

ePulse: Laser Measurement News

The true measurement of laser performance



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September 2020

Welcome to **ePulse: Laser Measurement News**, a review of new developments in laser beam measurements, beam diagnostics, and beam profiling. Each issue contains industry news, product information, and technical tips to help you solve challenging laser measurement and spectral analysis requirements. Please forward to interested colleagues or have them [subscribe](#).

Features

Challenges and Opportunities of UV Disinfection

The COVID-19 pandemic has put a spotlight on disinfection technology. UV radiation is a promising approach to preventing airborne infections and infections caused by exposure to contaminated surfaces. It has long been known as an option to inactivate pathogenic microorganisms, especially for water disinfection. Today, it is increasingly used in surface disinfection applications, as well. However, a prudent approach, familiarity with the technology, and a clear understanding of 'what' and 'how to measure' are crucial for reliable results. [UV Disinfection](#).



Beam Attenuation: A Key to Successful Beam Profiling

By Dr. Derrick Peterman, Sales Director, Ophir

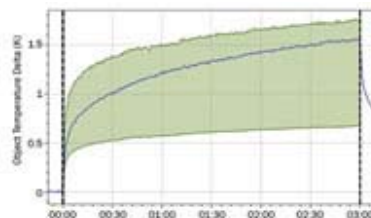
Sensors in most beam profiling instrumentation are very sensitive, saturating at power levels of ~ 1 micro Watt per cm^2 , much lower than the irradiance of even the lowest power lasers. Thus, beam profiling is a lot about carefully attenuating the power level so the beam can be analyzed. This is especially important when using high power lasers designed for cutting and welding metal. [Beam Attenuation](#).



Antireflection Coatings for High-Power Fiber Laser Optics

By Gheorghe Honciuc, Emiliano Ioffe, and Jurgen Kolbe, Ophir Optics Group

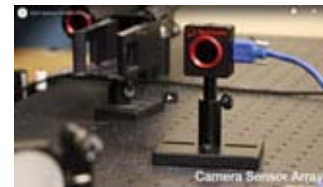
The nature of macro-materials processing applications, such as cutting and welding metal sheets, requires laser optics to perform properly at correspondingly high laser powers and power density levels. Minimizing losses due to absorption is of crucial importance to laser reliability and performance. As discussed in this



Videos of the Month

Ophir-Spiricon Product Tour

Here is a quick introduction to Ophir-Spiricon laser beam profiling products for additive manufacturing, high-power lasers using CCD cameras or non-contact measurement devices, BeamGage camera based profiling, no attenuation slit-based profilers, and the Pyrocam camera measuring 13nm to 3000 microns. [Video: Product Tour](#).



BeamTrack Sensor Measures Power, Energy, Size, and Position

Ophir's BeamTrack Sensor Series combines power and energy measurement, beam position, and beam size in a single compact device. See it in action. [Video: Beam Track](#).



Laser Puzzle

[Try your hand at this month's Laser Puzzle](#). This month we're tackling some challenging word play. Are you ready? Although the palindromic title is not truthful, it is worthy of note in that it is also an ambigram, i.e. it also reads the same when turned upside down.

All submissions will receive an 8GB USB pen drive. The grand prize winner will receive a 16GB iPad. E-mail answers to sales.ophir.usa@mksinst.com. Need a hint? E-mail john@enigmaturge.com.

[Here's the answer to last issue's](#)

Photonics Spectra article, achieving this requires a clearer understanding of the materials, coating technologies, and measurement techniques used for the manufacture of high-performance, low-absorption fiber laser optics. [Antireflection Coatings](#).

Applications

LiDAR: Why Measuring the Measurement System is Essential

By Dr. Simon Rankel and John McCauley, *Ophir*

While the benefits of LiDAR are indisputable and the applications are wide, the development of these systems is still improving in such areas as eye safety, power consumption, and system reliability. Knowing how the light source in these systems is behaving is critical to the success of the overall system. Measuring and understanding key LiDAR parameters such as average power or pulse energies, wavelengths, pulse duration, repetition rates, and beam divergence are critical to successful development of LiDAR systems. [LiDAR](#).

Webinars

Laser Degradation: There's No Way Around It, Here's How to Manage It

By John McCauley, *Business Development Manager, Ophir*

The natural degradation of the components that make up laser systems causes performance to change over time. Whether the laser is being used to map images in front of a vehicle, cut or weld metals, or neutralize an enemy drone, consistent laser performance is required to dependably and reliably produce a quality process that protects your assets. In this *Industrial Laser Solutions* webinar, we review key laser performance characteristics and how to measure them, how these measurements correlate to changes in laser processes, and three case studies that show how measuring and analyzing laser performance helped laser users troubleshoot common problems that arise during laser processes. Available on-demand. [Register here](#).

Principles of Laser Power/Energy Measurement

By Mark Slutzki, *Product Manager, Ophir*

Understanding laser behavior requires quantifying key laser characteristics. Regardless of how long you've been working with lasers, the subtle differences between the many measurement methods can be confounding. In this webinar, Mark Slutzki will define the various beam parameters and look at the technologies typically used for measuring each. You will see how these are implemented in various types of instruments and what type of equipment is best for what type of measurement. Hosted by *Photonics Spectra*. Available on-demand. [Register here](#).

Principles of Laser Beam Profiling

By Dr. Derrick Peterman, *Sales Director, Ophir*

While beam profiles often involve interesting pictures, it is not always clear how to extract useful results. This webinar will outline the standard techniques involved with beam profiling and the key practices that produce reliable beam profiling results. Dr. Peterman will discuss the data obtained from beam profiles and how it is used to make technical decisions. He will cover sensor arrays and scanning apertures, as well as how to attenuate the beam properly to obtain a reliable profile. Hosted by *Photonics Spectra*. Available on-demand. [Register here](#).

Laser Calibration

Power/Energy Meter Calibration Procedure and Traceability/Error Analysis

The total accuracy of measurement of a laser power/energy meter is affected by a number of factors. In this article, we focus on two: (1) The calibration uncertainty of the measuring sensor at the power level,

[puzzle](#). Congratulations to the winner of last issue's puzzle - **Yoel Sternberg, independent researcher**. "My interest in Ophir is two-fold. On the academic side, I like to stay on the cutting edge of optics technology, of which Ophir is an excellent example. In addition, I admire and am proud of Israeli achievements and Ophir is a company Israel can feel proud of."

Social Media: Blog

Ensuring Reproducible Laser Beam Parameters in 3D Printing and AM

Quality and reproducibility between one layer and another, or different lasers on the same system and even between systems, significantly depends on the laser beam parameters. Here are the laser malfunctions and degradation to look for. [Beam Parameters](#).

Can a Simple Sensor Replace a Laser Beam Profiler?

Sort of. It really depends on what you need to measure. If you need to measure beam position and size, the BeamTrack sensor may fit the bill. If you need beam profile measurement data beyond just position and size, then a beam profiling system is the way to go. [Beam Profiling](#).

Catalogs: Power Meters, Beam Profiling, IR Optics

[Download the 2020 Ophir Laser Measurement Catalogs today](#).

Includes tutorials and product specifications for power meters and beam profiling.

The [Ophir IR Optics Thermal Imaging Lenses Catalog 2020](#)

covers IR components and complex lens assemblies with fixed or motorized focus and zoom lenses.

MKS Newsletters

[TECHinnovations Newsletter](#) for the latest on vacuum, power solutions, gas delivery and analysis, plasma generation, and ozone solutions for semiconductor and advanced markets from MKS Instruments.

[Focus on Photonics Newsletter](#) for innovations in lasers, opto-mechanical components, vibration and motion control, and laser characterization from Newport Corp.

energy level, and wavelength at which it was calibrated, and (2) The energy calibration uncertainty, i.e. the extra error that is due to the extra calibration step necessary to calibrate energy. This is of concern only for thermal sensors, not for pyroelectric energy sensors. [Calibration](#).

Research News

Short-Pulsed 9.3 μm CO₂ Laser vs Fluoride Therapy

The objective of this randomized, single-blind, split-mouth controlled, clinical trial was to evaluate whether the use of a short-pulsed 9.3- μm CO₂ laser increases the caries resistance of occlusal pit and fissures in addition to fluoride therapy over 12 months. An Ophir Pyrocam III pyroelectrical camera and BeamGage software were used to measure the beam profile. An Ophir BeamTrack thermal sensor measured pulse energy. [Dental Clinical Trial](#).

Optical Steering of Electron Beam in Laser Plasma Accelerators

A dazzler system in combination with tilting a compressor grating were found to provide an effective way of using the laser group delay dispersion to continuously steer an electron beam accelerated by an asymmetric laser wakefield. The Gaussian spatial profile of the laser beam was captured by Ophir BeamGage imaging software. [Plasma Accelerators](#).

What's New

Wide Band Imager for Diverging and Large Beams

Ophir® Wide Beam Imager (WB-I) is a compact calibrated optical system for measuring the size and power distribution of large or divergent beams, including VCSELs, LEDs, and fiber lasers. The WB-I is capable of imaging any beam shape (round, line, or square) that is too large for a camera sensor. It features a 48mm diameter aperture and an angle of incidence of 70 degrees. Beams are captured on a translucent diffusive screen and re-imaged to produce a complete and accurate mapping of the light's intensity distribution. [Wide Beam Imager](#).



Laser Beam Profiler Finder

The Laser Beam Profiler Finder allows you to easily find the camera or slit-based beam profiler and accessories that best suit your application. Specify laser type, beam shape, and laser parameters. [Beam Profiler Finder](#).

Simulator for Centauri

Touchscreen Laser Power Meter

The Centauri Web simulator allows you to experience most of the extensive functionality of the Centauri touchscreen laser power meter, from multilingual interface to display types to math functions. Advanced measurement modes include pulsed power, low frequency power, fast power, and energy summing. [Centauri Simulator](#).



Corporate Social Responsibility Brochure

Relationships matter and at MKS Instruments we build ours on a solid foundation of integrity and trust. How we run our business, including our

Fast Ship Program

Ophir's [Fast Ship program](#) provides one-day shipment of the most popular power/energy, beam profiling, and M2 laser measurement equipment across the U.S.

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Corporate Social Responsibility (CSR) activities, is directly related to our core values and our stakeholder expectations. Our MKS CSR Management System helps guide how we deliver on our objectives in an ethical and sustainable way for our employees, customers, suppliers, and shareholders. [Corporate Social Responsibility](#).

FAQs

Beam Profiling

What is the difference between LBS-300HP-NIR and other beam splitters? [Read the FAQ](#).

Can I use LBS-300HP-NIR for both beam profiling and power measuring? [Read the FAQ](#).

Power Meters

Why does the chopper have a defined orientation, "This Side Toward Sensor"? [Read the FAQ](#).

I was logging data from a power measurement; there were some points when I increased the power of the laser beam, but in the logged data there was a time gap of a few seconds before the sensor responded. Why did this happen? [Read the FAQ](#).

About Ophir

Ophir is a brand within the MKS Instruments Light & Motion division. The Ophir product portfolio consists of laser and LED measurement products, including laser power and energy meters, laser beam profilers measuring femto-watt to hundred-kilowatt lasers, high-performance IR and visible optical elements, IR thermal imaging lenses and zoom lenses for defense and commercial applications, and OEM and replacement high-quality optics and sub-assemblies for CO₂ and high-power fiber laser material processing applications. Dedicated to continuous innovation in laser measurement, the product portfolio includes the **R&D 100** award-winning **BeamTrack** power/position/size meters and Spiricon **Ultracal™**, the baseline correction algorithm that helped establish the ISO 11146-3 standard for beam measurement accuracy. The company is **ISO/IEC 17025:2005** accredited for calibration of laser measurement instruments. The company's modular, customizable solutions serve semiconductor, industrial, life and health sciences, research, and defense industries throughout the world. An ISO 9001:2008 Registered Company.

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