

Photonics 4 Masterpieces

Laser micro machining and laser turning

Yves Burri - Sabato Lasertec SA



Photonics 4
Masterpieces

Geneva | 13. June, 2024

Milling



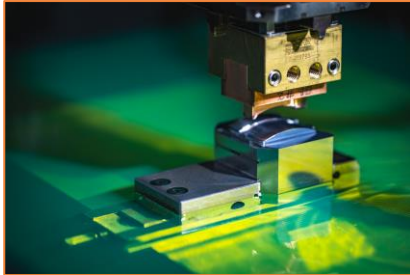
Milling 5axis



Turning



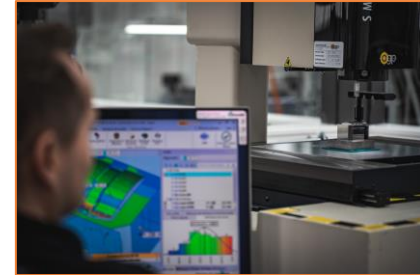
Die sinking



Wire EDM



Metrology



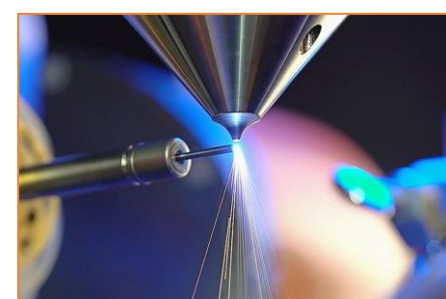
Grinding



Finish



Laser

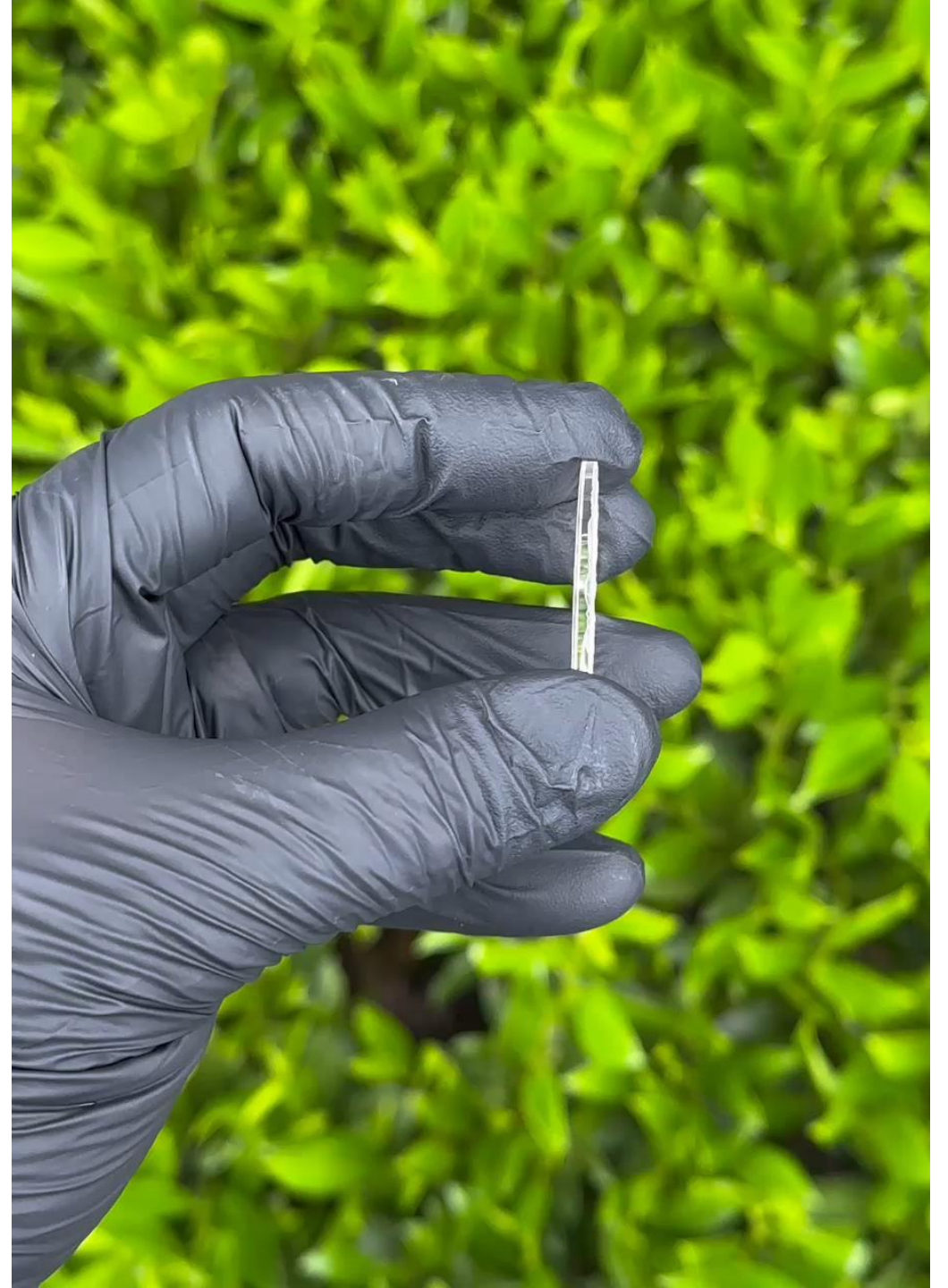


Sabato Lasertec

- Fiber lasers
- Ultra short-pulse lasers

Contract manufacturing

- Drilling
 - Cutting
 - Ablation
 - Turning
-
- >20 years of experience in lasers processes



Exclusive partner of GFH GbmH for Switzerland



Sale
Service
Process development

FR / DE / EN / IT



“We build high precision laser micromachining systems with ultrashort pulse lasers in series. Our modular machine concept enables ideal equipment for your application.”

Machine & User

«Which laser? How many watts?»

are the first questions asked

What is the key to great applications?

- Machine capabilities?
- User knowledge?

There is more than just laser power, especially in the watch and medical industry where parts are often very small.

Process is at the heart of the next two examples,
and then laser turning enabled by the machine capabilities

No need for high laser power...

but

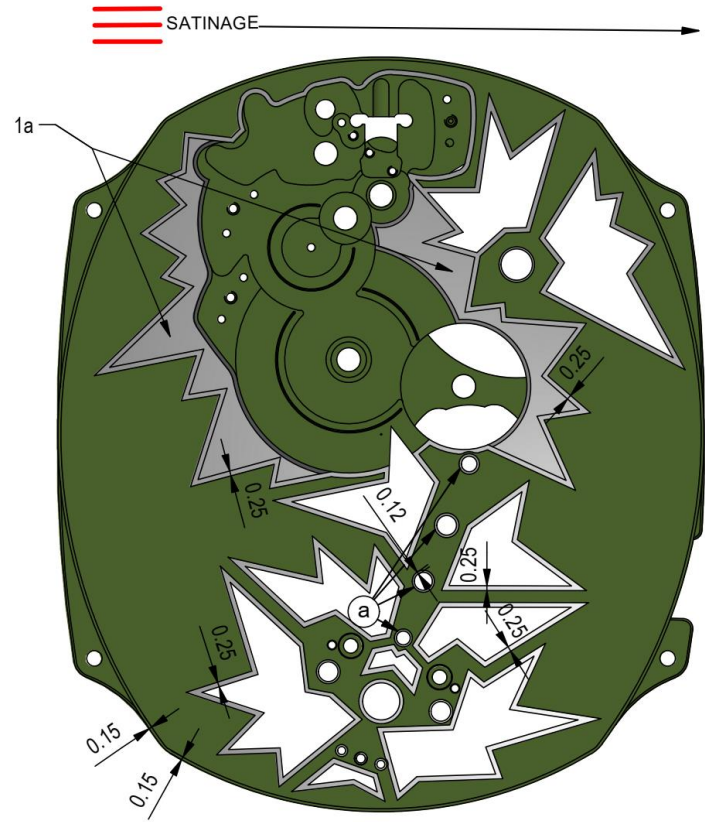
Very small spot
&
High precision

Rubis, Ø 1.0 mm

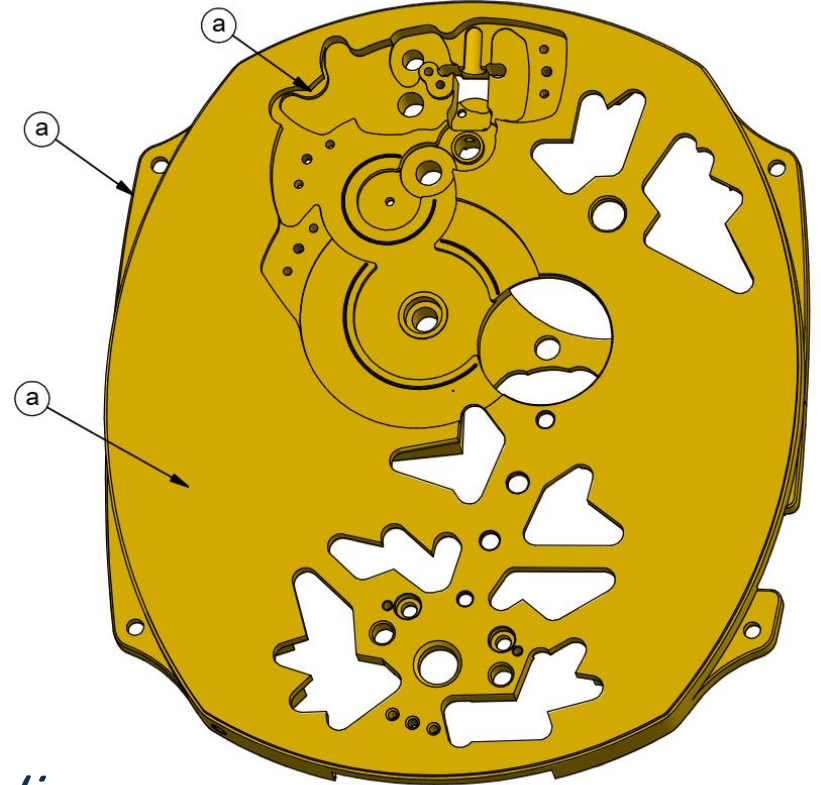


The challenge from Fiona Krüger

The vision



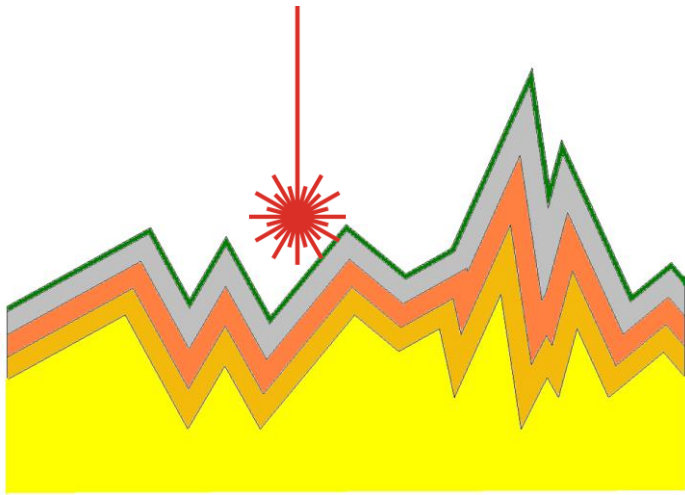
Step 1 (warm up! 😊): cutting the tips needs precise positioning



With Rhodior SA 

The challenge from Fiona Krüger

Satinage and coloring by *Rhodior*



Not to scale, not accurate (layers missing)
Electroplating : 0,2 – 0,4 μm each layer
ALD : nanometers

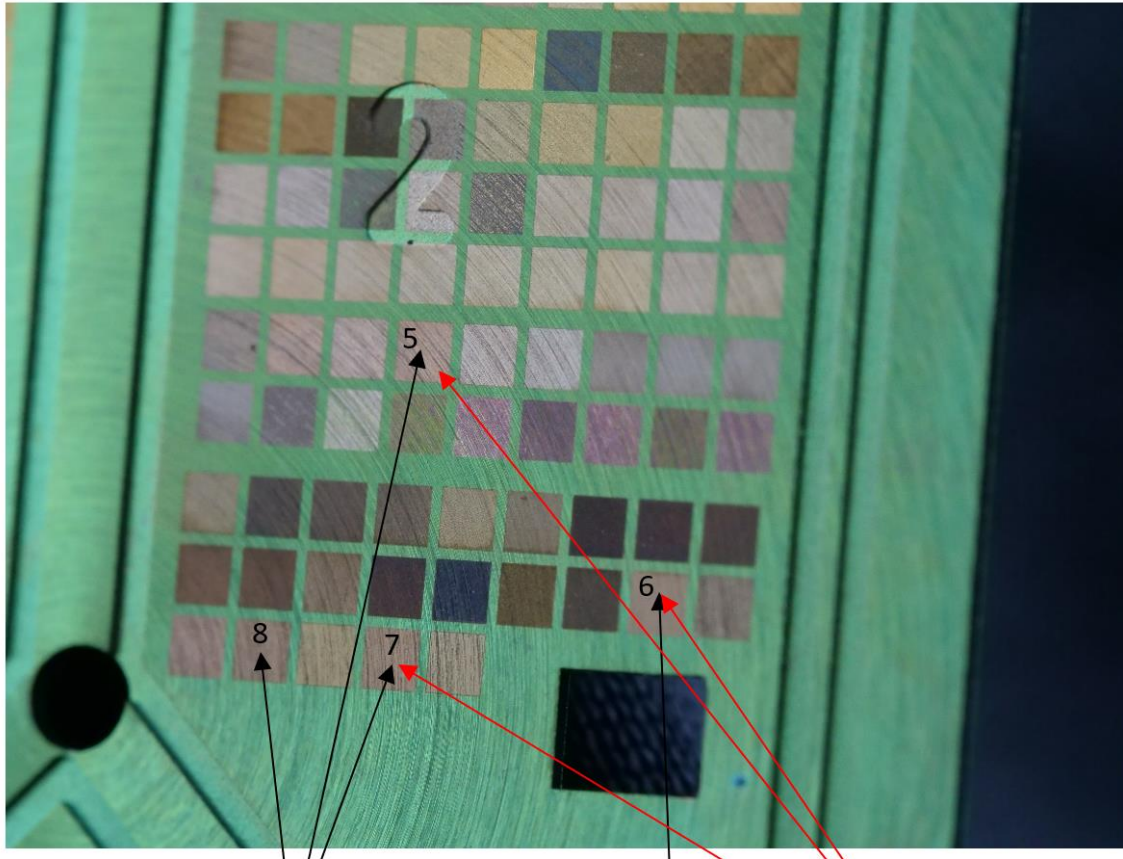
Step 2 : remove the green ALD layer
and reveal the 5N gold layer

Challenges:

- Completely remove the green layer
(and grey underlayer)
- Reveal the 5N gold layer without
touching the 3N gold layer
underneath
- Keep the satinage
- Positioning

The challenge from Fiona Krüger

Many tests later...



Finally a good result! (#7)
Very small but stable process window.

Critical parameters:

- Wavelength
- Pulse duration
- Laser power (precise to 0,05 W)
- Spot size
- Focal position
- Pulse overlap
- Hatching distance
- Repetitions

The challenge from Fiona Krüger



Laser turning – GL.smart

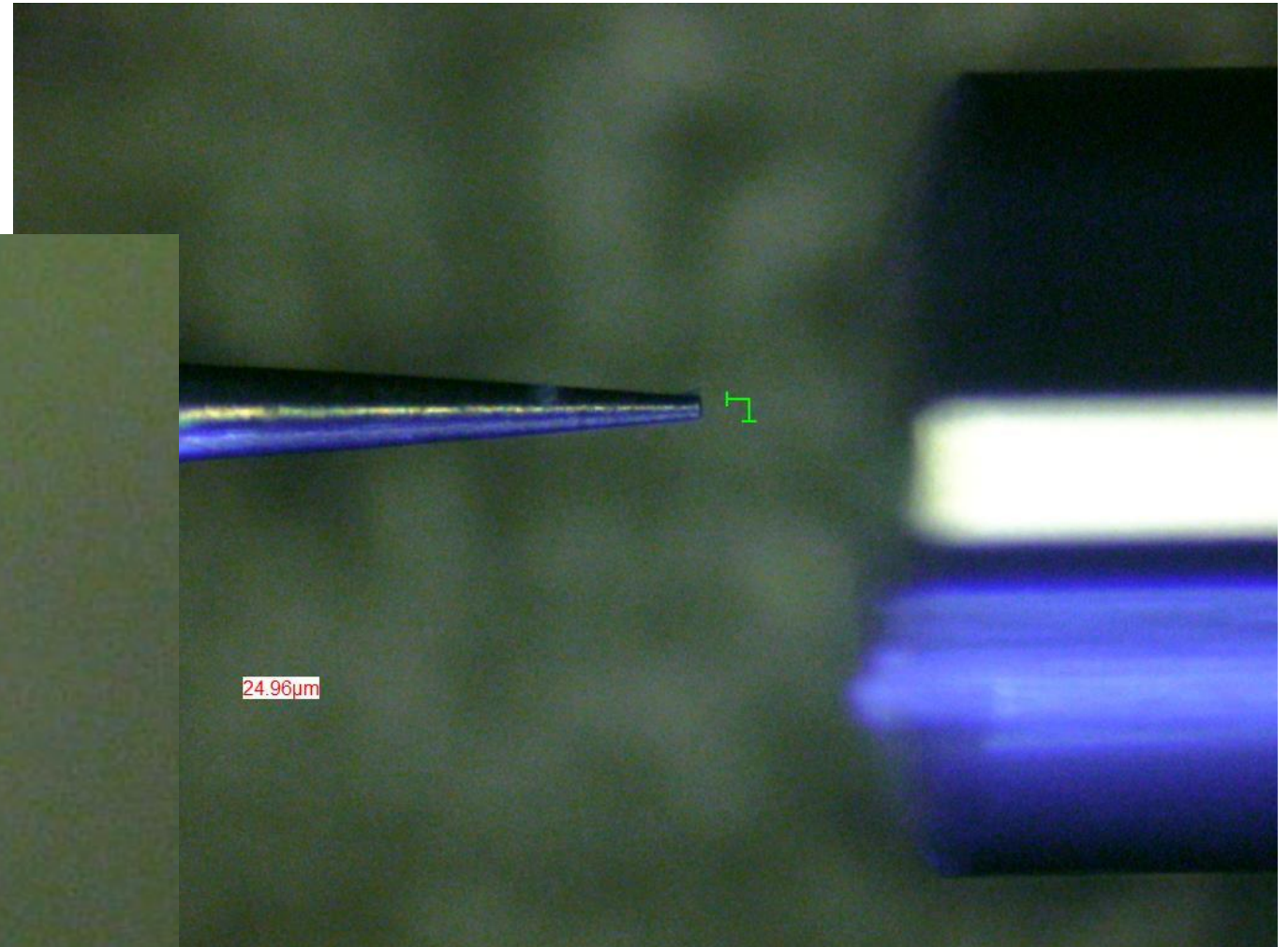
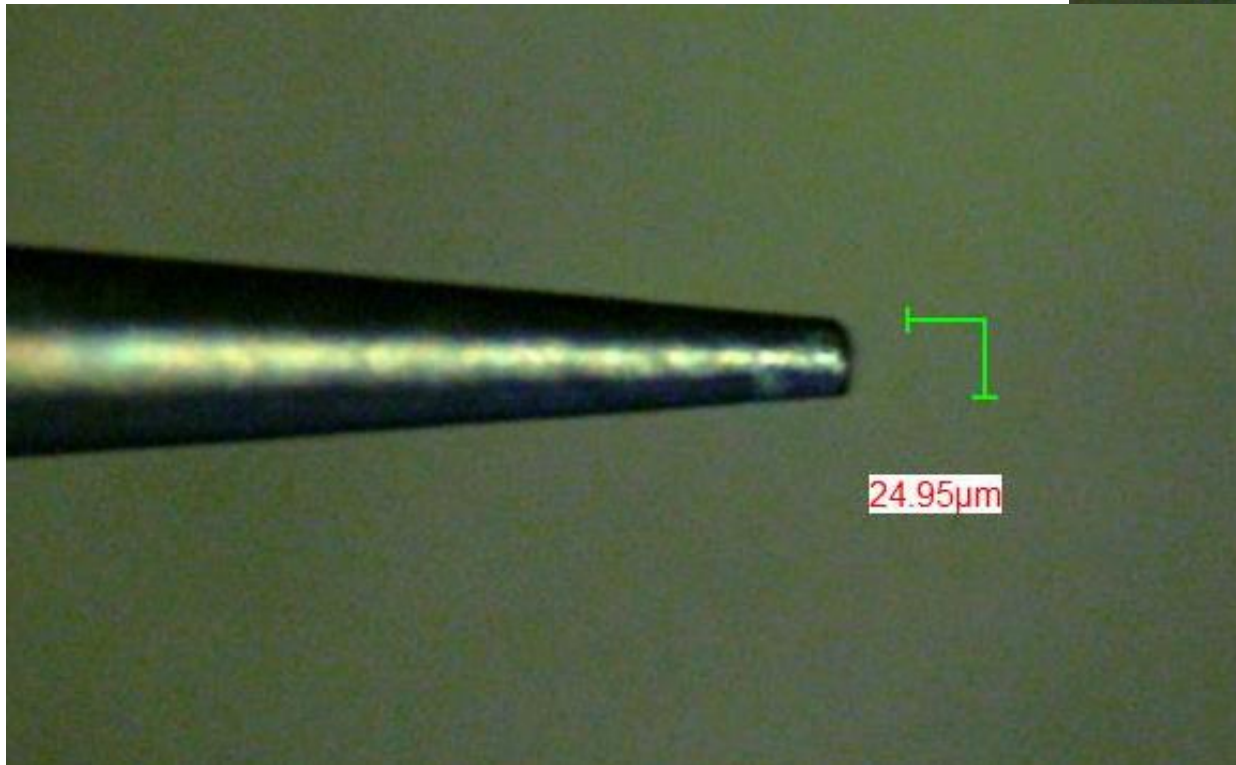


- Main spindle
- Tilting counter spindle
- Trepaning optic
- Bar loader & 6 axis robot options
- Parallel processing on 2 stations option
- Water cooling of all heat sources
- Automatic camera measurements
- Integrated topographical measurements as option

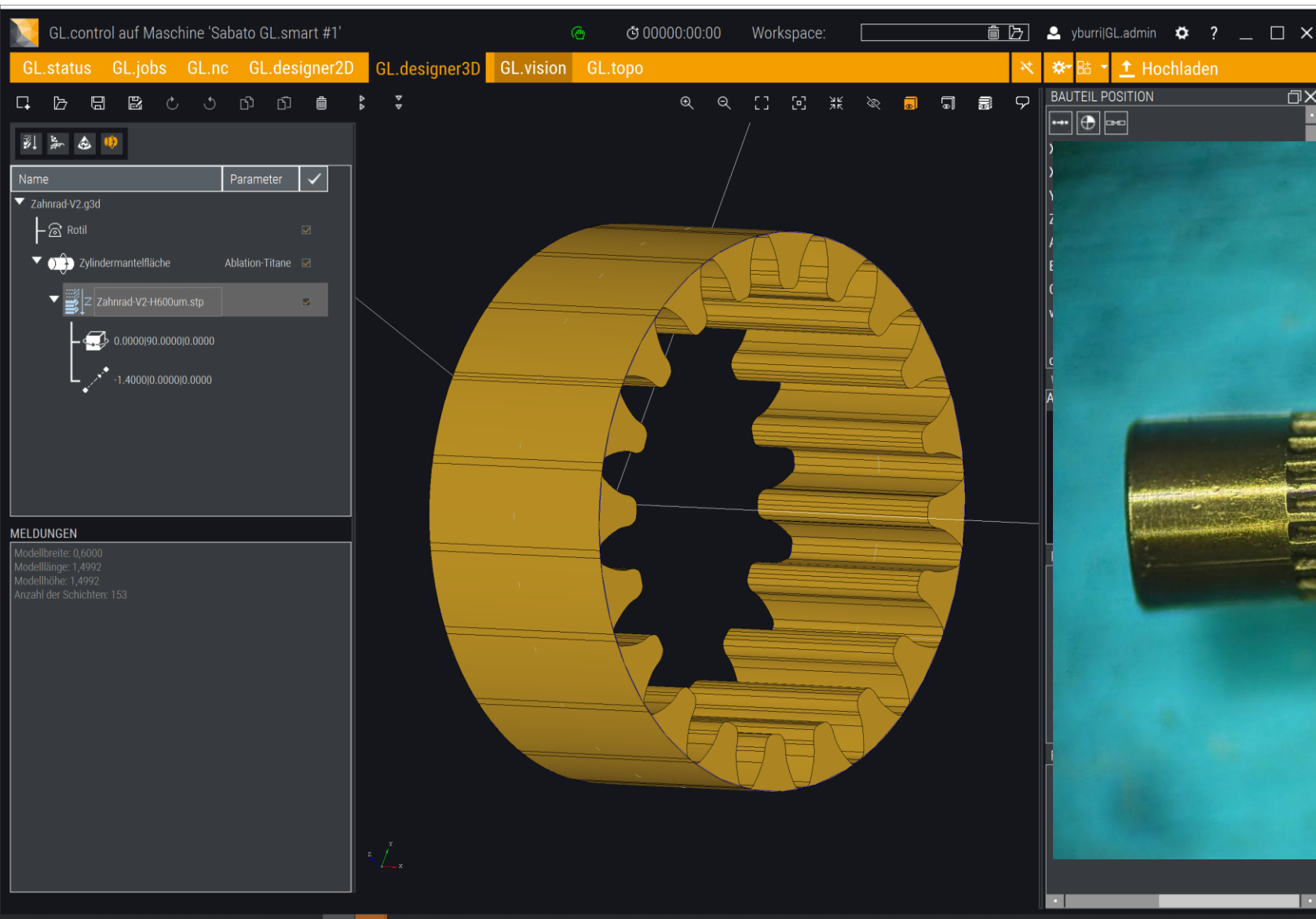
- For drilling, turning, cutting and ablation

Laser turning

Tungsten carbide, \varnothing 0.9mm
Tip \varnothing 25 μ m



Laser turning

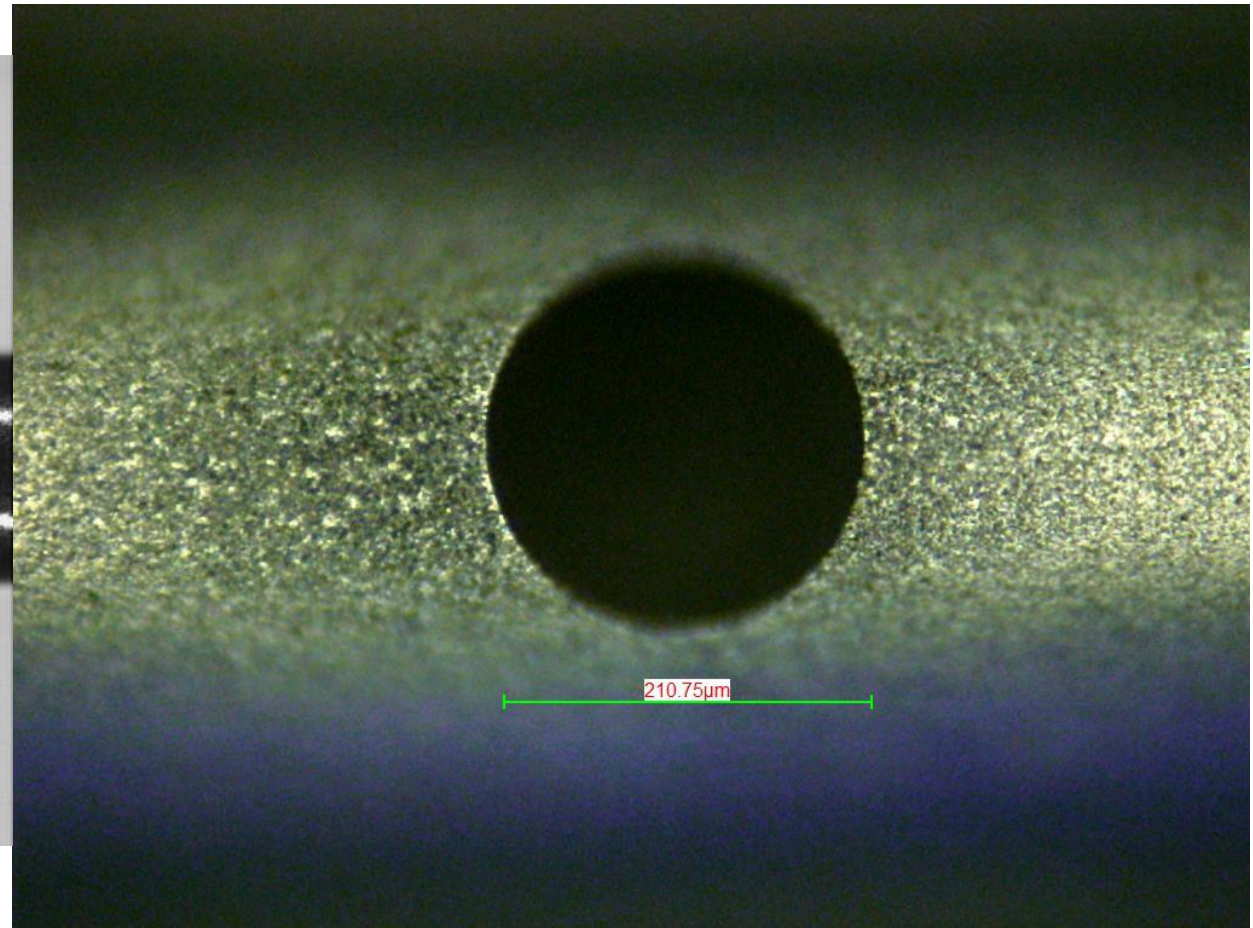
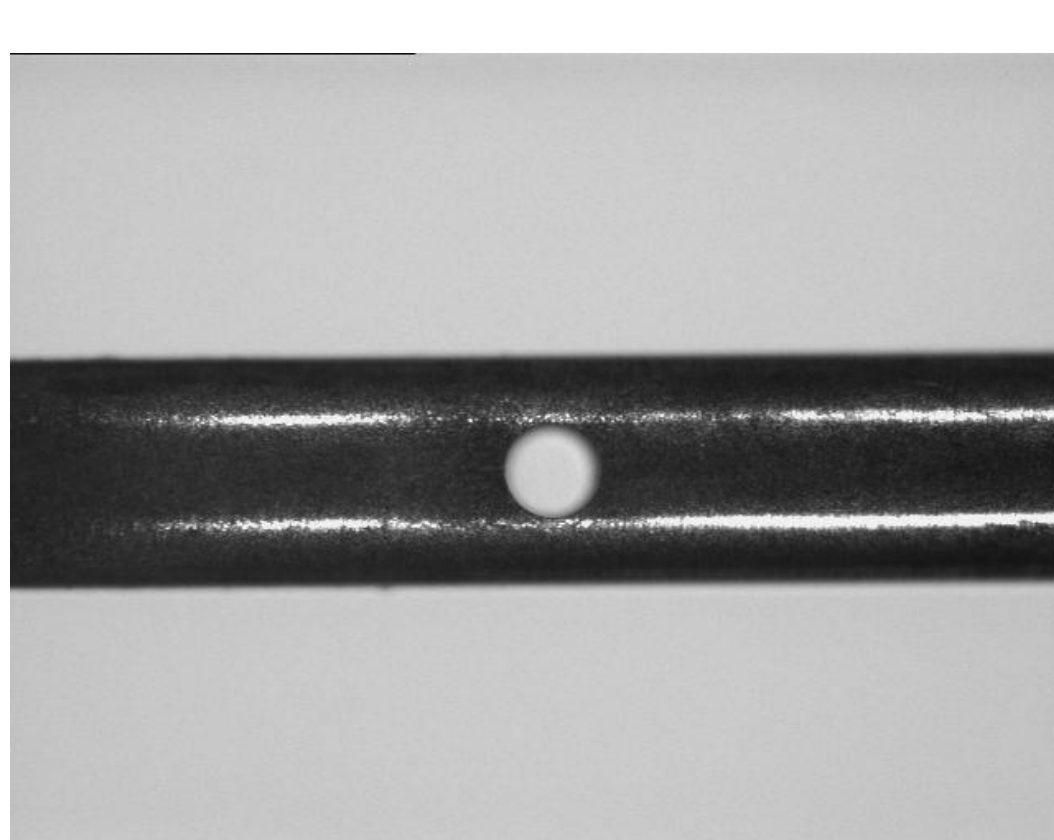


Stainless steel tubes,
OD 1.5 mm



Laser turning and drilling

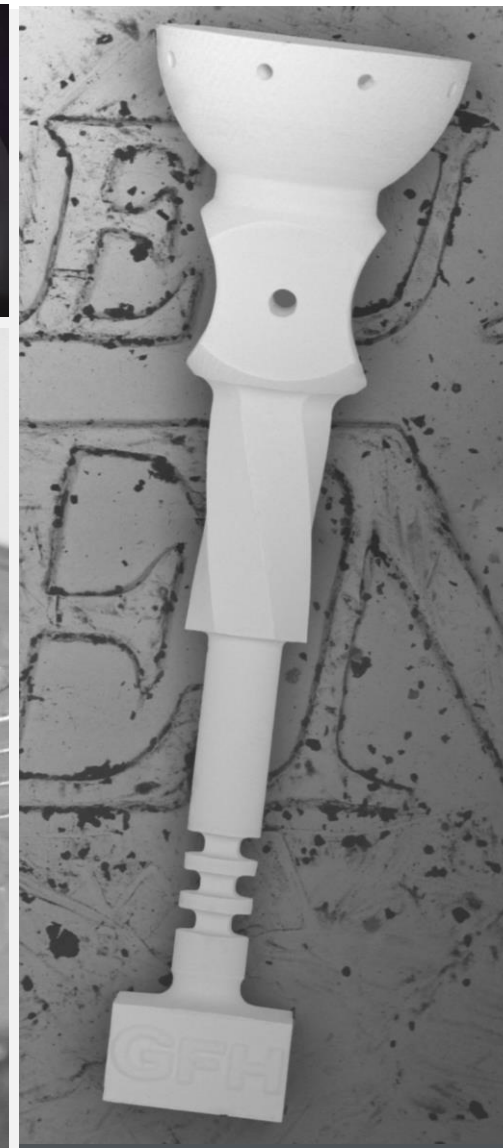
Titanium \varnothing 0.8 mm turned down to \varnothing 0.5 mm
Cylindrical drilled hole \varnothing 210 μ m



Laser turning & drilling & cutting & ablation



1 mm



500 µm

- précision inférieure à 1 µm
- qualité de surface jusqu'à un Ra < 0,1µm
- Diamètre d'outil à partir de 10 µm
- Pas de restriction des matières usinées
- Toujours affuté
- Pas d'usure de l'outil
- Coûts de production et de maintenance faibles
- Usinage sans forces

GFH GmbH[®]
laser micro machining

Thanks for your attention!



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