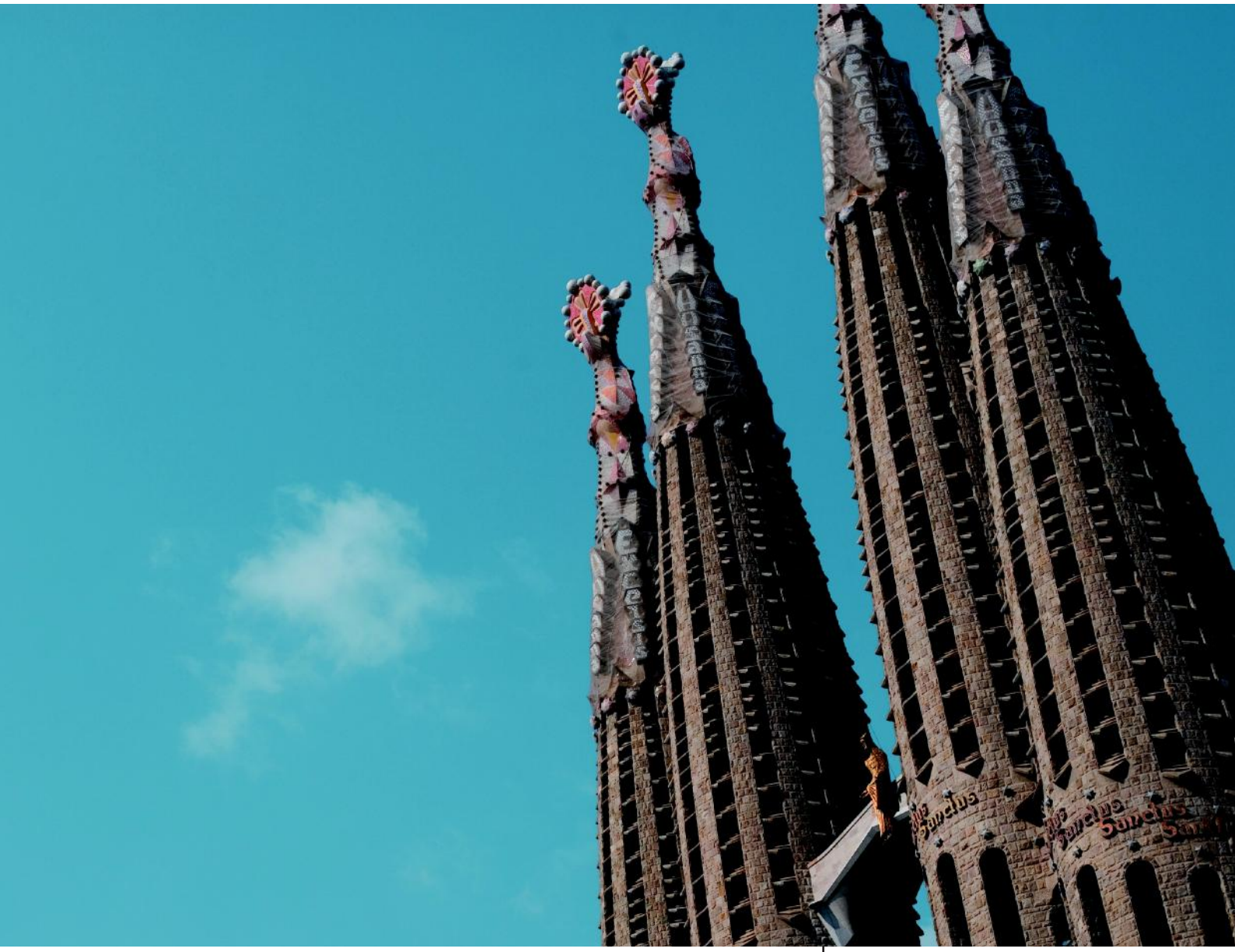
VOSSLOH SCHWABE

eco ideas



newsLIGHT

NEW PRODUCTS – NEW PROJECTS

newsLIGHT

EDITORIAL

Dear Customers,
Dear Readers

Here it is - the second newsLight issue, fresh from the press. This latest newsLIGHT will again inform you of our product highlights and latest projects.

The one topic that is with us every single day of our commercial and private life is how to save energy and, with it, how to protect the environment by reducing CO_2 emissions. Between 15% and 20% of the total power generated worldwide is spent on illumination.

Saving energy is the first and foremost source of energy, or so they say. But how do we efficiently save energy without having to give up any of the convenience and quality of illumination we are used to? A plain road to success can only be achieved with innovative products that excel in low energy consumption. As a manufacturer, we are also facing the challenge of minimising the amount of energy needed to make our products and systems. New (biological) materials will make a major contribution to this end.

It is not just LEDs which will illuminate our future under this aspect, as it were. There are also „intelligent" control systems which are striving for the pole position. What we must learn is to make prudent and expedient use of our energy resources and to explore alternative sources. We all take our share in the responsibility. The new and advanced technologies are the vessels that will take us there.

In this sense, we are adopting an optimistic and open approach towards new ideas and technologies.

Enjoy reading

Helmut Doll
Marketing Manager, Vossloh-Schwabe Deutschland GmbH

CONTENTS

SAGRADA FAMILIA

AN ENLIGHTENING PROJECT

THE HISTORY

The Sagrada Familia (full name: Temple Expiatori de la Sagrada Familia, in English the expiatory church of the Holy Family) is one of the most famous landmarks of Barcelona and certainly one of its most impressive sights. The Roman Catholic basilica was designed by Antoni Gaudí and has still not been completed.

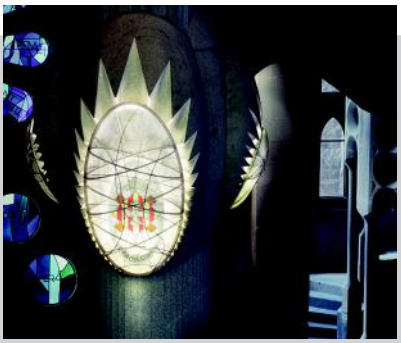
March 19, 1882
The foundation stone is laid on the feast day of St. Joseph. Gaudí takes over as chief architect one year after construction work began. Gaudí is to work for 43 years on the church; during the last 14 years of his life it is his sole task.

1926
Gaudí dies in a tram accident. Later, construction work is continued according to his plans with few interruptions.

2005
The UNESCO includes the Nativity facade, the Apse facade and the Crypt of Sagrada Familia as an extension of the World Heritage Monument in its World Heritage list.

November 7, 2010
Following completion of the interior, an important milestone is reached: the church is dedicated by Pope Benedict XVI. During the dedication service, the Pope raises the church to a Papal Basilica Minor. So far, eight of the 18 towers planned for the exterior of the church have been completed.

2026
The hundredth anniversary of Gaudí's death and, at the same time, the target for completion of the basilica. The construction work would then have taken a total of 144 years. Whether this can be achieved or not depends to a major extent on the financial situation. The construction work is still being financed exclusively through donations as well as through revenue from entrance tickets.



THE PROJECT

Despite the major differences between the facades of Sagrada Familia, they have one thing in common. They are full of symbolism.

Gaudí wanted his works to have something to tell, to be more of an experience than built space. Gaudí's vision is being implemented step by step through the extension by modern elements. One such project is the decision in favour of innovative lighting technology in the form of LED spotlights to set the scene for the sacral symbolism.

The interior is already finished and rises up into an extremely high vaulted roof borne by stone columns. These spread out on the ceiling to form branches, like a kind of leafy roof. Just recently these knots were fitted with a total of 40 luminaires equipped with white LED modules in a colour similar to daylight, and suitable control units from Vossloh-Schwabe.

The VS products in detail:
- VS-PowerEmitter-XR neutral white
- 7 LED-modules, neutral white
- PowerOptics2 VS SS-26° and 45°
- High Power ChainLED (COB) 12V, neutral white

- LED constant-current driver ECXe 350 mA, 11 W
- LED constant-current driver ECXe 700 mA, 17 W
- Electronic converter for LED modules 12 V, EDXe 130/12 V, 30 W

Photos of the interior: José Tió
Consulting & luminaire design: Anoche Iluminación Arquitectónica
Glass craftsman: D. Fita

View of the ceiling in the basilica

STREET LIGHTING

LED TECHNOLOGY FOR THE ROAD

LED TECHNOLOGY FOR STREET LIGHTING

A wise solution for all fields: energy, lighting technology and the environment

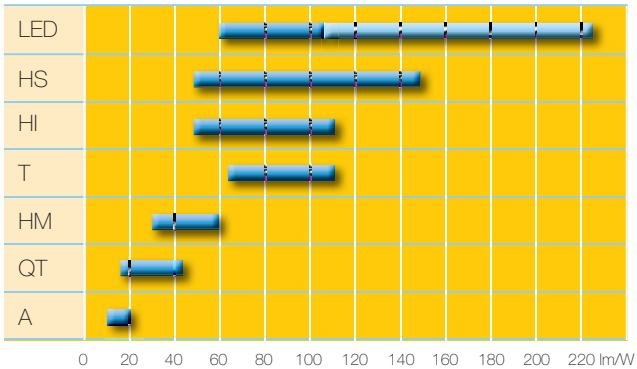
The fact is that most of the exterior lights in the world rely on entirely outdated lighting technology. Ten percent of the total German power consumption goes into street, square and bridge illumination, costing the state 760 million euros every year. Three out of nine German streetlights are older than 30 years. What is more, the luminous efficacy of the lamps is low and many lamps still contain mercury. This situation is further aggravated by the high power consumption of these lamps which turns them into first-rate polluters due to the ensuing CO_2 emissions.

LED technology benefits:

- **High power efficiency**
- **Long life**
- **Homogeneous illumination of the entire street**
- **Steadily dimmable from nought to 100 percent**
- **Light of a pleasant colour temperature**

Efficiency of the different light sources

Breakdown of power capacities (lumen/watt)



= current theoretical LED limit
LED (light-emitting diode)
HS (high pressure sodium lamp)
HI (metal halide lamp)
T (fluorescent lamp)
HM (high pressure mercury lamp)
QT (low-voltage halogen lamp)
A (incandescent lamp)

Street lighting standard – DIN 13201-1:2004

The standard defines a system of parameters for comprehensively describing all illuminations typical to road traffic.

Part 1
Selection of lighting classes by the following criteria:
- Main user's speed: high, medium, low, walking pace
- Types of users: motorised traffic, cyclists, pedestrians
- Geometrical properties of the road, type of traffic use, main type of weather (wet, dry)

Part 2
Performance requirements (definition of lighting classes):
- Luminous density on the road, horizontal illuminance or uniformity
- NEW: vertical, semi-cylindrical or semi-spherical illuminance

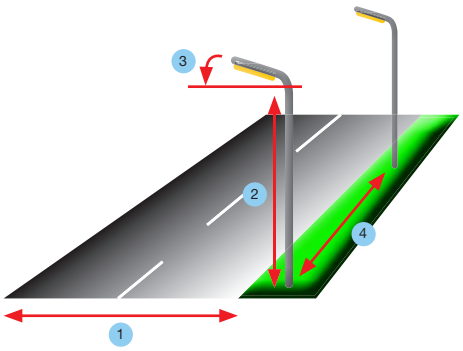
Part 3
Calculation of performance
- Description of methods for calculating the performance criteria used in Parts 1 and 2.

Part 4
Methods of measuring lighting performance
- Presentation of the photometric and other methods of measuring the performance of street lighting equipment.

THE ME LIGHTING CLASSES:
The ME classes apply to roads for motorised traffic at medium to high speeds; in some countries, these classes also apply to roads in residential areas.

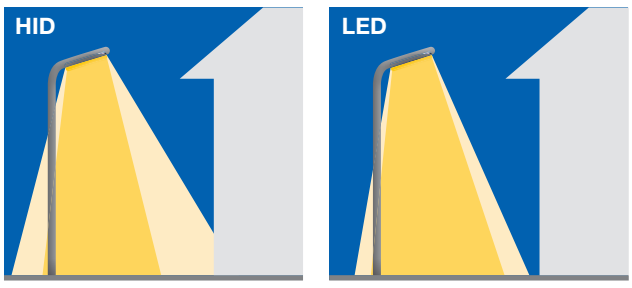
APPLICATION OF THIS STANDARD IS INFLUENCED BY THE FOLLOWING FACTORS:

1. Width of road
2. Pole height
3. Lamp inclination angle
4. Pole to pole distance



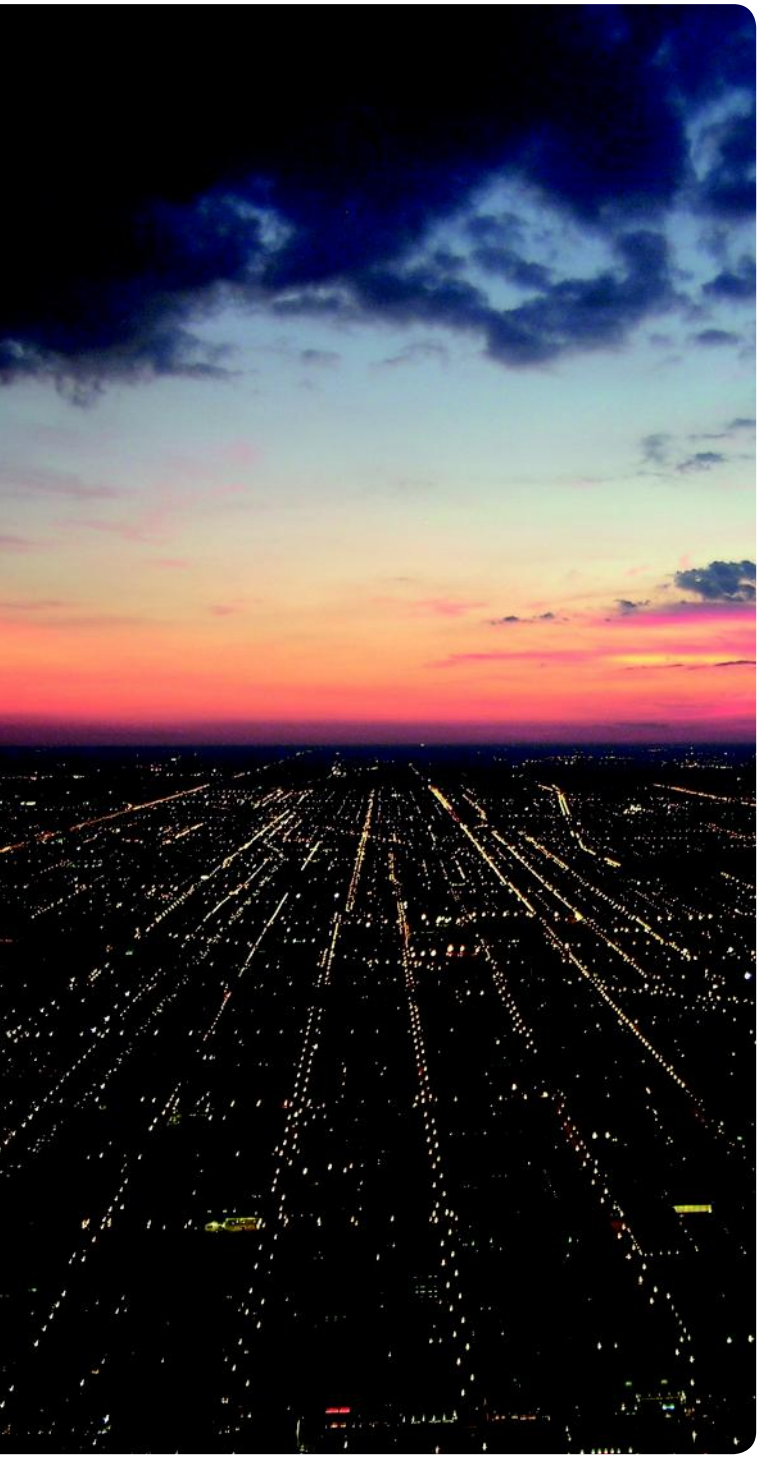
LED vs. HIGH PRESSURE SODIUM LAMP

High pressure sodium lamps are currently ubiquitous in street lighting. However, their higher efficiency is somewhat consumed by scattering losses: High pressure sodium lamps shine in all directions. Despite the reflectors, some of the light scatters and is lost. LEDs, on the other hand, benefit from true directional radiation which minimises scattering loss.



STREET LIGHTING

AN OUTLOOK INTO THE FUTURE



LED DRIVERS FOR STREET LIGHTING

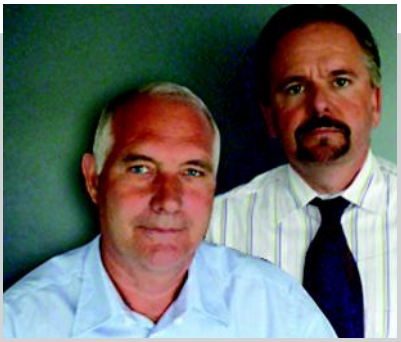
In the summer of 2011, Vossloh-Schwabe will launch the marketing of a LED driver for controlling two different operating currents for outputs up to 150 W. Its excellent efficiency of over 90% and the option of actuating a phase dedicated to reducing the output by up to 50% turn this driver into a paver of interesting pathways for modern LED street lighting, including a night set-back option for reduced light output at efficiently diminished power consumption.

- Simple actuation of an extra phase for switching from 700 mA and 400 mA.
- Optional phase switching by timer-controlled components such as PR 12 K LC or the Lixos system.
- Defined operation at 400 mA or, optionally, at 700 mA without switch over depending on the desired lumen/efficiency package.
- Safety circuits reliably protect the driver against mains transients and, thus, against faults and peak pulses from the public mains to warrant long and safe operation.
- Variants at IP20 or IP67 protection available.

OUTLOOK ON UPCOMING LED STREET LIGHTING MODULES

Vossloh-Schwabe is also developing an innovative illumination concept for street lighting to make best use of the LED driver.

- IP67 protection, designed to withstand humidity and dust.
- A specially designed lens ensures that the road is illuminated compliant to EN 13201.
- Due to the modular system design, the number of modules installed defines the lamp's performance rating and area of application. Thus, a single type of LED module is enough to equip a wide variety of types of luminaires.



On the left: Dipl.-Ing. Peter Stark (AE Workshop Manager); on the right: Hartmut Friedrich (AE Manager)

HANDLING OF VS LED-STREET LIGHTING PROJECTS

VS LED Application Engineering is the general source of support for customers and sales. Therefore, every project is handled according to the following factors:

- **Product knowledge**
- **Lessons learnt in previous projects**
- **Vertriebliche Erfahrung**

Joining hands with our customers, we take these factors as a basis of developing ideas and solution roadmaps. Be it the circuit board, individual LEDs or the fully assembled finished product, we will always be able to meet our customers' expectations. Optical and thermal simulations help to optimise the final product well in advance of fabrication.

Our know-how also allows us to satisfy special customer needs such as solar power modes, brightness or motion control. The Modules are adapted to every specification: light whenever and wherever you need it.

Following the first presentation and initial exchange of ideas with the customer, our Application Workshop enters the scene. Its prime ability is to quickly provide prototypes and hand-fabricated samples.

Options include migrating existing luminaires to LED technology or walking new roads with our customers to develop ideas for entirely new luminaire designs. Crucial conditions are a high level of communication with the customer, fast responses and a timely implementation of each step of the project.

What our customers appreciate:

- **ONE point of contact for handling the entire project**
- **Everybody pulls together**
- **Timelines are met**
- **VS provides ideas helping to yield optimal results for and with the customer**
- **Open communication**

MARKET TRENDS AND VISIONS

Matthias Görner, Technical Solutions Street Lighting, takes a stroll look ahead.

We can safely say today that, over the next few years, LED street lighting will increasingly move towards intelligent control systems. Light and presence sensors will generate exactly the illumination needed at a certain point in time.

LED street lighting applications will focus on public roads, bicycle lanes and pavements, public squares and parks.
Generally speaking, we will meet LEDs wherever presentable lighting and illumination is what it takes. LED light not only excels in its comfortable colour temperature and good colour rendering but also in the perfect illumination of the area.

Proving ground projects are currently underway aiming at street lighting "on demand". Subscribers to a chargeable service can send an SMS to have their way home well illuminated. The light will be turned on only if it is actually needed. This will help to further reduce energy consumption and CO_2 emissions.

LED UPDATE

NEWS ON OUR VS PRODUCTS

NEW COMPONENTS

VS' LED shop illumination system consists of LED modules of various performance classes, the matching electronic lamp ballasts and further accessories such as graphite foils for optimal thermal connection or cables for the linking in of active 12 V cooling components.

Luminaire design is further facilitated by standard marketable reflectors and heat sink solutions adapted to the VS modules. This wide range of components drastically shortens the time-to-market of LED luminaires.

The following are sources of reflector supply:

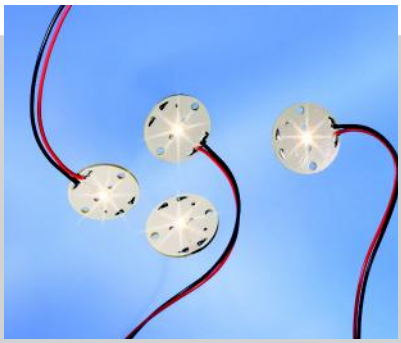
- ACL
- Alux-Luxar
- Jordan-Reflektoren

The following are sources of passive and active heat sink solution supply:

- Alpha-Numerics
- AVC
- Fischer Electronic
- Nuventix
- Sunon

A detailed list is available on our web site at www.vs-optoelectronic.com.

The next step will be to extend the product range by LED modules of colour rendering index Ra (typ.) 90.



NEW CONTROL GEARS

The start of series production of the control gears matching VS' LED shop illumination system is but a short way off. The product portfolio will comprise the following control gear variants:

- **700 mA and 1050 mA constant current drivers**
- **Dimming and non-dimming variants**
- **Fitted and stand-alone variants**

Both drivers reside in a housing equivalent to the housing already used for HID ballasts (M3) or compact fluorescent lamps (K3) today. Due to their max. output voltage of 60 V, the units meet the SELV requirements for luminaires and allow for simpler luminaire designs. The operating voltage is automatically adjusted between 20 V and 57 V.

The dimming variants can be controlled by DALI. The independent control gear variants support the special feature of mains through-wiring. Assuming the units are installed in a suspended ceiling, the mains lead directly interconnects the units which significantly reduces the cabling efforts.

Moreover, the LED drivers support DC operation at voltages between 176 V and 264 V which enables their use in illumination systems with an emergency standby supply from a central battery.

NEW PowerEmitters AND TriplePowerEmitters

PowerEmitter and TriplePowerEmitter update

VS updates its LED board range: VS PowerEmitter and TriplePowerEmitter. Both variants are now available with XP-series LEDs. Choose from three variants in response to actual brightness needs:

- XP-C (up to 84 lm/W at 350 mA)
- XP-E (up to 112 lm/W at 350 mA)
- XP-G (up to 140 lm/W at 350 mA)

VS also provides the matching lenses.

FUTURE LIGHT FORUM

SHARING IDEAS

FIRST “FUTURE LIGHT” FORUM – A COMPLETE SUCCESS

A total of 30 lighting technology experts including the representatives of eight major manufacturers of luminaires met at Vossloh-Schwabe Optoelectronic in Kamp-Lintfort. Participants greatly appreciated the one and a half day event which involved of a series of lectures followed by discussion groups.

Smaller groups addressed three major topics: future light in the office, in shops and along the road.

Andreas Vogel, member of VS' General Management, and Volker Neu, General Manager LED, briefly welcomed the participants and started the round of technical paper presentations on very interesting topics such as

- What options can biological materials offer?
- Seeing and being seen - where do I need light?
- Flexible circuit boards
- Ultra-transparent liquid silicone rubbers
- Optical technologies
- Applied optics and electronics
- Applied solid state physics

Researchers, developers and fabrication experts were heard in order to broaden the view on these topics. The speakers were from the industry, universities and institutions and the German state of North-Rhine Westphalia.

The second day focused on group discussions. Based on the new knowledge obtained the day before, the participants vividly discussed what future illumination solutions may look like. The speakers' hands-on experience directly contributed to every discussion. Since the exchange of ideas was very promising, participants spontaneously agreed to organise a follow-on event.

Some speakers used the opportunity to showcase their own designs alongside the meetings. The products Panasonic produces in Japan for the domestic market were met with great interest.

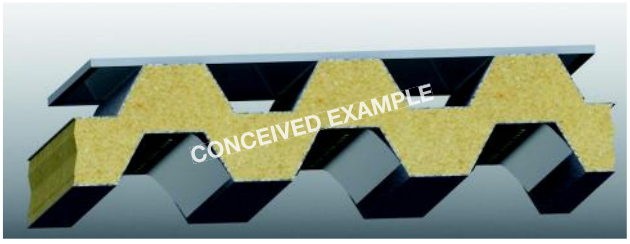
All in all, participants agreed that the Future Light Forum was very informative and creative. A successful initial forum with much potential for the future.

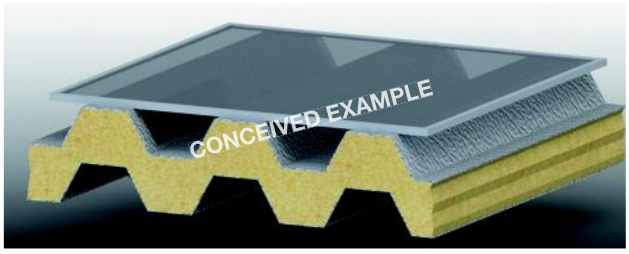
Vossloh-Schwabe thanks all participants.

Volker Neu, General Manager LED

Here are two of the Future Light ideas:

CEILING-MOUNTED ELEMENTS WITH BUILT-IN SOLAR MODULE AND BATTERY FOR LED REFLECTOR IN A TRAPEZOIDAL SHEET





Benefits:
- Wireless ceiling illumination
- Easy retrofitting of existing installations
- Reduced risk of fire
- Low heat load
- Shock-proof

Potential applications:
- Illumination of storage bins or warehouses
- Illumination of cold stores
- Bus stops
- Stables

STAND-ALONE SOLUTION WITH INTEGRAL TECHNICAL ELEMENTS AND COOLING HOUSING

Benefits:
- Wireless
- Design orientated
- Solar-powered with lithium-ion battery
- Control (daylight, time, radio,…)
- Easy retrofitting

Potential applications:
- Shop window illumination
- Facade illumination

VS DIMMING SOLUTIONS

DREAM TEAM: DALI BALLAST AND LiCS

Houben's Cologne warehouse

A SAMPLE PROJECT - THE HOUBEN WAREHOUSE

In a joint project, the warehouse of Arnold Houben GmbH in Cologne (Germany) was equipped with the new LiCS light control system. Facts and figures:

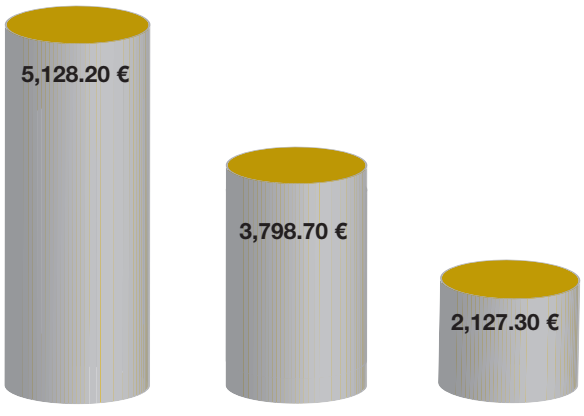
Warehouse size/height: 1,320 m2/7 m
Illuminants: 169 luminaires 1x49 W
Control gear: DALI ballast (5 W power loss)
Operating hours: 2,250 hrs./year (9 hours/day, 250 days/year)
Energy costs: 0.185 €/kWh

Use of motion sensor –30 %
Use of daylight sensor –20 %

The following annual effect is achieved:

- 9,000 kWh less
- 40% less CO_2 emissions
- Approx. 1,600,– € of annual savings

Breakdown of annual operating costs:



Old system (conventional ballasts)

New system without LiCS

New system with LiCS

eco ideas

APPROPRIATE ADD-ON: OUR DALI CONTROL GEAR

Our new CFL DALI product line is the ideal solution for highly power-efficient illumination, especially if combined with the LiCS control system. Our current DALI control gear is A1-rated and already meets the strictest requirements of the EU Eco-design Directive (2005/32/EC).

Performance characteristics:

- Two-strand, potential-free control input that is not sensitive to polarity
- Dimming curve adapted to the luminous sensitivity of the human eye
- Enables total system, group or individual lighting control
- Scene memory
- Lamp status messages
- Easy integration in building management systems
- Stand-by loss: < 0.3 W

Houben's Cologne warehouse

MultiSensors

Putting luminaires into practical groups and installing MultiSensors that respond to brightness and motion provide the convenience of perfect illumination – exactly when you need it.

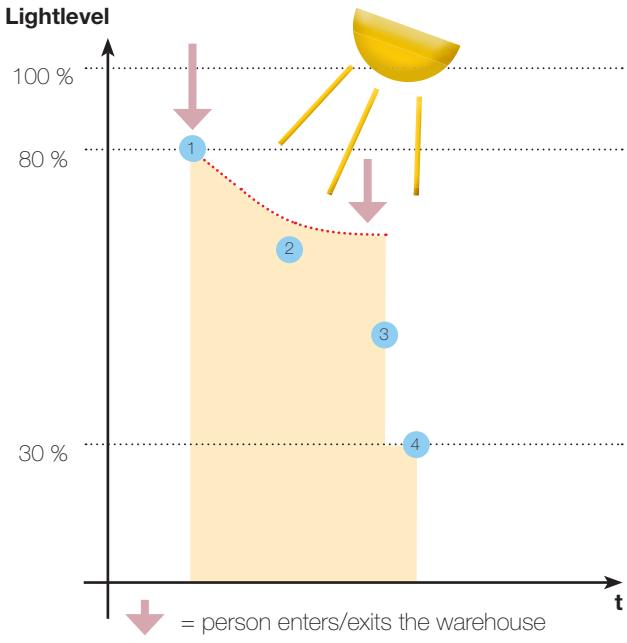
1 In the example on the right, the sensor detects motions in the warehouse. All luminaires allocated to the sensor turn on at a preset dim (80%).

2 For as long as the sensor detects motion, the integrated light sensor adjusts the brightness to the preset level, taking into account the amount of natural light.

3 If no motion is detected, LiCS either turns off the light completely or dims it to the preset intermediate level (e.g. 30%), depending on parameter settings.

4 After a set time, the system assumes idle mode.

Thus, the lighting system no longer needs to be manually turned on and off.



PREMIER S

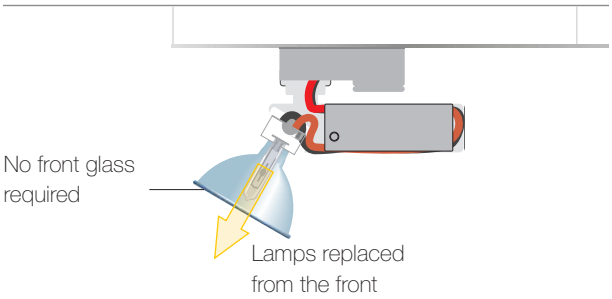
A NEW GENERATION OF HI LAMPS

TRIPLE-ENVELOPE-TECHNOLOGIE
Enclosed bulb prevents glass shards from falling out should the lamp shatter.

MINIMAL DROP IN LUMINOUS FLUX
Results in long service life at nearly constant light quality.

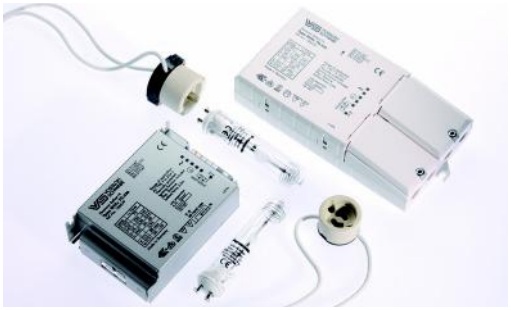
HIGH COLOUR RENDERING INDEX (Ra 93 / Ra 96)
Especially in the red spectral range

HIGH DEGREE OF LUMINOUS EFFICIENCY (100 lm/W)
Due to perfectly matched system components.



WE THINK IN TERMS OF SYSTEMS

As a system provider we are particularly dedicated to turning perfectly matched components and separate products into a functional unit. Thus, starting out with the Premier S lamp, a matching electronic lamp ballast and the lamp holder of the new GU8.5 socket emerged.



MADE IN EUROPE

INVESTING
INTO THE FUTURE

THE THREE KEY FACTORS OF THE VS LOCATION

- High level of personnel qualification
- Infrastructural conditions
- High level of quality

Three good reasons in favour of our European production sites.

Three good reasons for sound customer satisfaction.

Making better use of our potentials, more efficient processes and an ideal networking model back up and expanding our international competitiveness. Europe qualifies as a successful place of production, especially when it comes to new tailored products. Our high-quality products are perfect proof of it - a standard we feel obliged to maintain for the benefit of our customers.

Our successful vocational training and further training ensure that our **staff are highly qualified** which is very obvious in the know-how of our engineering departments, for example.

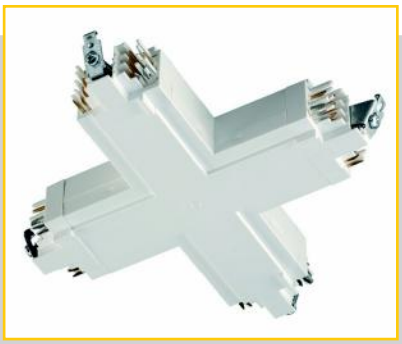
Product deliveries benefit from the excellent **infrastructural conditions** throughout Europe: Short distances and much reduced logistical risks warrant smooth and environmentally compatible processes.

“Made in Germany” still warrants a **high level of quality**. We therefore trust our nationwide German competence centres with manufacturing the majority of our products. Actual processes are implemented by local engineering departments closely interacting with product management.

VS’ European production sites:

- **Colmar, FR (magnetic ballasts)**
- **Kamp-Lintfort, DE (LED)**
- **Lüdenscheid, DE (lampholders)**
- **Oschatz, DE (ignitors)**
- **Sarsina, IT (lampholders)**
- **Svilajnac, SR (electronic ballasts)**
- **Urbach, DE (electronic & magnetic ballasts)**

INNOVATION THROUGH COOPERATION



iTrack is an intelligent rail system made by the luminaire manufacturer Fagerhult Belysning AB, Sweden, and an excellent example of innovative and cooperative partnership with Vossloh-Schwabe.

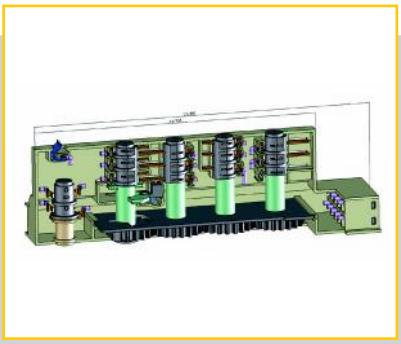
Fagerhult develops, manufactures and markets professional lighting systems for offices, schools, industry and clinics.

iTrack is a complete lighting system which unites luminaries, controls and emergency lighting on a single 12-pole rail system.

Depending on the area of application, iTrack can be equipped with a wide range of different components: from a simple industrial look to a sophisticated, aesthetic environment – there is a suitable luminaire version available for almost any application.

The key to the special flexibility of the system are different plugs and luminaire adapters, which were developed in cooperation with Vossloh-Schwabe. The couplings for the mounting rail system and the luminaire adapters are based on innovative connection technology – designed by our experienced development department.

The cooperation between Fagerhult and Vossloh-Schwabe was a resounding success!



FROM A SKETCH ON A BEER MAT TO SERIES PRODUCTION IN ONLY 2 YEARS

An interview with graduate engineer Christian Gerstberger, product manager lampholders at Vossloh-Schwabe in Lüdenscheid and responsible for the "iTrack" project.

Mr. Gerstberger, how exactly did the iTrack project come about and what's the story about the beer mat?
Everything began with an invitation for tender by the Swedish luminaire manufacturer Fagerhult concerning components for a new 12-pole mounting rail system, which included a description of the component functions. Using this information as a basis, we developed and calculated the concept for the components within 14 days and presented our results. The very first ideas on the project were sketched on a beer mat during dinner with some people from Fagerhult.

C. Gerstberger: ***Communication is absolutely essential for such a project.***

Which detail of the VS draft made the difference and led to the order being placed?
We developed a kind of module system for the different mounting rail connectors. The various individual system components can be used again and again in different assemblies, thus helping to slash the overall system costs and the investment costs.

What were the special challenges of this project and how did you and your team go about accepting these challenges?
A new aspect for us was the large number of 12 poles with the function of so-called mounting rail connectors, which make it possible to connect individual mounting rails simply and quickly, in terms of both mechanism and power supply.

Since Fagerhult was developing the rail for the system at the same time, a new challenge was added following the first concept draft: the possibility of turning the luminaire adapter or the luminaire through 180°. At the same time, the luminaire adapter had to contact all 12 poles of the mounting rail correctly. Our team prepared an ideal solution for both of these cases.

The procedure was continually accompanied by new, improved target requirements defined in an ongoing process during development on the basis of new findings and then integrated in overall system development.

In other words, no rigid development process according to the book?
No, quite the opposite. Flexibility is the name of the game in all our projects. In fact, you could say that not a single project is carried out according to the original plan. And that is the special challenge we development engineers have to face – staying on the ball and not losing sight of the latest development trends.

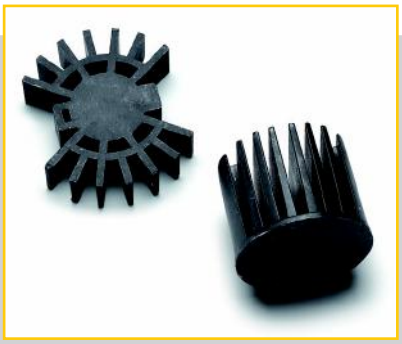
How would you describe the cooperation with Fagerhult? Did regular meetings take place? How did you compare notes?
Teamwork was the order of the day. Implementation was carried out jointly, constructive meetings took place, where everyone could contribute their know-how: Fagerhult (Sweden) and Whitecroft (UK), a member of the Fagerhult Group, in the field of luminaires and mounting rail development, whereby the mounting rails as such were implemented by the development department of Fagerhult China. VS was able to contribute know-how in the field of contacting and plastics engineering. In other words, it was a four-nation project that required quite a lot of coordination, meetings on site and weekly video conferences.

Would you say, then, that communication is essential for the success of such a project?
Exactly! This is the only way excellent results can be achieved and errors can be avoided. Enthusiasm flourishes on both sides when solutions are found through this close and open communication, and can be used as a basis for further development.

Finally, I would like to take this opportunity to thank my VS colleagues and the teams in Sweden, Manchester and China for the excellent cooperation during the two-year project period.

PLASTICS COMPETENCE

VS-LÜDENSCHEID (D)
VS-SARSINA (IT)

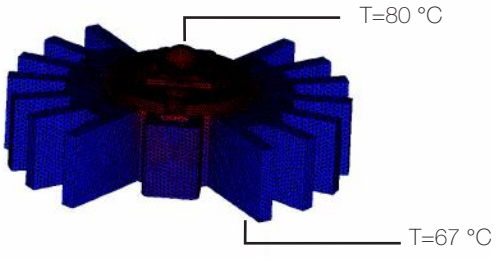


In this newsLIGHT issue, we would like to invite you to discover the Plastics business unit and the many VS innovations it has to offer. Today and from now on we will present to you new solutions for standard lampholders and discuss various components as examples of new developments and trends.

COOL PLASTICS

Heat sinks do not normally range among the typical historical components of lighting technology. But when LEDs started to penetrate the market, every lamp manufacturer was faced with the issue of cooling high-performance LEDs by means of passive and active cooling elements.

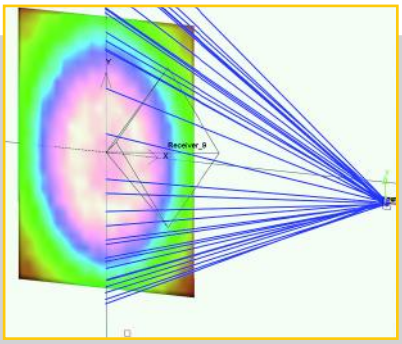
As opposed to conventional aluminium heat sinks, thermoplastics with added graphite are a clearly more cost-efficient alternative for LED applications of a total output of up to 15 W. It is not the thermal conductivity of the heat sink material alone that helps to lower the LED temperature. Even though the thermal conductivity of these materials is as low as 12-15 W/mK, acceptable LED temperatures can still be obtained.



Vossloh-Schwabe has tested and appraised the materials available on the market. Compared to aluminium heat sinks of the same dimensions, temperature differences of 3–6 °C were measured at the t_c point of the LED application.

The big advantages of the new plastic materials:

- **Tailored as well as complex designs possible**
- **Ease of assembly due to self-tapping screws**
- **Lower weight**
- **Major cost benefit of series produced parts**



VS has teamed with innovative plastics manufacturers to advance these solutions and is now confidently providing end-to-end solutions for your very specific application, from heat sink design and thermal calculation to choosing the appropriate material and starting series production.

All in all a cool decision for future cooperation!

OPTICAL CHALLENGE

Light is a key part of our life and, thanks to the new LED light sources, we are now striving to make light a pleasant experience without losing touch with our customers' wishes. As the conventional lamps before, LEDs also require reflectors and lenses in order to determine the angle of radiation and to increase efficiency.

In response to the diversity of LEDs available on the market, VS invests in the in-house development and production of an ever-increasing portfolio of lenses that adapt to any LED module.

The trend towards global cooperation of major customers keeps facing us with new challenges that our various VS engineering departments are glad to accept and master successfully:

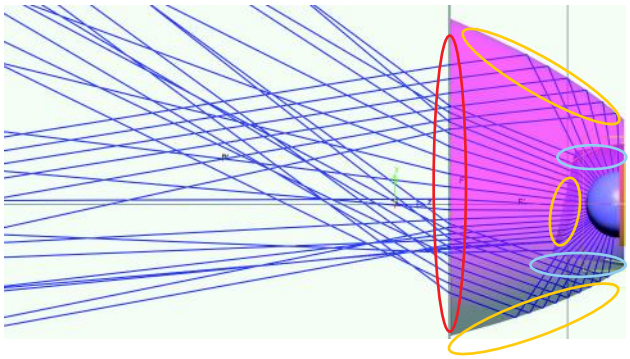
- Lens studies
- Moulding tool design
- End-to-end production from prototypes to final products

Our cooperation with Neff GmbH, a global leader in the household appliances sector, may serve as a good example.

Tasks set for VS:
- Illuminate different areas with 500 lx.
- Three different applications: 30, 60 and 90 cm cooker hoods.
- The area to be illuminated is not immediately underneath the LED module but behind. The light therefore needs to be slightly deflected towards the back.

The solution:
A special lens providing TIR (total internal reflection) and optimised for both the LED and the target application in a cooker hood. This lens emits the light at an asymmetrical radiation angle.

The lens produced in Sarsina (Italy) has three tasks:

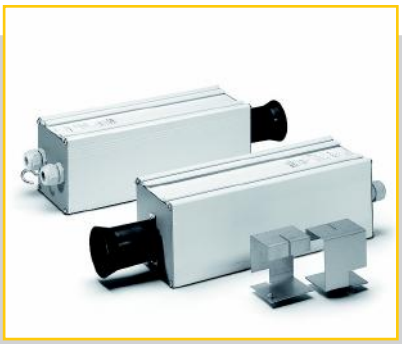


- Collect the light
- Focus the light
- Mix the light

This ensures that the cooking area is always illuminated homogeneously.

A SPROUTING SYSTEM SOLUTION

NEW CONCEPT OF ILLUMINATION BY VS



A greenhouse is the perfect means of growing vegetables, decorative plants and orchids even in winter or in climatically less favoured parts of the world. Environments inside a greenhouse can be as enclosed as you wish.

You may go for completely different climatic conditions in order to grow even the most demanding exotic plants. Factors to be considered include the type and intensity of greenhouse illumination, the temperature and oxygen content of the air, the nutrients in the soil and the fertilizer, the composition and pH value of the irrigation water and so forth.

The most important technical means is the correct system of illumination.

Vossloh-Schwabe offers its customers a system solution newly developed for this very area. A comprehensive HID lamp package comprised of:

- **A specially designed aluminium housing**
- **A durable plastic socket**
- **A ballast with a temperature switch**
- **A B-type condenser**
- **A timer ignitor**
- **A filter choke**
- **Fixing bracket and reflector sold separately**

Although a well-known and established component supplier to the market, Vossloh-Schwabe is entering new ground with this project. This system combines VS' entire know-how in the fields of magnetic ballasts, ignitors, capacitors and lampholders.

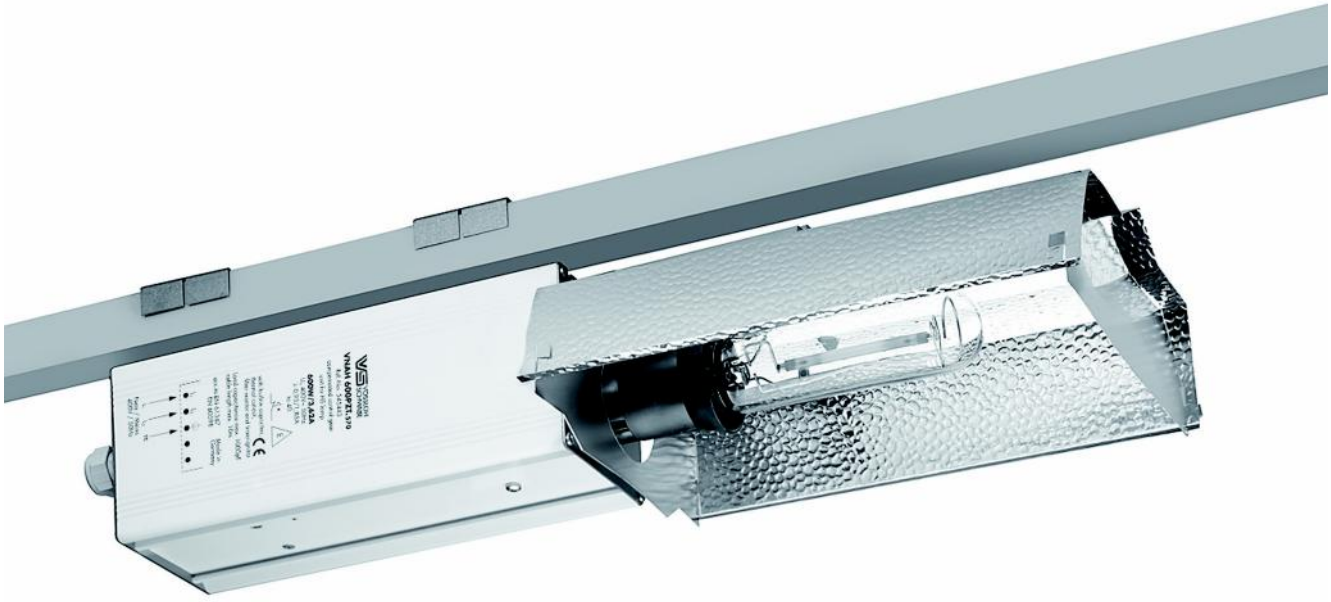
Greenhouses are a particular challenge to the components in terms of exposure to extreme humidity, heat, harmonics, etc. It is therefore of utmost importance to match all components with one another and adapt them to any environmental effects.

This VS system provides you with a very reliable lighting unit with a “warranted growth potential”.

Vertical installation of a lighting unit without a reflector

Facts & figures

- The specially designed aluminium housing directly contacts the ballast for optimised heat dissipation through the housing.
- The timer ignitor ensures that defective lamps are reliably switched off after a set time.
- The ballast has a winding temperature tw of 140°C and features an automatically resetting temperature switch.
- The B-type condenser is protected against humidity and has been specifically designed for greenhouse use.
- The filter choke extends the condenser's life by protecting it against harmonics.
- The lampholder is made of a sturdy and heat-resistant plastic material (PPS) and carries a T240 label.
- Failing components can be replaced separately.
- Thanks to the optional fixing brackets, the entire unit very easily mounts on the greenhouse rail system. Moreover, the 250 W ballast features a suspension attachment for vertical use.
- The ballast has a guide rail that the reflector mounts on. This ensures that even tailored reflectors simply click onto the rail.
- Ask VS for reflectors matching the lighting system.



VOYAGERS...

WITH A TALE TO TELL

This saying fits the recently completed A2 magnetics project for T5 lamps. And if as many as five project partners including Deutsche Bahn AG set out on this journey then, dear readers, we think we should tell the tale of this interesting project.

As the largest manufacturer of magnetic control gear, VS was involved in the development of this system package together with other partners. We start our journey with presenting the persons involved in the project:

- Peter Siemt, Head of Energy Management (DB Station & Service AG)
- Stefan Fassbinder, Electronic applications advisor (Deutsches Kupferinstitut, engl.: German Copper Institute)
- Bernd Lohmann, Senior Product Manager (AURA)
- Jan Christlieb, Managing Director (PALM STEP)
- Horst Bunke, Development Engineer (NORKA)
- Leo Pendes, R&D Manager Magnetic (Vossloh-Schwabe)
- Nicolai Seitz, Product Manager Magnetic (Vossloh-Schwabe)

CHRONOLOGY OF THE PROJECT

15th September 2009
First contact is made via email: Mr. Fassbinder and Mr. Siemt contact Mr. Seitz suggesting that Vossloh-Schwabe develops a magnetic ballast for T5 lamps. A challenge that meets with interest and acceptance by VS.

29th September 2009
Mr. Siemt prepares the first more detailed project definition: Vossloh-Schwabe is to investigate a system for 21 W and 35 W T5 lamps.

30th November 2009
Vossloh-Schwabe reports that the first sample units for 21 W and 35 W lamps have been developed. An A2 energy classification seems to be possible because the T5 lamps run on a very low current, there is just a little loss thus producing more light from less energy.

18th December 2009
Local meeting at Düsseldorf station
DB, PALM STEP, NORKA, Vossloh-Schwabe and the German Copper Institute discuss the current state of sample unit

development and define the next steps. The aim is to push final development and to perform an endurance test.

April 2010
First prototype presentation 21 W and 35 W at Light + Building fair on the PALM STEP/M + R booth.

June 2010
After various tests using standard lamps, the project for DB application (exterior lighting) is at risk of failing for the time being. The standard lamps are only stable down to a temperature of +15 °C. The lower the temperature the more often the standard lamps fail.

It is agreed with DB to repeat the tests using AURA's Eco Longlife Lamp whose design differs from that of standard lamps. Eco Longlife lamps are based on a patented system and a different gas filling.

September 2010
Various internal system tests show that AURA's Eco Longlife Lamp perfectly fits into the existing system package containing a magnetic ballast provided by VS and an electronic starter provided by PALM STEP and that all technical values are within the optimal range.

AURA is sent samples of the latest generation of VS's A2 ballasts for T5 lamps in order to take official readings for lamp approval.

VS officially confirms that the newly developed ballasts meet A2 classification requirements.

8th September 2010
DB, The German Copper Institute, AURA, PALM STEP and Vossloh-Schwabe meet at NORKA's.
Mr. Lohmann confirms the measuring results obtained by Vossloh-Schwabe: The lamps operate reliably and, if equipped with VS' A2 ballasts and PALM STEP's electronic starters, their life expectancy is equivalent to that of electronic ballast solutions.

Various tests are successfully completed at temperatures below zero and confirmed by AURA.

Until November 2010
NORKA tests the new system inside the luminaire.
Mr. Bunke confirms that all values are perfect down to –20 °C and that field testing can be started.

December 2010
Kick-off of the field endurance test at Düsseldorf main station using various NORKA luminaires (21 W and 35 W) and of the field endurance test at Vossloh-Schwabe's in Urbach using various control programs (more than 10,000 switching cycles at different intervals).

April 2011
Development of the 54 W T5 lamp is complete.
VS officially releases the system for AURA's 21 W, 35 W and 54 W T5 lamps and the system is presented to the market.

System benefits

LONG-LIFE CYCLE
Ballast and starter: > 100,000 hours
T5 lamp AURA: ca. 50,000 hours

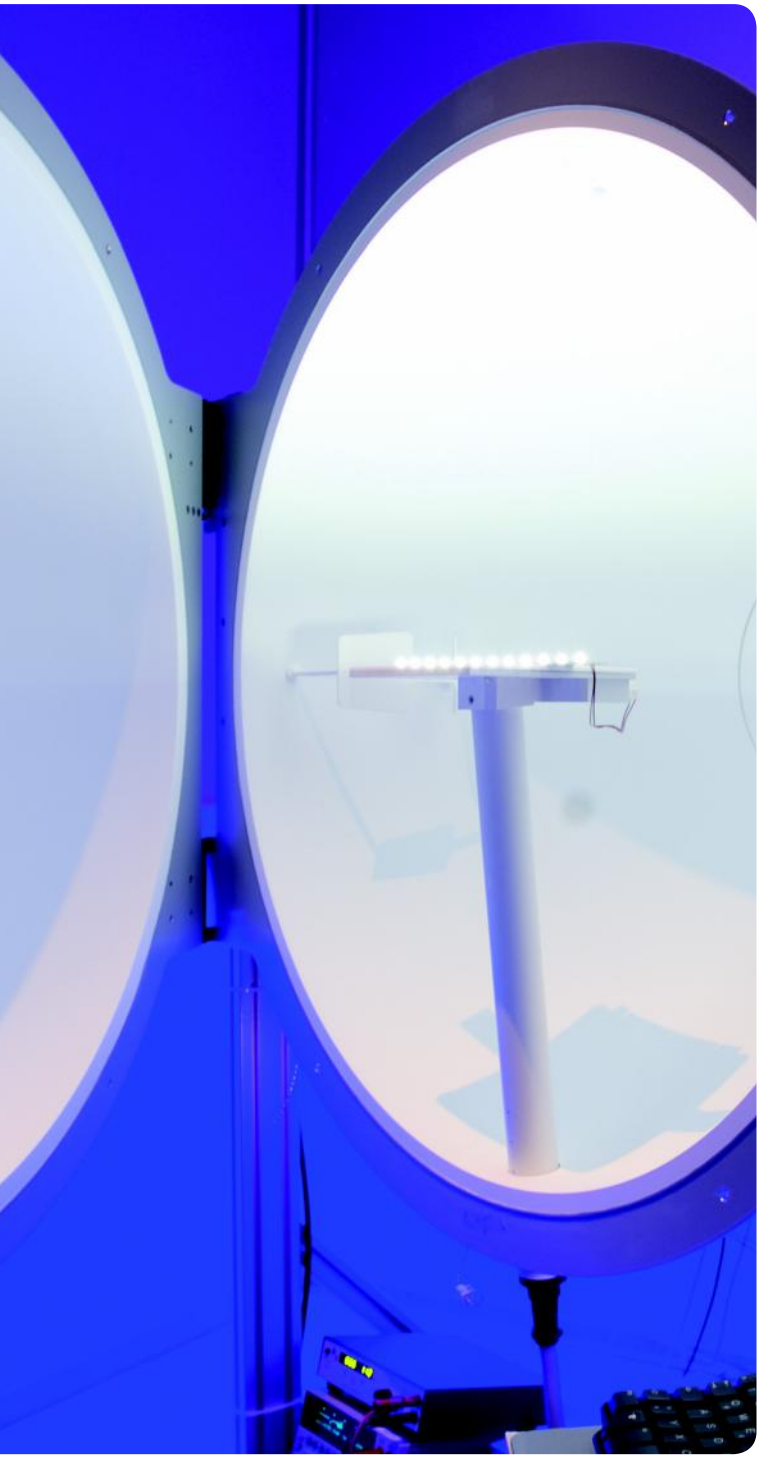
HIGHEST RELIABILITY
Very low failure rate of the control units of 0.025% per 1000 hours

LOW MAINTENANCE COSTS
Due to the extremely long life of components

ENERGY EFFICIENCY
Compliance with the limits required as of 2017 by energy classification A2

INTRODUCING:

THE LIGHTINGLABORATORY IN KAMP-LINTFORT



HIGHEST QUALITY STANDARDS

Every product we develop we also put through its paces to ensure that all properties are provided as specified and that a uniform and high quality standard is maintained.

The default process applied to every project is to examine four sets of characteristics:

- **Optical characteristics**
- **Electrical characteristics**
- **Thermal characteristics**
- **EMC test**

The first step concerns the optical characteristics.
Testing at this step verifies whether the product actually provides the optical properties specified on the data sheet. This includes the luminous flux under various temperatures, the colour rendering, light distribution and spectrum.

In this newsLIGHT issue, we would like to present **the optical characterisation by means of the integrating sphere** (CIE 127). It allows us to quickly and accurately measure the radiant power and luminous flux of various light sources.

Due to its diameter of one metre and its BaSO4 coating for diffuse reflection, the sphere fully integrates and mixes the radiation which is coupled out at a detector port and fed to a spectrometer for measuring.

Two measuring methods are supported: In a 2π configuration, radiation is emitted in forward direction; in order to measure the luminous flux in a 4π configuration (collecting the radiation emitting in all directions), a stage for the samples is available at the centre of the sphere (see illustration on the left).

STANDARDISATION AND TECHNOLOGY

NEWS

LED SAFETY STANDARDS

In order to make light sources (including LEDs) safe to use, international safety standards have been developed which are published by the EU as EN standards under the low voltage directive.

LED modules are mainly subject to two standards:

- DIN EN 62031 – LED modules for general lighting
- DIN EN 62471 – Photobiological safety of lamps and lamp systems.

DIN EN 62031 sets the general requirements for safeguards against inadmissible voltages and for thermal safety (including failure mode, humidity resistance, heating and corrosion analyses). The first edition is currently being supplemented and amended with regard to the marking and, for independent modules, to the IP classifications. Additional requirements and details concern the heat management of lamp constructions.

DIN EN 62471 (including the technical report of supplement 1) describes the photobiological safety requirements of lamps and lamp systems. This standard specifies compulsory guidelines and limit values. Assessments are made in three areas:

- UV hazards (100 nm to 400 nm)
- IR hazards (780 nm to 10^6 nm)
- Blue light hazards (400 nm to 500 nm)

The standard specifies exposure limits for all three of these areas. The limit values are then taken to define four groups of photobiological hazard risks.

The product-specific standards adapt the assessment to the technical conditions of the products in question. Where lamps and luminaires are concerned, experts are currently discussing measuring distances for assessing the photobiological safety. One aspect relates to defining adapted, multi-stage measuring distances with reference to the luminous flux packages of the lamps. The marking on light sources and lamps should also show the hazard group the products belong to. Actual marking will be required for hazard group 2 only. Hazard group 3 is not allowed for lighting applications. Publication of measuring distance specifications can soon be reckoned with.

Whenever an electric light goes on around the world, Vossloh-Schwabe is likely to have made a key contribution to ensuring that everything works at the flick of a switch.

Headquartered in Germany, Vossloh-Schwabe has been a member of the global Panasonic group since 2002 and counts as a technology leader within the lighting sector. Top-quality, high-performance products form the basis of the company's success.

Whether cost-effective standard components or tailor-made product developments are needed, Vossloh-Schwabe can satisfy even the most diverse market and customer requirements. Vossloh-Schwabe's extensive product portfolio covers all lighting components: electronic and magnetic ballasts, lampholders, state-of-the-art control systems (Lixos or LiCS) as well as LED systems with matching control gear units.

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