

“87% lower energy costs for 100% better light - it does not get any better.”

Hermann Peter  
Team Leader Real Estate, AEW Energie AG

New Light for more energy efficiency.



The AEW highrise building in Aarau is a perfect example for the reduction of energy consumption while at the same time improving the lighting situation. By using state of the art luminaire technologies and electronic ballasts, by installing daylight sensors and a constant illumination control system, by providing the option for individual dimming and by reducing the number of luminaires per office unit from six to four, TRILUX was able to lower the object's energy costs by an impressive 87%. This shows: New Light is worth it.  
[www.trilux.co.uk](http://www.trilux.co.uk)

# 3lux:letters

NEW LIGHT | ARCHITECTURE | TECHNOLOGY 1 | 2009



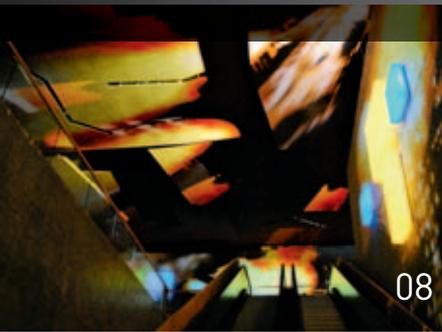
Light in schools 1 | 2009 3lux:letters The Architecture Magazine



**lux:** Light in schools  
The right concept for learning

**lux:** Light with a system  
More light or less electricity?

**lux:** Well advised  
The direct way to beautiful light



Titel page: a hallway does not always have to be lit from the centre. Moved to the edges of the ceiling, like here in the Freiherr vom Stein Gymnasium in Münster, the luminaires produce an interesting play of light along the wall and accentuatedly light the hallway from both sides of the room. Photo: TRILUX



## Dear Readers,

the year 2009 means a big challenge for the worldwide economy at numerous different levels. What is now wanted above all are sustainable concepts which take us safely through the turbulent times, as well as fresh and innovative ideas which lead us into an exciting future. You, as the readers, are at this moment holding a part of our measures in your hands which is important to us: the current issue of our 3lux:letters magazine. With this issue, we have given our magazine a new design, which is based on proven tradition as well as promising a lively future. We have now supplemented the news and information from the sector of light and architecture, found in 3lux:letters for more than two years, with background knowledge interesting particularly for you as planners. For instance, in the chapter "lux:architecture" you will see the insert "lux:technology" where (as the name already shows) the technical side of lighting planning in the respective building project is looked at more closely. In the chapter "lux:service" of this issue, you will also get to know our architects' consultants at TRILUX. The series "On materials" will this time inform you about the Miro®-Silver reflection material, and in "Planners ask, manufacturers answer" we even let you in on a little secret concerning electronic and conventional ballasts. Are you already familiar with our new advertising campaign? Learn about its background in the "TRILUX" chapter. Thus we are pleased to once again be able to hand you something exciting to read – and hope you will have fun reading it!

P.S. Do you have questions or suggestions regarding our magazine? Please e-mail us at [3luxletters@trilux.de](mailto:3luxletters@trilux.de)

A handwritten signature in black ink that reads "Dietmar Zembrot".

Yours sincerely

Dietmar Zembrot, Sales and Marketing Director



# LIGHT IN SCHOOLS

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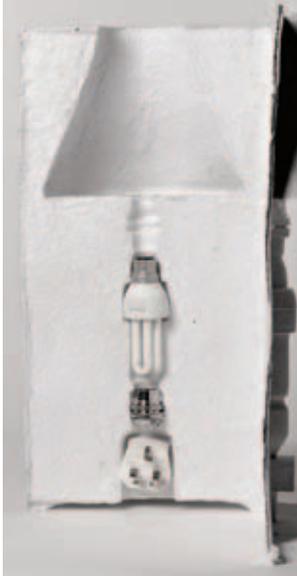


Photo: Claire Pepper, London

From outside, the inner life of the packaging can be guessed: lamp, socket and electricity cable give the luminaire its form.

### Packaging Lamp

2008

David Gardener

Dimensions (L x W x H):

250 X 250 X 500 mm

[www.davidgardener.co.uk](http://www.davidgardener.co.uk)



Photo: David Gardener, London

The luminaire made of low-cost packaging material looks practical and almost elegant.

Packaging is important for safe transportation but after unwrapping, one often doesn't know what to do with it. With his Packaging Lamp, British designer David Gardener found a practical as well as amusing solution to the problem. Instead of disposing of the packaging after it has served the purpose of transportation, it simply turns into an object: in no time, the unwelcome cardboard coat becomes a functional and extraordinary luminaire whose exterior form is determined by the packaged components such as an energy-saving lamp, socket and electricity cable. What was important, however, was not only the aesthetic aspect but the fire risk of the biologically degradable packaging material was also minimized with the cooler energy-saving lamps.

Derived in size and form from the original lettering "Hotel Erfurter Hof", today the sentence "Willy Brandt ans Fenster" shines above the former hotel.

On 19th March 1970, a historic event took place in the state capital of Thuringia: for the first time since the division of Germany into two countries the two German governments met in the Erfurter Hof. Many citizens flocked to this meeting of then German chancellor Willy Brandt and the chairman of the GDR council of ministers at the time, Willi Stoph. All the people wanted to see the man from West Germany on whom they pinned their hopes and demanded "Willy Brandt to the window". It is exactly this request which, since May of this year, has been mounted in neon writing on the roof of the former Erfurter Hof. Together with a separately controlled interior illumination of the room at whose window Willy Brandt showed himself, and a computer terminal for additional information, the lettering is a successful monument to honour the former German chancellor.



Acting on the calls from the cheering crowd, Willy Brandt showed himself at the window of the Erfurter Hof Hotel almost 40 years ago



Photos: www.erfurt.de

### Monument

„Willy Brandt ans Fenster“

Permanent installation by

David Mannstein

[www.erfurt.de](http://www.erfurt.de) > erleben und

verweilen > Kunst und Kultur >

Erinnerungs- und Gedenkorte



The Tetra lamp not only ensures atmospheric light but also a grin on people's faces if, for instance, a fridge-looter on his nocturnal raids instead of the classic milk carton finds the luminaire next to the relish and the curry sauce.

Refrigerators without Tetra Paks can no longer be imagined. For more than 50 years, the practical beverage carton from the Swedish company of the same name is a guarantee for fresh milk, juices, cream or wine as well. British designer Majid Asif has now taken this tried-and-tested cardboard container as the model for his Tetra Lamp, moving it into the light of attention in the true sense of the word. Corresponding in its shape to the original, the shining blue counterpart is punched out of translucent plastic and can be assembled within minutes. Recycling it should not take much longer since the luminaire consists of one single material. The LED light source inside the Tetra Lamp, which is dimmable to three levels, creates an atmospheric light: pure harmony and all this in the fridge.



Simple and simply classic: the luminaire in the form of the probably most famous beverage carton in the world, the Tetra Pak.

Photos: Majid Asif, London

**Tetra Lamp**  
 Design: MASIF Designs (Majid Asif)  
 Dimensions (L x W x H):  
 100 x 100 x 246 mm  
 Material: Polypropylene  
[www.masifdesigns.com](http://www.masifdesigns.com)



**Joachim Rind**  
 Architektengruppe Naujack  
 Rumpfenhorst, Koblenz  
[www.architekten-n-r.de](http://www.architekten-n-r.de)

Photo: EU-Realisierungswettbewerb  
 Kurfürstliche Burg, Boppard

**lux:** STATEMENT

## Energy efficiency – a ray of hope?

Global warming, climate change, environmental protection, resources management, economic growth ...

Is the state of our habitat already dramatic or is its ongoing change simply constant and unstoppable in motion and will our human and honourable attempts only succeed in slowing down the speed of this change in way that is hardly noticeable?

Be it as it may, the legislators are reacting and setting high standards in the form of conditions for the industry and guidelines in the building regulations (EnEV). In addition, they support means for saving energy on a broad level.

But how adequately do we treat our habitat? Shouldn't the change of thinking happen first of all in our heads and

therefore also in our own behaviour? How are we as planners reacting? Burden or pleasure? Is it possible that design qualities fall by the wayside in these one-way discussions about saving energy? This has to be avoided at any cost.

By declaring our intention to build in an energy-efficient way, we as planners and consultants have the chance to convince the clients of architectural quality with just the classic virtue of careful planning. There is no energy efficiency without architectural culture, without appropriate and clever solutions from the concept to the details.

A ray of hope?



Photo: xx



Photo: Studio Gilthero, London

Making your own candles is a test of one's patience; however, in the end we can be sure to have a unique piece. But Sarah van Gameren did not want to be content with just one candle, on the contrary: with the Big Dipper she developed, the Dutch designer is able to produce 24 wax chandeliers in one go. There is a simple if ingenious principle behind this: on two large metal rings of different sizes, supports for wick skeletons are attached. Like in a sensuous dance, the wicks are dipped one after the other into two barrels filled with wax and pulled out again to dry.

As simple as it is impressive: with the up-and-down movement, the Big Dipper lowers the rows of wicks into liquid wax.

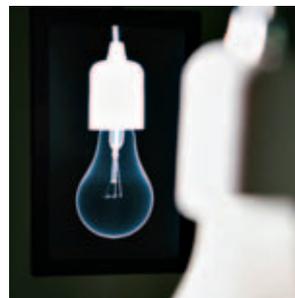
The wax chandelier is only the beginning: thanks to the flexible design of the chains of wicks, the Big Dipper is able to produce almost any form in wax.



Photo: Luke Hayes, London

**Big Dipper**  
Sarah van Gameren  
[www.studiogilthero.com](http://www.studiogilthero.com)

**X-Ray Light**  
Wonsuk Cho  
[www.samulnoli.com](http://www.samulnoli.com)



It must have been a sensation when, at the end of the 19th century, people were for the first time able to look inside their bodies. They owed this phenomenon to the German physicist Wilhelm Conrad Röntgen, who discovered the rays named after him in 1895. Meanwhile the technology developed from them has for a long time been a basic routine in medicine. But why only look for broken bones and other anomalies when there are so many other interesting things to x-ray? The Korean designer Wonsuk Cho must have thought along these lines when he had ordinary light bulbs x-rayed. The results are extraordinary lighting objects where not the lamps themselves but their inside seems to glow.

Whether ordinary light bulb or energy-saving lamp: each luminaire is first x-rayed to be then illuminated again as an x-ray.

A typical light box makes the x-ray of the light bulb shine.



Photos: Nam Young Kim, Seoul



Former US president Bill Clinton supports the renovation of the Empire State Building with the Clinton Climate Project of his William J. Clinton Foundation.



Photos: Bryan Smith/Empire State Building

Every night, 50 of the almost 6,400 windows of the Empire State Building are going to be replaced.

When the Empire State Building was being constructed at the beginning of the 1930s, energy efficiency was not yet an issue. Today, almost 80 years later, with an energy consumption of more than 40 million kilowatt-hours, it would certainly occur to no one to connect the skyscraper with low consumption. But this is going to change considerably in future: the currently highest building in New York is to be ecologically renovated for 20 million dollars. Overall, the energy consumption is to be lowered by 38 per cent which, for constructions such as the Empire State Building, amounts to the considerable figures of 105,000 tons of CO2 and 4.4 million dollars of energy costs per year. The famous exterior lighting of the top floors, however, is to be preserved for the New Yorkers.

**Renovation of the Empire State Building**  
[www.esbnyc.com](http://www.esbnyc.com)  
[www.clintonfoundation.org](http://www.clintonfoundation.org)

The different design of the two museum buildings sits harmoniously side-by-side without competing.

**The Nelson-Atkins Museum of Art**  
Oakstreet  
Kansas City, USA  
Architect: Steven Holl, New York  
[www.stevenholl.com](http://www.stevenholl.com)  
[www.nelson-atkins.org](http://www.nelson-atkins.org)



Photos: Andy Ryan, New York

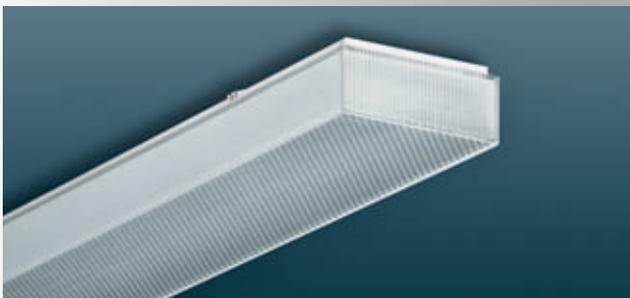


The open spaces between the new and the old building were turned into a sculpture garden as an expansion to the art museum.

Since 1993, the Nelson-Atkins Museum of Art in Kansas City has opened its doors for interested art lovers. Over the course of the years, however, even the largest museum building gets too small for its art treasures and thus an expansion was needed: five milky-white glass cubes of a new building with the major part underground create an atmospheric, modern contrast to the existing neo-classicist grand building. Due to capillaries inserted in the glass, the daylight is softly directed into the exhibition rooms. At night, however, the cubes look rather cool. The formal reticence and the choice of materials of the new building designed by the American architect Steven Holl not only speak the well-known language of the architect but also create two impressive buildings, harmoniously sitting side by side..

## lux: HISTORY

By combining prismatic and a specular reflector in the diffusers (top), a more directed light is made possible in contrast to the diffuse light of the opal diffuser (bottom).



Photos: TRILUX

## From the opal to the prismatic diffuser

Strictly speaking, the prismatic diffuser was already introduced at the end of the 1960s, parallel to the opal diffuser luminaire. At that time, the prismatic diffuser was blown into the requested form which, however, made an exact prismatic geometry almost impossible. Yet the advantages of such a luminaire were already obvious: it was able to direct the light and not just scatter it undirected and, in addition, due to the reduced loss of light emission, it resulted in considerably higher degrees of luminaire effectiveness.

The actual improvement, when it comes to energy efficiency, was the development of the TRILUX luminaire 3441 around 1980: the starting point was a new generation of luminaires which achieved a luminous flux of 5400 lm with 58 watt instead of the 4000 lm with 65 watt possible so far.

This made it possible to reduce the number of lamps in the luminaire and the connecting wattage whilst producing the same illuminance. This in turn resulted in a marked lowering of the lamp temperature and therefore an increase of luminous flux. Furthermore, the visual conditions were improved because the lamps could no longer shadow each other. Prismatic was additionally combined with a specular mirror inside the luminaire which meant an additional gain in efficiency as well as improved glare limitation. For this, the new injection moulding process was used for the diffuser.

The luminaire is to this day part of the TRILUX range, not least thanks to its timeless design. In combination with the factor of energy efficiency, it has thus become one of the classic luminaires and is much in demand.

The new overall illumination lights all four façades, the flights of steps and the roof sculptures for about one euro per hour.

#### Illumination of the Berlin Reichstag

Michael Batz  
www.reichstags-illumination.de  
Sponsored by  
Stiftung "Lebendige Stadt"  
Stiftung "Zukunft Berlin"  
Deutscher Sparkassen-  
und Giroverband



Photos: Stiftung "Lebendige Stadt"



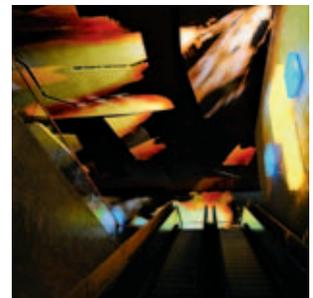
With three lighting scenarios, different architectural accents are emphasized.

The Berliners liked what originated as a temporary event for the Football World Championship 2006 so much that they wanted it to be permanent after the Championship: an adequate illumination of the Reichstag. This was realized on the occasion of the 60th anniversary of the foundation of the Federal Republic of Germany on 22 May 2009 when the design by the Hamburg lighting artist Michael Batz was inaugurated. His lighting concept is to "continue as an appropriate nocturnal image the significance, stateliness and architectural characteristics of the building and its function as the seat of the Bundestag". Approximately 400 luminaires wrap the building in a warm white light and at the same time fulfil ecological requirements: with the help of state-of-the-art technology 60 per cent of energy can be saved compared to the previous illumination.

#### Concert Hall

Emil Homs Kanal 20  
Copenhagen  
Architect: Ateliers Jean Nouvel, Paris  
www.jeannouvel.com

For this project, Jean Nouvel again commissioned the French lighting designer Yann Kersalé, who turned the Concert Hall into an illuminated work of art.



During the day, the façade is rather inconspicuous, at night it becomes a projection screen for what is taking place inside.



Photos: Philippe Ruault, Nantes

In an area whose architectural future is uncertain, the key to success appears to be the mysterious. French architect Jean Nouvel made use of this approach when designing the Copenhagen Concert Hall: a blue fibreglass tarpaulin wraps the cuboid outside frame and lets the viewer only guess what is inside. At night, the façade becomes a scene of images, colours, light, an expressive mirror of the eventful life inside. Together with the courtyards and terraces, the route through the interior flanked by little shops, the various concert venues and the restaurant, the Concert Hall has become a world of contrasts and surprises, a spatial labyrinth. It goes to show that architecture is "like music. It is perfect for moving and pleasing us."

### Licht, Glanz, Blendung (Light, Shine, Dazzle)

Beiträge zu einer Kulturgeschichte des Leuchtenden (Contribution to the Cultural History of What Shines)  
Christina Lechtermann / Haiko Wandhoff (publisher)  
From the series: Publikationen zur Zeitschrift für Germanistik, volume 18  
Published in 2008 by Peter Lang AG, Bern  
251 pages, several illustrations.  
15 x 22 cm, hardcover.  
German.  
€ (D) 46.90 | € (A) 48.20 | £ 32.90 | US-\$ 67.95  
ISBN: 978-3-03911-309-5  
www.peterlang.net

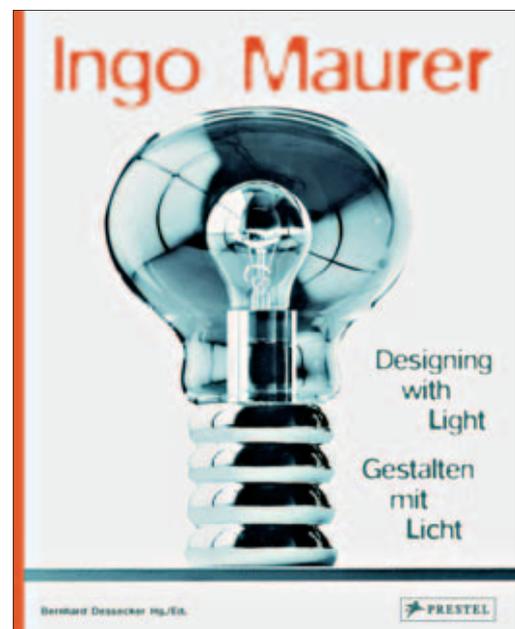


"And God said: Let there be light, and there was light, and God divided light from darkness." The divine origin and the essence of light, seeing and realizing are analyzed in the first chapter of this book. In 13 scientific research reports, professors and lecturers explain the different aspects of light. The central topic of the book is the representation of everything that shines in the culture of the Middle Ages. There are discussions of subjects from skywriting and religion, radiance and shine in literature just as much as of optical experiments or the first staged theatre lighting. Black-and-white illustrations of historic paintings and writings supplement the cultural history of all that shines.

### Designing with Light – Gestalten mit Licht

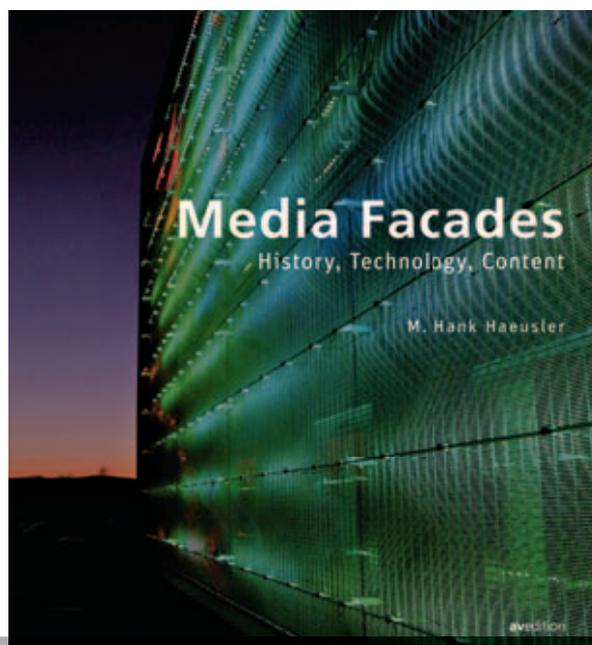
Ingo Maurer  
Bernhard Dessecker (Herausgeber)  
Published in 2008 by Prestel Verlag, München.  
288 pages, 600 colour illustrations.  
24 x 30 cm, half-linen.  
German, English.  
€ (D) 59,00 | € (A) 60,70 | CHF 99,90  
ISBN 978-3-7913-3829-3  
www.prestel.de

Winged light bulbs, flying saucers, floating candles or exploding musical instruments are typical of Ingo Maurer's work. He combines materials such as glass, chrome, paper, porcelain and much more in ever new colours and forms. The creativity of the lighting artist Ingo Maurer is impressively documented in this book with an abundance of colour photographs. The well-known lighting designer from Munich celebrated his 75<sup>th</sup> birthday in the year 2008. Reason enough for the interior architect Bernhard Dessecker to secretly write this "birthday book" on Ingo Maurer's life's work and to present it to his long-standing friend. Thus the reader is delighted up to the last page with Ingo Maurer's humorous, fresh, daring and explosive multitude of ideas.



### Media Facades

History, Technology, Content  
Matthias Hank Haeusler  
Published in 2009 by avedition GmbH, Ludwigsburg  
248 pages, 204 colour illustrations.  
22 x 24 cm, hardcover.  
English.  
€ 49,90 | CHF 84,00  
ISBN: 978-3-89986-107-5  
www.avedition.de



Films on the façade, oversized advertising screens, surprising effects on the wall of a house. Media Facades focuses on the historic and technical background of media architecture and presents a comprehensive collection of contemporary projects. Divided into chapters on mechanical, projected, shining and screen façades, the book provides specific insights: techniques are explained, in some cases detailed photos show the construction. In addition, the computer programmes used and the interactive or generative systems of the productions are explained. Thus this publication is not only a diverting illustrated book but also a help in planning a particularly topical architectural phenomenon.

Particularly in the case of large construction projects such as schools or office buildings, a lot of energy can be saved with an artificial-light installation adapted to the building. (Photo: RWE-Tower in Dortmund)

## LIGHT WITH A SYSTEM

People may have different opinions regarding the ban on light bulbs, yet it is undisputable that it is necessary to save energy in the illumination of buildings. However, the mere use of particularly efficient light sources is not enough to fulfil future energy requirements. A solution could be electronics for steering and controlling lighting systems which offers a lot of potential for saving but can also have a negative effect on user acceptance.

By Mathias Wambsganß

If one looks at the research activities, discussions and legal regulations of the past few years around the theme of "saving energy in the building sector", one notices that from the point of view of the energy planner a lot has developed in a positive direction. In the first regulations, only the energy consumption of the building's heating was considered for reduction. In the sector of residential construction, to this day these are the essential figures which can be influenced by architects and engineers in their planning. In the sector of non-residential buildings, additional energy needs for ventilation, cooling, humidification and dehumidification as well as illumination played and still play quite a considerable role. Particularly since many processes necessary for these amenities use exclusively or partly electric energy which then accounts for a high primary energy factor when the corresponding evidence is supplied. Since the introduction of the EnEv 2007 [regulation for saving energy, energy performance certificate for buildings], these energy services are also assessed. The need of primary energy of the planned building has to be shown, smaller or equal to a value relating to a comparable building equipped with reference technology in the computation model of the DIN V 18599.

Depending on the quality of the planning of the building and the building services engineering and also depending on the quality of the technology used, the energy need for the illumination of an office building can easily amount to 20 per cent of the primary energy requirement of the whole building. In cases of "bad"

planning regarding daylight and artificial light, it could easily rise to 40 per cent. According to a 2003 study on the energy consumption of schools, an average of approximately 60 per cent of the electrical energy consumption is used for lighting. The high significance of dealing with daylight and artificial light is thus not open for discussion from the energetic point of view.

### Saving electricity – not light!

Lowering the guidelines for the minimum intensity of illumination is not a solution and neither is it really seriously being discussed. On the contrary, a growing number of studies are even focusing on the increase of the light provided in work places, in geriatric care institutions and also in schools. The objectives of the studies are manifold: they range from a lessening of the consequences of shift work, to an increase in life quality in care institutions to the specific stimulation of schoolchildren to increase learning performance. Independent of the fact that the goals and the possibly existing "risks and adverse effects" of the respective interventions always have to be considered in a differentiated way, some facts are undisputed:

- Many physiologically relevant effects only come into play with higher levels of light.
- For the treatment of seasonally affected depression, several thousand lux near the eyes are recommended.
- The citizens of the G8 nations meanwhile spend an average of



more than 90 per cent of their lifetime in closed rooms – with an upward trend.

- Frequently these rooms are badly lit in the physiological sense and/or the spectral composition of the light is unfavourable.
- The photo-sensitivity of the ganglion cells in the eye, only known since the beginning of this millennium, and their direct connection with the endocrine system of human beings also justifies higher levels of light with correspondingly adapted spectral qualities.
- According to a study by the Robert Koch Institute, more than 60 per cent of the population of Germany show a tendency to vitamin D shortage.

These arguments significant and justify a claim for “more rather than less light”. A way out of this apparent contradiction to the special energetic significance of systems of artificial light consists in the forced use of daylight and in the application of carefully planned and technically high-quality solutions with artificial light. Important aspects which have to be considered in the planning are summed up under the headings of room- and system potential.

#### **Room potential**

The geographic location and the external shade of a building are usually outside the responsibility of the planners, the orientation and the depth of the rooms, however, can be planned to a

certain extent. The decisive variables for a good room potential such as size, location and quality of the windows, selection and degrees of reflection of materials and also the specification of the sun-and-glare protection system can be influenced to a high degree by the planner. But the façade is also definitely one of the key parts for sustainable building concepts. Many interdependencies and basic principles have been known for a long time and yet are again and again handled carelessly: large glass surfaces are automatically and often wrongly equated with good daylight autonomy.

#### **System potential**

The choice of as optimal as possible a combination of lamp and luminaire is solely the responsibility of the planner. He thus has an influence on the light yield of the lamp, the optical efficiency of the luminaire and finally on the operating efficiency of the luminaires. In view of the sometimes considerable differences among what are basically similar solutions makes this into a rewarding field of activity. The increasingly more important lighting electronics also has a considerable influence on the energy consumption of an artificial lighting system and the acceptance of the light solution.

#### **EnEv 2012 – an outlook with worries?**

With expected further tightening up of the requirement level for the primary energy need of buildings coming into effect in the



Photos: Boris Golz

The work of the lighting planner starts in the design phase: in the Gemeentehuis in Steenberg, the window openings were arranged in such a way that the light can penetrate deep into the room through a slit near the ceiling.

For the lighting planning in a building, it is essential to see artificial light and daylight in a shared system and – like here in the old library of Kiel University – to coordinate them.

planned EnEV 2012, efficient lighting technology alone will no longer be sufficient for reaching the goals formulated there. As a consequence, the potential of daylight has to be increasingly used and the interplay of daylight and artificial light has to be optimized. Overall, there are high expectations of the presence- and daylight-dependent control of lighting systems in order to correspondingly reduce the energy needed by solutions with artificial light.

### Building-system technology

In practice, however, there are some hurdles to overcome in order to realise installations which do justice to the users' demand and fulfil the energy expectations. In many projects components from building-system technology are used which are supplied by different manufacturers and whose interplay have not, or only to a limited extent, been tested beforehand. In the usually short and very hectic phase prior to initial operation, the designated functions then have to be adapted to the technical and spatial circumstances.

A dimmable artificial-light installation, switching off depending on presence and controlled by daylight can be described in a few words in a list of specifications. Ideally, the planners make demands in addition to the required functions which only have an acceptance from the users if their automatic processes are either easy to understand or running without the users even noticing them. In most cases, however, the detailed parameters

are set during the initial operation by "system integrators", companies specializing in building-system technology which often have only little, in some case no knowledge of dealing with daylight and artificial light. All the same, they are making an abundance of decisions on system variables which have not been explicitly described or could not be described for lack of knowledge. The usability of an installation, its acceptance and the achievable saving potential, however, depend to a decisive degree on this phase of the realisation. After all, buildings are not constructed in order to save energy but to enable people to work in them and, in the ideal case promote their productivity with a good working atmosphere.

In contrast to the car industry where such partly complex interrelations are again and again tested on prototypes, many configurations in buildings are "one-offs" whose teething troubles have to be painstakingly cured or at least improved under pressure from discontented users and clients in a long post-phase. In the worst case, functions are simply deactivated and the aimed-for energy savings thus not achieved. This is certainly not in the interest of users, clients, planners, legislators and, above all, not in the interest of the desired relief for the environment. In good time, before the next level of the EnEV in the year 2012, what is needed is a joint effort by the industry partners involved from the sectors of lamps, luminaires, electronics, sensors, façade cladding and committed research institutions in order to better understand the interdependencies of the components



and to reliably assess the actual potentials. Above all, the fundamental functions such installations have to provide need to be described uniformly and precisely.

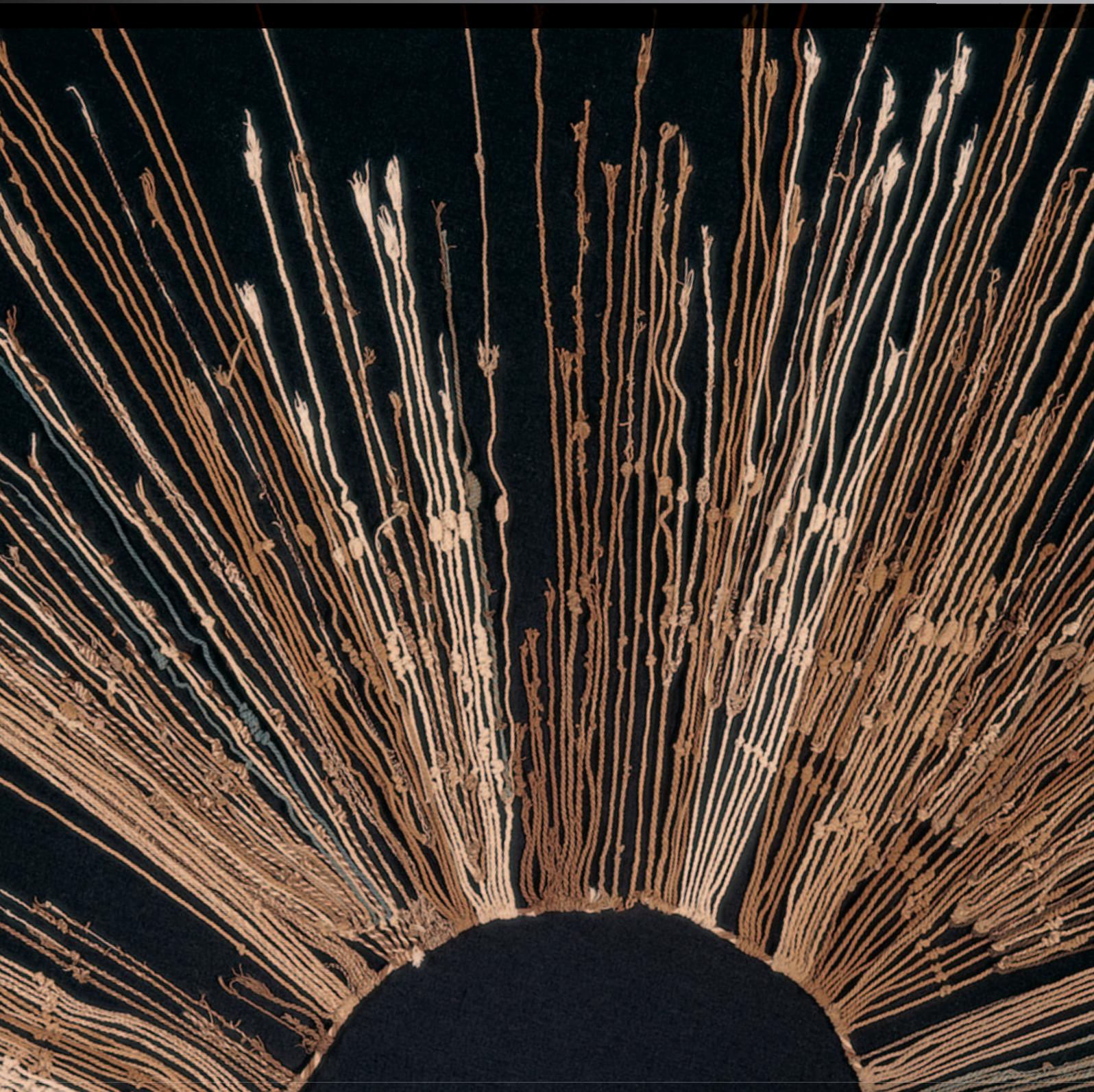
#### **“Interactive combinations of products” as a recipe for success**

In view of the increasing significance of building automation, right up to the linking of components of individual-room control with those of the primary installations, a purely manufacturer-specific solution for steering or controlling daylight and artificial light should not be the only variant promising success. Neither should floor lamps, which as it were “ex factory” may have excellently adjusted individual components or control algorithms, be the only solution. In the interest of competition, it has to be possible to make a variety of combinations of luminaires, sensors, cladding and electronics from various manufacturers work to the satisfaction of the users and to really reach the energy goals. Features and functions of the components such as sensor characteristics and coverage as well as dimming-, steering- and controlling strategies, set-point shifts, switch-off points, reaction when switched on again and many more have to be uniformly documented and easily available to planners. This is the basis for a successful adjustment to the overall system and thus individual adaptation to the respective building; beginning with the design planning it should be continuously traceable until the initial operation and then subsequently adequately documented.



#### **Mathias Wambsganß**

born in Ludwigshafen am Rhein in 1965, studied architecture at TH Karlsruhe until 1995. In 1999, together with four partners from architecture, mechanical engineering and physics, he founded the ip5 engineers' partnership. Until 2004, he was teaching and doing research in Karlsruhe in the field of building physics and technical finishing and since 2006 has been teaching lighting planning and networked building technology at the Rosenheim Hochschule für angewandte Wissenschaften. Since 2007, he has also been a board member of the LiTG. [www.ip5.de](http://www.ip5.de)



## EFFECTIVE?

**Quipu of the Incas, Larco Museum in Lima, Peru.** At first glance, this is just thousands of strings of dyed wool or cotton. But quipu, the knot writing of the Incas (ca. 1400–1532 AD), is not just a crazy assortment of strings, it is unique: the numerical code knotted into the strings contained all the important information such as census results or harvest dates. A highly effective way of transferring large amounts of data and storing them for generations.



Photo: Museo Larco, Lima/Peru

**“The most beautiful we can experience is the mysterious. From it all true art and science originate.”**

Albert Einstein (Ulm 1879–1955 Princeton), US-Swiss physicist, Nobelprize winner and founder of the relativity theory.



## EFFICIENT?

**Light conductors made of glass fibre or plastic.** A light-conducting cable consists of several thousands of fibres of which each is only a few hundredths of a millimetre thick. Yet large amounts of data are transferred at a speed of 160,000 kilometres per second. But not only is the speed a plus: the efficient technology makes it possible to replace a 10-ton copper cable with an only 1 kilogramme glass-fibre cable – an alternative which saves resources.



Photo: istockphoto

**“We are whirling at an incredible speed through endless space, everything is turning around us, everything is in motion, energy is everywhere.”**

Nikola Tesla [Smiljan 1856–1943 New York], Croatian electro-engineer and inventor. It was only thanks to his invention of the alternating current that the transport of electric energy across large distances became possible.

## LOOKED INTO

3lux:letters has asked three renowned light experts three questions concerning “Light in schools”.



Photo: Christoph Mittermüller, München

**Frank Vetter**  
Lighting planner  
Day & Light Lichtplanung, Munich

**Using energy efficiently saves energy. However: the mere saving of energy does not necessarily mean using it in an energetically meaningful way. To what extent does this efficiency play a role in your work?**

**Frank Vetter:** The most important issue when it comes to saving energy with illumination is the efficiency of the illuminants. However, the efficiency is often to the disadvantage of the light quality, particularly the colour reproduction. That is why we plan holistically and compensate the use of less efficient illuminants in places where good colour reproduction and brilliance are wanted with the combination of various illuminants. In addition, energy can be saved in the choice of the lighting technology by directing the light with little loss to where it is needed. But especially decisive is appropriate lighting planning beyond the requirements of the norms: through a well-balanced combination of bright areas and direct light, a situation can be created where a room can be experienced and lit in correspondence with the seeing task without requiring high illuminances.



Photo: Frank Vetter, München

Residential complex on Innsbrucker Ring



**Maurici Ginés**  
**Light Designer**  
**artec<sup>3</sup>, Barcelona**

**Maurici Ginés:** Energy efficiency is important from the start when one is still able to control and determine which level of efficiency is to be reached; it is part of the creative process. Usually, one works with the efficiency of the spot light or the light source which is the easiest to install; as a rule, this is the case in the household area or also in the illumination of outside space. If one then adds to this the efficiency of the whole system which results from the overall strategy, we have an exponential increase of the efficiency. As an example, one could list the guidelines for the illumination of public spaces where the starting point is holistic; with this, effective strategies for saving energy and for energy efficiency can be applied without, in the process, neglecting goals which have a positive effect on the people's perception and their feeling of well-being.



**Iain Macdonald**  
**Architect**  
**YRM, London**

**Iain Macdonald:** Energy efficiency is approached holistically in our firm. By being ISO 14001 accredited we manage our own energy consumption including work related travel carbon footprint, day-to-day operation of our offices. Thus we, for instance, prefer a pencil to a laptop to sketch an idea. We continue this approach when designing projects in order to embrace sustainability standards such as Breeam or LEED. At a macro scale, for example, when urban planning we are interested in analysing and modelling land use and activity, the energy consumption, the eco systems and the relationship between economic and environmental sustainability. This includes investigating modes of transport, property market trends, city planning strategies, availability of local sources of energy etc. before we start designing buildings. For learning purposes, we have the YRM Sustainability Group involving all group and partner offices.



Torre del Agua, Saragossa



West End Park, Sofia

Photo: Xavier Graells

Rendering: YRM Architekten

**The triumph of the compact fluorescent lamp (the so-called “energy-saving lamp”) appears to be unstoppable even though it is in fact controversial as a successor to the conventional incandescent lamp. Energy-efficient alternatives do exist but they have advantages and disadvantages. Which combination of illumination do you recommend to our readers?**

**Frank Vetter:** As long as the low-voltage halogen lamp has not yet been banned by the legislator, this is the only replacement for the incandescent lamp wherever the quality of a continuous colour spectrum etc. is wanted, as for instance above the dining table. In conference rooms, a combination of fluorescent and halogen lamps makes sense. In other places, such as highly-frequented zones, this can be compensated by using efficient illuminants such as halogen lamps there. Wherever efficiency and brilliance are wanted, the use of metal halide lamps is recommended. Existing incandescent lamp sockets can be equipped with high-voltage halogen lamps in the shape of light bulbs. Unfortunately, these are also to be banned as of 2016. In the living area, it makes sense to soon switch to low-voltage halogen systems.



Photo: Day &amp; Light - München

Gallileo, Frankfurt am Main

**Efficient, individual and attractive – today, light has to achieve more than just illumination. Where did you last discover what you think is a good example for such up-to-date illumination?**

**Frank Vetter:** An exemplary project is the new seat of the National Assembly of Wales ([www.mondoarc.com](http://www.mondoarc.com) > Projects > Architectural). The design of the illumination is reserved, well integrated into the architecture and emphasizes it. Especially the main hall which follows the often cited but never equalled example of the Rome Pantheon, using daylight in an optimal way and thereby reducing the energy consumption of artificial light. A combination of diffuse and brilliant lighting fixtures allows individual light scenarios and, due to an intelligent light control, is optimally adjusted to the level of daylight. A huge compliment to the colleagues: BDSP Partnership DPA Lighting und ARUP.

#### **Frank Vetter**

born in Munich in 1973, studied interior architecture at the Fachhochschule Rosenheim. Before and after his studies, he had already gained experience in the field of lighting planning at HL-Technik Lichtplanung and Lichtplanung Ulrich Werning. After graduating in 1999, until 2003 he worked as a lighting planner at Werning Tropp and Partners (later Werning Day & Light), where he was subsequently project director until 2008. In 2009, together with Ulrich Werning he became partner in the then renamed Day & Light Lichtplanung GbR.

[www.dayandlight.de](http://www.dayandlight.de)

**Maurici Ginés:** Depending on the way it is used or on the visual communication, every kind of room demands different means. In view of the multitude of luminaires, diffusers and lighting fixtures, I would recommend consulting a lighting expert who can assist you in the right choice. And this for the light sources as well as for the light environment. I hope that the incandescent lamp with its soft light, its excellent colour reproduction and its good recyclability does not disappear. I also hope that I will one day be surprised that research has succeeded in tripling the efficiency of the incandescent lamps just as recently I also noticed that the photovoltaic panels have been able to double their electricity production thanks to a new combination of materials.



Photo: Duccio Malagamba

Plaza del Torico, Teruel

**Iain Macdonald:** We find a mix of various light sources, including daylight and artificial light, for rooms and specific tasks very important. In our own offices we work with an adaptive lighting system that responds in real-time to the external light levels. In design studios a natural variation of lighting levels which in turn changes the ambience seems to stimulate creativity. As whole-life costing is fundamental to sustainable building design, this concept includes details such as choice of lamps. Here, the energy saving lamp poses a disposal challenge due to the mercury content of some models which work against the well-known benefits of a longer life span and lower energy consumption. Hence we favour to use an appropriate mix of efficient energy saving lamps and incandescent lights for task lighting and where atmospheric light colour is important.



Rendering: YRM Architekten

Maratex Shopping Centre, Baia Mare

**Maurici Ginés:** The Torre Agbar in Barcelona by Yann Kersalé appears to me to be a daring approach for a city which risks little when it comes to city lighting. In a reserved, unobtrusive way, it somewhat represents the trend to be followed, yet as fixed, visual communication. Or the Bridge of Aspiration in London by Speirs & Majors – a work where architecture and illumination creatively solve visual communication inside and outside by using a concept based on the theme of the content of the building. But also the Crown Fountain in Chicago by the artist Jaume Plensa and the lighting design by Jim Baney, who serves as an example of how to structure the public space with the illumination and the visual information and bring it closer to the population by using poetic licence.

#### Maurici Ginés

born in Barcelona in 1970, in addition to lighting design and lighting technology at the Universidad Politécnic in Terrassa, Barcelona, he also studied electro technology for low voltage in the Ministry of Education and Culture as well as solar energy at the study centre for solar energy Censolar in Sevilla. With the intention of making the profession of the independent lighting designer respectable in Spain, in 1998 he founded Artecuminotecnica (since 2007 artec3). In 2004 he was made the first professional member from Spain of the Professional Lighting Designers Association (PLDA).

[www.artec3.com](http://www.artec3.com)

**Iain Macdonald:** A current example that comes to mind is the variety of lighting projects in Linz, European City of Culture 2009. Besides the impressive illumination of the Ars Electronica Centre (AEC), other buildings such as the Lentos Museum and the nearly completed Castle Museum, all form an attractive composition across the river Danube. The AEC has impressive lighting effects which are achieved with 40 000 LED lights, on all facades in changing colours with minimal energy consumption of only 3 – 5kW ([www.aec.at](http://www.aec.at)). The subtle changes in the MIT campus lighting are also impressive. On all of the above projects we endorse the idea that lighting schemes merge with architecture to form an inseparable design. The schemes also seem to combine practical lighting purposes and aesthetical illumination purposes with ease.

#### Iain Macdonald

born in Glasgow in 1955, studied architecture at the Macintosh School of Architecture in Glasgow as well as industrial design at the Domus Academy in Milan. After graduating, he worked as an architect and planner in London and Basel where he cooperated on significant projects such as the Royal Victoria Docks or the British pavilion for Expo 92. In 1992, together with YRME he won the competition for the Euro Medical Technology Campus. In 1997 he was the managing director in the Paris branch of the office Aukett + Heese active worldwide and in October 2006 he joined YRM.

[www.yrm.co.uk](http://www.yrm.co.uk)

Like a leitmotif, the colour green runs through the whole building as a definite design element: in the hallways, for example, it is selectively used to create accents.

## A TOUCH OF GREEN

The Freiherr von Stein Gymnasium school was unable to celebrate its 50th anniversary as a grammar school in the same location in Hindenburgplatz in Münster: increasing numbers of pupils made a move inevitable the year before this historic event. However, this time the solution was not new premises in an already existing building, but Kresing Architekten finally designed a completely new home for the old grammar school with the new building in Gievenbeck.

By Marina Schiemenz

**Client:**

Stadt Münster

**Architects:**

Kresing Architekten GmbH, Münster  
[www.kresing.de](http://www.kresing.de)

**Location:**

Dieckmannstraße, Münster, Germany  
[www.freiherr-vom-stein-gymnasium-muenster.de](http://www.freiherr-vom-stein-gymnasium-muenster.de)

**Luminaires:**

Baureihe 391...  
Baureihe 500...

**Photos:**

Christian Richters, Münster; Studio K,  
Altenberge; Boris Golz, Arnsberg







A huge sun dial decorates the generously designed forecourt which appears to directly merge into the school yard.

The school yard, which is enclosed on all four sides, visually expands right to the forecourt and the flight of stairs due to the partially elevated wings.



The large flight of stairs, where some of the changing rooms are located, leads into the hall equipped for four kinds of sports.



On the little roof terrace, away from the lessons, pupils and teachers can relax while looking up into the sky.



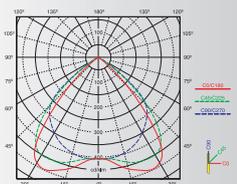
Linearly arranged luminaires not only provide light for the recess hall but at the same time accentuate the edge below the gallery.



## lux: TECHNOLOGY

### 391... series

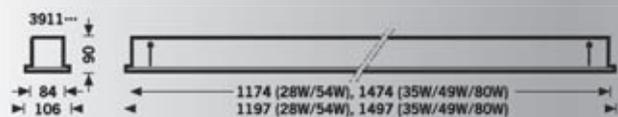
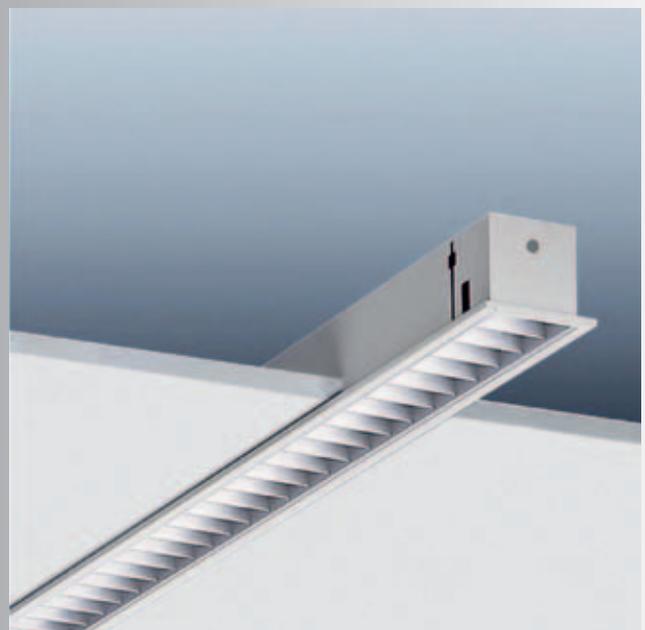
A luminaire of the 391... series was installed in the classrooms of the Freiherr vom Stein Gymnasium. It can be universally used for ceilings with hidden or visible mounting rails as well as with sawn fitting apertures. Due to its surfaces coated to intensify reflection, the



Luminous intensity distribution

finely segmented RSX darklight parabolic reflector grid made of superpure aluminium achieves especially high degrees of effectiveness. In addition, the luminaire is monitor-compatible according to EN 12464-1, which, due to reduced luminances of  $L \leq 1000 \text{ cd/m}^2$ , applies all around for emission angles over  $65^\circ$ . The white, powder-paint coated 3911RSX is operated with an electronic ballast. The surprisingly narrow shape makes an elegant design possible. Here the end cap of this standard luminaire was adapted to the ceiling apertures as a custom-made product.

Frontal apertures ensure heat-resistant through-wiring of the white powder-paint coated luminaire.





The hall for four kinds of sports is accessed via the stands. Here light colours dominate but green is found again as a design element.

Due to the flexible technical concept, the assembly hall can be used for various purposes – for instance as a concert hall.





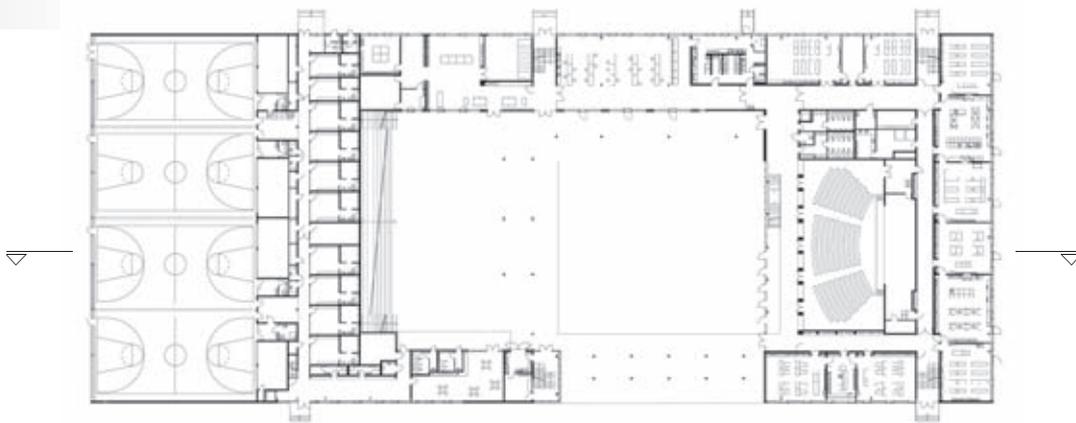
In the classrooms, frontal teaching is also visually translated: the seats of the pupils are illuminated by a rectangle of light, while the desk and the blackboard are moved into the focus with the help of a separate luminaire.

Münster, 1851: in the private rooms of 37-year-old Emilie Koch, there are 12 young girls, with their heads buried in thick books and eager to learn. The reason is not really a cosy book-reading afternoon over coffee and tea but the first lesson in the newly founded Protestant private school for girls which the committed school mistress had established with the permission of the Royal government in Münster. In 1909, the girls' school became a Protestant grammar school which in 1920 was turned from a private to a municipal school and in 1923 was given its present name: Freiherr vom Stein Gymnasium. Over the following years, various changes of location in the Münster city centre were necessary before the school building in Hindenburgplatz was inaugurated in 1957. As the first grammar school in Münster, the "Stein", as pupils and teachers affectionately call it, was run as a full-time day school. Together with a broad and differentiated sixth-form programme, the day school attracted continuously rising numbers of pupils which, in 2006, made another and (hopefully) last move necessary. But if it absolutely had to be a new

building, then not only the location in the Münster city district of Gievenbeck and the integration into the surroundings should be right, but the educational concept should also be communicated in the plans. This meant a special challenge for the Münster office Kresing Architekten.

Flanked by the barracks buildings on one side and by residential complexes on the other side, the school is integrated in the suburban development as a significant building volume. Designed as a wide but elongated building, the school is divided into various zones which provide space for different uses but still submit to the overall concept and blur the border between inside and outside. This created a new understanding of the school as an area of life: overall cultural growth instead of education as a clearly defined objective.

Over a slight ramp, the spacious forecourt leads under the elevated wing into the central, one-third covered interior courtyard of the school complex and straight to a seating island with a solitary tree. To the north, two one-storey connecting wings open the view onto the generous flight of stairs leading to the



Ground plan ground floor



Ground plan 2nd floor



Section

spectators' stands of the hall for four different kinds of sports. From the southern end of the school yard, one gets into the glazed, two-storey recess hall where the bottom edge of the gallery – like to the upper edges of the hallways – is emphasized by a continuous line of luminaires. The assembly hall with the stage and the ancillary rooms, with the music- and the band room behind them, are directly spatial related. Due to this arrangement, flowing transitions are created: from the gym hall across the large flight of stairs and the school yard right into the recess hall and the assembly hall.

Above the ground floor is the two-storey building for the secondary grades I and II, which in its design takes the respective ages of the pupils into consideration, and the wings for the specialized courses. An open terrace area and thematic courtyard gardens enliven the individual levels and at the same time create a pleasing balance of openness and closeness.

Beyond the school building are the teaching gardens and small playing fields. A wet-dry orchard, a stop for the regional school buses, a car park to the south as well as the one-storey

bungalow with the janitor's apartment to the west and the track-and-field facilities to the north are grouped around the new building.

In addition to the green covering of all visible parts of the roof, biotopes and nature-oriented open spaces are an ecological plus and at the same time create possibilities for experiencing nature during outdoor lessons. If one realizes this connection with nature, it quickly becomes clear that the colour green, said to promote concentration, not only runs through the individual parts of the building but seems to come directly from nature and to flow back into it again. This closeness to nature was probably one of the reasons why attention was paid to sustainability and robustness when selecting the individual materials and construction elements. Furthermore, thanks to the well-balanced ratio of glass and closed areas of the façade, the solid internal walls and the good insulation of the external walls, high solar gains can be expected. Thus the Freiherr vom Stein Gymnasium is not merely a school but, as the architects claim, a "habitat for pupils and teachers".

In the classrooms and the computer rooms, the suspended luminaires from the TRILUX 5051 AL... series provide a mixture of direct and indirect light and thus ensure a working situation which is easy on the eyes.

## PASSIVE HOUSE TOP OF THE CLASS

In Neckargemünd, the architects Donnig + Unterstab impressively proved that the standards for passive houses can also be kept in the case of a major school building project: since May 2008, approximately 1,300 pupils fit into a complex there which sets an example from the ecological point of view and thus demonstrates how energy efficient running a school can be in the future.

By Lasse Ole Hempel

**Client:**

Stadt Neckargemünd  
[www.neckargemuend.de](http://www.neckargemuend.de)

**Architects:**

Donnig + Unterstab, Rastatt  
[www.donnig-unterstab.de](http://www.donnig-unterstab.de)

**Location:**

Alter Postweg 10, Neckargemünd, Germany  
[www.gymnasium-neckargemuend.de](http://www.gymnasium-neckargemuend.de)

**Luminaires:**

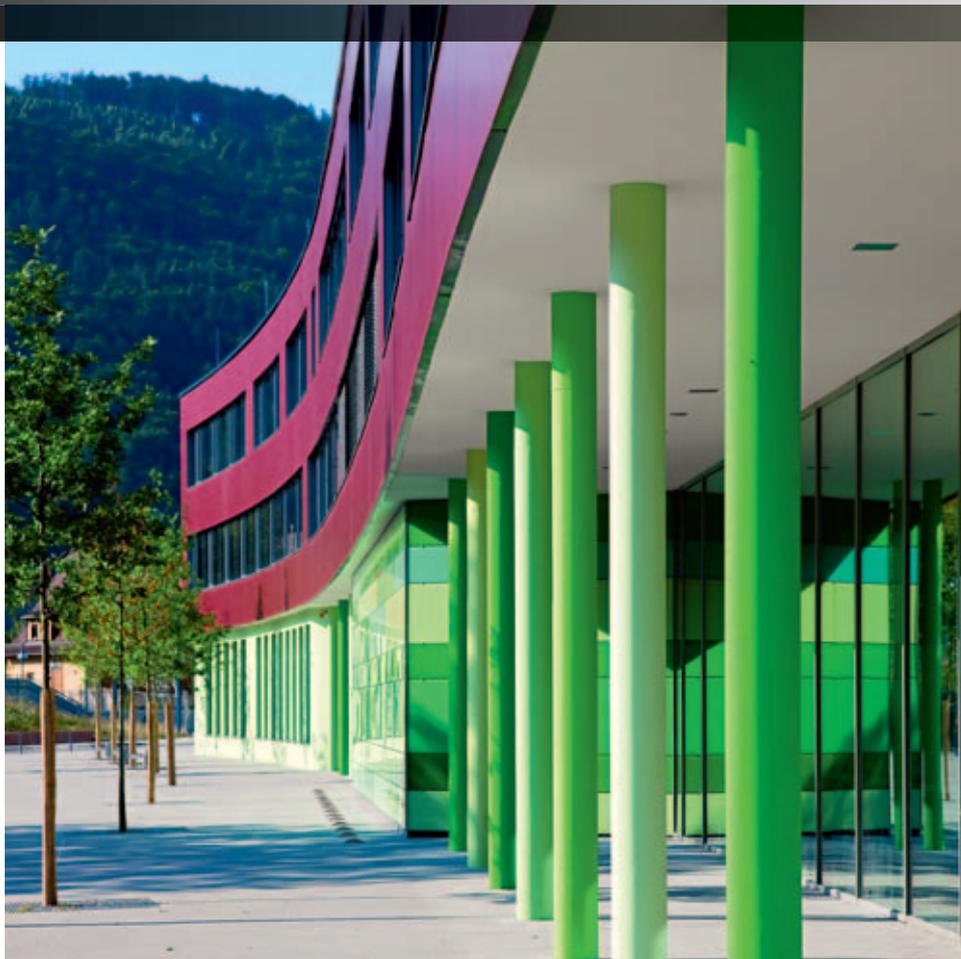
Baureihe 5051 AL...  
Fidesca  
Delta

**Photos:**

Irene Heermann, Neckargemünd; Donnig + Unterstab,  
Rastatt; Boris Golz, Arnsbert







The slight curve of the layout and the recessed entrance zone loosen up the otherwise rather strict design of the façade.

In the school centre's laboratory rooms, the TRILUX Fidesca luminaire was chosen thanks to its easy-to-clean surfaces and its high-quality laminated wire glass.



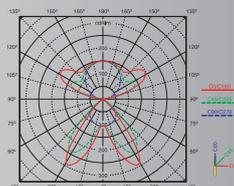


The 932-square-metre solar installation on the roof of the complex makes the Neckargemünd school centre the largest school building in Germany to be certified as a passive house.

## lux: TECHNOLOGY

### 5051 AL... series

The white-painted, aluminium suspended luminaires of the 5051AL... series by TRILUX are particularly well suited for illuminating workstations: whether the workspace is to be illuminated with direct light or the whole room with indirect light, the very narrow luminaire with its 40 mm can do both. The finely segmented RSX darklight parabolic reflectors made of super-purity aluminium ensure especially high degrees of effectiveness. The long sides of the 5051 AL consist of extruded aluminium, the heads of die-cast aluminium.



Luminous intensity distribution

In the Neckargemünd school centre as a passive house, the planners resorted to a special solution: here the luminaire was installed as a continuous line and equipped with two lamps.

The suspended luminaires are available in three different lengths of lamps and can therefore be perfectly adapted to the spatial conditions.





Generous glazing of the halls as well as wide flights of stairs linking the individual levels creates space and transparency.



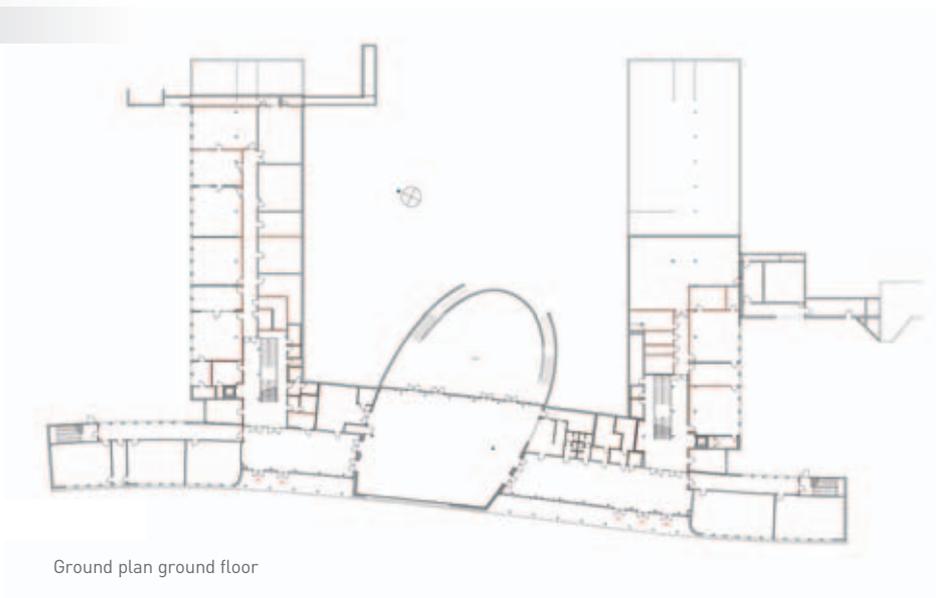
The planners answered the changing illumination needs with a combination of spotlights and suspended luminaires.

The re-planning of the Neckargemünd school centre presented the architects with a special challenge since here grammar school and secondary school are combined on the same premises and with a shared administration. After the original school centre had been destroyed by a fire in 2003, the city organized a competition for the new development of the site. It was possible and even requested to re-arrange the complex so it would take the intra-urban location of the school centre and the extreme hillside situation more into consideration. The winners of the competition for the realization, the architecture office Donnig + Unterstab from Rastatt, reacted to the special requirements with a U-shape: entrance zone, assembly hall and central administration are housed in the wing oriented towards the city centre. This curving main wing in the south west with its streetwall forms a new border towards the city, exudes self-confidence and gives the centre the appropriate urbanistic significance. Together with the two wings where the grammar school or the secondary school are located, an overall ensemble was created which is harmoniously embedded in the new

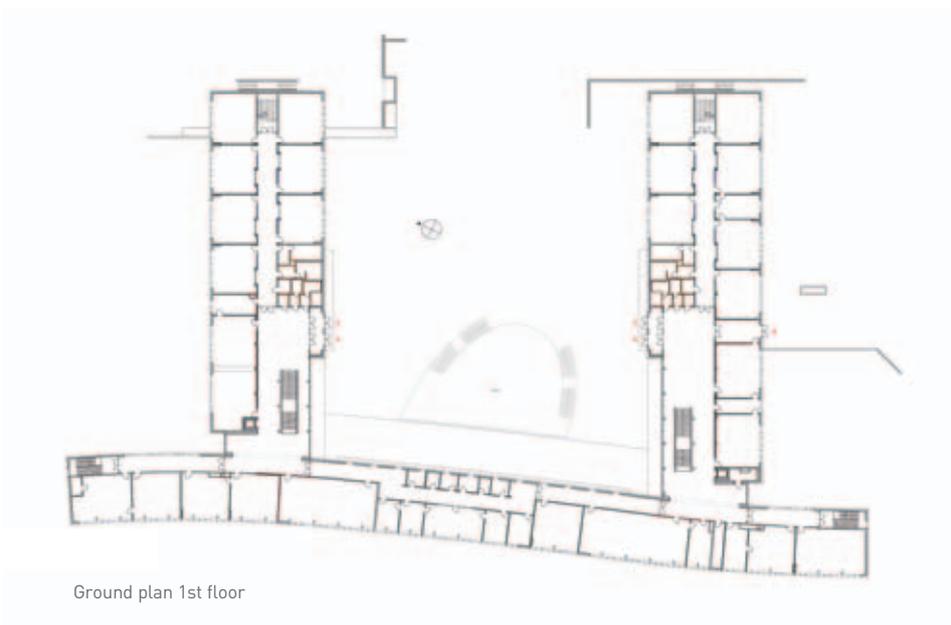
city centre. The U-shaped arrangement of the building volumes follows the natural course of the site and in its middle leaves enough room for a spacious campus.

All in all, the architects followed a rather unusual architectural concept: instead of, as often is the case, planning the main entrances to be at the highest point of the site, in the Neckargemünd school centre they are found at the lowest point, while the parking facilities are turned away from the school at the highest point. The generously designed entrance zone permits separate access to the two schools. The assembly hall is the central element of the school centre and, at the same time, an important linking element between the two wings. The way from the assembly hall in the direction of the rectangular campus and the surrounding free spaces leads through the oval-shaped atrium from which one reaches the level of the higher school yard by going up some steps.

It is said that a school is above all a social place where communication ranks first. In Neckargemünd, the spacious surroundings invite pupils as well as teachers to recreation and exchange but



Ground plan ground floor



Ground plan 1st floor

also to sports or to outdoor lessons. In the planning of the exterior spaces and the buildings, the architects had the goal of leaving enough space for flexibility – also in order to be able to adapt the school centre to possibly changing future needs.

The whole building envelope meets the standard of a passive house. Highly efficient heat recovery ensures that the indoor gains of heat will also be used – just like the solar energy and the heat diffusion of people and equipment. In each classroom, however, there is one additional individual radiator which is used during particularly cold winters. For the geothermic system, 14 drillings at 150 m were made. Two thirds of the required energy is produced by a heat pump. The last third is supplied by two boilers fired with wood pellets. Thanks to this ecologically innovative energy concept, the Neckargemünd school centre thus became the largest school building project in Germany certified according to the standard of passive houses. In addition, the Donnig + Unterstab officewon a price for their roof concept at the International Green Roof Congress 2009: the 4 000-square-meter roof surfaces with dense green covering not only optimize the insulation of the build-

ing but also have three large-format photovoltaic installations on 932 square meters.

The lighting design is based on the energy master plan. The lighting planner in charge, Heinrich Gantert of the Oberhausen planning office Gantert und Braun, favoured an economical and at the same time intelligent handling of energy. In the whole complex, the lighting is centrally controlled and adapted to the respective conditions and demands: sensors distributed over the building ensure that sunlight and artificial light optimally supplement each other and automatically control the intensity of the luminaires depending on the need. With the help of indirect and direct light as well as natural illumination, an optimal working environment for pupils and teachers is thus created.

## WELL ADVISED WITH TRILUX

A lot is happening in light- and lighting planning, stimulated above all by the rapid technical progress of the past years and by the energy-efficiency requirements. Yet in all this architects see themselves confronted with an almost unmanageable multitude of lighting possibilities. That is why they are getting support in their planning from the lighting consultants at TRILUX, with whom lighting solutions can be worked out in the preliminary stage.

“For us, it is not about a specific product but above all about light itself and its quality in the room: about dynamics, light direction and light intensity”, Martin Westermann, lighting consultant at TRILUX, describes the task. As are numerous others of his colleagues all over Europe, he is on the road to professionally support architects in their planning. With this service, TRILUX directly addresses the architects without focussing on sales since here the motto is rather that the journey is the reward: exchanging ideas on current building projects with architects for the cause of good lighting.

This makes sense these days when more and more frequently for architects time is also money and when planners are therefore glad about professional exchange. With the lighting consultants from TRILUX, the architects now have a contact person whom they may well see as a sparring partner in the design process. The reason is that the consultants are either architects or interior architects or they have worked hard for their design-specific competence in the practice of lighting planning. Thus it is possible to turn to the TRILUX consultants at an early stage of

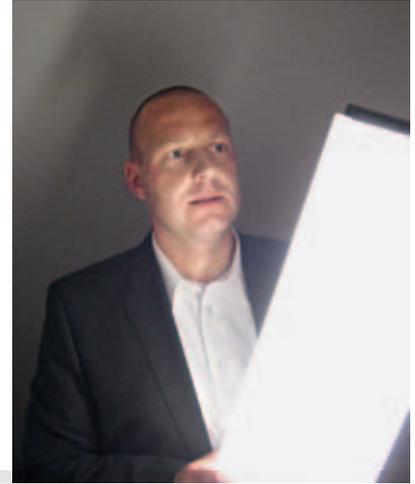
the design process – and this completely without any obligations and without the usual time pressure.

Now, several digital tools exist to calculate and visualize the planned artificial light. Of course TRILUX also makes these available, such as the Dialux programme with which lighting planning can be visualized relatively close to reality. But above all what is inevitable is to imagine individual scenarios in the mind’s eye. The right dialogue partner with a broad knowledge of light is really worth his weight in gold in this phase of the planning.

Thus the TRILUX lighting consultant is both: he thinks from the architectural side, hence looks for the best possible light-space effect, yet he always has the actual feasibility in the back of his mind so that the idea of the lighting – once thought-up – in the end can be very competently and above all very quickly translated into a performance description. This makes everyday work much easier for the planner – these days something essential for an architecture office!

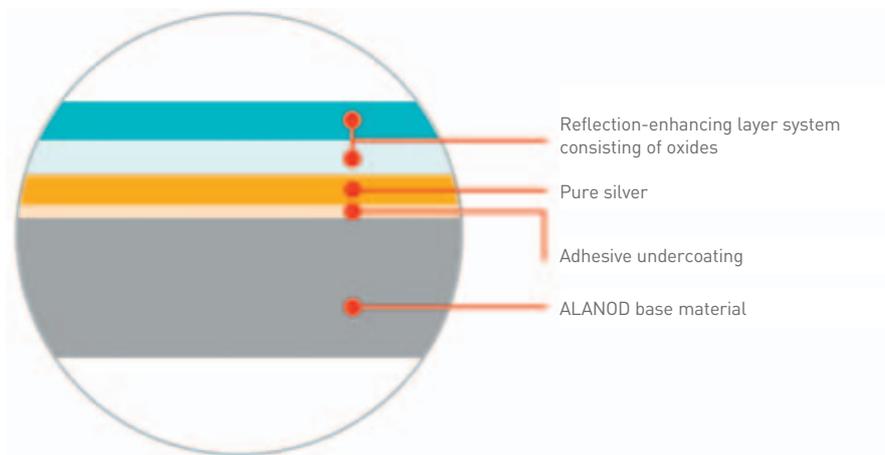


These and many additional consultants all over Europe are glad to assist you in questions of lighting (from top left to bottom right): Sabine Madaus (Germany), Birgit Mörl-Richter (Germany), Hetty Rümke de Gier (Netherlands), Martin Rohde (Germany), Lorenzo Clerici (Italy), Pierre Thinès (Belgium), Pål Frigstad (Norway), Pavel Boucek (Czech Republic), Richard Holt (Great Britain), Martin Westermann (Germany). Please find the contact addresses in the colophon on page 47.



## ABOUT MATERIALS

Not only as TFT-, LCD- or LED displays in mobile phones, notebooks, monitors or televisions: the next generation of the aluminium surfaces, the high-tech Miro-Silver® aluminium band by the German Alanod company, is also found in the lighting technology by TRILUX.



Miro-Silver® (layer composition left) is produced in various degrees of glossiness, such as for example high-gloss Miro-Silver and structured Miro-Micro Matt.

Thanks to its high reflection values, Miro-Silver® is particularly well suited for light-engineering systems in interior and exterior lighting.



Fotos: Alanod

Already in the middle of the 1990s, there was a small revolution in the sector of light-engineering surfaces. With the help of special layering systems, it became possible to increase the reflection ability of aluminium surfaces to, thus far not attained, 95 per cent. In the first half of this decade, the next evolutionary step was accomplished with another increase to now 98 per cent. This was only made possible by adding a layer of pure silver which is sealed with the already tried-and-tested layer system without any loss and is corrosion-resistant. Together with the well-known advantages such as complete colour neutrality of the reflection, high mechanical robustness and wear- and UV-stability, the improved reflection features mean, in most cases, an increase in efficiency of 10 to 30 per cent compared with the still frequently used Eloxal surfaces. From the middle of this year, TRILUX has made standard for all reflector grids in T5 luminaires to have highly reflective silver layers. This ensures consistent high quality and, due to large numbers of units being manufactured, reasonable prices as well.

# PLANNERS ASK, MANUFACTURERS ANSWER

In the everyday work of a planner, many a question comes up which cannot be found in any handbook. Answers to such questions are given here by the experts from TRILUX who also gladly tell you one or more tricks.

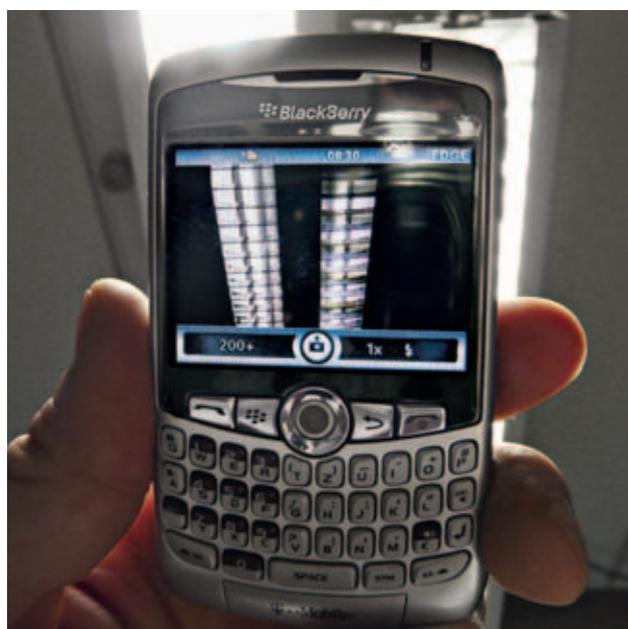
## How do I recognize whether a fluorescent lamp is operated with a conventional or an electronic ballast?



**Thomas Kretzer**  
Managing director

With the help of a cell phone camera, one can recognize very quickly whether the luminaire works with an electronic (left) or a conventional ballast. It is interesting to see what happens when the camera is rotated.

Discharge lamps (fluorescent lamps, high-pressure lamps) have negative voltage features. With constant voltage, the electricity rises extremely due to the increasing conductivity of the gas discharge and the lamp would be damaged. That is why voltage-limitation with the help of ballasts is necessary. This voltage limitation can be made with conventional (KVG) or electronic ballast. So if one wants to know which technology is inserted in a luminaire, this is very easy to find out: for instance with the help of a commercially available cell phone camera. If the switched-on lamp flickers when looked at through the camera display, it is a conventional ballast. If, however, the lamp is calm and clear, an electronic ballast has been inserted. The reason for this is the very long frequency (50 Hz), with which the conventional ballast operates – an electronic ballast, on the other hand, achieves an operating frequency of up to 70 kHz. Through the camera and on the display, the lower frequency shows as a flickering. However; the human eye is too slow to notice the flicker-effect of the luminaire without aids.



## BRIGHTENING WITH TECHNOLOGY

For a long time now, it is no secret that for TRILUX luminaires the product design and the technical equipment go hand in hand. The new advertising campaign, where a lot can be learned from the texts as well as from the images, clearly shows what important advantages this means for the planner.

New Light for more energy efficiency! With this motto, TRILUX is preparing for the future which will be determined by the debate about energy consumption. The fact that resources are getting increasingly scarcer affects all areas of our daily life, whether in the car industry, the economy as such – or the lighting sector. Long before the prohibition of the incandescent lamp was publicly discussed, in favour of the energy-saving lamp, the TRILUX engineers have been designing luminaire systems with very high degrees of efficiency. After all, increasing the efficiency has from the very beginning been the most important core area since 1948 when the company name was chosen: TRI-LUX, triple luminous efficiency.

This responsible course of action is reflected more than ever in the new advertising campaign of the company in Sauerland. And it does so at several levels: "We wanted to design a campaign which, on the one hand, shows the effectiveness of the TRILUX products and their energy-saving potential and, on the other hand, the competence of TRILUX for designing light", Axel Thomsen explains, the creative director at the Serviceplan

advertising agency in Hamburg. That is why the advertisements are not limited to just single catchphrases. The explanations of the illustrated product or project in the text also supply the most important information for each planner interested in the details. Special care was used for the typescript especially developed for the campaign – and this from real light: working in darkness, with a lamp every single letter of the alphabet was by hand traced and simultaneously photographed with time exposure, in several versions to create diversity. Thus even when it comes to the written word, the objective is not the simple information through letters. What TRILUX, as one of the most important leading innovators in the business, has to say is being transported by a ray of light in true style.

Energy effectiveness, design competence and New Light are the three key concepts which will stand for TRILUX in future as well. That this is the path is not least shown by the numerous awards which TRILUX has received.

New Light really is worth it!

So sieht es aus,  
wenn Umwelt-  
experten  
und Designer  
einer  
Meinung  
sind.



Neues Licht für mehr Energieeffizienz.  
Die TRILUX Solvan UXP.



Ihr Erscheinungsbild:  
**klassisch.**  
Ihre Technologie:  
**revolutionär.**



Neues Licht für mehr Energieeffizienz.  
Die TRILUX Solvan Black.



Das Angenehmste  
an Energieeffizienz:  
Das Licht, das sie  
verbreitet.



Neues Licht für mehr Energieeffizienz.  
Die TRILUX Solvan UXP.



Mit 85%  
Betriebswirkungsgrad,  
so effizient wie elegant.



Neues Licht für mehr Energieeffizienz.  
Die TRILUX Solvan Black.



The new advertising campaign by TRILUX communicates on different levels: beside the luminaire itself and a catchphrase, further down there is detailed information regarding the core subjects of energy effectiveness, design and New Light.

# Energieeffizienz kann man in Zahlen messen. Und in Designpreisen.



Neues Licht für mehr Energieeffizienz.  
Die TRILUX Solvan Black.



Jede Leuchte von TRILUX ist mehr als einfach nur Licht. Zum Beispiel die TRILUX Solvan Black: Vielfältig einsetzbar, verändert sie jeden Raum, ohne dabei aufdringlich zu wirken. Ihr Raster mit UXP-Technologie und Silberbeschichtung ermöglicht Betriebswirkungsgrade von bis zu 92%. Mit integriertem Lichtmanagement sind Einsparungen von bis zu 70% möglich. Aber auch gestalterisch kann sie überzeugen – die Jury des red dot design awards zum Beispiel. Alles in allem ist sie ein Beweis für die perfekte Verbindung von Energieeffizienz und Design. Oder kurz: für TRILUX Neues Licht. [www.trilux.at](http://www.trilux.at)

A quiet and inconspicuous installation is planned as the basic programme in order not to exhaust the effect of the façade.

From dusk until midnight, light compositions are being shown which bathe the bank of the Danube in a colourful light visible from afar.



Treusch architecture /  
Photo: Andreas Buchberger



Photo: rubra

## PLANETARY ORBITS ON THE ILLUMINATED FAÇADE

In the year 2009, Ars Electronica in Linz, the festival of digital art and media culture, is already celebrating its 30th anniversary. For this occasion, the associated AEC Museum has been expanded and given a dominating media façade.

By Franziska Bettac

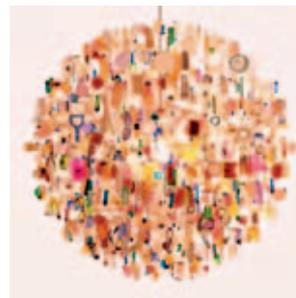
In the course of having received the title "Linz 2009 – Culture Capital of Europe", the self-proclaimed "Museum of the Future" by the Vienna architectural office Treusch Architekten was opened right on 1st January 2009. The existing museum was supplemented with two additional buildings and generous underground spaces. A common façade, the new shell of light, combines the cubatures into one whole. The media façade is illuminated by 40,000 coloured LEDs and, with its 5,000 square metres, is held to be the largest of its kind in Europe at the present time. On a total of 1,100 panes of rolled glass, the individual pixels, complicated colour gradations can be shown. For the opening, the New York artist Zachary Liebermann created a generative "work-in-process" of light art influenced by the actual planetary orbits and the course of the sun – homage to Johannes Kepler, who held a teaching chair in Linz from 1612 to 1627. At night, the AEC needs for its elaborate light production 3 to 5 kilowatts, comparable to the consumption of 12 computers. In order for its glow to be visible from afar even at dusk, however, the energy demand is then five times this amount.

[www.aec.at](http://www.aec.at)



Photos: Stuart Haygarth

Spectacle looks like an expensive, extravagant, five-tier chandelier in a hotel lobby. But the secret is much simpler: commercial eye-glass lenses turn it into something extraordinary.



From junk and rubbish other people would prefer to get rid of, Stuart Haygarth magically creates incredible objects: the chandelier Tide (top), the sparkling Optical chandelier (middle) or even a children's night light in the context of the Nippon 2007 vogue (bottom).

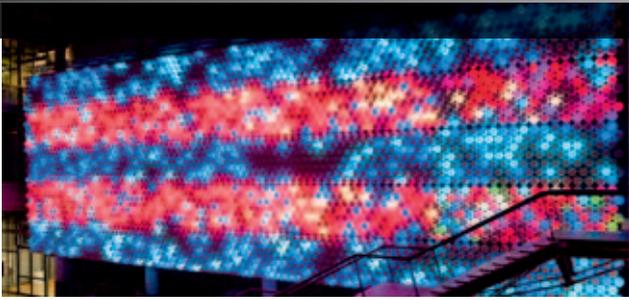


## THE CREATIVE ASPECT OF RUBBISH

Whether used plastic bottles, discarded eyeglass lenses or even food containers from the takeaway: in the hands of British artist Stuart Haygarth, even the smallest piece of rubbish turns into a true work of art.

By Marina Schiemenz

On the beach of Dungeness in the south-easterly British county of Kent, Stuart Haygarth has for years been collecting things other people had carelessly thrown away – basically just rubbish. Yet it is precisely these banal and unassuming things that he magically transforms into something unexpected: his appropriately named chandelier Tide, for instance, consists of translucent plastic finds whose shapes could not be any different. Only the interplay of the objects makes them merge into a whole and thus reminds of the moon as the trigger of the tides. Also impressive is Haygarth's Optical luminaire which appears to consist of hundreds of sparkling diamonds. Only on closer inspection does one become aware that these are not precious stones that refract the light, but more than 2 000 spectacle lenses. Also made of the commercial seeing aids is the staggered Spectacle chandelier that magically creates fascinating light effects. More playful is the night light for children composed of plastic spheres filled with gimmicks which one used to get from automats at every street corner. With its variety and passion, Stuart Haygarth's homage to rubbish could not have been more successful. [www.stuarthaygarth.com](http://www.stuarthaygarth.com)



Photos: rosalie

The formidable wall of a total of 3,150 computer-controlled illuminated pixels has the impressive dimensions of 9.25 x 27 metres.

From close-up: white, commercially available plastic buckets are made to glow with the help of RGB light-emitting diodes.



## A WALL OF LIGHTS AS A CONDUCTOR

At first glance, the work by the Stuttgart artist rosalie looks loud and trendy, reminiscent of advertising panels and of an oversized LED image. But when looking at it for longer, *HYPERION\_Fragment* develops a strong intensity.

By Franziska Bettac

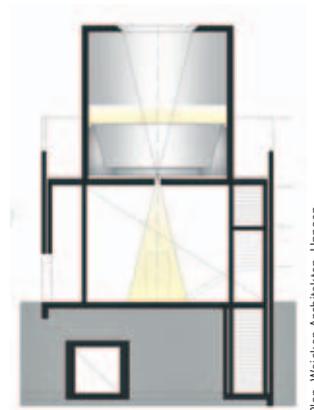
The light composition by the artist rosalie swells, glows, gains speed and rhythm, in order to then become calm, even calming, downright "quiet" once more. Originally, this project was created in dialogue with the Austrian composer Georg Friedrich Haas. Together the two artists wrote the "Concert for Voice of Light and Orchestra" for the Donaueschinger Musiktage 2006 where it was rosalie's wall of lights conducting the musicians. In the ZKM, the visitor is now able to experience the light sculpture without music, but *HYPERION\_Fragment* fascinates even as a fragment. According to Rosalie, this is about "the idea of a special aesthetic excursion. A voyage to no-man's land". *HYPERION\_Fragment* really succeeds in taking the viewer along on the trip: The glowing, shakily shining work of art fascinates him without overwhelming him with its enormous luminance. The work derives its title from the name of the mythological figure Hyperion, the gigantic Greek titan. He is the father of Helios, the sun god, of Selene the night and Eos the dawn. An installation *Helios* has already been created by rosalie in 2007 – may we now look forward to Selene and Eos?

[www.rosalie.de](http://www.rosalie.de), [www.zkm.de](http://www.zkm.de)



Third Breath, 2005, in the Zentrum für Lichtkunst in Unna, is the first permanent installation by the American light artist James Turrell in Germany. Above all the interplay of the coloured artificial light with the light of the sky invites to stay here.

The permanent installation basically works like a camera obscura. The light from the Skyspace falls into the dark lower room and is there projected onto the floor.



## THE SKY OVER UNNA

His ongoing project Roden Crater in the US Arizona desert is simultaneously the prototype for the Skyspaces can now be found all over the world. Now the light artist James Turrell has constructed a Skyspace in Germany as well, in the Ruhr district town of Unna.

By Thomas Geuder

The works by the US-American light artist James Turrell require of their viewers what many people have lost today: time! His installations have to be experienced – just a glimpse is not enough. James Turrell investigates light as a phenomenon, a medium demanding physical and emotional reactions from people. Although light cannot be grasped, he turns it into an object. In Turrell's Roden Crater observatory, so to speak the prototype of his Skyspaces series, the sky over Arizona can be experienced in all its facets. Meanwhile, there are Skyspaces all over the world. Whether in the USA, in England, Israel or Japan, the purpose is always to experience the sky. Third Breath, 2005, in Unna goes even a step further: on the upper floor of the two-storey building is the Skyspace. Through a lens on the floor, the light is projected into the room below, similar to a camera obscura, and appears there as a live two-dimensional image. At dusk, when the sky turns dark blue, the surfaces of the walls are illuminated in changing colours which makes the sky always appear complementary – a fascinating spectacle from which it is hard to disengage

[www.lichtkunst-unna.de](http://www.lichtkunst-unna.de)



## HOLY GLOW

In a globally linked world, it is no longer a piece of news that people in Asia sometimes take great pleasure in anything that is colourful and kitschy. As a travelling European, however, one is every so often suddenly amazed at the curious forms this passion takes. That was what happened in Notre Dame Cathedral in Saigon, the officially named Ho-Chi-Minh City in Vietnam: as if the holy aura of Mary were not enough, resourceful pastors without further ado equipped her with a halo shining in blue and a just as blue frame of light. On seeing this, the traveller immediately asks himself whether the numerous notes of thanksgiving on the walls are dedicated to the Saint or, in one or the other case, perhaps also to the “miraculous illumination” – we will probably never find out.

# COPYING WELCOME!

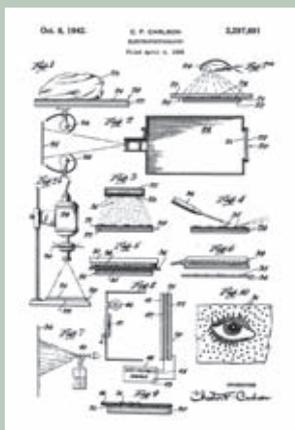
The times when manuscripts had to be painstakingly duplicated by hand are long past. At only the push of a button, today we produce numerous copies. In the 1930s, there was not yet any thought of such a luxury. The vision of a copying machine, however, was already anchored deep in the brain of the American physicist Chester Carlson. After the first fruitless attempts to develop a suitable process, Carlson finally happened upon photoelectricity: the starting point of his considera-

tions was a zinc plate coated with sulphur which was electrostatically charged through friction in the dark. An inscribed glass pane was put onto the plate and exposed for about 10 seconds with a photo lamp. In the process, the sulphur lost its charging and thus its adhesion in exactly the places where it was not darkened by the writing. Subsequently, Carlson dusted the zinc plate with fine powder which adhered to those spots still covered with sulphur. With slight pressure, the plate was pressed onto a sheet of waxed paper which fixed the powder on the paper. The first electro-photo-copy was born! Although it was still a long way from this first copy to the present-day copiers, Chester Carlson all the same made people's lives a lot easier with his invention.



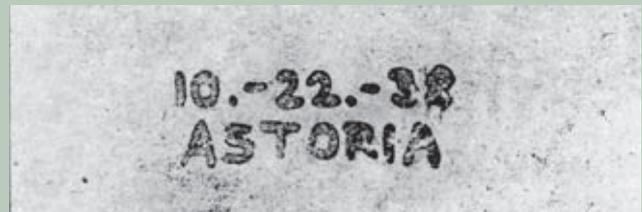
The first electro-photo-copy shows the date as well as the place of its origin: 22 October 1938 in Astoria/New York.

The inventor Chester Carlson presented his patented xerographer. The made-up word "xerography" was derived from the Greek words for "dry" and "to write".



Photos: xerox

The title page of Chester Carlson's patent specification of 6 October 1942.



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