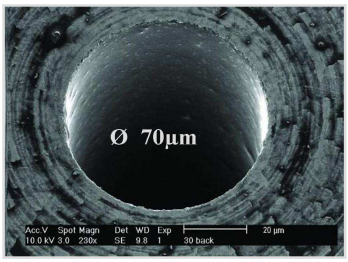
Micro-drilling using µ-EDM

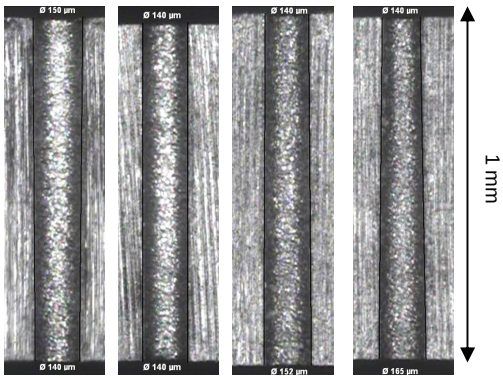
Technical advantages

- Positive and negative tapered holes erosion.
  Diameter from 50 µm to 1.8 mm.
  Taper up to ±30 µm/mm.
- Mechanical taper setup on double clamping head.
- High process repeatability and stability.
- Geometrical high precision
- Able to drill hardened steel.
- Excellent surface texture.

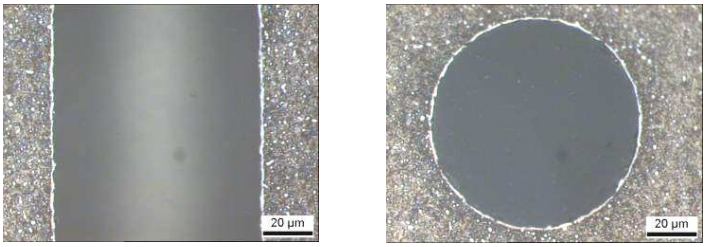


SEM micro-hole picture
depth 1mm, Ø 70 µm
in hardened steel

- Limited white layer deposit guarantying no material alteration, no micro-cracks.
- No burrs and material deposit on the hole entrance and hole exit.

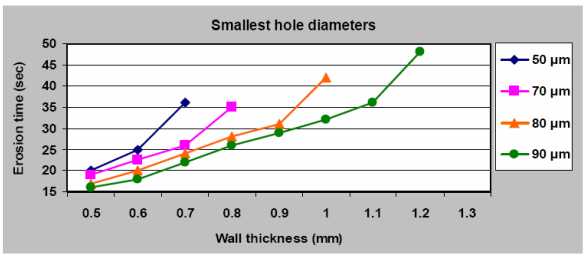


- 10 µm Straight + 12 µm + 25 µm
Positive/negative tapered holes feasibility examples



Limited white layer deposit using µ-EDM

- Flow stability
- Highly accurate workpiece positioning
- Cycle time 15-40s depending on hole diameter and wall thickness.



Erosion Time vs. diameter / thickness

Micro-drilling using µ-EDM

Today's main application domain

Injector nozzle micro-drilling for the automotive fuel direct injection (diesel and gasoline).

FP1

Technical strength: desired hole taper is mechanically setup, producing tapered holes required for injection nozzles with high repeatability and stability.

Tapered holes advantages for engine injector applications: spray efficiency, self-cleaning, cavitations reduction.

POSALUX delivers machines to Tier1 automotive suppliers:

- FP1: small batch production machine (1 spindle)
- HP4: mass production machine (4 spindles)


HP4 (4 spindles)

Large applications range

Micro-drilling diameters from 50 µm to 1.8 mm (0.002 to 0.07 Inch.) on conductive materials.

Cylindrical, conical (± tapers), step shaped holes on steel, hardened steel & carbide, titanium, platinum, conductive ceramics for watch, aeronautics, and medical industries.

Principle

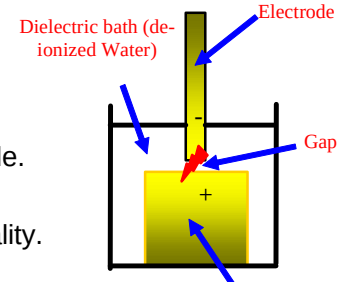
µ-EDM = Micro Electrical Discharge Machining

Electrical discharging process erodes conductive material without any mechanical force.

The electrical discharge phenomenon occurs in a small gap between the electrode and the conductive material in a de-ionized water bath.

A pulse generator provides the necessary energy to the electrode.

The electrode rotates on itself to increase drilling speed and quality.



µ-EDM principle

Quality measurements through in-house testing

- Diameter, shape and positioning checked using a video IP machine.
- Flow performance checked on flowbench (100 to 140 bars, up to 2.000 psi).
- Roughness evaluation equipment.