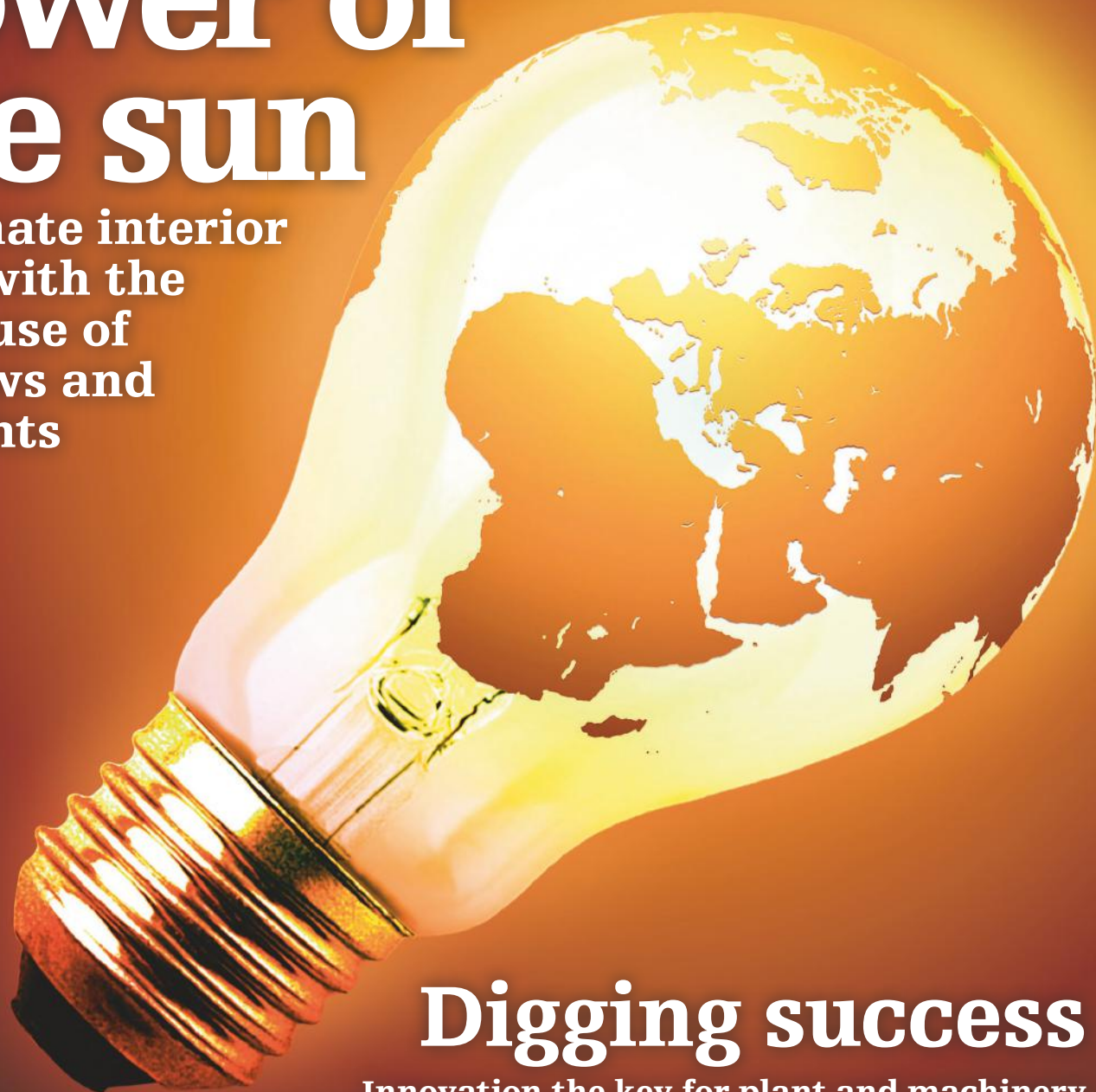


Builder & Engineer

FOR THE CONSTRUCTION PROFESSIONAL

Power of the sun

Illuminate interior space with the clever use of windows and rooflights



Digging success

Innovation the key for plant and machinery

Plus: A look at what's driving the commercial vehicles market

It's time to lighten up

Claire Cameron investigates the topic of daylighting and how the use of windows and rooflights can help bring sunlight into buildings all year round.

WITH increasing energy costs and concerns about global warming, the use of windows and rooflights to bring sunlight indoors is gaining momentum as more people look to natural sources to save money and the environment.

In 2002 it became a legal requirement for buildings to be designed with adequate amounts of daylighting and the presence of natural light has recently been voted the top must-have by office workers in a survey by the Royal Institution of Chartered Surveyors.

Of the 1,000 UK respondents, more than half (63 per cent) believe natural light is key to boosting productivity. Good heating and ventilation came second in the survey with 62 per cent of the vote.

Similarly, research by leading roof window manufacturer Velux found homeowners also deem daylighting as key.

The findings, published as part of the firm's Healthy Homes Barometer 2015 survey, revealed that 68 per cent of UK residents rate the amount of daylight entering their property as 'important' or 'very important', with women more particular than men.

However, although daylight is free, Dave Bennett, general manager of Cradley Heath-based Howells Patent Glazing, says: "Few people actually take note that utilising more natural light in their buildings means a lower electricity bill."

So why is natural daylight so important?

According to Velux, 90 per cent of daily routines take place indoors therefore "daylight and fresh air are two of the most important elements to support a healthy indoor environment," explains its product manager, Grant Sneddon.

Recent studies have proved that natural daylight also has a positive effect on mood. It can enhance morale, lower fatigue, and reduce eyestrain. School pupils' productivity increases while sunshine in an office building can help lift the spirits of the workforce.

"Much of the research on the benefits of natural daylight has focused on the learning environment", explains Paul Trace, managing director of Lumen Rooflight.

"Enhanced student performance and motivation, increased teacher and student attendance, reduced energy costs, as well as a positive effect on the environment are



some of the improvements seen in school buildings that use well-planned day lighting concepts," he says.

"One such study by Sacramento California, 'Light Helps Pupils Learn', is one of the largest ever undertaken on natural light in schools. It suggests that children learn faster and perform better in exams in classrooms with more daylight. It identified that exam results were up to 26 per cent higher for schoolchildren in classrooms with plentiful natural light than for those in classrooms with little or no daylight.

"Many of these benefits can also be applied to the workplace. Daylight improves concentration so that working environments, be they factories or offices with natural light, tend to achieve increased productivity."

The presence of natural light can also help ease the symptoms of many diseases, including chronic respiratory problems because "daylight helps to shorten patient recovery times, improves their mood and generally promotes well-being," says Trace.

"It's no surprise that architects involved with hospitals, housing for the elderly and other healthcare buildings are constantly adjusting and updating their designs to reflect the importance of introducing daylight and, more specifically, natural sunlight."

The presence of natural light in buildings can also help sufferers of Seasonal Affective Disorder (SAD), explains David Willetts,

chairman of global daylighting company Serratlux.

It is estimated that up to 20 per cent of the UK population suffers from the so-called winter depression but it responds well to the serotonin hormone which is triggered by daylight.

Natural light also offers an environmentally friendly way of saving money.

By using less lighting and heating in buildings, energy costs are reduced "which can reduce your carbon emissions and help command more rental premium because of green building status," says Willetts.

As Sneddon points out, natural daylight is very difficult to replace and match in a building environment.

"While certain electrical light sources are available to mimic daylight closely, none have been made that imitate the variation in the light spectrum that occurs with daylight at different times throughout the day, in different seasons, and under different weather conditions," he says.

"This is why the use of artificial light should never replace daylighting in buildings that are designed to be occupied for long periods of time.

"Artificial lighting accounts for around 14 per cent of a typical household's energy bills. With development in lighting technology, there is the potential to significantly reduce the need for lighting,

especially with LED lighting becoming more affordable. However, regardless of the type of lighting, energy use can be reduced by simply installing fewer electric lights and incorporating effective daylighting in design. Many UK households choose to dim electric lights automatically in response to the changing levels of daylight, a process referred to as 'daylight harvesting'."

Letting the light in

Geography, latitude, climate and the design of a building are all important factors when it comes to the amount and direction of sunlight coming through a window, therefore "managing the hole in the wall can prove quite a challenge," explains Willetts.

"Daylighting is affected by the orientation of a building, where it is in the world and what it is being used for, so a good designer will start with these factors.

"Architects are always looking to create uniquely designed buildings and unlike mass produced products like cars, buildings are bespoke and so have individual needs and problems," says Willetts and if used correctly "natural light is used by most interior designers to showcase a building in all of its glory", agrees Bennett.

To allow natural light to shine into a building the size and location of windows should be based on the cardinal directions.

Therefore in the UK, buildings with south-facing windows fair best as they avoid direct light from the rising eastern sun, the hotter-setting western sun and the winter coldness of north-facing windows.

"With perfect placement and planning, you can ensure that a building will utilise natural resources to make for a healthier and more energy efficient living space for occupants," says Sneddon.

Howells Patent Glazing has recently launched a new slim line rooflight bar, which it says offers thermal efficiency without compromising on style and design. Providing a design solution to allow more natural light into buildings without compromising thermal efficiency is one of the key factors that Bennett is constantly asked about.

He says "using high performance double and triple glazing with a fully thermally broken rooflight system makes for the best outcome when considering daylighting."

And Sneddon agrees that this energy efficient approach means there is little need for artificial lighting during the day.

"By increasing glazed areas to afford more daylight, there is also an increase in solar gain that helps heat up the indoor space during the colder months," he says.

"This will also help to reduce the energy need for additional heaters and in turn reduce energy bills even further.

With perfect placement and planning, you can ensure that a building will utilise natural resources to make for a healthier and more energy efficient living space for occupants



Grant Sneddon

"Of course, there needs to be a balance between the positive effect of large glazed areas and the possible negative effect of excessive heat loss and glare.

"With clever design and smart thinking, it's possible to design to a minimum 25 per cent glazing to floor area to achieve a healthy balance between the positives and negatives. If the building design follows the minimum 25 per cent glazing to floor area rule, the room itself will be exposed to increased daylight, reducing heat loss and the need to use electrical appliances to light and heat the home."

But a poorly designed building can fail in its daylighting efforts.

Offices will often be found with the blinds closed at certain times of the day as workers struggle against glare and reflection, especially if like me, they suffer with light sensitivity due to cataracts.

"The idea of letting light in is basic but managing it is more of a challenge especially if the building is already built and you are working on a retrofit," says Willetts.

"Putting a hole in the wall is the simple part but installing the glass is where the problems begin as unwanted effects like

What to consider when looking at rooflighting

Manufacturing firm Howells Patent Glazing gives this advice



FLAT roof skylights offer maximum light exposure, and the integration of specialist supporting bars will create an uninterrupted flow of sunlight due to this design's framing. There are many options for flat roof lights, including hip ended, gable ended, traditional lanterns and contemporary flat glass types. Walk-on options are available for those with a sense of adventure, with the ability to be incorporated within balcony flooring or roof terraces. It is essential to use safety glass within any overhead glazing.

• Sliding windows can incorporate traditional patent glazing or a fully thermally broken system. The choice of modern solar control glass can be used to good effect in reducing solar gain and glare. As for ventilation, allow fresh air to flow into your home as well as sunlight by incorporating openers, either manual or electric in operation. Another ventilation option to consider is accompanying roof vents.

• Think about the view the glazing will provide, as well as which style will best



suit both the interior and exterior of your home. It might be that you require a different internal finish compared to the external profile. Different internal and external profile finishes are available including square, ornate and raked features to suit the application. There are lots of different profiles available, at varying levels of cost, from slim lines with large glass to more traditional frames.

• For a more dramatic effect, often favoured within more traditional builds, a true lantern roof light that incorporates both slanted and vertical windows may be the best option. Vertical window height is available in variable, bespoke sizes and allows top-hung opening vents to be situated within the openings. Pyramid, octagon and even dome glazing should also be considered.

• Low maintenance, modern glass options that benefit from self-cleaning upgrades make things even easier, and Polyester powder coated aluminium is also considered to be a low maintenance finish to your roof light. ■

glare can be difficult to manage. Once the shades come down they tend to stay down so the original effect of the window – to give natural light and a view – is defeated.”

But Willetts believes Serraturax has found a cost-effective solution to daylighting problems in schools, hospitals and office buildings after developing two products – SerraGlaze and SerraView Smart Daylighters.

“Low angled sun in the UK poses a problem so a flexible daylighting tool is needed to give the architect or engineer the maximum flexibility to do what they want to do either with the design of a window or coping with the hole in the wall that already exists,” says Willetts.

By applying the daylight redirecting film SerraGlaze onto the upper third of a building’s existing windows, the two principal functions of a window are achieved.

This is because “the SerraGlaze film has got air pockets embedded into the acrylic so when light waves strike it, they are redirected onto the ceiling and across the room,” says Willetts.

Meanwhile, SerraView Smart Daylighters

look like transparent blinds but rather than blocking light out, its objective is to provide large volumes of glare-free daylighting upward and into the interior. Built into the head-rail is a fully autonomous sun-tracking system used to rotate the louvers to provide optimum levels of daylight according to the sun’s elevation.

“The SerraView is designed to function more like fibre optics where light bounces all the way down. The throw of light goes a long way because of how the air pockets are constructed,” explains Willetts.

Among many other pluses, the products are said to improve comfort, performance, lower greenhouse CO emissions and cut wasted lighting costs.

Lighting from the sky

Lumen Rooflight has recently developed the world’s most environmentally friendly British made rooflight.

Planus Accoya is made entirely from Accoya timber and as Trace explains

rooflights can provide a more even pattern of light than vertical windows.

“Rooflights let in light from the brightest part of the sky and are not generally affected by external obstructions, such as trees or other buildings,” he says. “In addition, rooflights can also add to the more subjective qualities of spaces as an integral part of the building’s architecture.

“They can provide views of the sky and promote a sense of well-being and connection with the outside without the distractions encountered with views through vertical glass windows.”

And Sneddon believes the role that daylight and roof windows play in energy efficient buildings must not be overlooked.

“By introducing roof windows into the building design, you can offer homeowners the opportunity to gain a degree of control over temperature, humidity, air quality, ventilation, noise levels and daylight within their home.

“Roof windows provide the ideal solution to maximise energy efficiency by increasing the amount of daylight that enters the building, while also adding fresh air and proper ventilation to an indoor space.” ■



David Willetts

Bringing light to the dark

Designing an appropriate external lighting scheme without compromising daylight, the surrounding environment or natural habitats, can be a challenge. Lighting engineer Aimie Loveday of multi-disciplinary consultants, M-EC, discusses the constraints, considerations and creativity required of engineers when tasked with devising new or remedial lighting for development.



THE implementation of external lighting or artificial light has a primary function to safeguard our night-time environment but how it is designed, installed and maintained varies significantly. Location, local authority specifications, existing hazards e.g. trees or overhead cables, must all be considered, and that’s before any demands of energy efficiency, cost savings or future maintenance can be addressed.

What’s defined as ‘obtrusive light’ – e.g. obstructing your view of the night sky, keeping you awake though a bedroom window, glare or sky glow – is a

form of pollution and has to be properly managed.

To achieve this, a lighting impact assessment is undertaken to ascertain the environmental zone e.g. protected, natural, rural, suburban or urban and this forms the parameters to work within. Day-time and night-time monitoring is then carried out to provide commentary on the impact of both existing and proposed lighting.

Naturally the type and scale of development will also affect the recommended lighting scheme. Residential developments, for example, where lighting is positioned on boundaries of properties to minimise intrusion into homes, have completely different requirements to traffic routes and motorways, where the glare factor has to be accounted

for and high uniformity is essential. There is no ‘one size fits all’ approach.

Despite this, location has the most fundamental impact on the design we can create. The environmental zones within which we work dictate every detail, from direction and brightness of light to choice of lantern, position of columns and how lights are cleaned and maintained.

Improvements in technology have significantly and positively altered the lighting schemes we can design. Instead of timers, we can either use a CMS (Central Management System), where a remote operator can dim or switch off individual lights as well as detect any faults, or where this isn’t possible, we use photo cells – enabling us to dim or trim the lights as appropriate.

Other techniques such as colour rendering mean we can make more recognisable environments e.g. blue tints for clinical spaces, yellow tints for more inviting residential areas. All of these technologies are compatible with most LED lanterns. Despite some misconceptions, LEDs are actually highly energy efficient, longer lasting and give better light quality than SON and SOX lamps. They are also extremely adaptable, meaning for retrospective works, they do not necessarily need to be replaced and instead, can be retrofitted, back shields, etc.

Ultimately, good lighting design is all about balancing the right type of light at the right time and within the right context. That way we can ensure a bright future for all. ■

ADVERTORIAL

Join us for the National CDM Awards

Richard Wilks, President of the Association for Project Safety, discusses why the National CDM Awards is helping to shape and share good practice in industry, while encouraging people to purchase tickets for an entertaining and enlightening evening event.

At the Association for Project Safety, we’re committed to shaping and sharing good practice within industry. We strive to continuously improve and promote the professional practice of Design and Construction Health and Safety Risk Management in all that we do. From the production of our Member publications – such as Digest – to our regional events and national programme of Continual Professional Development, we work to ensure our Members maintain their skills, knowledge and experience, meaning APS Members are among some of the UK’s most trusted, leading specialists.

It’s not just about training and CPD:

For the first time this year, we announced that our National CDM Awards would be a celebration in its own right. Historically part of our Annual Convention, we wanted to separate these different elements of our events calendar, so that we can truly take a moment to celebrate success and acknowledge some of the inspirational work that is happening within our sector.

You see, at APS, we feel that awards are an important part of development, up-skilling and

By taking part – whether you’re shortlisted or a winner – you’re also helping to shape and share good practice.

ensuring your expertise is fit for the future. Each entry we receive into the National CDM Awards will be scrutinised by a panel of industry figureheads, including the Health and Safety Executive, over the summer months – watch this space as the shortlist will be revealed in early September.

Simply being shortlisted is a huge achievement as your submission will be judged by a panel of people deemed to be the best in the business. Go on to win the award category, are you’re truly in a class of your own. By taking part – whether you’re shortlisted or a winner – you’re also helping to shape and share good practice.

Your submission case study provides industry with examples of inspirational good practice, setting a precedent for people to work towards in the design and construction health and safety risk management sector. By promoting these awards, we’re aiming to raise the profile of Design and Construction Health and Safety Risk Management in the sector, so that construction workers return home safely each and every day.

It’s never too late:

While entries into this year’s

National CDM Awards may have closed, it’s never too late to be part of the celebration; tickets are now on sale and can be purchased from the APS website. The winner of each of the nine different categories will be announced during a glittering gala dinner on Thursday 27 October at the Radisson Blu Portman Hotel, London, with the evening promising to be entertaining and enlightening in equal measures.

Even if you’re not up for an award this year, I would strongly encourage you to support the event. Of course, it’s great to put your glad-rags on and enjoy some time in the company of your work colleagues away from the office while networking with leading industry figures and peers. But really, the reason why I’m urging you to book your tickets and be there on the night is so that you can witness first-hand the exceptional talent and the projects they are delivering within our industry.

While training, development and CPD is of course a crucial part in the betterment of ourselves and of our profession, awards can also give us great insight into how others are working, examples of inspirational good practice, and provide us with a benchmark of excellence to work towards in our own projects.

TICKETS

If you’d like to join us at the National CDM Awards, purchase your tickets from:

<http://www.aps.org.uk/book-your-ticket>



APS National Awards 2016

Radisson Blu Portman Hotel 27th October 2016

Let’s celebrate success