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SWISS MADE 



SACE

# Spark Assisted Chemical Engraving (SACE)

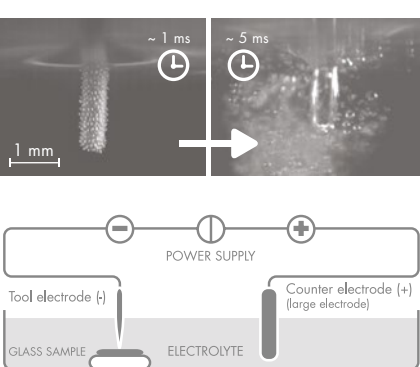
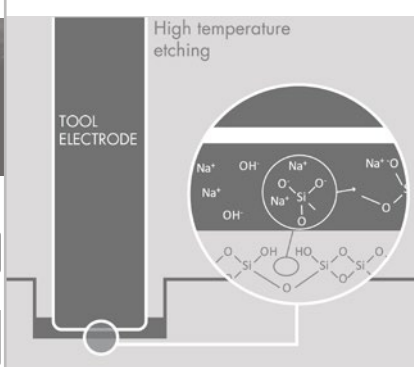
- Mass and flexible production: prototyping small series, batch "1 size", industry 4.0
- Modular concept with various number of spindles possible: 1 to 4 heads machine configuration
- High positioning accuracy and process stability
- clean-room compatible
- mask less process
- no tooling costs
- Surface strengthening and texturing
- 2,5 D machining
- Burr and micro-crack free machining



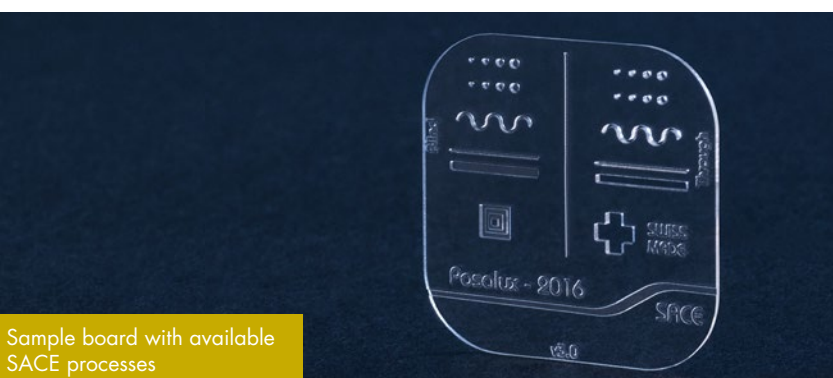
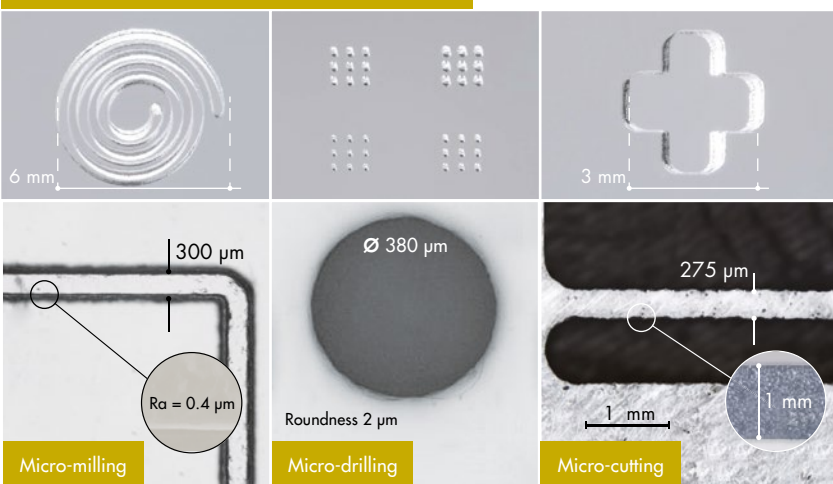
## Machining specifications

<b>Tool:</b>	$20\ \mu\text{m} < \varnothing < \infty$ ; Tungsten carbide
<b>Working area:</b>	220 mm x 220 mm
<b>Drilling:</b>	$150\ \mu\text{m} < \varnothing < \infty$ ; $0 < \text{depth} < \text{several mm}$ ; 1-5s down to 700 $\mu\text{m}$ ; vertical drilling to tapered holes (0 to 90°); aspect ratio 1:10
<b>Milling / Engraving:</b>	Typical tool feed-rates: 20 mm/min; $\varnothing$ 50-100 $\mu\text{m}$ , depth: several mm; tolerances on channel width: 5%; aspect ratio 1:10
<b>Micro-cutting:</b>	Typical tool feed-rates: 10-20 mm/min; depth: 4-5 mm
<b>Polishing:</b>	Different surface qualities can be achieved. Depending on the application, very rough to very smooth surfaces are possible.
<b>CNC:</b>	TwinCAT 3 CNC Beckhoff with TwinSAFE-PLC for safety
<b>Optional process:</b>	Automatic loading, unloading and washing process for wafer and other parts
<b>Chemical (caustic soda):</b>	Chemical can easily be disposed and recycled; low level of requirement for personnel protection (classical protection)
<b>Maintenance:</b>	Low and easy
<b>Dimensions (WxLxH):</b>	Spindle module: 1000x1550x2000 mm

Innovative glass micro-machining technology with high flexibility, accuracy and efficiency

Principle	Mechanism
<ul style="list-style-type: none"> <li>Glass dipped into electrolyte</li> <li>Voltage applied between tool and counter electrode</li> <li>Water decomposition happens</li> <li>Sparks occur through gas film around tool</li> </ul>	<ul style="list-style-type: none"> <li>High temperature etching</li> <li>Dissolution of glass according:  <math>\text{SiO}_2 + 2\text{OH}^- \rightarrow \text{SiO}_3^{2-} + \text{H}_2\text{O}</math> </li> <li>Local etching of glass around the tool by spark assisted chemical engraving (SACE)</li> </ul>
	

Specific algorithms to optimize material removal rate



Sample board with available SACE processes

Burr and micro-crack free machining

## Applications

Machining of SiO-based non-conductive material, e.g. glass, quartz, silicon etc.  
Glass is optically transparent, highly chemically inert and sterilizable.  
The burr and micro-crack free process makes it suitable to downstream processing e.g. fusion bonding.

### Medical industry:

- Microfluidic devices
- Multi layer mixer
- Lab-On-Chip
- Chemical (mixer chips, micro-reactor)

### Electronic industry:

- Drilling for Through Glass Vias (TGV)
- Optical PCB
- Micro-electro-Mechanical-Systems (MEMS)

### Watch industry:

- Watch dial glass
- Mechanical parts
- Decoration



Lab-on-a-chip for cancer research



Through Glass Via made by SACE



Watch dial made by SACE

Custom devices and support



Release 4001

# SACE

glass micro-machining

Founded in 1943, Posalux is a leading manufacturer of micro-technology machines intended for mass production. From our headquarters in Biel, Switzerland, we engineer and produce world-renowned system solutions.

Our clients are distinguished companies leading the automotive, electronic, watch, and medical industries. Thanks to our global network of Posalux branches and agents, we are able to provide reliable services and support to our customers worldwide.

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