EN

Our precision makes it possible

lasea
PRECISION LASER **SOLUTIONS**

Coming from the space industry, the LASEA group was founded in 1999 to respond to the growing needs of precision laser processes. A Belgian company, LASEA is internationally recognized in the laser industry. Right from its creation, it has specialized in automatic machines which use short and ultra-short pulse lasers.

Combining the most innovative equipment with industrial reliability without concession, we supply the most demanding sectors (medical, pharmaceuticals, luxury watchmaking). LASEA designs and manufactures workstations and special machines to solve applications such as marking, engraving, cutting, drilling, texturing, thin film ablation and micro-welding.

As a pioneer in femtosecond laser machining since 2003, LASEA continually invests in order to stay at the forefront of innovation. With a strong team of experts in optics, mechanical engineering and automation, LASEA develops new technologies and processes for the most complex applications.

Chosen by the references in these sectors, LASEA delivers and installs machines all over the world with a single objective: to supply its customers with a reliable, high precision result responding to the highest standards in terms of quality, while guaranteeing the confidentiality of each project and the shortest return on investment.

LASEA
Precision Laser Solutions
www.lasea.com

Axel Kupisiewicz – CEO

1999

- Development of coating removal applications (patented)
- Creation of LASEA

2000

- First industrial unit for glass coating removal
- Development of laser decontamination technology (patented)

2004

- First laser systems sold for pharmaceutical industry
- European FP6 project Naginels™ (Traceability and anti-counterfeiting applications)

2006

- First installations of "on-the-fly" film cutting & pharmaceutical traceability lines

2007

- Patent on femtosecond micro-machining
- ITM award as "Best practice in process"

2009

- First installation of a femtosecond micro-machining system
- Construction of a new 1000m² building in the Liège Science Park

2010

- First reference in the traceability of surgical instruments

2011

- World premiere of an industrial machine with femtosecond laser at the Laser World of Photonics trade fair in Munich, Germany
- Presence on the Swiss prestige watchmaking market

2012

- Creation of LASEA France
- World premiere in the field of cochlear implants in Australia

2013

- World premiere in the field of intraocular implants (IOL) in the United States

2014

- Trophy of Excellence and AWEX Export Award
- Doubling of the area surface of the facilities in Belgium

2015

- Development of the LS-Precess for cutting and drilling without taper (patent)
- World first in the field of pharmaceuticals (NAGINELS technology)

2016

- Creation of LASEA United States
- First installation of an extreme precision machine in the US (0.2 µm)
- Introduction of an 8 axis CNC machine in the LS range (5 mechanical axis and 3 scanner axis)

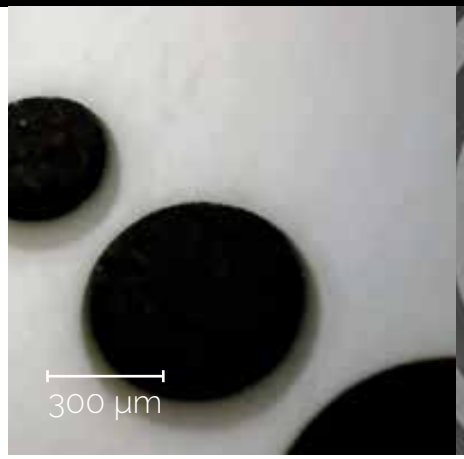
2017

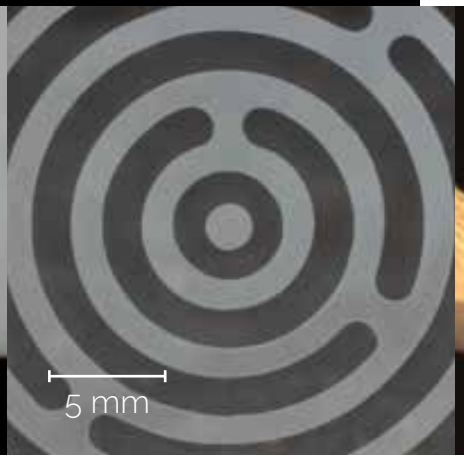
- Creation of LASEA Switzerland
- WOW company acquisition, leader in automated solutions development

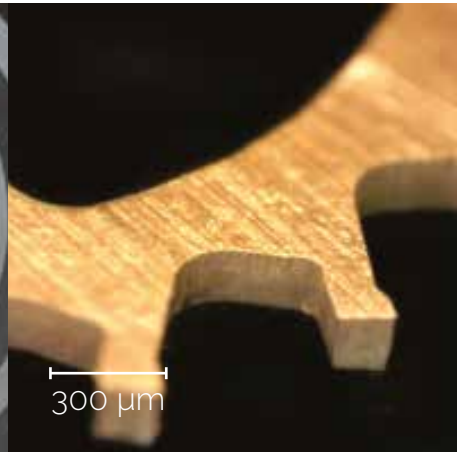
2018

- Software LS-Plume launching
- First machine on the market with 7 axis simultaneous movements

Laser Micromachining







Laser drilling

Laser drilling is a fast and precise way of producing a vast type of holes and can be applied to all materials, even the hardest or most fragile.

Picture: ceramic

Laser thin film removal

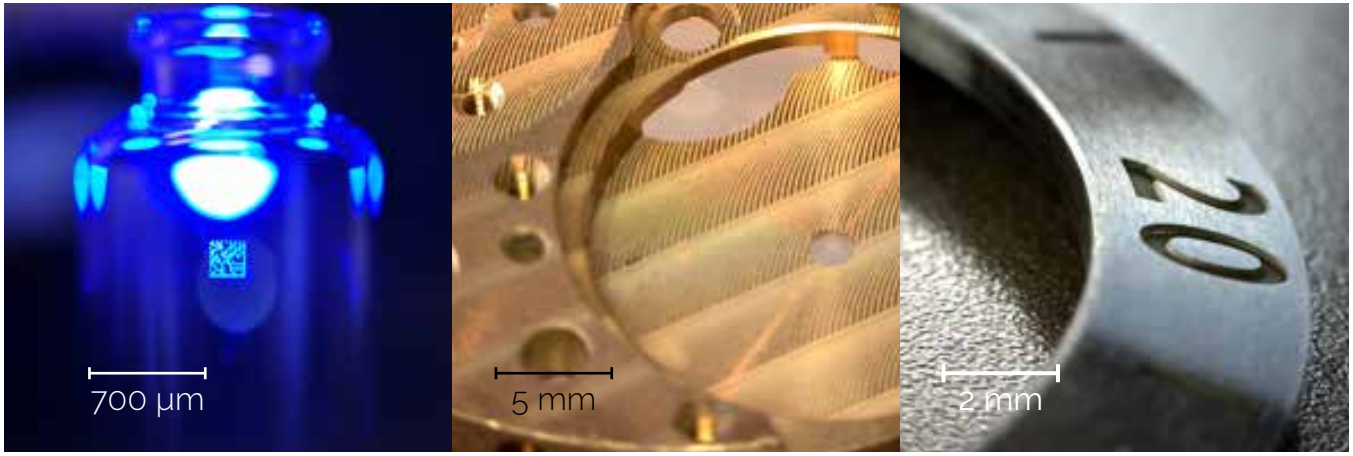
Laser thin film removal enables selective engraving without delamination, bumps or micro cracks in the fields of solar cells, OLED's and microelectronics.

Picture: metal layer on glass

Laser cutting

Laser cutting applies to all materials (hard, fragile, soft, etc.). This flexible and contactless technique offers clean and bumpless cut walls.

Picture: brass



Laser marking

Laser marking consists in permanently modifying the contrast of a surface. This process is flexible, clean (no additive), contactless (no wearing) and maintenance free. It can be used for the serialization of products or as an anti-counterfeit system.

Picture: glass

Laser structuring and texturing

Laser texturing and patterning offers decoration or functionalization of all materials surfaces by fine and high speed engraving for either simple (lines) or complex patterns

Picture: brass

Laser engraving

Laser engraving enables fast and contactless machining of embossed designs with perfectly monitored dimensions.

Picture: zirconia

Feasibility tests

Innovation, our passion

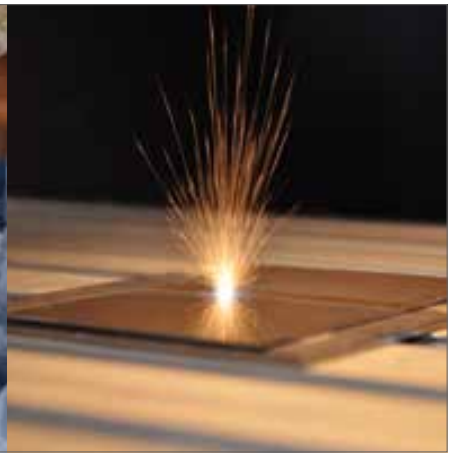
By partnering with the most renowned universities and European research centres, LASEA contributes to the development of new laser technologies and processes (FP6, FP7, Eranet, Eureka, H2020, programmes to name a few). Several projects have been considered as "success stories" by European R&D Organizations. We provide our skills and knowledge to implement new applications.

Production of prototypes

The LASEA Company is equipped with production zones in clean rooms and several application laboratories in order to guarantee high quality engineering work. Its engineers are able to develop machining processes for the production of prototypes or pre-series.

Customer request

Research



Development

Our team and our equipment

The LASEA team of engineers is able to meet the most demanding challenges for our customers. The laboratories are equipped with the latest laser technologies: power laser diodes, fiber lasers, DPSS lasers, femtosecond lasers, CO2 lasers. These lasers are integrated in machines that themselves are equipped with 2D and 3D scanners, linear axes or robots, and measuring and vision equipment.

Originating from the Liège Space Centre, one of the five test centers of the European Space Agency, our team has access to very high precision equipment such as electron microscopes, spectrometers and contour followers, as well as many experts in optics and physics.

Quality check

Validation

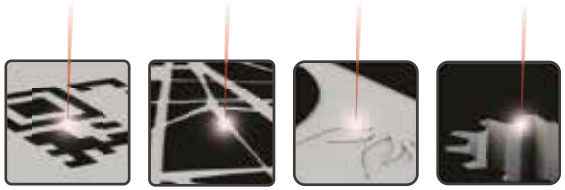
Expertise report with recommendations

LASEA solution


LS5-2
lasea

Machines

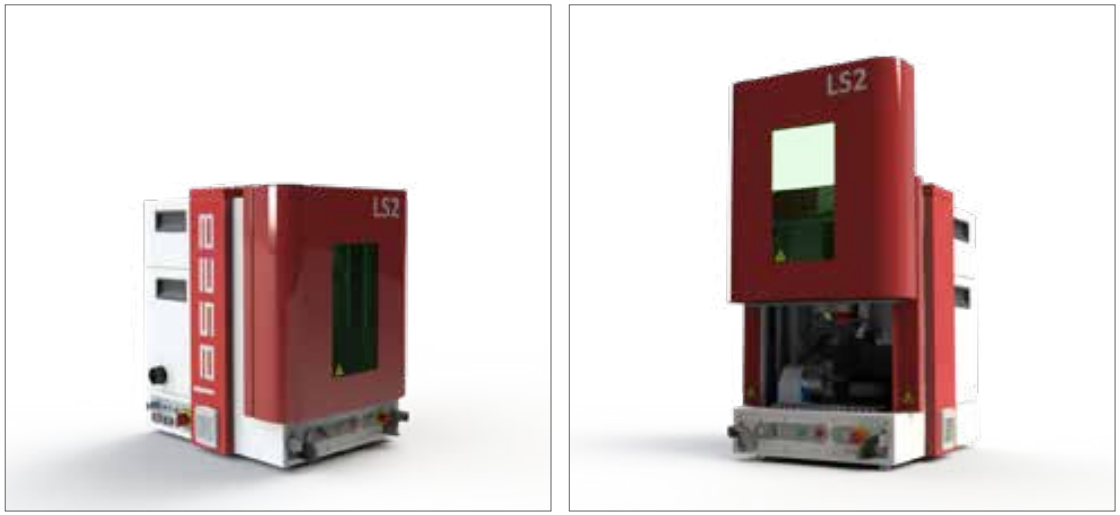
LS2



MARKING TEXTURING ENGRAVING CUTTING

Easy, reliable, ultra-compact

Designed for the machining of small parts, the tabletop LS2 workstation is a class 1 machine. Its robust design (welded mechanical structure) allows operation in the most demanding of environments. It allows for nanosecond or picosecond lasers integration with a simple « plug and play » installation.



LS2

Main specifications

MACHINE	LS2 BASIC	LS2 MOTION
Mechanical axis	Z	X Y Z
XY Travel	—	200 x 200 mm
Z Travel	350 mm	350 mm
Nanosecond or picosecond laser source	From 10 to 50 W	
Scanner	LS-Scan XY	
Dimensions of the working table	650 x 480 mm	
Software	KYLA™ 2D and EasyKYLA	
Focusing assistance	Double pointer	
Door	Automatic	
ACCURACY / REPEATABILITY		
XY axis (par axis)	—	P±50µm R±10µm

Options

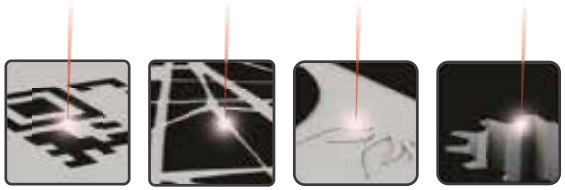
C axis	n x 360 deg	—
A (or B) axis	+- 120°	—
Accessories	Power meter, fume extractor	
Vision	Real time visualization and positioning camera	
Other	Fume extractor	

Dimensions

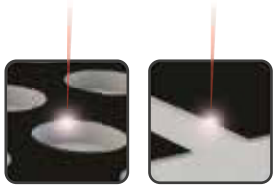
Width x Depth x Height	680 x 820 x 920 (nanosecond laser source) 680 x 980 x 920 (picosecond laser source)

• Standard / o Option / — Not available in this configuration

LS3



MARKING TEXTURING ENGRAVING CUTTING



DRILLING THIN FILM REMOVAL

The ultra-compact machine

The LS3 has been specifically designed for micromachining applications in an industrial environment and integrates our complete range of laser sources. It is a compact, robust, modular and flexible machine thanks to its multiple options that allows micromachining applications with high quality.

LS3

Main specifications

MACHINE	LS3 BASIC	LS3 MOTION
Mechanical axis	Z (200 mm)	XYZ (300 x 300 x 200 mm)
Femtosecond laser source	5 to 40 W	
Scanner	LS-Scan XY	
Dimensions of the working table	575 x 430 mm	-
Software	KYLA™ 2D and EasyKYLA	
Vision	Visualization and positioning camera	
Assistance for laser focus	Dual laser guide	
Table	Marble	
Door	Manual	
ACCURACY / REPEATABILITY		
XY axis (per axis)	-	A +/- 25 µm R +/- 5 µm

Options

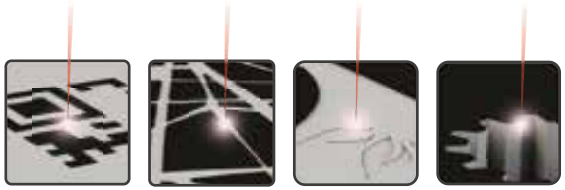
LASER SOURCES		
Picosecond	30 W	
Nanosecond	10 to 100 W	
ROTARY AXIS		
C Axis	n x 360°	-
A (or B) Axis	+- 120°	-
LS-MODULES		
3D Scanner	3D Module of the scanner (KYLA™ 3D included)	
Vision through the scanner	LS-View	
Beam management module	LS-Shape	
OTHER		
Vision	-	Cognex camera, shape recognition
Metrology	-	Optical profilometry (confocal sensor)
Autofocus	Laser distance sensor	
Door	Automatic	
Accessories	Power meter, fume extractor, cutting nozzle, rotary table	

Dimensions

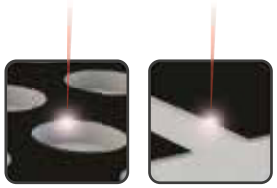
Width x Depth x Height	1200 x 1310 x 1950 mm

• - Not available in this configuration

LS4



MARKING TEXTURING ENGRAVING CUTTING

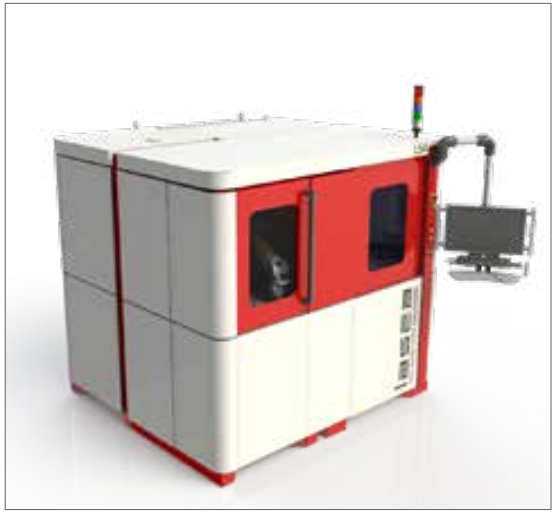


DRILLING THIN FILM REMOVAL

The accurate, compact, modular, upgradeable micromachining machine

The LS4 has been specifically designed for micromachining applications in an industrial environment. It integrates our complete range of laser sources. It is a modular and flexible machine thanks to its options developped to reach extreme precisions.

The 3D version allows micromachining of complex 3D pieces thanks to the combination of the mechanical axis and optical axis movements.»



LS4 connected to LS-Robot

LS4

Main specifications

MACHINE	LS4 ACCURATE	LS4 ACCURATE 3D
Mechanical axis	XYZ	XYZAC
XYZ Travel	500 x 300 x 200 mm	
A Travel	-	-30° / + 90°
C Travel	-	n x 360°
Femtosecond laser source	5 to 50 W	
Scanner	LS-Scan XY	
Lens	Telecentric F-Theta	
Beam management module	LS-Shape	
Vision	Visualization and positioning camera	
Autofocus	Laser distance sensor	
Door	Automatic	
Air conditioned working area	Yes	
Electrical cabinet	Air conditioned	
Software	KYLA™ 2D and EasyKYLA	
Assistance for laser focus	Dual laser guide	
Table	Marble	
ACCURACY / REPEATABILITY		
XY axis (per axis)	A : +/- 2 µm R : +/- 0.5 µm	
Axis A	-	A +/- 5 arcsec R +/- 3 arcsec
Axis C	-	A +/- 6 arcsec R +/- 3 arcsec

Options

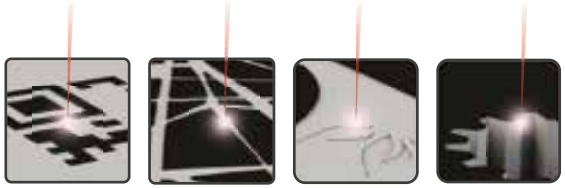
LASER SOURCES	
Picosecond	30 W
Dual source	Combination of 2 sources (fs and ns)
LS-MODULES	
3D Scanner	LS-Scan Z (KYLA™ 3D included)
Zero taper cutting and drilling	LS-Precess
Vision through the scanner	LS-View
Robotization	LS-Robot module or external robot
OTHER	
Vision	Cognex camera, shape recognition
Metrology	Optical profilometry (confocal sensor)
Automation	LS-HMI (PLC)
Autofocus	Laser distance sensor
Accessories	Power meter, fume extractor, cutting nozzle

Dimensions

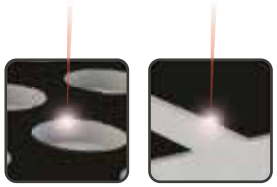
Width x Depth x Height	1350 x 2280 x 1950 mm (LS4) / 2290 x 2340 x 1950 mm (LS4 connected to LS-Robot)

• - Not available in this configuration

LS5



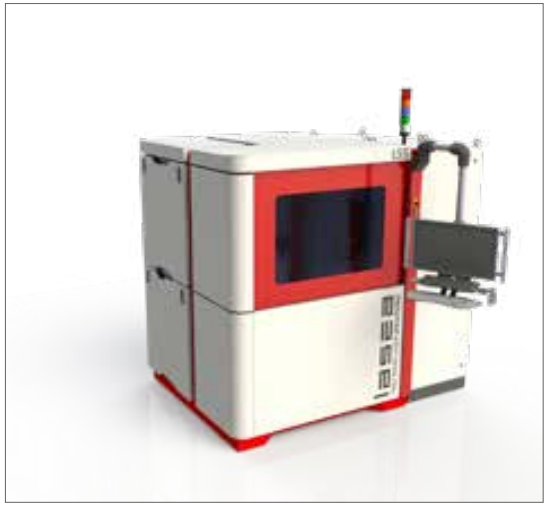
MARKING TEXTURING ENGRAVING CUTTING



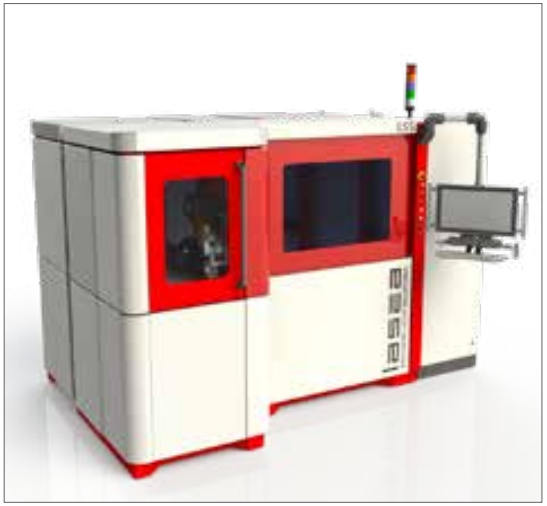
DRILLING THIN FILM REMOVAL

The flexible machine for high precision micromachining

High precision work can be achieved with no risk of external disturbance thanks to its granite structure and external enclosure perfectly isolated from the internal structure. The LS5 can include all kinds of laser sources (some of the most powerful on the market), including femtosecond sources for micromachining, or even multiple lasers for more flexibility. Extremely accurate features can be obtained at very high speed (several meters per second with acceleration ramps of only a few microns). The 3D version allows machining of complex 3D parts thanks to the combination of mechanical and optical axis movements. The integration of a robot in the enclosure (or externally) combined with a double-head make it an ideal machine for production environments.



LS5



LS5 connected to LS-Robot

LS5-2 with integrated robot

Main specifications

MACHINE	LS5 ACCURATE	LS5 ACCURATE 3D
Mechanical axis	XYZ	XYZAC
XYZ Travel	500 x 300 x 200 mm	
A Travel	-	Depends on the application
C Travel	-	n x 360°
Femtosecond laser source	5 to 100 W	
Scanner	LS-Scan XY	
Lens	Telecentric F-Theta	
Beam management module	LS-Shape	
Vision	Visualization and positioning camera	
Autofocus	Laser distance sensor	
Door	Automatic	
Air conditioned working area	Yes	
Electrical camera	Air conditioned	
Table	Marble	
Assistance for laser focus	Dual laser guide	
Table	Marble	
Software	KYLA™ 2D and EasyKYLA	
Assistance for laser focus	Dual laser guide	
ACCURACY / REPEATABILITY		
XY axis (per axis)	A : +/- 2 µm R : +/- 0.5 µm	
A axis	-	A +/- 5 arcsec R +/- 3 arcsec
C axis	-	A +/- 6 arcsec R +/- 3 arcsec

Options

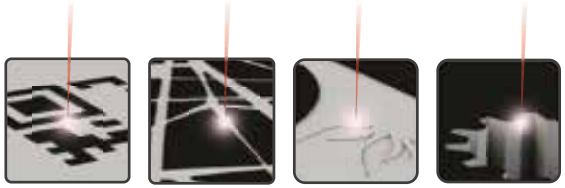
LASER SOURCES	
Picosecond	30 W
Dual source	Combination of 2 sources (fs and ns)
LS-MODULES	
3D Scanner	LS-Scan Z (KYLA™ 3D included)
Zero taper cutting and drilling	LS-Precess
Vision through the scanner	LS-View
Robotization	Pick & Place (plates, palets and/or workpieces) / LS-Robot module (plates, palets and/or workpieces) / Machine preparation for external robot
OTHER	
Vision	Cognex camera, shape recognition
Metrology	Optical profilometry (confocal sensor)
Automation	LS-HMI (PLC)
Autofocus	Laser distance sensor
Accessories	Power meter, fume extractor, cutting nozzle

Dimensions

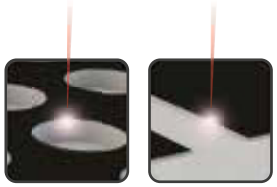
Width x Depth x Height	2120 x 1680 x 1950 mm (LS5) / 3060 x 2130 x 1950 mm (LS5 connected to LS-Robot)

• Standard / o Option / — Not available in this configuration

LS6



MARKING TEXTURING ENGRAVING CUTTING



DRILLING THIN FILM REMOVAL

For large dimensions parts

The LS6 is the laser machine that opens wide its doors to a world of precision. Thanks to its motorized doors and its wide accesses to the processing zone, the LS6 can operate both manually and with automated loading. It's also designed to process large parts such as glass plates and photovoltaic panels.

Thanks to its translation stages, this machine allows for large plates machining at high speed while keeping high precisions.

LS6

Main specifications

MACHINE	LS6 ACCURATE
Mechanical axes	XYZ (linear)
XYZ Travel	1.000 x 1.000 x 200 mm
Nanosecond laser source	10 to 100W
Scanner	LS-Scan XY
Beam management modules	LS-Shape
Software	KYLA™ 2D and EasyKYLA
Vision	Visualization camera
Autofocus	Laser distance sensor
Door	Automatic
Electrical cabinet	Air conditioned (air/air exchanger)
Table	Marbre
F-Theta 100 mm lens	-
F-Theta telecentric 100 mm lens	•
SiC mirrors for the LS-Scan XY	•
Air conditioned working area	•
ACCURACY / REPEATABILITY	
XY axis (per axis)	P±4µm R±0,75µm
Z axis	P±10µm R±1µm

Options

LASER SOURCE	
Femtosecond	5 to 100W
LS-MODULES	
3D Scanner	LS-Scan Z (KYLA™ 3D included)
Zero taper cutting and drilling	LS-Precess
OTHER	
Vision	Cognex camera, shape recognition
Metrology	Optical profilometry (confocal sensor)
Automation	LS-HMI (PLC)
Robot	Pick & place module
Accessories	Fume extractor

Dimensions

Width x Depth x Height	2300 x 2300 x 2000 mm

• Standard / o Option / — Not available in this configuration

Special laser machines, tailor-made solutions

The LASEA laser systems have been specifically designed for simple and rapid integration into our workstations and the specific environments of our customers, for which we can design the best solution.

Our teams of mechanical design, electrical, electronics, software and automation engineers develop the solution according to a precise specification sheet.

In addition to laser solutions, being our main expertise, LASEA also has great experience with automation, robotics, vision and human-machine interfaces, which completes our tailor-made machine offering.

Do not hesitate to present your project to us. Whatever its complexity, we will find solutions to carry it out

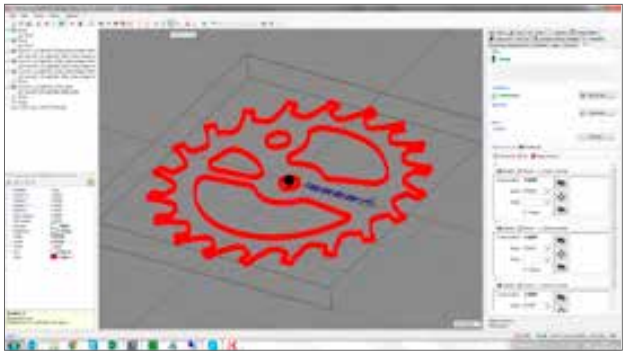

STÄUBLI
UNIMATION


PROCEDE
RECETTES
STATUTS
MAINTENANCE
RAPPORT
KYLA
FERMER PORTE
ACQUIT

Software

SOFTWARE

KYLA™ EasyKYLA

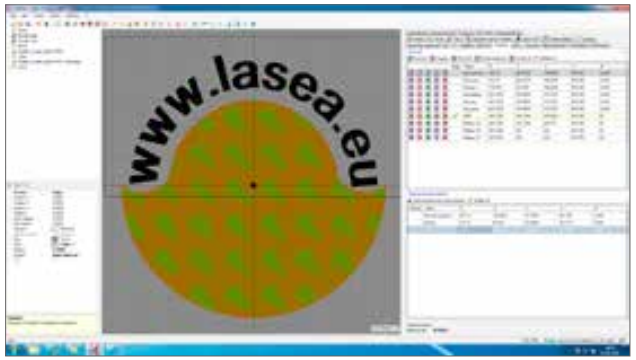


Control software

The laser processes are programmed by the LASEA control software, KYLA™. This software package controls all the devices and material functions (as they come standard or as options) offered by LASEA.

A complete version of KYLA™ is supplied with every LASEA machine. A simplified version named EasyKYLA™ can be specially configured for use by a production operator.

All the devices controlled by KYLA™	
Laser sources	Wavelength, repetition rate, emitted laser power, pulse duration
Mechanical shutters	Opening or closing
Power attenuators	Transmitted powers
Beam expander	Enlargement factor from x2 to x8
Scanners	Scan speed, position, acceleration ramps, repetitions
LS-Precess	Speed, taper angle, polarisation
Axis	Speed, position, acceleration
Cameras	Dimensional measurements of the displayed image, part recognition
Automatic focusing and contour following systems	Resolution and analysis zone
Power sensors	Duration of the measurement
Fume extractor	Activation and deactivation



On the basis of .dxf, .stl, .jpeg, .bmp files or a fresh file creating text objects, barcodes or geometric shapes, it is possible to very quickly obtain a 2D or 3D track ready to be executed. The software automatically transcribes the image, text, or diagram created into movement vectors for the scanner or axes.

The user-friendly graphical interface enables the beam trajectories and also the parameters to be displayed and the laser parameters to be controlled. This graphical interface can also be replaced by an interface in the form of movement commands of the G-code type.

Main functionalities
Loading, editing, and saving of formula and configuration files
Import of DXF, STL, BMP, or JPEG files
Creation of texts with Windows TrueType fonts, "Single Stroke", barcodes, or data matrices with automatic incrementing function or link with a database
Integration of a CAD module capable of changing the machining motifs in DXF formats
Automatic generation of the laser beam path and display in 2D (3D as an option) of these tracks
Display and modification of the parameters linked to the laser, movements of the scanner and the axes
Automatic generation of optimization matrices
Automatic and synchronized control of the scanner and the axes
Display of camera images, possibility to save the images and video films and to take measurements
Automatic registration of log files including the laser, scanner and axis parameters
Functions to assist calibration

LS-HMI

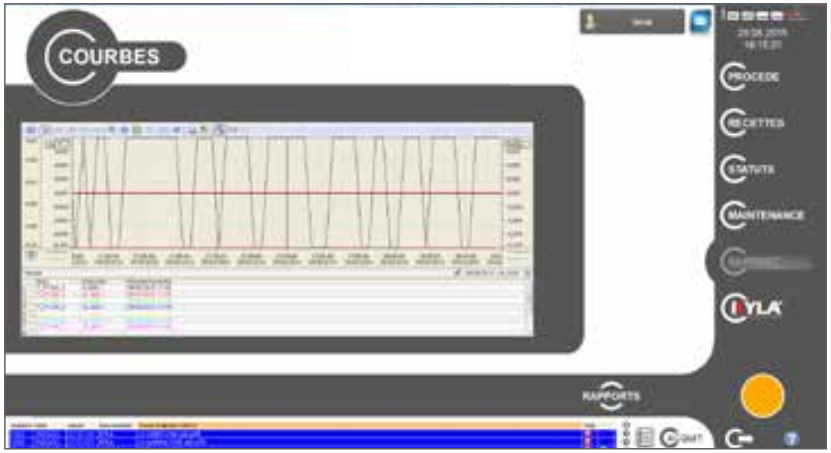
The HMI perfectly suited to the industrial environment

In industrial production, the tailor-made machines and workstations of LASEA can be equipped with the human-machine interface LS-HMI. The control console is equipped with a touch screen that displays and controls the alarms as well as the configuration and production parameters.

The LS-HMI has control and monitoring operative functions (manual and automatic mode), production counters, users management and the possibility to display all of the digital and analogue inputs/outputs for rapid diagnosis in the event of an alarm.

The LASEA LS-HMI has been designed to facilitate the operator's task:

- Ergonomically redesigned
- Quick and intuitive access to information
- User-friendly interface



Main specifications

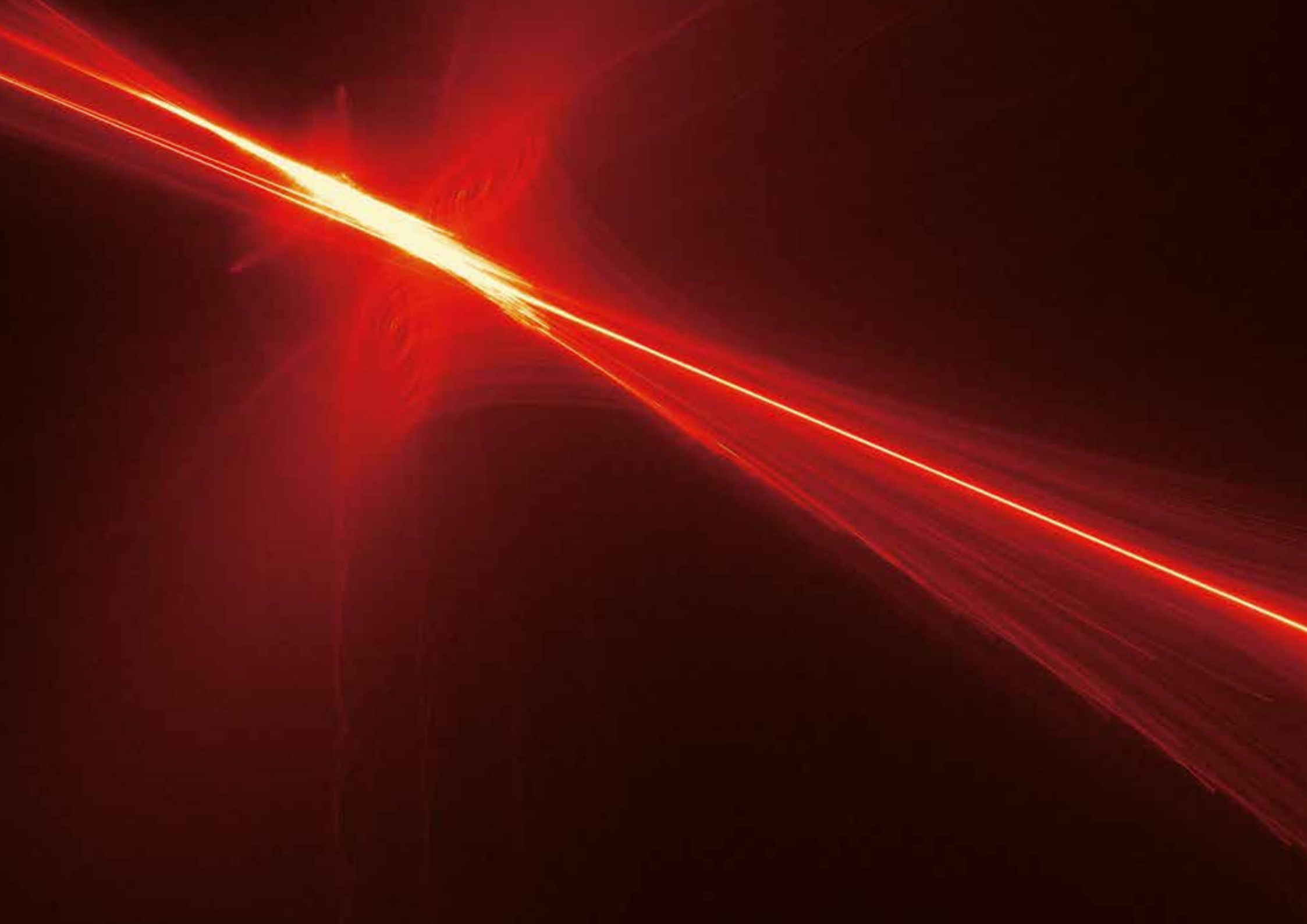
22" touch screen
KYLA™ & EasyKYLA
Audit trails, reports
Data exchange with the ERP of the company
Users and Passwords management

Views

Main information	Production order and current recipe, production counter
Detailed information	Image of the treated part, logged user, list of latest alarms
Process	General status of the machine, M.O. and processes online
Recipes	Management of the general production parameters
Settings	Management of the general parameters of the machine
Status	Diagnostic of the electrical signals connected to the PLC
Forcing	Diagnostic of the failures by using offline the outputs of the PLC
Reports	Display of the archived information

History

Alarms
Manufacturing Data
Operator actions
Tracking curves



Laser Sources

Laser Sources

Satsuma (Amplitude Systèmes)

Carbide (Light Conversion)

Nanosecond laser (IPG)

The most powerful femtosecond laser on the market

LASEA can integrate many laser sources in our machines in order to closely match the specifications of our clients. LASEA is a pioneer in the integration of femtosecond lasers in industrial installations. Ultrashort lasers have emerged as important tools in scientific and industrial fields. Fiber lasers offer very attractive prospects for obtaining a high average power.

We also use nanosecond laser sources, as well as high power sources for most thermal applications such as welding, while being infrared, ultraviolet or visible.

LASEA has forged strong links with the best suppliers of laser sources such as Amplitude Systèmes and Light Conversion for femtosecond lasers, IPG Photonics and Synrad for nanosecond lasers.

Amplitude Systèmes relies on innovative developments in the field of the conception of fibers and laser amplifiers to offer a range of ultra-short fiber lasers with simultaneous high average power and high output energy.

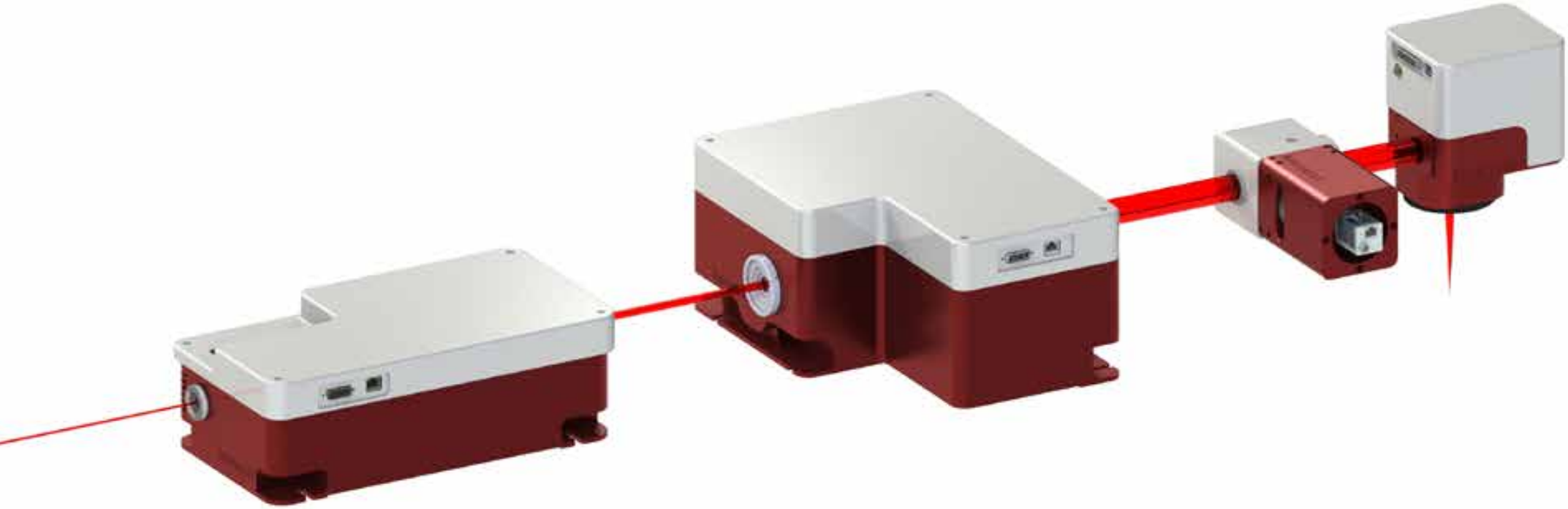
The innovative design of Light Conversion lasers brings a new approach by integrating the oscillator, the compressor and the amplifier in the same mechanical structure. Thanks to their average power and high pulse energy, these industrial femtosecond lasers are excellent tools for many micromachining applications.

LASEA's FL range of fiber laser systems (from 10 to 100W) includes a pulsed IPG laser with very high reliability (MTBF > 100,000 h). This laser delivers a high power laser beam with a pulse duration of 4 to 200ns in order to benefit a maximum energy and to adapt to sensitive materials with short and high speed pulses.

AMPLITUDE SYSTÈMES	Satsuma	Satsuma HP	Satsuma HP²	Satsuma HP³	Tangor	Yuja
Wavelength	343 nm • 515 nm • 1030 nm					
Maximal power	5 W	10 W	20 W	50 W	100 W	10 W
Pulse energy	10µJ	20µJ	40µJ	40µJ	300µJ	100µJ
Pulse duration	350fs - 10ps				500fs – 10ps	500fs – 10ps
Maximal repetition rate	2 MHz					
Operation mode	Pulsed					
Compatible LASEA machines	LS3 • LS4 • LS5 • LS6				LS4 • LS5 • LS6	LS3 • LS4 • LS5 • LS6
Applications	Marking • Engraving • Cutting • Drilling • Thin layer removal • Texturing					

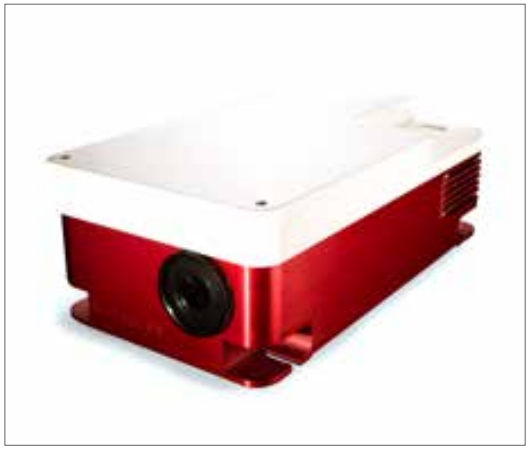
LIGHT CONVERSION	Pharos	Carbide
Wavelength	343 nm • 515 nm • 1028 nm	
Maximal power	4 - 40W	6 – 20 W
Maximal pulse energy	200 – 2.000 µJ	65 – 400 µJ
Pulse duration	290fs – 10ps	
Maximal repetition rate	1MHz	1MHz
Operation mode	Pulsed	
Compatible LASEA machines	LS3 • LS4 • LS5 • LS6	
Applications	Marking • Engraving • Cutting • Drilling • Thin layer removal • Texturing	

IR NANOSECOND	FL 20	FL 20 T	FL 30	FL 50	FL 100
Type	Fiber laser (Ytterbium)				
Wavelength	1064 nm				
Maximal power	> 20W	> 20W	> 30W	> 50W	> 100W
Pulse duration	100 ns	4 ns to 200 ns	100 ns	100 ns	100 ns
Operation mode	Pulsed				
Compatible LASEA machines	LS2 • LS3 • LS4 • LS5 • LS6				
Applications	Marking • Engraving • Cutting • Drilling • Thin layer removal • Texturing				



Modules

LS-Shape



LS-Shape

LS-Shape, laser beam management module

Dedicated to laser micromachining, the LS-Shape is a unique beam management module, inevitable for reaching an optimized process.
While it is irrelevant to have access to a lot of fine parameter tuning on conventional marking or machining applications, ultrashort processes require much more attention on pulse overlap, or power density, or on the preservation of a perfect optical quality. A person skilled in the art knows how hard it is to prevent from astigmatism on enlarged beams for example. Beam attenuation is also tricky due to changes on beam geometrical shape with AOMs, or on pulse length with diode current modulation.
Apart from the choice of laser, it is this beam management which defines the machining quality, efficiency, and repeatability. The LS-Shape is the right tool for this optimization and its quick alignment steps make its integration very easy.
Finally, for high productivity installations, replacement of this module is immediate to continue the production, while the repair is done.

Directly connected to a computer through an ethernet interface, the LS-Shape is driven by our software KYLA™, a full micromachining software able to communicate with several stages, cameras, and lasers.
Including a certified safety shutter, a beam dump, an attenuator, a beam expander, a power measurement, a polarization converter, and a protection against back reflections, everything is in this sealed aluminum block material for a perfect and stable laser path.

Key features

- Motorized safety shutter with sensors
- Beam dump
- Motorized beam expander (x2 to x6)
- Motorized attenuator
- Power measurement
- Protection against back reflections
- Circular polarization converter

Main specifications	LS-SHAPE
Input aperture	6 mm
Output aperture	20 mm
Available wavelengths	343 nm – 515/532 nm – 1.030/1.064 nm
Maximum power	50 W
Maximum allowed energy (@300fs-1030nm)	300 µJ
Maximum allowed energy (@10ns-532nm)	1 mJ
Transmission	> 90%
Shutter closing time	< 500 ms
Beam dump capacity	20W continuously, 50W during 1 min (water cooled beam dump for continuous 50W on request)
Beam expansion	Motorized option (see below) / Default fixed x3 magnification (fixed x2 or x4 on request)
Attenuation	Motorized option (see below) based on polarization
Power measurement	< 0,5% power sampling with calibrated ratio
Circular polarization	Pmin / Pmax > 90 %
Alignment	Factory aligned with < 0,5 mm lateral offset and < 200 µrad angular offset according to incident beam Reference irises for on-site alignment
Size	397 x 210 x 130 mm^3

Options	
Atténuateur	Motorisé
Elargisseur de faisceau	Motorisé (x 2 à x 6)

LS-Scan

LS-Scan

LS-Scan, high acceleration laser head

Dedicated to laser micromachining and high accuracy marking, the LS-Scan is LASEA's unique scan head. While conventional marking applications require high scanning speeds with accuracies around 30µm, micromachining still requires speed to prevent from heat accumulation, but the accuracy is a lot more critical, and the drawings often feature a lot more details with constant needs for accelerations. The LS-Scan's technology, based on flat moving coil motors, is different from conventional moving magnet technology.

Moving coils being lighter than magnets and having a 5 times less current consumption, the LS-Scan reduces thermal drifts and offer acceleration ramps about 20% smaller than the best traditional moving magnet scanners.

Thanks to these performances, more laser power can be used without degrading the machining accuracy and hence the cycle time can be reduced.

Directly connected to a computer through an ethernet interface, the LS-Scan is driven by our software KYLA™, a full micromachining software able to communicate with several stages, cameras, and lasers. Alternatively, the standard XY2-100 protocol can be used with an external control card.

Key features

- Highest dynamic performance on the market
- Low thermal drifts
- 3D available
- Easy interfacing with KYLA micromachining software
- XY2-100 protocol compatible

Main specifications	LS-Scan XY 10	LS-Scan XY 15	LS-Scan XY 20
Scanner aperture	10mm	15mm	20mm
Tracking error	80µs	110µs	160µs
Available wavelengths	343 nm - 355 nm - 515/532 + 1.030/1.064 nm - 10.600 nm		
Maximum power	100 W		
Maximum allowed energy (@300fs-1030nm)	400 µJ		
Maximum allowed energy (@10ns-532nm)	1 mJ		
Transmission (with F-Theta)	> 90%		
Angular travel	640 mrad		
Maximum scanning speed	70 rad/s		
Static positioning resolution	10 µrad		
Repeatability	+/- 10µrad		
Thermal drift (on 8 hours)	+/- 20µrad		
Size	126 x 121 x 144 mm3		

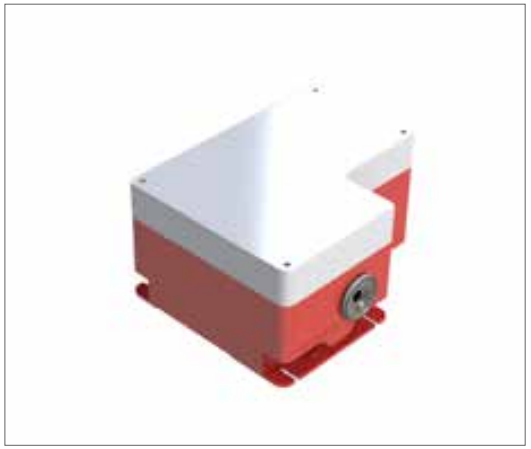
Z-axis extension module	
Mounting	Before LS-Scan XY
Input aperture	22 mm
Beam diameter modification	x 0,8
Spot size modification	x 1,25
Tracking error	4 ms
Size	109 x 70 x 80 mm^3

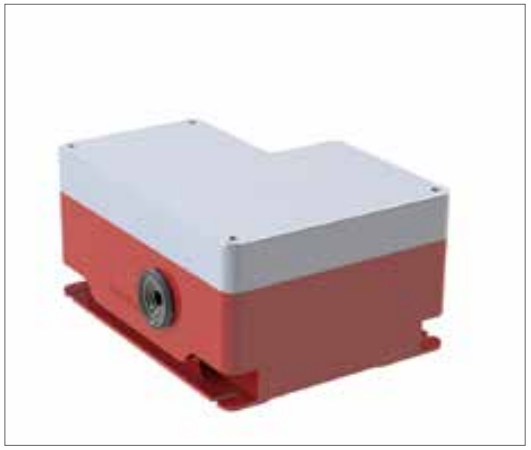
Options	
SiC Mirrors	Improves scanning acceleration due to higher mirror stiffness
F-Theta lenses	Various F-Theta or telecentric F-Theta lenses available / Supplied with the appropriate adapter ring to prevent from dangerous back reflections
Cutting nozzle	Offers the ability to switch to a gas assisted cutting / drilling process

Objectives						
Distance focale	50 mm	60 mm	80 mm	100 mm	160mm	255mm
Taille de spot minimum (M^2= 1,1, 1.030 nm, LS-Scan 20)	10 µm	12 µm	14µm	16 µm	22 µm	35 µm
Champ du scanner	12 x 9 mm^2	23 x 13 mm^2	28 x 20 mm^2	70 x 50 mm^2	120 x 70 mm^2	200 x 165 mm^2
Champ en Z (avec le module 3D)	0,8 mm	1 mm	2 mm	3 mm	7 mm	20 mm
Distance de travail	60 mm	66 mm	79 mm	126 mm	176 mm	317 mm

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

LS-Precess





LS-Precess

LS-Precess, laser beam precession module

Laser drilling and cutting processes have been well established in the industry for many years. Cutting processes using scanning heads are more and more common due to their ease-of-use and process speed, and also due to a lower overall cost than a stage-driven system with its gas consumption, but in all cases, with a nozzle or a scanner, conical trenches are inevitable due to gaussian shapes of laser beams. The LS-Precess is a module able to suppress or control these kerf conicities. It is well suited for drilling and cutting with a nozzle and stage movements, but it also allows the use of scanning heads, with the same ease-of-use as conventional scanner processes.
The principle is a high speed continuous rotation around the beam propagation axis of a lateral beam shift. Once focused, these lateral shifts are converted to rotating attack angles which crops both sidewalls of the kerf.
LASEA's patented technology is the only one compatible with the use of scanners and F-Theta objectives, allowing processing fields up to 20 x 20 mm, with a stable zero or negative taper.
In addition, for high productivity installations, replacement of this module is immediate to continue the production, while repairs are done.

Directly connected to a computer through an ethernet interface, the LS-Precess is driven by our software KYLA™, a full micromachining software able to communicate with several stages, cameras, and lasers.

Including a motorized setting of the lateral shift and a by-pass function to perform conventional cutting, engraving, or texturing, this module is an easy to integrate add-on for a perfect laser processing system.

Key features

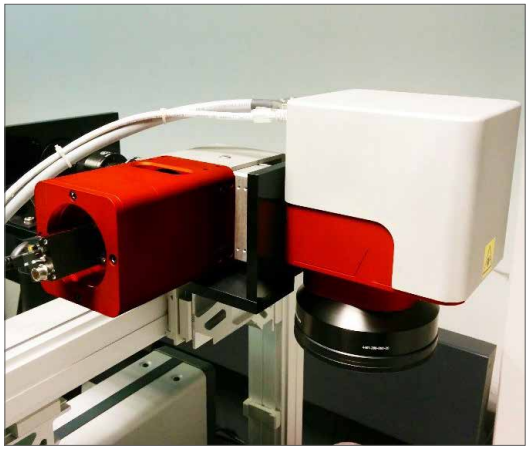
- Motorized beam shift setting
- Up to 30.000 rotations per minute
- By-pass function
- 50 and 80 mm telecentric F-Theta lenses
- 40µm min kerf size

Equipements de base	
Input aperture	22 mm
Output aperture	22 mm
Available wavelengths	343 nm – 515 nm – 532 nm – 1.030 nm – 1.064 nm
Maximum power	50 W
Maximum allowed energy (@300fs-1030nm)	300 µJ
Maximum allowed energy (@10ns-532nm)	1 mJ
Transmission	> 80%
Lateral beam shift	5 to 7,5 mm from the center
Maximum rotation speed	30.000 rpm
By-pass	By-pass variable between 0 and 100%
Polarization	Non-random laser polarization required Motorized output polarization (often set as perfectly circular on target with Pmin / Pmax > 95%)
Alignment	Factory aligned with < 0,5 mm lateral offset and < 100 µrad angular offset according to incident and by-pass beams Reference irises for on-site alignment
Size	376 x 293 x 175 mm^3

Objectifs		
Focal length	50 mm	80 mm
Min kerf size (M^2= 1,1, 1.030 nm, LS-Scan 20)	40 µm	60 µm
Scanning Field	8 x 7 mm^2	22 x 20 mm^2
Conicity compensation	+/- 5 to +/- 9°	+/- 3 to +/- 6°
Appropriate material thicknesses without refo-cusing	100 à 300 µm	200 à 600 µm
Working distance	60 mm	79 mm

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

LS-View



LS-View

LS-View, Vision through the scanner

Dedicated to scan field observation before, during, and after the laser process, the LS-View is a passive vision system aligned with the laser beam. No mechanical stage movement is required to get a clear image of the workpiece.
Before the process, viewing the scan field center can help positioning the workpiece at the right place. During the process, displaying the ablation allows a visual monitoring of the process. After the process, another visual inspection can validate that the ablation has been done where it was supposed to be.

Including a dichroic optic for wavelength splitting, an objective with its focus setting, an interference filter for getting a sharp image, and a ½" camera, the LS-View offers a direct visualization of the center of the laser scan field, with resolutions down to 8 µm.
In addition to XY positioning, vertical resolution is in the range of the laser Rayleigh length which allows a fast Z positioning of the workpiece without having to engrave it.
Directly connected to a computer through an ethernet interface, the LS-View's camera is displayed in our software KYLA®, a full micromachining software able to communicate with several stages, cameras, and lasers.
Alternatively, the image can be displayed on another software as any standard camera.

Key features

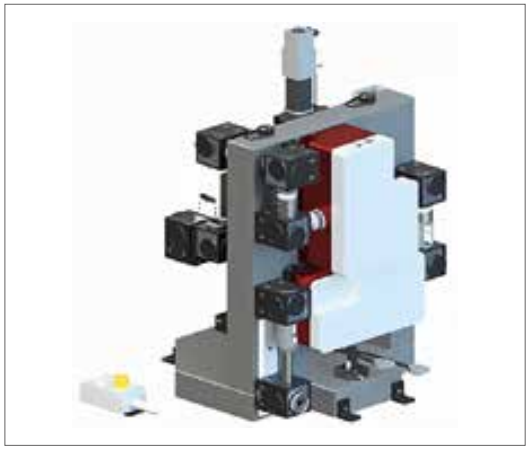
- High resolution image
- Less than 2% laser attenuation
- Focus setting

Mains specifications	LS-View IR	LS-View VIS	LS-View UV
Laser wavelengths	1.030/1.064 nm	515/532 nm	343/355 nm
Clear Aperture	22 mm		
Maximum power	50 W		
Maximum allowed energy (@300fs)	300 µJ	150 µJ	30 µJ
Maximum allowed energy (@10ns)	1 mJ	500 µJ	100 µJ
Transmission	> 98 %		
Observation wavelength	700 nm		
Reflection band (camera)	420 – 900 nm	615 – 900 nm	420 – 900 nm
Transmission band (laser)	990 – 1.600 nm	490 – 532 nm	340 – 360 nm
Size	251 x 115 x 85 mm3		

F-Theta objectives			
Focal length	50 mm	80 mm	100 mm
Field size	3.9 x 2.9 mm^2	7.2 x 5.4 mm^2	7.7 x 5.8 mm^2
Optical resolution	8 µm	11 µm	14 µm

These data can change according to LS-Scan input aperture, telecentricity, or lighting

LS-Lab



LS-Lab

The right set-up for micromachining

Just like a high-end micromachining system, this small lab set-up, combined with LASEA's beam management modules, allows performing high precision laser processes. Equipped with Nano positioning stages and an electrical cabinet for safety management, the LS-Lab is the link between OEM modules and a ready-to-use laser set-up.

Designed to give access to cutting, drilling (zero taper), texturing, marking, engraving, or thin film removal applications, this set-up is pre-mounted and aligned with the chosen optical configuration and is to be placed on an optical table, next to a laser. Nothing else is required to start micro-machining! Considered as a partly completed machinery, this set-up is a class 4 system, and therefore requires the use of safety eyewear and all the appropriate protections. It can easily be integrated into a class 1 environment as it already includes a safety shutter with several sensors, all checked by a safety controller.

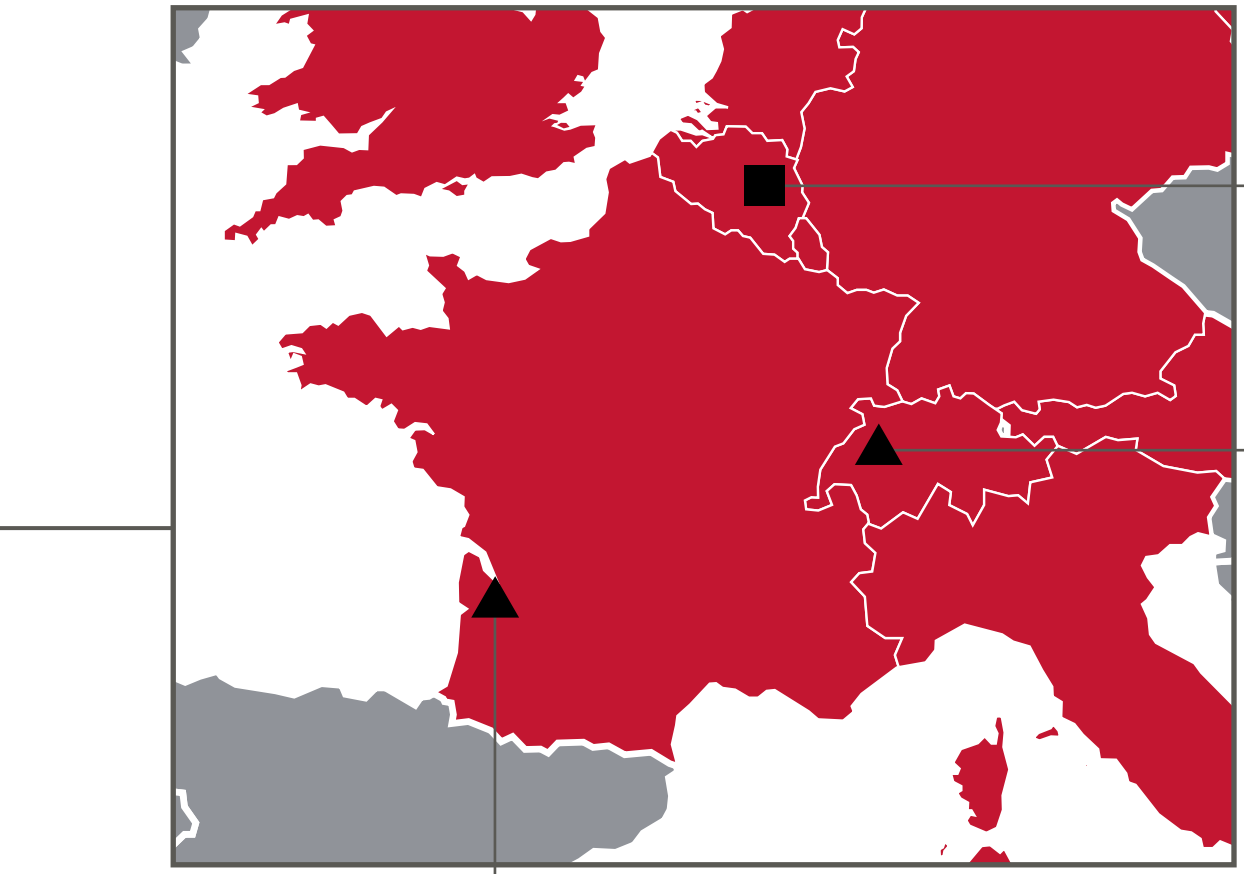
Key features

- 9 high quality beam benders
- 500 nm resolution
- 160 x 160 x 300 mm field
- Safety management
- Easy alignment
- Possibility to add LASEA's beam management modules:
    - LS-Shape
    - LS-Precess
    - LS-View
    - LS-Scan

Main specifications	LS-Lab
Available wavelengths	343 nm – 355 nm – 515 nm – 532 nm – 1.030 nm – 1.064 nm
Z stage	Z Travel of 300 mm Repeatability of +/- 1 µm Z accuracy of +/- 2,5 µm over the full travel Z accuracy of +/- 1 µm over 50 mm
Table	Marble
Sample holder	Suction system (vacuum pump not provided) with kinematic tilting base plate
Electrical cabinet	19'' 12U cabinet with several racks for safety, module, and stage management
Control panel	Movable control panel with emergency stop and reset pushbuttons, and various pushbuttons depending on the chosen options
Dimensions	600 x 600 x 1.050 mm
Weight	260 kg

Options	
Laser source	Nanosecond
Laser source	Femtosecond (see page 34)
XY axis	XY Travel of 160 x 160 mm Repeatability of +/- 100 nm XY accuracy of +/- 500 nm over the full travel XY accuracy of +/- 300 nm over 50 mm
Modules	LS-Shape LS-Precess LS-View LS-Scan
Objectives	Various objectives available with focal lengths from 10 mm to 254 mm
Fume extractor	Fume extractor with Hepa filters and nozzle

More than 250 laser systems throughout the world



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