

Roban-knife

Femtosecond laser Micromachining system

System features

- Femtosecond laser with 1030nm & 515nm
- Machine vision
- High precision laser machining
- User-friendly software tools control of entire system through single-window GUI
- Easily extendable system (like SLM)

Applications

- ◆ 3D direct laser writing
- ◆ Micro-cutting and drilling
- ◆ Surface micro- and nano-structuring
- ◆ Selective ablation
- ◆ Laser induced etching
- ◆ Internal modification of transparent materials



Photos of system

Principal optical system scheme

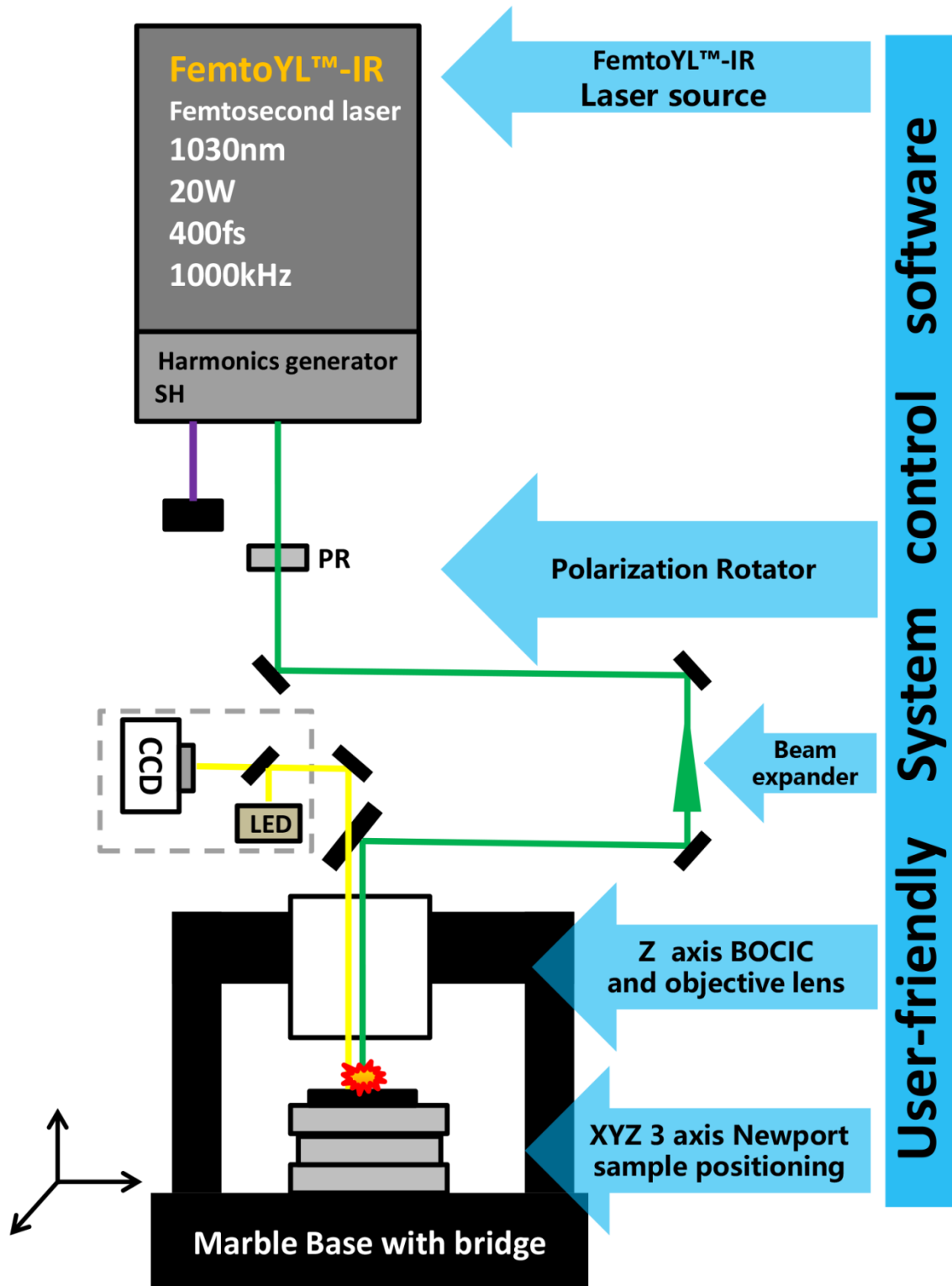







Figure.1 Femto-writer-1 principal scheme

System hardware configuration

Feature	Specifications	Value	Unit
Femtosecond laser source FemtoYL™-IR			
 	Wavelength	1030&515	nm
	Average power @1030 nm	20	W
	Repetition rate (tunable)	25-5000	kHz
	Pulse duration (tunable)	min<400 max 10	fs ps
	Pulse energy (tunable)	max.> 40	μJ
	Beam quality M2	<1.2	mrad
	Beam diameter (FWHM)	≈2	mm
	Burst pulse group	1-10	number

Sample positioning system 3 axis XYZ Newport positioning stages			
	Total travel XYZ	50×50×4.8	mm
	Resolution	XY 1 Z 60	nm nm
	Max speed	XY 300 Z 5	mm/s mm/s
	Repeatability	30	nm
	Max. Load	5	kg
	Mounted on Marble base	Yes	

Machine Vision			
	Optical magnification	0.58x-7.5x	number
	Max compatible sensor	2/3"	inch
	Interface mode	C type	
	Magnification mode	Motors Zoom Lens	
	Optical resolution	1600×1200	pixel
	CAMIF	Gigabit Ethernet (1000Mbit/s)	
	Frame rate	39	fps
	Pixel Size	3.75	μm
Working distance	Infinite to pupil of objective		

Set of focusing optics			
	Magnification	From X10 to X80	
	Numerical aperture	From 0.15 to 0.8	
	Working distance	From 20.2 mm to 1.25 mm	
	Transmission (@1030 nm)	>80 %	
	Transmission (@515 nm)	>80 %	

Beam delivery



Dielectric mirror HR 45 deg	R >99.5%
Wavelengths	1030 nm , 515 nm
Clear paperture	25.4mm
No dispersion	
Mounted in standard two-adjuster kinematic mirror mounts	

Safety laser goggles



Lens material	Resin
Optical Density	4+ (190-535 nm); 4+ (730-1090 nm); 4+ (1030 nm)
Visible Light Transmission	80 %

Power meter (optional)



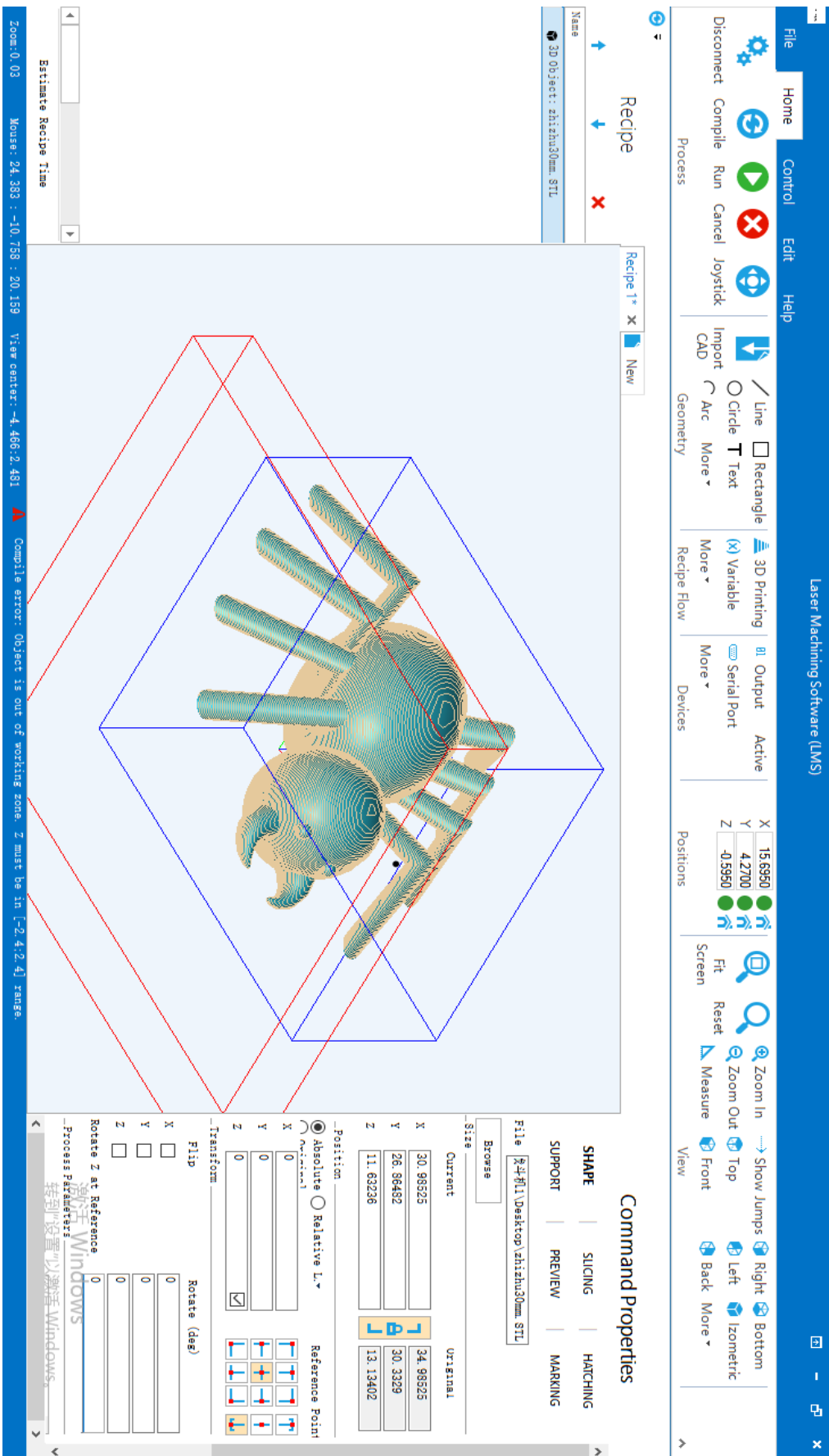
Max. measurable power	15	W
Aperture	17	mm
Spectral range	0.15 – 20	μm
Auto calibration		

System configuration

Main components of the system are listed in quotation. Minor components and exact configuration is determined during system design stage. Set of spare optical components (mirrors, beam splitters, polarizers) is included in the system quotation.

System should be installed in cleanroom (ISO 6/7 equivalent) environment with controlled temperature (21 ± 2 °C) and humidity ($40 \pm 10\%$).

User-friendly software



Applications

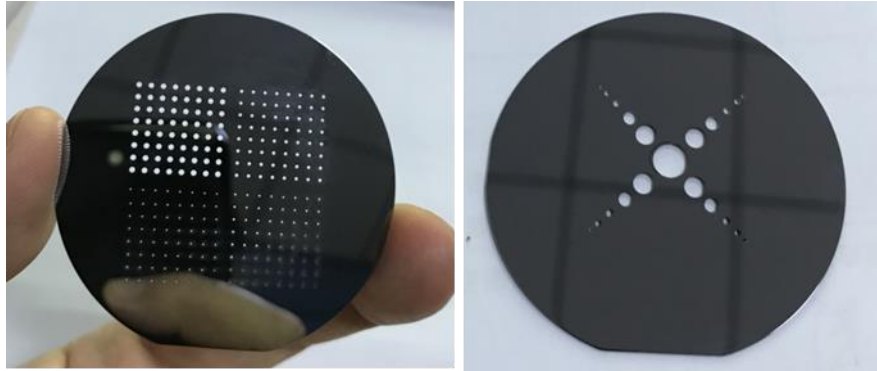


Fig1. GaAs (thickness: 300 μm , Diameter: 2inch) drilling, On the left the diameter of hole are 800 μm 、500 μm 、300 μm and 200 μm respectively. On the right the diameter of hole are 5mm、3mm、2mm、1mm、800 μm and 500 μm respectively.

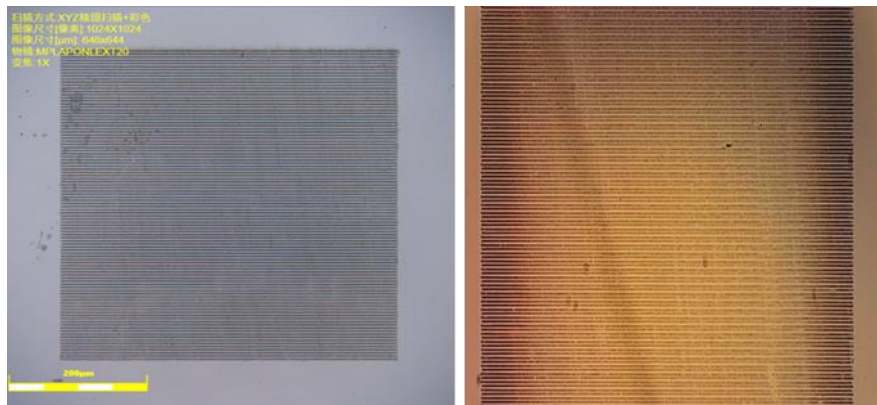


Fig2. Sapphire surface femtosecond laser ablation. On the left is a grating of 2 μm period, and on the right is a grating of 3 μm period.

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