

ULTRA-SHORT PULSE MACHINING (USP)

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PERFORMANCE FEATURES

- micromachining of all types of material
- "cold ablation" - no to hardly any thermal damage to the material
- no burr formation or melt adhesion, hardly any reworking of loosely lying dust particles
- extremely high reproducibility
- surface structuring
 - > from intact colour change,
 - > via defined structural change (def. roughness values)
 - > up to extreme depth removal of several millimetres
- minimum layer removal is in the sub-micrometre range
- typical concity approx. 1/3 of the material thickness
 - > vertical bores, cuts or undercuts (on request)

PROCESSING OPTIONS

- different laser sources/systems with pulse lengths from pico- (10-12s) to femtoseconds (10-15s) and wavelengths of 1,030 nm (IR), 515 nm (green), 355 nm (UV)
- lateral structure resolution up to 5 µm
- depth resolution down to less than 1 µm
- processing space: approx. 500 x 600 x 75 mm³
- structuring of tubes with maximum diameter of up to 90 mm and maximum length of 300 mm
- scanner processing (remote), fixed optics (drilling optics with gas support), Z-sensor for ablation measurement and image processing possible in one set-up
- automatic image recognition of position features

TYPICAL APPLICATIONS

- cutting of thinnest foils without distortion with smallest web widths and slits (burr- and distortion-free, similar to etching quality)
 - > filters, screens, shadow masks, stencils, gauges, shims, spacer plates, squeegee masks
- introduction of predetermined breaking points in brittle-hard materials for subsequent separation
- creation of microstructures in materials that are difficult to etch or cut
 - > cavities in ceramic substrates for the insertion of so-called bare chips
 - > channel structures for microfluidic applications (reactors)
 - > separation of surface structures through structured channels
 - > aluminium oxide, zirconium oxide, silicon nitride, silicon carbide
- structuring of coated components (decoating)
 - > electrical layer separation on full-surface sputtered hollow ceramic cylinders
 - > electrical and mechanical decoupling of electrolytically or galvanically applied copper layers on ceramic or plastic bodies
 - > selective removal of cover and protective layers on circuit carriers
- creation of defined surface structures for special moulding, adhesion and friction properties
 - > tempered functional surfaces on injection moulding tools
 - > holders and clamping claws made of non-machinable materials
- introduction of special surface geometries with small depths to improve friction properties
- laser drilling of micro-holes, also in multiple arrangement
- cutting of ceramic and metallic materials without thermal interaction - due to the increase in quality, finer structures and layouts are also possible
- clean, stress-free processing of plastics/ PCB materials without carbonisation of the cut edges (FR3, FR4, FR5, polyimide, Kapton®/ Py-ralux®)

diversity of materials and applications.

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