

Key points about Optec MicroMaster

Optec MicroMaster for UV Micromachining

- Optec MicroMaster is a complete small footprint workstation for UV laser micromachining, and includes excimer laser, sophisticated beam delivery optics, precision part motion, & flexible control software. The only thing the customer has to buy are the gases used by the laser itself.
- Unlike most laser systems, MicroMaster is NOT a focal point processing machine. Instead, the laser beam is used to illuminate a mask, whose image is then projected onto the part at selected optical demagnification. Typically, different mask motifs are combined with laser firing and part motion to build up the desired complete machining pattern on the workpiece.
- Every time the laser is fired, a layer of material on the order of 0.1-1 μ m thick, is removed from the area defined by the mask motif, whose size on the part is typically in the range 10-1000 μ m, with μ m-scale resolution. Most polymers(not PTFE) can be machined, as well as hard materials like ceramics; many applications involve selective removal of layers from sandwich-like structures.
- Typical applications are in electronics packaging & display devices, medical devices, microfluidics..

Basic System Architecture

- The laser source is housed in the machine base.
- The beam delivery unit (BDU) is the Optec LightDeck, an integrated unit which accepts different mask options and provides PC control of UV demag. and focus/depth, as well as part vision systems.
- The LightDeck accepts two main types of s/w driven mask options;- a) mask selectors, which select one of a number of alternative fixed motifs, & b) dynamic masks, which use a single motif of adjustable size/shape.
- Part motion is X,Y, with theta option; part fixture options include vacuum chucks and rotary fixtures.
- MicroMaster s/w control uses Optec ProcessPower.

Key Strong Points

- The ONLY system with continuously variable demag. under s/w control.
- Optec design confocal 3-element process lens, with 1.5 μ m resolution and TTL(through the lens) vision over the demag. range, means that when the part is in focus on the CCTV monitor, the UV is automatically in focus, with the machining area highlighted. WYSIWYG,- what you see is what you get.
- ProcessPower s/w is a highly developed user interface, including video measuring cursor, beam profiler, user-friendly process and set-up routines,- and accepting industry standard CAD input.
- Exclusive use of ATL SP300i short pulse excimer, patented sliding discharge, with the highest beam brightness of its class,- available in 248nm or 193nm versions.
- System is reconfigurable, and memorizes alternative settings, for e.g. with different operators. When the LIN-50 mask selector is used in combination with the MVA(motorized variable aperture), an infinite number of combination motifs can be created and stored in PC memory as 'virtual' masks for later recall.
- Holistic & ergonomic system design for operator ease of use & small footprint

LightDeck Optics Platform Features

- Composite honeycomb core on cast Al base.
- Independent 'P' & 'M' axis control(see LightDeck leaflet), with permanent front panel readout of optics positions
- Easily interchangeable pre-aligned optics, and accepts different mask options and beam forming modules.
- Includes TWO independent vision systems(TTL and off-axis) plus FOUR lighting sources, for optimal part lighting/contrast, including highlighting.
- Precision energy control is provided by rail mounted Optec AT4020 energy controller run by system s/w.
- LightDeck BDU and part handling mounted together on a synthetic granite frame for stability.

MicroMaster Performance/Cost Ratio

MicroMaster is the most fully equipped general purpose turnkey workstation on the market, with unique ProcessPower s/w. Depending on options, typical ex-works system cost is EUR145-175k. 60+ systems are installed worldwide.

Sanity Check

Always do a quick check to see if the application may be feasible. Assume 5-10mJ incident on the part. Polymers/thin films require 2-4J/cm²(ceramics/metals >10J/cm²); each shot removes around 0.3μm depth. Maximum rep. rate 300Hz. Gas fill lifetime 5M shots. Consult Optec if in doubt.

How to Select Options

- Consult MicroMaster leaflet for performance data & some options.
- Determine if the process requires standard 248nm, or optional 193nm.
- Decide if Theta option is required.
- Decide on part fixturing,- standard issue octagonal vacuum chuck(large flat parts), combination fixture (small vacuum chuck plus PHI axis rotary fixture), or consult Optec for custom fixtures
- Choose mask option;-

Universal Mask Holder;- 40-P rotary selector;- LIN-50 linear selector;- 2xMA15P;-	simple 2 axis manual holder, standard issue 40 motifs, PC control 10 motifs, PC control manually controlled rectangular variable aperture, available in four blade control version or /S version with symmetric opening.
MRA N.B. LIN-50 + MRA	motorized version of 2xMA15P/S combination allowing virtual motifs, also requires additional CM controller
Custom	special mask options on request
- Choose gas control option;-

Universal Manifold Debris Control Nozzle	provides shield gas + fume extraction coaxial gas nozzle, better debris control, but more difficult access to part, and some limitation on part vision contrast; useful mainly for flat parts.
---	---
- Specific Requirements;- Consult Optec.