PHOTONICS NEWS

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Insights

Quality

Development

Investments

New Products

Content

Digital Transformation

From the Company

Production Facilities at LASER COMPONENTS

New Products

LASER COMPONENTS®

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Dear Reader,

The past 15 months have brought many challenges and changes that none of us could have anticipated. We have had to find new and innovative ways to navigate through these unique circumstances. The global crisis made it necessary for both the world and our company to adapt to new business environments and continue to devise improved methods to move forward.

One of the changes in early 2021 was the retirement of Gary Hayes, G.M. of LASER COMPONENTS USA. For the past 20 years Gary built LASER COMPONENTS USA into a dynamic sales company with teams across the country. Gary's passion for photonics and his outgoing personality were driving forces in the growth of LASER COMPONENTS, and the welcoming culture that he created. We all wish Gary the best in his retirement.

In early 2021, I was named the new G.M. Over the past 14 years, my team and I have supported the growth of the company focused on the APD, PLD, and IR product lines. My areas of expertise are in laser diodes, APDs, and IR components, as well as the application of these products in LiDAR technologies. I hold a BSME from the University of Massachusetts and an MBA from the University of New Hampshire. I have over 30 years of experience in fiber optics and photonics, previously working for Corning Inc. and Schott AG.

Tradition is paramount in our company and innovation remains key to our continued success. These traditions, along with being a global family run business, have been kept alive for over 20 years. Among the many goals that I have for LASER COMPONENTS USA, is to carry on and maintain this culture. With the United States slowly opening up as the COVID pandemic is coming under control, we see great potential. We look forward to resuming more normal corporate activities such as in-person customer visits, trade shows, and increased sales growth as the economy continues to expand.

While we have maintained close contact with our customers through video conferencing, nothing is more satisfying than sitting down with our customers face-to-face and working through new designs. We stand ready with updated technologies in all areas of our business, as well as our continued commitment to producing high quality products, the ability to meet all of our customer's needs, and delivering outstanding customer service.

The future is bright, and I look forward to working with all of you.

Yours,

Matt Robinson
General Manager / COO, LASER COMPONENTS USA, Inc.

VUCA WORLD

Strategies in an Ever-Changing World

Volatility, Uncertainty, Complexity, Ambiguity (VUCA)

We are in another year, in the middle of a world that is ever changing. While our global society has seemingly left it to a few visionaries to draw the future of our world, we are arriving at what can be called our "new reality." What is this "new reality", and how do we define it here at LASER COMPONENTS? More importantly, what effect does it have on our customers?

Everything VUCA?

The term VUCA (volatility, uncertainty, complexity, ambiguity) has ceased to be associated exclusively with the end of the Cold War. Today, it describes the world in which we live – volatility, uncertainty, complexity, and ambiguity occurs in everyday life, as we experience constant and increased changes. Our world's volatility is more than just a feeling. Where building upon past experiences with a clear conscience was the norm, we are finding that uncertainty is on the rise. "Best practices" are degenerating into a misnomer and being replaced with so called "good practices." As if this already isn't enough, complexity is increasing, with cause and effect being intertwined in all areas. Ambiguities in communications or in the evaluation of information occurs on a regular basis.

New Paths

As the world is changing, companies must also change in order to recognize the driving demands being presented, and the wherewithal to meet them. Remaining true to one's own values and creating necessary stability is vital, while being open to taking new paths, as they are happening at the same time. We find ourselves in a field of apprehension, where creativity and resilience are more in demand than ever before.

From Inside to Outside

We at LASER COMPONENTS have used the past year to grow closer together. We are countering increasing complexity with a strong network connection from all locations, taking advantage of our internal expertise and knowledge.

As a prerequisite for efficient collaboration and communication, the digital workplace has taken center stage. No matter where our experts are located, whether working from home, in the office, or on the other side of the globe, our flexible and resilient teams meet virtually, and exchange and store transparently, keeping one another informed about the tasks and next steps throughout the entire company.

Trust in Us

One of our goals is to provide our customers with information about the status of any project at all times. Our expertise and proficient knowledge enable us to implement solutions for unusual and complex customer requirements. Examples of the collaboration of cross-disciplinary teams includes end surface inspection of coated fibers according to optics standards, separation of wafers, coating of laser facets for distance and velocity measurement, and the rapid development of our fiber-coupled white light module ALBALUX®. Our most recent projects involve increasing the quality of our COUNT single photon counters (see box): The detectors are manufactured at our site in Arizona, and our electronics along with assembly and test developed in Germany. Only through continuous coordination of sub-processes, can new requirements be implemented and tested quickly and reliably.

Innovation Pressure and Mindset

Increasing volatility within our society has led us to become more innovative. We know that we must counter this through transparency and collaboration. By changing our way of thinking, we have become acutely aware of what the "digital mindset" is. Years ago, knowledge was hoarded, but now shared transparently for everyone to access. This allows cross-disciplinary teams to generate effective solutions in a more efficient manner.

Process optimization and structural adjustments have become necessary. With the consistent implementation of 5S (see pg. 007), over the past year, we now have increased efficiency in production at a much higher quality. ➔

VUCA

We want our customers to come back, not the product. As with many things in product, there is more to it than what most people see. As precision in manufacturing is carried out, there is more time to develop new products and to further refine our processes.

We are proud of our new company building in Arizona (see pg. 008): The production areas were set up according to 5S with professional and well-thought-out workplaces. Together with standardized routines, we have created a framework that allows for greater innovation.

Strengthening Aptitudes. We Listen to our Customers.

We have seen increase in the uncertainties in decision-making and have addressed these concerns. As we continue to strengthen our close ties with customers, we view direct and open collaboration as one of our greatest strengths. Many investment decisions have been made based upon customer stipulations and requests, providing us the abilities to continue to grow and operate. Our team is continually ready to listen and look forward to joint ventures and projects.

Looking at the New: Become Part of our Community!

We look forward to seeing you in person. We want to talk about current projects and technical details in small groups, exchange ideas and expertise in conferences and discussions, and make short presentations reporting on what is happening within our company, providing you with regular updates. We offer various virtual formats for you to choose from. Over 800 people participated in our first LC TALKS event series focusing on IR technologies, giving us the rise to a community that will meet regularly in smaller circles for "fireside" chats and networking.

We will continue to present our products in a classic manner such as the New Products section at the end of this magazine. It is far more exciting to talk directly with our experts: Care to take a look behind the scenes? We are currently working on virtual tours of our optics and fiber optics manufacturing facilities, and offer you the opportunity to ask questions directly to our experts. ■

Marketing Director Claudia Michalke explains how LASER COMPONENTS faces the challenges of digital transformation.

Fully Automated Measuring Station for COUNT Modules

As of March 2021, we have extended our quality assurance in Olching by adding a new measuring station for our COUNT photon counters. Together with manufacturer Swabian Instruments, the equipment was adapted precisely to our requirements. It combines the Time Tagger Ultra, a highly-sensitive time-correlated single-photon counting (TCSPC) system, with ultrashort-pulsed diode lasers, high-precision reference power meters, and computer-controlled motion tables. Up to twelve individual COUNT modules, with or without fiber coupling, important values such as jitter, dark count rate, after pulsing, dead time, and detection efficiency can be determined simultaneously as these values are generally determined at different wavelengths. We now offer our customer's measurements at four wavelengths – 405 nm, 505 nm, 670 nm, and 804 nm, all of which are specified in the test report. ■

Preventing Errors in the Name of Quality While Keeping Order

In recent issues, we have taken on the task of quality management. To make the tasks easier to tackle, we have broken them down into three main parts: structure, culture, and economy. In this issue, we will look at two measures in structural organization and currently being implemented step by step at all LASER COMPONENTS locations.

5S Much More Than Just "Living More Beautifully"

Like many QM building blocks, this simple and sustainable structural building and maintenance method comes from the toolbox of Taiichi Ōhno, a former production manager at Toyota. It deals with a topic that everyone can see and relate to immediately: A well-organized and efficiently designed workstation.

The basic idea is simple: If I do not have to constantly search for my tools, I can concentrate better on my work. I can work faster and make fewer mistakes. This approach from manufacturing is easily applied to desk jobs, and so we have come the famous 5S:

1. Seiri – Sort: "Do I need this for my work, or can it go?"
2. Seiton – Straighten: "A place for everything, and everything in its place!"
3. Seiso – Shine: "Cleaning is inspecting!"
4. Seiketsu – Standardize: "Standards save searching and waiting!"
5. Shitsuke – Self-discipline and continuous improvement: "Develop yourself and your team!"

The first three steps are the easiest to accomplish in 5S. The last two steps take this principle to another level. In all work areas, 5S can achieve astounding results. In order to take full advantage of the benefits of 5S, the principle must become part of the corporate philosophy lived by everyone. In the spirit of the Kaizen principle, it is important to keep evolving in order not to end up with a patchwork of well-intentioned but misunderstood "pro" solutions (provisional instead of professional).

FMEA Preventing Errors before They Occur

A failure mode and effects analysis (FMEA) is both preventive quality and effective risk management, and important to start at an early stage of product development.

This tool also has five steps:

1. System Analysis
   It is necessary to establish clear "vertical" structures, and asks the following questions: Into which steps can I divide the development and production process, and where are the system boundaries?
2. Functional Analysis
   In this step, it is prudent to start from the finished product: Which product features are produced by which process features, and in which step?
3. Failure Analysis
   The characteristics of this last step are reversed into the negative: What can go wrong with the product and the process? What has gone wrong before?
4. Risk Assessment
   This is the most comprehensive and complex step. For all of the errors we described in the last step, the following three criteria are evaluated on a scale of 1 to 10: Importance to the customer, the likelihood that an error will occur, and the likelihood that it will be detected. The product of all three criteria is the risk priority number (RPN), ranging from completely trivial (1×1×1=1) to complete mishap (10×10×10=1000). This is only a guideline. Should all three criteria be included in equal measure in the RPN, it is helpful to sort the errors according to their significance to the customer, followed by occurrence and probability of detection.
5. Optimization
   This step presents the opportunity to establish corrective and preventive measures. The measures can relate to the occurrence and/or detection of the errors where the error will occur less frequently and detected more quickly.

QM Quality Management Means Prevention

5S and FMEA are two excellent methods in the preventive nature of quality management. Through structures, standards, and continuous improvement, a company learns from past mistakes, ensuring they do not occur again. Most importantly is that all departments and employees pull together – and therein, lies the greatest challenge. ■

Pius Perko, CQO

Looking toward the Future: New State of the Art Detector Facility

State-of-the-Art Technology and Lean Manufacturing

In December 2020, Raj Chakraborty and the LASER COMPONENTS Detector Group team moved to their new building in the boomtown of Chandler, Arizona. Following the latest concepts of workflow efficiency, employee collaboration, and comfort, the facility is set up with growth in mind. We asked Raj to give us his first-hand impression of what it is like to work in these brand-new surroundings.

As the name LASER COMPONENTS Detector Group would suggest, our company focuses on the development and manufacture of detectors. As with all companies in the LASER COMPONENTS Group, we pride ourselves on our diverse portfolio, which consists of four distinct product lines, each with its own target markets and requirements. Avalanche photodiodes are a key technology in time of flight-based distance measurement applications – from range-finders to complex LiDAR systems in self-driving cars. InGaAs PIN photodiodes are commonly used in spectroscopy, while PbS/PbSe detectors are mostly delivered to the medical industry for use in respiratory analysis. Pyroelectric detectors – commonly known as pyros – are the latest addition to our portfolio. They are used for flame detection in the oil and gas industry.

The LASER COMPONENTS Group restructured its organization. Every product line now has its own dedicated product manager (PM) to meet the unique challenges presented by the different markets. Each of them has a roadmap and strategy that encompasses meeting and exceeding the KPIs, R&D activities, quality improvement, and business growth. Four of the PMs are employed by the detector group, covering each of the aforementioned business units.

Detailed Planning for Growth and Efficiency

This is a rather long introduction; however, as we go on, you will find that it is essential for understanding the way our new facility was planned and built. From the very first stage three aspects were considered in designing a sound building. Starting with our four business units, we took care that their distinctive requirements were taken into account in order to develop and produce the highest possible quality with each product line. The overall design of both the production and office areas ensures that we are able to benefit from the synergies each area provides for the others. The third aspect was growth: You do not plan a new facility without considering the future. So we took care to plan ahead and create enough space for future staff. This will allow us to grow productivity by 4×. As a positive side effect, these plans encourage us to work on achieving this growth and fill the empty spaces.

Last but not least, the overall design was meant to encourage social exchange between staff members, make them feel at home, and create a sense of pride in being part of the LASER COMPONENTS family. You will see that it all fits together nicely.

Saving Time with Spaghetti

Let me start with our new production area: Almost half the space is filled with a modern and sophisticated cleanroom area. It was built to the highest ISO standards and meets 10K class requirements to ensure stringent particulate and contamination control. It also meets all semiconductor industry ESD control standards required in electronics manufacturing. One major advantage of the acoustic ceiling tiles and the sound-proof walls of the cleanroom is keeping outside noise to a minimum. They allow for a quiet working environment and better concentration on the job. Stringent temperature and humidity controls are set to balance the need for product preservation and worker comfort.

The cleanroom area is divided into four distinct sections according to our main product lines. During the planning stage, we took care to place the workstations in a way that provides optimal workflow efficiency. We set up so-called spaghetti diagrams for each manufacturing process to visualize the way goods and production kits moved from one work-station to the next. In the end, there was a tangled collection of lines that look like a spaghetti dish. We untangled the pasta strings and streamlined the product circulation in our new facility. As a result we reduced manufacturing time by about 30 percent. A production process that would have cost us ten workdays in the old facility can now be finished in seven days.

➔

New Concepts in Building Design

Creating a Community through Culture and Atmosphere

As chief culture officer, Caroline Paul is responsible for promoting the corporate culture at all locations of the growing LASER COMPONENTS Group.

Company culture was a main focal point in planning our new building in Chandler, AZ, as part of chief cultural officer Caroline Paul's responsibility: "A building of this complexity must serve its purpose and meet necessary technical requirements. It was equally important for us to create a pleasant working atmosphere as well as consider both the social aspects of the workplace and work-station ergonomics." As both a long-time colleague at the company and the wife of the owner, she has ample experience in this area, both in Germany and abroad. She is very familiar with the company culture, philosophy and brand identity, making her the ideal choice for this project.

During the planning of the new building in Chandler, she made sure that there was enough daylight at all office workstations. To make the open communication culture tangible, desks were arranged so that teams of different sizes could work together while being flexible.

"Togetherness is very important throughout the entire company group", sums up Caroline Paul. To promote contact and exchange, a great deal of emphasis was placed on providing generous social spaces. In the cafeteria, there is both seating and a facility for preparing meals. Different-sized seating groups offer something suitable for every team size, ensuring that employees can mingle over meals and socialize with colleagues from other departments. In keeping with the Arizona climate, Caroline also implemented shaded outdoor seating, complemented by a barbecue grill.

In designing the building's facade and interior, Caroline incorporated LASER COMPONENTS' corporate design, a major role that she had in its development. Climate conditions in this desert state were taken into account, such as shading elements reminiscent of the company logo while providing for a pleasant coolness inside. "This allows us to simultaneously reduce energy costs for air conditioning", she stated, and implemented a company-wide approach to sustainability in interior design. "High-quality, durable furnishings are important to us. As with the German parent company, we combined modern design and natural materials. All design elements were chosen to reflect a company culture that spans continents." ■

Communication Creates Synergies

The office space features an open cubicle concept that is different from the usual U.S. office designs. Workspaces are only separated by glass walls of about 3 ft. At first we had to get used to the new design, but this concept turned out a major boost in employee collaboration and seamless information sharing. PMs are now able to create overlaps and synergies between their business units and benefit from each other's ideas and solutions.

We had already decreased e-mail traffic on a global basis by setting up a digital workplace. Internal e-mails have also significantly decreased as colleagues are now sitting next to each other and able to communicate openly. Everyone knows what their colleagues are working on at any given time, which allows us to eliminate double work. There are clearly-marked, sectionally-divided office areas that are separated by job responsibility, which encourages better collaboration within each job function.

Our three conference rooms now allow for multiple meetings to happen

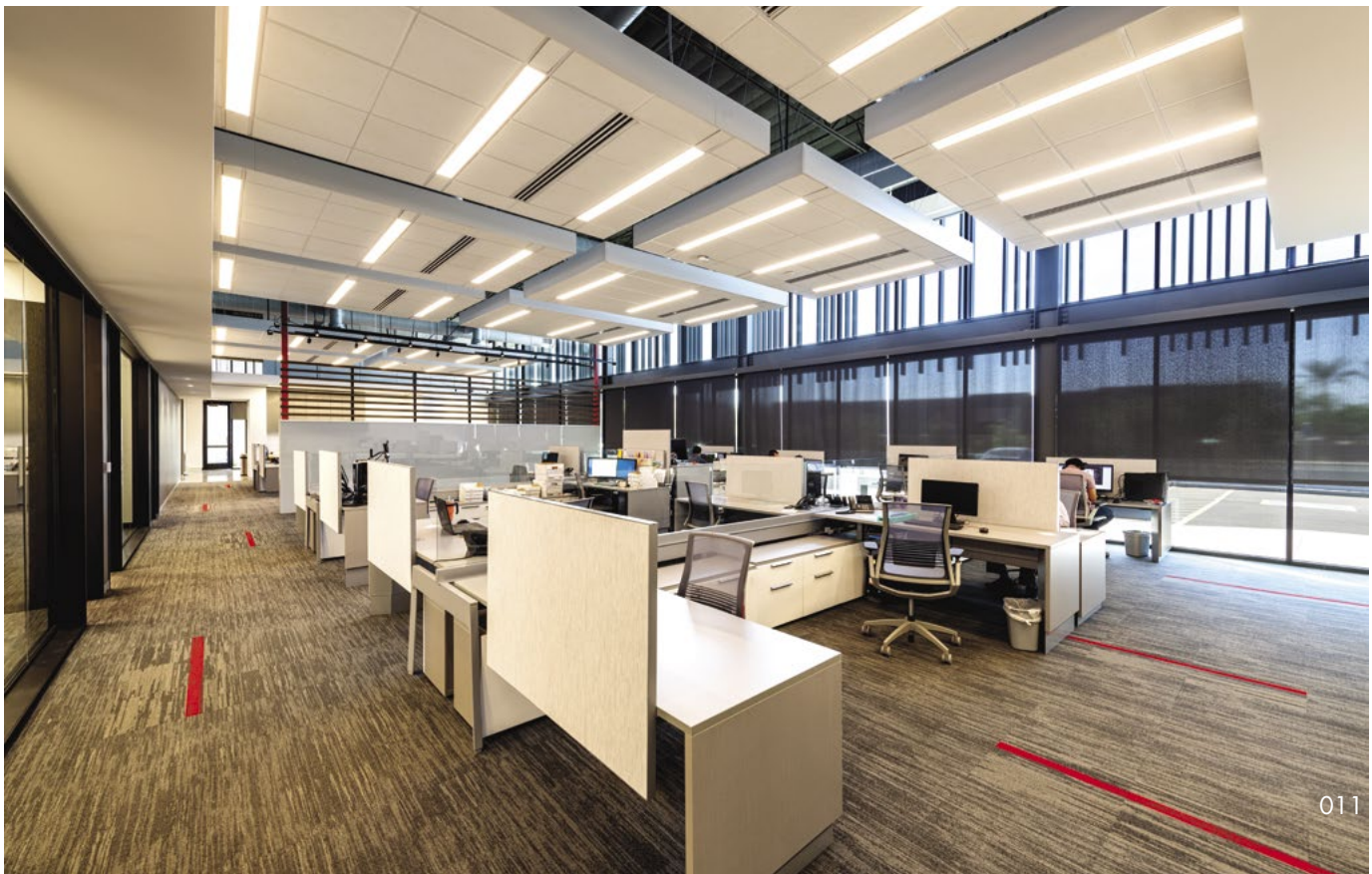
simultaneously. This has become even more important with the frequent use of virtual meetings. Conference rooms can be booked online, which is only one example of the advantages we experience from the group-wide rollout of a unified digital communications platform.

Both the production and office areas were built with future growth in mind. If we double our staff to 80 employees, there would still be enough room to make them all feel comfortable. We could even extend our workforce to 200 by introducing a three-shift rotation.

The interior of the building is an integral part of the corporate design of the LASER COMPONENTS group.

Boomtown Chandler

All this takes place in the buzzing atmosphere of one of the fastest growing cities in the U.S.: Chandler is the technology hub of not only the Phoenix area but the entire state of Arizona. It is already home to the largest employers in the state. There are high-tech companies galore and more on their way with leading companies relocating from California. The state of Arizona and the municipal government of Chandler are encouraging this development with a favorable tax system, a high concentration of skilled workforce, good schools, lots of residential development, and a strong industrial infrastructure. From the very first moment, city executives have been eager to make us feel welcome and fulfill all our needs. All things considered, this seems to be exactly the right time and place to turn a new page in the history of the LASER COMPONENTS Detector Group. We are looking forward to the challenges that come with new customer requirements. They give us a chance to grow and be part of an exciting future. ■



"The Laser Market Is in Constant Motion"

Optics Production: Technology and Know-how for the Customer

The rapid technical progress in laser technology is constantly opening the door for new areas of application. The demands on laser optics are correspondingly diverse. By consistently investing in personnel and technology, LASER COMPONENTS is able to remain on the cutting edge of development and fulfill even the most extraordinary customer requests. Where is this journey heading? We spoke on this topic with Barbara Herdt, head of the laser optics business unit, and Christian Grunert, head of production.

Photonics News: Mrs. Herdt, what do you see as the greatest challenge in the next five years?

Barbara Herdt: The technical possibilities made available by laser technology have evolved since we entered the optics manufacturing business. Today, we are dealing with an extremely wide range of laser types, each of which places highly specific demands on the optics. This range extends from petawatt lasers for research facilities to ultrashort pulse lasers in micromaterial processing to cw kilowatt lasers for cutting and welding in industry. In the first two cases, the main issue is the laser damage threshold, while the main challenge for cw optics is achieving the lowest possible absorption. In addition, the entire wavelength spectrum is now being used. Thanks to new technologies in microchip fabrication, the UV range especially has grown very strongly in recent years. We expect new developments in each of these segments. As a manufacturer of customized solutions, we must ensure that we have the skilled personnel, the production facilities, and the measurement capabilities to be able to respond quickly to new requirements with our usual high quality.

Photonics News: What role do your colleagues play when it comes to responding flexibly to these different customer requirements?

Barbara Herdt: You could say that they are our most important asset. Our sales team is not made up of classic sales representatives but rather – without exception – of highly qualified optics experts who can find the right solution even for unusual requirements. When our customers contact us, they know that there is an engineer at the other end who understands exactly what is important to them. At the same time, they know the technical capabilities of our manufacturing department and what we can do.

Christian Grunert: And in production, we know exactly what we need to do to turn the customer's specifications into a finished product. For example, we can reduce the absorption of the optics by using different polishing processes or making changes to the substrate material. Many of our colleagues working at the coating machines have been with the company for ten or more years and know their equipment inside out. These people often find creative solutions that allow us to expand the potential of the machines beyond their technical specifications.

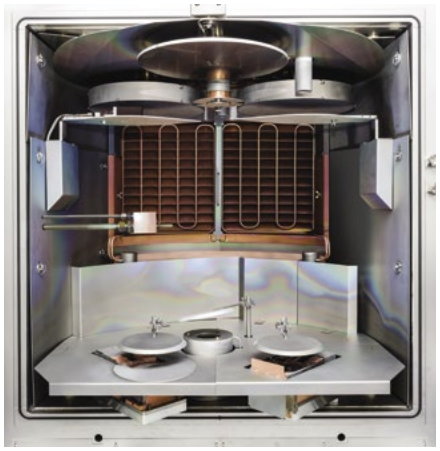
Photonics News: Is it possible for customers to only order a single optic with highly specific specifications?

Christian Grunert: That happens, of course. In fact, it is precisely for these orders that we decided years ago to also produce substrates in house. If necessary, we manufacture individual lenses, the imaging properties of which meet the customer's requirements.

Barbara Herdt: Of course, this is somewhat more expensive than mass-produced goods from the Far East. But we also deliver controlled quality. Anyone who installs our optics can be sure that there will not be any problems with them. Today's laser systems often consist of a dozen optics. When a problem occurs, you have to check each one of them to find the underlying cause. The bottom line is that this is more expensive than investing in good products from the start.

Photonics News: You have mentioned the high quality of optics several times. How can you ensure that you will fulfill this promise?

Christian Grunert: We have now accumulated an impressive array of measuring systems with which we can examine every conceivable parameter. Double checking certain performance data and having customers who place new requirements on the end product will expand our capabilities even further. Currently, our R&D team is working on further automating the damage threshold measuring station to be able to record this value even faster and more accurately. After all, a high laser damage threshold is becoming increasingly important, especially in the high-power range. In addition, we will soon have a cavity ring-down spectrometer at our disposal. This is a particularly sensitive measurement method that can also be used to measure reflection values above 99.95



percent for mirrors. Major industrial laser manufacturers now expect such values as a standard.

Photonics News: Does this diversity also apply in other areas of production?

Christian Grunert: Yes. For example, we can choose from three different coating processes. Each of them offers specific advantages. In addition to the classic e-beam process, in which the coating materials are evaporated in a high vacuum, we also have systems available that work with the ion-assisted IAD and PIAD methods. We have used these, for example, to produce mirrors with edge lengths of 300 mm × 200 mm and a particularly uniform coating thickness for a major project. We also use the IBS method, in which coating material is knocked out of a solid metallic or oxide "target" by an ion beam. This imparts enormous kinetic energy to the particles, resulting in extremely dense and homogeneous coatings.

Barbara Herdt: Especially with large optics, we will soon face challenges that we will no longer be able to map with IAD. That is why we have invested in a large IBS system, which is expected to be installed in the summer. This will enable us to produce complex large-area coatings and at the same time meet the increasing demand for IBS coatings in our usual high quality.

Photonics News: It sounds like you will have a lot on your plate for the next little while.

Barbara Herdt: Yes, that is most certainly true. But a rolling stone gathers no moss, so we are already looking forward to the new challenges presented by our customers. ■

Success through Intelligent, Practice-oriented Products

High Quality Standards in Laser Module Production

Mechanical engineering is one of the industries in which automation and digital transformation have a strong impact. Mechanical precision has long been combined with sophisticated data technology, and in many applications, today's machines are classified into the category of human-machine interaction. Some view them as mechatronic hybrid beings with their own senses and their own goal-oriented intelligence. The role of the eyes is played by digital image processing (machine vision), where structured laser beams scan surfaces and objects, a camera records the reflected light, and software uses the results to calculate how the machine should proceed. As application requirements become more complex, production becomes more demanding, especially using laser modules for machine vision. With miniaturization taking hold in this area, these small components should deliver the same performance as their larger predecessors. As in all production areas at LASER COMPONENTS, the same applies as the application determines the product specifications. LASER COMPONENTS and its subsidiary Blau Optoelektronik GmbH supply these custom MV solutions, as well as standardized laser modules.

Below is an overview from Jochen Maier, head of the optosystems business unit.

No Two Modules Are the Same

Regardless of the industry, we consider each laser module individually, based on the benefits to be achieved by the application. Our product engineers know which specifications will enable the customer to implement these ideas in the best way. Wavelength, beam profile, power, housing, connection, and power distribution are individually adapted to the requirements. We also develop customized solutions "from scratch", upon request. Our in-house development team brings physicists and engineers together from different disciplines, working together to combine products and processes. Their various specializations enable them to pursue unusual approaches and develop application-specific solutions.

Eye Safety for Medical Applications

In addition to industrial image processing, our FLEXPOINT modules are used in several medical systems, such as positioning lasers in magnetic resonance tomographs and other diagnostic procedures. To obtain the sharpest images, examinations are generally performed under low level anesthesia. This slows down the blink reflex, which the body uses to protect the eyes from strong light. Our modules must ensure laser class 1 eye safety. To guarantee reliable laser class categorization, each FLEXPOINT model is measured by us according to DIN EN 60825-1 and assigned the appropriate laser class. The measuring stations are certified at regular intervals by external experts. We take this very seriously, as we go the extra mile to ensure patient health and safety.

Successful Practice-Oriented Models

Success is a matter of intelligent, practice-oriented product development. This can be seen in the example of the ILM12F series, in which the housing is made of stainless steel and has an M12 thread. This allows the modules to be integrated quickly and easily into a wide variety of industrial positioning and alignment systems. This product series, which was expanded a few years ago to include a dustproof and waterproof ILM12IP model, has become a mainstay in our product line. With the global pressure to be innovative in the industry, these modules have become increasingly popular, especially in international business.

High Quality Standards

The highest quality standards do not just apply to eye safety. During production, beam quality, focus, and alignment are checked in each individual module, as the product is expected to meet the given specifications over a long period of time. The overall system, which consists of a diode, electronics, and housing, must have a correspondingly long service life. Selected FLEXPOINT models undergo an accelerated service life test during the development phase, performed in a climatic chamber, with the aging process simulated under various thermal conditions.

Launching an Offensive for Consistently High Quality

With such a diverse range of products that must meet the requirements of very different industries, uniform, cross-location, and quality assurance are important. LASER COMPONENTS and Blau Optoelektronik are pursuing this goal with a joint failure mode and effects analysis (FMEA) project. Systems analysis is the basis, with the manufacturing process put under a microscope. The assignment of process parameters and potential sources of error, initially make it possible to evaluate the process steps in terms of their points of weakness. Appropriate measures taken to eliminate these points. In this manner, we can ensure that every customer order is processed as quickly as possible, and the FLEXPOINT modules from both production sites always meet the highest quality standards. ■

Our Partner for High-Quality Laser Modules

BLAU OPTOELEKTRONIK

Blau Optoelektronik GmbH was founded in 1987 by Frank Blau. The company is located in Überlingen on Lake Constance and benefits from Blau's many years of experience as a developmental engineer for laser technology in the aerospace industry. Pioneering achievements in the development and manufacture of laser pointers laid the foundation at that time for today's dot, cross-hair, and line laser modules. Since that time, the product range has continuously expanded, initially to include triangulation-based laser distance meters and laser transmitting and receiving systems. Later, microcontroller systems were added. Since 2012, Dr. Ingmar Blau and Eugen Romasew have been at the helm of the company as managing directors. ■

Positioning aids in the heavy industry.

Performance-Optimized Laser Technology

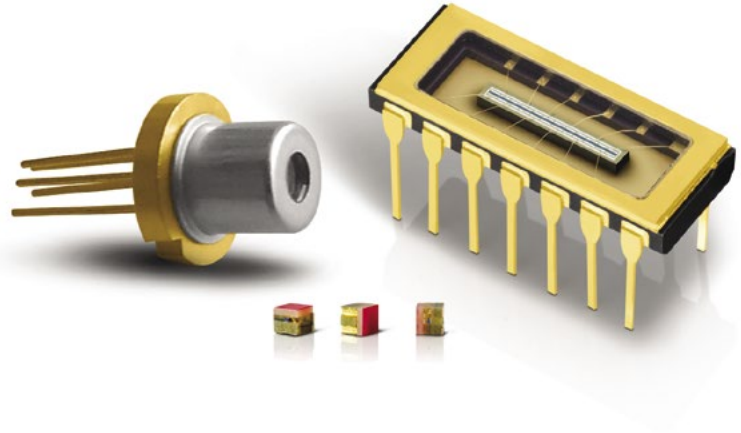
The Road to Next-Generation LiDAR Sensors

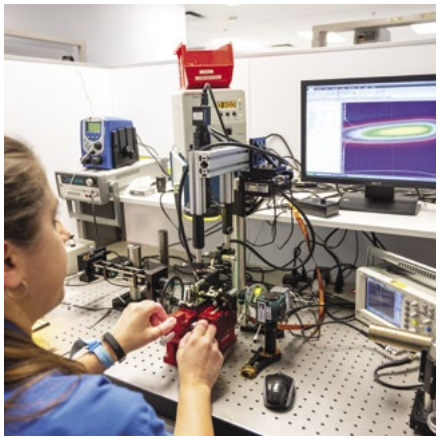
Our Canadian facility in Vaudreuil-Dorion near Montreal has been designing and building pulsed laser diodes (PLDs) since 2002. From humble beginnings in a dark, empty warehouse, LASER COMPONENTS Canada has turned into a leading supplier of PLDs with wavelengths of 850 nm, 905 nm, and 1550 nm. In a market that is mainly driven by demanding industries such as automotive and defense, the company has always been on the cutting edge in technological developments. General Manager Jeff Briton shares with us where PLD technology is heading.

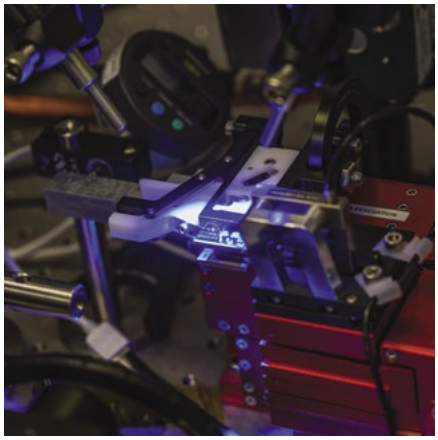
PLDs are mostly used in time-of-flight-based distance measurement, of which LiDAR is currently the most advanced field of application. The automotive industry is the primary driving force behind the development of this technology. This technology is already used in driver assistance systems such as autonomous emergency braking (AEB), but still has a long way to go.

The industry is well known for its challenging demands such as operability within a wide temperature range and resilience against all kinds of shocks and vibrations. In addition, automotive LiDAR must feature an exceptionally high resolution in future applications to detect and discern objects at greater distances and deliver a detailed 3D picture of any object within its range.

One evolving technology is flash LiDAR. It offers a wider field of view without the use of mechanical components to guide the beam, making it more robust and cost effective. The challenge here, is that it makes use of divergent laser emissions, which are considerably weaker than focused laser beams. Flash LiDAR not only depends on highly sensitive single-photon detectors, but also on powerful emitters that provide as much light as possible. LASER COMPONENTS is one of the few companies in the market that provides both emitters and detectors. Since the detectors are provided by the LASER COMPONENTS Detector Group in Arizona, we focus solely on the emitters.



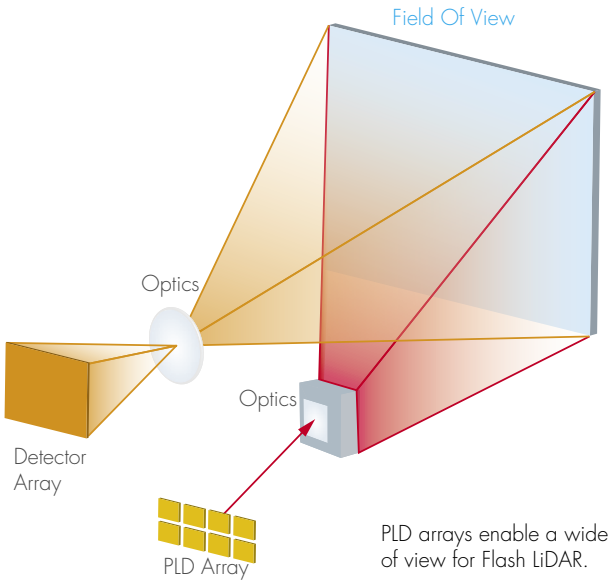




Short Pulse – High Resolution

To match the requirements of LiDAR and particularly that of flash LiDAR, our engineers and technicians follow two strategies. The most common one is achieving a higher resolution that keeps the pulse lengths of the emitting diode as short as possible. Higher pulse frequencies result in a higher density point cloud, delivering a more detailed image of the vehicle's surroundings in a shorter time. Thanks to elaborate drive electronics and a proprietary hybrid design, products such as our QuickSwitch PLD provide pulses between 2 ns and 3 ns at pulse frequencies of over 200 kHz. We are currently developing new QuickSwitch variations to extend our portfolio. There are many ways to condition the output of our PLDs including drive electronics, collimating optics, and the PLDs themselves. We are concentrating on collimating optics for integration into our current product portfolio, with further enhancements for other designs under investigation.

We are also extending our range of housing options. In addition to the common TO design, we offer several other housings and open carrier PLDs. These can be delivered with fast-axis collimator optics to reduce beam divergence and facilitate easier optical design within the application. Customers can pick the right configuration to meet their specific needs. In the case of distinctive demands, customers can count on our capable staff to come up with the right solution.



PLD arrays enable a wide field of view for Flash LiDAR.

All the Emitters in a Row

The second strategy is to arrange the emitters in arrays. The most common configurations are linear arrays with 4, 8, or 12 elements in a row. We are currently considering various packaging options including ceramic, metal, encapsulated, and open carrier PCB. To create these arrays, we use the trench isolation method in which the emitting elements are separated by "trenches." To achieve very high power, multiple emitters are combined electrically – either in series, (power output is produced all at once with two electrical connections) or in parallel, providing individually addressable emitters that can also be energized all at once using an appropriate multi-channel driver. Both designs have their limits to the physical spacing of the emitters which need to be considered in the customers' design.

We support this overall strategy by an extensive range of measurement capabilities. Even at short pulses of a few nanoseconds, we can determine whether our PLD meets the customer's power specifications. In addition to this, we also invested in lifetime-testing equipment to prove the automotive-grade quality of our components.

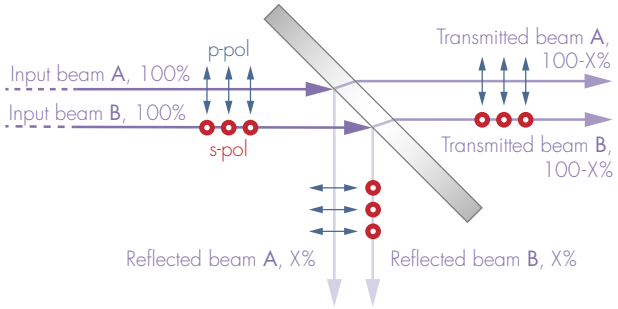
All in all, I would say that we are very well equipped to meet emerging market requirements. ■

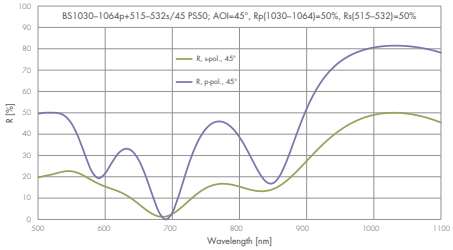
ONE Optic Instead of Two

50/50 Beam Splitter for Multiple Wavelengths with Different Polarizations

WEB US45-202

If you wanted to split two beams of a frequency-doubled laser at a 50:50 ratio, you used to need two optical components: a beam splitter and a polarizer. With our double beam splitter, we have combined both functions into one component, saving space in setup and time in servicing. With frequency doubling, the wavelength is divided in half and the polarization rotated, allowing green p-pole radiation to be generated from infrared s-pole. LASER COMPONENTS has developed a beam splitter in which a combined beam with the wavelengths 1030 nm and 515 nm





are split in such a way that 50 % of each of the beam components is reflected or transmitted, despite the different polarization of the two wavelengths. It is now possible to create individual adaptations of the reflection/transmission ratio according to your requirements, as well as changes to the polarization and wavelengths. Please inquire about this new product! ■

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Visible and Invisible Wavelengths from the Same Chip

Global Novelty: Switchable Light Source

WEB US45-117

LaserLight SMD (Surface Mount Device) W-IR is the world's first white light source that can be transformed into an IR emitter on demand. KYOCERA SLD Laser offers a high range, narrow beam angled white light source, with outstanding properties in luminous flux (450 lumens) and luminance (1000 Mcd/m²).

In IR operation, an output of 250 mW is achieved at wavelengths of 905 nm or 850 nm. Both emitters are housed on the same 7 mm x 7 mm chip. To facilitate PCB assembly, the chips are available on an optional starboard.

IR wavelengths are used primarily in professional security applications. In the future, the new video surveillance camera could automatically switch on the light as soon as any suspicious movement is detected. The light and motion sensor could be accommodated in the same device without complex cabling. ■

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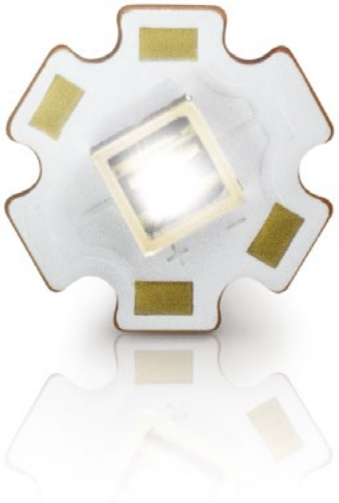
Brighter and Longer

SMD White Light Sources

WEB US45-404

White light sources from KYOCERA SLD Laser offer high luminance with low heat generation. The company has recently added two new features to its technology. The manufacturer has been able to extend the lifetime of its 500 lumen chips to 10,000 hours, which is good news for anyone planning to use them in industrial applications.



Additionally, white light sources with 1,000 lumens are now available in the same 7 x 7 SMD housing. This innovation is especially interesting where the light is fed into a fiber for transmission: The small spot of light and extremely high luminance allow the use of very thin fibers in medical endoscopy; longer transmission distances are possible in industrial endoscopes. ■

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More Safety for the Driving Force of the Future

Pyroelectric Detectors for the Detection of Hydrogen Flames

WEB US45-101

Flame detection is a crucial safety feature for hydrogen-powered cars of the future. This applies to burner control in the engine, and to open flames at hydrogen filling stations.

H_2 flames are invisible to the eye but can be detected by IR detectors (e.g., the L2200D1810-JH from LASER COMPONENTS).

With a newly developed IR filter combination, this pyroelectric detector measures the IR emissions of water molecules at 2.95 µm as produced during the combustion of hydrogen. This component is supplied as a dual-channel detector in a rugged TO-39 housing. ■

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Cost-Effective Positioning Lasers

Space Saving and Easy to Integrate

WEB US45-303

For positioning tasks in mechanical engineering, we offer compact and cost-effective cross-hair and line laser modules. At a length of 16.5 mm and a diameter of 9 mm, LC-LML-635-09 and LC-LMC-635-09 can be integrated in a way that saves space. They deliver a maximum laser power of 5 mW at a wavelength of 635 nm (red) and a fan angle of 60°.

The small cross-hair laser modules of the LC-LMC series are often used to display points of processing. When drilling or milling, the piercing points are marked before the tool touches the surface of the workpiece. Line lasers are used to align edges or show the cutting lines when sawing. ■

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High Quality Lens – Manufactured In-House

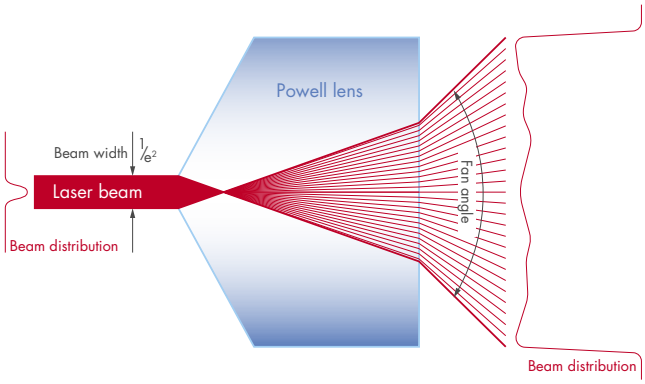
Powell Lenses for Line Lasers

WEB US45-505

Powell lenses guarantee a homogeneous intensity distribution along a line and used to form a perfect line profile from the light of a laser diode.

LASER COMPONENTS offers these components from its in-house production. Manufacturing in Germany guarantees availability with consistently high-quality.

Powell lenses are manufactured with substrate diameters of 6 mm and 9 mm. Customers can choose from different specifications that meet your needs. To produce as many line lengths as possible, choose from fan angles between 1° and 90°. The lenses can be adapted to different input beam diameters.



The optics are also used in our own FLEXPOINT laser modules. Lenses and complete line laser modules can be produced to meet customer specifications. Call on us anytime, no matter the quantity. ■

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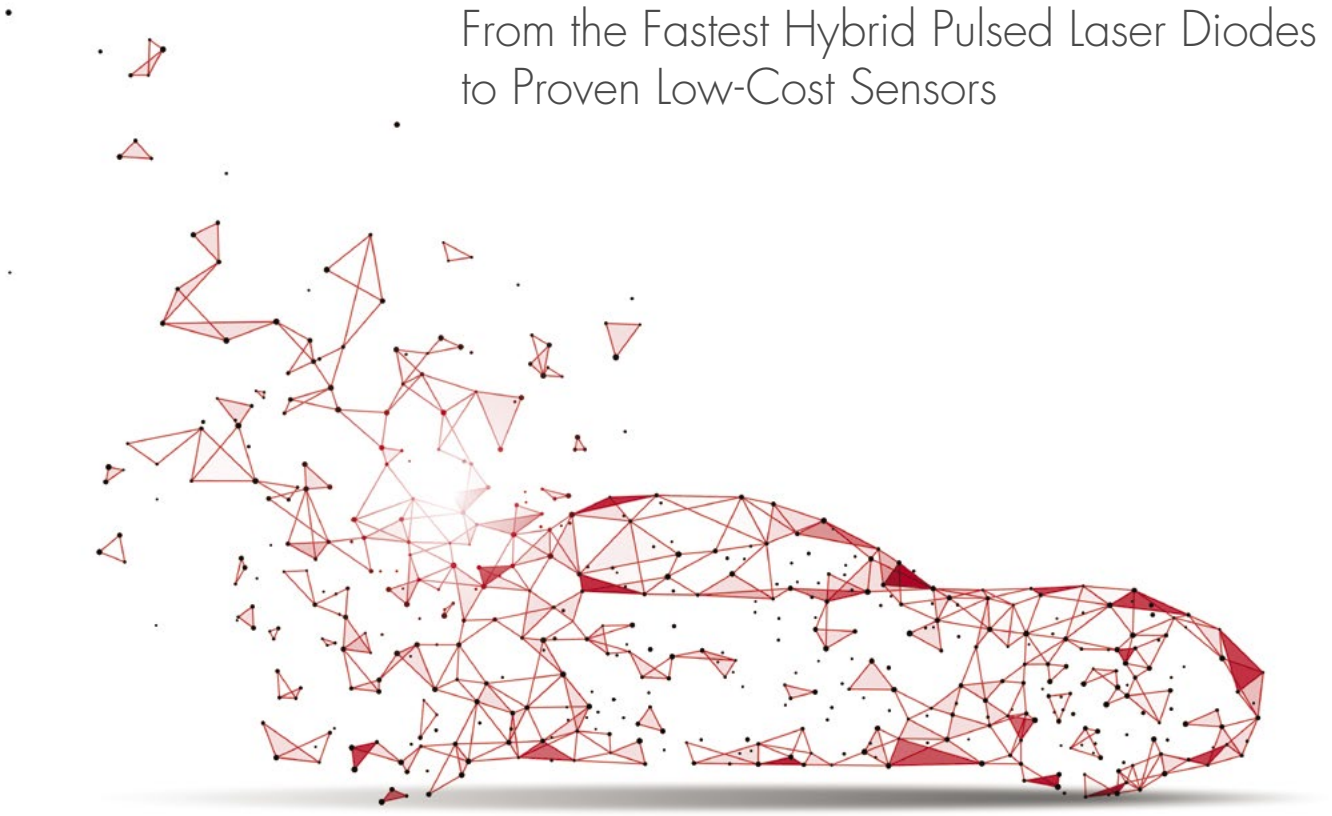
3D LiDAR

LASER COMPONENTS

We Manufacture Emitters and Detectors

From the Fastest Hybrid Pulsed Laser Diodes to Proven Low-Cost Sensors



www.laser-components.com

WEB US45-007

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