LS-Precess

Controlling conicity

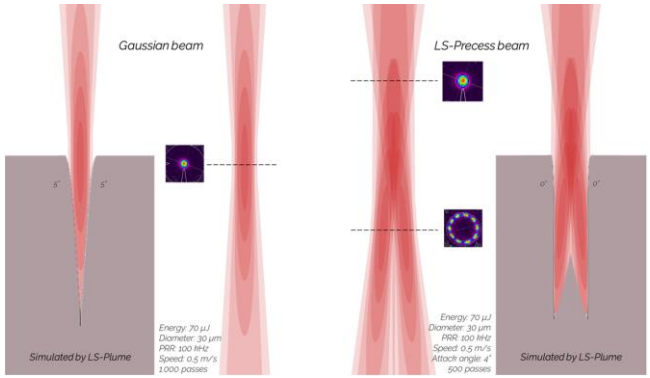
Ultrashort laser processes always lead to the formation of a conical trench. This conicity, of a few degrees, cannot be suppressed with a gaussian beam, even at high energy.

The LS-Precess applies a special movement to the beam, at high speed. At the focal plane, this engineered beam, hitting the surface with various attack angles, is able to crop both sidewalls of the trench.

The LS-Precess is well suited for drilling and cutting with a gas nozzle and stage movements, but it also allows the use of **scanning heads**, with the same ease-of-use as conventional scanner processes. There is no new software to master, nor complex helical trajectories to program. The LS-Precess can be seen as a tunable beam shaping system, with simple settings and unchanged during the process.

LASEA's **patented technology** is the only one compatible with the use of scanners and F-Theta objectives, allowing processing **fields up to 25 x 25 mm** without taper.
It is also the only one compatible with a polarization splitter, allowing splitting the beam after the LS-Precess, down to as many scanners as needed for parallel processing.

Directly connected to a computer through an ethernet interface, the LS-Precess can be driven by ASCII commands or by our software KYLA™, a full **micromachining software** able to communicate with the scanner, several stages, cameras, and lasers.



Key features

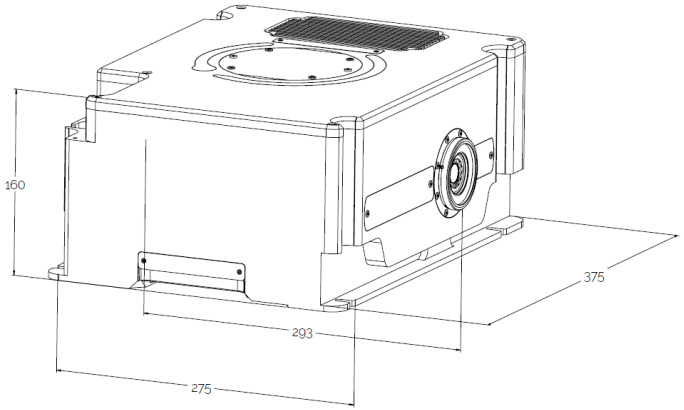
- Dual wavelength 515 + 1.030 nm
- High speed rotation of the attack angle
- By-pass function
- Easy to use
- 30 µm min kerf size

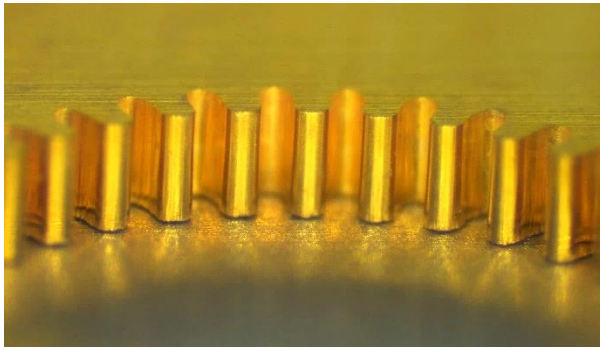
Specifications	LS-Precess
Maximum input beam diameter	6 mm for precession mode 12 mm for by-pass mode
Input aperture	22 mm
Wavelength	Dual wavelength 515 +/- 5 nm & 1.030 +/- 10 nm (343 +/- 3 nm upon request)
Max input peak energy density	40 µJ/mm² @ 300 fs – 1.030 nm* 20 µJ/mm² @ 300 fs – 515 nm*
Max input peak power density	8 W/mm² @ 300 fs – 1.030 nm* 4 W/mm² @ 300 fs – 515 nm*
Max input power	100 W
Input polarization	Linear laser polarization required
Transmission	80 % in precession mode 90 % in by-pass mode
Maximum rotation speed	30.000 rpm (500 Hz)
Output aperture	22 mm
Size	375 x 293 x 160 mm
Power supply	24 V – 2 A (5 A peak)
Interfacing	Ethernet

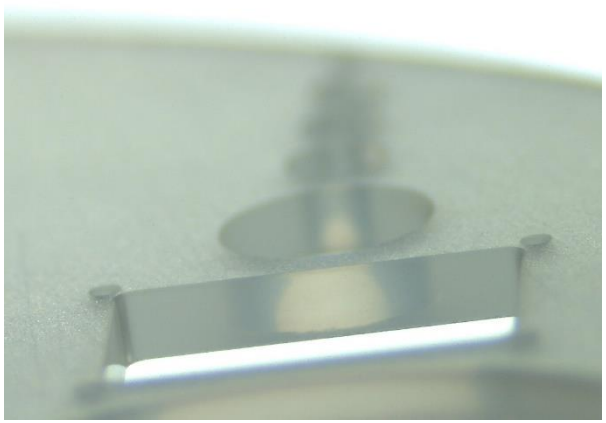
**: Due to fused silica, at higher energies or powers, self-focusing effects may appear, which could eventually damage the following optical components*

	Advised objectives	
Focal length	**50 mm**	**100 mm**
Min kerf size (M^2= 1.1, 1.030 nm, LS-Scan 20)	35 µm	50 µm
Scanning Field	7 x 7 mm²	25 x 25 mm²
Conicity compensation (attack angle)	4 to 8°	2 to 4°
Appropriate material thicknesses without refocusing	100 to 300 µm	200 to 600 µm
Working distance	60 mm	110 mm

These data can change according to laser beam quality, LS-Scan input aperture, or wavelength







Left: Real image showing a precessing beam into a fluorescent liquid

Right:500 µm thick brass and 700 µm thick sapphire cut with LS-Shape, LS-Precess, LS-Scan, and a 5 W femtosecond laser

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