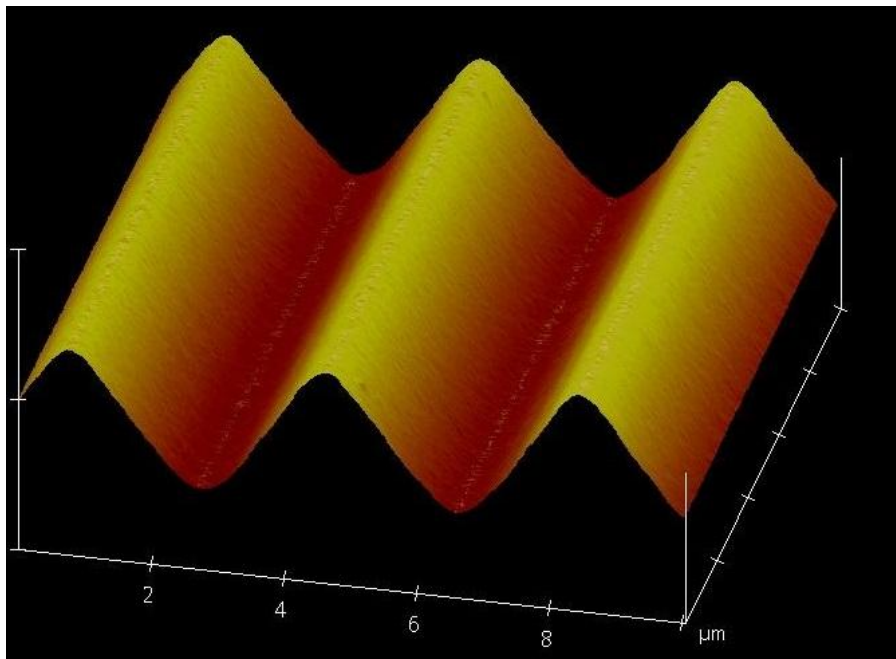


PICO MASTER

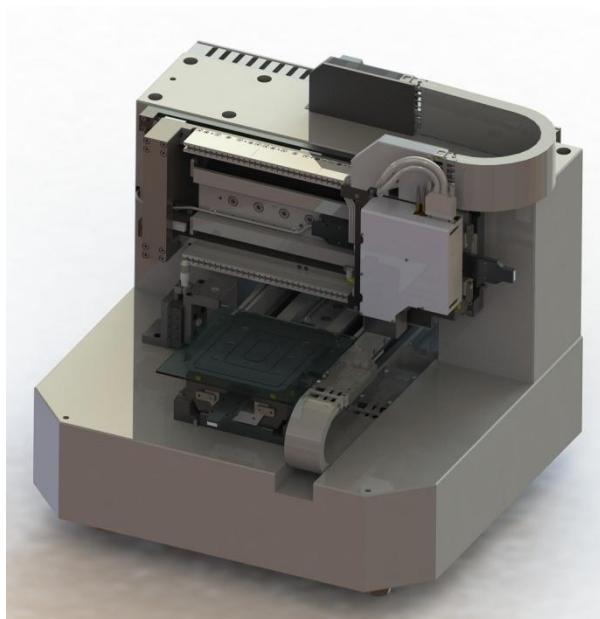
UV direct laser writer
for maskless lithography



Introduction

The PicoMaster is a versatile UV laser writer with ultra high precision components, specifically designed to give the user the highest degree of freedom to create micro structures in photo sensitive layers. The rasterizing principle of the machine ensures proper and constant exposure over the whole surface. Scanning the substrate at high speed and stepping the laser head with a software adjustable pitch.

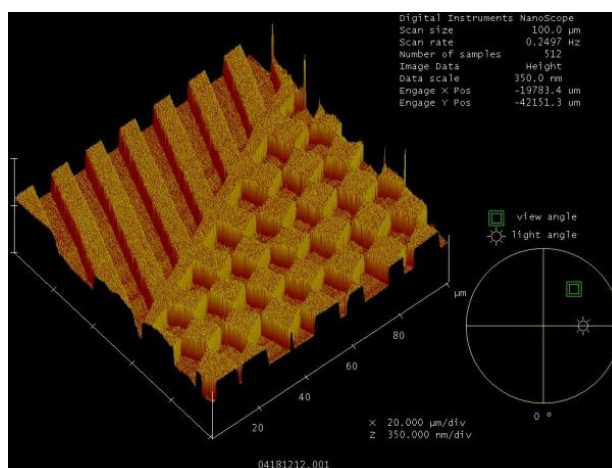
Supporting up to 255 levels of grayscale or pure binary mode allows for 3D optical structures, surface structures as well as mask projects makes the PicoMaster the ideal Litho tool for R&D as well as production.



The PicoMaster is a standalone, fully enclosed system. All required components, including control rack and vacuum pump are within the enclosure, which allows for quick and easy installation.

When connected to an air conditioning unit to supply conditioned air, a build in Hepa filter will create a clean cross flow.

The massive base frame supported by isolation mounts filter out ground frequencies to ensure minimum vibrations in the system.



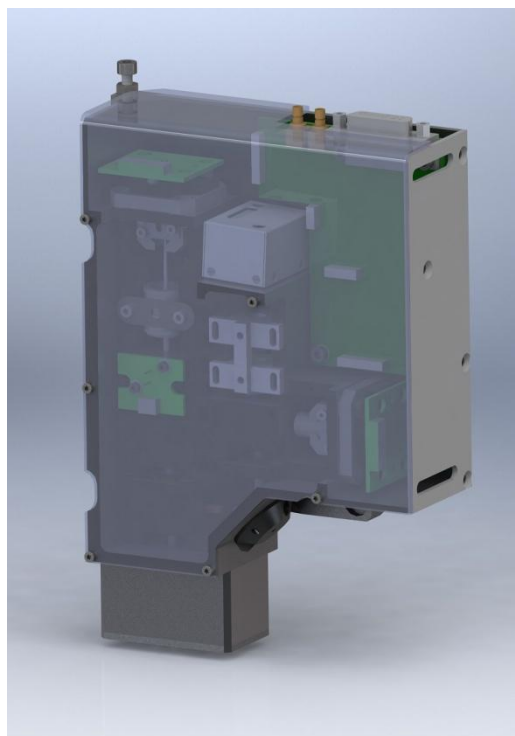
Sample of binary mode image

Optics

The full optical path is contained in a small easily changeable module. By keeping the optical path as short as possible, the pointing stability is greatly increased.

The laser controlled autofocus system automatically corrects for surface errors or wedge shaped substrates.

Auto NA switch on request.



Optical properties	
Wavelength	405nm (optional 375nm)
Spot size	280nm FWHM
NA	0.85 (optional 0.9). Smaller on request
Intensity	Max 3mW in the spot. Software controllable.
Autofocus	2Khz bandwidth, red laser controlled -0.5...x...+0.5mm height variation.
Focus offset	Adjustable by software control.
Wafer thickness	0...10mm, mechanically adjustable.
Wafer size	Max 230x230mm
Exposable area	Max 225x200mm (speed depended)
Data rate	Standard 10Mhz. @400mm/s scan speed, this gives a 40nm address grid.

Mechanics

Both the scan and step axis incorporate high precision dove tail air bearings which are driven by linear motors with nanometer resolution encoders. This system allows for extreme low mechanical errors and fast scan movements.

Substrates are clamped down by using a vacuum chuck. Vacuum chucks are easily exchangeable to support different wafer sizes.

Mechanical properties	
Stroke Scan and Step	Max 230mm.
Repeatability	<20nm
Resolution	2nm
Scan speed	Max 450mm/s
Scan acceleration	Max 15000 mm/s ²
Straightness axis	< 1µm over 250mm
Mechanical alignment	<0.1mm
Optical alignment	On request

Performance

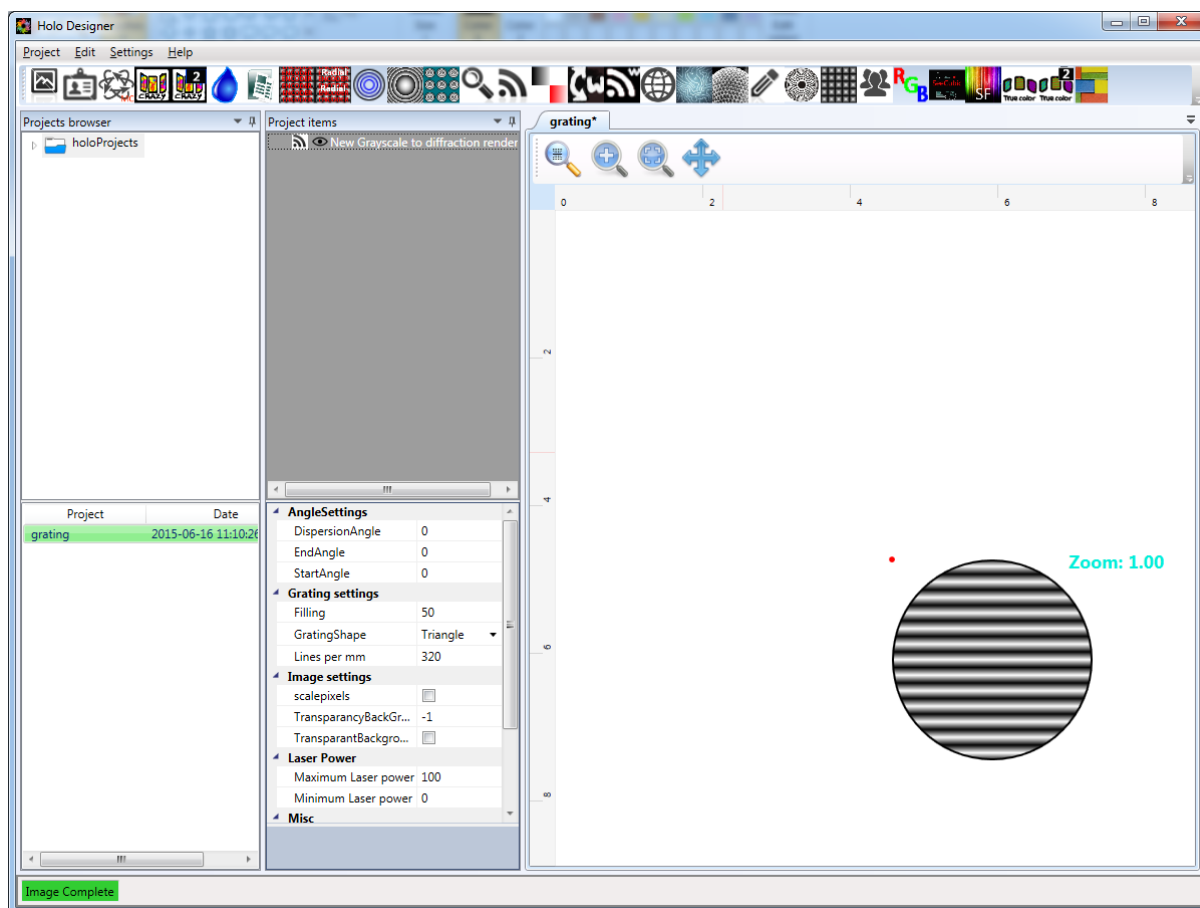
Performance specifications	
CD ¹	Min 0.3µm
Intensity uniformity	<0.5%
Autofocus uniformity	<0.5%
Write speed ²	1mm ² per minute
Address grid	Standard: 40nm in scan direction and 100nm in step direction. Software selectable down to 10nm in both directions.

¹Critical Dimension of the PicoMaster strongly depends on process parameters, such as resist types and layer thickness.

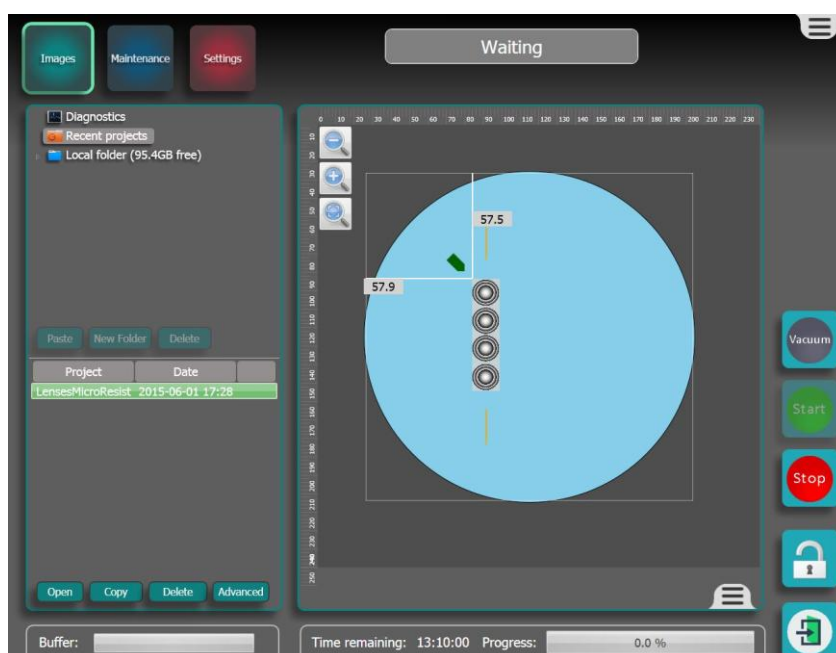
²The speed depends on the selected address grid.

Software

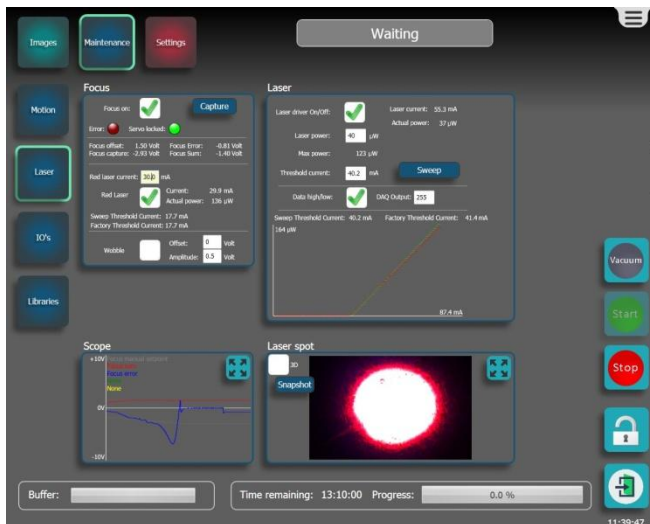
The Picomaster comes with two windows based applications, the PicoMaster Machine controller and the Designer. The Designer allows the user to select features and combine images while the PicoMaster Machine controller processes these jobs and control the machine. Jobs are processed on the fly, limiting preparation time to the minimum.



Screen shot of the visual designer software.



The PicoMaster machine controller allows the operator to queue jobs, monitor progress and gives a high level of manual control features.



Manual functions to monitor laser quality and stability, including spot camera.

Supported formats

Standard binary sources

GDGII, Oasis
Optional: Gerber

Supported but not recommended Graphics

DXF

Parameterization

Bitmaps

3D sources

Basic shapes can be configured without source files.

grayscale bitmaps, Parametric
Optional: STL

Although not required, it is highly recommended to run the designer software on a separate Windows based computer.

Optional Holographic libraries

The PicoMaster comes optionally with an extended set of libraries specifically for holographic structures. Each library is a plug-in software module to the designer software. This allows for individual updates or new features to be added over time.



Some of the standard available libraries specifically for holographics.

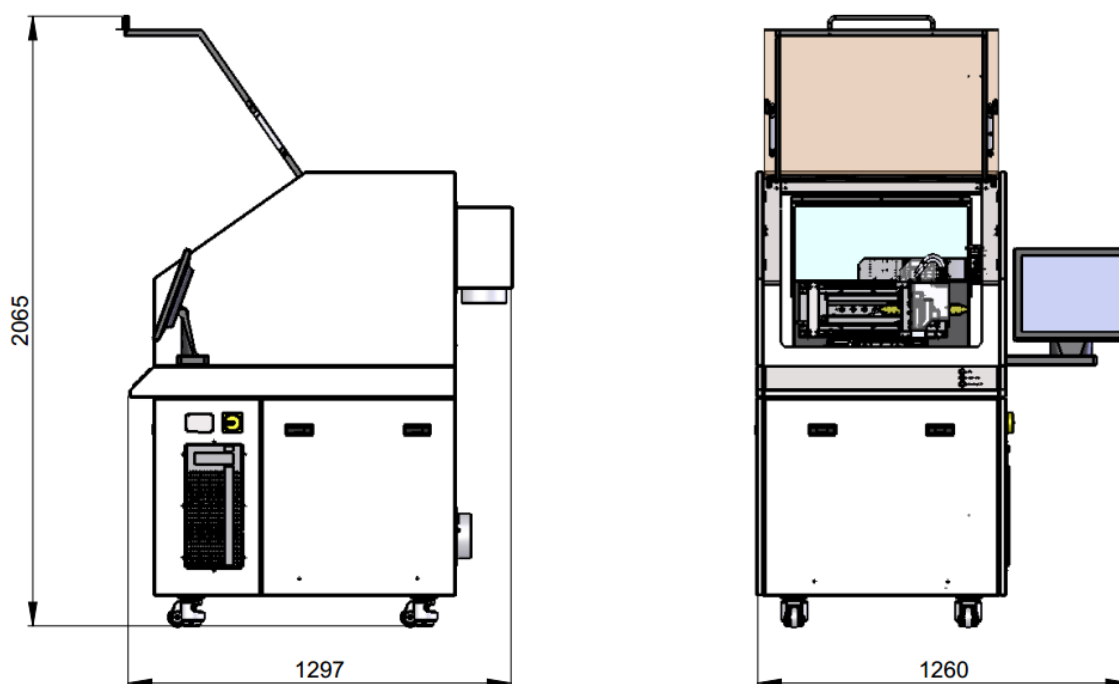
Micro images	Copies b/w bitmaps to micro format. Can be used for micro text or micro images
2D/3D images	Creates colored images with high reflectivity.
Covert images	Hidden images which are only visible when illuminating with a point source laser.
Stereogram	Animated images with multiple frames
True color images	Stunning true RGB images
Bas relief	Outputs images which give a strong height effect.
Switch	Flip true different images when tilting the object

Image sources: Black/white bitmaps, Grayscale bitmaps, 32bit color bitmaps (including transparency)

All features come with programmable frequencies, angles, dot sizes and shapes. Using analog mode instead of binary mode even more effects are possible to achieve.

The proprietary designer software allows the user to combine many features and effects and create complex projects with ease. The PicoMaster processes these projects on the fly. No Pre-Processing is required.

Installation requirements



Dimensions.	
Width	With fixed screen: 1260mm. Without screen 900mm
Height	To ceiling: 2065mm.
Depth	1297 mm
Weight	700kg
Electrical connection	230V AC, max 1kW
Compressed air	5-7 Bar
Ethernet	For server connections and remote access
Conditioned air piping ¹	Ø 150mm in and out
Environment	Clean room ISO class 5 or better.
	Room Temperature 21°C +/- 1°C
	Room Humidity 45-70% RH

¹ It is strongly recommended to use an air conditioner with recirculation option to maintain optimal process conditions within the PicoMaster. A conditioner can be supplied as option.