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UpTek Solutions Corp.

Imperay

Large Scale Micromachining System

Features

- Integrated multi-axis high-precision positioning platform
- Stable marble gantry support structure
- Compatible with most ultrafast laser systems
- Modular design of beam transmission system
- Feature-rich laser processing head
- Customizable double station structure

The Imperay large scale micromachining system integrates the Aerotech five-axis high-precision positioning platform and the UpTek Solutions industry leading high-power, high-stability femtosecond laser.

The Imperay large-scale micromachining system has excellent performance in the fields of precision etching, welding, cutting, drilling and microstructure fabrication.

ImpeRay system uses a granite gantry frame structure design, which ensures the stability of high-precision machine tools and optical systems. The user can choose the scanning galvanometer machining head, spiral beam scanning machining head, high numerical aperture objective machining head, and can also customize the dual work station solution to configure dual processing heads to meet more processing needs.

UpTek's offers more than a decade of experience in the field of femtosecond laser ultra-precision machining.

UpTek Solutions
Ultrafast Laser and Applications

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Machine head options

- Scanning galvanometer machining head
- Spiral beam scanning machining head
- High numerical aperture objective machining head

Imperay Platform parameters

	X	Y	Z (2)	B	C
Travel (1)	600mm	300mm	200mm	±90°	360°
Accuracy	±1μm	±1μm	±1μm	3arc sec	6arc sec
Repeated positioning accuracy	±0.4μm	±0.4μm	±1μm	1arc sec	3arc sec
Resolution	5 nm	5 nm	0.1μm	0.06arc sec	0.2arc sec
Maximum speed	2000 mm/s	2000 mm/s	220 mm/s	600rpm	600rpm
Maximum load	150kg	150kg	60kg	100kg	20kg

Note: (1) Platform travel and other parameters can be customized.

(2) Double Z-axis double work station system can be provided.

Imperay Laser parameters (1)

	Ti:sapphire/Astrella	Yb:KGW/Pharos	Yb:KGW/Tangor
Pulse width	≤100fs	≤290fs	≤350fs
Output power	≥5W	10W,20W	50W,100W
Repetition rate	Up to 10KHz	Up to 1MHz	Up to 1MHz
Central wavelength	790±10nm	515nm,and 1030nm	515nm,and 1030nm
Spot pattern	M^2 ≤1.3（TEM_{00}）	M^2 ≤1.5（TEM_{00}）	M^2 ≤1.5（TEM_{00}）
Energy stability	<0.75%RMS	<0.5%RMS	<0.5%RMS
Contrast	>1000:1 pre pulse >150:1 post pulse	>1000:1 pre pulse >150:1 post pulse	>1000:1 pre pulse >150:1 post pulse
Beam stability	<20 μrad/° C	<20 μrad/° C	<50 μrad/° C
Spot size（$1/e^2$）	~6mm	~3mm	~3mm
Polarization state	Linear polarization, horizontal direction	Linear polarization, horizontal direction	Linear polarization, horizontal direction
Dimension	1234×768×305	640×410×305	640×410×305

Note: (1) The system is compatible with a variety of models and parameters of femtosecond lasers, you can contact the manufacturer according to specific needs.

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Applications

- Femtosecond laser precision etching
- Femtosecond laser precision cutting
- Femtosecond laser precision drilling
- Femtosecond laser precision welding
- Femtosecond laser 3D microstructure fabrication

Optional processing module (1)

Scanlab scanning galvanometer (for laser marking)

Light aperture	10 mm
Maximum scanning Angle	±15°
Marking speed	2 m/s
Jump speed	12 m/s
Repeatability	2μrad
Nonlinearity	＜0.5%
Typical processing format (2)	70×70

Note：(1) The following modules are optional accessories;(2) use f=100mm field mirror.

Spiral beam scanner (for precision drilling)

Optical speed	3000 rpm
Depth-diameter ratio	10:1
Beam Angle （f=100 mm）	0~5°
Aperture range（f=100 mm）	100~600 μm
Aperture error	±3μm

High numerical aperture objective (for precision etching and cutting)

Magnification	Numerical aperture NA	Focusing power(μm)	Focal depth（μm）	Working distance(mm)	Focus(mm)
×5	0.14	2	14	34	40
×10	0.28	1	3.5	33.5	20
×20	0.42	0.7	1.6	20	10
×50	0.55	0.5	0.9	13	4
×50	0.42	0.7	1.6	20.5	4
×80	0.5	0.6	1.1	15	2.5
×100	0.7	0.4	0.6	6	2
×100	0.55	0.5	0.9	13	2
×200	0.62	0.4	0.7	13	1

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