



PHOTONICS *NEWS*

FOR
CITY LIFE
BEYOND BORDERS

—— Municipalities around the world are investing in smart infrastructures that make life in the city more sustainable and more pleasant.

CONTENT

EDITORIAL — 3

Top Story

FOR CITY LIFE

BEYOND BORDERS — 4

**Powerful Networks and Sensors Are the
Foundations of the City of Tomorrow.**

FOR HEALTHCARE

BEYOND BORDERS — 12

**Health Checks on the Web Make Life Easier
for Doctors and Patients.**

FOR PROJECTS

BEYOND BORDERS — 18

**Together with our Customers, We Are Making
the Modern World Safer and More Sustainable.**

FOR CONNECTING

BEYOND BORDERS — 24

**Light Instead of Radio Waves: Will Data Soon
Come from Light Bulbs?**

PRODUCT HIGHLIGHTS — 26

TRADE SHOWS AND EVENTS — 28

IMPRINT

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——— Dear Reader,

We live through such turbulent times, pandemics, wars, huge rises in fuel costs, inflation, staff shortages across the global supply chain and more. How does Laser Components keep going? All our metrics continue to show an increase in demand year on year and with long term planning many of our supply chain partners are well stocked. When we have had some supply chain challenges with electrical components, we have seen a recovery in supply and in prices that briefly went sky high.

The Laser Components Group has grown beyond 20% last year allowing the investment plans to continue, both for immediate and for longer term. What is a challenge is locating skilled workers for our production plants, and it is the same for giants like mobile phone producers meeting their customers' demands.

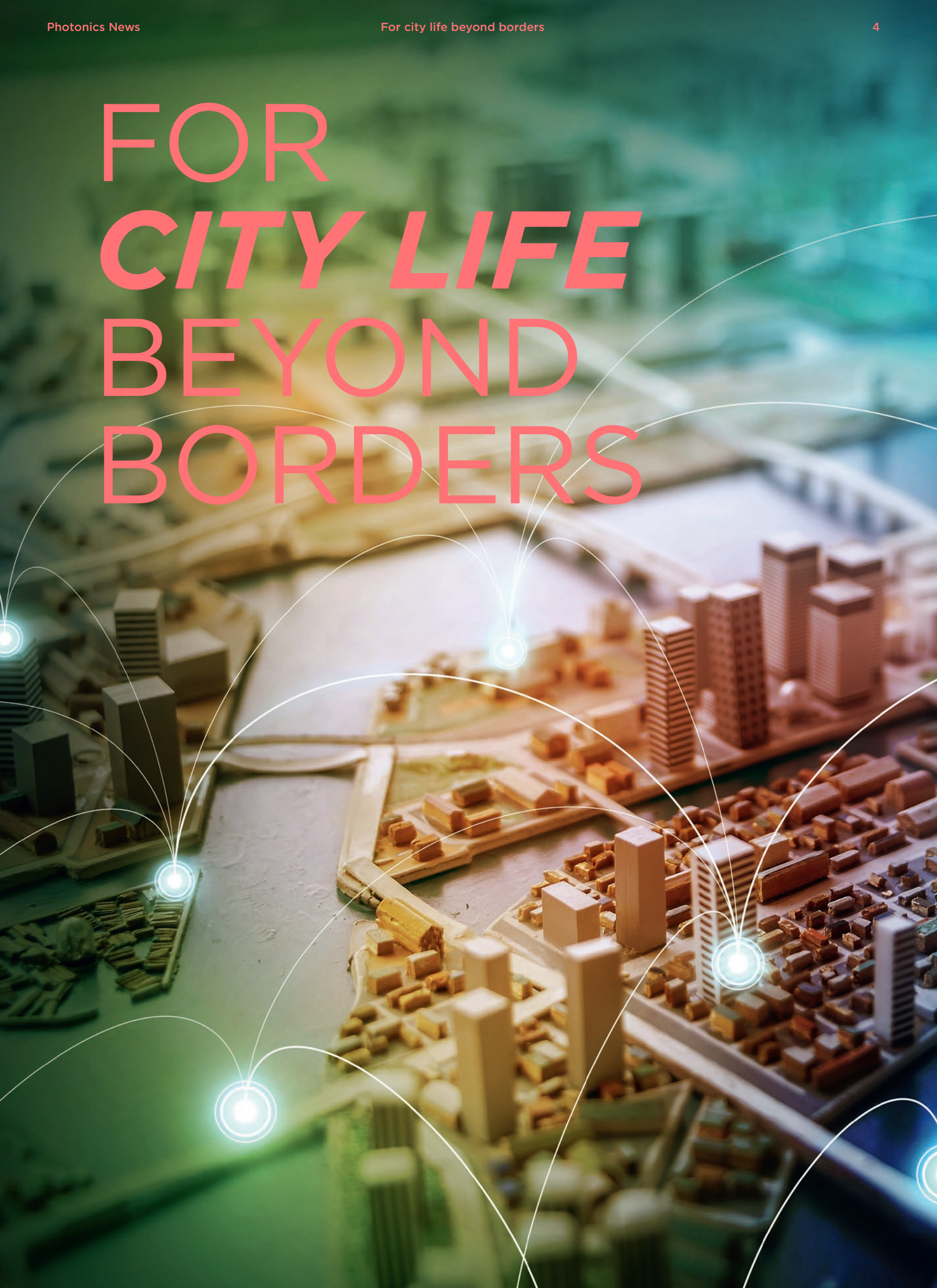
Globally we now have 280 employees whilst including loyal staff with over 30 years' service, demonstrating a balanced working environment and careers attractive to our people. There is, like many companies, some attrition, roughly less than 5% in recent years. It is pleasing to be able to plan solidly for the future. The oldest office in Germany is 42 years old, then the UK that is 30 years old. This means our greatest challenge is with long standing employees reaching retirement age, totalling about 20 within the next 5 years. We consider this to be one of many management tasks to keep the group 'well oiled' with new members allowing us to keep ahead, and tackling the many business and technical challenges whatever they are.



CHRIS VARNEY
Managing Director LASER COMPONENTS (UK) Ltd.



FOR *CITY LIFE* BEYOND BORDERS

An aerial view of a city model, possibly made of wood or plastic, with various buildings and structures. Overlaid on the image are several glowing blue nodes connected by thin white lines, suggesting a network or data flow. The background is a blurred cityscape with greenery and water.

SMART CITIES ARE FAR MORE THAN JUST A VISION. WITH SENSORS AND OPTICAL TRANSMISSION TECHNOLOGY, WE ARE MAKING TODAY'S CITIES FIT FOR THEIR JOURNEY INTO THE HIGHLY INTERCONNECTED FUTURE.



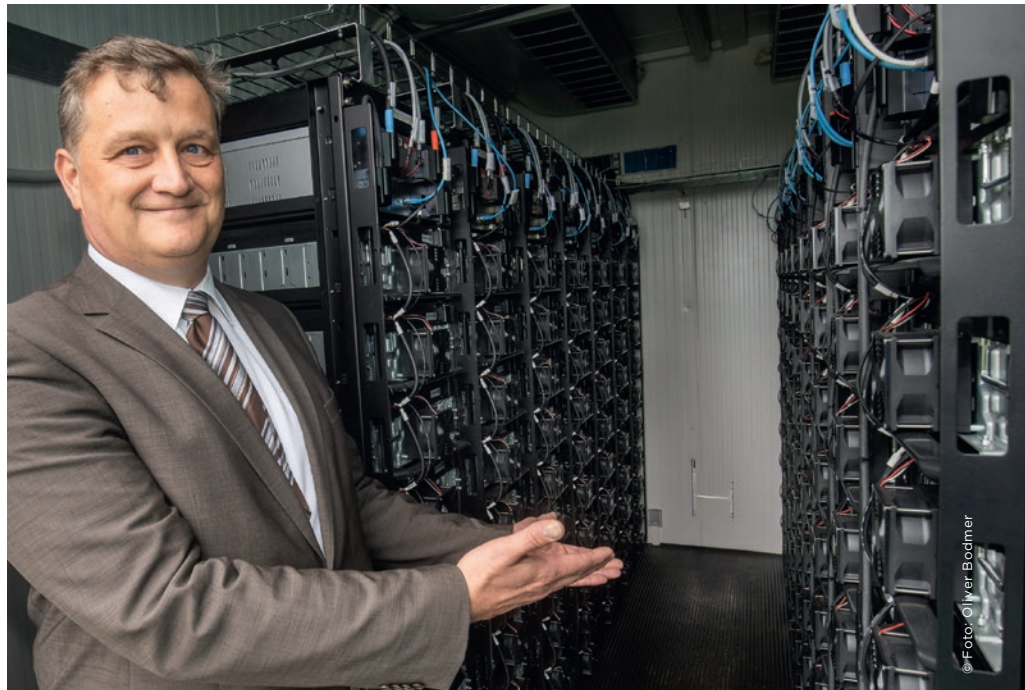


THE CITY OF TOMORROW: MORE SUSTAINABLE AND LIVABLE

—— Urban development is always a challenge because road and utility networks have often grown organically over centuries. Digital networking was not envisaged at the time that this growth initially began. How far a city is on the way to becoming a smart city largely depends on how courageously the competent authorities act. At Stadtwerke München (Munich's municipal utility company), Dr. Jörg Ochs and his team are not afraid to break new ground and think outside the box.

MASTER OF DIGITISATION

— Dr. Jörg Ochs has been driving digitisation and the development of smart infrastructures at Stadtwerke München (Munich's municipal utility company) for many years. He is currently head of IT at one of the most important interfaces for the internet of things.



© Foto: Oliver Bodmer

S

»Smart City« - This magic word triggers wild associations: even the most grounded contemporaries can at least conjure up ideas of automated infrastructures that relieve residents of many tedious tasks. No one has to put out the dustbin or sweep the pavement anymore. The automated city will take care of that by itself, and citizens will actually only have to leave their homes to pursue pleasant recreational activities in the crystal-clear air. This idea will probably remain science fiction for a long time. Nevertheless, we cannot ignore the fascination of the topic, even if we are only approaching the goal with tiny steps.

All Cities Want to Become Smart

Ultimately, the smart city is based on the same fundamental idea as Industry 4.0 – just on a larger scale. Both ideas rise or fall with the networking infrastructure. Digitisation and new technologies should lead to sustainable urban development that makes efficient use of ecological and social improvement potential. In the end, the overall concept encompasses as many areas of life as possible. This idea is so forward thinking that cities across nations, states, and cultures are working feverishly to expand their digital structures. One of the most well-known smart city developments is currently the new Egyptian administrative capital to the east of Cairo; the South Korean test-tube city of New Songdo City boasts the title of »smartest city in the world«.

»THE CHALLENGE IS BRINGING TWO WORLDS TOGETHER.«

DR. JÖRG OCHS / *Head of information technology at Stadtwerke München (SWM) (Munich's municipal utility company)*

Old Networks – New Networks

Many of these flagship projects were planned as smart cities on the drawing board. This, of course, makes things much easier because the foundations for the interconnected infrastructures can be laid before the construction of the first building even begins. Things look a little more difficult for most European cities. »The oldest parts of Munich's water network are over 200 years old, and since then it has grown organically with the city,« says Dr. Jörg Ochs, head of IT at Stadtwerke München GmbH (Munich's municipal utility company) and the driving force behind many digitisation and network expansion projects in the Bavarian capital. »The situation is similar with the power grid. Our main challenge is therefore to make existing infrastructures "smart".«



LiDAR provides detailed 3D data for traffic analysis, whereas other technologies fall short of this. For example, the system can distinguish between trucks, small cars, and bicycles. (S. 10)

2.5 ns

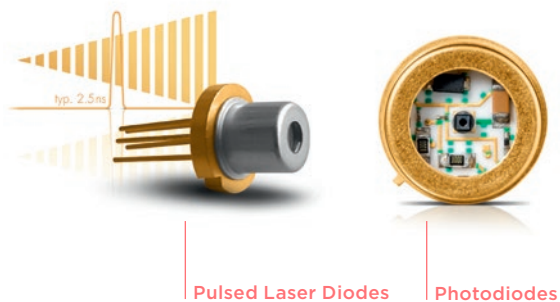
Pulse length for particularly high resolution is guaranteed by the QuickSwitch®

How Do Sensors Communicate?

The backbone of all digital solutions is generally considered to be the fibre optic network. When it came to expanding the smart structures, Dr. Ochs was nevertheless surprised: »Fibre optics are important for digitisation, but they are not the network of the smart city. I have one problem in particular here. I want to have as many measurement readings as possible, but a power connection is not available on site for a fibre optic or radio modem to transmit the data from the sensors. So, for this level of communication, we decided to use a LoRaWAN. This is a very energy-efficient radio technology. That means that it is possible to operate a sensor for two to five years with one battery. In the meantime, we have distributed around 50 LoRa base stations in the city and can thus enter the internet of things. Of course, the base stations are then connected back to the fibre optic network.«

Listening for Leaks

A good example of the use of networked sensors is the water network, which is the oldest network in the city and has around 3,200km of pipes. It is also very complex compared to other supply networks: there are different pressure zones to consider, and the water can change its direction of flow depending on consumption. Over the centuries, weak points have shown up in the pipes time and again, and water has seeped away unnoticed into Munich's gravel-rich soil. »Water is a valuable resource,« Dr. Ochs knows. »That's why we have to track down every leak and repair it quickly.« In outdoor areas, the average consumption for certain zones can be determined with flow meters. It is important that these so-called »water balance zones« have only a few points of connection with the neighbouring network. This is not possible in the city centre because the network is too dense there. The municipal utility company tested a new strategy together with the Ludwig Maximilian University of Munich. They »listened« to the network with microphone sensors to »eavesdrop« on leaks. An artificial intelligence evaluated the data from this round-the-clock monitoring and was thus able to reliably detect and localise leaks.



»EXHAUST GAS EMISSION MEASUREMENT, LIDAR, MACHINE VISION: THERE ISN'T AN OPTICAL MEASUREMENT SYSTEM OUT THERE FOR WHICH WE DON'T ALREADY HAVE SUITABLE COMPONENTS.«

SVEN SCHREIBER
— He really knows his stuff: as head of sales at LASER COMPONENTS Germany, he has an overview of the diverse product range.



»HIGH-SPEED NETWORKS ARE THE BACKBONE OF THE SMART CITY.«

DR. ANDREAS HORNSTEINER / *Head of fibre optics*

Will LiDAR Soon Be Regulating Traffic?

»Munich is growing extremely fast – by 20,000 inhabitants a year. And we don't just have to supply them with energy, but mobility is also becoming a big issue,« says Dr. Ochs. »The Munich metropolitan region currently has around six million inhabitants and a large proportion of them are drawn to Munich to work.« Traffic guidance, therefore, already plays an important role in these considerations. Intelligent, networked guidance systems are being used to direct the masses of cars in such a way that traffic jams and dangerous situations can be avoided. Optical technology could play an important role here. »Most people are familiar with LiDAR systems in cars, but they can, of course, be used just as well to observe and analyse the flow of traffic from the outside,« says our LiDAR expert Winfried Reeb. That's exactly what the city of Munich has done in a pilot project, equipping a busy intersection with a LiDAR system. The advantage: this technology captures 3D data from all road users – whether cars, pedestrians, or cyclists. It is even able to distinguish different types of vehicles (cars, trucks, vans). This allows planners to accurately analyse what is happening at the intersection in real time. If many of these LiDAR systems are used in a smart network at different intersections, it may soon be possible to manage road traffic in a predictive manner.

Trying It Out in One District

To try out all his ideas for the Smart Munich of tomorrow, Dr. Ochs has an entire district at his disposal. The so-called M.Quartier is currently being built on an area of 460,000 m² and is 100% owned by the municipal utility company. »In this district, I don't have to coordinate with any other parties involved,« the smart city expert is pleased to say. »There I have not only office buildings but also apartments, retail stores, and even an event location. It's like a really small city that I can play with. One important topic for us was heat recovery, for example, but we've also tried out a lot in terms of digitalisation – from public hotspots to indoor navigation to smart streetlights.«

It Has to Happen Faster!

For Dr. Ochs, the smart city is also, above all, an innovation driver: »With every project I've tackled so far, they've said: ›If we start now, we'll be done in 50 years.‹ But I still want to see everything evolve myself. So, we have to come up with new solutions that will enable us to meet these challenges more quickly. We are always at the forefront and we have already been looking at quantum computing and rebuilding our IT into an agile product-centric model.«

> 2.7 MILLION VIEWERS

... have now watched the first presentation of LiFi technology. (Page 24)

»TOGETHER WE ARE STRONG«

... Under this motto, we are campaigning with customers and business partners for an extension of the RoHS exemption for PbX detectors. (Page 22)

AEC-Q101

... certified pulsed laser diodes from LASER COMPONENTS Canada ensure more safety on the road.

In the smart city, many different areas of life are interconnected via IoT. LASER COMPONENTS has the building blocks for a successful smart network.



DIGITAL TRANSFORMATION

... is the driving force behind many customer projects. We make the transition possible. (Page 12)

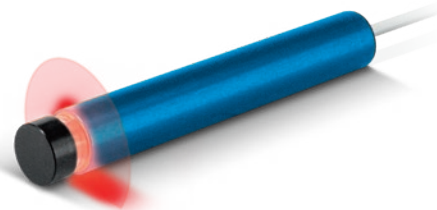


MORE THAN 100 YEARS

... of expertise have been accumulated by the members of our network technology team.

> 1,500 VERSIONS

... of our laser modules are now available. The latest version is our FLEXPOINT® Radial, which is used in measuring the insides of pipes. (Page 20)



»IT'S ALL ABOUT INFRASTRUCTURE,
SUSTAINABLE ENERGY SUPPLY, CITY-FRIENDLY
MOBILITY, AND INFORMATION AND
COMMUNICATION TECHNOLOGY.«

FOR *HEALTHCARE* BEYOND BORDERS

HEALTHCARE AND PREVENTIVE CARE ARE LEAVING THE HOSPITAL AND DOCTOR'S SURGERY. IN THE INTERCONNECTED WORLD, THE PATIENT GOES ABOUT HIS OR HER USUAL ACTIVITIES. HOWEVER, THE DOCTOR ALWAYS HAS AN EYE ON ALL VITAL SIGNS.





KEEPING AN EYE ON THE HEARTBEAT

—— As smartwatches and other consumer products find their way into healthcare, doctors and nurses will soon have more time for urgent acute cases. With optimally adapted sensor technology, they record cardiovascular functions so accurately that they replace expensive medical technology during preventive checkups.

A

Almost everywhere in the world, healthcare facilities are facing the same problems: overworked doctors and nurses, long waiting times in emergency rooms, rising costs, and »informed« patients who are increasingly demanding a greater say in their therapy, which further increases the workload for medical staff. Networked, »smart« medicine should help change these conditions. Many of the basic principles governing this shift are not much different from those with which we are familiar from smart city concepts or Industry 4.0: internet-of-things devices, computer-aided data analysis, and artificial intelligence ensure that standardised processes run smoothly. But there is one crucial difference: the human factor!

Everything Revolves around People

Unlike on the factory floor or in the control of traffic flow, almost all processes in »smart healthcare« revolve around people. The state of a patient's health is the main focus. A patient should receive good treatment and feel as comfortable as possible because – as we all know now – the general well-being of a person accelerates the recovery process. At the same time, smart technology also helps relieve the workload of doctors and nursing staff. This requires above all else reliable, meaningful, and up-to-date data on the patient's state of health. "Remote patient monitoring" shows how such computer-assisted doctor-patient communication can work.



The Doctor Checks In Remotely

The benefits are shown in a study from the Netherlands¹. In this study, 1,140 heart patients received smartphone-compatible devices such as blood pressure monitors, pedometers, pulse oximeters, thermometers, and user-friendly ECG devices. So-called »smartwatches« were also used for the first time in a clinical study. Over a period of four years, the participants measured their vitals at regular intervals. The doctor was able to access the data online and assess how the health of the

individual test subjects was developing. All in all, the project was rated positively by most of the participants in the end. Even if some found it a little annoying to constantly have to measure themselves, the patients agreed that they learned more about their own state of health during the course of the test – and did so in the comfort of their own homes. The doctors were able to confirm this.

»IT IS REASSURING TO KNOW THAT PROFESSIONALS LOOK AFTER ME, ALSO IN MY OWN ENVIRONMENT.«

TEST PATIENT

1.



534

Million wearables were sold worldwide in 2021.

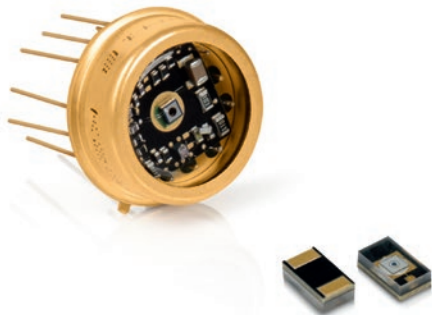
1. As routine examinations are increasingly being shifted online, doctors will once again have more time for detailed patient consultations.

2. Consumer products can be operated without extensive training. Even technical laypeople can measure their blood pressure in the comfort of their own homes. The doctor checks the vitals remotely.

2.



—— At LASER COMPONENTS, the path to a standard product almost always begins with an adaptation according to customer requirements.



**LASER COMPONENTS
DETECTOR GROUP**
— Raj Chakraborty, general manager of the Detector Group and his team develop and manufacture a wide variety of detector types for medical devices. They always focus on the specific requirements of the application. Regardless of the size of the order, each customer receives a product that is optimally tailored to their needs.



The Simpler, the Better

For this type of telemedicine to work, the measuring devices have to be particularly easy to use. Patients are not medical professionals who are constantly fiddling around with complex equipment; nevertheless, they need to know how to generate usable data. High-quality consumer products, such as those offered by the French manufacturer Withings, are therefore best suited. Their intuitive design encourages people to use them over a long period of time. During the study, these devices were linked to each participant's electronic medical records, allowing doctors to check their patients' current condition and track their progress at any time. The smart-watches take non-contact measurements via an optical sensor – without painful needles or uncomfortable electrodes.

A PPG Obtains Data from the Blood

To monitor a patient's cardiovascular system, smart devices use photo-plethysmography (PPG). This optical measurement method uses one wavelength (e.g., green) to measure the pulse rate. Another cleverly selected pair of wavelengths detects the arterial oxygen saturation (SpO₂) of the blood in the arteries. A photodiode serves as a detector for all three wavelengths. The decisive factor in this case is hemoglobin, which is the blood's logistics service provider, so to speak, and transports oxygen to the cells. The absorption behavior of this molecule changes depending on the oxygen saturation.

Just a few simple steps and the doctor knows all the important vitals.

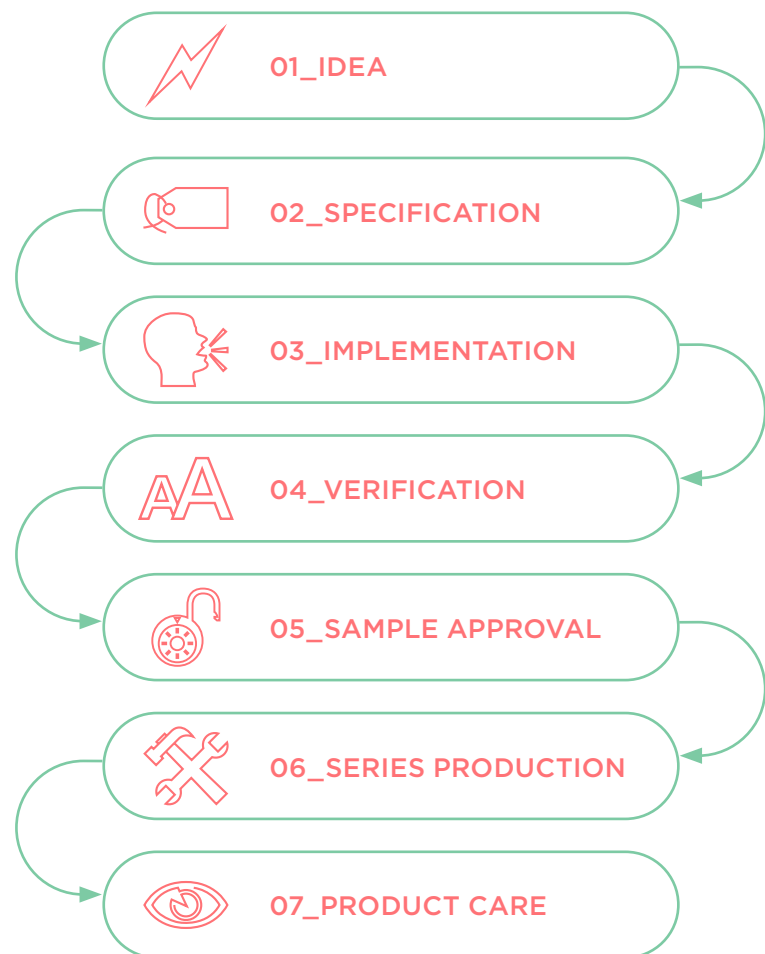
Large Quantities of Quality

»As photonics experts, we manufacture individual components for small niche markets, as well as large quantities for manufacturers of consumer products such as smartwatches,« says Sven Schreiber, head of sales at LASER COMPONENTS Germany. »Regardless of the delivery quantity, all of our customers can rely on the components we offer to meet their exact requirements.« Often, collaboration begins with a single standard product (e.g., a photodiode that is ordered for testing purposes). This allows a manufacturer to first determine whether our technology is suitable for their application. Together with the product engineer, we can then discuss what adjustments are necessary. »Of course, time and again compromises have to be made in the process,« Schreiber knows. »If you absolutely have to achieve the optimum in a specification, you sometimes have to make compromises elsewhere. For example, it is possible to achieve a smaller formfactor by using an SMD package. We know from decades of experience what to adjust so that everything comes together in the end.« Only when we are certain that all of the customer's expectations have been met can mass production begin in any quantity, large or small.

Close collaboration between the customer and the product engineer results in a product that is optimally tailored to the application. In several steps, the partners jointly approach a result that meets the desired specifications and can be technically implemented with reasonable effort.

Today's Customisation Is Tomorrow's Standard

Both sides benefit from this approach because often enough new standard products emerge from customisations initiated by a single customer. »Through the wishes of our customers, we see where the market is heading, and we always strive to help shape this development,« says Schreiber, explaining the company's strategy. »No new product development should fail because of one of our components. To achieve this, we must constantly redefine the limits of what is technically possible.«



»WE TALK TO THE CUSTOMER AT EYE LEVEL AND WORK OUT THE OPTIMAL SOLUTION TOGETHER.«



FOR *PROJECTS* BEYOND BORDERS

WHETHER YOU ARE LOOKING TO MEASURE PIPES OR DEVELOP A MODULAR DISINFECTION SYSTEM FOR AN AIR-CONDITIONING UNIT, WE RECOGNISE GROUNDBREAKING IDEAS AND WORK WITH YOU TO GET THEM OFF THE GROUND.



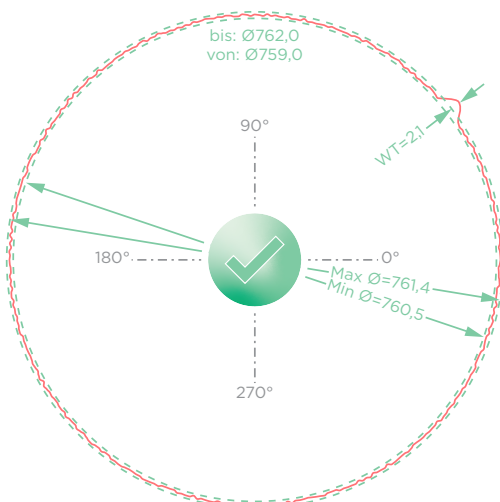
TOGETHER WE MAKE IT WHOLE

— One innovation leads to another: MSG Maschinenbau GmbH relied on the expertise and creativity of LASER COMPONENTS in the development of its new pipe measuring system.



1.

1. Same way of thinking: Matthias Kramer from MSG also focuses on the needs of his customers.
2. Measurement data can be used to create a detailed digital 3D model of the inside of the pipe.



2.



The development of a successful new product is always a joint effort. First comes the company that has an idea and needs components to carry it out. Then comes the product engineer who has an overview of the portfolio and can assess the technical feasibility. And finally come the tinkerers in the development and production departments who take care of the details and turn theoretical considerations into a functioning component. All three complement each other, and the end result is a product innovation like the FLEXPOINT® Radial.

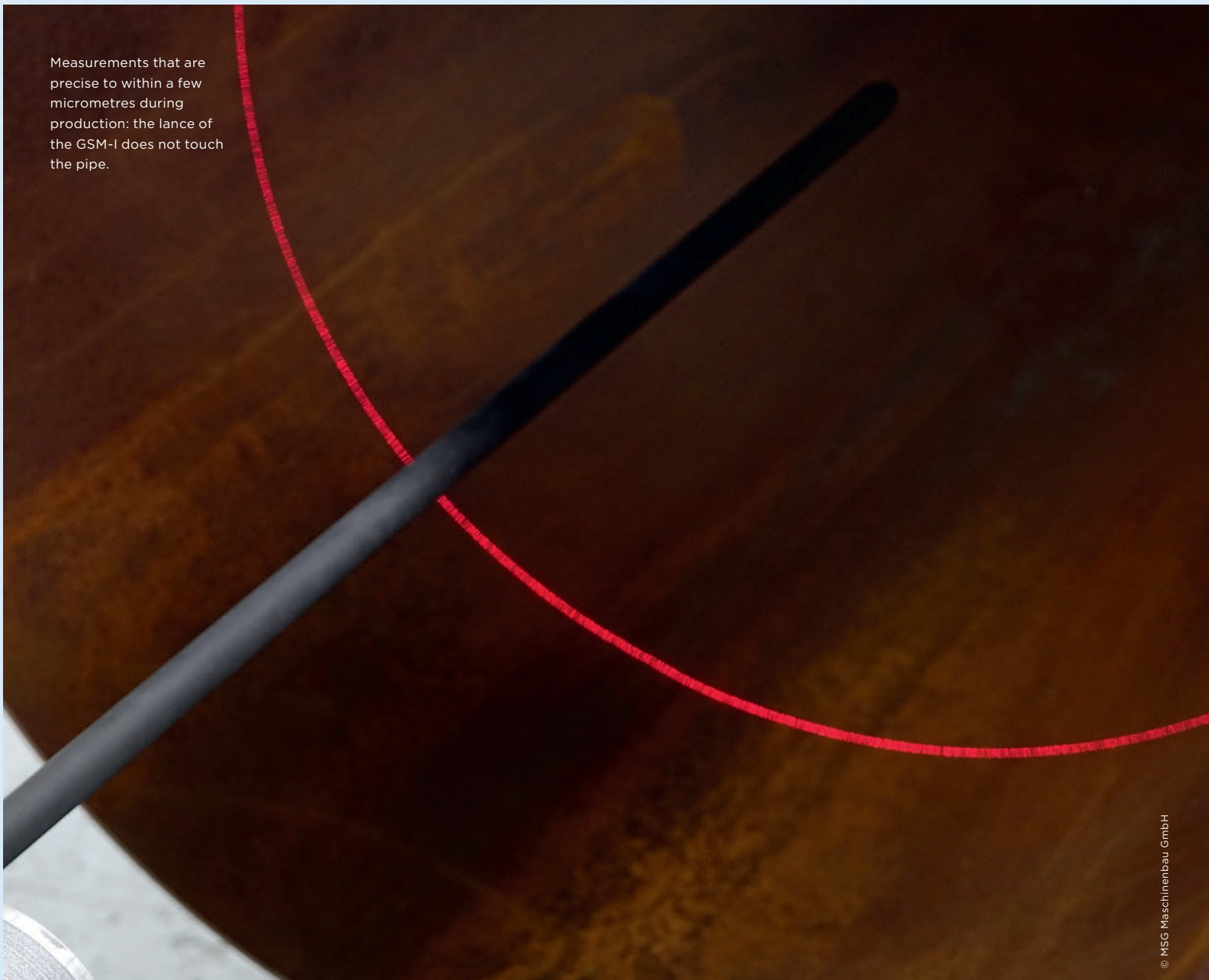
Why Not Measure from the Inside?

The inspection of pipes begins long before they are buried underground in cities as gas or water lines. Pipes must be as round as possible to later withstand the pressure of earth or water masses. But how can the manufacturer determine that the deviations are within the norm? And preferably in real time, so that they can be corrected during production. Matthias Kramer from MSG Maschinenbau GmbH had an idea: how about a self-calibrating optical measuring system that you can slide into the tube? To achieve this, he needed a laser that projects a homogeneous line across 360° onto the inner surface of a pipe – and preferably without moving parts, to keep the system robust and easy to use.

The Devil Is in the Detail

Kramer turned to Stephan Krauß from LASER COMPONENTS. »A ring-shaped laser beam is, of course, a very special product for which there is only a small market,« says the product engineer. »But that is exactly what is so appealing about these types of projects. After all, anyone can do 'normal laser modules.« The basic principle is simple: a laser beam is directed onto a cone-shaped mirror inside the module so that its light is reflected evenly at an angle of 360°. »As always, the devil is in the detail: the laser beam must also be perfectly round and precisely aligned with the cone,« Krauß knows. »Our partners at Blau Optoelektronik have the experience and intuition needed for optimal alignment.«

Measurements that are precise to within a few micrometres during production: the lance of the GSM-I does not touch the pipe.



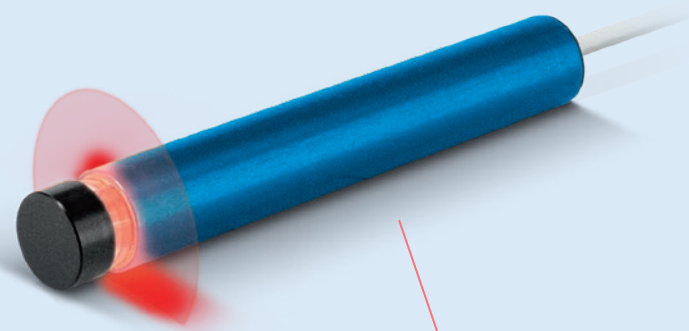
© MSG Maschinenbau GmbH

»USING OUR INNOVATIVE ALGORITHMS, WE CAN CREATE HIGHLY ACCURATE SCANS OF THE PIPE'S INTERIOR.«

MATTHIAS KRAMER / Managing partner of MSG Maschinenbau GmbH

Digital Twin

The result of this process is the FLEXPOINT® Radial ring laser module, which enables measurements at an accuracy of 50µm and yet is flexible enough to adapt power and focus to different materials and tube diameters, for example. Based on the measurement data, a »digital twin« of each tube is created. These virtual models will later facilitate maintenance planning in the digital city of the future.



80 %

homogeneity: »our measurement system thrives on the line quality of the laser module.«

TAKE A DEEP BREATH

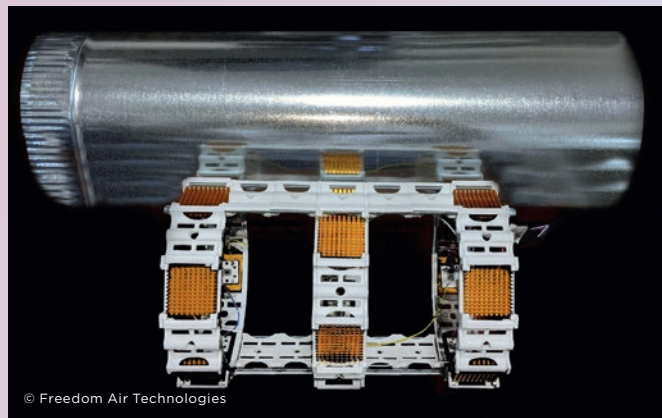
+ Round-the-clock particle measurements ensure that all road users can stop safely in a tunnel at all times.

To facilitate measurements, PbSe detectors are used to determine the concentration of toxic gases such as carbon monoxide and nitrogen oxides. With a typical wavelength range of 1µm to 4.7µm, this detector technology continues to offer the best price-to-performance ratio. In addition, it responds very quickly to even small changes in the level of infrared light and produces a strong signal. Together with our detector plant in Chandler, Arizona, our sales engineers are developing customised solutions to further increase this performance (e.g., by enhancing the sensitivity of the detector up to 5.2µm through cooling, installing infrared filters for specific wavelengths, and searching for new materials with better thermal conductivity). In addition, LASER COMPONENTS supports the RoHS exemption for PbX detectors to ensure that this technology will remain available in the long term.



7

... FAQs on RoHS exemption:
lasercomponents.com/faqrohs



Your ABC

... in search of the best UV LED:
lasercomponents.com/uvguide

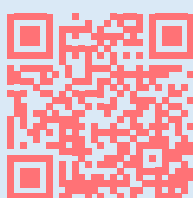
RING FROM UV

+ The Florida-based company, Freedom Air Technologies, is making sure germs do not spread via air conditioners in the hot, humid Gulf Coast climate. The up-and-coming startup has developed ring-shaped LED modules that can be easily integrated into the pipes of the units. Thanks to the reflective metal surface in the tubes, it is possible to neutralise more than 99.9% of all pathogens with just a few radiation sources. »The modular concept was inspired by know-how from LASER COMPONENTS,« says Nicholas Connelly, sales account manager. »We know how to achieve uniform dosage and which wavelength mix is best. This input was invaluable to the overall design process and enabled a solution that scales easily from single devices to comprehensive, complete systems.«



NO CHANCE FOR FIRE

+ FFE's flame detectors detect sparks **before fire or smoke even starts.** Sensor manufacturer FFE relies on proven PbS technology for flame detection that offers both high spectral sensitivity and fast response time needed for this task. The detectors cover the long wavelengths required for flame detection from the smallest sparks, regardless of the burning material. At the same time, the FFE sensors are sensitive to the short wavelengths that are needed to detect flames even through windowpanes. »Unlike many other manufacturers, we offer our customers additional steps such as a burn-in test so that the detectors can be calibrated and deployed more quickly«, says Ed Williams, product engineer at LASER COMPONENTS (UK).



ONE

... manufacturer and a wide range of IR detectors: Our customers can choose from InGaAs, PbX, pyroelectric, and even HQE detectors:
lasercomponents.com/infrared



460

... hot axle box detectors are currently installed in the German railway system.



NOTHING RUNS HOT

+ Every second counts when it comes to **measuring the temperature of a train's wheels.** So-called »hot axle box detectors« determine on a moving train whether the wheels, wheel bearings, or brakes have heated up and pose a danger to passengers. The trains are often travelling at speeds of 300km/h and more. The detectors have to distinguish cold from hot parts in just 72µs. Only PbX technology can perform these types of measurements in such a short amount of time with the necessary sensitivity.



FOR **CONNECTING** BEYOND BORDERS

—— The connected world is just getting started, and it is already clear that wireless connections will soon run out of bandwidth. New, visionary ideas could ensure that the IoT train does not run out of steam halfway through its journey. LiFi – wireless data transmission using visible light – is one such idea and can be implemented with little effort.

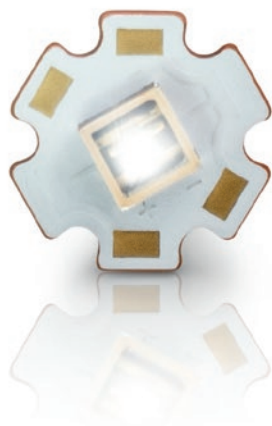
S

Smart homes, smart cars, smart cities: the world is getting smarter all the time. This means one thing in particular: vast amounts of data that need to be transmitted quickly, reliably, and in an increasingly mobile manner. In 2020 alone, around 64 zettabytes of new data were generated worldwide (a zettabyte is a trillion bytes – a one with 21 zeros). Estimates are that this number will almost triple to 181 zettabytes by 2025. Existing mobile networks are reaching their limits in four areas:

- ___ **Capacity:** the number of available radio frequencies is limited.
- ___ **Efficiency:** a base station uses only about 5% of its energy for radio operation.
- ___ **Availability:** dead spots and a poor network in rural areas.
- ___ **Security:** radio waves can be intercepted and interfere with electronic equipment.

5

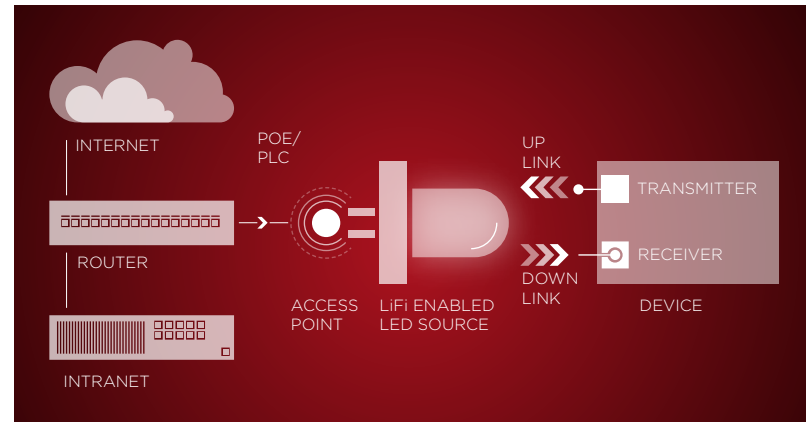
important awards
LaserLight technology
has already won.



LIGHT FOR THE COMMUNICATION OF THE FUTURE

— At KYOCERA SLD Laser, JOHN PEEK is advocating for the use of LiFi in the automotive industry.

LiFi uses the visible spectrum for data transmission.



»LASER LIGHT MAKES LiFi FASTER AND MORE MOBILE.«

STEPHAN KRAUSS / *Optosystems product engineer*

LiFi – More Than Just SciFi

But what if every streetlight, desk lamp, and car headlight – in short, every light source – worked like a cell tower? What sounds at first like an idea from a science fiction novel is actually working technology that the visionary Harald Haas introduced more than ten years ago. Since the ban on incandescent bulbs went into effect in 2009, old bulbs have mostly been replaced by semiconductor-based LEDs. The white light emitted by these sources can be modulated using control electronics. When a user switches on a light in his home, he may not realise that it was never actually off in the first place. When he switches the light off, it is dimmed down to such an extent that it is no longer visible to the human eye. However, data transmission continues without a problem.

Laser Light: Brighter, Faster, Further

Recently, powerful white light lasers have brought new life to the LiFi idea and made it more mobile. At LASER COMPONENTS, for example, you can get the LaserLight™ engine from KYOCERA SLD Laser. These light sources are superior to conventional LEDs in almost all relevant aspects: they are considerably brighter, can be modulated about a hundred times faster, and have a longer range. This makes them a versatile LiFi source. Possible applications include smart cities, aerospace, underwater communications, and logistics and warehousing. In car headlights, they could provide the optimal data infrastructure for semi-autonomous driving – the highly networked road traffic of tomorrow. In February 2021, a trial with an autonomous truck convoy in Japan proved that this works.

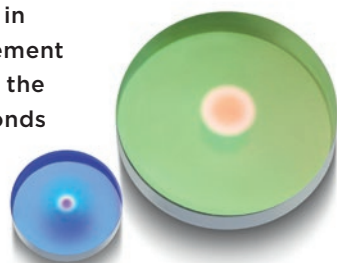
PRODUCT HIGHLIGHTS

Web
UK69-0010

High-quality Graded Reflectivity Mirrors

SERIES PRODUCTION WITH REPRODUCIBLE QUALITY

+ Further development in production and measurement technology ensures that the Gaussian curve corresponds precisely to the given specifications, even for large series.



Graded reflectivity mirrors (GRMs) have a Gaussian reflectance gradient from the centre to the edge. They are used, for example, in unstable resonators to generate laser beams with low divergence and high pulse energies. LASER COMPONENTS is one of the few manufacturers worldwide to offer such optics.

- / software-supported calculation of the reflection curve
- / consistently high quality of the Gaussian curve
- / quality control at an automated measuring station



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Large-area Protection against Laser Beams

CERTIFIED SAFETY

+ KENTEK's laser protection materials are now approved for higher power densities. This was the result of tests carried out as part of the certification process in accordance with EN 60825-4.



The most impressive change was for the EVER-GUARD SLC-EVG laser protection curtain, which may now be used for power densities up to 500 MW/m². This opens up several new application possibilities because the product was previously only approved for up to 12 MW/m².

- / FLEX-GUARD SLC-250WB: Now up to 4.25 MW/m²
- / EVER-GUARD SLC-EVG: Now up to 500 MW/m²



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Highly Scalable Bit Error Rate Tester

OPTICAL TESTING IN VOLUME

+ BERT-1102 is a single platform transceiver test solution that reduces complexity and allows engineers to increase test efficiency and accelerate time to market.



Characterisation and manufacturing tests can be run on optical transceivers and opto-electrical components with symbol rates up to 29GBaud/s. Its high signal fidelity and seamless scalability make it a cost-effective test solution for communication eco-systems with up to 400Gb/s.

- / up to 64 synchronised 29 GBaud channels
- / integrated clock synthesiser for hassle-free operation
- / easy-to-use graphical user interface



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White Light Modules with Exceptionally High Luminance

BRIGHT LIGHT FOR FIBRE APPLICATIONS

+ With a luminous power of 500mW and numerous connections, the LS-WL1 white light module is the ideal solution for endoscopes, microscopes, and other systems that require bright light.



This is ensured by the small luminous area of 350µm, thanks to which the beam can be easily coupled into multimode fibres with core diameters of up to 1mm. The integrated microprocessor supports four operating modes out of the box: cw, strobe, pulse triggering, and modulation. However, you can also select your own individual control pattern with a switching frequency of up to 100kHz.

- / integrated cooling: no overheating – even during long operating times
- / high luminance: brighter than any LED
- / USB interface: tablet control with the LABVIEW interface
- / numerous fibre interfaces: versatile in use



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Cost-effective, Bright Dual-junction VCSEL Diodes

POWERFUL LASER SOURCE FOR GESTURE CONTROL

+ Light at the highest quality level: with an output power of 15mW, this VCSEL diode makes future technologies such as gesture control possible.



Thanks to dual-junction technology, you only need an operating current of 8mA for this. As with all VCSEL diodes, you also benefit from the good beam quality: the round beam can be easily coupled into almost all applications. As required by car manufacturers, it offers maximum reliability at temperatures from -40°C to 85°C.

- / dual-junction technology: high performance at a low operating current
- / automotive grade: maximum reliability
- / beam divergence of only 25°: high coupling efficiency



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Distributed Bragg Reflector Laser Diode

BRIGHT, NARROW LASER LINE

+ High power, edge emitting, single frequency Distributed Bragg Reflector (DBR) laser diodes are the perfect choice for spectroscopy, atomic physics, or quantum information.



DBRs use short, highly reflective, unpumped Bragg reflectors to achieve a single, highly reliable, narrow linewidth source tuned to critical wavelengths. Their diffraction limited beams deliver outputs near the maximum theoretical brightness at powers up to 400mW.

- / high modulation (up to 6.8GHz)
- / short pulse duration (<100ps)
- / narrow Gaussian linewidths (<500kHz)
- / wavelengths from 760nm to 1083nm



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FOR SOLUTIONS BEYOND BORDERS

THIS IS WHERE THE
BEST IDEAS ARE BORN:

