PHOTONICS NEWS

Company Newspaper of the LASER COMPONENTS Nordic AB

lasercomponents.se
#09 ▪ 12|18

Laser Welding for Functional Clothing

Emotions Measured in the Movie Theaters

Maya City Explored with LiDAR

Cruise Liners – Laser Ahoi!

New Products

Bringing the Maya's Back to Life

Dear Reader,

when Christmas is approaching, I am always amazed by the speed at which the year appears to have flown by. Even more so in the past few years, since joining LASER COMPONENTS Nordic. Both our local organization, as well as the global one, is experiencing a continuous growth and even more opportunities to prove ourselves at the competitive photonics markets. For our local organization this means that we're now adding more skilled people to the sales team, to keep up with the increasing demand for our products. In January, we are happy to welcome Harvey Washbrook to the team. Harvey has many years' experience of sales in the field of photonics, both to the Nordic research community and to the industry. We are confident that our ability to serve our customers will get a real boost and we look forward to receiving all your inquiries for new projects.

In this issue of Photonics News Nordic, we will present several interesting customer applications in areas as diverse as laser material processing for clothing, ship building, archaeology, and going to the movies. Low-friction, flat, and flexible laser welds are ideal for garments that come into contact with the skin. See how it's done on page 3–5. Our lasers are frequently used in very demanding alignment applications. The Norwegian Bliss was put to sea in February this year and this impressive 333,4 m long vessel is one example of what we can help our customers achieve (pp. 6–-9). Archaeology has always fascinated me, just as lasers always have. So, using LiDAR for uncovering ancient civilizations is twice the fun (pp. 10–11)! Last, how exactly can IR detectors be used in the cinema? Find out on page 12.

Next year will be a busy one, especially in terms of exhibitions and conferences. I won't say too much about it now, but an invitation to Photonics West 2019 is in order. We're in booth #1751 and this year both entrances will be opened, so it will be easy to reach us. See you there!

Yours,

Mikael Winters

Content

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Imprint

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Innovative Processing of Apparel

Flat and Low-friction Seams via Laser Welding

Machine sewing, hot-air welding, and ultrasound are well-known procedures applied in the finishing of clothing. Laser welding is a completely new technology used in the clothing industry. The Swiss company Leister Technologies AG is developing this market to industrial maturity. Promising garment prototypes are already being produced. We spoke to project manager Frederike Lehmeier about this new process. "Compared to ultrasonic welding, laser-welded seams have an undamaged fabric surface; melting points are not visible on the surface. Adhesive material is not required either," she explained the advantages.

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LASER
MATERIAL
PROCESSING

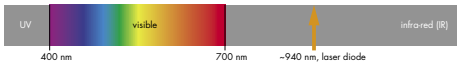
Laser welding is therefore particularly interesting for functional clothing: the seams can be extremely flat, elastic, and therefore skin-friendly. A so-called seamless effect can be achieved because the outside of the materials to be welded is not damaged. This technology is based on laser transmission welding, in which fiber-guided diode lasers are used in the near IR (NIR) range.

Laser transmission welding requires working with a laser-transparent and a laser-absorbing material. These two materials are joined exclusively between both material layers. Another possibility is the use of exclusively transparent materials; in this process, absorbers are partially applied to the positions to be welded.

The Basic Rules of Laser Welding:

1. Transparency and absorption are required

A laser transmission weld requires a transparent and an absorbent textile when lasers with a wavelength of 940 nm are used.



2. Welding same with same

In laser welding, thermoplastic materials are joined together. During the welding process, laser radiation is absorbed by plastic and converted into heat. Thermoplastics are plasticized in the joining zone and joined under pressure.

In order to achieve a connection with high strength, similarly-typed thermoplastics should primarily be used. Practically speaking, this means, for example, that polyester can only be welded with polyester and polypropylene only with polypropylene. Working with the same materials has a positive ecological impact on a subsequent recycling process and is becoming important for increasingly sustainable production in the textile and clothing industry.

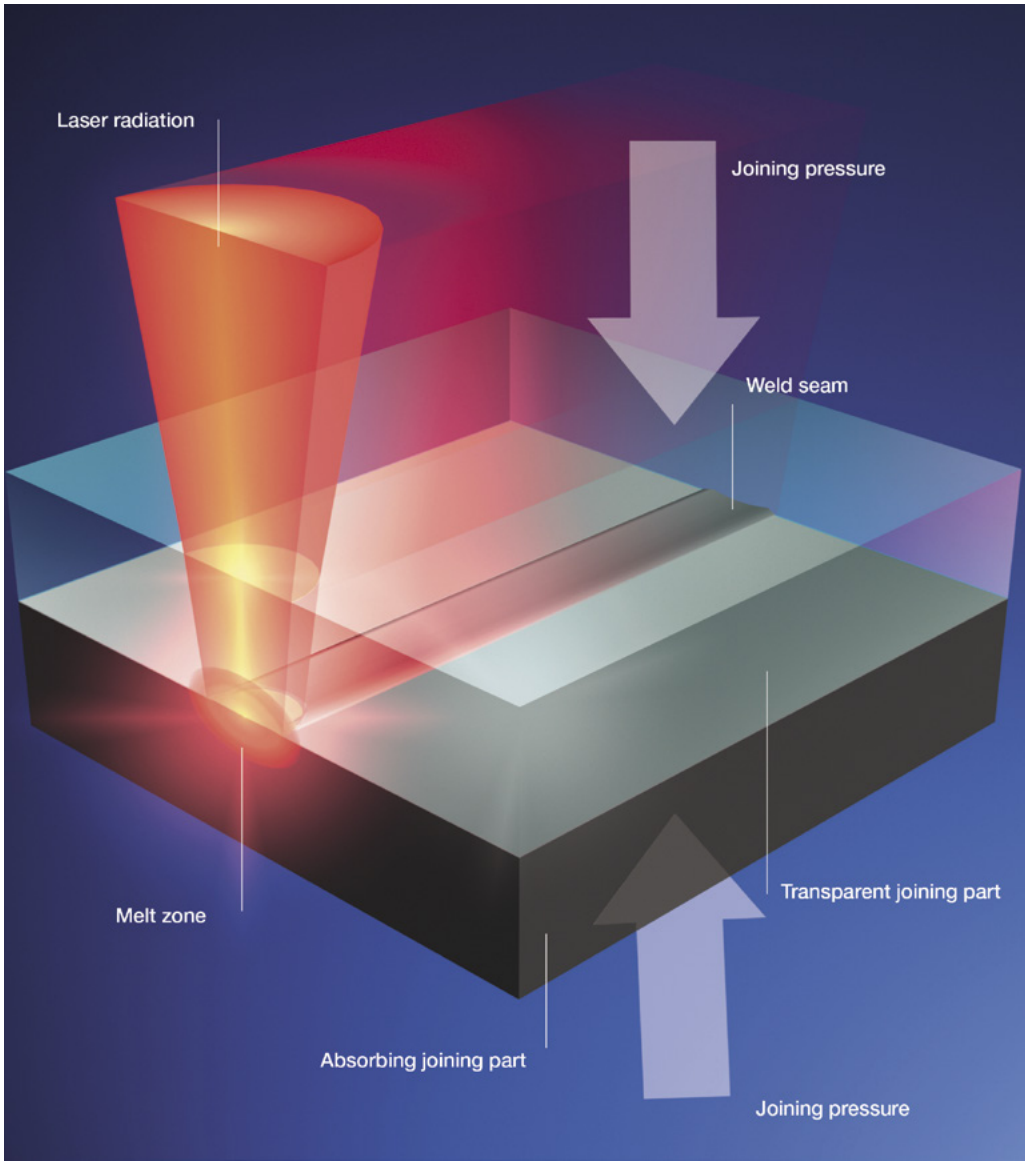
Materialization

Materials tested to date in the textile and clothing industry include single-layer elastic and non-elastic knitted and woven fabrics, spacer fabrics, non-woven materials, membranes between 10 µm and 25 µm, and multi-layer textiles (laminates). The chemical basis is largely polyester articles and, for knitted fabrics, polyamides and polypropylene articles.

In addition to polyester products, polyurethane-based materials can also be welded. The low foreign fiber content of a material type (e.g., elastane) does not significantly influence the laser welding process and the seam quality as long as they have laser-transparent properties.

Many of the textile materials available on a standard basis have laser-transparent properties. It is more difficult to use materials with sufficiently high absorption; they usually have a dark shade. Working with absorbent and transparent materials is often accompanied by a two-tone appearance.

If this is not desired, purely transparent materials can also be processed together "using a trick:" Either mostly liquid, NIR-absorbing pigments (absorbers) are introduced or additional absorbent materials are used.



Leister Technologies AG is Developing Two Machine Concepts for Processing Textiles.

A two-dimensional cutting and welding system for the clothing industry will be available as early as 2019. This laser system is based on a vacuum table and can draw in up to three layers of material. Welding and cutting is carried out completely automatically, and different tool heads are applied for each process step. Globo Optic is used for laser welding. The cutting process is performed using a knife tool, which can be selected depending on the material being processed. An inkjet printing head can be integrated on an optional basis to print absorbers on transparent textiles.

In 2020, a continuously manually-operated laser sewing machine will be available as a standard product for shaping seams. In this development, laser technology is integrated into the mechanical engineering process that is well known in textile and clothing technology. This operation is carried out for the user with the help of a similarly familiar methodology. Machine designs and dimensions, as well as the classification as laser class 1, allow positioning in a conventional production line. ■

Application Fields and Seam Shapes

Low-friction, flat, and flexible laser welds are ideal for garments that come into contact with the skin. This increases the wearing comfort of underwear, swimwear, sportswear, and fitness clothing – an enormous benefit for sweaty athletes who wish to enjoy the highest wearing comfort! This has been successfully tested in practice. Two main seam shapes are used for textiles:

1. Seam shapes for two-dimensional connections are used, for example, for attaching pockets but also for decorations, reinforcements, or fixing insulating materials to outer fabrics. This technology can be particularly interesting for the continuously growing wearables market if sensors and other technical components are incorporated directly into the clothing.

2. Three-dimensional, shaping seams are used, for example, for overlapping seams, hemming seams or the welding of strip materials.

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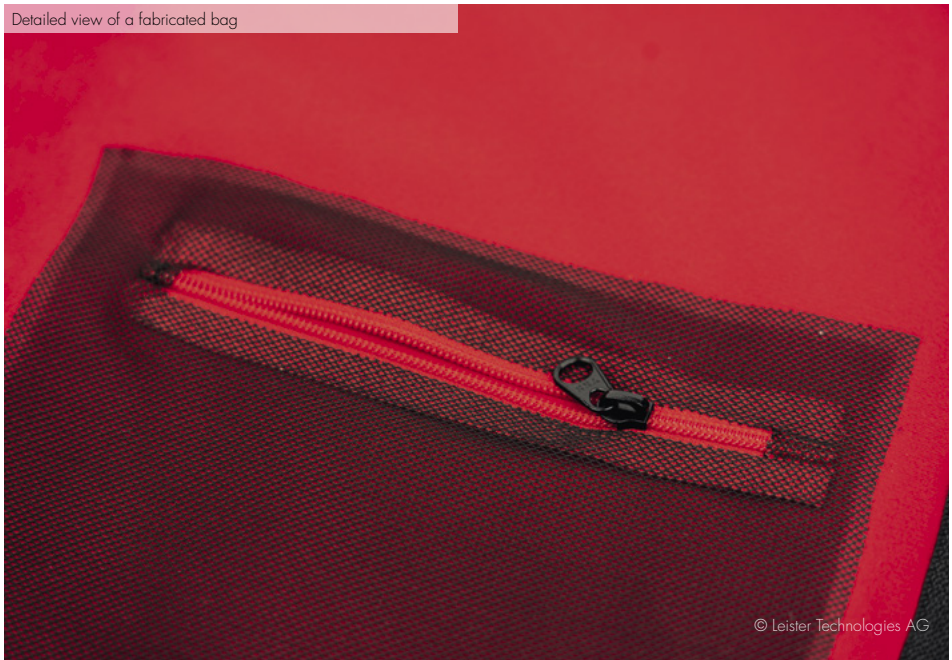
Outlook

Laser welding yields a new joining technology for clothing, textile products in medical technology, and technical textiles. Manufacturers and brands in the textile and clothing industry have a high need for innovation and differentiation in a highly competitive market. This development takes into account innovative laser technology.

Leister pioneered the development of textile-specific laser machines. We are working on making the sophisticated processing of textiles industrially accessible by means of suitable machines. ■

The project leader F. Lehmeier during the prototype test



Detailed view of a fabricated bag

Norwegian Bliss

The Norwegian Bliss undocked on February 19, 2018. Transfer to the North Sea began on March 13, 2018. At only 0.2 knots, the 333.4-meter-long and 41.4-meter-wide ship was discharged from the MEYER WERFT shipyard and steered backwards towards the sea on the Ems River for better maneuverability. In June, the "Breakway Plus" class ship will set sail from Seattle for a seven-day cruise to Alaska. From November they will be found in the eastern Caribbean.

This ship is one of the most state-of-the-art cruise ships. 27 dining options, a theater with over 800 seats, the longest (electric) go-cart track at sea, a 180-degree panorama observation lounge, multi-story water slides – one of which goes beyond the railing – and many more attractions promise guests an unforgettable journey. More than 1,700 crew members ensure the well-being of the approximately 4,000 passengers. ■

STRAIGHT & FAR

State-of-the-Art Sensor Technology in Shipbuilding

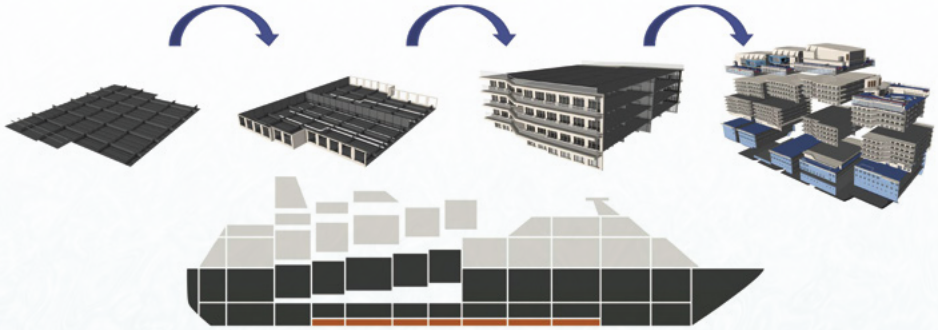
"A cruise is fun. A cruise is beautiful." More and more tourists are convinced of this. According to a current estimate, 27 million cruises[1] will be booked worldwide in 2018, which is about one and a half times as many as ten years ago[2]. It is no wonder, then, that more and more, larger and larger ships are sailing the seas. The order books at the shipyards are full. Keeping the construction time of ocean giants like the "Norwegian Bliss" (see photo) as short as possible requires not only perfect project management but also means precision work with steel structures that weigh tons.

Continue on page 008 ➔

1 http://www.cliadeutschland.de/pdf/2017/35-15.12.2017_CLIA-Outlook-of-the-Industry_Praesentation.pdf
2 https://de.statista.com/statistik/daten/studie/168360/umfrage/passagiere-auf-kreuzfahrten-weltweit/

Ship Puzzle

When renowned shipping companies need new cruise ships, they turn to MEYER WERFT in Papenburg. In its 223-year company history, this family-run business from Lower Saxony has repeatedly proven that pioneering spirit and belief in new technologies pay off.



© Jens Schröder

A cruise ship is constructed with different modules in a block-building process.

When Josef L. Meyer decided in the 1870s to focus resolutely on the construction of steam-powered steel ships, many Papenburg shipping company and shipyard owners looked upon him with mild amusement. History has proven him right: In the 19th century, there were about twenty shipbuilding companies in the city, and of them only MEYER WERFT has survived to this day.

The decision to start building luxury cruise ships has also proven to be the right one. In 1984, when the company accepted the order for the ocean giant "Homeric", this outcome could not have been foreseen. The project was a risk and associated with many technical challenges. For example, a new lock had to be built specifically for the purpose of removing the ship from the dock when it was finished.

From Small to Large

MEYER WERFT is still one of the most modern shipbuilding facilities in the world. Following the principle of modular construction, the production of luxury liners such as the "Norwegian Bliss" takes just nine months from when the keel is laid to launch. By comparison, this new ship is about four times the size of the "Homeric", which was completed in 1985 and spent a year in the building dock at the time.

In modular construction, small partial elements are prefabricated and then assembled into ever larger units: Initially, individual steel plates are painted with a sealant to protect against corrosion, cut to size with a plasma burner, and welded together to form panels. Other components that are important at a later stage for the operation of the ship are also manufactured in advance.

This means that production of these individual parts can begin immediately after the order has been accepted while the building docks are still occupied by other ships.

The heart of steel construction is the automated panel line. There, the cut steel plates with profiles, beams, and side walls are processed into so-called sections. The thermal insulation, as well as the cable wiring and piping packages, in which up to 250 km of electricity and water pipes will run later, are also laid now. The production facility works, so to speak, in a figurative headstand. The steel plates, to which all other elements are attached, serve as cabin ceilings in the completed ship, the cable ducts and pipes are used to supply the cabin above. Every four hours a finished section leaves the production hall.

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In the construction dock (left), self-levelling lasers (centre) and precision detectors (right) ensure millimetre-precise positioning of the sections weighing several tons.

Ralph Zimmermann, Head of Surveying at MEYER WERFT in Papenburg:
"Producing a modular cruise ship for 4,000 passengers means assembling many individual pieces with millimeter precision. Traditional methods are complex, cost time, and require a lot of personnel. With state-of-the-art laser technology, we can work much more precisely and efficiently nowadays."

A Precision Job for Strong Men – From Section to Block

This time remains for shipyard workers to assemble the finished sections into the next larger units. About eight to ten of them form a block that extends across the entire width of the ship. The blocks are up to 37 meters long and up to six decks high. In order to form a perfect unit, the individual sections must be positioned exactly. This is done manually. Since a crane is too inaccurate due to the inertia in the crosshead and rope, the shipyard workers use hydraulic traction and compression presses to fit the parts, which weigh around 160 tons, with millimeter precision.

Achieving this precision is one of the greatest challenges. Mechanical plummets were used for a long time; however, they were very susceptible to wind. They were constantly "off center" and also had to be read visually. In order to align the sections precisely, their position had to be measured in a separate work step by measuring teams using tachymeters. Then it was readjusted and measured again until the component had arrived at the right spot. "This laborious process consumed a lot of resources," says Ralph Zimmermann, Head of Surveying at MEYER WERFT. "That's why we've been looking for a state-of-the-art method for a long time. Shipbuilders should control their work as self-sufficiently as possible. At the same time, the technology had to withstand the everyday working conditions in a shipyard."

Positioning Lasers in Action

Prefabricated "off-the-shelf" solutions did not meet these requirements.
After extensive tests, an optoelectronic alignment system has been in use since the autumn of 2017, which the shipyard has developed together with LASER COMPONENTS and the Neubrandenburg University of Applied Sciences. In laser-assisted alignment, four lasers each are placed on the front and rear of the hall floor and anchored with integrated bolts. These self-levelling lasers automatically level out unevenness so that the laser beam is always perpendicular. A detector is attached to the section ceiling above each laser, which evaluates the position of the beam similar to the crosshairs of a rifle scope. The data is then transmitted by radio to a display so that the shipbuilders are always informed about the exact position. When all eight beams hit their target exactly in the center, the section is in the right place and assembly can begin.

In this way, the blocks are not only completed more accurately but also faster. Ralph Zimmermann is enthusiastic about the alignment system: "The positive effects on our production processes can already be clearly seen. I can no longer imagine the daily work performed at MEYER WERFT without this system." Accordingly, the next step is already being planned. Then it is a matter of positioning the entire blocks. Up to now, costly, sensitive tachymeters have been used to assemble around 70 of these "puzzle pieces," which weigh up to 800 tons, into a ship. Here, too, lasers could soon point the way. ■

Such Theatrics!

Did you know that MEYER WERFT is the largest German theatre builder? Today, every modern cruise ship has at least one large theatre hall with up to 1,000 seats, a fly tower for changing sets, and a retractable orchestra pit. This is why MEYER WERFT has built more theatres than any other company in Germany.

Precise Adjustment Across Long Distances

With the STRAIGHTliner FAR laser alignment system, components can be positioned across distances of up to 200 m with millimeter precision. This is important not only in shipbuilding but also in the alignment of machines, rails, cranes and elevators.

The system features a long-range laser module that can be focused to a point that has a diameter of less than 15 mm at a distance of 200 m. The equipment also includes the wireless connection of an extra-large detector to a PC and intuitive Windows software with graphical user guidance. ■

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WEB N09-068

Secrets in the Rainforest

New Insights into Ancient Cultures

Impenetrable Rainforest

Everyone has seen pictures of the temples and pyramids of Tikal. But if you have not visited it yet, it is hard to imagine how vast the ruins really are. The national park in which they are located covers an area of 575 km^2. Most of it is covered in dense rainforest. Compared to the surrounding Mayan biosphere reserve, however, this is only a small blob. This huge nature reserve in the northern part of the province of Petén covers 21,000 km^2 - an impenetrable and protected rainforest the size of Wales.

It has long been suspected that the dense vegetation hides further remains of Mayan civilisation, but the search for them has proven difficult. In the days of Alexaner von Humboldt, when researchers still struggled through the thicket with a machete, it was often pure luck when they came across old buildings. Many a ruin may have gone undiscovered because an expedition missed it by just a few hundred metres. Of course, more state-of-the-art methods have been available for a long time; for example, aerial photos. However, even photos of the region do not reveal much more than a dense ceiling of treetops. It was not until the application of laser technology that it was possible to look through the trees.

Complex Aerial Measurements

Light detection and ranging (LiDAR) uses laser light to measure distances. When the laser pulse hits an obstacle, the reflected light is detected by a detector. The exact distance to the obstacle can be calculated from the time between the emission of the pulse and the arrival of the returning light, which is referred to as time of flight (ToF) in technical jargon. This principle is familiar to every DIY enthusiast who has measured his or her home with a laser rangefinder before. This technology is also used in obstacle detection during autonomous driving or with self-piloting drones (Photonics News #PN06, pp. 3–5). One of the great advantages of LiDAR is its high resolution: Compared to other technologies, laser-based systems operate with very short wavelengths and can, therefore, record considerably more details.

Avalanche Photodiodes and Pulsed Laser Diodes for LiDAR Measurements

WEB N09-041

Pulsed laser diodes in the near IR range are commonly used in LiDAR cartography. Avalanche photodiodes (APDs) detect the reflected laser pulses. At our facilities in Canada and the USA, we manufacture both components in order to equip LiDAR systems for a wide variety of applications – not just archaeology.

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To create a digital elevation profile, the laser scans the landscape from an aeroplane or helicopter. Several thousand pulses are sent every second. In addition to LiDAR, two other technologies are used to determine the exact elevation profile: A satellite-supported GPS constantly records the exact geographical position of the aircraft so that the LiDAR measurements can be located later on the map. This happens in all three dimensions because the exact flight altitude naturally has a crucial influence on the ToF result. In addition, an inertial measurement unit (IMU) – essentially a gyroscope – measures the various angles of inclination of the aircraft since these directly influence the path length of the reflected laser beam.

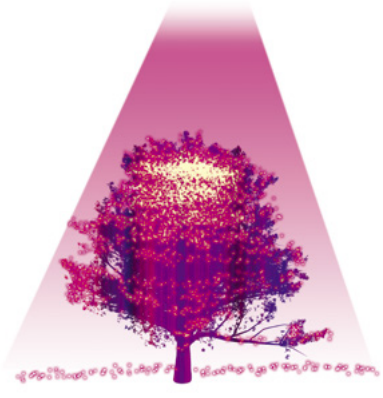
Trees Are Essentially Removed

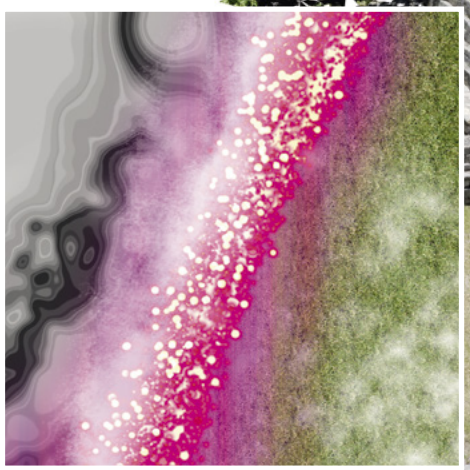
Within trees and other plants, an effect occurs that is particularly useful in laser cartography. Unlike buildings or rocks, leaves do not reflect all light. One part penetrates the leaves and continues to move towards the ground until it hits the next "obstacle" and so on. Thus, it can happen that the same light pulse is reflected several times – each time with lower intensity and of course with continuously increasing ToF. All these reflected signals can be assigned later to the original pulse.

The result is a three-dimensional image of the tree – or even of an entire forest. Using complex algorithms, a computer can virtually remove vegetation from the landscape profile identified. What remains is a detailed model of the bare floor. The Maya researchers were surprised at how much new knowledge they were able to gain from the LiDAR data. The surface structures showed that hundreds of years ago houses, high roads, and fields once existed where the rainforest now grows. Until recently, it has been assumed that the hinterland of the Mayan cities was sparsely populated. Now the archaeologists know better: The metropolises were closely interlinked.

New Discoveries Everywhere

Not only in Central America does laser technology provide new insights into the past. In Lancashire, Cumbria and Northumberland, LiDAR investigations revealed ancient Roman roads. Archeologists had always expected them to be there, but no trace of them was visible on the aereal photographs they had worked with, up to now. At least, they know what they found. Their colleagues in Guatemala are far from that. They must first evaluate and analyse all data. It, therefore, remains very exciting. ■

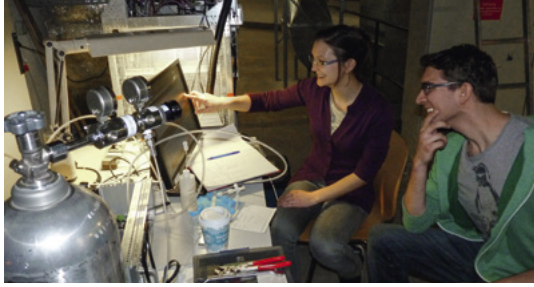




Something's in the Air

Exciting or Funny?
Using Spectrometers to Measure Moviegoers' Feelings

Does a thriller smell different than a comedy? Of course not; after all, olfactory cinema has not yet been invented and emotions are created by images and sounds. However, it is now known that plants and insects pass on information via chemical substances. So, why wouldn't humans do the same as well? Scientists from the Max Planck Institute for Chemistry and the Johannes Gutenberg University of Mainz have investigated this question. For this purpose, they have chosen a place where many people feel the same feelings simultaneously: **the cinema.** ➔



© Air Chemistry Department
Max-Planck-Institut für Chemie

In school, we learn that the oxygen we inhale is converted into carbon dioxide in the body. Generally speaking, this is correct; however, our breath also contains other substances (i.e., so-called volatile compounds). Eight hundred seventy-two of these substances are now known to scientists, some of which are produced by physiological processes in the body. This knowledge is used to measure changes in the body; for example, how the organism reacts to physical activity or certain foods. Strong emotions also trigger biochemical processes in the muscles, nervous system, and blood circulation. Prof. Jonathan Williams and his team from the Max Planck Institute for Chemistry in Mainz wanted to find out whether these reactions can be detected in the air we breathe.

100 Gases in 30 Seconds

A movie theater offers the ideal setting for this project, especially because all viewers react to the film at the same time. This means that the measured values can always be assigned to a specific scene. In addition, the theater halls are continuously ventilated: fresh air enters through openings under the seats, and the "used" air escapes through ventilation openings in the ceiling. Scientists installed several mass spectrometers at the openings and were thus able to measure the concentration of around 100 different volatile compounds at 30-second intervals. The continuous circulation also has the benefit that the composition of the air quickly returns to a normal level after the movie. This makes it easy to compare the results of successive measurements later on.

Over the course of one and a half months, the values were measured in two theater halls of a multiplex cinema in Mainz. During this period, films of various genres were shown: in addition to the usual comedies and action films, horror and children's films were also shown; and even a ballet performance was among them. The spectrograms of the individual curves were so characteristic that the researchers could often see with the naked eye which film was involved. In particular, exciting and funny scenes are clearly recognizable by the measurement curves.

Exciting and Funny Curves

"When the heroine fought for her life at the height of one of the action films, the values of carbon dioxide and isoprene in the exhausted air always rose significantly," explains Williams, "at each and every showing." This is important because this is the only way to produce reproducible (i.e., scientifically reliable) results. Isoprene is known for being released through muscle activity. One explanation for the increase in isoprene concentration in a seated audience could be that moviegoers get tense, restless, and breathe faster during exciting scenes.

The fact that the clearest measurement results were achieved for "tension" and "humor" could be related to evolution. Certain substances are released from the body to signal to others that increased attention is required ("tension") or that it is time to relax ("humor"). The findings of the study can be advantageous in various areas. In medical breath gas analysis, for example, it is possible to determine whether a patient is in a stress situation and whether the results could be falsified. For audiovisual media such as commercials, films, and video games, the reaction of the test audience can be better evaluated by air measurements. ■

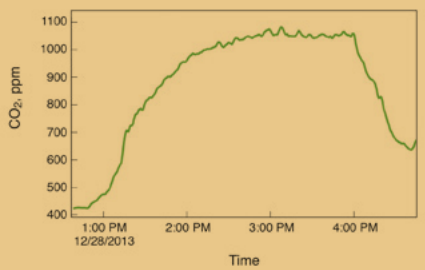
IR Spectroscopy for CO_2 Measurements

WEB N09-033

Scientists at the Max Planck Institute used proven IR spectroscopy to measure the carbon dioxide concentration in the cinema auditorium. Like other gases, CO_2 absorbs certain wavelengths of the IR spectrum. If the air is irradiated in the IR spectrum, a sensor can precisely determine the CO_2 content based on the absorption behaviour. The sensors are matched to the absorbed wavelength of 4.265 µm.

Due to continuous air circulation, the CO_2 curve established in cinemas takes the classic shape of a "shark fin." The concentration in the air rises steeply after the start of the movie until it settles at around 1000–2400 ppm. As soon as the audience leaves the cinema, it quickly drops again and approaches the starting value.

Carbon Dioxide (CO_2)



Pyroelectric detectors by LASER COMPONENTS are mainly used in high-resolution analytics and medical applications. ■

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New Products

WaveEye - Precise Wavelength Measurement

Compact Measuring Device

WEB N09-071

The WaveEye is a particularly compact and versatile wavelength measuring device for cw or quasi-cw lasers between 450 nm and 950 nm. The measurement data is available with a data rate of 1 kHz without a warm-up delay. It can be used for an optical input power range between 0.1 µW and 1 mW. The digital measured value output is carried out via a USB connection, which also serves as a power supply. In addition, the wavelength information is available as a voltage of up to 4.096 V at the analog output. The WaveEye is particularly easy to operate via comfortable software or simple serial text commands.

Due to its small size, the WaveEye is suitable as an OEM component for a variety of applications (e.g., in tunable lasers or as part of a larger measuring device). ■

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Complete Electronics Package for UV-LEDs

LED30UV Test Kit for Initial Tests and Test Series

WEB N09-055

The evaluation of UV LEDs is often a time-consuming and cost-intensive process because special driver boards and heat sinks have to be developed depending on the application.

With the LED30UV, you can easily, quickly, and reproducibly carry out initial tests and test series for the various ranges of the ultraviolet spectrum. This package contains one LED carrier with a heat sink, an AMPYR LED30W LED driver with an integrated heat sink, a plug-in power supply unit, and a six-pole cable for connecting the driver and carrier unit. We configure the UVA, UVB, or UVC LED that you desire on the LED carrier.

With this modular package, you have a plug & play solution, with which a fast and simple evaluation of LEDs up to a maximum of 25 W is possible. ■

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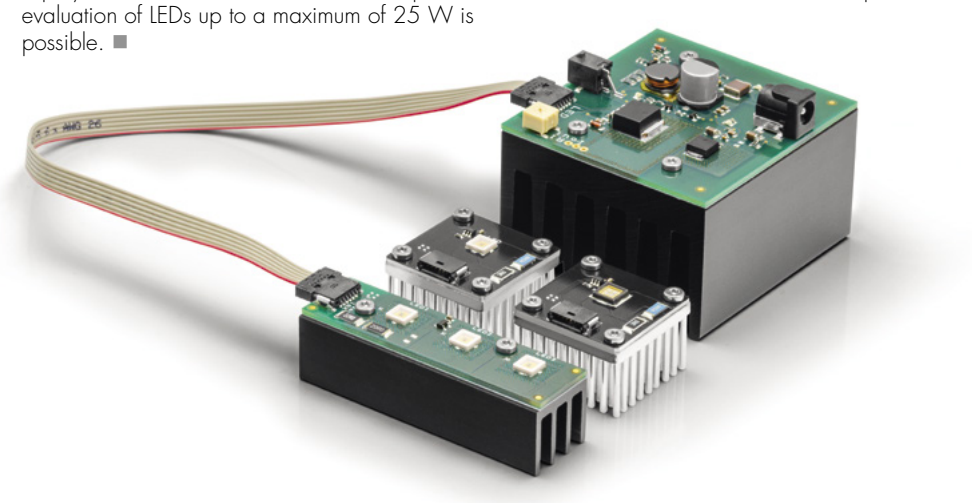
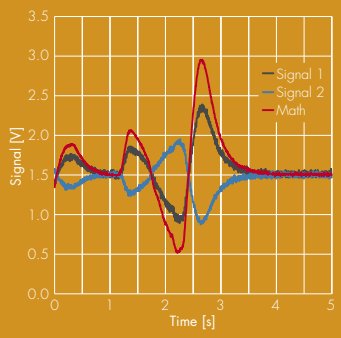


New Line of Differential Pyroelectric Detectors

Plug-and-Play Version with an Integrated Two-Stage Amplifier

WEB N09-133

With our differential pyroelectric detectors, the charge carriers on the top and bottom of the chip are able to be amplified separately for the first time. This causes the detector signal to double while the background noise only increases by a factor of 1.4.



This patent-pending idea can significantly increase the sensitivity of IR analyzers. The separate signal outputs make the detector insensitive to interference currents.

For better implementation in existing systems, we now also offer a version with a classic 3-pin housing. Both signals are fed into a differential amplifier in the housing. For the user, the detector looks normal at first glance: a single supply (i.e., only one signal output). The difference is evident in the application: The signal-to-noise ratio is around 50% better than with conventional high-end models. ■

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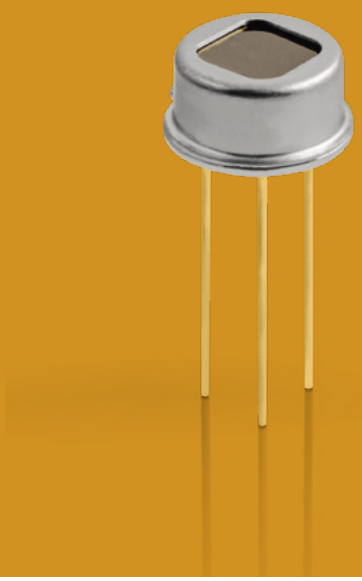

Detectors Now Available with IR Filters for Measuring NO_2

For Clean Air

WEB N09-233

Particularly since the diesel scandal, everyone has been talking about the concentration of nitrogen dioxide in the air. While carbon compounds are routinely measured using the NDIR method, the search for standard IR detectors with filters for NO_2 measurements has been pursued in vain. To detect nitrogen oxides, usually electrochemical or UV processes are used. In engine development, laser-based IR processes are employed.

LASER COMPONENTS has established itself in recent years as the manufacturer of pyroelectric detectors with the broadest range of standard bandpass filters. It is therefore only logical to expand this leading product range: We now offer pyroelectric detectors with narrow-band IR filters for NO_2 measurement (filter option V) upon request. The filter specifications were developed in close cooperation with users.

This makes it possible for manufacturers of NDIR exhaust gas measuring benches to expand their devices by an additional IR measuring channel and to dispense with alternative methods. Two further innovations from LASER COMPONENTS are very helpful in this context: Firstly, the gas humidity can also be measured using NDIR with the help of the "M" filter. Secondly, NO_2 measurement is without a doubt challenging and we therefore recommend the use of the latest and best detector generation – our differential pyroelectric detectors. ■

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Rochester Precision Optics

New Partner for Customized Aspherical Optics

WEB N09-001

With Rochester Precision Optics (RPO), LASER COMPONENTS has gained a leading international manufacturer of aspherical precision optics as a partner. The glass optics are pressed using a proprietary precision glass molding (PGM) process. RPO, a U.S. company, acquired the necessary know-how and equipment from Eastman Kodak Company when it was founded in 2005.

Today, RPO is a leader in the production of customized aspheres ranging in size from 1 mm to 60 mm. The company covers a wide range of focal lengths and numerical apertures.

In addition, RPO also offers molded optics made of plastic and CNC-manufactured aspheres for the infrared range. Most elements are custom developed.

Aspherical optics offer numerous advantages in practice. For example, they enable more compact designs and thus help to reduce the weight and number of optical elements in many applications. They can also be used to optimize performance features such as the modulation transfer function or to achieve higher tolerances in inclination and alignment. ■

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Optical Fibers with Ball Lenses

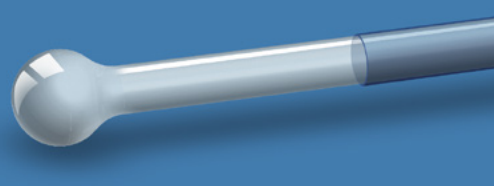
Expansion of Technology in the Field of Fiber Optics

WEB N09-118

Ball lenses are used in fiber optic technology to optimize the illumination characteristics of the fiber. Depending on the geometry of the light source, these lenses are used to focus or collimate light. This is why they are used in endoscopes and other medical applications, for example. The rounding of the ball lens also reduces the risk of injury during examination.

Upon request, LASER COMPONENTS can melt ball lenses onto the end surfaces of silica fibers in various diameters. The fiber geometry must be taken into account here as a basis. Our technology supports fiber diameters of 200, 365, 400, 550, and 600 µm. Of course, you can also order assembled fibers with ball lenses as a finished OEM product from us.

All fibers are processed and sterilely packed according to ISO 13485. Thus, they meet all hygiene requirements for medical technology. ■



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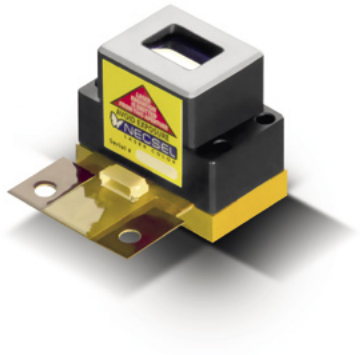
Yellow Laser

577 nm – Healing Wavelength

WEB N09-142

For the first time we can now also offer a yellow laser source in addition to red, green, and blue lasers. With award-winning patented technology, our partner Necsel has succeeded in generating a laser beam with a wavelength of 577 nm at an output power of 1 W.



Yellow lasers are mainly used in medicine and the life sciences. The light has a detoxifying and anti-depressive effect. For example, doctors have achieved success in the treatment of Lyme disease, multiple sclerosis, and depression through intravenous treatment with yellow laser light. ■

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New Conversion Screens

Optimized Performance and Resolution

WEB N09-051

Our range of conversion screens is constantly being optimized and expanded to cover as many application areas as possible. These three new versions are currently being added:

- **LDT-007BN** for low-power Nd:YAG lasers converts IR radiation of 700 nm to 1400 nm into visible red light of 654 nm.
- **LDT-1064CN** made of resistant ceramic is suitable for high-power IR lasers (900–1100 nm) up to 200 W/cm². The area of 60 mm x 40 mm can be used up to the edge.
- **LDT-1064N** offers a particularly large area of 50.8 mm x 50.8 mm and can also make the invisible radiation of IR lasers (800–1700 nm) with larger diameters visible as green light (530 nm).

All screens are ready to use immediately and do not have to be activated. Upon request, we will be happy to supply you with a sample to test the screens in practical applications. ■

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LASER COMPONENTS