ePulse: Laser Measurement News

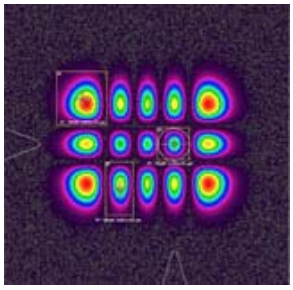
May 2018

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

Evaluating a Multimodal Beam

By Mark Szorik, Sr. Sales Territory Manager, Ophir Products



Initially, lasers generated a fundamental Gaussian mode - TEM00 or a close derivation of this. Shortly thereafter, researchers devised ways of generating and using more complex higher-order multimode formats, such as a TEM03 or TEM33. But because lasers are dynamic and in a constant state of flux, variations in modal distribution can and do occur. That raises the question, how can real-time qualitative and/or quantitative data about a beam or light source be collected, single or multimode? Measuring Multimodal Beams.

BeamWatch® AM™ Wins 2018 Innovators Award from *Laser Focus World*

Laser Focus World magazine has honored Ophir with the 2018 INNOVATORS AWARD, PLATINUM-LEVEL for BeamWatch® AM™, the industry's first laser beam monitoring system for additive manufacturing. In its first year, the Innovators Awards program celebrates the disparate and innovative technologies, products, and systems found in the photonics market. Only four companies were honored with the Platinum level award, including Ophir. 2018 Innovators Awards.

Applications

SLM Troubleshooting Made Easy with BeamWatch® AM

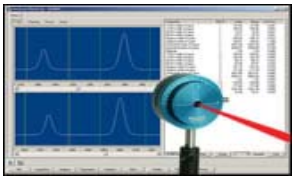
By Christian Dini, Director Global Business Development, Ophir

When we developed BeamWatch AM, we not only drew diagrams and thought about great features, we also talked to experienced manufacturers of selective laser melting (SLM) machines about issues they needed to address and parameters they were interested in. Bit by bit, we created a measuring device that is compact, fast, and delivers a precise view of the laser beam. During the final stage of development, the German Fraunhofer Research

Videos of the Month

Measure Beam Diameters as Small as 5 Microns

Scanning slit profilers can make highly accurate measurements of beam diameters as small as 5 microns, while cameras are limited to beams greater than 45 microns. As a result, applications for focusing lasers or building optical systems are far easier with a NanoScan. This video explains how to choose the right NanoScan for your application. NanoScan.



Low Power Measurements: Best Practices

Measuring very low power beams of light can be tricky; even small values of noise, drift or offset can have major impact on your readings. In this video, we'll look at some best practices that can help you get the best performance from your very low power measurements. Laser Power Measurements.

Laser Puzzle

Try your hand at this month's Laser Puzzle. All submissions will receive an 8GB USB pen drive. The grand prize winner will receive a 16GB iPad. E-mail answers to sales@us.ophiropt.com. Need a hint? E-mail john.mceldowney@us.ophiropt.com

Here's the answer to last issue's puzzle. The winner of last issue's puzzle is Stan Bystrak, Automation/Controls Engineer, Integer. "We have approximately 20+ laser power meters and sensors that we use to monitor our laser welding, etching and cutting process in our production." - Stan Bystrak.

Institution for Additive Manufacturing Technologies (IAPT), one of several beta sites, conducted a series of tests using BeamWatch AM with five different SLM machines. They were able to uncover detailed insights based on precise measurements and learn more about the everyday use of the measurement system. Selective Laser Melting.

Lasers Lead to New Medical Devices
Laser technology and leading-edge medical devices are deeply linked, both in manufacturing the devices and in the use of lasers in such devices. This technical digest from *Laser Focus World* presents approaches to laser fabrication of medical microsystems and stents, an improved hollow light-guiding fiber for laser surgery, and a review of laser measurement solutions for medical applications. Medical Devices.

Measuring SWIR Laser Source with High Sensitivity InGaAs Camera
An application at Ophir called for the beam analysis of a 1550 nm SWIR (Short Wave Infrared) laser source with a challenging optical arrangement. Signal loss occurred at each beam transfer across multiple reflective surfaces. A very sensitive camera with frame summing was required to bring out the full beam pattern, size, and depth. Beam Profiling with InGaAs Cameras.

Research News

Oversized Megawatt-Level Surface Wave Oscillator in Y-band
In this paper, the design and experimental results of a powerful compact oversized surface wave oscillator (SWO) in Y-band are presented. The cylindrical slow wave structure (SWS) with rectangular corrugations and large diameter about 6.8 times the radiation wavelength is proposed to support the surface wave interacting with annular relativistic electron beam. The power distribution pattern near the radiation horn by using the Pyrocam III camera, which has a frequency response from 0.1 to 28.3 THz and an imaging area of 12.4 mm x 12.4 mm. Surface Wave Oscillator.

Technical Tips

Automotive Parts Defects Detection Using Non-Contact Sensors
By Shmulik Barzilay, International Sales Manager, Optimet
The automotive world is one of the largest developing markets in the world. The industry embraces new technologies for both in-line and off-line quality control of production. Parts are scanned with a variety of metrology tools, different laser sensor technologies, and using CMM, all using robots that works 24/7. Let's look at the in-line defect detection task, where speed is an important issue but exact part measurement is not. Automotive Defects Detection.

Laser Beam Profiler Wizard
Find the beam profiler that best suits your application. Select wavelength, beam size, CW or pulsed, and special features needed. Laser Beam Profiler Wizard.

Webinars & Workshops

Best Practices: How to Achieve the Most Accurate Laser Energy Measurements
Measuring a pulsed laser is complex. Besides power, you also need to worry about pulse energy, frequency, and pulse width (duration). If you need to measure laser pulse energies - perhaps to monitor a process that uses them - you will most likely run into a variety of issues and challenges. In this *Photonics Spectra* webinar, Ophir's Mark Slutzki will cover Technical principles behind energy measurement, Best practices for making sure you are getting accurate readings, and how to avoid out-of-tolerance issues with your measuring tools. **Available On-Demand**. Accurate Laser Energy Measurements.

How to Avoid Choosing the Wrong Power/Energy Sensor
Sensors are critical for accurate laser measurement, yet are often

Social Media: Blog

The Only Handheld Ophir Meter that Measures Laser Exposure/Dosage
Often, when discussing laser measurements, we refer to the power or energy of the laser. Sometimes, though, we need to measure the total energy **exposure** - the total sum of the laser energy deposited over a set amount of time - such as in photolithography, medical lasers, and UV curing. Here's how. Laser Exposure/Dosage.

Catalogs: Power Meters & Beam Profiling

Download the new 2018 Ophir Laser Measurement Catalogs today. Tutorials and product specifications for Power Meters and Beam Profiling. Beam Profiling Magalog includes application notes, technology articles, and reference algorithms.

Trade Shows

International Engineering Fair 2018
May 22-25, 2018
Nitra, Slovakia

Optics & Photonics Days
May 28-30 2018
Jyvaskyla, Finland

Lasys
June 5-7, 2018
Stuttgart, Germany

Photonex London
June 14, 2018
London, UK

a.ivela
June 19-22, 2018
Ancona, Italy

Photonex Scotland
June 19, 2018
Edinburgh, Scotland

Photonics Event 2018
June 19, 2018
Enschede, Netherlands

OptecNet Jahrestagung
June 20-21, 2018
Berlin, Germany

Lees
June 24-29, 2018
Ancona, Italy

Laser Korea
June 26-28, 2018
Nano, Korea

Lane 2018
September 3-6, 2018
Furth, Germany

CIOE China
September 5-8, 2018
Shenzhen, China

Licht
September 9-12, 2018
Davos, Switzerland

selected based on the wrong criteria. Choosing solely on the measurable power range or aperture size is typical but insufficient. In this *Laser Focus World* webinar, Ophir's Dick Rieley focuses on key factors in the selection process, including beam diameter, beam density values, cooling requirements, and exposure duration. **Available On-Demand.** Avoid Choosing the Wrong Power/Energy Sensor.

Measurements for Laser Safety Workshop
This hands-on course will teach you how to perform laser safety measurements according to applicable laser safety standards. The focus is on workshop exercises designed to make maximum use of laser output measurement equipment in solving real-world laser measurement problems. Hosted by Rockwell Laser Industries and Underwriters Laboratories, featuring equipment from Ophir. Location: Raleigh-Durham, NC. Laser Safety Workshop.

What's New

Advanced "Do It All" Laser Power Meter
StarBright is Ophir's most versatile and advanced hand held laser power meter that can ''do it all.' It's advanced, yet provides an easy user experience. It was designed for a minimum number of key presses for each setting and, should you need it, each menu option within the meter has an explanatory info box. StarBright also offers a choice of four interface languages and advanced processing functions, including average, offset, density, scale factor, normalize, and more. StarBright.

2018 Ophir Optics Catalog
The new Ophir Optics catalog of commercial-off-the-shelf (COTS) high performance IR thermal imaging optics is now available. Featured products include infrared thermal imaging optics for MWIR and LWIR imaging, for cooled and uncooled IR cameras, and for motorized and zoom lenses. 1-FOV to multiple FOV, as well as extenders. Designed for surveillance, homeland security, commercial and defense applications. Download your copy today. 2018 Ophir Optics Catalog.

CCD Beam Profiling Camera
The SP928 beam profiling camera accurately captures and analyzes wavelengths from 190nm - 1100nm. It features a compact design, wide dynamic range, unparalleled signal to noise ratio, and built-in pre-triggering circuitry that makes it ideal for measuring CW and pulsed laser profiles. SP928 Beam Profiling Camera.

FAQs

Power Meters
What's better for monitoring the performance of a low-power pulsed laser - a power sensor or an energy sensor? Read the FAQ.

I've noticed that the specified response time for thermal sensors always mentions "0-95%." What's that about? Read the FAQ.

Beam Profiling
With regard to beam width accuracy, is blooming ever a problem? Read the FAQ.

Do beam profiling cameras need calibration? Read the FAQ.

IMTS
September 12-15, 2018
Chicago, IL

Frontiers in Optics
September 16-20, 2018
Washington, DC

TCT Show
September 25-27, 2018
Birmingham, UK

LpS 2018
September 25-27, 2018
Bregenz, Austria

Laser World of Photonics India
September 26-28, 2018
Bangalore, India

IEEE Photonics Conference
September 30-October 4, 2018
Reston, VA

Fast Ship Program

Ophir's Fast Ship program provides one-day shipment of the most popular power/energy, beam profiling, and M^2 laser measurement equipment across the U.S.

How to Get a 15% Discount

If you're an end user of our laser equipment, we'd like to know more about how you use it. Provide us with 500 words and a few images. In exchange, we will give you a 15% discount on your Ophir laser measurement equipment. Here's a sample application article to get you started. We'll showcase your application in our ePulse newsletter and you'll get recognition by the industry for your commitment to providing high quality laser services. And you'll get the discount! E-mail kevin.kirkham@us.ophiropt.com

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About Ophir

MKS Instruments, Inc. is a global provider of instruments, subsystems and process control solutions that measure, control, power, monitor, and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. With over 40 years of experience, the Ophir brand comprises a complete line of instrumentation, including power and energy meters and beam profilers. Dedicated to continuous innovation in laser measurement, the company holds

a number of patents, including the **R&D 100** award-winning **BeamTrack** power/position/size meters and Spiricon's **Ultracal™**, the baseline correction algorithm that helped establish the ISO 11146-3 standard for beam measurement accuracy. The Photon family of products includes **NanoScan** scanning-slit technology, which is capable of measuring beam size and position to sub-micron resolution. The company is **ISO/IEC 17025:2005** accredited for calibration of laser measurement instruments. The company's modular, customizable solutions serve manufacturing, medical, military, and research industries throughout the world. An ISO 9001:2008 Registered Company.

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