PHOTONICS NEWS

LASER COMPONENTS USA, Inc. Magazine #44 ▪ 01|21 laser-components.com

CLIMATE & ENVIRONMENT

The Winds of Climate Change

Ice and Laser Technology

Intelligent Wind Energy

Sustainable Cleaning

New Products

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Content

LASER COMPONENTS
www.laser-components.com

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LASER COMPONENTS USA, Inc.
116 South River Road, Building C
Bedford, NH 03110, USA
Phone: +1 603 821 7040
Fax: +1 603 821 7041
www.laser-components.com
info@laser-components.com

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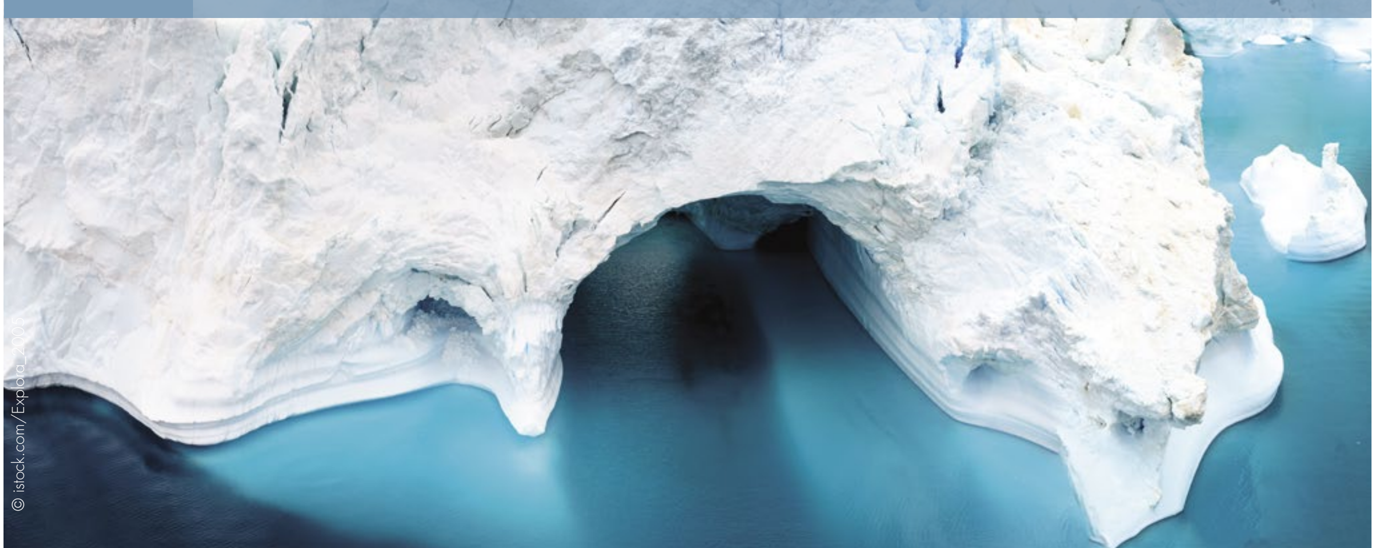


Dear readers,

After falling infection rates in summer, we are once again reminded of the "new" reality at the beginning of the winter season. The hope remains that the economy will be less affected than it was this spring. We have been following all the CDC guidelines have and optimized our office processes for working remotely, in the best and most feasible way.

At LASER COMPONENTS, it is important to us that we stick to our long-term goals despite the incalculable extent of the pandemic, and an end which that is still unknown. We are using this time wisely, as we keep up with product developments and technologies, and as always, dedicated to you, our valued customers.

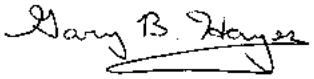
We recently opened a brand-new facility in Chandler, Arizona, which was ready for occupancy on schedule at the end of September, after less than twelve months of construction. The 3,000 square meter (29,000 sq. ft) building is used for the development and production of avalanche photodiodes and infrared detectors, the demand for which has multiplied in recent months. The state-of-the-art temperature and humidity-controlled cleanrooms of ISO7 class (10,000 US standard FED-STD-209E) contain airtight passages and an air shower. The new building provides space for 80 employees working in a single shift with up to 200 employees working three shifts. With more space, we have been able to double critical production equipment and expand our automated testing capacities.

In addition, investments have also been made at the production site in Germany. The facility has added another large ion beam sputtering coating system for producing high-quality laser optics. This will soon be put into operation, along with additional measuring stations, to determine absorption by means of cavity ring-down spectroscopy. Testing starts at 1064 nm; 532 and 355 nm testing is also possible. Using a set of reference mirrors, absorption values in the range of $R > 99.995\,\%$ can be measured at 1064 nm.

As of November 30, 2020, a completely revised concept for the measurement of single-photon counters is now available, allowing several fiber-coupled and free-beam modules to be measured and characterized simultaneously. We can now measure at 505 nm, in addition to 405 nm, 670 nm, and 804 nm, all of which are new. The beam paths are adjusted automatically, and the process flow from production to measurement has been optimized. The burn-in capacity for COUNT modules has been increased from 20 test stations to 80.

We will continue to keep you informed and updated about all updates as we move forward.

Sincerely,



Gary Hayes
CEO/General Manager, LASER COMPONENTS USA, Inc.

POLAR RESEARCH

The Perpetual in Perpetual Ice - What Does It Mean?

Perpetual Ice is found in places that have temperatures below -30 degrees and -10 degrees, and precipitation incurs in the form of hail. It is called perpetual ice, because their geological formation composed of ridges, soils, and plateaus, is permanently covered with ice in polar regions or high mountains. This is significant in relation to our planet's climate. Over the course of time, it has become increasingly clear that monumental changes in perpetual ice are taking place. The retreat of the sea ice is one of the top indicators of global climate change. In order to create meaningful climate models, scientists need reliable devices to measure data. Gathering much needed data in the hostile environment of the polar region, requires skilled researchers to find various solutions to this serious issue. Some researchers send recording devices each weighing several tons, into the depth of the Arctic Ocean. Others rely on a satellite that records the thickness of the ice layers thousands of meters above the earth. In both cases, optical technologies play an important role. ➔

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AlfredWegenerInstitut / Stefan Hendricks (CC BY 4.0)

Arctic Marine Monitoring

A Delicate Balance in the Global Ecosystem

There are many factors that affect the current changes in the global ecosystem in the Artic Ocean. Researchers from the Alfred Wegener Institute have been trying to find the underlying cause of this issue. The most daring action they have taken thus far is the MOSAiC expedition. The research vessel Polarstern has been frozen in the ice of the Arctic winter for one year, serving as a base station for a variety of experiments. In addition, scientists are using high-tech equipment elsewhere in their work to non-invasively observe the sea floor.

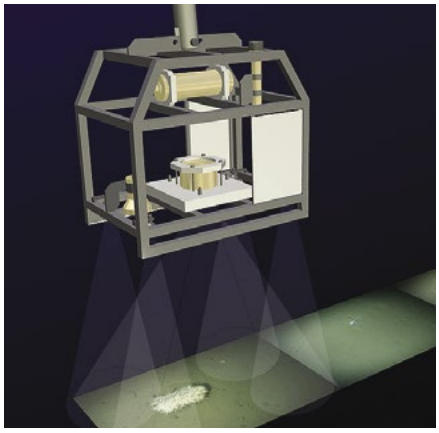
At its underwater observatory "Hausgarten," the Alfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research has been observing the water, fauna, and (micro)flora in the Fram Strait since 1999. Both the warm, saline West Spitsbergen Current and the cold, low-salt East Greenland Current flow through the 500 km wide strait. This makes it the Arctic Ocean's only deep-water connection to the system of the world's oceans, which is crucial for the exchange of oxygen and nutrients and an important variable in the global climate system.

Autonomous Measuring Stations

Hausgarten has twenty-one stations with free-fall devices that serve as observation platforms on the seabed, covering depths between 250 meters and 5500 meters.

OFOS (Ocean Floor Observation System) and OFOBS (Ocean Floor Observation and Bathymetry System) technology can withstand a pressure of 600 bars.

In addition to the physical properties of sea water (temperature, salt content, and nutrient content), researchers observe the Arctic microflora and fauna. During the ice-free summer months, they use additional equipment of a remote-controlled underwater vehicle that takes specific samples at regular intervals, with experiments carried out on site.



The ocean floor observation system OFOS takes pictures 1.5 meters above the sea floor.

© Alfred Wegener Institut

An autonomous mini submarine traverses all vertical water layers to record the course and interaction of biochemical processes. At depths of up to 3000 meters, it is also used for large-scale observations on the seabed.

Pictures from Depths of 5000 meters

The most important research equipment at Hausgarten includes camera systems towed by ships, such as the ocean floor observation system (OFOS) and the ocean floor observation and bathymetry system (OFOBS). High-resolution images of the sea floor are captured using a vertically-downward-aligned digital SLR camera, a video camera, spotlights, and flash lamps. The OFOBS is also equipped with a sonar system. All the components are housed in such a way that withstand the enormous pressure load at water depths of up to 6000 meters. OFOS and OFOBS are lowered on a steel cable to approx. 1.5 meters above the sea floor to not affect the structures being recorded. The cable accommodates fiber optic cables for data and video transmission, and a copper cable for the power supply. A research vessel pulls the structure weighing several tons through the area to be surveyed at 1 km/h. During this process, the video camera takes HD recordings of the seabed, while the single-frame camera provides a 23-megapixel snapshot every 30 seconds.

Lasers Used to Survey Deep-sea Objects

To use the data obtained from the cameras scientifically, the size of the surveyed objects is recorded. This is done with the help of three powerful FLEXPOINT dot laser modules. These modules are mounted in an equilateral triangle around a single image camera. Each of the three (3) modules is set at 50 cm, with visible red dots on each image. Scientists determine the number of pixels between the dots that estimate the actual size of the depicted objects.

> At 50 mW, the laser dots even outshine flash lamps.

The use of three lasers also make it possible to determine the size of an object on uneven ground, as the distances between the dots no longer form an exact equilateral triangle. A 635 nm wavelength was chosen, ensuring that the laser dots on the images are optimally visible. A 50 mW output also ensures no over-illumination, when using strong headlights and flash lamps.

Size Matters

There are several reasons why scientists want and need to determine the size of seafloor objects. These include looking at the size of a particular area that is more likely to contain young or adult fish and crabs. If distances can be measured, they can also determine the size of geological structures (black smokers, hydrothermal vents, mineral resources), etc. In addition, size determination also helps in assessing the amount of plastic waste deposited on the ocean floor, now a huge global environmental hazard. This has also become a concern with worrisome dimensions in the Fram Strait, in the deep-sea trenches off the Portuguese coast. ■

> Underwater recordings provide frightening insights into the pollution of the seas.

Dr. Autun Purser
Dr. Autun Purser is a scientist specializing in deep-sea ecology at the Alfred Wegener Institute in Bremerhaven. With the help of lasers, he was able to measure the deepest-existing octopod eggs ever observed as part of his current research.

Dipl.-Ing. (FH) Burkhard Sablotny
Burkhard Sablotny has been working in marine research since 1988 with a focus on deep-sea technology, twenty-four years of which he has spent at the Alfred Wegener Institute.

The Alfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research: **www.awi.de**

FLEXPOINT modules are now used in various underwater missions. Not only are dot lasers used, but MV modules for industrial image processing as well. Using remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs), they scan the sea floor and provide detailed 3D data on corals, shipwrecks, and offshore facilities. We offer modules with wavelengths between 405 nm and 905 nm for other applications. The output power can be customized from a few microwatts to 100 mW.

Mark Flahive: +1 603 821 7040
m.flahive@laser-components.com

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Triple-Wavelength Polarization

LiDAR Observations in Barbados During SALTRACE

Aerosol particles are a major component of the atmosphere, influencing weather and climate on our planet. Their impact on cloud formation, precipitation, and the radiation budget of the planet is the subject of current research. The IPCC report [IPCC, 2013] separates two pathways of interaction of aerosols with climate, the direct and indirect aerosol (e ect). Aerosol particles scatter and absorb incoming solar and outgoing terrestrial radiation (direct e_ect).

Polarizers and Meteorological Impact.

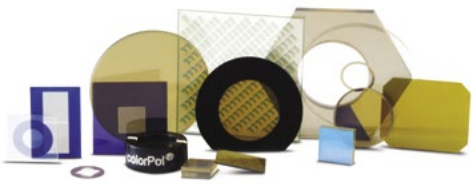
Aerosol particles are required in the cloud formation process by acting as cloud condensation nuclei (CCN). Their ability to partly serve as ice nucleating particles (INP) influences ice formation and precipitation and the hydrological cycle.

What does this mean and why is it important? Mineral dust and sea salt are the most abundant aerosol types (by mass) dominating the natural aerosol load on earth, and aerosol distribution is highly variable in time and space, both horizontally and vertically. The Sahara contributes 70% to the total global dust emission, as wind systems transport Saharan dust out of Africa, influencing weather, visibility, and air quality around the globe. Most of the dust moves toward North and South America, and the Caribbean. The Saharan dust measurements were performed in the framework of the Saharan Aerosol Long-Range Transport and Aerosol Cloud-Interaction Experiment (SALTRACE) during three campaigns in Barbados. The successful implementation of the depolarization-ratio measurement at 1064 nm and application during the three SALTRACE campaigns motivated the expansion of the wavelength range towards 1064 nm also in the case of particle extinction and lidar-ratio measurements. This development is an important contribution to the advance of aerosol lidar technology.

The Meteorological impact in Barbados is significant as it is the eastern-most island of the Caribbean, with its neighboring islands on the west and the Atlantic Ocean to the east. The climate in the eastern Caribbean is controlled by the trade winds, with principal wind directions from northeast, east and southeast. The patterns of air masses arriving at Barbados are related to the shift of the intertropical convergence zone (ITCZ). In summer months, the ITCZ is

Barbados: The Perfect Climate for Studying Wind.

shifted northwards, so that air masses arriving at Barbados originate primarily from North Africa. Being a more remote island, Barbados is ideal in studying these conditions. ■



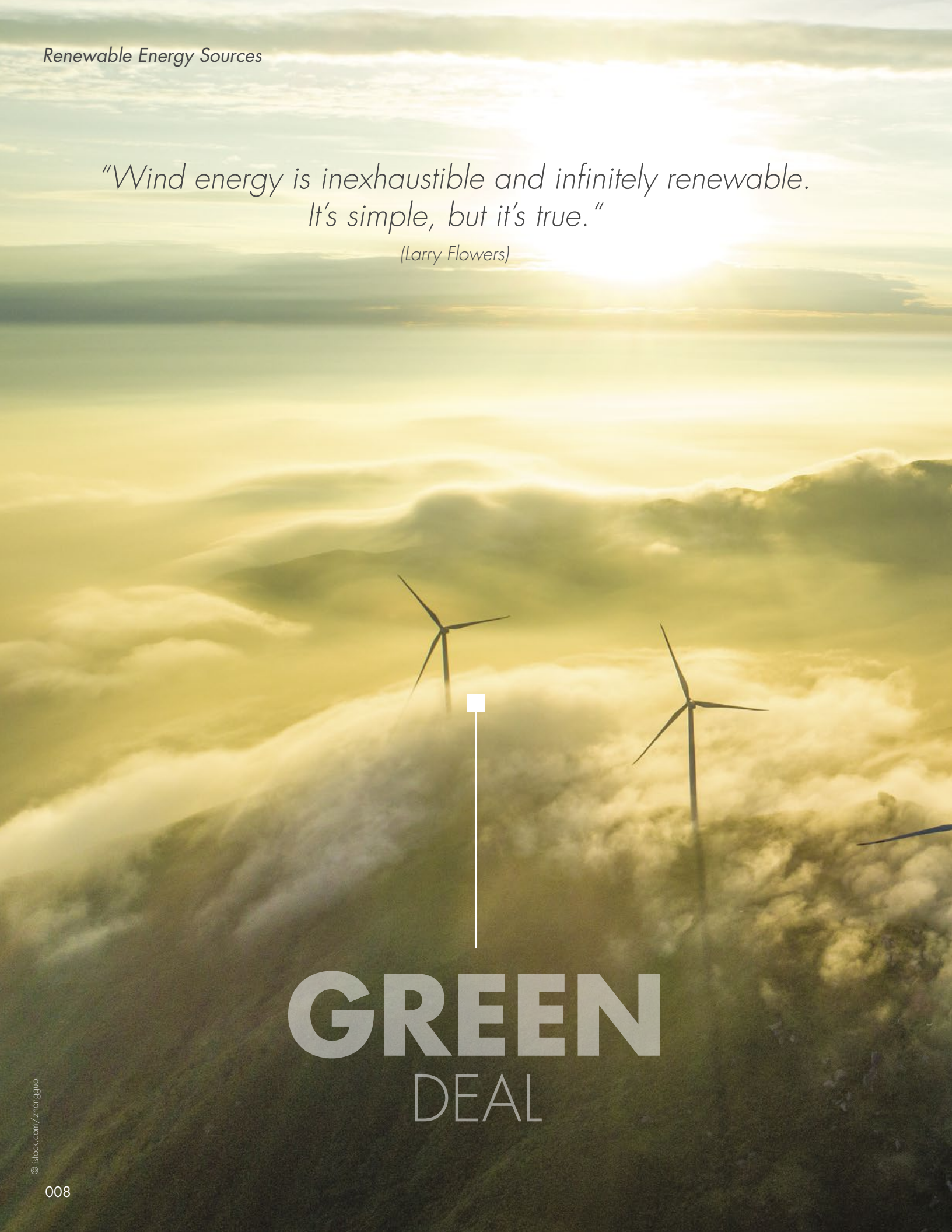
WEB US44-155

CODIXX Polarizers change your view of the world with reduced glare and enhanced colors. From the air in the skies above to under the sea, glare is removed, colors are more richly saturated and shiny spots are gone. Processed like glass or silicon wafers, they are durable, and highly effective. Achieves sharp contrast and high transmission for the UV, VIS, NIR, and Mid-IR ranges with a wide acceptance angle of ±20°

Sean Wilson: +1 603 821 7040
s.wilson@laser-components.com

"Wind energy is inexhaustible and infinitely renewable. It's simple, but it's true."

(Larry Flowers)



GREEN DEAL

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More Than Just the Air

Wind energy offers many advantages, which explains why it is one of the fastest-growing energy sources in the world. Research efforts are aimed at addressing the challenges to greater use of wind energy.

If the "New Green Deal" comes to fruition in the U.S., 600,000 more jobs in manufacturing, installation, maintenance, and supporting services by 2050 will be implemented. Not only through new wind farms, but through more efficient use of the existing infrastructure. Wind energy enables U.S. industry growth and U.S. competitiveness. New wind projects account for annual investments of over $10 billion (about $31 per person in the U.S.) in the U.S. economy. It is a clean fuel source that does not pollute the air, like power plants that rely on combustion of fossil fuels. Wind turbines do not produce atmospheric emissions that cause acid rain, smog, or greenhouse gases. Over the past 10 years, U.S. wind power capacity has grown 15% per year, and wind is now the largest source of renewable power. Read on to learn more about the benefits of wind power and some of the challenges it is working to overcome. ➔

From Where the Wind Blows

Fiber Technology: Making Intelligent Wind Turbines Possible

Every year, 25,000 new wind turbines are built worldwide, as the demand for this renewable energy source continues to increase. The answer from manufacturers and wind farm operators is the same in building larger and more powerful turbines. The control technology for limiting and optimizing output, however, has remained identical. At 170 m (about twice the height of the Statue of Liberty), the rotor diameters in offshore wind farms are now larger than some cathedral towers, and at the limit of what is technically feasible. On average, these huge wind turbines only achieve an efficiency of around 45 percent, and run at reduced capacity too often. When the wind load is too high, for example, it could damage he turbine. There are several companies that utilize both fiber optics measurement technology and AI (Artificial Intelligence) technology in their turbines, to increase efficiency.

Sensors in the Rotor Blade

The most important components in increasing the performance of a wind turbine in addition to the generator, are the rotor blades. Their direction of inflow, determines how efficiently the energy of the wind can be converted into electrical power. The wind direction and orientation (the pitch angle of the rotor blades) must be adjusted for the wind energy to be optimally used. Fiber-optic sensors inside the blades provide around-the-clock information about the physical properties of the rotor blade and the wind forces that strike it.

The Wavelength Displays the Force

For its measurements, some companies use industrialized edge filter systems in combination with fiber optic technology. When broadband light is fed into the fiber, a certain wavelength is reflected by the grating. The wavelength depends upon the effective refractive index of the fiber core and the grating constant. If one of these factors

Wind power plays a crucial role
in the expansion of renewable energy.

Fiber optic sensors in the rotor blades provide detailed measurement data around the clock.

changes due to external influences such as temperature fluctuations or expansion of the fiber, the wavelength also changes. This principle can be used in various sensors to measure the acceleration or elongation of the rotor blades, to deduce the shear and torsional forces acting on the turbine at a given point in time. With little cost and effort, these sensors can be installed in existing turbines. In contrast to conventional electrical sensors, these specific sensors are insensitive to electromagnetic fields. This makes it possible to use the sensors at crucial measuring points in rotor blades, despite the danger of lightning strikes. Fiber optics applications are more powerful than electrical sensor components that cannot cope with enormous dynamic loads.

Industry 4.0 funds can be used to make power generation more efficient.

Intelligent Control Technology

Real added value is only created from the data recorded by the sensors through complex algorithms. This digital technology transforms the wind turbine into an intelligent power generator based on the measured data. For this purpose, an industrial PC, called thin-edge client, is in each turbine. In terms of Industry 4.0, the individual computers are linked to each other via the industrial internet of things (IIoT). The wind farm operator always has an overview of the output and operating status of each individual turbine, while keeping an eye on the values of the entire wind farm. Collected data is continuously recorded and evaluated using artificial intelligence. The analysis software is increasingly capable of aligning the rotors of the individual wind turbines in such a way that the entire wind farm always delivers optimum performance. It is believed that this is the best way to significantly increase efficiency within the wind energy industry. ■

At LASER COMPONENTS you can select the right fiber optics supported application in sensors, lasers, and spectrometers. Customers with UV and femtosecond lasers can inscribe their own gratings.

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Mike Tuohy: +1 603 821 7040
m.tuohy@laser-components.com

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No Mess Cleaning: A New Way of Cleaning our Environment

After finding major pollutants in our environment from the 1970s and 1980s, strict international approval procedures and safety regulations were introduced in regulating harmful chemicals. The process was tedious, and in many cases, substances that were originally considered harmless turned out to be harmful years later. Thanks to alternative technologies, the use of certain chemicals in cleaning, is now considered essential. A prime example of cleaning of materials and components in industry is called laser ablation. This technique is a "green" alternative that works completely without chemicals. The process of clean lasers has already been honored for this development in cleaning technology. ➔

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CLEAN ME

Sustainable Laser Cleaning Without Toxic Chemicals

Clear Beam Profile Ensures the Highest Precision

Several steps in production in modern industry require clean and precise pre-treated materials. Examples of this are the surface condition of the embossing structure of printing rollers in the paper industry, and the degreasing and microstructuring of rotor shafts in electric mobility. The bonding of components to metal surfaces, requires the removal of the oxide layers in advance. Their surfaces must have the exact amount of roughness to achieve stable, reproducible, and process-reliable bonds of selected adhesives. It is precisely in this area that cleanLASER technology has made quantum leaps in quality. The laser can also be used in marking glass and removing coatings, to generate transmission points on windshields for GPS transmitters and radio reception.

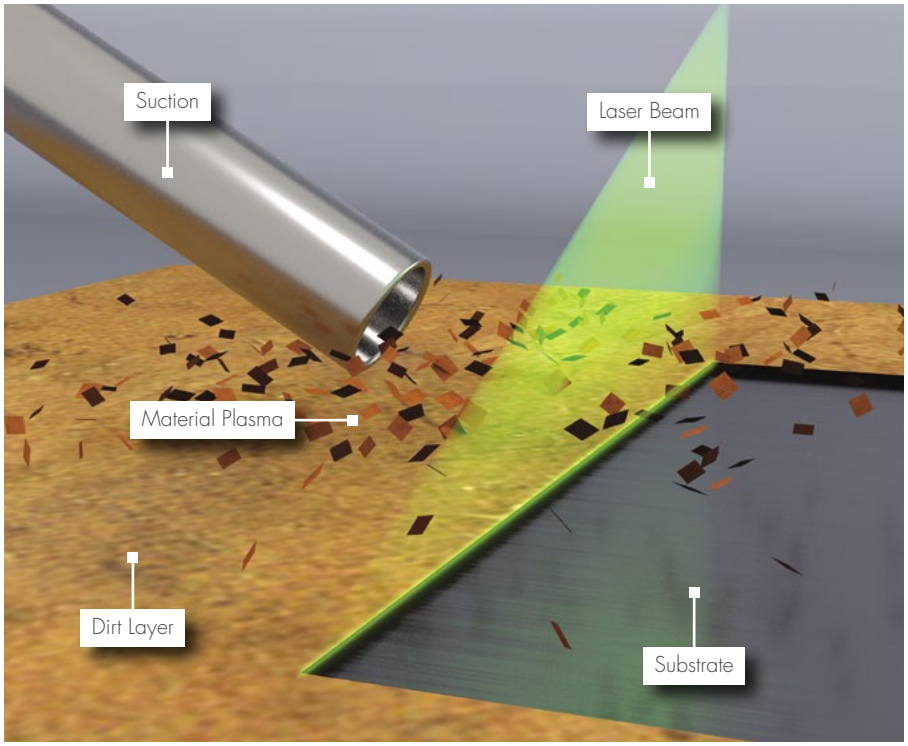
Lasers Clean "Gently" and Quietly

Coatings should be completely or partially removed from other parts. In the past, aggressive chemicals such as acids or alkalis were used, and handling of these hazardous substances required elaborate safety precautions, and the issue of proper disposal. Alternative methods such as particle blasting are associated with noise and dust generation. Conventional cleaning methods often attack the base material in addition to the undesirable coating. For many applications, laser cleaning is an attractive alternative: Precision, automation, and reproducible results guarantee the desired quality. There are also the environmental aspects to consider: Energy consumption of fewer kilowatt hours and cleaning media not required in making the laser process the most sustainable cleaning technology on the market.

The Cleaning Process: Layers as Thin as Possible

The cleaning process is based on the principle of laser ablation. This is achieved by strongly heating the material by a short laser pulse. Since heat conduction is a slow process, the thermal movement of the atoms remains concentrated at the focal point of the laser, leading to higher temperatures. As a result, the heated material layer is vaporized and extracted. If the laser beam reaches the basic substance (which is metal in industrial cleaning), it is reflected by the surface and remains undamaged. It is crucial that the wavelength, pulse duration, and shape of the laser beam precisely match the base material and the layer to be removed. A "sledge-hammer method" equally successful in

The debris is evaporated by the laser beam.



LASER COMPONENTS Fiber Optics: Our ready-to-use fiber assemblies are produced in house and available for quick delivery. We provide cables for use in data transmission, medical technology, and high-power transmission as well as fiber bundles for use in illumination or cold light sources. One particular highlight are our fibers with optical coatings. AR coatings are available for many different wavelength ranges.

Sean Wilson: +1 603 821 7040
s.wilson@laser-components.com

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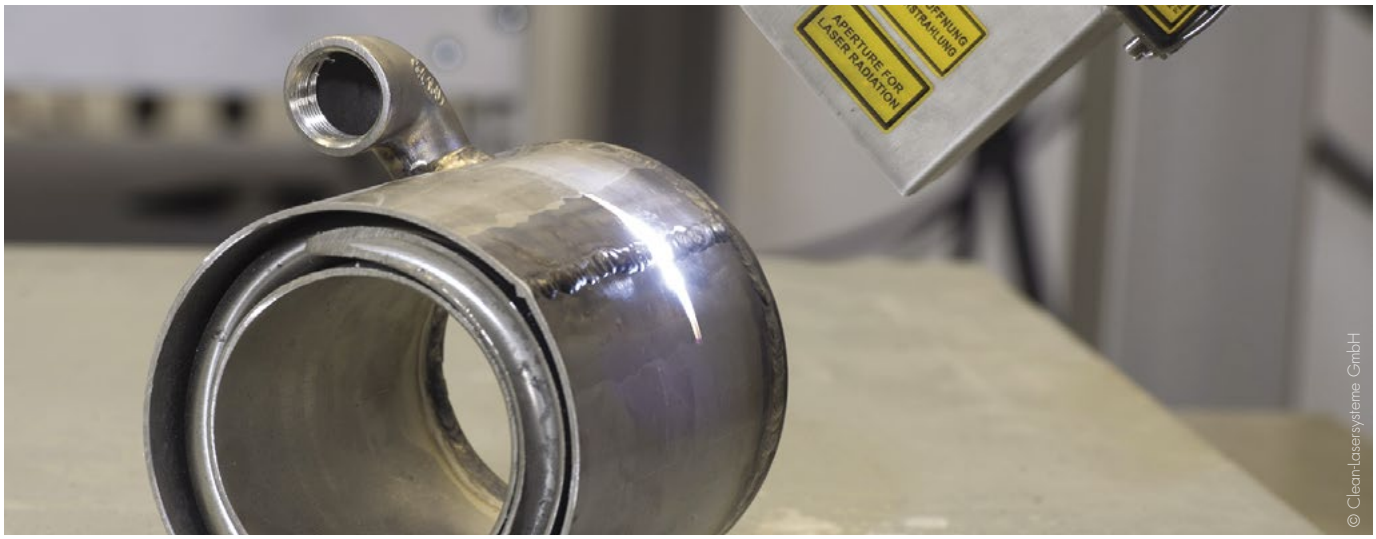
all applications, does not apply. In automobile production, laser cleaning has significant advantages in several different areas. These include the adhesive pretreatment of engine seals, structural parts, control units, and the welding and soldering pretreatment of gear wheels, aluminum bodies, and airbags. Paint must be removed from stabilizers and contact points for the ground wires on the body of the car. In other areas, Electromobility is added, especially in the manufacture and assembly of batteries.

Uniform Power Distribution

While most laser applications use a laser beam with a Gaussian intensity distribution, laser cleaning requires the homogeneous illumination of a comparatively large area under one millimeter. The laser power is distributed evenly across the material. A top hat profile is used. The beam coming out of the optics bundled like a top hat, and hits the material with a clearly defined edge, is optimal. This shape can be achieved with diffractive optical elements (DOEs), including glass carriers into which complex microstructures are etched. Targeted phase modulation in these microstructures generates the greatest intensity profile by interference in the working plane of the laser. ■

In car manufacturing, laser cleaning offers considerable advantages for more than 30 work stages.



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ENGINE, DRIVE, CHASSIS, BRAKES

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Components made of aluminum and magnesium can be pre-treated particularly well with the laser.

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Photonic Communications

Single Photons are Paving the Way for the Future

Many consider quantum computing the gateway to a new world of fast-thinking, intelligent computers. While classic computers process information as bits, quantum computing uses qubits. As a comparison, the classic bit is represented by a coin that can only show heads or tails, whereas qubits are more like a coin that spins as it is being tossed. In addition to the equal probability of ending up on either side, its other properties include spinning speed, the direction of the spin, the angle of the spinning axis, and so forth. All these properties may be used to carry data, but only for as long as the coin is spinning. As soon as it lands on the ground it will once again end up with one side up, and the exciting qubit turns into a boring old bit.[1]

Secure Data Transfer

While IBM, Google, and their respective research networks are working on augmenting quantum computing, others have set their eyes on another aspect of the quantum future of how it may affect cybersecurity and data encoding.

Quantum computing poses a potential threat in that it is capable of rapidly decoding existing encryption methods. One readily available solution is quantum key distribution (QKD). The first theoretical principles of quantum encryption were established as early as the 1980s. Most commonly, single photons are randomly put into distinct states of polarization that are transmitted from an information source (Alice) to a recipient (Bob), where they are re-transferred into digital information.[2]

SpooQy-1: Singapore's experimental quantum CubeSat for testing a source of entangled pairs of photons.

© Centre for Quantum Technologies, National University of Singapore

1 https://www.sciencealert.com/quantum-computers
2 https://en.wikipedia.org/wiki/Quantum_key_distribution

One of the most secure forms of establishing a trusted connection between Alice and Bob is the use of entanglement. There is a magical band between a pair of photons created as twins, causing one of them to behave exactly like the other, even if they are miles apart. Scientists call this "spooky action at a distance." One entangled photon is transmitted to Bob, while the other returns to Alice, and both data and code information can be transmitted at the same time.

Long-Distance Communication Challenges

Using modern fiber technology, QKD may be applied today, but only on a metropolitan level. Due to the optical attenuation of fibers, the signals can only be transmitted for a few hundred kilometers before they are degraded into indistinguishable blabber. In legacy technologies, optical or electronic repeaters are used to overcome these obstacles, however, on a quantum level these technologies are not likely to be available within the next few decades. Unlike radio transmissions, the free-air transmission of optical data relies on the "line of sight," which is the uninterrupted line between the sender and the recipient. Scientists are setting their minds beyond the confines of our planet. The attenuation of the atmosphere is far lower than that of an optical fiber. Effective communication is possible over significantly longer distances, given suitable sensitive single photon detectors. An entangled quantum code generated by a satellite in Earth's orbit could be transferred to both Alice and Bob if they are both within reach of the satellite.

In 2017, the Micius satellite of the Chinese Academy of Science was successfully used to transfer a traditional quantum code from China to Vienna, Austria. At the National University of Singapore, scientists are currently working on an entangled quantum encryption device that will fit into a nano-satellite cube of 11.35 cm × 10 cm × 10 cm. The aptly named SpooQySat, in operation since June 17, 2019, currently serves as a live demonstration of an entangled photon source in space.

Meanwhile, here on earth, the detectors on Bob's side must be able to filter out a single encoded photon from surrounding background noise. Scientists employ single photon avalanche diodes that absorb incoming photons and transfer them into electrical signals. Quality is defined by their quantum efficiency and the ability to block out background noise. ■

Every Photon Counts

Highly Sensitive Measurement Tools Help Gather Data in Fundamental Research

WEB US44-153

APD's (silicon avalanche photodiodes) are most effective in quantum information processing, with many experiments being conducted in a wavelength range of 810 nm. Under the brand name COUNT NIR, LASER COMPONENTS offers a plug-and-play module with a notable detection efficiency rates of 50% at 810 nm, 80% at 700 nm, and extremely low dark count rates of < 50 cps. This device is based on a single-photon avalanche photodiode (SPAD) designed in house, specifically designed in Geiger mode, detecting extremely weak light signals.

The all in one, COUNT NIR offers researchers a versatile set of features that combines high photon detection efficiency, high dynamic range, and ease of use for the most demanding photon counting applications. ■

Mark Mitchell: +1 603 821 7040
m.mitchell@laser-components.com

How Do You Eat an Elephant? The Answer Is the Same

When a company reaches a certain size, clear and standardized procedures are necessary to meet the needs of its quality expectations. This is especially important in an international company such as LASER COMPONENTS. Structures must be implemented and practiced across all language and cultural barriers. This is my job as chief quality officer, and as such asked the age-old question, "How do you eat and elephant"? The answer to is always the same "One bite at a time."

Orla/Shutterstock.com

There Is No Such Thing as No Structure

Structures do not emerge from nothing. In every company, structures are usually already in place when the quality manager starts his work. Some structures are clearly visible and recorded on an official organization chart. But there are hidden structures, ingrained working methods, and "unofficial channels" that have been established over the years. Both are equally important for my work. The first thing I need to do, is scan the existing structures to create a solid data foundation and then determine system interfaces. I then have a good understanding of the "maturity level" of various subject areas. Models such as the Excellence Model of the European Foundation for Quality Management (EFQM), its American counterpart, the Malcolm Baldrige National Quality Award, and the Capability Maturity Model (CMM) help me achieve this.

It Begins with an Audit

No matter which model is used, an audit is always the first step. The word alone can cause panic among many employees. "An audit is coming! What have I done wrong?," is generally the first thing that comes to employees' minds. The reality is not as bad as it seems. The Latin scholar knows that the word "audit" comes from "audire," which means "to hear." This is what every good quality manager does first. They listen to what is being told. The more I listens, the better I succeed in taking an inventory and understanding the structure. Various audits are performed depending upon the subject: A process audit scans the process chain with the customer in mind, while a 5S audit is about making the workplace and its environment safe, clean, and neat. The value stream analysis, commonly referred to as makigami (paper roll) in Japanese, examines the efficiency of individual processes.

Experience Is a Must

All the various models and procedures provide a rough framework for orientation, and determine which filters and comparison parameters are really needed. On one hand, there are clearly defined standards, laws, and specifications that can be evaluated objectively. However, the most important and dangerous criteria, are the personal experiences of the quality manager. We are always dealing with people, and experience is required in recognizing small details and correlations, but can be challenging as the QM is also human.

A crucial part of my work is to remain neutral in terms of value systems and impartiality. Preconceived notions and stereotypes can be very obstructive in structural analysis. The role of QM is one of a juggler and trainer: We work with people and therefore should contribute to the optimal utilization of everyone's potential and the creation of an effective relationship network. My job is to find the positive balance between valuing what has already been grown and then making it clear that growth cannot continue if everything stays the same. I must be aware that repeatable, measurable, and standardized processes (delivery engine) are just as important as innovations that originate from creative chaos (design engine).

The Wheels Must Turn

The seven most expensive words for a company are "We have always done it this way." This also applies to quality management. The wheels of improvement should never stop turning. It is important to use scanning tools regularly and make them a daily part of process management. This ensures that we get a little better every day. ■

Foto Weltkugel: © istock.com/lvcandy

Pius Perko, CQO

NEW PRODUCTS

Optimal Heat Dissipation

Precise Laser Alignment

WEB US44-374

We have now revised the mounts for our FLEXPOINT modules. This enables us to further improve precision while reducing product costs. In addition to two standard versions for diameters of 11.5 mm and 19 mm, the range includes a precision model for 19 mm modules. With three adjusting screws, the beam can be positioned along two axes at an accuracy of a few tenths of a millimeter.

The rotation can be adjusted precisely to the desired angle. All three mounts efficiently dissipate heat from the module's housing towards the base plate, and does not impair the beam properties when using powerful lasers. ■

Mark Flahive: +1 603 821 7040
m.flahive@laser-components.com

Good Things Come in Small Packages

Small Laser Module with Automatic Overload Protection

WEB US44-248

Presenting LC-LMD-515-07-01-TM-01, currently the smallest laser module, with a green dot of 515 nm. This small but mighty component, has a diameter of 3.3 mm and is 7.8 mm long, without pins. It can be integrated into the smallest of systems such as alignment, positioning, and measuring devices.

The proven automatic power control (APC) feature protects the module's electronics from overloading. High-quality glass lenses ensure optimum beam quality in this small form factor offering. ■

Mike Tuohy: +1 603 821 7040
m.tuohy@laser-components.com

FLEXPOINT MVpulse: Modules with Pulsed Continuous Wave Lasers

Laser Protection Class 2 and High Energy Output

WEB US44-274

In industrial image processing "more light" means faster shutter times and shorter process times, with the ability to capture more images evaluated per second. Most systems must meet laser class 2 requirements to protect employees' health. FLEXPOINT MVpulse line laser modules have combined both requirements. The continuous wave laser beam is pulsed by an integrated microcontroller in such a way that each pulse is up to five times stronger than in cw operation. Measured along a defined pulse sequence, the module meets the requirements of laser class 1 or 2.

An electronic system developed by LASER COMPONENTS, monitors the control signals of the application, allowing the light to always be available when needed for the application. At the same time, the energy and duration of the individual pulses can be adjusted in such a way that laser protection requirements are always be met.

The FLEXPOINT MVpulse is available for the wavelengths 640 nm, 660 nm, and 780 nm and delivers output powers of 10 mW to 100 mW at pulse lengths between 15 ms and 0.38 ms. ■

Mark Flahive: +1 603 821 7040
m.flahive@laser-components.com

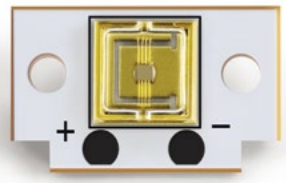
The Brightest of the Bunch

Powerful VCSEL Technology Used in LiDAR Applications

WEB US44-275

Leading market research institutes forecast rapid growth for the global VCSEL market until 2030.
LASER COMPONENTS VCSELs ranges between 200 mW and 50 W with NIR wavelengths between 850 nm and 940 nm. Upon customer request, laser diodes are also available as high-power arrays. These compact and multi-mode lasers are primarily required in LiDAR, where high power lasers are crucial for the range of a system.

Vertical-cavity surface-emitting lasers (VCSELs) are surface emitters in which the light is emitted perpendicular to the chip's surface, allowing the beam to be easily collimated. The extremely short rise times enable fast pulse sequences in the exceptionally low nanosecond ranges. There is change with temperatures of 0.07 nm/degrees. Within the semiconductor structure. This is far better than edge emitting diodes. In addition, a narrow-band bandpass filter can be integrated on the detector side. ■



Matt Robinson: +1 603 821 7040
m.robinson@laser-components.com

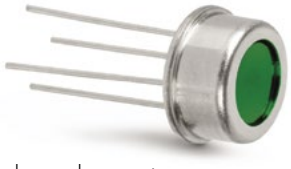
Temperature-stable Pyroelectric Detectors

High Detectivity at Low Modulation Frequencies

WEB US44-233

Fourier-transformed IR spectroscopy (FTIR) requires particularly sensitive detectors. At low to medium modulation frequencies, special pyroelectric LTO detectors are well suited for this purpose. LASER COMPONENTS' LT3111 series pyroelectric detectors offer high detectivity and a good signal-to-noise ratio at low modulation frequencies. At 10 Hz, specific detectivity is 4.0 E+09 Jones. The LT3111 detectors perform similarly to more expensive thermoelectrically cooled semiconductor detectors.

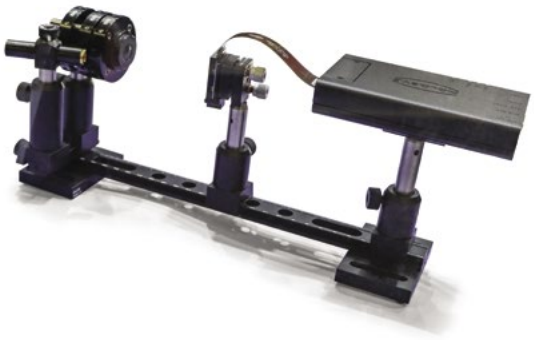
For pyroelectric detectors, the general rule is thinner chips supply higher detectivity. We use chips with a thickness of 7 µm. LTO chips are extremely robust and supply consistent temperature stability. While other detector types in industrial environments require a Peltier element, LTO technology works well at elevated temperatures without the need for added cooling. ■



Susan Wells: +1 603 821 7040
s.wells@laser-components.com

LUNA SLM Platforms for Small and Portable Solutions

Spatial Light Modulator Provides Compact Form Factor



WEB US44-280

The LUNA phase only Spatial Light Modulator (SLM) is a plug and play phase modulator. It contains a driver unit with standard digital video interface (DisplayPort) and a phase only LCOS (Liquid Crystal on Silicon) MicroDisplay with full HD resolution (1920x1080 pixel) and 4.5µm pixel pitch leading to an active area diagonal of 0.39" with an aspect ratio of 16:9.

This SLM platform saves board space, enabling the compact driver, making integration more convenient. The standard driver box has a size of only 84.4x47x28.8mm. The display can accept video data input via a 4-lane MIPI DSI, bringing this phase only Spatial Light Modulator technology to a new level of potential for industrial implementations. quipped with a driver unit with a USB interface, the LUNA can change the voltage vs. phase level distribution (gamma control) and dynamic range (voltage across the LC cell) in order to calibrate the SLM for different wavelength. ■

Sean Wilson: +1 603 821 7040
s.wilson@laser-components.com

IR Laser Diode ADL-85Y51TL

Small Package, Great Performance

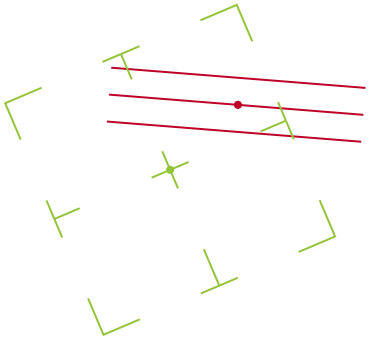
WEB US44-249

With an output of 250mW and a 5.6mm housing, the ADL-85Y51TL laser diode offers high laser power in a small package, at a very reasonable price point. The single-mode laser diode emits a continuous beam (cw) at an IR wavelength of 850nm. It is especially designed for applications in which the power distribution remains comparatively consistent across longer distances. This is ensured by a divergence angle of 8°x17°: small for a laser diode. The ADL-85Y51TL is ideal for use in several industries including laser distance measurement, sensor technology, and facial recognition. It also opens new fields of application in aesthetic medicine and photodynamic therapy. ■

Mike Tuohy: +1 603 821 7040
m.tuohy@laser-components.com

More than Twenty New Beam Patterns

New Solutions for More Accurate Imaging



WEB US44-277

For our FLEXPOINT modules you can now choose from an even larger variety of beam patterns. To better capture even complex shapes, we have expanded our product range to include more than twenty DOE pattern generators. This includes multiple lines with three or eighty-one lines. Among cross-hair lasers, the largest fan angle is now 75°; this allows a very large X to be generated even at short distances. The selection of "truly random patterns" for 3D stereo image processing alone has been expanded by four new versions. Several new options are also available for both infrared wavelengths and green and blue laser modules. All patterns can be integrated into our standard FLEXPOINT modules. ■

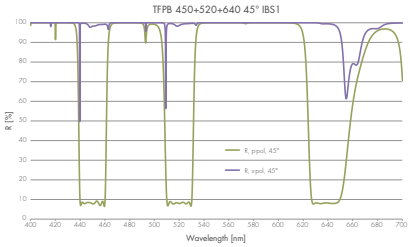
Mike Tuohy: +1 603 821 7040
m.tuohy@laser-components.com

Thin-Film Polarizers

Polarize Three Wavelengths Simultaneously

WEB US44-286

LASER COMPONENTS has developed a thin-film polarizer that simultaneously separates the polarizations of three wavelengths. Designed for an angle of incidence of 45°, the optics show high quality reflection properties for s-polarization in blue (450 nm), green (520 nm), and red (640 nm) light, while p-polarization is transmitted.



In optical systems, polarizers can be used to combine linearly polarized laser beams from several sources, even if they have the same or different wavelengths. Conversely, these types of optics make it possible to separate unpolarized light at three wavelengths into two polarizations simultaneously.

While the manufacture of thin-film polarizers is no longer an art, trichroid polarizers present a major challenge. The complex layer design is produced in our ion beam sputtering (IBS) facility, enabling compact layer structures, providing excellent reflection properties. ■

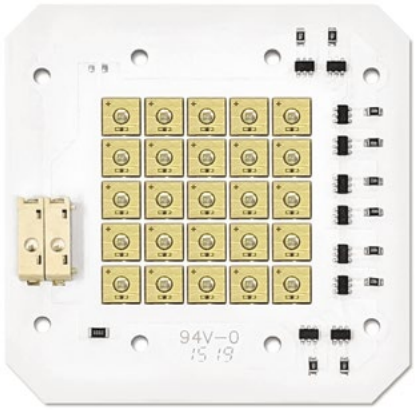
Mike Tuohy: +1 603 821 7040
m.tuohy@laser-components.com

Bolb Inc. Germicidal UVC Arrays

100 mW of Power

WEB US44-242

Bolb Inc. offers UV LEDs (Light Emitting Diodes) as single emitters and fully assembled arrays. The boards are easily installed and provide optical power of 100 mW for the LED. Both the S6060 and S3535 type of LEDs are available in arrays with 1x4, 1x12, and 5x5 diodes. UVC LEDs (typically 270 nm) are used in many different applications such as sterilizing and disinfecting air, water, and surfaces in industry and healthcare.



The device developers in these industries are specialists in their field, interested in providing a compact design with a quick application within their own devices, and UVC LED arrays offer this advantage. Their high performance allows significantly shorter treatment times, not found in individual LEDs. ■

Nicholas Connelly:
+1 603 821 7040
n.connelly@laser-components.com

Compact Laser Diode Drivers for LiDAR

High Power Nanosecond Pulses

WEB US44-255

PicoLAS has launched two powerful and compact electronic nanosecond devices for LiDAR applications: the LDP-AV 16N45-40 and LDP-AV 1N50-450 laser diode drivers.

The LDP-AV 16N45-40 driver was specially developed for multi-channel applications. A total of 640 A can be distributed across 16 separate channels. Each channel can be driven sequentially and independently, allowing an output current of up to 40 A per channel. The exact pulse duration is set by the manufacturer according to customer specifications.

The LDP-AV 1N50-450 is a nanosecond range driver, that can drive more than 650 W. To minimize inductance, the emitters can be mounted directly to the PCB. Thanks to their compact design, the electronics achieve a power density

of 1.71 W/mm² and enable output currents of up to 450 A at a fixed pulse duration of 5 ns, for example. ■

Paul Buettner: +1 603 821 7040
p.buettner@laser-components.com

LASER COMPONENTS USA, Inc.
116 South River Road, Building C
Bedford, NH 03110, USA

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Huyen Vu: +1 916 545 0923
h.vu@laser-components.com

* Maximum laser class 2 according to DIN EN 60825-1:2015-07

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