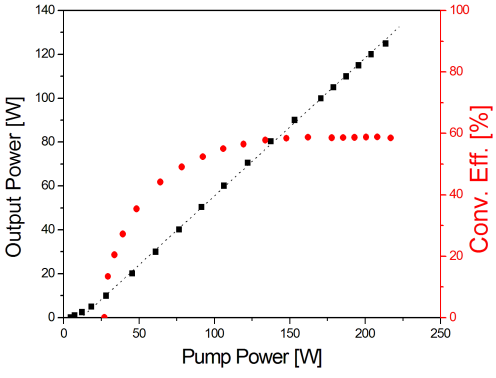
The source for compact high performance lasers

Innovative Laser Company with Cutting-Edge Technology

LASER APPLICATIONS

- SILICON WAFER MICROMACHINING
- DRILLING, CUTTING & SCRIBING OF SOLAR CELLS, FPDs & PCBs
- MANUFACTURING OF MEDICAL DEVICES
- LASER MARKING FOR PRODUCT ID AND TRACEABILITY
- LIDAR



Midaz Lasers is an innovative company with cutting-edge diode-pumped solid-state (DPSS) laser technology together with an expansive core of know-how and proprietary technology spanning laser science and Optics. Midaz offers a broad capability for addressing customer-driven technical solutions for today's laser markets. Founded as a start-up company out of Imperial College London in 2006, Midaz has established laboratory facilities for laser development, product assembly and testing.

Our unique laser amplifier technology is underpinned by our understanding and capability in laser design and thermal management for effective scaling to high powers. Our proprietary nonlinear optical technology enables efficient laser solutions requiring frequency conversion, particularly into the visible and UV. The potential of this technology is very far-reaching for improved solutions to a large number of market sectors (e.g. industrial, medical, remote-sensing and military). In addition to our standard product range, we have taken our technology platform and have packaged a number of additional engineered demonstration units targeted at showing cutting-edge specifications with innovative product development. We expect these to form future company products and welcome customer interactions as to how they can address solutions for them.

Extreme Solid-State Laser Technology

Micro-Slab design "bounces" into life!

One of the cornerstones of Midaz laser capabilities is a unique diode -pumped "Micro-Slab" Laser technology. We developed the micro-slab technology over several years prior to company start-up [1, 2] and as a company we have collaborated with customers on engineering solutions.

Our Micro-Slab crystal design provides dramatic advantages in laser performance compared to the more traditional rod-based amplifier geometries. The three independent dimensions of the slab geometry allows simple and robust delivery of high power diode pumping to one rectangular side face – a process that is well-matched to the emission shape of high power diode bars. The result is high output laser powers with high spatial quality at incredibly high wall-plug efficiency. The small dimensions of the micro-slab lead to ultra-compact and highly robust operation.

[1] A. Minassian, B. Thompson and M. J. Damzen, "Ultrahigh-efficiency TEM_{00} diode-side-pumped Nd:YVO_4 laser", Appl. Phys. B 76, 341 (2003)

[2] A. Minassian, B. Thompson and M. J. Damzen, "High-power TEM_{00} grazing-incidence Nd:YVO_4 oscillators in single and multiple bounce configurations", Opt. Commun., 245, 295 (2005)

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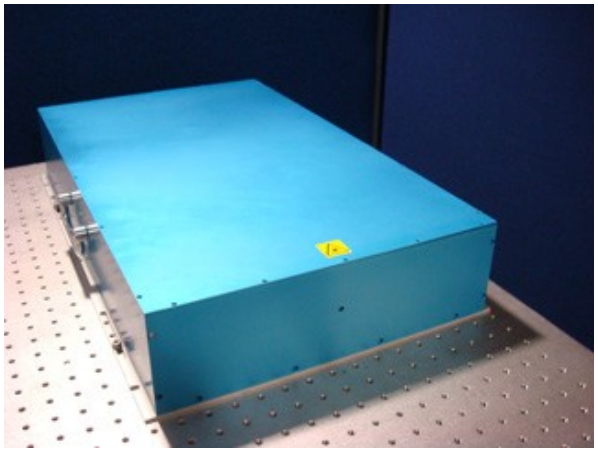
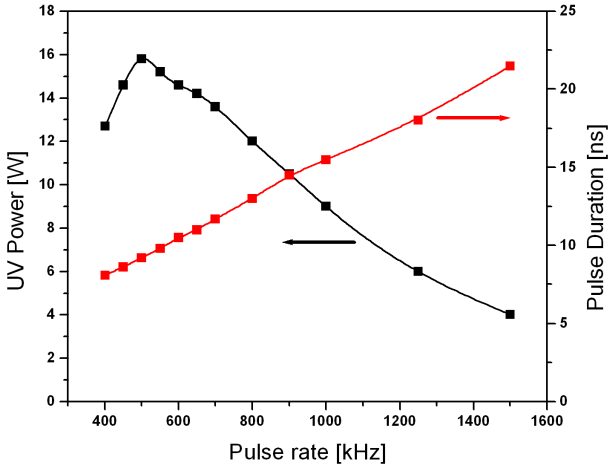
Extreme Performance in the UV (355nm)



Our capability in high pulse rate UV lasers was driven by customer needs for improving precision micromachining performance. A key limit to speed of processing in these applications is the limited pulse rate of current laser tools. The Midaz UV Mega-Pulse technology demonstrates extreme performance which exceeds current laser sources.

The high pulse rate of the Mega-Pulse is accomplished at very high UV powers >10W (up to 15W at 500 kHz) as required for high speed processing. That's impressive since it is hard to achieve the conversions to UV at these high pulse rates. What is more, the high UV power, which is accomplished by our propriety technology in pulsing and frequency conversion, also leads to the shortest pulses (~ 10ns) and highest pulse stability even at these extreme pulse rates. And this can all be done at the highest spatial TEM_{00} beam quality, with $M^2 < 1.3$ or better.

If UV is not required our Mega-Pulse capability can be used at other wavelengths. For example we have demonstrated performance up to 50W average power in the green (532 nm) with pulse rates to beyond 1 MHz and all the advantages of short, stable pulsing as before.



Technology Pipeline – the future is bright

Innovative New Power Scaling Technology:

The Problem with high power lasers: Solid-state lasers are limited in power by the detrimental heating effects of the intensive laser pumping degrading laser performance, particularly to spatial beam quality but also efficiency and stability. Fibre lasers have there own limitations due to peak power damage of fibre core and facet, and the onset of undesirable features due to optical nonlinearities. Semiconductor lasers must use large emitter sizes at power above a few hundred milliWatts and become highly multimode in spatial form.

A New Solution. We have an innovative new platform that is under development to break through those limitations. The approach we take is to combine together a number of laser modules and produce a single output. Our approach is a coherent combination, in which all the combined lasers have precisely the same frequency. It has advantages over incoherent designs, and especially so in applications requiring a single frequency output. In coherent combination, all beams being combined must be spatially and spectrally matched and maintain a precise absolute phase relationship. We have a new solution to solve this problem. It is based on using adaptive laser modules that can automatically self-adjust their spatial, spectral and relative phases for constructive combination into a single beam. We call our technique "Adaptive Beam Combining" (ABC) which we have pioneered over many years. A bonus of this adaptive approach is that the self-combination also establishes a laser system that is insensitive to vibration and misalignment. This technology is covered by Midaz-filed patent applications.

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