Lasers in electronics production

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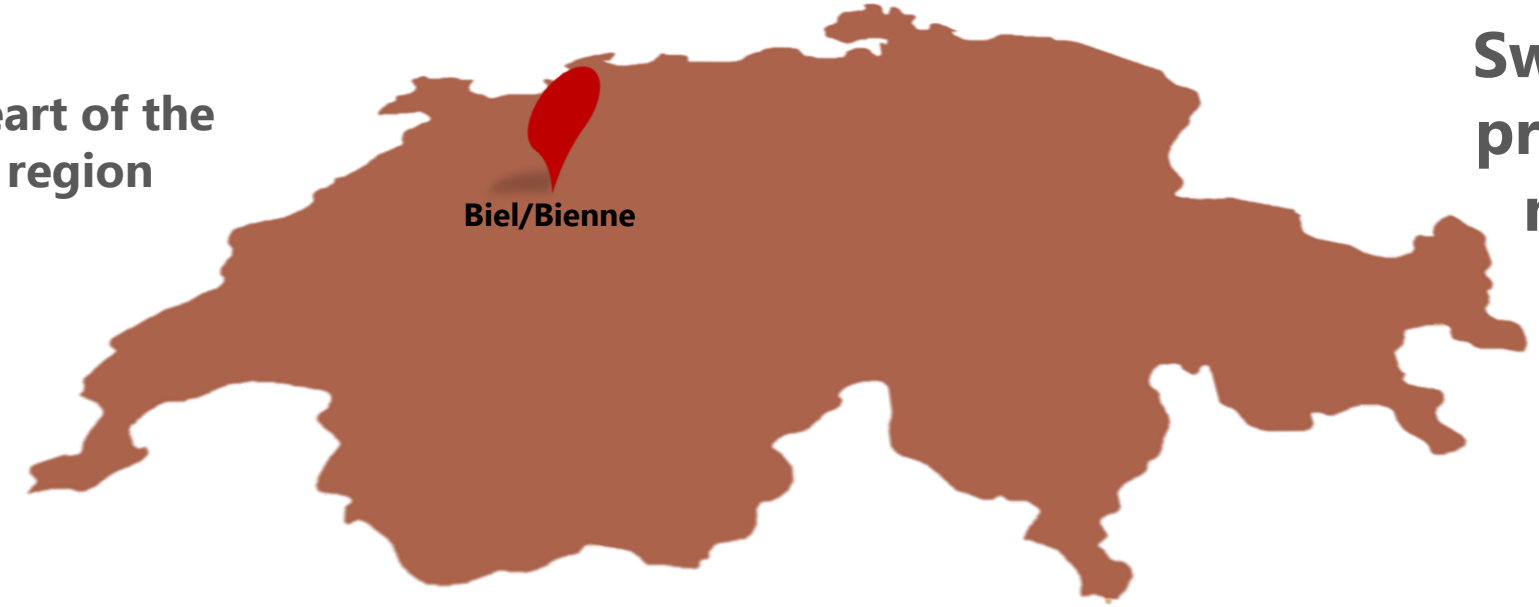
Posa - to put
Lux - Light

From Radium to Laser

Located in the heart of the watch making region



Swiss manufacturer providing high-end micromachining equipment

Providing high-tech micromachining solutions

Since 1943 | Headquarters in Biel/Bienne, Switzerland.

- **Expertise in high-tech micromachining** solutions tailored to meet the evolving needs of the industry
- **Proven reliability:** Trusted for durable, high-precision performance in mass production environments
- **Market leadership:** Committed to continuous innovation and excellence in micromachining technology
- **Innovation at the core** of our work, driven by our people to create machines that exceed expectations

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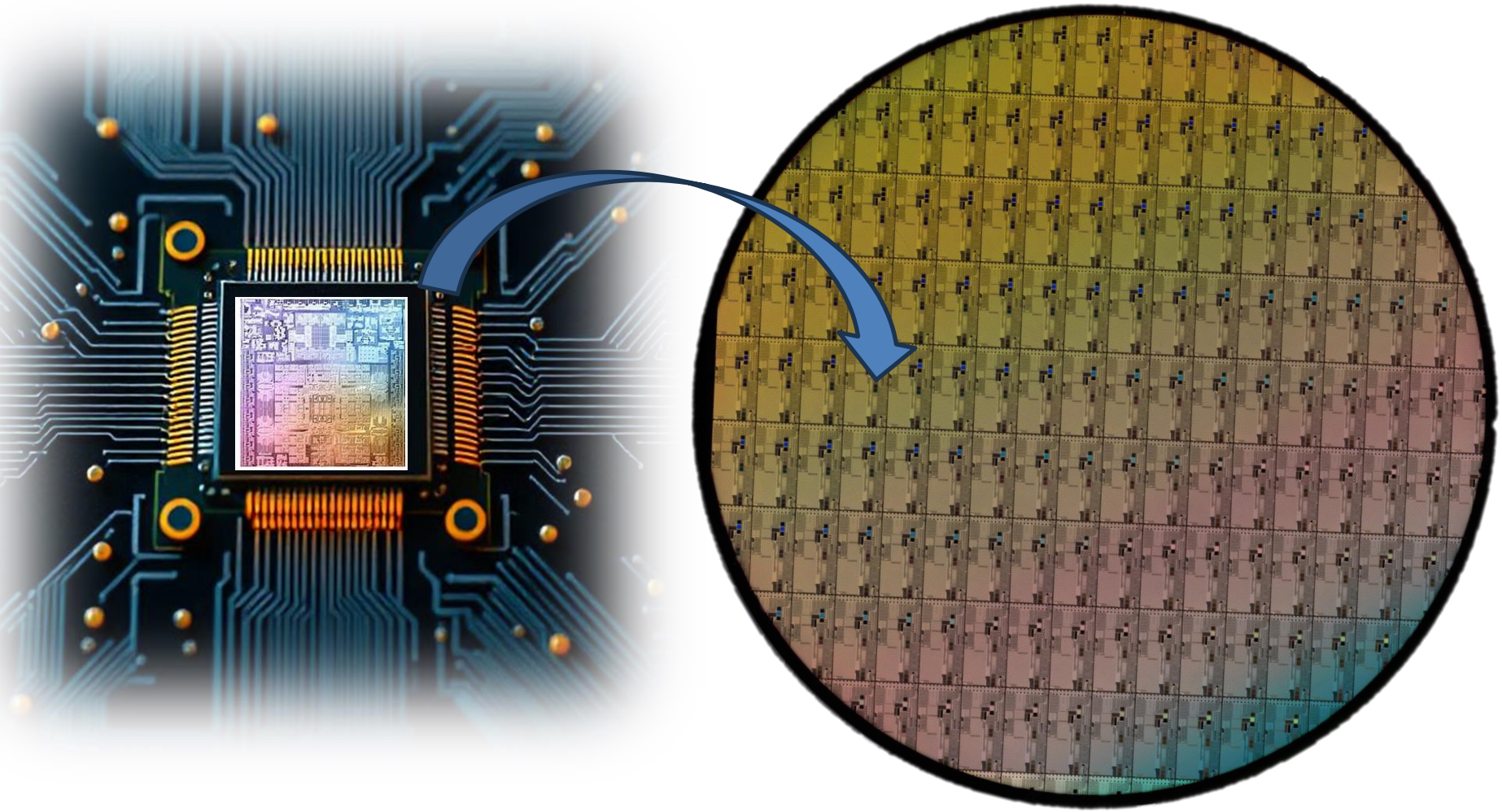
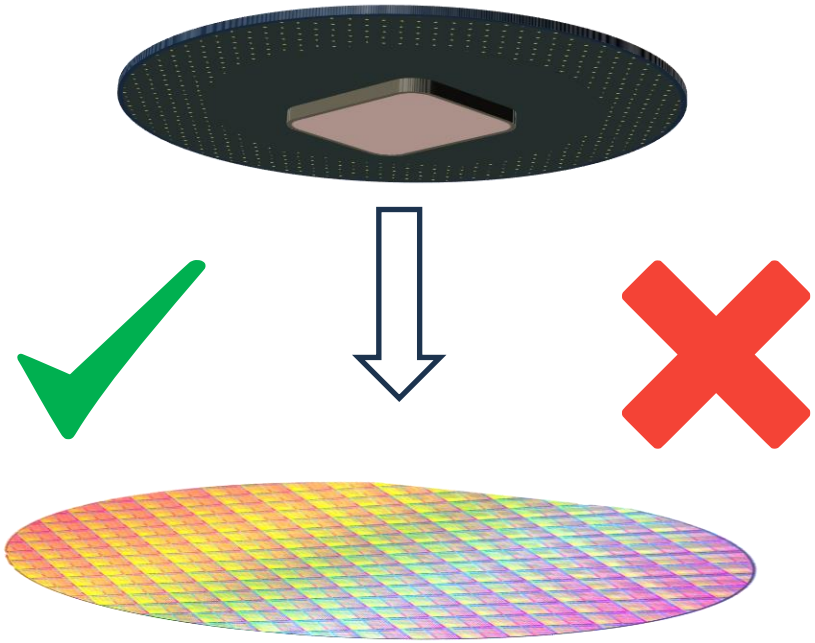
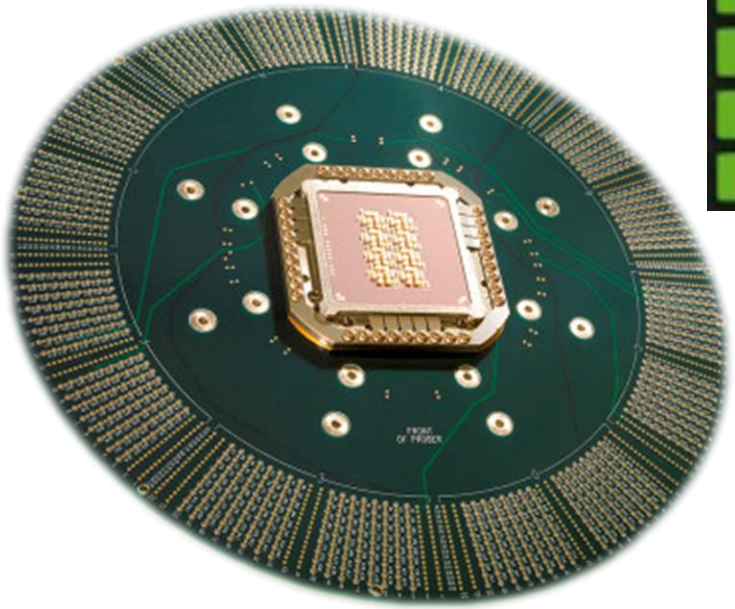
What is Electronic Test Equipment? – Understanding Probe Cards

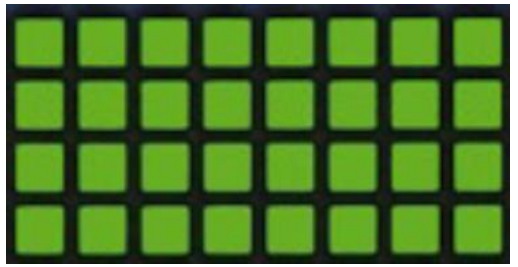


- 100s of chips manufactured per wafer
- Low yield rate of high end complex chips. E.g. Apple M3 chips had yield had as low as 55% yield rate during early production. (www.laptopmag.com)

What is Electronic Test Equipment? – Understanding Probe Cards







Guide plate

Probes

Probe cards are instruments used to electrically inspect semiconductor wafers. They provide an interface between automatic test equipment (ATE) and the wafer, allowing for testing of integrated circuits (ICs) before they are diced and packaged. These probe cards have **metallic probes** that align with the test point pads on the semiconductor wafer and send signals through them.
These probes are held in place by a **guide plate**—a highly precise component that guides the probes towards the test point.

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The Challenge – Smaller Chips, More Complexity

2nm technology can pack 50 billion transistors on a chip the size of a fingernail

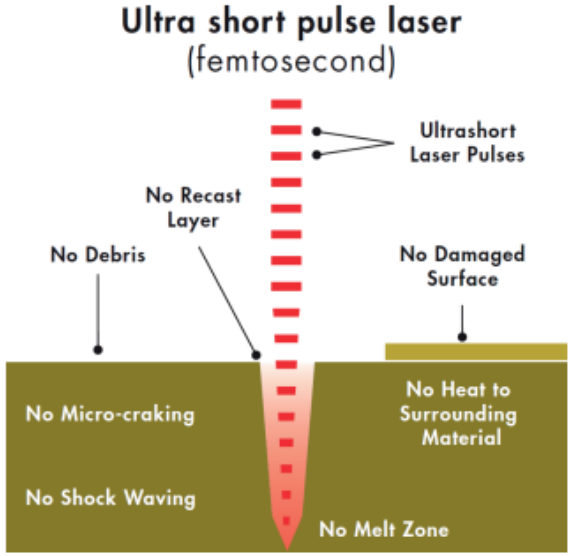
- Hole diameters continue to shrink: down to 20 µm and smaller
- Wall thickness (between holes) ≤ 10 µm
- Position accuracy ≤ ± 2 µm
- More holes are needed per guide plate—up to hundreds of thousands per plate

E.g. 100 k holes drilled @ 3secs per hole will take 83 hours of drill time only. Missing the above-mentioned accuracy will result in scrapped hardware

The Engine Behind Precision

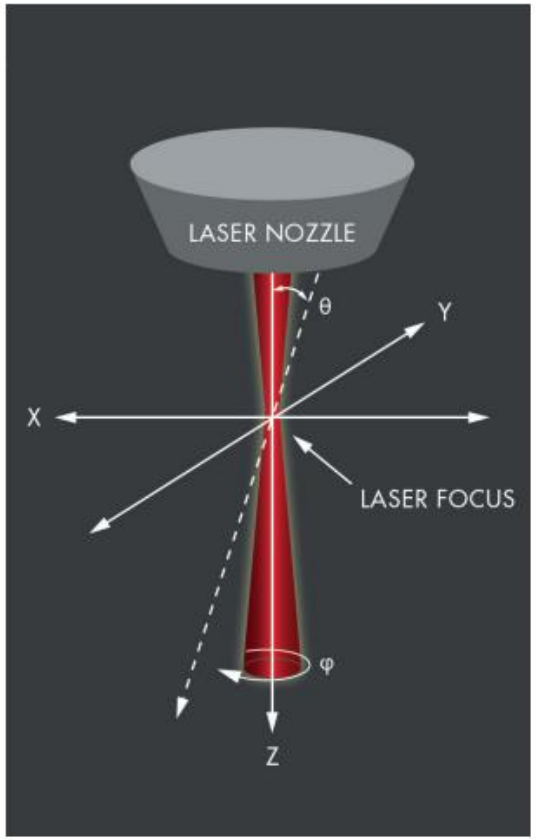
Ultrafast lasers

- Ultrashort pulses laser source (< 300 fs)
- Precession head with 5 optical axis
- High precision positioning X-Y table
- Interchangeable clamping devices
- Robust and multifunctional software
- Focal length measurement (autofocus)
- Powermeter for laser stability check
- Thermal stability control
- High resolution camera for repositioning jobs



5-axis precession head

- Allows complete geometry achievement
- Avoids any damage on hole shapes



Rigid, thermally stable machine

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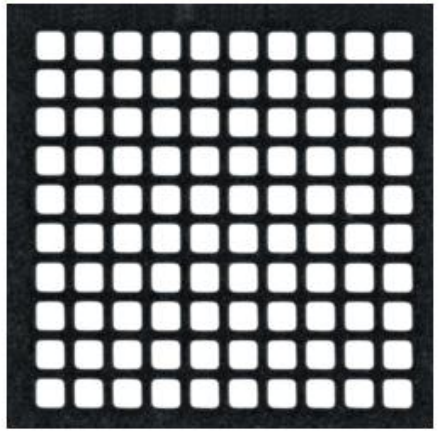
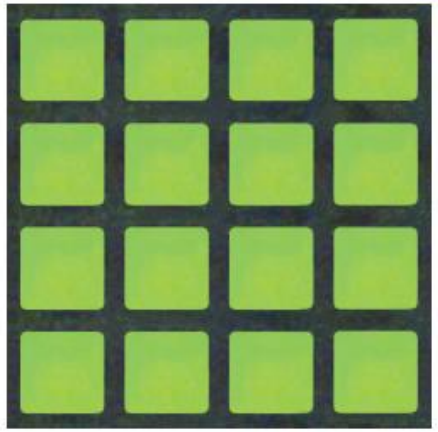
Hole Geometry

Square holes 25 x 25 µm in Si_3N_4
Material thickness 300 µm

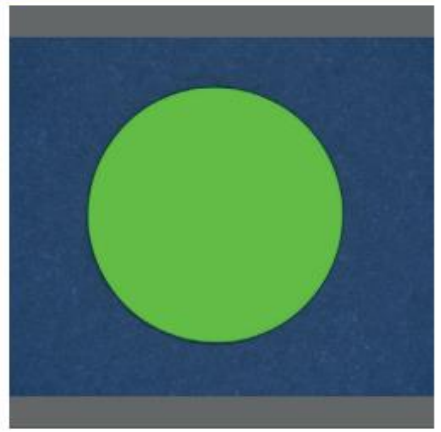


Wall thickness ≤ 10 µm
Corner radius < 4 µm

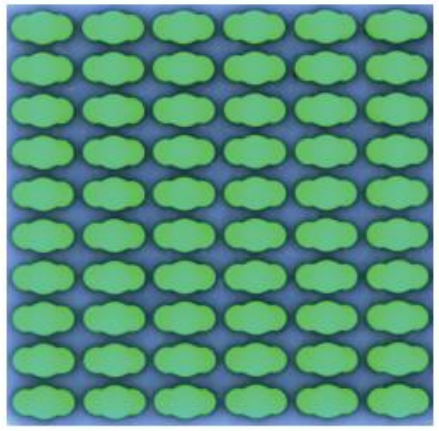


Round holes Ø 30 µm in Si_3N_4
Wall thickness < 10 µm

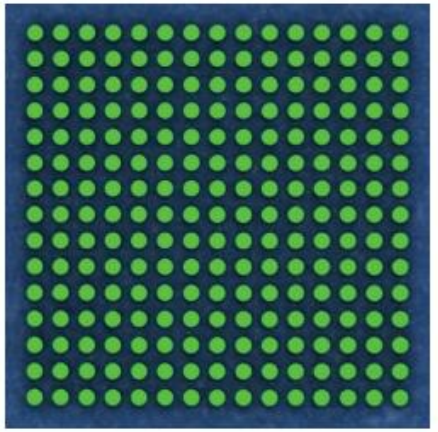
Reference hole Ø 2 and 3 mm
in ceramic or polymer material



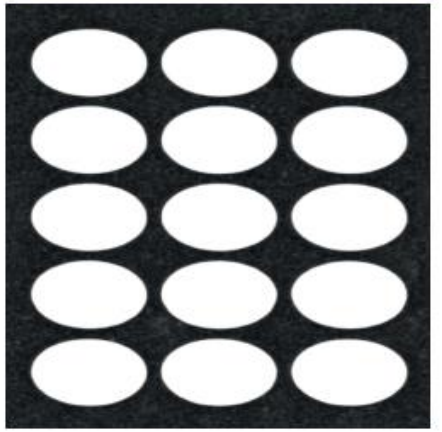
Cloud holes in Photoveels IIs



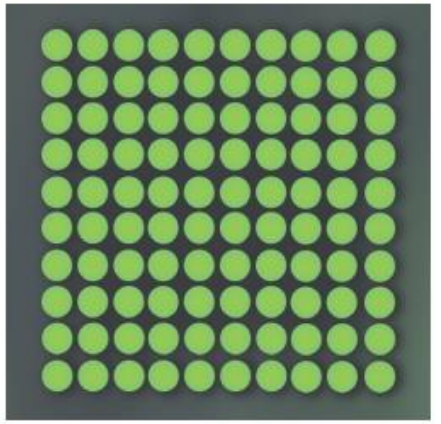
Round holes Ø 20 µm in Si3N4



Oblongs Ø 80 - Ø 90 µm
in Photoveel IIs



Round holes 30x30 µm in PPS
or S1000, material thickness 350 µm



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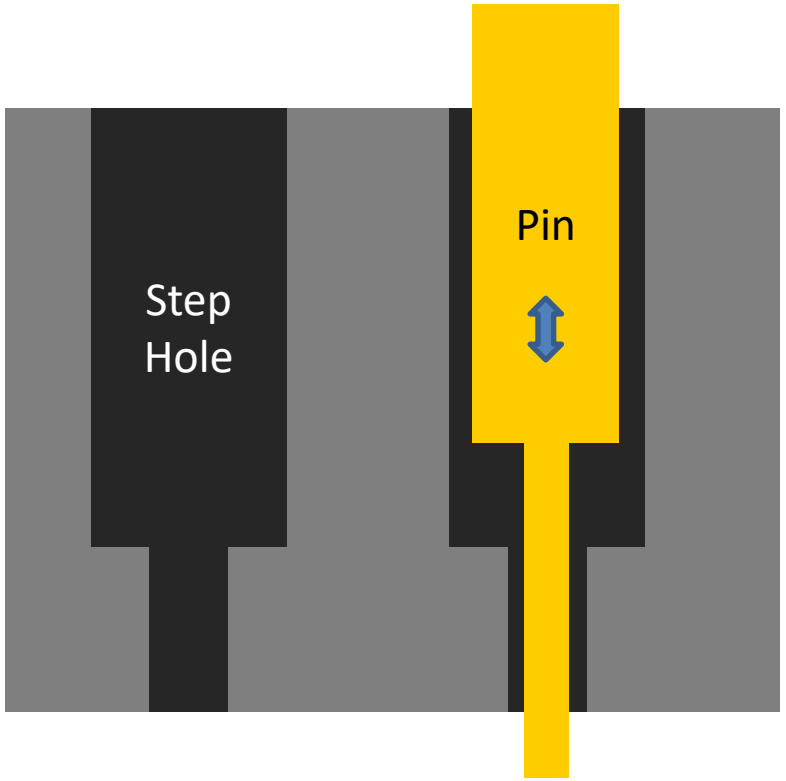
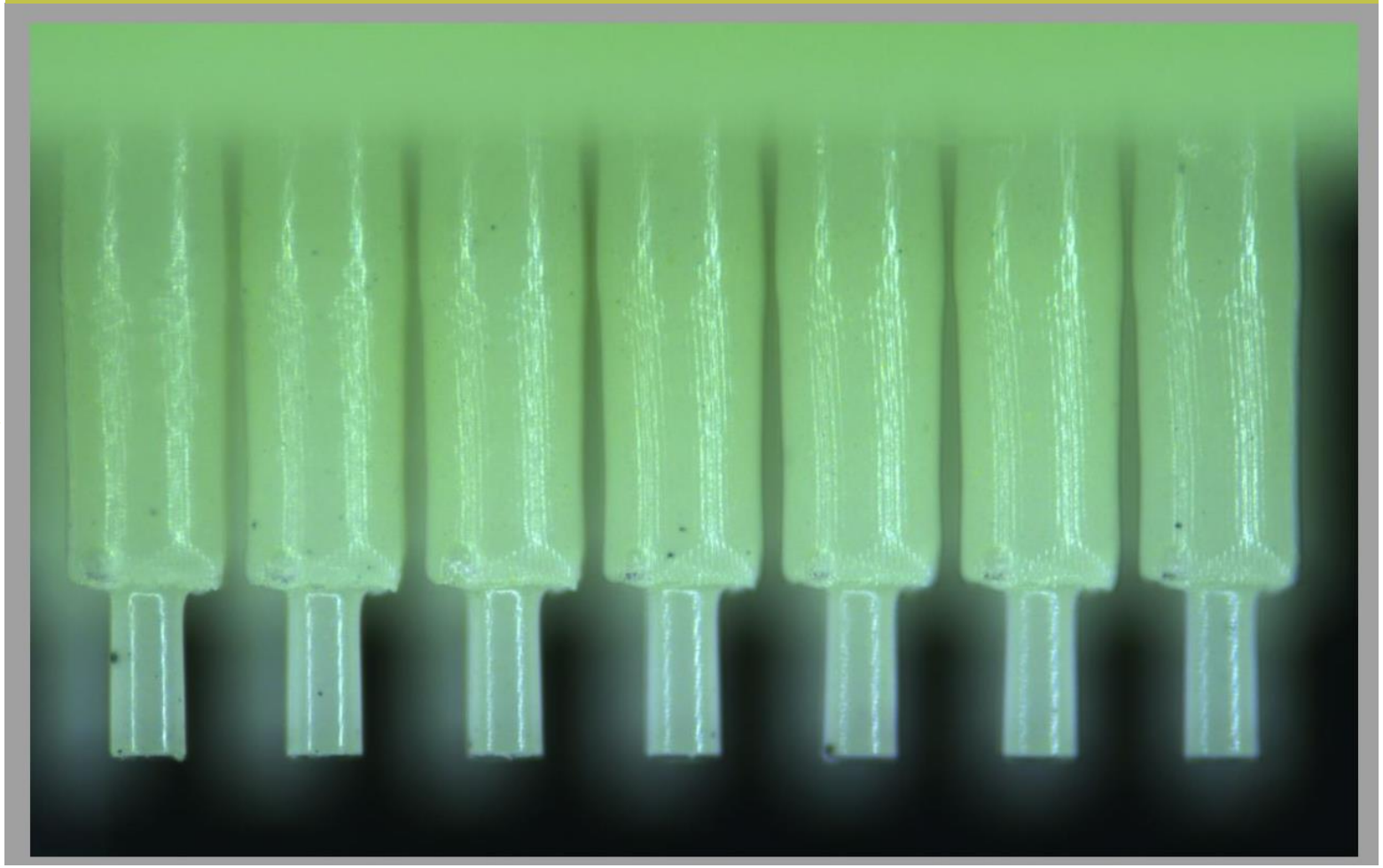
Here you can see the types of holes we've machined

Hole Geometry Portfolio

Step hole design required

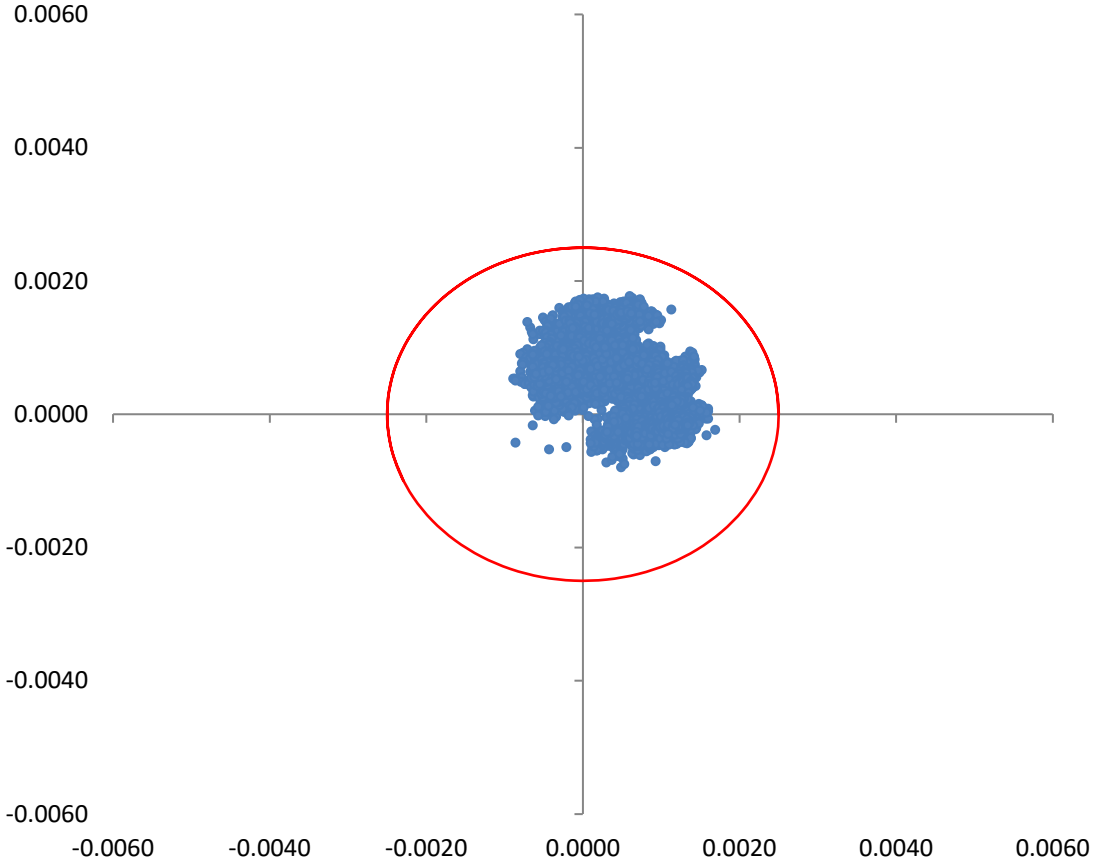


Positive print of step-hole machined with laser

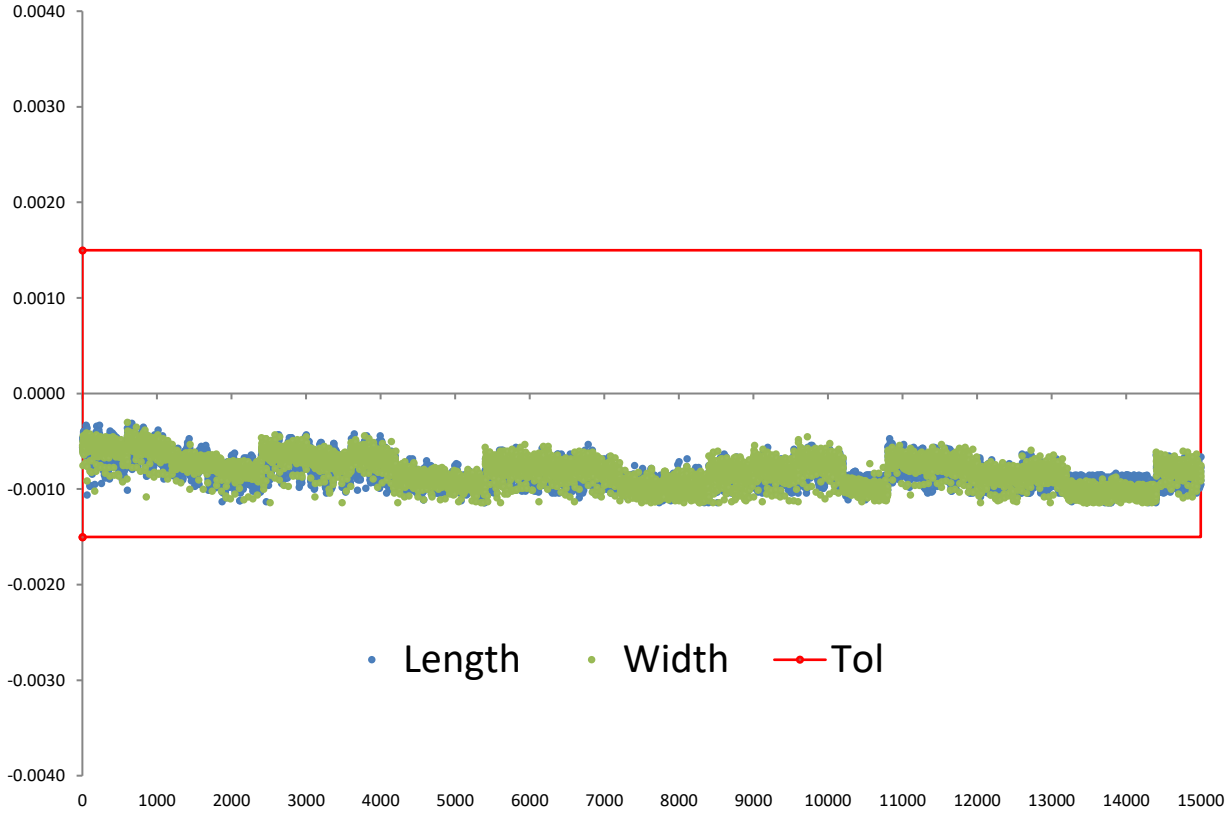


Proof of Precision

XY position error



50x50µm square hole dimension error



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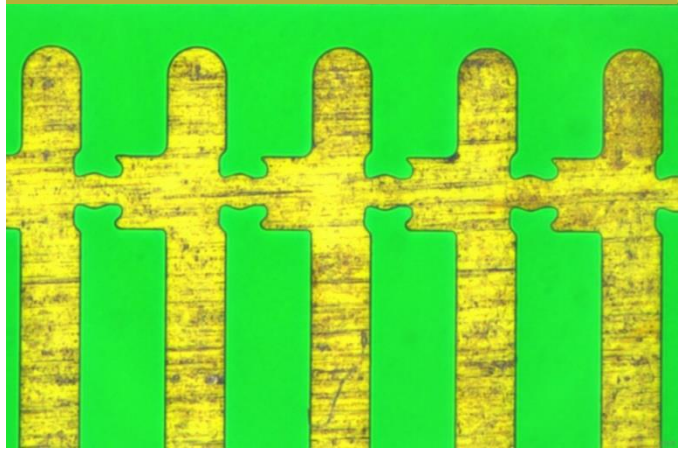
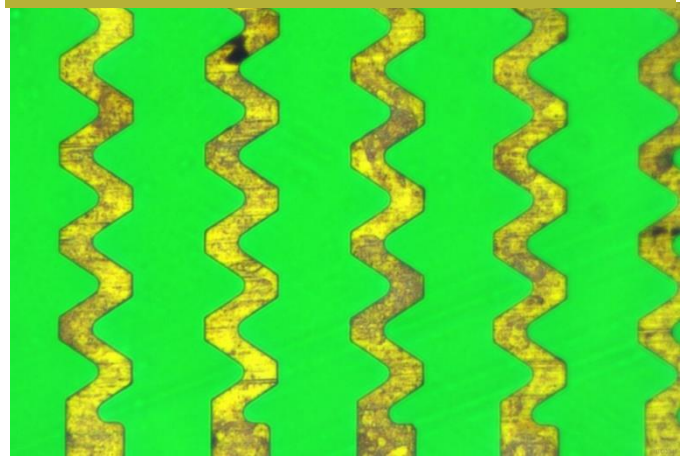
20% measurement of 75000 holes

Vertical probes

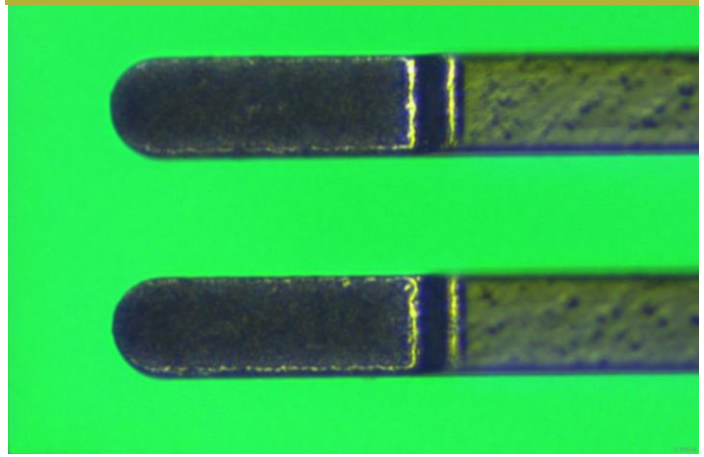
Probe head with tabs



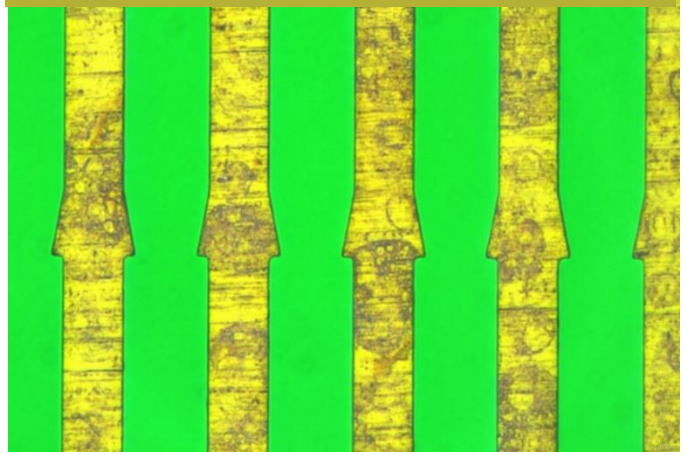
Spring structures



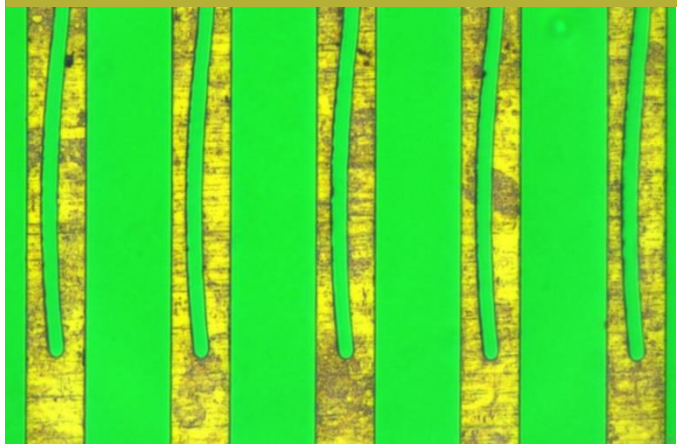
Probe tips with step



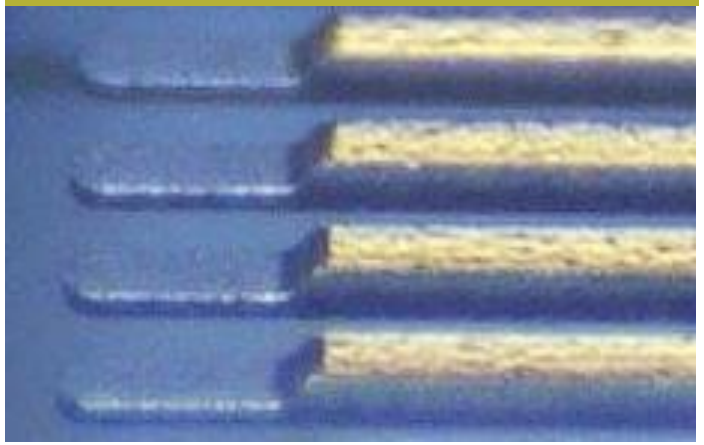
Mechanical stop points



In cut structures



Probe tips with step



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Probe tip ablation

Vertical probes

Micro hole drilling

Cantilever probes

One machine to rule them all

We design the Future of Micromachining