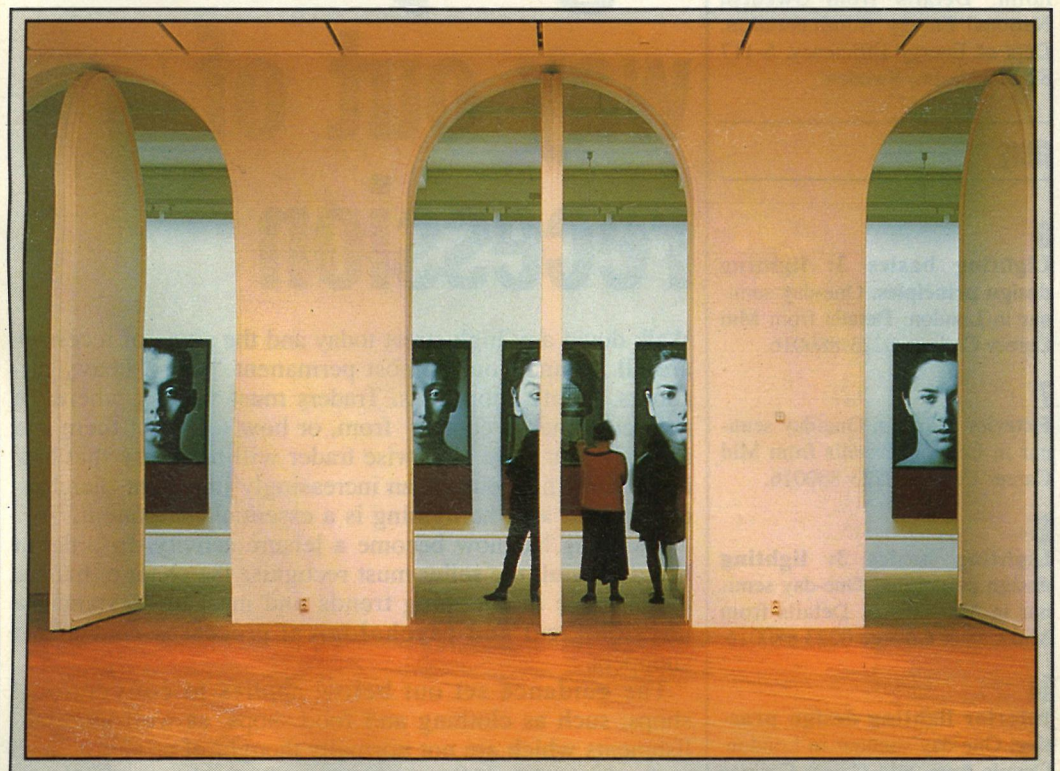
LIGHTING EQUIPMENT NEWS

MAY 1991



The Museum of Contemporary Art in Oslo is housed in the former Norwegian State Bank. The early twentieth century building with its intimidating granite facades is arranged like a square around internal spaces: the former banking hall and new rooflight room, formed by roofing over an internal courtyard. In all, it provides some 4000 square metres of space on three floors.

A broad granite staircase leads to the first floor which houses the information centre and cafe, and provides space for temporary exhibitions. The second floor contains the old banking hall with gold edged rooflights – a space which now houses modern sculpture. The rooflight room serves as the location for photographic and specialist exhibitions, while the third floor houses an experiment exhibition space and a reference gallery of work by Picasso.

Architects Fosse and Aasen were responsible for refurbishing and rebuilding work, with lighting design in the hands of Nielsen and Borge. A new lighting installation is based on 500 metres of track by Erco, using Optec wall washers for illuminating the walls evenly, spotlights to create emphasis, and indirect lighting to provide ambient light.

New lamps for old

Four major lamp companies are now involved in a race to get the electric induction lamp onto the lighting market. Matsushita, Philips, GE-Thorn and GTE Sylvannia are all working on a combination of low pressure and HID lamps of this type, which are expected to give an exceptionally long life of 60 000 hours or more (Matsushita claims only 30 000 hours) while producing high quality white light.

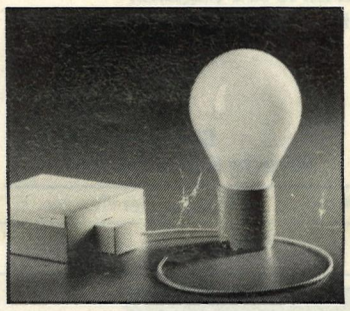
This concept of the electrodeless lamp is not new, the basic idea goes back nearly a century and UK patents on practical implementations date back to the 1970s. But advances in miniaturised electronics have recently made the lamp a practical possibility, by making the high frequency circuitry available at an acceptable cost. Equally, the 2.65 MHz frequency waveband needed for these lamps has recently been made come on stream in Europe as a result of pressure from the lamp manufacturers; the situation in the USA remains somewhat more complicated.

The new lamp differs fundamentally from conventional incandescent and gas discharge lamps as it has neither a filament nor electrodes. Instead, an induction coil comprising a ferrite bar and a primary coil induces a high frequency energy flow within a sealed container. This excites a gas, usually mercury, within the container to give off ultraviolet radiation. The process is then similar to conventional gas discharge lamps: the photons generated strike a fluorescent coating on the inside of the container, generating visible light.

It is the ageing of the filament or electrodes that normally determines the life span of a conventional lamp. In practice, with an induction lamp, the life of the lamp becomes that of the electronic components themselves, so that the claimed life of 60 000 hours may well be exceeded.

Major problems in developing these lamps have been to miniaturise the electronics, remove the risk of radio frequency interference and aid the efficient removal of large quantities of heat. Starting the initial process and making the lamp efficient over a wider variation in operating temperatures also presents difficulties.

The various manufacturers are producing solutions along very different lines. The Matsushita and Philips products appear to be at the most advanced stage of development. The Philips lamp, initially an 85W lamp with a 5500 lumen output geared to the requirements of the professional market, is due to come onto the market in September. At 110mm



in diameter, the lamp is slightly larger than a standard GLS lamp, but its efficiency of 65 lumens per watt puts it on a par with compact fluorescents.

Maximum lumen depreciation across the lifespan is said to be in the region of 30%, and the lamp will be made available in triphosphor in 3000K and 4000K versions. Philips sees this lamp as just the first in the series. Later versions will be available in a range of wattages and some will also be dimmable. However, the company expects to sell only to the professional market and to market not a lamp but the whole system comprising lamp and gear.

The energy produced by the high frequency generator is pushed through a screen to avoid RFI. The heart of the lamp system is a heat pipe (Philips patent 1562 265, 1980) which comprises a closed reservoir with a vapourisation wall at one end of its length and a condensation wall at the other. Heat generated by the lamp hits the vapourisation wall, causing the evaporation of the sodium heat transport medium contained in the tube. The vapour then flows to the colder condensation wall at the opposite end of the rod condensing there. The condensate returns through a gauze layer on the inside of the reservoir wall, and is available for reuse. Thus, heat is quickly and effectively removed from the lamp.

The GTE lamp, aimed as a replacement for a 60W-100W incandescent, is designed as a lamp for domestic use. However, the company feels that with the current efficiency of 65W per lumen needs to be improved of the lamp is to offer mass market opportunities.

According to GTE's Peter Lees, there is another major consideration. A 5W radio transmitter can broadcast a signal for up to 100 miles; the lamp we are talking about is a 20W to 30W equivalent. In other words, it amounts to quite a powerful radio transmitter, and public acceptability and screening became major issues.

The long life of these lamps — equivalent to operating 8 hours a day for at least 24 years — opens a new range of lighting possibilities. Philips suggests that lighting could be permanently built into building elements. Equally, lighting could be incorporated into works of sculpture with a medium-term lifespan.

All companies remain very coy about pricing policy preferring only to say that the new lamps will be 'more expensive', but prices naturally reflect R & D costs. To what extent they will be kept high to protect the conventional lamp market remains unclear.

Export policy questionned

The President of BEAMA has written to Tim Sainsbury, Minister for Trade, expressing the concern of the electrical and electronics industries about the government's intention to revoke recent committee stage amendments of the Export Investment Guarantees Bill. These guaranteed continued government involvement with insurance and re-insurance of political risk for a period of three years after privatisation.

Sir Robert Davidson made the point that a large number of small and medium-sized companies covered by the ECGD's short term credit would be badly hit by this move.

Saving begins at home

A £1 million publicity campaign aimed at promoting the more efficient use of energy in British homes is to be launched by the government in the autumn. The campaign will be jointly funded by the Department of Energy's Energy Efficiency Office and the Department of the Environment. It will receive significantly more expenditure in later years.

The campaign will explain how families can use energy more wisely and will aim to improve understanding of the greenhouse effect, global warming and the impact on energy use on the environment through the emission of carbon dioxide.

Environment minister Tony Baldry feels that, "many householders would be only too willing to do their bit to reduce output of the gases that contribute to global warming if only they had a better understanding of how energy efficiency in their own houses can help."

Help with new technology

The DTI has identified electronic and electrical equipment manufacturers as one of the groups most likely to benefit from its newly launched £10.5m Manufacturing Planning and Implementation studies programme initiative.

The initiative is designed to give 6 000 small to medium sized manufacturing companies (SMEs), nearly 10% of which are electronic and electrical equipment manufacturers, an increased competitive advantage by adopting 'best practices' in their application of advanced manufacturing technology.

In the past, many of these companies have invested in new technology only to find it has failed to achieve the intended results because of lack of effective planning prior to implementation. This occurs because such companies do not possess all the necessary in-house skills to plan its introduction. MPI provides selected companies with a grant of up to £50 000 for expert advice from UK consultancies.

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In brief...

● Despite recession in the industry. CIBSE has increased its membership by 7 per cent in the past year. Total membership now stands at 15 158.

● The Hawker Siddeley Group has purchased the European industrial batteries business of the Chloride Group plc for £43.5 million.

● **F W Thorpe's** interim results to 31 December 1990 show an increase in profit before tax of 52%.

● **Menvier** has formed a new division, Menvier Linear Lighting, to handle linear lighting systems.

DIARY

MAY

1
Lighting basics 1: Light and vision. One-day seminar in Manchester arranged by Mid Career College, 0223 880016.

7
Innovative lighting techniques. Evening meeting at Godalming, Surrey, held by CIBSE London and South East region. Details from Carl Sandford 071-387 4442.

8
CIBSE Lighting Division AGM followed by lunch and presentation of lighting awards. Tickets from CIBSE 081-675 5211.

9
Lighting basics 2: lamps and luminaires. One-day seminar in London arranged by Mid Career College. 0223 880016.
Lighting heritage — past, present and future. An evening meeting in Rushyford, Co Durham, organised by the North Eastern region of the Institution of Lighting Engineers. Details from Martin Clark, 0661 860001.

16
Holography. Evening lecture at the college of Technology, Dublin, arranged by IEEIE. Details from 071-836 3357.

19-23
Interior Design International exhibition at Earls Court, London. Details from ID Exhibitions, 0895 622233.

21
Dun and Bradstreet, High Wycombe. Evening visit to new offices arranged jointly by IEE and London and South East region of CIBSE. Details from Andy Robinson, 081-953 6282.
Lighting basics 2: lamps and luminaires. One-day seminar in Manchester held by Mid Career College 0223 880016.

22
Joint lecture. Institution of Hospital Engineers and London and South East region of CIBSE. Afternoon event in London. Details from Andy Robinson, 081-953 6282.
16th Edition Wiring Regulations. Evening meeting at Birmingham Chamber of Industry and Commerce. Details from IEEIE 071-836 3357.

25-29
Light Pavilions, commercial lighting exhibition in Milan. Details from Associazione INTEL (02) 3264282.

28-30
First European conference on energy efficient lighting, Stockholm. Details from Swedish National Energy Administration, Dept of Energy Efficiency, S-117 87 Stockholm, Sweden.

JUNE

6
Lighting basics 3: lighting design principles. One-day seminar in London. Details from Mid Career College 0223 880016.

7
Exterior lighting. One-day seminar in London. Details from Mid Career College 0223 880016.

11
Lighting basics 3: lighting design principles. One-day seminar in Manchester. Details from Mid Career College 0223 880016.

14
Interior lighting design practice. One-day seminar in London. Details from Mid Career College 0223 880016.

17
16th Edition Wiring Regulations. One-day symposium in London for college lecturers. Details from IEEIE 071-836 3357.

18-19
Safety in live entertainment. Conference in London arranged by CIBSE, 081-675 5211.

NEWS

UK office set up for French glass

A major French glassworks has set up an information and technical support office in Uxbridge, Middlesex, trading as Vianne UK Ltd. It will support the existing UK distribution and sales network of lighting glassware.

Cristalleries et Verreries d'Art de Vianne, based near Bordeaux, exports to more than 70 countries and claims to be Europe's largest manufacturer of lighting glass.

Products range from hand decorated designs in coloured glass, including reds and blues, to modern glassware for uplights and energy saving light sources. Mouth blown glass is a speciality of the company.

Vianne is keen to work with designers interested in the company's expertise in one-off designs.

New brand of metal halide lamp

Amba Lamps is starting to manufacture metal halide lamps, concentrating on speciality lamps for stage, film and television studios and sports stadia.

Factory space has been doubled at its Dewsbury premises and the new lamps are expected to be on the market in September

CIBSE

The Chartered Institution of Building Services Engineers

Light your way out of recession

Walk down any high street today and the signs of recession are all around you. Almost permanent "sale", heavy discounts, empty shop units. Traders must wonder where the next customer is coming from, or how to attract them into their shop or store. The wise trader will recognise that how he presents his goods is an increasingly important merchandising tool, and the lighting is a essential component.

Shopping has now become a leisure activity. In order to be successful, the seller must recognise the change that has taken place in shopping trends and must understand the physiological and psychological processes that affect shoppers.

The guidance set out below applies to conventional shops, such as clothing and food shops, as well as establishments which are not normally thought of as shops, such as banks and building societies which also need to sell themselves and their services. The fact that the "merchandise" is less tangible than in a conventional shop places even greater emphasis on the need to design the interior, and in particular the lighting, to be as effective as possible.

Lighting is the single most important factor in successful merchandising. It helps to attract the attention of passersby to the shop and to the goods on display in the window. It makes the shop inviting from the outside so that people will want to enter.

Once inside, if light is used properly, it will make the merchandise more attractive and direct attention to particular items. It can stimulate inpulse buying. It can be used to create atmosphere and image. It can subconsciously direct people within the shop, improving the use of the space and the time people spend in the shop.

Good lighting sets the image of the establishment and creates the right atmosphere for the selling process. It needs to appeal to the target customer group. In addition, it can improve working conditions for the shopkeeper, so that at the end of a hard day, visual fatigue is reduced. This means fewer mistakes and less tiredness or irritability, which could offend a customer.

Lastly, good interior and exterior lighting is an effective deterrent against crime.

When the lighting of a shop is being planned it is vital to take time and think about how the shop, the products and the shopkeeper are going to be "sold" to potential customers.

There are three primary objectives for the lighting of merchandising areas.

● Step 1 is to attract the attention of potential customers to the shop and the merchandise. The quantity, quality and effect of the light in creating a suitable appearance in the shop, and enhancing the merchandise in the window and the interior, are determining factors in selling.

● Step 2 is to initiate the purchase. Buying decisions start when the customer is visually intrigued and are usually completed when the customer has visually evaluated the product; for example, read a label or scanned a magazine. The lighting must facilitate those activities.

● Step 3 is to complete the sale. Adequate lighting at the point of sale is vital for completion of the transaction. Shopkeeper and customer must read prices, manipulate money and change, check bills and so on. But this isn't just a utilitarian matter. When customers are served in poor lighting they are more liable to distrust the shopkeeper and have a lower opinion of the shop.

These parameters outline the successful approach to retail lighting and are the starting point for a new Lighting Guide that is currently being written by CIBSE's Lighting Division technical committee.

Karl Pike, secretary, Lighting Division.

NEWS

Appointment USA

The Light Fair exhibition, held in Chicago in March, is a new exhibition which emerged as a result of the conflict between the organisers of the Lighting World Exhibition, previously run annually in the USA, and alternating from coast to coast.

It is sponsored by the Illuminating Engineering Society of North America and the International Association of Lighting Designers in conjunction with AMC Trade Shows.

In essence, the IES and IALD sponsored the original Lighting World Exhibition, but did not like, among other things, its increasing bias towards domestic lighting and trade matters. But a bold statement like this over simplifies the nature of the clash, which even led to legal restraints being applied.

The outcome was two proposed shows Lighting World and Light Fair – and considerable uncertainty about which would survive. The major manufacturers, for the most part, supported the IES/IALD Light Fair which now has the hallmark of the premier show in the USA. By contrast, a Lighting World show was proposed for New York but has now been cancelled. Lighting World may not, however, be completely dead and may re-emerge in a different form.

Anyone used to European lighting shows such as the Hanover Fair, will find the Light Fair a bit of a shock.

For a start, the booths (which we would call stands) are much more basic. The lavish stands that appear at Hanover just aren't seen here.

The second shock to the European visitor is that the emphasis is on what you can buy *now*, not on potential products or future ideas. Whether this is a good or bad thing depends upon your point of view.

Visitor type

Another interesting difference is in the type of visitor. In the USA there are many lighting designers and interior designers and they attend in large numbers. The University of Kentucky, for example, shipped over 70 of its interior design students to the show.

The second type of visitor common to the US shows is the agent representative - sometimes called 'manufacturers' reps'. These are independent sales organisations, typically small, who act as agents for manufacturers, selling ranges of products to potential clients. They tour trade shows hoping to find new product lines, reinforcing existing ties and attempting to meet new clients.

The show comprises two parts: one is the exhibition itself, the other is the series of seminars which runs throughout the show.

Energy efficiency, for a variety of reasons, is not as well developed in the USA as in Europe. 'Green' issues and the desire to save energy and reduce pollution are now of critical concern. Legislation, forthcoming legislation and financial incentives are starting to bite, with a result that a 'Green Lights' programme has been launched in which major corporations pledge to install improved, energy-efficient lighting in the next three years. This programme was the basis for the keynote address as well as the topic of many of the seminars.

Unlike in previous years, almost every exhibitor was offering an 'efficiency' story with some of his products. The main drive for this is tax incentives which enable power boards to make attractive offers for energy efficiency.

Panasonic had its ranges of compact fluorescent lamps on display. They are similar to the PL/Dulux series but with electronic ballasts in the lamp cap, so they just screw in. Not much of a surprise to Europeans, but still novel to some Americans.

General Electric was generally very excited about its takeover of Thorn lamps to create GE-Thorn. Thorn Lighting has always had a very good reputation with specifiers in the USA and access to Thorn technology was regarded as an advance for GE and its clients. The company showed white Lucalux (a high pressure sodium deluxe lamp) and 2D with some pride.

Low voltage

The American love affair with low voltage tungsten halogen mirror lamps was at its height last year. Now it has settled down and is more like a contented marriage, with compact fluorescent and biaxial lamps providing the fresh romantic interest. The only major development on show in the field of compact tungsten halogen mirror lamps was Philips' introduction of MR lamps with square fronts. This is just a style issue, but does give fixture designers a choice of shape.

All of the major lamp makers: (**Eye, Venture, GE, Sylvania and Philips**) showed white SON lamps (2700-2800K) with ES bases.

Philips has this type in addition to their unusual bipin base version. Some of those on show didn't seem to give the best performance in practice.

Sylvania was offering subminiature fluorescent triphosphor lamps with a 7mm diameter up to 13 watts. These seem intended for display and decorative use, and attracted much interest.

Lots of reflector materials companies were exhibiting and, of these, **Analod** demonstrated some of the best finished reflectors and seemed to have a professional approach noticeably superior to some of its US counterparts.

The range of interior fixtures was wide. Many of the better products were designed to meet the needs of 'architectural' lighting and looked good, but often their performance was poor. It was noticeable that the three major European fixture companies, **Zumtobel, Thorn** and **Trilux** had luminaires on display that were significantly superior to the locally manufactured products in all but a few cases.

Industrial fixtures remained based on refractor optics. One interesting development was the two-level discharge fixture which can switch from high to low to high output for energy management.

Outdoor lighting – American-style with lots of 'box' shapes – is well developed. Performance of the floodlights leaves much to be desired, but the bollards are some of the best in the world. **LSI, Kim** and **Devine** all had interesting and well thought out amenity lighting ranges on display.

Seminars covered six key applications: office; retail; outdoor; residential domestic; energy in design; energy in economics.

In the space available it is not possible to review these topics in full, but one highlight was the increasing emphasis on the new IES recommendations on lighting for VDT use (Recommended Practice 24-1989). After nine years of 'meetings' the IES has produced a set of recommendations that run broadly similar to European practice.

The 'Green Lights' programs mentioned earlier, which is partly about energy conservation and partly concerns pollution (from power station gases and the products themselves) started in autumn 1990, the paper was presented by **Robert Kwartin** and **Jerry Lawson** of the EPA.

Some of the power authorities are giving a potent impetus to the scheme by making 'too good to miss' deals with consumers who reduce their loads through energy saving. The first reaction has to be 'what is in it for the power company?' The answer is that they are able to use it to offset tax.

The net result of all this is that it makes more sense to replace complete fixtures with energy-efficient ones, rather than to modify existing luminaires with auxiliary reflectors. The British government should note the impact that such a simple tax incentive is having on the economy. No one appears to be the loser in this scheme, which is both stimulating trade and encouraging energy efficiency.

Sandra Stashik, of Grenald Associates, talking about office lighting, pointed out that the use of electronic ballasts and better lighting controls was increasing dramatically, but reminded us that there was also a powerful shift away from straight technical standards towards a better understanding of the needs and desires of the users. In fact, 'quality of life' was an issue mentioned by many speakers. A common theme was that users were becoming more critical and less willing to accept mediocrity. Improving lighting quality while saving energy was a constant message.

Mixed bag

Opinions of the value of individual seminars varied. As one might expect from a full session of seminars with about 27 speakers over three days, some set low standards and then failed to achieve them. They are best left nameless. Others, such as **Helen Diemer**, the current president of the IALD (of David Maintz Inc), taunted delegates with 'if you are involved in lighting at all, you must attend this seminar to learn exactly how you and your clients are going to be affected by new legislation.' A tough promise which was fulfilled with consummate professional ease.

Future Lightfairs are scheduled for New York in 1992 and 1994 and for San Francisco in 1993.

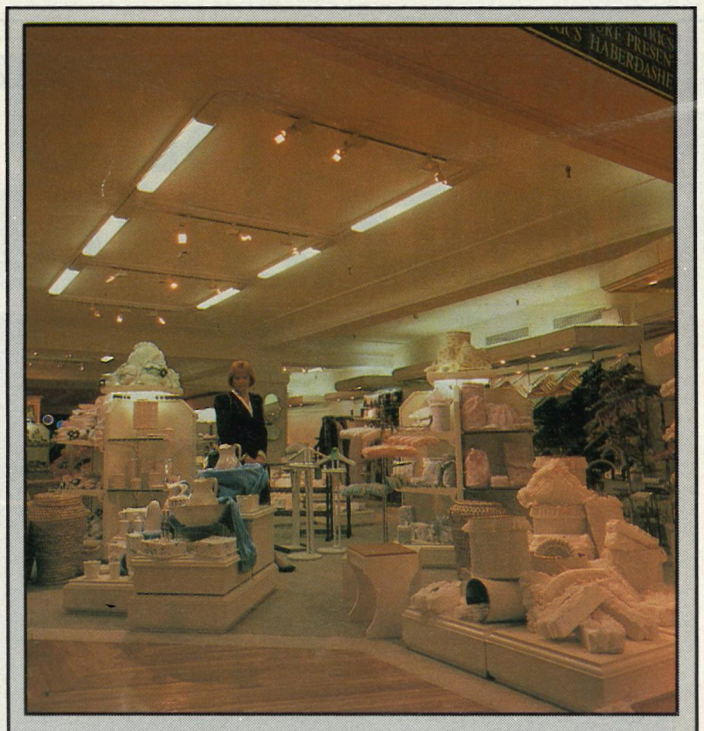
One niggle about Lightfair is its full name 'Lightfair International'. If the manufacturers Thorn, Zumtobel and Alanod did not attend it would be difficult to identify anything like an international element. In short, for 'International", 'USA" might be a fairer substitution.

Lighting the streets of Eurodisneyland

When Eurodisneyland opens its gates in the spring of 1992, its streets will be lit by specially designed luminaires from Eclatec the French subsidiary of Emess.

Over 1300 luminaires and columns will be needed to light streets and giant car parks on the site at Marne-la-Vallée, near Paris, which is expected to cover 5 000 000m² by 1992.

Four different sizes of the elliptically shaped luminaires will be used, mounted on columns of varying heights. The light sources will be a mixture of high pressure sodium and mercury.



The bathroom accessories department at Harrods has a new, up-to-date lighting installation. Multilite Systema 8000, designed in Italy, is a modular linear lighting system introduced by Thorn for the European market. It has slim, oval tubes that house a variety of lighting, including recessed tungsten halogen floodlights.

Harrods is using a combination of fluorescent and low voltage spotlight modules arranged in rectangular grids to provide background and accent lighting. Each prewired module has a four-way terminal block for easy installation.

COMMENT

Jumping on the bandwagon?

Are we on the verge of producing the 'everlasting' lamp? The recent trend has been towards manufacturers claiming longer lamp lives for their high technology light sources as they become more at home with technology, introduce computerised production lines and gain more confidence in their quality control systems.

The most recent twist to my tail is the long-life GLS lamp that beats them all – Luna Lighting claims and average life of 16 000 hours for its lamp with a strengthened filament. And, at a trade price of £1.95, that represents extremely good value for the consumer. However, with this development we seem to have about reached the limit for conventional lamp technology.

Beyond that, until last week, we were in the realms of science fiction. That is, with the exception of the induction lamp promoted in a low-key fashion by Matsushita on its Hanover stand last year. Now three other companies have declared themselves in the running with prototype electrodeless lamps guaranteeing a maintenance free lifespan of some 60 000 hours – GE Thorn, GTE Sylvania and Philips. The time-scale for the availability of these products is more or less uncertain, although Philips is talking about making the lamps available on the market on a limited basis in September.

The premium demanded for these lamps will be such that, at this point in time, only very limited applications are claimed for them for instance where access for maintenance is extremely difficult or where the lamps are required to burn for long periods of time. In other words, in its most advanced areas, the lamp sector can be clearly seen to be technologically led rather than responding to market demand. Products are launched with the claim that they will meet specialist needs. Only with the lower costs than come about with mass production, or when a larger number of manufacturers begins to market 'me too' products do prices fall sufficiently for a wider range of applications to become feasible. Look at the spread in the use of dichroic lamps from a limited application, illuminating delicate or perishable stock, to a more general use for their decorative qualities.

Hanover also showed fittings manufacturers moving in a different direction. Nervousness, even in Europe's largest and most stable lighting market – the German market – showed in the perceived need of some of the largest niche companies to diversify and spread their risks. Thus, even major players such as Trilux were seen to be expanding their activities from the specialist areas they made their name in – in this case fluorescent fittings, diffusers and hospital lighting – to cover downlighters with a much more general applications. Like all of us, they're just hedging their bets.

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NEWS

Aspire to elegance in building services!

Tom Smith, the new president of CIBSE, urged engineers to aspire to elegance in his inaugural address at the Institution's technical conference at the University of Canterbury in April.

Visual and aesthetic values – the title of the address – is his chosen theme for the year ahead.

'We are suffering visual pollution," he told his audience, adding that as he looked at the world today he found that excepting nature there was more visual ugliness than beauty. The artistic aspect of products was being neglected and needed greater attention, especially at a time when Britain was "going into Europe" where more people were concerned about elegance.

At every stage

Building services, he said, comprised assemblies of components which formed engineering systems. These in turn combined with and related to the buildings they served, so that everything from the component to the complete system assembly must satisfy the subjective visual and aesthetic judgments of many people.

He recommended greater involvement of industrial designers in new component and product development: "The industrial designer is the link between art and technology, he can be the eyes and the sensory organs of the design team".

The consultant should make his selection of components and products based on aesthetic considerations plus function. The electrical contractor contributed by ensuring that the connections to the component and the cables leading from it were equally as elegant as the component. The manufacturer's part, together with an industrial designer, was to make the product and encourage elegance in design alongside functional efficiency.

Addressing the question of designing engineering systems, Mr Smith said that conveying a particular required visual effect in words only was virtually impossible. Engineers must learn to conceive building services designs in similar terms to those used by architects, in order to contribute to the visual and aesthetic effects of their systems on finished buildings.

To enable engineers to develop three-dimensional thinking he advocated that free-form drawing should be included in engineering courses.

Progressing to the integration of engineering systems in buildings, the president said it was the architect who had the vision of the building and the building services engineer must, in the early stages of design, be reactive to the architect's needs. He felt, however, that engineers should be much more pro-active in many aspects of design when they had come to appreciate the broad principles of the architect's intent.

To do this, engineers needed a better appreciation of aspects such as shape and form, texture and colour, light and lighting. Engineers in the main had failed to understand and contribute in a constructive manner to the visual and aesthetic qualities of engineering services in buildings, which had been increasing in quantity at a phenomenal rate over the years.

At the same time, architects had failed to realise there was a difference between architectural design and building design. The former was their sole domain, but the latter belonged to many disciplines, of which building services engineers were the most influential and important.

Barriers between art and engineering were highest in universities and all such barriers must be completely broken down, Mr Smith stated. It was essential that architects and engineers trained together at certain stages.

Good business

"Good design is good business," the speaker said. It was because of that approach, he believed, that his own work at Steensen, Varming, Mulcahy and Partners had been successful.

Engineers should ask not only "How will it work?" but "How will it look?"

Visual and aesthetic values would be explored in greater depth at the institution's summer conference in Copenhagen in September, said Mr Smith, concluding what he called (with apologies to Chaucer), *The Engineer's Tale*.

A feature of Stanstead Airport is a steel and light sculpture that changes colour, by Diane Maclean and Hugh Tessier. The 6.7m span, 2.7m high structure consists of four layers of stainless steel. Each of the three lower layers is lit by Lumenyte, a "side glow" fibre optic material. Six, 6mm diameter tails are fixed to each layer. Four metal halide light projectors and a slowly revolving colour wheel with dichroic filters provide the colour change. All the fibre optic lighting equipment was supplied by Applied Lighting Technology.

The artistic aim was to produce a work of art that travellers could sit around, relax and possibly have their nerves calmed by.

Help with energy audits

Energy audits and surveys is a new applications manual produced jointly by the Chartered Institution of Building Services Engineers, the Building Research Energy Conservation Support Unit and the Energy Efficiency Office.

Copies, price £34 (£17 to CIBSE members), are available from CIBSE, 222 Balham High Road, London SW12 9BS.

People in brief...

● **Tony Shaw** has been appointed marketing director at Bradley Lomas Electrolok.

● **Gary McCartan** is now product marketing manager for fluorescent luminaires at Crompton Lighting. **Graham Soar** has been appointed product marketing manager for emergency lighting, and **Andrew Stearns** for discharge and amenity lighting. **Angela Smout** is lamps product marketing manager.

● **Douglas Robb** has joined Building Services Design Partnership as managing director designate. **Peter Cunningham**, who founded the firm, continues as full time executive chairman.

Joint venture to Amsterdam

British manufacturers of contract interior products are being offered a subsidised opportunity to exhibit at IDI Europa in Amsterdam. The Department of Trade and Industry has agreed to finance a joint venture scheme at IDI Europa, which will be organised and administered by the British Contract Furnishing Association on behalf of the DTI.

The show will take place at the RAI Exhibition and Congress Centre in Amsterdam from 28-31 October 1991.

The group stand is open to all companies who market British products for commercial and public interiors.

For more information contact Peter O Murray, British Contract Furnishing Association, PO Box 384, London N12 8HF, tel 081-445 8694.

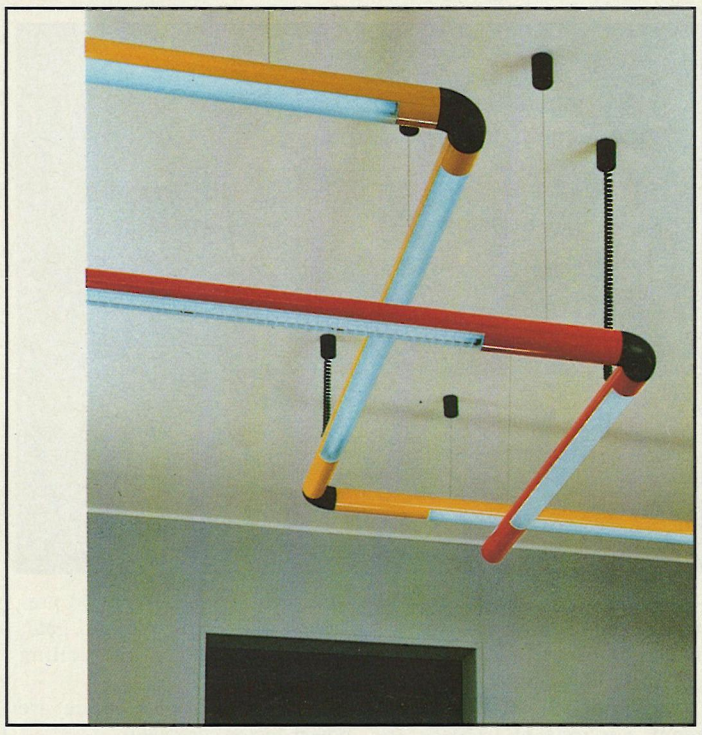
Lighting finance reviewed

A financial survey of companies in the lighting field, including those concerned with lighting devices and systems, has been published by ICC Business Publications.

Price of the 1991 edition is £215 (including VAT, postage and packing). For further details contact ICC at 72 Oldfield Road, Hampton, Middx TW12 2HQ.

NEW PRODUCTS

Linear system for lighting



Menvier Linear Lighting has introduced the Tubo 65 range. This tubular lighting system has a 65mm diameter and a choice of acrylic diffusers or polycarbonate louvres. A mains voltage lighting track is also available for the 1.58m modules.

A range of seven couplers is made by Menvier, which means that complicated layouts can be achieved.

Tubo 65 modules can be supplied with factory-fitted emergency lighting conversion kits.

The system is available in a wide range of standard RAL colours. Customised colours can also be produced to match either existing interior design schemes or corporate colours.

Reader Service No. 151

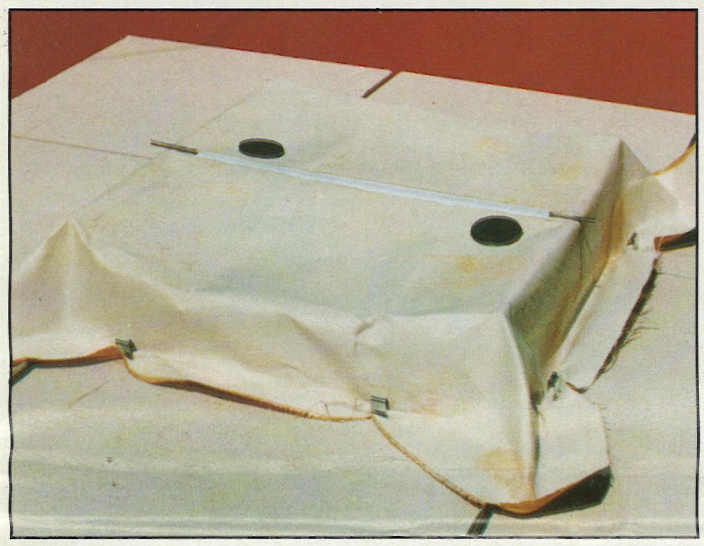
Energy saving for petroleum forecourts

Parkersell Retail Petroleum Services has introduced a range of automatic lighting control systems. Known as LCS90, they are specifically designed for petroleum forecourts.

Electricity consumption is controlled by dividing illuminated areas of the forecourt into zones. These zones are automatically adjusted to maintain required lighting levels during site operation hours.

The compact LCS90 control panel is also designed to incorporate intruder-protection controlled circuits and independent consumption metering.

Reader Service No. 154



Fire protection for recessed lights

Environmental Seals has launched a method of fire protection for recessed fluorescent luminaires and downlights.

Its Envirograf intumescent tents clip securely over the housing of the fittings and have ventilation and cable holes which seal up if affected by fire to prevent the spread of flames in the ceiling void.

The tents are stated to take only 10 minutes to fit; because they are very lightweight no extra ceiling supports are required. Other sizes are available to order.

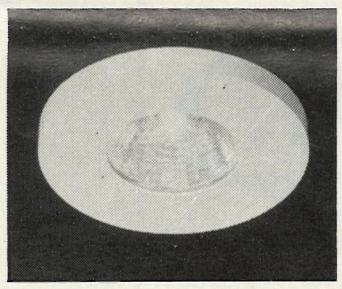
Since the introduction of recessed lighting fittings that require ventilation around them, most suspended ceilings and plasterboard ceilings have lost their fire protection.

Reader Service No. 152

Downlight for damp environments

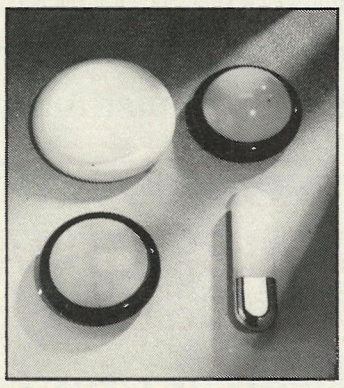
Nautic is a low voltage downlight by Luna Lighting with a solid aluminium screw-on bezel which incorporates a borosilicate front glass.

Its IP55 ingress protection rating enables it to be used in such applications as overhanging canopies outside shops and hotels, in leisure centres, swimming pool areas, saunas, jacuzzis, and shower rooms.



Nautic uses either a 20W, 35W or 50W dichroic lamp and can be supplied with bezels to any colour specification.

Reader Service No. 153



Ceiling or wall luminaires

A range of ceiling or wall mounted lights called Termoluce is available from Lampways. The circular or oval fittings have polycarbonate diffusers which are ultra-violet stabilised, and use either GLS or low energy lamps.

The luminaires are made in Italy and have either a black, white or brass finish.

Applications include corridors, stairwells and restaurants.

Reader Service No. 155

For more information on any of the products listed, circle the enquiry number on the free reader reply service card.

LIF LINE

The new lighting awards

The National Lighting Awards have enjoyed great success since their inauguration in 1986 and have served as an effective vehicle to promote an awareness of the unique role that good lighting design plays in our everyday life.

Influential figures, from royalty to RIBA, were happy to lend their support to the aims of this award and commend the design skills and technical expertise of Britain's best lighting designers together with the owners for commissioning such well lit innovative lighting schemes.

By the same token EMILAS, the LIF's Energy Management in Lighting Awards Scheme, was successfully launched in conjunction with the Electricity Council 15 years ago as a response to the energy crisis of the 1970s. In recent years the importance of promoting environmental issues as well as energy conservation has been pushed to the fore and likewise EMILAS has grown in importance as the award for the very best in energy conservation and management using the latest technology.

Yet, like all good things, a time for change has arrived.

This year the LIF will not be organising a National Lighting Awards competition.

EMILAS will run to its conclusion with the fifteenth EMILAS Awards ceremony in June at the Royal Overseas League, with the Awards being presented by Lord Graham of Edmonton.

The two LIF competitions will then take on a transformation.

In 1992 LIF will launch a new and more prestigious National Lighting Awards which not only seeks to commend good lighting design but also the greatest attention to energy efficiency and management. Lighting is both a science and an art and the new competition will seek to commend schemes which excel in both disciplines.

In this way we hope that negligence of environmental issues in the name of aesthetics will be tempered and, conversely, the commendation of negligence will be replaced by the maximum attention to good design in all energy management schemes.

Thus, winners in the new National Lighting Awards can be sure that their contribution to lighting design represents the very best in Britain.

Balance and differentiation between installations will be achieved by a sophisticated weighting system of assessment. The criteria for the four categories — industrial, commercial, civic, leisure — will be different.

In this way the industrial design criteria, for example, can be more fairly assessed against commercial schemes by giving more prominence to energy management in industrial categories while still considering the element of innovative design and flexibility.

In addition, a special discretionary Assessors' Award could be given to any scheme the assessors feel embodies outstanding or commendable qualities for its design approach. Eligible schemes, for example, might pay particular attention to health and safety aspects, or to the principles of good energy management in a small industrial scheme. We would, thus, hope to encourage the entry of schemes that are felt to be of special merit if not on a grand or aesthetically overwhelming scale.

A major review of the competitions and the structure of the new award scheme is still in its infancy.

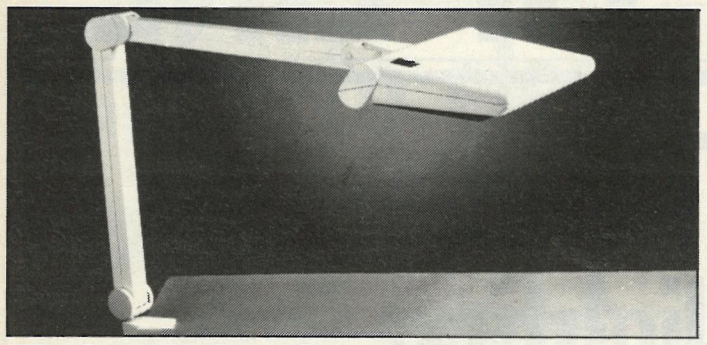
We hope to produce a more prestigious and media-attractive award scheme that will encourage greater support from all sectors of the industry — whether designers, manufacturers, contractors or users — and set an exemplary standard of the best of British design using the latest lighting technology and expertise.

With a relaunch aimed for summer 1992 a lot of work will now be required to draw on all sources for their views and guidance.

Given the success of LIF's previous award schemes, a merger such as this can only strengthen that success, and launch a new awareness of the benefits for everyone of good efficient lighting design.

Views regarding the new National Lighting Awards and suggestions for the review are welcomed from all areas and should be addressed to Amanda Leweson at LIF, Swan House, 207 Balham High Road, London SW11 6HT.

NEW PRODUCTS



Twin light for VDUs

Twin 22 task light from Ledu provides for the lighting needs of a single work station where operation of a VDU is combined with general desk work.

It gives an asymmetrical light distribution and a choice of two light levels.

The lamp housing is fitted with a multiple switch, two 11W compact fluorescent lamps and two reflectors.

Ledu states that on the single lamp setting an even light distribution and illuminance provide the right ratio of illumination between the working surface and the screen, while the dual light setting provides a high degree of asymmetry to give a good light distribution over a larger area.

There is a choice of either long or short, spring balanced arm.

Reader Service No. 156

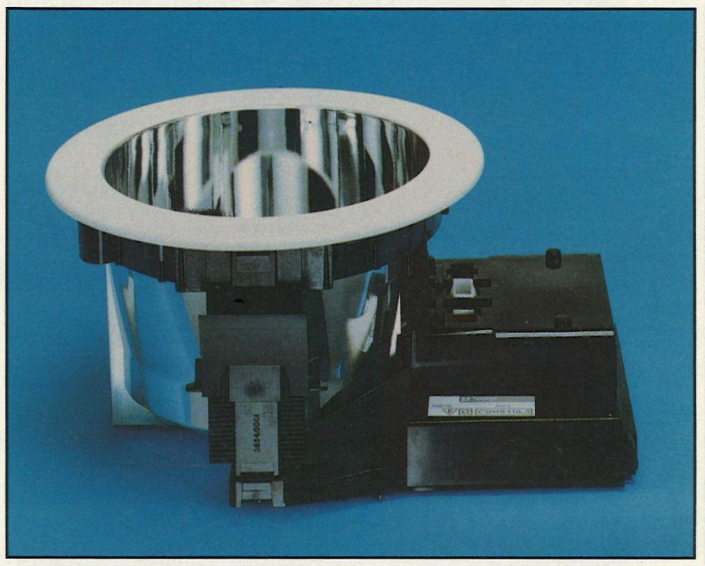
Drama in corridors

A range of round, recessed downlights has been launched by Thorn. Called Chalice, they have sparkling gold or silver coloured reflectors and have been designed to add drama and interest to corridors, foyers and retail interiors.

Chalice is available in two aperture sizes, 150mm and 180mm, with two reflector options, specular silver or gold.

The downlights are supplied with either 2L or 4L compact fluorescent lamps in a range of wattages from 7W-26W. Lamps can be positioned either horizontally to provide a general light distribution, or vertically to produce a spotlight effect. In short, 18 variations can be achieved.

A specially designed fixing mechanism consists of a support arm which slides down a ratchet and locks into place, securing the luminaire when it touches the ceiling tile. The downlights are made of polycarbonate and are extremely lightweight.



Three-hour maintained emergency versions of Chalice are available for use with 4L lamps. These fittings are supplied prewired and with remote gear, which is located in the ceiling void.

All versions of Chalice are power factor corrected.

Reader Service No. 157

UV lamps kill flying insects

Amba Lamps has launched a range of ultra-violet lamps for insect killing luminaires. Sizes range from 150mm 4W to 1200mm 40W. They are stated to be compatible with all popular ranges of ultra-violet insect killing systems in use in the food industry.

Amba is guaranteeing the life of the new lamps for 8000 hours.

Reader Service No. 158

High bay fitting can be twinned

Twinpower has introduced Multiline Odysee, a range of high bay discharge luminaires.

The aluminium extrusion that houses the control gear can be extended in length to include a further set of control gear. This offers the lighting designer a number of lamp options, including mounting two reflectors side by side to use either two lamps of the same type or, Twinpower suggests, a metal halide lamp with a sodium lamp.

Installation time in fitting twin reflectors in this manner is less than if an equal number of single luminaires is installed.

Reflector lens covers and wire guards are available.

The brightly painted control gear housing also acts as a heat sink.

Reader Service No 159

What you get is more than what you see

When you look at a 2D Compact Fluorescent you'll see a lamp of unique shape from which derive equally unique attributes. Unlike other fluorescent compact lamps, the 2D's tube is well spread and its luminous flux, free and unhindered, can be efficiently collected and re-directed as desired.

The broad luminous area of 2D lamps makes them ideal for general lighting tasks from strictly functional or highly decorative, yet efficient, luminaires.

When you see the 5 wattages in the three sizes of 2D, you'll think of the design advantages in a co-ordinated range of luminaires and lighting solutions.

The Colour Rendering Indices of Ra 82 and 85 and the choice in colour temperatures make 2D perfect to light merchandise for sale or people at work and at leisure.

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It has been since we invented the first lamp in 1879.

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Reader Service No. 12

Recession's no excuse

Dutch lighting giant Philips is one hundred years old this month. Its British subsidiary is under new leadership with the return of *Mike Goodwin* as managing director. So *LEN* went along to ask him some questions about the future of the UK company.

Recession's no excuse — just look to market opportunities. The message is coming across clearly from City House, and it comes from the top.

Mike Goodwin is bullish about UK business. After all, structural changes in the lamp industry have been kind to his company, even if the economic environment is tougher.

"When I left to go to the USA," he says, outlining the background to his return, "I left behind me a healthly lighting company, making acceptable profits in a reasonable economy. When I returned I found we had become number one in the UK market, largely because of divestment by the previous leading player. But, although I was handed back a company which now had number one market share, I am working in a changed competitive environment and a more difficult economic situation. The nature of the competition, too, has changed. We are competing with companies which are more categorised by product line than hitherto — in the form of three lamp companies and a larger number of luminaire manufacturers. The upshot is that we are now the only full-line lighting company, manufacturing both lamps and luminaires."

Looking to the future, Mike Goodwin is anxious to build on relationships with the electrical wholesale industry and to work jointly with them in developing new product opportunities. "With wholesalers we will be looking for partners with whom we can bring added value to the business and form long-standing strategic alliances. In other words, we are ourselves developing even stronger relationships with rather fewer distributors, companies with which we share a point of view. This has benefits in that we have far more control and it offers a greater opportunity to make decisions with our distributors about what we both want to do." In this context he stresses the importance of personal relationships, of knowing the man you are dealing with.

Survey

A recent industry survey attracted 22 respondents. Of these, 81% said their total order books were below normal; and 53% made the point that their export orders were also down. As a consequence, 24% felt that stock levels were "more than adequate". Goodwin interprets this as "overstocked", a situation creating nervousness. The net effect is that price pressures are beginning to develop. "Although the market is clearly significantly down, it is still a big market," he insists. "We all hope that the trade will be at least sensible about how we price products. Very heavy fixed costs, in the lamp sector especially, do bring pressure to bear on prices."

This situation paints a poor profitability forecast — his alternative, is to concentrate more and more on valued added. For instance, there is a tremendous market in cost avoidance. Here he sees great potential, and even goes so far as to maintain that the potential market for professional lighting is "almost untapped". "Cost of ownership," he stresses, "enhances the whole throughput. We have set our cap at looking for opportunity in that latent market. It is fair to say, as rule of thumb, for indoor professional lighting that, if the installation does not have electronic controls and is more than four years old, then the user is wasting money. If we then do a rough calculation about how big that market is, it's certainly larger than the market we have now. I would suggest if all of us — manufacturers, distributors, contractors, specifiers — were to concentrate on that market, we are all going to have plenty of work and produce significant profits."

"If we back economy in this way, the users are also going to be the winners. In short, if we take advantage of this opportunity in lighting there is no recession; it's only an excuse if we do not do well."

Other companies find their way out of quiet periods by stepping up exports. As part of a multinational, Philips Lighting does not have this option. This does not appear to trouble Mike Goodwin in any way — quite the reverse. "It does not matter because my business relationships and my task are in this country. Our focus is the UK, and to my mind the market potential here is vast, so we can ignore any tales of recession. We measure our performance in terms of creating new opportunities. We are not specifically interested in trying to get a bigger share of what already exists. We are more concerned with taking the latent UK market and getting a differential share of that."

He is no less confident about the domestic consumer market. "You ask me if we have been successful here or not, and I would say that from a marketing point of view, if a supermarket food chain or DIY manages to retail a PLCE lamp at £12-£14 then we have succeeded. We regularly place some fifty or sixty lighting lines in these outlets that they would not have considered ten years ago, and they have been very effective in raising public awareness of lighting."

"In fact, I have a great appreciation for retailers themselves. They require absolute discipline and keep us on our toes. This is not because they are difficult people but because when a product is not on the shelf you are effectively out of business. Most retailers do not have a second-line supplier and they depend on you to perform against your promises."

Performance

"The best of them expect very high performance levels for a newer product line. Unlike the professional market, the majority of products we are now selling to the domestic consumer have only come on the market in the past ten years. The domestic market is also very cost conscious."

"Finally, I must admit that over the years certain retailers have done more then the lamp manufacturers to make new light sources available and to educate the customers in their use. These retailers we particularly value and we take them into our confidence very early in the development stage of new products."

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Light is our business.
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Reader Service No. 14

CSP puts a measure to quality

Lighting at work has a tremendous effect on productivity — so how can you forecast what workers will think of their office lighting? *Bob Bell* describes a system developed by Thorn Lighting for forecasting user satisfaction and relates it to the CIBSE Code.

The recently introduced CSP Index is an attempt to achieve what many people would consider impossible — to be able to predict what the workers' opinions about the quality of their lighting will be.

Introduced initially for office lighting installations, it uses a computer model as a basis for balancing the mass of interrelated parameters relating to the lighting equipment, the space in which it is installed, and the people and activities within that space. The result is a simple quality index (Qi) measured on a scale from zero to 100 — although, in practice, values much above 70 are uncommon.

The index is based on the principle that three factors influence perceptions of 'quality' in a lighting installation — visual comfort, visual satisfaction and visual performance. **Comfort** is concerned with factors such as discomfort glare which disturb people and cause stress, irritation or fatigue. **Satisfaction** relates to people's feelings about the workplace, whether it appears bright or gloomy, and whether it seems adequately lit. **Performance** is a more subconscious factor relating to the ability of the staff to do their work well under the prevailing lighting conditions.

The CSP Index draws upon existing and new research into the factors that influence people's perception of different lighting conditions, to produce a computer model which is used as the basis for the evaluation process. This takes account of such elements as: the horizontal illuminance (Eh); cylindrical illuminance (Ec); glare index (GI); uniformity (U); distribution factor (DF[F]); colour rendering index (Ra); and the extent of VDU use within the area. This last element is an increasingly important factor in modern commercial lighting.

CIBSE code

All these factors are covered by the *CIBSE Code for Interior Lighting* which gives a wealth of information on how to design a quality lighting installation and CSP does not replace the code. But many installations fall well short of the requirements of the code. Although many designs never 'see' a code of practice, the few that do are limited to just the lighting level recommendations.

A lighting installation designed to the *minimum* requirements of the Code would produce a CSP index of about 35. This would correspond to 80% satisfaction with the office lighting as CSP measures quality in terms of the probability that people will be satisfied. This may, at first, appear reasonable until it is remembered that if 20% of staff are dissatisfied with their working environment it could have a major influence on performance, staff morale and absenteeism. Figure 1 enables these probabilities to be assessed. For a given CSP Index the percentage of people holding a certain opinion about the office lighting can be read off the graph. For example, a CSP Index of 40 would produce 85% satisfaction while 70 would produce 95% satisfaction. In practice, lighting is not the only cause of dissatisfaction and, therefore, a CSP Index of over 70 is unusual.

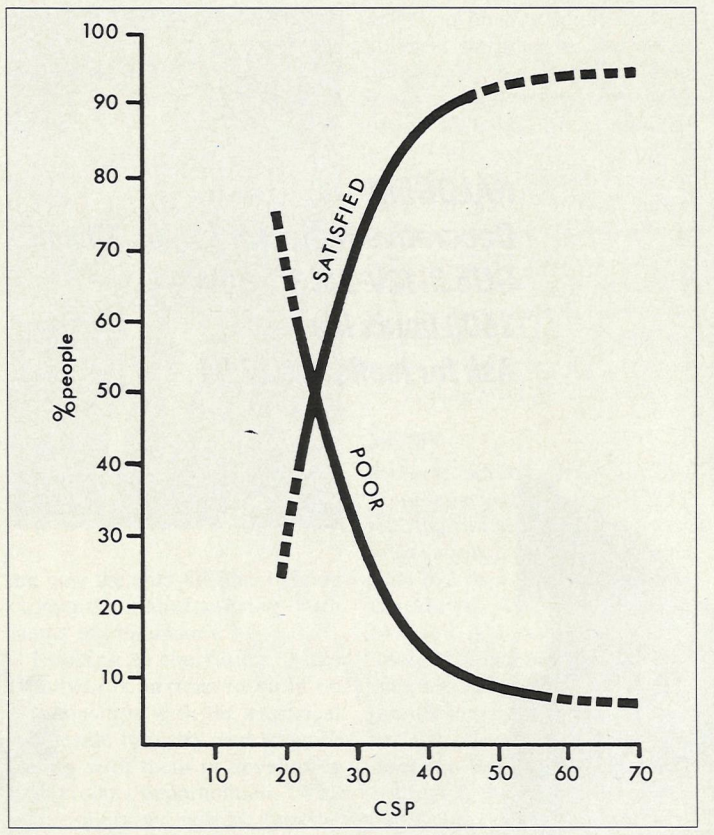


Figure 1. Graph relating CSP Index to opinions on lighting.

Need for a quality index

Lighting represents 15-16% of total electricity use in developed countries; about 9% of the total commercial. Not only is the commercial sector the largest user of lighting energy, but lighting constitutes some 50% of electricity consumption in the average office. This is a strong incentive to invest in energy-efficient lighting.

It is important, however, to view these costs in the context of total operating costs. The capital and operating costs of lighting a modern office represent less than 0.5p in the pound — while wages and associated costs consume 84 pence in the pound.

Thus, a 30% reduction in lighting load — which is readily achievable by a switch to modern technology — would represent a saving of less than 0.15p in the pound. In contrast, a 1% improvement in performance by the work force would be worth nearly six times this figure. Expressed another way, the money saved by a 30% cut in lighting costs is equivalent to 40 seconds extra work time in the average day, or one headache per worker per year!

So, we shouldn't aim to save energy, but to save energy while improving productivity.

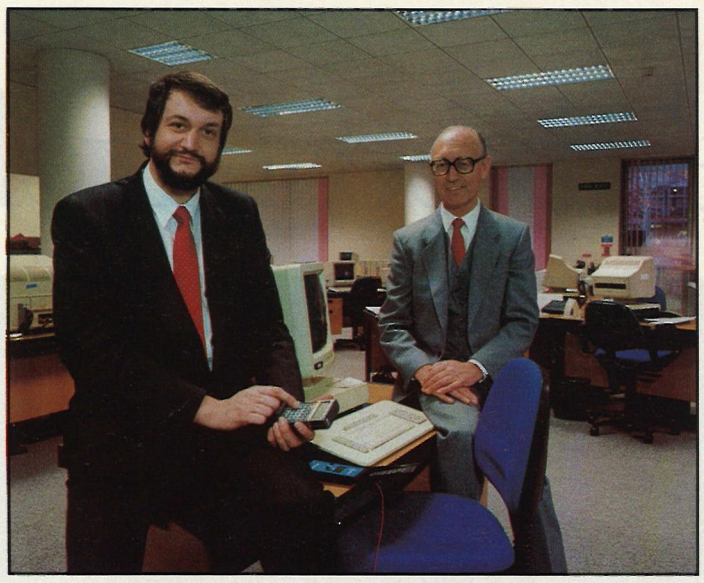
Studies over the years have shown that real and perceived improvements in the working environment can have a dramatic effect on the performance of the work force. As far back as the 1920s, the experiments of Mayo in the Hawthorne works in Chicago, showed that productivity had more to do with worker satisfaction than with illuminance — the well known Hawthorne effect.

In a more recent example an industrial company improved its lighting with a scheme that, it calculated, would achieve a two-year payback in terms of energy saving. At the same time, because of better lighting, a 5% improvement in productivity was hoped for; this they calculated would yield a payback in just five days! In practice productivity improved by 8-10%.

CSP development programme

It was against this background that, in December 1988, Thorn Lighting initiated a programme to develop a quality index for office lighting installations. "The object was not to develop a new design method but to use existing criteria and establish their interrelationship with worker's judgements", says Bob Bell, the company's chief lighting engineer. He describes the Index as a barometer by which it will be possible to judge the overall effectiveness of the design as perceived by the workforce.

An independent lighting consultant, Dr Bob Bean, was commissioned to pioneer the work. In the first place existing worldwide research into human response to different lighting conditions was examined. The object of this was to bring together all the signifi-



Bob Bell of Thorn and consultant Bob Bean.

cant findings and see if they could be combined to produce a single meaningful index.

At the heart of this process is the theory that we respond to three interrelated criteria — visual comfort, visual satisfaction and visual performance — and that if they could be represented by a single index in the range 0-10, then the quality index could be represented by the formula:

$$Qi = 3 \times \frac{C \times S \times P}{C + S + P}$$

This formula ensures that all three elements must be given due attention. It can be imagined as a box with sides of lengths C, S and P. The CSP Index is similar to the volume of the solid and the highest CSP results when the volume is biggest (Figure 2). In

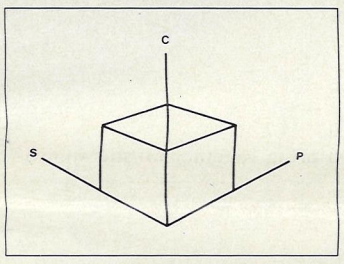


Fig. 2. CSP visual quality solid

human terms, it means that people's judgements about their visual environment will be most influenced by the factor that is poorest, and increasing the other two factors will not do much to compensate for the problem.

As a result of the first phase, Dr Bean produced a complex family of interrelated formulae which were brought together in a computer model to yield a quality index of this form.

The next step (Phase 2) was to test his hypothesis experimentally. The decision was taken to use real people in real office environments rather than laboratory conditions. The reason for this was simple. If it was to be of any practical use it had to work in the real world not the laboratory — and lighting research is littered with results that never worked when applied to the real world.

Phase 2 of the programme was thus a pilot study by Thorn's own research staff in various company offices looking at the attitudes of office staff during their normal work in a range of office environments.

The results at this stage were better than had been expected and provided some additional data to enable the system to be refined. Among the patterns that began to emerge was the importance of cylindrical illuminance and the relatively lower significance of such things as colour temperature. The question of daylighting was taken into consideration and it appeared that whilst the *presence* of windows provides an important link with the outside world, satisfaction does not vary dramatically with distance of the subject from windows.

Phase 3 was to look for independent verification. Five academic institutions were commissioned to carry out tests in a variety of office buildings across the country to enable human response to different conditions to be compared with the results predicted for the same installations using the proposed CSP Index.

The teams used a simple test to determine workers' responses to their office environment. They noted the types of luminaire employed so that manufacturers' photometric data could be consulted and were also given a kit to enable them to measure illuminance, cylindrical illuminance, colours and reflectances and room dimensions. They also had a camera so that they could photograph the installation.

The test was restricted to offices with overhead lighting; offices with uplighting or localised lighting were excluded. Some of the offices had VDUs while others did not. The researchers were not told anything about CSP, so that they could not introduce accidental bias and their measurements would be of a similar quality to what might be expected in practice. Their results were scanned at the end for test errors, for omissions and to ensure consistent experimental method.

Combined with the pilot study, this meant valid data had been obtained for over 44 offices with a total of 650 occupants — a much larger sample than is normal for such exercises.

It is interesting to note that 25% of the offices surveyed failed to meet the basic illuminance recommendations of the CIBSE Code; 30% had excessive discomfort glare and 9% had too much light on VDU screens.

Effectiveness

The results of the survey were positive in confirming the effectiveness of the CSP model as a means of discussing workers' opinions about the quality of their lighting. Many statistical analyses of the results were conducted and produced similar results! They indicated that the correlation between illuminance and subjective assessment of the quality of lighting is not as close as the CIBSE Code suggests while the correlation between the CSP Index and subjective assessment is significantly better.

An important test is the statistician's rank correlation which tests how good a system is at putting things in the same order as the assessments. The CSP Index yielded a rank correlation coefficient of 0.54 compared with 0.33 for horizontal illuminance. Moreover, the analysis indicated a significance of 0.03 per cent, ie the probability of such close correlation by chance is less than 3 in 10 000.

The CSP Index model allows for subsequent refinement. It already takes full account of modern VDU use by including the proportion of VDU users and the time for which the screens are used, but Professor Wilkinson's work on the effect of high frequency lighting on opinions was still in progress while the system was being developed. This will, however, be taken into the system in due course.

The results of the CSP development work and evaluation indicated a number of factors:

- ☐ A meaningful quality index (Qi) embracing visual comfort, satisfaction and performance is possible and the results correlate well with practical tests.
- ☐ Cylindrical illuminance (Ec) is a significanct element in quality.
- ☐ Other significant criteria are horizontal illuminance (En), distribution factor (DF[F]), glare index and VDU use. These and the cylindrical illuminance all need to be correctly measured or calculated.
- ☐ No special, new measurements need to be recorded other than cylindrical illuminance, which, although not new is unfamiliar to many.
- ☐ Uniformity (U) is not as significant as had once been thought.
- ☐ Correlated colour temperature (CCT) is almost negligible in its effect upon the CSP calculations. However, it may emerge as a more significant element in localised lighting or industrial lighting and is included in the model for these future purposes.

Using CSP

The CSP Index calculations are incorporated into a computer model which is offered as a Shareware program for use on personal computers. It is available for use by anybody who wishes to use it, subject to normal Shareware software conditions (ie the copyright is retained by the authors). A small fee of about £3.50 plus postage is payable to the Shareware company for duplicating the disk. It can be used at the design stage to generate a CSP Index for a proposed lighting scheme or it can take actual measurements from an existing installation.

When used at the design stage, the intention is that the lighting engineer should design the scheme first using the appropriate codes of practice and then use the CSP program to obtain an Index for the installation to determine the probable human opinion of the lighting quality. If he then wants to improve the installation quality, he can change selected parameters on the screen to evaluate the options available.

When the CSP program is run, the user is presented with a single screen display into which he inserts information in five groups:

- ☐ Data about the room (length, height, height of luminaires above the work plane, effective ceiling, wall and floor reflectance and glazed/wall area).
- ☐ Data about the luminaire (distribution factor, downward light output ratio, upward light output ratio, light modulation ratio at 100Hz and whether high-frequency gear is used).
- ☐ Data about the light source (colour rendering index and correlated colour temperature).
- ☐ Data about the room illumination (average horizontal illuminance, average cylindrical illuminance, average uniformity on desks and discomfort glare index).
- ☐ Data about the office workers (number of workers, number who use VDUs, percentage of time they use VDUs, and whether the work is especially demanding).

All this data remains visible on the screen while the software calculates the CSP Index which is then displayed on the screen below the input data.

In an installation where, say, 20% of staff used VDUs it would be possible to input the same data separately for the VDU users and the non-VDU users to get a separate quality index for each group and so determine how well it met the needs of each group, as well as a composite index for the whole staff.

The CSP software includes a full text file of notes on the CSP Index with guidance on how to measure, calculate or otherwise obtain the input data. It also provides material to enable a separate user suvey to be carried out (following the same criteria as the surveys used in the development programme) to enable the results of the CSP evaluation to be verified.

Bundled together in the same software package is the Hyperlight program, which Bob Bell describes as 'an interactive aid to the CIBSE Code'. Written by J Lynes and W Burt, this is a text-orientated program containing explanations and guidance on office lighting which can be called up on screen.

Conclusion

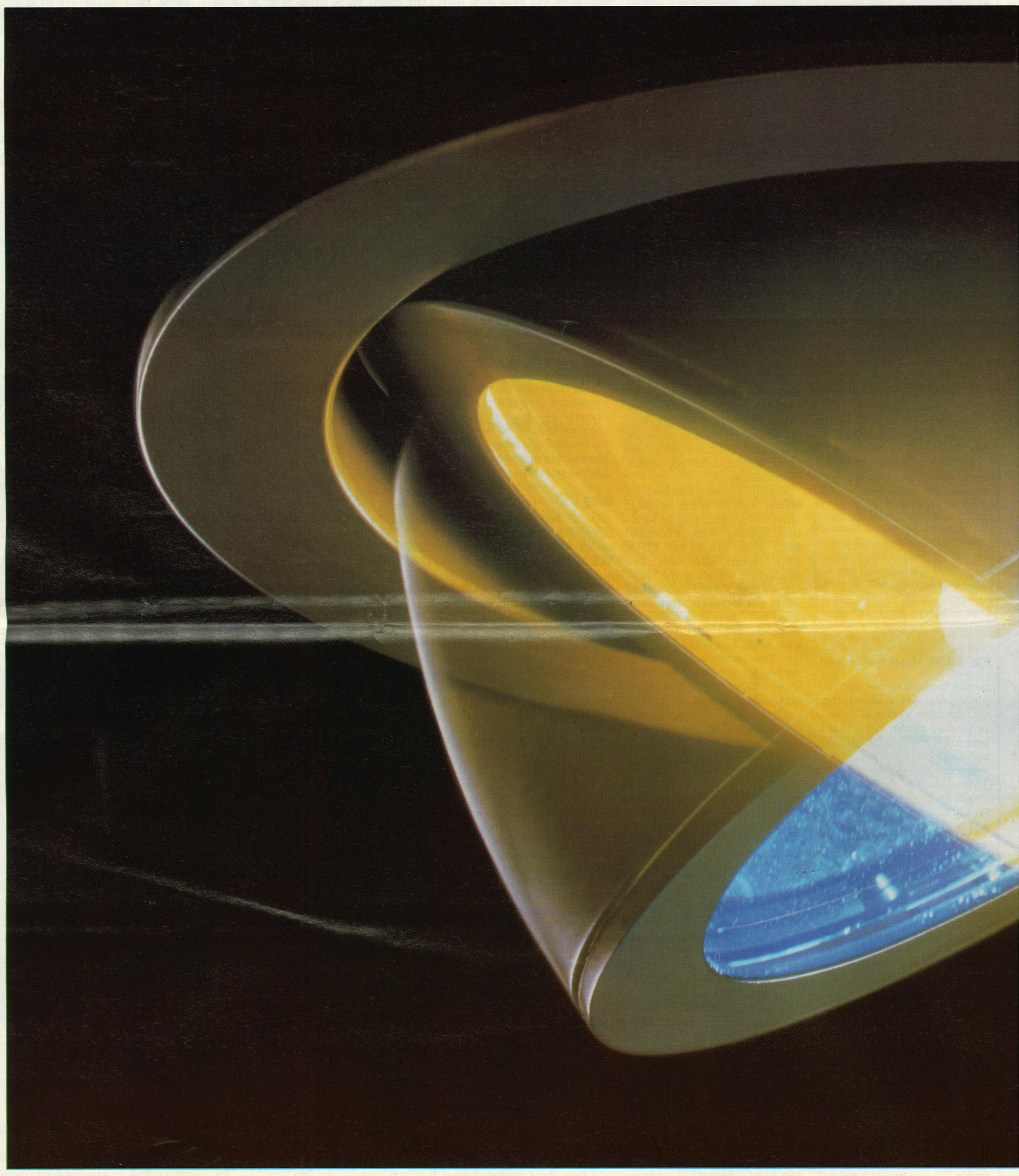
Bob Bell admits that at the outset of the project he had not thought it possible to produce a robust and viable index. Research work of this type with real situations seldom produces a clear result. "The biggest surprise for us was that it worked" he admits. The result of Dr Bean's work has exceeded expectations, producing a remarkable degree of consistency. "It's not perfect" admits Bob Bell, "but it is a powerful tool by which it is possible to judge the quality of office lighting in relative terms, and it is the best measure yet of what the workers will think".

"It is like using a barometer to judge the weather" he says, "It is simple to use and gets the right answer most of the time. When the index increases so does office lighting quality and when it decreases so does office lighting quality. That's a major step in understanding what makes office workers happier and offices run better. For the very first time we have a lighting measure which looks at lighting from the office worker's point of view that will benefit the employer and employee alike."

At present the CSP Index is restricted to offices with conventional overhead lighting. The concept could be extended in future to include offices with localised lighting or uplighting. If it becomes accepted, it will be extended to apply to factory, warehouse and other forms of lighting. But first the CSP Index for office lighting quality needs to gain widespread acceptance.

So far the indications are all positive.

We've fixed Pixel

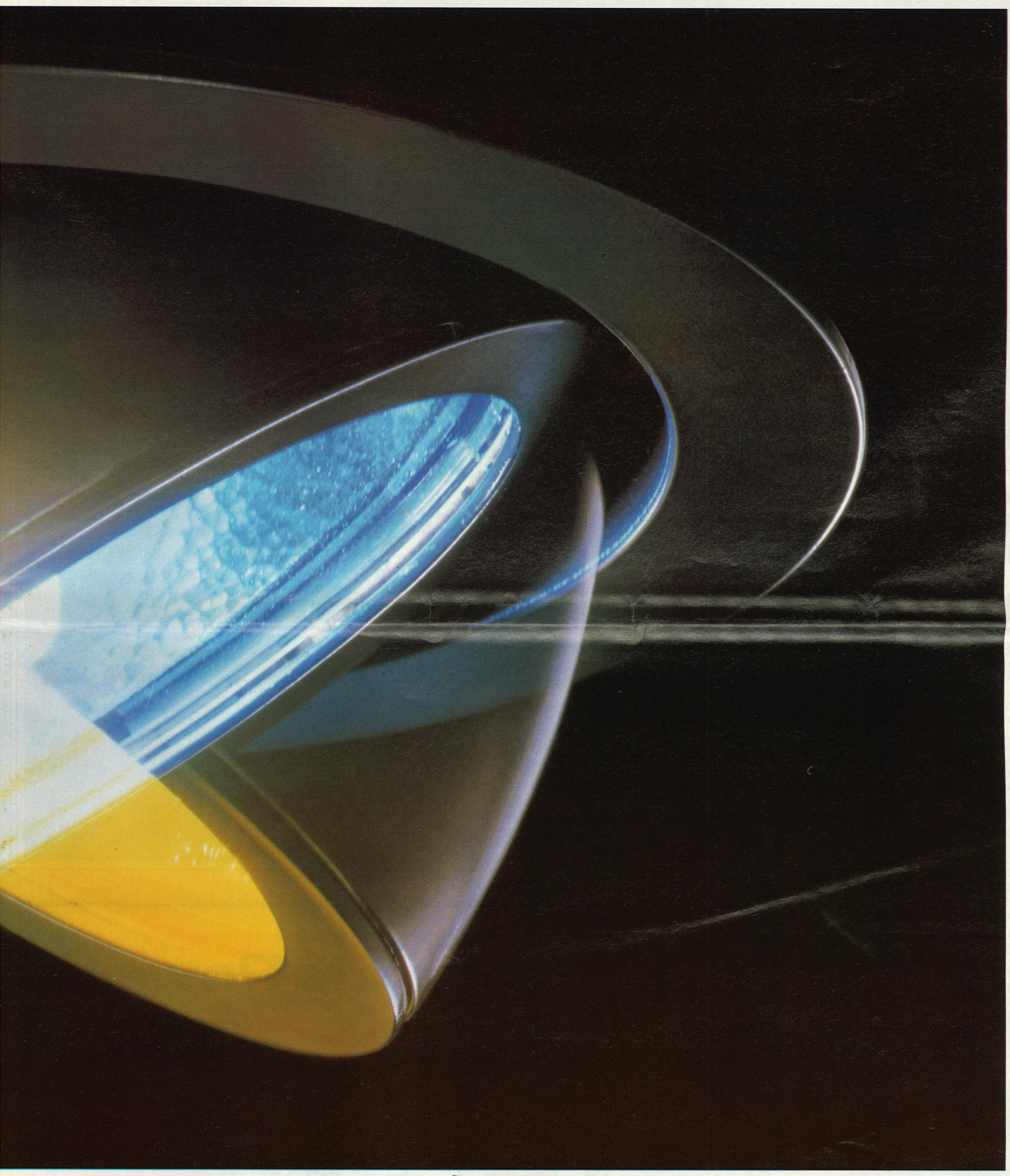


Theoretically Pixels are downlights, so they should only light downwards. In practice they move 45° from the horizontal and 355° around the vertical axis.

This means you can direct the light wherever you like, even after initial installation.

Pixels are made from die-cast aluminium and are available in two types: the 185 series, suitable for the latest light sources such as the 2500 K SDW-T and miniature 35, 70 and 150 watt metal halide lamps. The 100 series also has a wide range of accessories, such

so it moves.



STZ

as fresnel lenses, louvres, colour and UV-IR filters.

Pixels carry the F safety standard mark and can be fitted to flammable surfaces since the temperature of the contact points never exceeds 90° C.

For more information direct your correspondance to: iGuzzini, Unit 310-311, Business Design Centre, 52 Upper Street, Islington, London N1 0QH, Tel. 071-2886025, Fax 071-2886057.

iGuzzini
Architectural Lighting

Stansted Airport — Simplex high bay fittings, using SON and MSI lamps, provide good but cost-effective lighting with good colour rendering.

Efficient industrial lighting

Industrial processes provide some of the most demanding environments for lighting installations. Here, more than in any other sector, economy can be false economy. So, the key must be to choose the most appropriate system not the cheapest. *Trevor Humphreys* of Simplex Lighting gives a few pointers.

In the current economic climate, the capital cost and energy consumption of lighting installations are becoming increasingly important to specifiers, contractors and users. However, these are only two factors affecting the overall efficiency of lighting installations. Ensuring the right quality of light for the task, minimising the overall maintenance costs and ensuring the suitabilty of the luminaire to the environment, all significantly affect the cost effectiveness of a lighting installation.

Light quality

Most users accept the link between light levels and productivity — no one asks the evening shift to work with the lights switched off! However, some remain sceptical that it is the distribution of the light, not just the amount, that is of crucial importance. Excessive glare, reflections, strong contrasts in lighting levels or a light source with inappropriate colour rendering can all affect employee performance and, hence, productivity and quality. Opting for the 'cheapest' lighting scheme can prove very costly indeed.

Several factors affect the quality of light. But the first equipment choice to be made by the lighting designer is the selection of the appropriate light source.

Selection is determined primarily by the colour rendering properties of the lamp, its output/wattage and the lamp life. The colour rendering properties are of crucial importance. While this is widely recognised in industries such as textiles and printing, other industrial users are sometimes less conscious of this need. However, care should always be taken to ensure that the light source gives the required colour rendering.

For example, in an engineering area the use of SON laps may reduce the contrast between surfaces such as brass and copper which could lengthen visual inspection times or lead to costly errors.

Where more than one light source gives a satisfactory colour rendering, the designer can choose the most cost effective lamp. This he will calculate on the basis of:

- ☐ the light output of the lamp;
- ☐ its energy consumption (and that of its associated control gear);
- ☐ the life of the lamp.

Thus, energy consumption is not the only criterion — a brighter source may require fewer fittings and hence reduce capital costs, while a longer life lamp could reduce maintenance costs.

Care should be taken over the use of fluorescents in certain onerous areas, as their light output falls significantly at high temperatures. If temperature build-up is likely to occur, suitable HID sources should be used.

Which control gear?

Having determined the appropriate light source, care should be taken to select the most cost effective control gear.

Fluorescent control gear

High frequency gear and ballasts which allow dimming enable light and, hence, energy to be used flexibly. High frequency gear is more energy efficient than conventional switch-start gear, and by extending lamp life will also reduce maintenance costs. The possible payback of measures such as high frequency gear and control systems should be investigated before deciding which gear to use.

The use of high frequency control gear can prevent stroboscopic effects — the effect of light which makes rotating machinery appear either stationary or moving at a different speed from what it actually is. Stroboscopic effects are most commonly overcome with the use of localised non-discharge lighting. However, if the effect is widespread then high frequency gear may be the most cost effective solution. In onerous environments fluorescent control gear should be protected within the fitting.

HID gear

In many industrial environments heat and moisture are major problems. In such areas HID control gear should be sealed, corrosion resistant and cool running. If gear which is not up to the task is selected, it may quickly deteriorate and need to be replaced. It can also affect lamp performance. Superimposed pulse ignitors will ensure first-time lamp starts and extend lamp life.

Where ambient temperatures are very high, in processes such as furnaces, casting manufacture or some plastics manufacture, control gear should be sited as far away from the heat as possible. Lamp performance will not normally be affected.

Choosing the right luminaire

The luminaire significantly affects the cost and efficiency of a lighting installation in four ways. The most obvious consideration is the price of the fitting, but other, equally important factors are:

- ☐ light distribution of the fitting;
- ☐ the ease with which it can be maintained;
- ☐ its suitability for the industrial environment.

Attempts to 'save' money at the expense of these three factors can result in lost productivity and greatly increased maintenance or running costs.

Light distribution

As already mentioned, the quality of light can significantly affect productivity. The fitting chosen should give a light distribution appropriate to the visual task. For example, where the height of the working plane is liable to change, or varies widely over a relatively small area, then closely spaced, wide distribution fittings will normally be selected to give the necessary vertical illumination. Most industrial manufacturers offer a range of luminaires of differing light distribution appropriate to the varied requirements of industry.

Whichever type of distribution is required, selecting the most efficient fitting for the task will reduce the number of luminaires required, and hence reduce capital, installation, maintenance and running costs.

Glare

When focussing on light distribution, the temptation to concentrate purely on the quantity of downward light should be strongly resisted. While louvres and diffusers can slightly reduce the amount of light reaching the working plane they both help control the light distribution and reduce glare. Glare can significantly affect productivity and can be a hazard in many industrial environments. Workers involved

High bay fitting (Simplex Series 1 Hibay) with circular control gear. The lamp is sealed and corrosion resistant. The circular shape prevents hot spots, thus optimising efficiency.

with moving machinery, toxic substances, molten metal, or merely moving heavy loads, are all at risk if temporarily blinded by disability glare. Even 'discomfort' glare can be dangerous if it distracts an operator from spotting a potential obstacle or hazard.

Perceived glare is only partly dependent upon the amount of light we see. It is actually a relative phenomenon, caused by excessive contrast between the area upon which the eye is focussed and the surrounding area. Thus, in certain circumstances, lighting of non-process areas will be required in order to reduce the perceived glare from luminaires in process areas.

A degree of upward illumination may also be required. For example, poorly lit food processing areas will appear unhygenic. Similarly, a dark ceiling above luminaires can also create a depressing tunnel-like atmosphere. In these circumstances some upward light to illuminate the ceiling is required, both to create a more cheerful atmosphere, and to increase the perception of cleanliness. Thus, the efficiency and suitability of a luminaire for an environment should not always be judged purely on the amount of downward light it produces.

Minimising maintenance

All lighting designers include a maintenance or 'light loss' factor to take account of lost light output due to dirt, and assume regular cleaning of fittings. As maintenance costs increase, so ease of maintenance is becoming an increasingly important factor in scheme design and luminaire selection.

Careful design of an installation can greatly reduce maintenance costs. For instance, wherever possible luminaires should not be directly mounted over process areas, particularly onerous areas which can be found in the paper making, plating, food, drink and tobacco industries. It can be dangerous as well as costly for maintenance personnel to be suspended over process areas in these industries — few people would want to re-lamp luminaires while suspended over a plating tank giving off acid fumes!

It is better to mount luminaires near the edge of such areas so that the vats or tanks are adequately illuminated, but need not

Bass brewery — Conductalite luminaires mounted back to back allow access to lamp and gear units from a single point. Each pair of luminaires provides glare-free illumination over the process area.

be covered or shut down for lighting maintenance. In any industrial environment, if production has to be stopped to allow maintenance, or if maintenance is only possible outside working hours, then the total cost of a lamp change can be very high indeed.

Most manufacturers incorporate features into their luminaires which make maintenance easier.

- ☐ Sealed luminaires should have easily removeable covers to allow quick lamp changes.
- ☐ Fluorescent fittings have removable gear trays as changing components is more easily done on a bench than working 5m off the floor looking up at a dark luminaire.
- ☐ Gear for HID fittings is normally accessible via a single opening. HID luminaires should also allow the use of safety chains where appropriate.

Corrosion resistance

Three factors determine the nature and extent of corrosion:

- ☐ nature and concentration of the corrosive agent;
- ☐ presence of moisture, heat, and dust;
- ☐ design of the fitting, including its overall shape and the material used in its construction.

As the first two factors are often outside the designer's control, special care must be taken when selecting the luminaire.

The designer or specifier must ensure that the materials from which the luminaire is constructed are suitable for the proposed industrial environment. Aluminium may be affected by the presence of strong acids; some plastics, while generally resistant to acid attacks may be corroded by certain organic substances. If in any doubt about a luminaire's suitability for a particular environment always consult the manufacturer.

The presence of moisture on a fitting can either cause otherwise inactive substances to corrode the luminaire, or speed up the rate at which corrosion takes place. Thus, luminaire design should minimise moisture retention; surfaces should be smooth; and the fitting should be free of unnecessary nooks or crannies where mositure or dust might collect.

Regular cleaning is essential as dust retains moisture, thereby intensifying the corrosive reactions on the luminaire surface. Annual cleaning is adequate for most environments. Where prismatic controllers are used it is important that the prisms are internal.

If dust, dirt or moisture are present, a minimum IP44 fitting is recommended, preferably a sealed (IP65) fitting. An IP65 fitting will prevent the ingress of dust or moisture. Any seal fitted should be effective but must still allow for easy lamp reaplacement. Luminaires should have the minimum horizontal surface area which could act as a dust trap or allow fungul growth, and the luminaire should be suitably robust to withstand cleaning by hosing down.

Another method of preventing dust build-up is to have an open fitting which allows the free passage of air. Thus dust passes through the fitting, rather than settling on it. This method is used mainly on HID luminaires and in dry environments.

While luminaires which are corrosion resistant and easy to maintain will, of course, cost more than 'standard' products, maintenance cost savings can be enormous. Moreover, luminaires which are not designed for hostile environments will quickly corrode, require frequent maintenance, and unfortunately have a short life. Luminaires with a cover which is not sealed will act as dust traps and reduce the amount of light reaching the working plane, or else incur a heavy maintenance cost.

Conclusions

To provide a truly cost effective industrial lighting installation the primary consideration must be selection of the correct light source and luminaire. Attempts to 'save' money by using luminaires not suited to the task can cause the owner considerable expense in terms of lower productivity and unnecessarily high maintenance costs.

Poorly designed lighting can also affect the safety of industrial workers. Luminaires should have a light distribution appropriate to the work situation. They should give minimal glare, be easily maintained and be constructed from materials suitable for the industrial environment.

Selection of light sources and luminaires should, of course, include energy considerations. Energy control systems are becoming increasingly sophisticated, and it is not possible to do them justice in a single paragraph of this article. Their cost should of course be weighed against their potential benefits. However, it is important to remember that energy consumption is only one of several factors affecting the overall cost of a lighting installation. Only when all the criteria I have mentioned have been met should the relative cost of manufactuers' fittings become a factor in luminaire selection.

My article has only been a general guide. For further information on industrial lighting, the following are useful publications:

CIBSE Lighting Guide 1 — The Industrial Environment 1989
CIBSE Lighting in Hostile and Hazardous Environments 1983

Industrial lighting in action

Some practical examples of lighting installations in a variety of industrial premises.

Part of Sharpness Docks where lighting is by floodlights on 25m high columns.

Better lit docks

The term industrial lighting is used to describe lighting installations for widely varying environments, from areas where there is a risk of explosions, such as in petrochemical plants, to clean rooms such as factories where electronic components are assembled and dust must be excluded from the atmosphere.

In the following case studies contrasting locations have been selected to show examples of modern industrial lighting practise.

In the late 1980s new regulations for the illumination of docks required a new exterior lighting scheme at Sharpness Docks in Gloucestershire. The docks needed an installation that would illuminate the complete quayside and tidal basin area to a level of 20 lux.

Over the years, since the first dock was constructed in 1827, Sharpness has been illuminated on an ad hoc basis. The resulting scheme centred around the lock and basin area and consisted of 90W low pressure sodium luminaires on standard telegraph poles, similar luminaires mounted on warehouses and silos, and 1600W metal halide fittings on 55m high lattice towers. Most working areas of the docks had only a minimal level of lighting.

The present scheme designed by Abacus Municipal uses the company's raising and lowering lighting columns in heights of 25m and 12m in the dock areas and standard 5m and 8m columns along the pier and access roads.

Abacus AM503 and AM504 series floodlights with 400W tubular high pressure sodium lamps were used throughout to provide an illuminance of 20 lux.

The raising and lowering columns can be rotated through 90°, further facilitating maintenance from ground level.

Fitting a Zenith luminaire on a giant boring machine.

Machine lighting in a big way

Giant boring machines 220m long, which are playing a major role in the Channel Tunnel project, have their own special lighting.

The machine operatives work in searing heat, fumes and dust created by the machines as they work their way forward along the 50km triple tunnel.

Lighting obviously plays a vital part, not only in a functional capacity but also by contributing to efficiency and safety. Reliability is of paramount importance, particularly as the work continues round the clock pausing only for maintenance. All equipment must go forward in the rail wagon and therefore has to be as compact as possible.

Gewiss has supplied lighting for the machines in the Marine South Tunnel. Zenith fluorescent industrial luminaires use either single or twin 1500mm White lamps. They include painted reflectors and also have maintained, three-hour emergency lighting facilities.

Shallow profile

Housings and diffusers are both made of tough polycarbonate. They are sealed with neoprene gaskets and tamper resistant clips to ingress protection rating IP65.

The diffusers have lenticulated prisms to reduce glare. One of the reasons they were chosen was because of their low profile: only 112mm deep.

For on-site safety reasons the luminaires were adapted to operate on a supply of 110V 50Hz.

Lighting improves safety near tanks

A new lighting installation for the Bayer latex plant at Bromsgrove uses zone 1 hazardous area luminaires by ABB Power to light outdoor storage tanks.

During the production of latex, flammable materials react together under pressure, hence the need to keep abreast of improvements in safety.

Existing 200W tungsten fittings have been replaced with four fluorescent eLLK and eLLM systems which are certified by PTB, Germany, to the appropriate Euronorm.

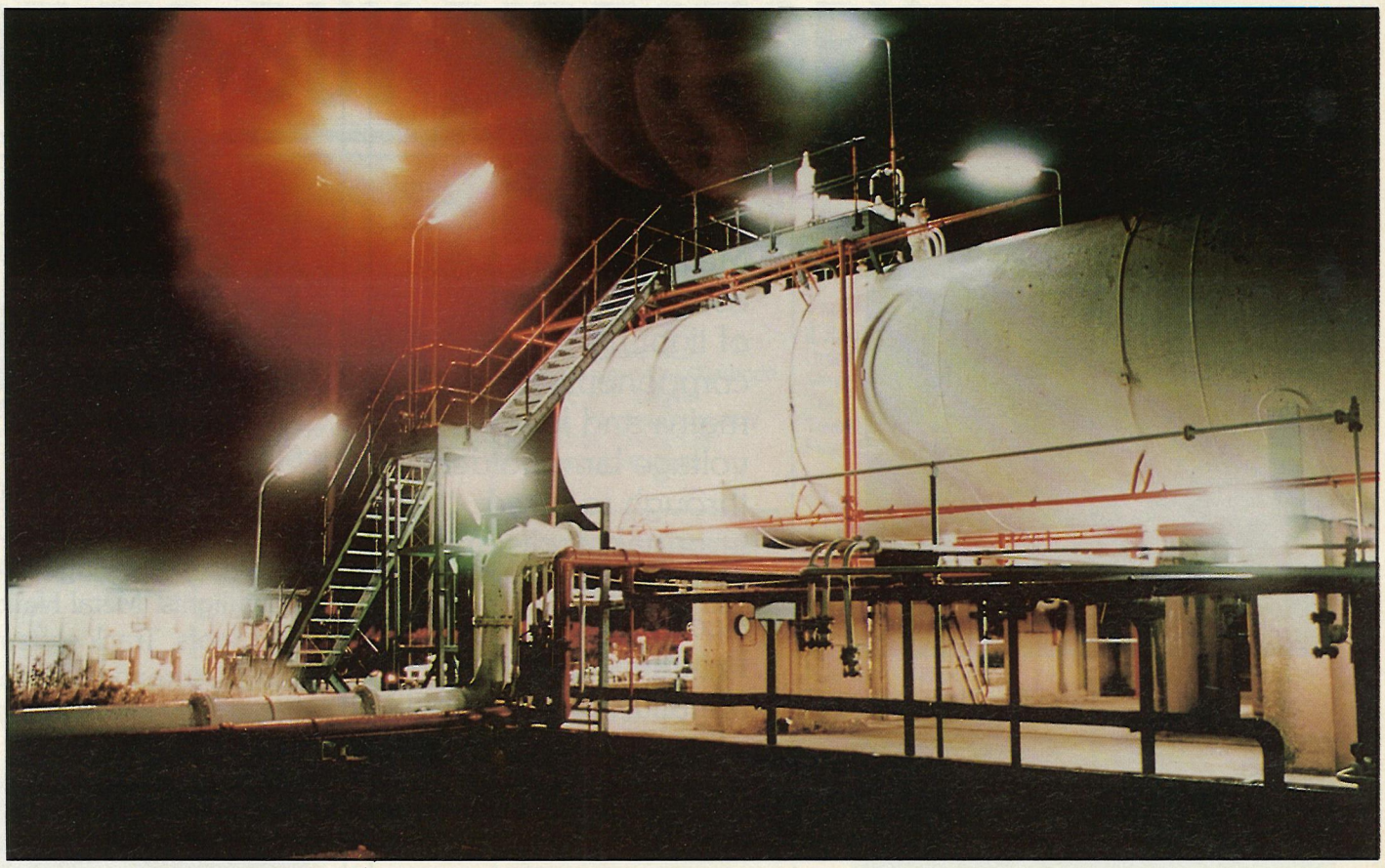
The lighting system installed also uses electronic ballasts, which result in a 20 000hr lamp life, polycarbonate housings and diffusers, and allows fast relamping and maintenance. Ingress protection rating is to IP65 standard.

Protection for industrial processes and staff is increased by incorporating automatic switching which disconnects the mains voltage from control gear whenever the diffusers are opened.

Self-contained emergency lighting facilities are incorporated in the luminaires so that lighting is maintained during power cuts.

One process-specific requirement in relighting the plant was that safety shower units must be clearly visible: in the case of an accident operators must have rapid access to a shower. So the units were fitted with green, compact fluorescent lamps to provide maximum visibility.

As well as increasing safety standards, the new lighting installation has reduced electricity running costs.



New hazardous area lighting at a latex plant.

Windows lit by sodium

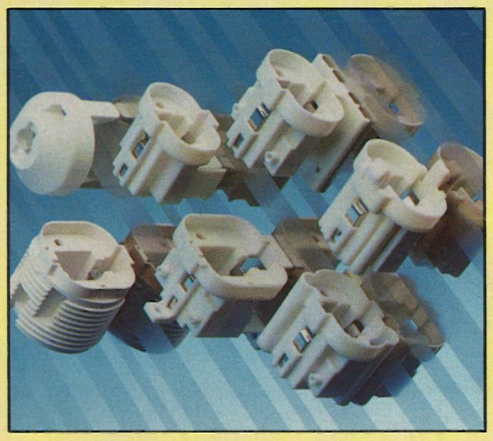
A window factory lit by sodium and HalogenA lamps.

The manufacturing area at the Crittall Windows plant at Braintree, Essex, is lit by 789 shallow, rectangular luminaires using 250W tubular high pressure sodium lamps.

Some of the fittings have a built-in 150W HalogenA lamp to provide light while the sodium lamps are warming up. With the luminaires suspended 4.5m above the work benches, the installation gives an illuminance of 500 lux. Total installed load is 218kW.

Store rooms are lit by drum shaped, surface mounted luminaires, each containing two PL9 compact fluorescent lamps.

METALLUK



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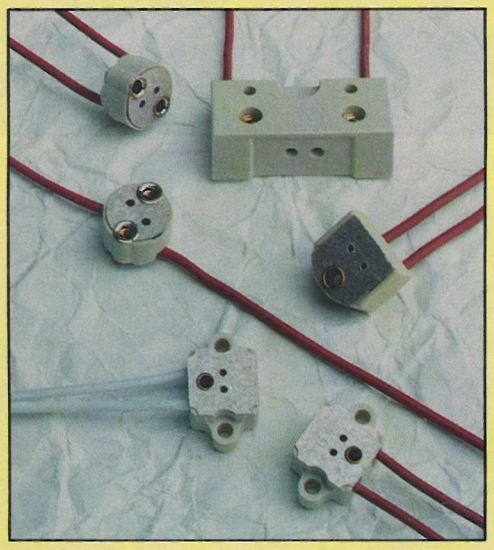

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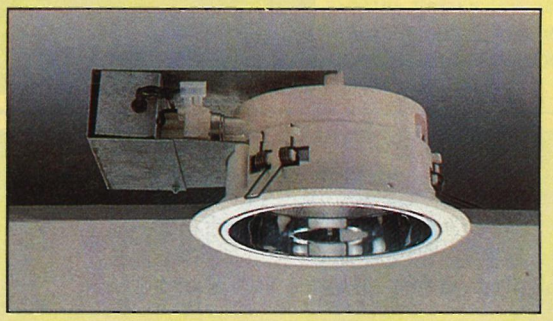

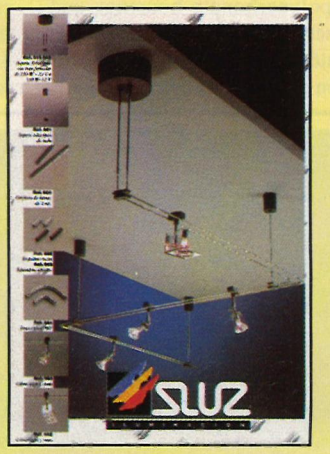

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ACORN LIGHTING PRODUCTS Ltd

Acorn Lighting Products Ltd was formed fourteen months ago to source products and components for the UK lighting industry. A few of the main agencies are shown on this page, but a considerable number of other products are available to the company, enabling us to provide a comprehensive service. Acorn Lighting are able to cater for most companies requirements, and save the problems and cost of scouring the World for essential items. We are only a phone call away.

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The Italian manufacturer Fratelli Francesconi offer a comprehensive range of high quality cast aluminium external and interior fittings for use with GLS or low energy lamps.

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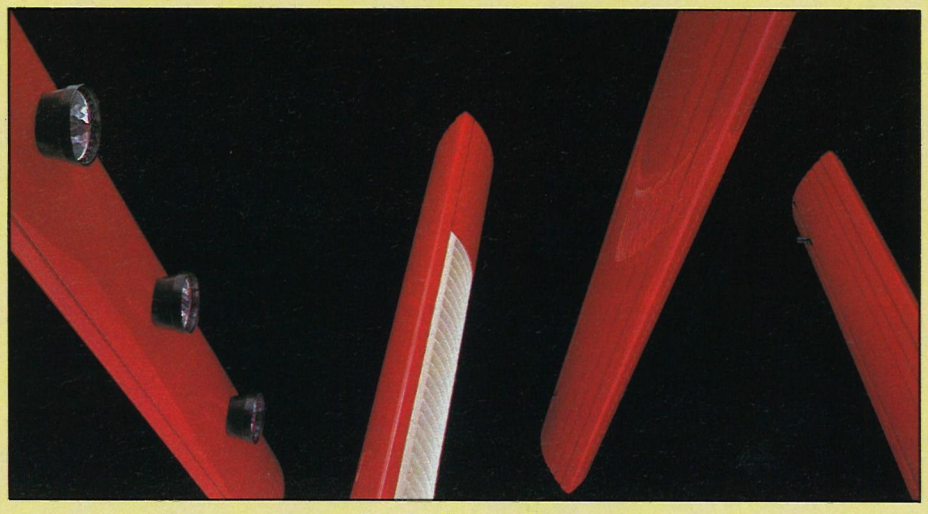

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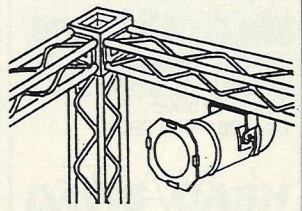

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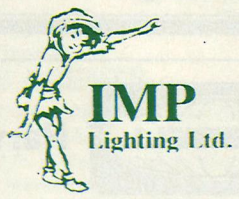

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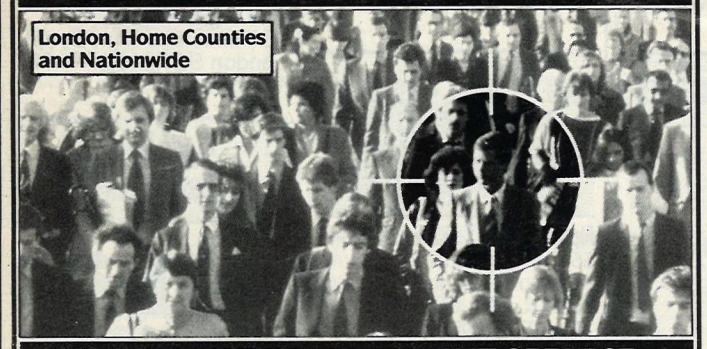

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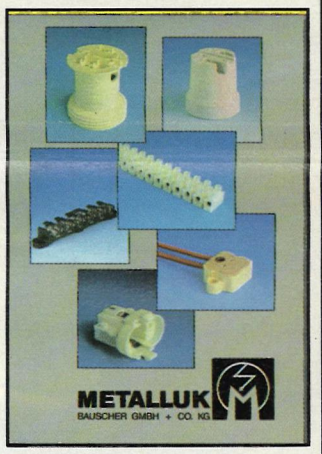

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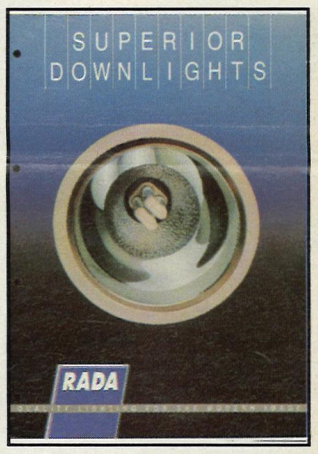

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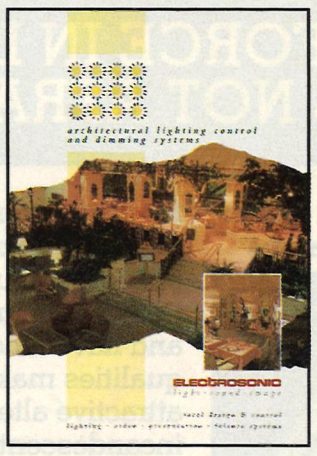

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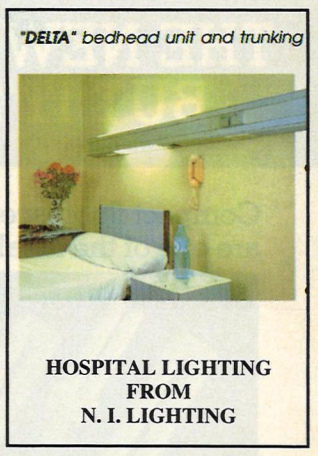

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low energy lighting

Reply To:

21st February 1991

For the attention of
Mr Jim Hughes
Lighting Equipment News

Dear Jim

I am writing to inform you of the excellent response our advertisement received in the November issue of Lighting Equipment News. We received literally hundreds of reader enquiries, from architects, designers and other lighting specifiers.

I will certainly include Lighting Equipment News in all future advertising promotions undertaken by CONNECT Lighting Systems.

Yours sincerely
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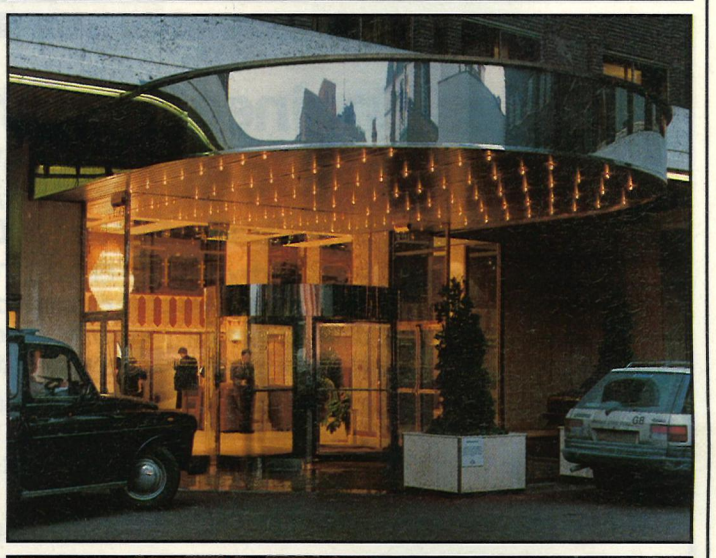

Adding sparkle to a Hilton

The Hilton International Hotel, Regent's Park, London, has recently been refurbished. Light-Graphix was asked to light the prestige entrance, among other areas.

Under the imposing curved canopy and through into the foyer, Linear Style 35 lighting system with a special matt silver finish blends with the ceiling and uses G18 Clusterbright lamps to create a starlit sky effect.

Marble steps leading up to the restaurant have been illuminated by a rectangular light tube system fixed in an aluminium channel recessed into the risers.

Management buyout at Lee

The directors of Lee Environmental Lighting have bought the company from Lee Panavision International. This management buyout creates a wholly British-owned company with an established network of distributors throughout the world.

Lee Environmental will continue to offer a full range of low voltage lighting and will launch new products early next year. The company is moving to new premises in Bolton.

Managing director, Martin Duff, said: "The buyout enables us to concentrate exclusively on the display lighting market, and eliminates conflicts of interest which are inevitable as part of a group of companies working in different markets around the globe.

"We will be able to bring new products to the market faster, yet still use the experience of the team we have built up here over the last few years."

Light at the end of the Tunnel

Floodlighting to illuminate the perimeter area and roadways of the main Channel Tunnel construction site has been supplied by Powerlite Electrical Products.

The units are Powerson 400 fully enclosed floodlights which use 400W high pressure sodium lamps and have integral control gear.

Under the terms of the contract with Trans Manche Link, 400 floodlights have been supplied. The high light output and long lamp life were important considerations in selecting the luminaires.

Theatre lighting show

The 13th trade show for the theatre, entertainment and presentation industries will take place from 23-24 May at the Mermaid Theatre, Puddle Dock, London.

Lighting equipment and accessories will be among the products and services on show.

Further details and free admission tickets are available from the Association of British Theatre Technicians, 071-434 3901.

IN YOUR NEXT ISSUE

The June issue of *LEN* will look at Europe's largest lighting market – the newly unified Germany. Data on market size is supplemented by a glimpse at some of the exciting work currently being carried out by lighting designers. A Hanover Fair review will complete this section.

In a more technical vein, we consider the increasing role of electronic components in lighting.