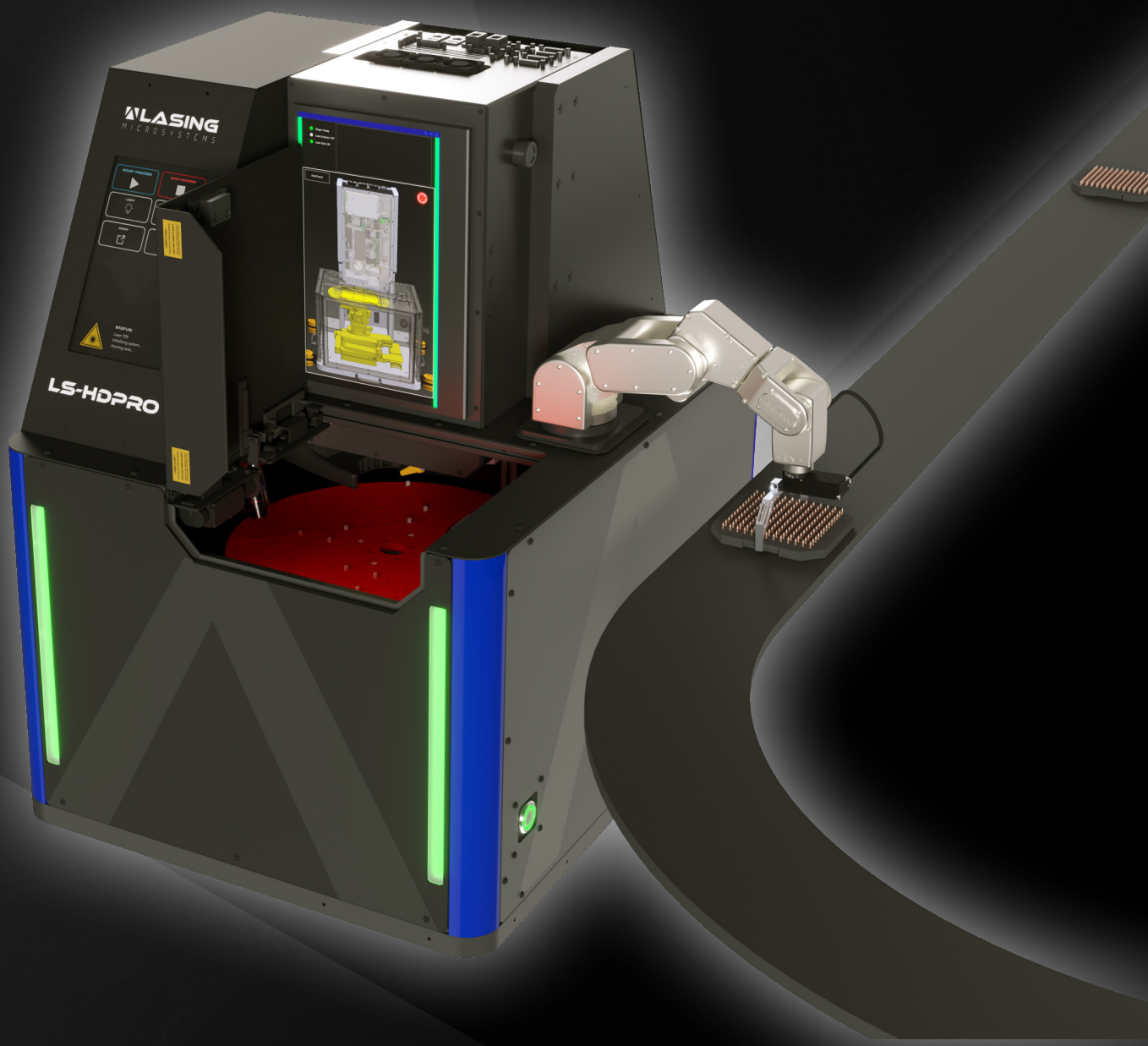
LASING
MICROSYSTEMS

HD-PRO



ULTRA COMPACT ALL-IN-ONE
LASER MICROMACHINING SYSTEM

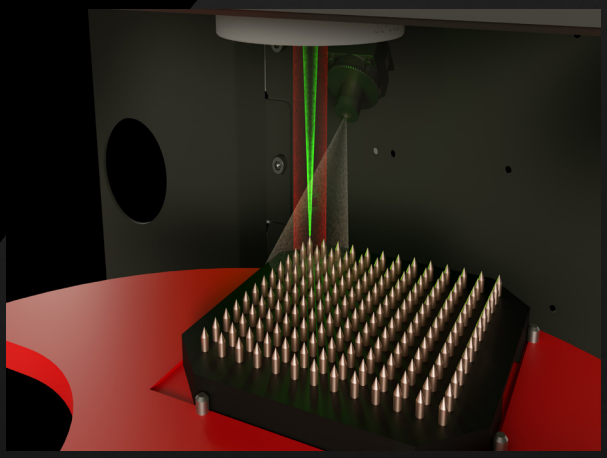
ULTRA-COMPACT, PRODUCTION-READY FOOTPRINT

ALL-IN-ONE MICRO-MACHINING & 3D METROLOGY

SUB-MICRON ACCURACY & NANOMETRIC RESOLUTION

LASER-AGNOSTIC & FULLY AUTOMATED

WHERE FEMTOSECOND PRECISION MEETS ULTRA-COMPACT ENGINEERING



HDPRO is a high-performance, ultra-compact, all-in-one laser micromachining platform that integrates laser processing, precision motion, advanced vision, and 3D surface metrology within a single Class-1 enclosure.

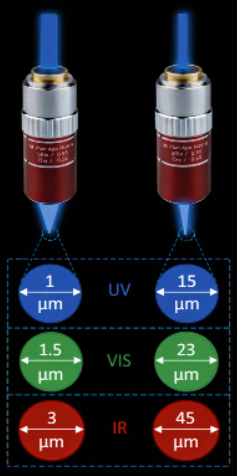
Designed for both industrial production and advanced R&D environments, HDPRO supports short to ultrashort pulsed laser sources and delivers sub-micron laser processing with nanometric positioning resolution.

HDPRO integrates a confocal interferometer 3D profiler, enabling immediate, in-situ inspection directly inside the machine. This transforms HDPRO into a true lab-in-a-machine, where fabrication and metrology coexist in a single automated workflow.

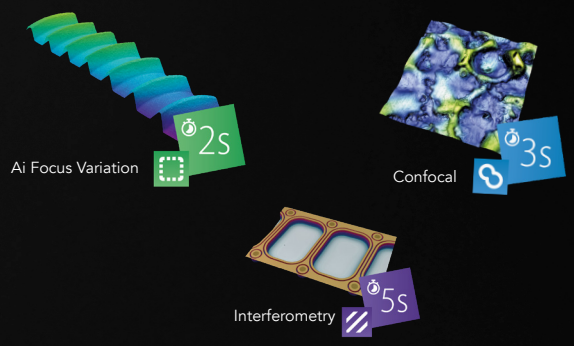
KEY SPECIFICATIONS

WORKING AREA	3 times 100 mm x 100 mm x 5mm
RESOLUTION	Down to 20 nm (XY), 0.1 µm (Z)
REPEATABILITY	± 0.3 µm (XY); ± 0.1 µm (Z)
ACCURACY	± 2.5 µm (XY); ± 1 µm (Z)
AVAILABLE LASER SOURCES	VIS-UV ns or IR-VIS fs or UV fs
SUBSTRATE HOLDER	Custom
MINIMUM LASER SPOT SIZE	Down to 1 µm
EXTERNAL DIMENSIONS	450 mm x 750 mm x 1000 mm (WxDxH)
WEIGHT	Approx. 120 kg
CONTROL UNITS	Integrated PC with dual 27" monitor

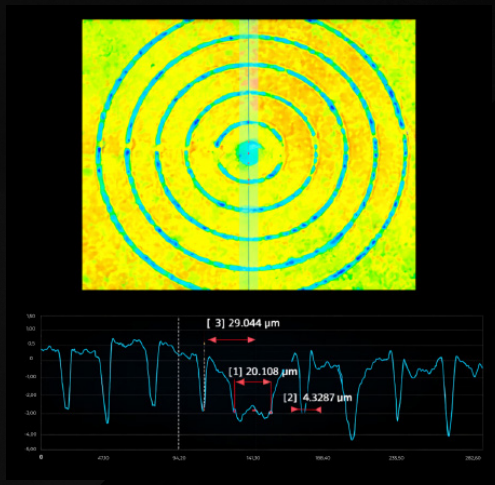
LASER OPTIONS	MAX POWER & ENERGY	PULSE WIDTH
ns-532 ns-355	1 W - 20 µJ 0.4 W - 8 µJ	< 15 ns
ns-532 HP ns-355 HP	2.5 W - 30 µJ 3 W - 30 µJ	< 15 ns
ns-532 HE ns-355 HE	1 W - 100 µJ 2 W - 100 µJ	< 15 ns
fs-1030 fs-515	10 W - 100 µJ 5 W - 50 µJ	< 400 fs
fs-343	10 W - 25 µJ	< 800 fs

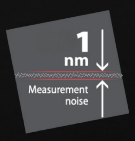


HIGH RESOLUTION 3D OPTICAL PROFILER WITH TRIPLE TECHNOLOGY



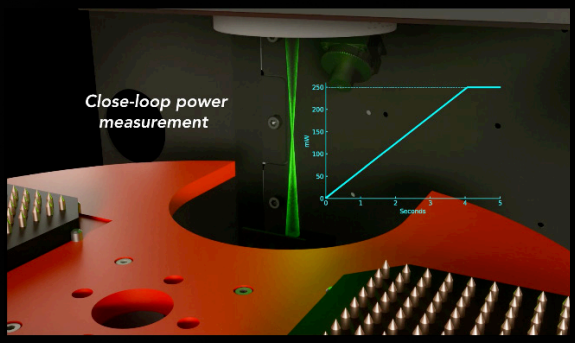
- From 5X to 100X objective magnifications.
- Motorized torret with up to 7 objectives.
- Vertical resolution down to 1 nm in DZ.
- Horizontal resolution down to 0.25 µm.
- Automatic stitching of full working area.
- Advanced and intuitive 3D measurement software.
- Automatic report generation (PDF, CSV, 3D format).

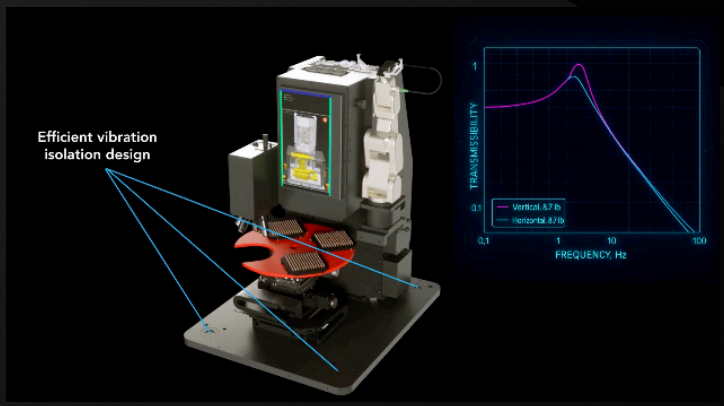




MEASURE THE MACHINE PERFORMANCE

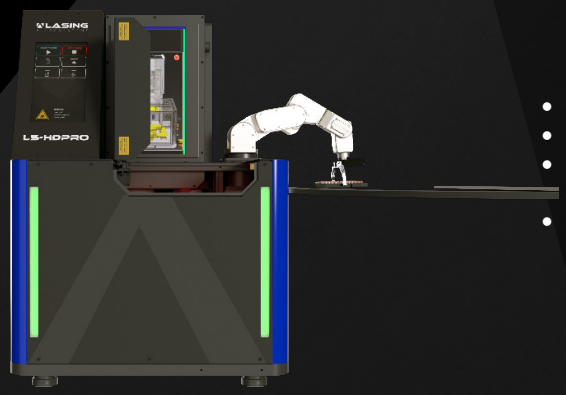
- Closed loop power measurent on working area.
- Closed loop laser beam alignment algorithms.
- Data generation with critical variables.
- Automatic report generation (PDF, CSV, 3D format).





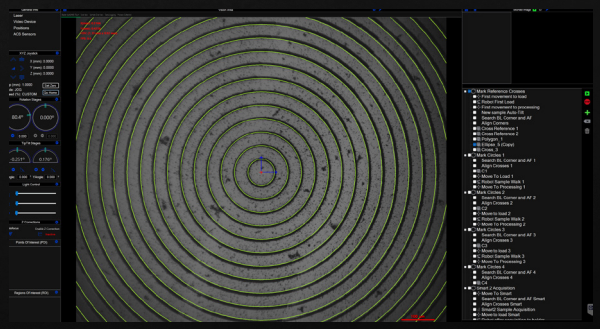
- Automatic lens calibration procedures.
- Co-lineal laser to perform DZ and Tip-Tilt automatic adjustments.
- Isolation platform with active vibration measurement control.

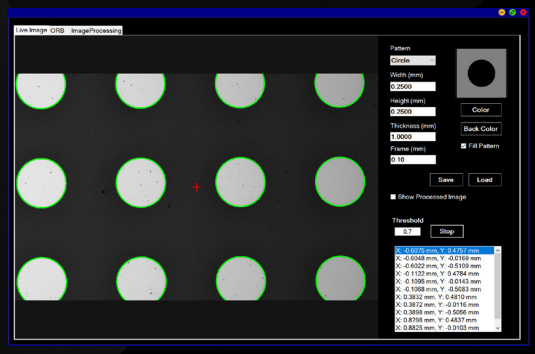
READY FOR MASS PRODUCTION



- Motorized door with program synchronism.
- 360 ° Rotation plate to holds 3 samples.
- 6 axis robot arm for up to 0.5 kg load and 50 µm repeatability.
- Digital & analog Inputs and Outputs for external synchronization.

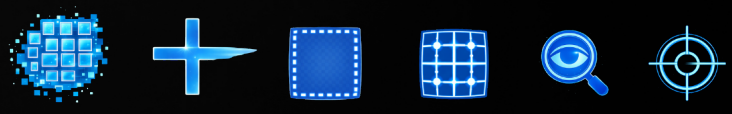
POWERFUL SOFTWARE LPS





- Intuitive clean codeless software.
- Design and import CAD trajectories (dxf, dwg, Gcode).
- Import image files.
- Control of full laser parameters.

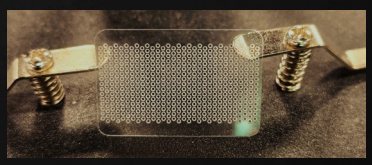
- Vision plugins for automatic recognition.
- 3D profiler functionalities integrated.
- 3D closed loop correction to minimize stitching errors.
- Automatic report generation.



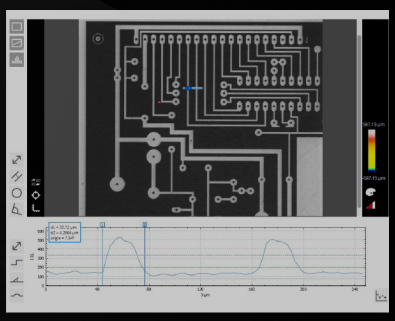
Camera Stitch | Autofocus | Galvo distortion connection | Galvo calibration | Visual inspection | Track view

APPLICATIONS

- Microelectronics & Semiconductor R&D.
- Photonics & Optoelectronics.
- Microfluidics & Biomedical Devices.
- Advanced Materials & Functional Surfaces.
- General Surface structuring.

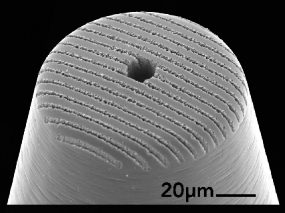


Fused silica micro-drilling



OCT Thin-film nano-patterning

Alumina tips micro-texturing



LASER & OPTICS

COMPATIBLE LASER SOURCES	Nanosecond, femtosecond
SUPPORTED WAVELENGTHS	IR, Green, UV (laser-dependent)
LASER INTEGRATION	Internal or external customer-supplied laser
MINIMUM LASER SPORT SIZE	Down to 1 µm
BEAM DELIVERY	Galvo-scanner + motorized XYZ stages
FOCUSING OPTICS	From 60 mm FL and up to 40× high-NA objective
OPTICAL CONFIGURATIONS	Galvo+objective; galvo + f-theta, axicons
POLARIZATION CONTROL	Manual or automated (linear, circular, elliptical)
POWER MONITORING	Integrated power meter

MOTION & POSITIONING

MOTION AXES	Up to 6 axes (XYZ + rotation / tilt, configurable)
WORKING VOLUME	3 x (100 mm x 100 mm x 5 mm)
POSITIONING RESOLUTION (XY/Z)	XY: 20 nm resolution / 300 nm repeatability / < 2.5 µm accuracy Z: 100 nm resolution / 100 nm repeatability / < 1 µm accuracy

VISION & METROLOGY

VISION SYSTEM	Co-axial & Parallel Dual high resolution vision systems
VISION FUNCTIONS	Automated field calibration and features recognition
INTEGRATED PROFILER	Confocal interferometer 3D profiler
PROFILER RESOLUTION	Vertical down to 1 nm, lateral down to 200 nm
MEASUREMENT OUTPUT	True 3D surface topography
INSPECTION	Automated pass/fail inspection & process feedback

SAMPLE HOLDING

SAMPLE HOLDER	Custom substrate holders for each application
SAMPLE ALIGNMENT	Automated alignment & rotation compensation
SAMPLE TRANSFER	Automated transfer between processing & metrology
MULTI-POSITION FIXTURES	True 3D surface topography

SOFTWARE & AUTOMATION

CONTROL SOFTWARE	Proprietary all-in-one control environment
SOFTWARE FUNCTIONS	Laser parameters, motion control, optics & metrology
WORKFLOW	Fabricate --> Measure --> Optimize
CAD SUPPORT	DXF, DWG and standard CAD formats

LASING
MICROSYSTEMS

Julián Camarillo, 26 1º- 28037 Madrid - +34 913775006 - info@lasing.com - www.lasing-microsystems.com