlight II lightlines and Panos downlights using white reflectors blend inconspicuously and uniquely into the hospital's corridors.

Functionality was also made possible thanks to the Zumtobel Emotion lighting control touch panel which allows the user to change scenes according to the function required and the time of the day

At the German Heart Institute in Berlin, Germany, each year around 3 000 open-heart operations are undertaken along with more than 1 500 additional surgical procedures. With patients often in critical condition, the Institute sought a new way to improve care on the wards. "It is extremely important to us that the patients in our intensive care unit feel secure, comfortable and well looked after – both medically and emotionally. The all-encompassing HealWell lighting concept from Philips creates the optimum framework for this," said Doctor Roland Hetzer, Medical Director at the German Heart Institute.

Doctors at the German Heart Institute understand the importance of light. When extensive renovation was carried out at the facility, they were looking for a modern, controllable lighting concept that could assist patient recovery. Not only would this make it easier for staff to give treatment but, as mentioned, innovative lighting has been shown to have a positive effect on stress, sleep patterns and hormone release.

Philips HealWell was specified. This patient room lighting system has been designed to support natural sleep rhythms by mimicking the natural light patterns outside. When patients enter hospital, they often have trouble sleeping, which can have a negative effect on their health and mood. Not only does HealWell help to keep their sleep patterns normal, but light hues can be changed at the patient's desire, and the system complies with all hygiene regulations.

In the patient recreation room, additional comfort comes from luminous textiles. They deliver ever-changing ambience that soothes and relaxes, while also softening sound. The new lighting systems are helping the Institute to provide better care for patients, and a better working atmosphere for staff. Just what the doctor ordered.

Patients are able to control the light in their rooms via remote control, using preferred coloured settings. This gives them a greater sense of control, and an increased sense of wellbeing.

Other considerations

Economical light for health: The range of applications in medical practices and hospitals is diverse and challenging – patient rooms, corridors and glare-free computer workstations meet the need for safety and orientation. Energy efficiency adopts a decisive role due to the continuous use of artificial light. Mature LED technology together with an intelligent light management system is able to cut energy overheads by up to 85 percent compared to conventional, obsolete lighting systems.

Colour rendering: During minor medical procedures an accurate colour rendering and a glare-free light field are crucial for staff to administer care. In emergency situations the light fixture must also be easy to manoeuvre, have a wide range of movement and the ability to stay where it is positioned.

Lighting in a patient's room must be multifunctional to assist physicians and staff who are busy keeping close watch on patients, while also creating atmosphere in a hospital environment that is comforting and contributes towards the healing process. In public areas such as hospital corridors, stairways and lounges lighting should be bright enough for people to see clearly while maintaining comfortable light levels.

The work environment for nurses and physicians in hospitals is stressful. They are required to perform a range of complex tasks – charting, filling prescriptions, administering medication, and performing other critical patient-care tasks. Inadequate lighting and a chaotic environment are likely to compound the burden of stress and lead to errors. However, very few studies have focused specifically on the impact of different types of lighting conditions on staff work performance in hospitals.

The importance of planned lighting maintenance

When it comes to preventative and predictive maintenance in retail environments, top performing organisations typically have programmes that are less than 10% reactive, with 90% being proactive in nature says David Edgar of Nova Lighting Services. Simply put, reactive unplanned maintenance costs at least double to achieve the same overall net result.

Although LED manufacturers have done a good job promoting the benefits of the technology, there is a myth that LEDs last forever with no maintenance. Unfortunately, it is just not true. Although LED technology is more efficient and longer-lasting than traditional lighting, a lighting system still needs regular upkeep to operate at full potential and, for this, a proactive maintenance programme is most important. While LEDs do not burn-out like fluorescent lamps and other bulbs, over time the diode begins to emit less light, affecting quality and energy efficiency. Dirt build-up can also reduce light levels and lifetime.

One way to keep lighting output degradation at bay is to clean the LED and surrounding components. When dirt builds up on the fixture, lamp or lens, the LED will emit less light, reducing quality while still consuming energy. Cleaning a fixture can improve lighting output from the diodes and lenses and assist with keeping the heat management features of the fixtures clear of debris and build-up, which optimises performance and extends equipment life.

Another way to maintain peak performance is by checking connection points, which can loosen over time due to normal wear and tear. Checking them periodically ensures that bulbs won't flicker or fail to turn on. Other than the dimming and failure of diodes, failure is also caused by internal drivers, surge protectors, and integrated motion sensors. In South Africa, this becomes even more relevant with our ongoing irregular electricity supply. Depending on brand quality, some electronics are not designed for ongoing unplanned switching or power surges, which hasten deterioration and compromise manufacturer guarantees (always read the small print). LED lamps can also lose almost one-third of their luminosity over the course of their service lives.

Ensuring that lighting quality is always at optimum levels throughout your trading area also reduces safety and security incidents further leading to improved client satisfaction and store turnover, as well as reduced stock shrinkage in your backup areas. Security cameras are also more effective when the lighting levels are good.

Often overlooked areas of high importance are the customer changing rooms, in-store independent display cabinets such as the upright fridges, freezers, cosmetic stands, point-of-sale stands and window displays. Turnover is negatively affected when clients cannot see themselves properly in the changing areas, or the colours of the products purchased look different once at home because colour specifications are not maintained, or the products inside the display stands are simply in the dark and cannot be seen by passing customers. A planned lighting maintenance service will ensure the correct lamp types and colours are fitted into the correct fixtures, and that enough of the correct types of lighting stocks are on hand to complete the service.

Planned lighting maintenance improves your return on investment (ROI), while reactive maintenance results in more unplanned downtime and higher repair and unplanned call out costs thus negatively affecting the ROI of the entire lighting system (or upgrade project) that the organisation was banking on when first installing or upgrading the system. Just as the correct lighting system for an application is essential to achieving maximum benefit and ROI, having a regular maintenance plan is equally as important.

www.novalighting.co.za

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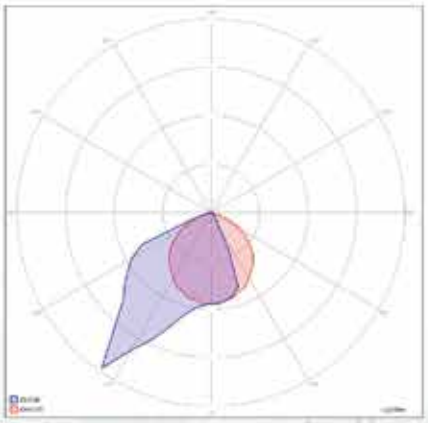

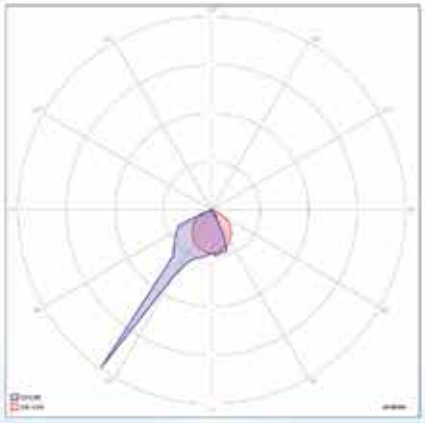

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LED highbay lighting for state-of-the-art sports hall

BEKA Schréder recently supplied an LED highbay lighting solution for the new state-of-the-art sports hall of the German International School Cape Town, also known as DSK. The sports hall is one of the most modern and well-equipped halls in the Western Cape, if not countrywide. Some of its key features are: a gallery with space for more than 150 spectators overlooking a 23 x 44 m court with a clear height of nine metres; two automated curtain walls that divide the main court into three sections, allowing three classes to take place simultaneously; acoustic panels ensuring that the noise levels meet DIN requirements for acoustics in school sports halls; three basketball, three volleyball and six badminton practise courts, while the main centre court offers a handball, basketball, tennis and volleyball court of international size.

The facility called for a high-quality LED lighting solution. Because of its high efficiency, BEKA Schréder's OMNIstar-midi was the luminaire of choice. The required lighting levels of 900 lux were achieved at very low energy consumption levels.

Further energy savings can be achieved with the installed DALI lighting control system, which enables the school to control the light level of each luminaire independently or as a group. This allows them to have the correct light level for the sport being played, and at which level, namely practice or match game, or even an international event. This can be done remotely from a smart device and thus, by selecting the required light level, energy savings are achieved by consuming only the amount of energy needed.

The South African designed and manufactured OMNIstar-midi is a cost-effective, efficient lighting solution for maximising energy and maintenance cost savings. It is the smaller sized floodlight in BEKA Schréder's OMNIstar family. The various optical solutions make it a versatile floodlight, ensuring the correct lighting for the area to be illuminated. Various optical solutions are available to achieve the highest energy savings and the most economical lighting solutions.

BEKA Schréder locally develops and manufactures energy-efficient LED lighting products, designed and suitable for local conditions.

www.beka-schreder.co.za

Do all lights need a Letter of Authority?

A question Spazio Lighting frequently receives from professional consultants is: "Do all light fittings require a Letter of Authority (LOA)?" And the answer is, "Yes they do".

All complete light fittings need to have an LOA. It does not matter if the products are imported or locally manufactured, if they are sold by a shop or a wholesaler, or even if they are custom-made, they require an LOA. The Letter of Authority is proof that the luminaires meets the safety compliance standards as set out by the National Regulatory Body, also known as the NRCS.

Each product must have a full test report to the prescribed standard (IEC 60598), and the test report may not be older than three years. This type of test report will record each clause of the standard, the measurement results and describe the product in full.

Why is it so important to have an LOA in place? Many luminaires are imported and manufactured using inferior material or components, which are not only cheap but are also likely to fail prematurely, and end up costing the consumer more money. Furthermore, non-compliant fittings may also be dangerous and a health and safety risk. Testing compliance and LOA applications ensure that the correct and approved components, which have passed testing, are used in the luminaires and that the fittings carry a valid warranty.

Custom-made and locally manufactured products must have an LOA and, unfortunately, in most cases, these are normally the products that do not comply because they do not go through the proper testing procedures.

LOAs for imported products are policed at customs and if a product does not have an LOA in place, the product is blocked and importation refused. Locally manufactured products are unfortunately not controlled and are often illegal.

Spazio Lighting frequently comes across products with many illegal features which are sold under the pretence of them being locally manufactured. It is therefore important to ensure that you buy light fittings from reputable shops and wholesalers that supply goods with the necessary documentation in place.

www.spazio.co.za

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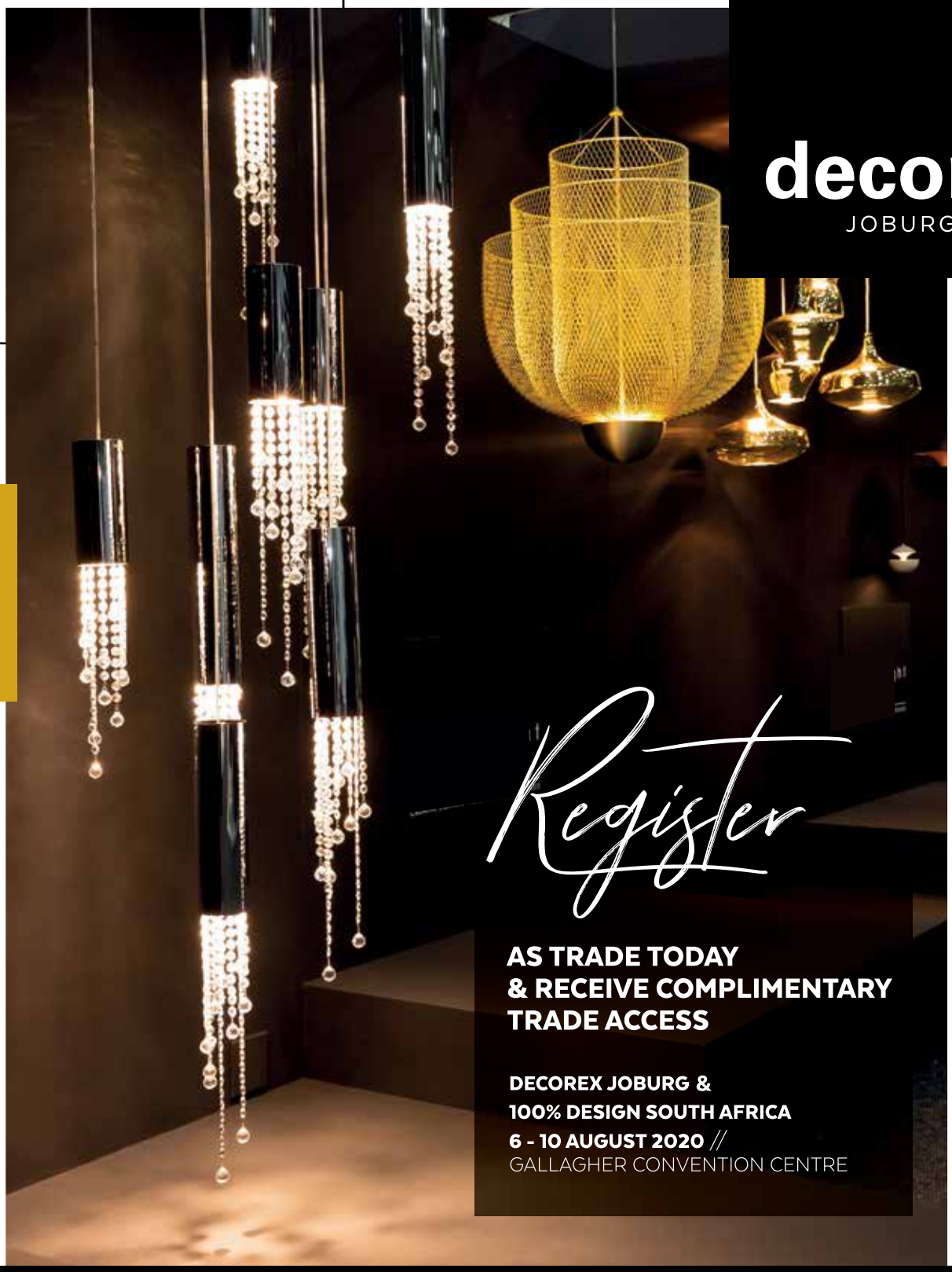

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Bathroom lighting safety: Zones and IP Ratings

When planning bathroom lighting you may choose fixtures that are functional and stylish. But have you factored in safety? The bathroom is a wet zone so it's important that the lighting meets certain rules and regulations to keep you safe when using this space.

The following explanation of bathroom zones and fixture IP ratings should help you make an informed choice:

A bathroom is divided into zones and these zones dictate what type of lighting should be installed to ensure safety and the longevity and functionality of the fixture:

Zone 0: This area is inside the bath or shower itself. Fixtures used in this zone must be low voltage and rated at least IP67, meaning they are totally immersion-proof.

Zone 1: This area is above the shower or bath and measures approximately 2.25 m from the floor. A minimum rating of IP45 is required, but it is advised that a rating of IP65 be used.

Zone 2: This area stretches 0.6 m outside the perimeter of the bath and reaches a height of 2.25 m from the floor, requiring a rating of at least IP44. Remember to consider the area around the basin: a 60 cm radius around the tap is considered part of Zone 2.

Zone 3: This is any area of the bathroom not included in Zones 0, 1, and 2. It's a zone where no water is likely to be used. While there are no specific IP requirements for this zone, a rating of at least IP21 is recommended.

Certain IP ratings are required for the different zones, but what exactly does IP mean and why is it important? IP stands for Ingress Protection and is a rating system used to define how protected the fixture is against particles and water. The first digit represents the level of protection against particles and the second digit represents the protection against water.

www.eurolux.co.za

Flicking the switch on a brighter tomorrow

Founded in 2008, Durban-based PioLED Lighting is a trusted and appraised LED supplier, producing luminaires ideally suited to conditions found in the South African market. PioLED Lighting prides itself on its excellent service and impeccable product quality, looking to lighting trends and cutting-edge LED advancements for design inspiration. PioLED Lighting, with an unparalleled range on offer, has the reputation of being a leader in the South African LED industry.

Shedding light on the South African market

PioLED Lighting's broad range of LED bulbs and fittings ensures illumination for all sectors of society:

- Residential: From heavy-duty security floodlights to sophisticated and sleek recessed panel lights, PioLED LEDs light up homes nationwide. The aesthetically pleasing strip and rope lights available can be used to effectively transform the mood of any room creating visual depth and intrigue.
- Commercial: PioLED's linear lights are the perfect lighting solution for offices and task-oriented environments. The long, clean lines of these fittings can be used to emphasise structural architecture and improve the general aesthetics of a space. Another popular choice for the commercial sector, downlights are all-purpose fittings for embedding in level and sloped ceilings – often an aesthetic characteristic of restaurants and hotel lobbies.
- Industrial: The UFO High Bays of the PioLED range offer maximum lighting for minimal space requirements and can light up industrial spaces from corner to corner. Not only are these fittings powerful, but they also offer uniform illumination with minimal glare – an ideal choice for cavernous warehouses.

Deliveries to your door

PioLED's head office is located in Durban's port, making reliable and time-efficient deliveries to respective businesses across the country. The company has branches in Durban, Johannesburg and Cape Town, with helpful staff members on call to assist clients in any way possible.

www.pioledlighting.co.za

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Durable LED floodlight series to illuminate exteriors

Opple Lighting's new LED Floodlight EQ series is touted as the most advanced product introduced under the category of professional luminaries and is also revolutionary in nature owing to its energy efficiency.

The EQ series is specially designed to consume low energy. It is a progressive light that easily replaces conventional high bays and has 90% lower energy consumption than halogen floodlights. One of its major features is its time span, which is nearly 30 000 hours. Being equipped with advanced features such as IP65 water and dust proof helps it adapts to severe environments. The 2.5 kV surge resistance makes the LED Floodlight EQ series robust and durable in poor grid environments with an amazing in-built feature of aluminium housing which is vibration-proof, wind-resistant and rust-proof. Available in different variants – 10/20/30/50/70/100 W – the LED Floodlight EQ series is available in two series an EMC version, and Non-EMC version.

www.opple.co.za/en

Portable LED lighting units: placing mines in a favourable light

With the enormous investment involved in large open-pit mines, the pressure is on these operations to produce. Inevitably, this dictates that they work around the clock. However, working at night presents potential safety hazards that are not present during the hours of daylight. This is according to Craig Swart, Fleet Manager at Rand-Air, the leading local provider of compressed air and power to the mines, as well as to many other industry sectors.

"The most serious potential hazards in an open-pit mine – even during daylight hours – are the very large load-hall-dumpers, excavators and rope shovels used to excavate and transport broken ore. Apart from vehicle headlights, better all-round area lighting is an absolute necessity to ensure safe operations," says Swart, adding that having clear, strong area lighting means that drivers of off-the-road mining equipment will be able to pick up the reflective strips on a pedestrian's safety vest with greater ease.

Rand-Air has the solution in its portable LED lighting units. "As these units are fitted with LED bulbs, they are remarkably economical and will run for days without requiring refuelling or any other attention. In addition, modern LED bulbs last longer and fail less often than their earlier filament counterparts, and can handle harsh mining conditions without burning out prematurely," Swart explains.

As the diesel engine, generator and lighting tower are all contained on a single trailer, there are no trailing cables to get cut, damaged or trip over. Furthermore, as they are mounted on a robust trailer, moving them to new positions as mining shifts in the pit, takes a matter of minutes.

What makes Rand-Air portable lighting units an even more attractive rental proposition is that the company regularly upgrades its equipment fleet with new machines. In addition, Rand-Air lighting units are all manufactured by Atlas Copco and deliver the most cost-effective, lowest maintenance service.

Rand-Air portable lighting units are also backed up by the company's unmatched service ethic. In the unlikely event of an issue with one of the machines, Rand-Air's qualified technicians are on standby 24/7 to ensure that full lighting is restored without delay. Speaking to the all-important requirement for safety at all times – particularly within the mining environment where occupational health and safety challenges are amongst the biggest causes of injuries and fatalities – Swart makes the following recommendation: "In any industry, outdated lighting units that are not operating at a satisfactory level pose a serious threat to the working environment and its people. A preventative maintenance strategy is therefore critical to guarantee safe operation of the equipment, and is key to minimising the risk of injuries or accidents."

www.randair.co.za

In Good Company installs huge lights in A/D/O courtyard

A curved, golden mirror ideal for taking selfies is among the large light fixtures that Brooklyn designer Fernando Mastrangelo's In Good Company has placed into the courtyard of Brooklyn hub A/D/O. Six designers from In Good Company, Mastrangelo's platform for emerging artists, were commissioned to create a piece for the exhibition called Glow Up.

"Each designer was challenged and commissioned to craft sculptures and chandeliers that interpret the concept of light in its many forms, the various ways we interact with those forms, and the emotion we feel within those interactions," A/D/O said. "Visitors navigating Glow Up are encouraged to look up to discover moments of warmth, and to look inward for moments of reflection."

Amanda Richards melted discarded scrap metal and used the resulting fluid to adorn her set of three pendant lights titled Pearl Pendants. "The process repurposes intimate heirlooms into ornamental, yet functional design, giving the trinkets new life," A/D/O said.

Designer Nick Missel was influenced by the distortion of nature caused by fog or pollution. His work, Moon Wrap, is intended to resemble the moon as viewed through a haze. Its shapeless exterior is coupled with an underside cast in reflective chrome.

Sabine Marcelis creates furniture and lighting from same materials as Barcelona Pavilion

Designer Sabine Marcelis has used glass, travertine and polished metal to create a collection of sculptural interventions that respond to the materiality of Mies van Der Rohe's Barcelona Pavilion. No Fear of Glass is the latest in a series of temporary installations staged at the pavilion, which is a recreation of the structure built by Mies van der Rohe and Lilly Reich for the Barcelona Expo in 1929.

One of the instructions given to Mies van der Rohe when designing the pavilion was to "not use too much glass". Marcelis playfully subverted this request by using glass as the main material for her interventions.

The designer created two chaise longues, two pillar lights and a fountain for the installation, using glass, travertine and chrome in a direct response to the materials found throughout the pavilion.

Each of the pieces uses transparency, reflections and ombré effects to distort how they appear as visitors move around the space.

The designer also introduced a light fixture that mimics the cruciform mirrored-steel pillars used to support the pavilion's roof. Marcelis's version is made from two-way mirror and incorporates a neon light tube that appears when it is turned on.

Sammode reissues classic lighting designs by Pierre Guariche

French lighting manufacturer Sammode has re-launched a collection designed in the 1950s by Pierre Guariche, including a standing lamp with a perforated 'sail-like' diffuser. The selection of desk lamps, floor lamps, wall lamps and pendants reissued in 2019 by Sammode are typical of Guariche's innovative approach to mass-produced furniture and lighting.

A pioneering force in French industrial design during the post-war period, Guariche set up his own design agency in 1951 to create furniture and lighting that utilised the latest manufacturing processes to make them as affordable as possible. Nearly 70 years later, Sammode has chosen to return some of Guariche's most iconic lighting designs into production using contemporary components and technologies.

Each of the products displays an intelligent use of materials to produce an appropriate and comfortable level of light. The lamps are also defined by their use of rational forms and clever mechanical details such as adjustable balance arms, cantilevers and counterweights.

"Pierre Guariche designed the full range of luminaires to cover all the needs identified for a given space," said Sammode Studio in a statement accompanying the products' rerelease. "His luminaires are hugely comfortable and convenient in use, with no visible light source and an appropriate quality of light, whether intended for general lighting or traffic areas, to create an atmosphere or for a specific use, soft, powerful or even diffused by reflection."

The lamps are made mostly from metal, which is bent, formed and folded into sculptural forms. The light is reflected by the metal surfaces or dispersed through perforated surfaces to lend it a softer, more ambient quality. Among the relaunched designs is the G30 standing lamp, also known as the Kite. It features a white-lacquered perforated steel shade resembling the sail of a boat that is supported by mast-like brushed-brass poles.

Corrugation Lights is a collection of wavy plywood lighting inspired by mid-century furniture

London-based designers Tino Seubert and Theodora Alfredsdottir combined wavy, moulded plywood with off-the-shelf aluminium tubes to create this modular lighting collection. Seubert and Alfredsdottir based the design of the Corrugation Lights on techniques used to manufacture some of the most recognisable examples of mid-century furniture.

In particular, the designers explored the process of moulding plywood veneer, which was used by many post-war designers to create furniture with curved, organically inspired forms. "The collection takes veneer forming as a starting point – a process that requires skilled craftsmanship, which was introduced to the furniture world by design names like Alvar Aalto and the Eameses – and pairs it with off-the-shelf aluminium tubes," the duo explained.

"[This creates] a snug fit where the hard, powder-coated metal meets the soft, wavy wood and gives the pieces a pleasant contrast". The series of suspension lights and wall-mounted sconces feature wiggly plywood elements that enclose the metal tubes. A simple frosted bulb projecting from the base of the tubes provides the illumination.

When used together in pairs, the moulded wooden pieces form a single unit that can be attached to the wall and used as a simple sconce. Additional sections can be fixed to the wall to act as a bridging element connecting multiple sconces. This offers the potential to create fixtures that span entire walls.

The wooden forms can also be combined linearly to make suspension lamps that can incorporate any number of light fittings. The aluminium tubes come in a range of five colours, and the ash veneer can be lacquered to match these hues or left in its natural finish.

Folded TIME-LIGHT-LINE Installation

Three months before the exhibition opening, architects ATELIER XI received an urgent commission from the curators to transform the abandoned manufactory into an exhibition venue. And the subject of the exhibition is said to outline a chronological narrative on the urban development of the local area where the factory resides.

After visiting the site, the architects were impressed by the vast scale and the rigid grid and truss system demonstrating the history behind this factory. Therefore, they suggested keeping the original industrial traces as much as possible while applying a minimum amount of intervention which took form as a light-filled structure in contrast to the existing heavy framework. The 250 m long "Folded Time-Light-Line" was proposed as continuous membrane walls filled with light to reshape the space to have a linear exhibition sequence within a limited construction time (one month).

Around twenty research and art works from universities, institutes, artists, and architects were shown in the rehabilitated venue where the folded light wall forms a series of spaces hosting these works in a linear (chronological) sequence. The main challenges of the project came from limited construction time, restrained budget, and the scale of the space. To respond to these factors, the architects deliberately chose the affordable membrane material, which is capable of spanning over 50 m. The 250 m long wall, completed within 20 days, and was ready for visitors prior to the exhibition opening day.

The translucent membrane allows for seamless installation of single-sided, double-sided, and double-curved light walls. The translucency of the material and the lighting environment encourage visitors to interact with the installation by adjusting their physical distances from the membrane for engaging light effects.

Glow-in-the-dark skatepark created inside Triennale Milano by Koo Jeong A

A gallery inside the Triennale Milano museum is transformed into a fluorescent skateboarding venue in this installation by South Korean artist Koo Jeong A.

Jeong A has installed a full-size skatepark inside the Triennale Milano's ground-floor galleria and it is free for the public to use. The skating bowl is covered in glow-in-the-dark paint, creating different experiences as the lights are turned on and off.

Called OooOoO, the installation is the first instalment of Year of Play, an exhibition series curated by Julia Peyton-Jones and Lorenza Baroncelli, exploring the importance of physical interaction in an increasingly digital world. A lighting scheme was then devised to alternate with the music, so visitors could be subjected to two very different settings.

When the main lights are on, the space appears like a traditional gallery. When they are turned off, the space becomes illuminated in fluorescent shades of green and blue, making it feel more like a nightclub.

Newport Lighting heads outdoors with exterior lighting offering

Increasingly, outdoor spaces seem to mimic indoor spaces. This 'blurring of the lines' is largely as a result of developments in more hardwearing materials, and associated technology.

With this in mind, Newport Lighting has turned its focus to exterior lighting with its ASTRO offering, which reflects the latest European trends.

One of Britain's leading – and award-winning – lighting design brands, ASTRO unveiled several new outdoor collections at Euroluce in Milan. The varied exterior lighting collection is characterised by its simplicity, and reflects the synthesis of timeless design principles and brand-new finishes.

A favourite is the moon-like Eclipse Wall Light that floats on walls whilst emanating a soft lunar glow. Also worth a mention is the sleek and stylish Harvard Wall Light, available in fashion-forward black, polished stainless steel, bronze and brass.

When it comes to finishes, robust antique brass textures add a chic industrial style, personified in the Cabin lighting range. Other finishes include polished brass, nickel and chrome, encompassing a more refined aesthetic, whilst matte textured black, white and grey create a contemporary impression.

Included in the myriad finishes is the frosted glass option. This provides a less fussy overall aesthetic whilst diffusing light.

www.newport.co.za

A light to win your heart

willowlamp's new collection focuses intensively on smaller, accessible pieces that are readily accommodated in the average living space.

Creative director and founder of willowlamp, Adam Hoets, has taken a playful direction with one of the pendant lamps – the Secret Love Clover. This delicate, heart-shaped pendant pays homage to the charm and magic of the four-leaf clover. It was dreamed up – along with other lamps in the series – after Hoets and his fiancée found a number of the cheerful plants on a mountain run one morning.

"It took me a long time to decide how to turn the joyful, sweet plants I saw into interesting three-dimensional objects," reveals Hoets, who came up with the concept. "Simply extruding a curtain of chain in the shape of a clover was just not interesting enough. Normally, I like to conceptualise an idea fully in my head, but this time I decided to play around with 3D CAD wireframe drawings, repeating simple lines."

The Secret Love Clover has a secret of its own – seen from below and at an angle, where the straight chain is cut away, a heart pattern is revealed (the heart shape in the individual clover leaf was tipped on its side and extruded slightly). The pendant is elegant and voluptuous, with finishes available in silver, smoke, copper, brass, rust, white, red, black and a mixture of colours.

www.willowlamp.com

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