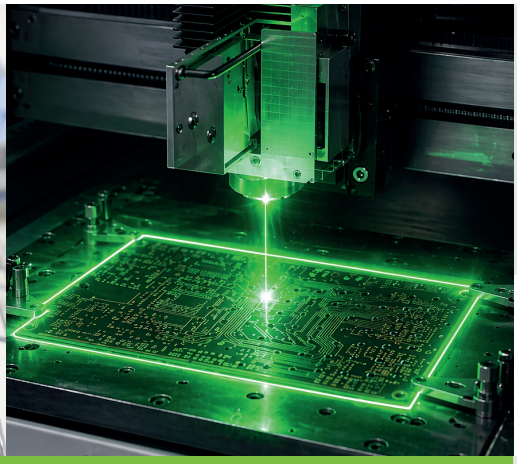
CASE STUDY

BEAM QUALITY SETS BLOOM LASERS APART FOR HIGH END LASER MICROPROCESSING

Seconds-fast beam measurement with Ophir BeamSquared device boosts laser manufacturing quality





BLOOM LASERS FOR INDUSTRY

As electronic devices shrink and computing power demands soar, chip designs must become even more compact. This requires lasers with tighter beam stability, higher pulse-to-pulse energy consistency, and nanometer-scale positioning accuracy. BLOOM LASERS designs and produces pulsed lasers offering exceptional beam quality with M^2 values below 1.2. To achieve those exceptional values and enhance the performance of their lasers, the French high-tech company relies on MKS technology: Within seconds the Ophir BeamSquared beam propagation analyzer delivers core measurement data including astigmatism, asymmetry, and M^2. Measurements are taken at each step throughout the development and manufacturing process ensuring the beam quality of the lasers. For continuous power measurement, two Ophir sensor discs are integrated into each laser system for remote diagnostics and maintenance.

Durable lasers made in Europe

High-power pulsed lasers are essential drivers of continued miniaturization and densification in the semiconductor industry. However, the requirements of those nanoscale applications are enormous. Lasers in critical micromachining environments need to deliver highly precise beams while being robust in 24/7 production lines. In addition, manufacturers expect uninterrupted operations for tens of thousands of operating hours. BLOOM LASERS was founded in 2021 to address these needs. The company, headquartered near Bordeaux, specializes in developing and manufacturing high-end pulsed lasers for micromachining. Mainly focusing on UV and green wavelengths, their lasers are used globally for high end applications such as drilling vias or cutting PCB, panel level advanced packaging (ablation, drilling, cutting) and wafer level processing (scribing, dicing).

Product:
- BeamSquared® SP204S CMOS M^2 Beam Propagation Analyzer
- OEM 20C-BB-PST-NC Disc

Field of application:
- Laser development and production

Uses:
- Beam quality check at each step of the production process
- Power sensor integrated in the laser for remote monitoring

Benefits:
- Quality-focused manufacturing: Short measurement time allows multiple measurements
- Simplified remote maintenance: Integrated sensor discs



Fig. 1: The option to use the measurement device (as seen in red on the bench or below) in an upright position is an advantage especially in the confined space of a clean room.

Ease of use and consistent measurements

With the ramp-up of production capacities at the modern manufacturing facility in Pessac, Cité de la Photonique, new measurement technology had to be acquired. From the very beginning, the experts at BLOOM had been using an Ophir M2-200s measurement device from MKS. Since the integrated lens of this meanwhile discontinued model could not capture laser beams with larger diameters, new M^2 measurement devices were needed for several production lines. The requirements were diverse: the device had to be capable of measuring M^2, astigmatism, and asymmetry. It also had to be suitable for various wavelengths as well as different pulse durations in the nanosecond and picosecond range.

The engineers selected three M^2 measurement devices, each of which underwent extensive testing. One product was ruled out because the measurement results were not plausible. Another was too slow and showed significant weaknesses in usability.

In contrast, the Ophir BeamSquared measurement device—the successor to the Ophir M2-200s—performed convincingly. Arnaud Guillossou, Development Engineer at BLOOM, explains: “The BeamSquared beam propagation analyzer is easy to use and delivers all relevant measurement data in just 20 seconds. To check UV laser beams, the BeamSquared set-up on the bench stays the same. We just swap to a UV lens, change the laser wavelength in the software and start measuring.”

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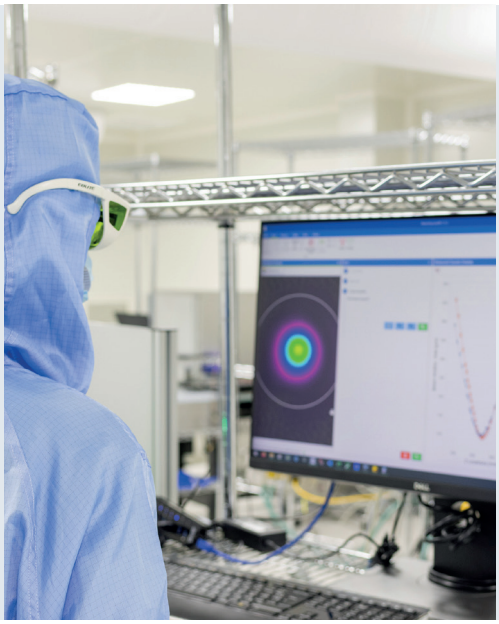




Fig. 2+3: Nearly every manufacturing step in building the laser is accompanied by measurements taken with the Ophir BeamSquared system.

Raising the quality bar even higher

Meanwhile, multiple Ophir BeamSquared analyzers are used at BLOOM. Besides the absolute measurement results of each individual instrument, the engineers tested the reproducibility of the devices. Arnaud Guillossou: “We want to ensure that all our lasers deliver the same high-quality beams. This is why we not only checked the repeatability of the measurements with a single device but also measured the beam of one laser with each of our BeamSquared units. The reproducibility across devices proved to be excellent.”

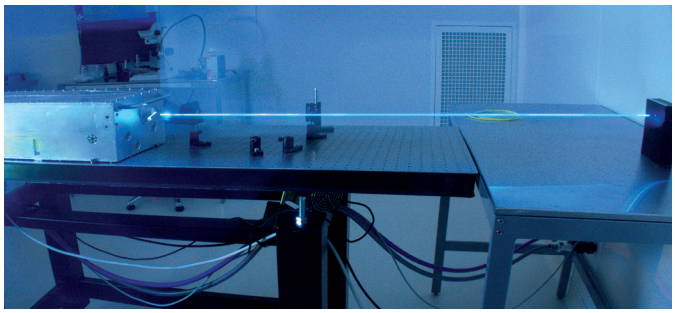


Fig. 4: A core differentiator of BLOOM industrial grade lasers is their exceptional beam quality.

Confident that the measurement devices deliver reliable and reproducible results, they are used extensively in production. Nearly every manufacturing step in building the laser is accompanied by measurements taken with the Ophir BeamSquared system. The engineers at BLOOM not only check the behavior of the beam at the focal point but also track the spatial shape of the beam along the caustic.

To optimize the process, the pass/fail indicator is frequently used at this stage. Along the production chain—from the assembly of the seed laser to amplification and beam shaping—numerous measurements are performed with the BeamSquared system. The customer also receives a detailed report containing extensive system data together with their new fiber laser.

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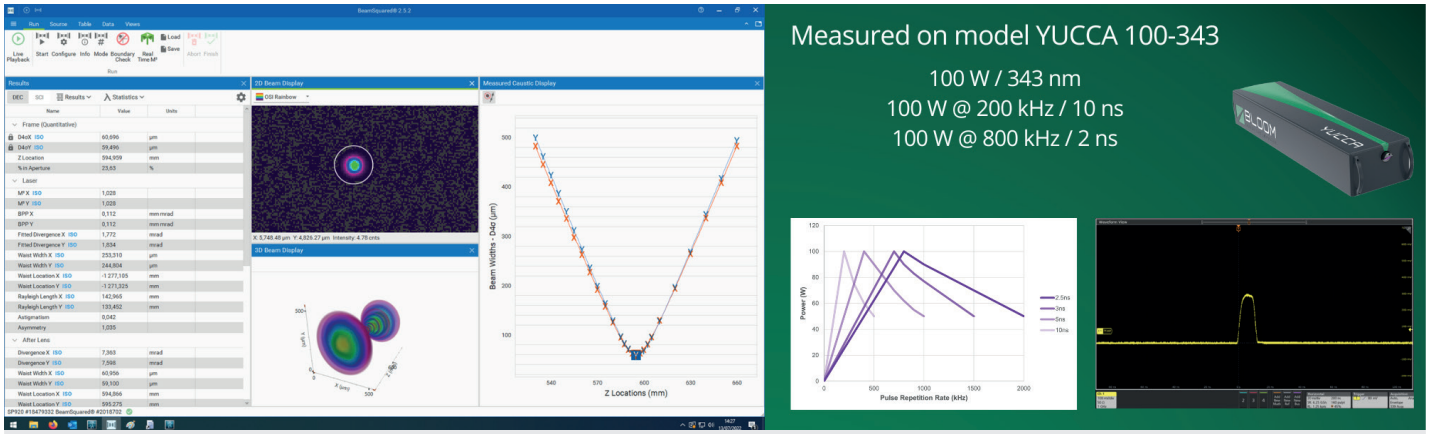


Fig. 5: Measurements taken with the MKS Ophir BeamSquared beam propagation analyzer prove the high quality of the Yucca 100-343 laser under test.

> “Our main strength is the reliability of our laser sources to satisfy a highly demanding industry, as of micro-electronic. This is why the Ophir BeamSquared device is core to our quality assurance program.”
>
> Julien Saby, CEO of BLOOM

Built to last

In addition to the extensive testing and quality control in laser production, BLOOM integrates a high number of sensors in each unit to enable remote monitoring and remote health status. Additionally, the customer gets the option to trigger an automatic loop to adjust the laser. In case additional remote support is needed, BLOOM engineers just ask for the relevant log files, remotely adjust the laser and close the track. Julien Saby, CEO of BLOOM, points out: “Our main strength is the reliability of our laser sources to satisfy a highly demanding industry, as of microelectronic. This is why the Ophir BeamSquared device is core to our quality assurance program. Plus our customers benefit from our easy-to-use graphical user interface to operate the laser combined with multiple ways to remotely assist them if needed.”

The close-meshed quality controls used in laser manufacturing, along with the sophisticated mechanisms for remote monitoring and maintenance, ensure the durability of BLOOM lasers. Precise and reproducible measurements of beam quality are essential for the company to meet the high demands of 24/7 operation, particularly in semiconductor manufacturing.

www.ophiropt.com

Casestudy_Bloom_05/26
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