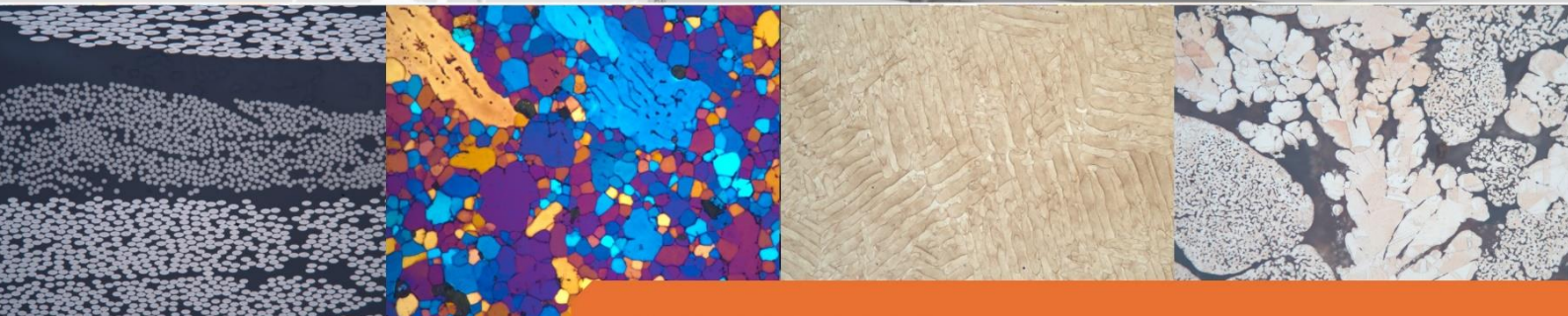


## Application lab report

### Preparation method comparison - electrolytical vs. ordinary etching of Steel samples




## QATM-Preparation method

### Objective:












The aim is to polish and etch the samples electrolytically and to compare the results with the normal preparation. For this purpose, the samples were ground and polished once normally and once electrolytically and the results were compared. It should be mentioned that the etching should always be done normally with Nital (in this case 3% alcohol).

### Hot mounting

 Mounting					
Device	Consumable	Heating time	Temperature	Pressure	Cooling time
QPRESS 50-4	EPO black	6:00	190°C	250 bar	4:00
Filler or additional consumables	Heating power	Pressure mode	Cooling power		
-	100%	From beginning	100%		
Notes					
<ul style="list-style-type: none"> <li>- The samples were mounted because they should be ground and polished once normally with automatic machines and once electrolytic with QETCH 1000.</li> </ul>					

# QATM-Preparation method

## Grinding/Polishing

Device	Samples holder	Pressure mode					
QPOL 300 A1	Sample holder R520 Z5400106	Central					
Step	MEDIUM		 RPM		 N	 min	
 Planar grinding	SiC-Paper/Foil P320	H <sub>2</sub> O	SH: 120 WP: 250	◀ ▶	30	Till flat (Approx. 2:00)	
 Grinding	SiC-Paper/Foil P600	H <sub>2</sub> O	SH: 120 WP: 250	◀ ▶	30	0:45	
 Grinding	SiC-Paper/Foil P1200	H <sub>2</sub> O	SH: 120 WP: 250	◀ ▶	30	0:45	
 Polishing	SIGMA	Diamond suspension 3 µm + Lubricant alcoholic base	SH: 120 WP: 250	▶ ▶	25	5:00	
 Polishing	ZETA	Diamond suspension 1 µm + Lubricant alcoholic base	SH: 120 WP: 250	▶ ▶	25	5:00	
 Etching (electrolytic)	Etchant Nital 3 % alcoholic					0:10	

### Notes

- SH = rpm for sample holder
- WP = rpm for working plate
- Dosing interval for diamond susp. 3 µm and 1 µm = every 30 s for 1.5 s
- Dosing interval for 3 µm and 1 µm lubricant = every 60 s for 1.5 s

## QATM-Preparation method

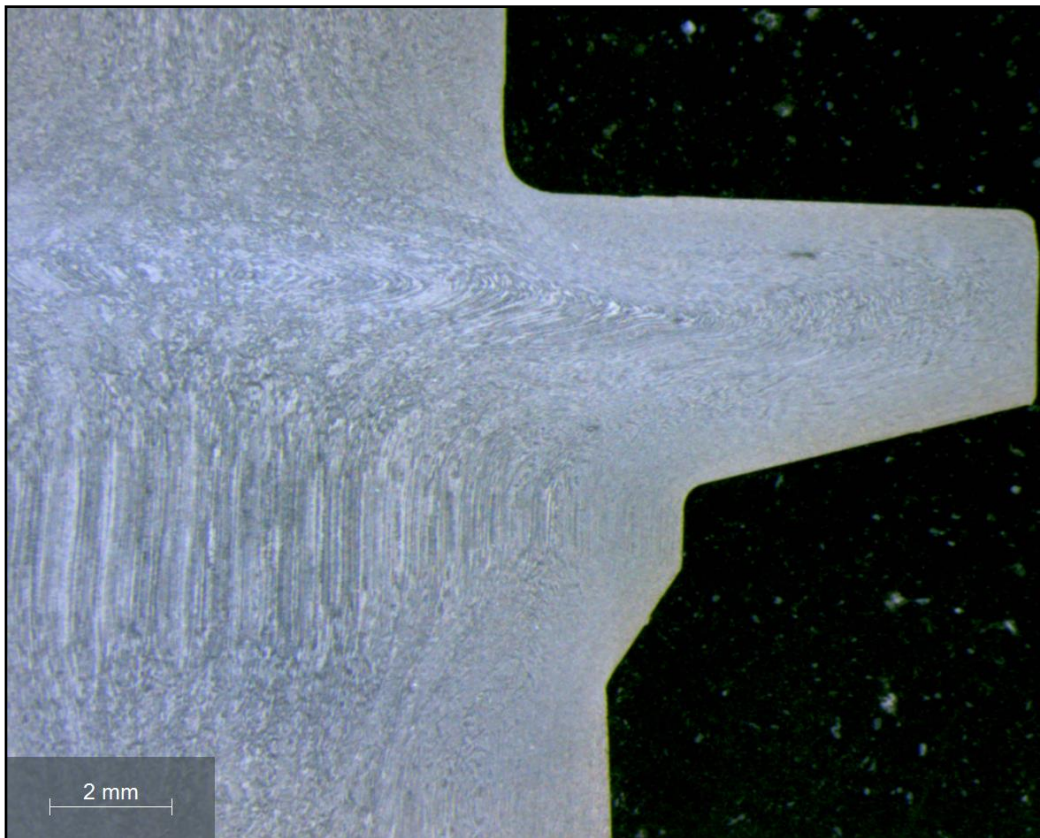


Figure 1: The deformation lines and grains orientation of the samples after normal grinding and polishing and after 10 seconds etching with 3% alcoholic Nital – 8 x.

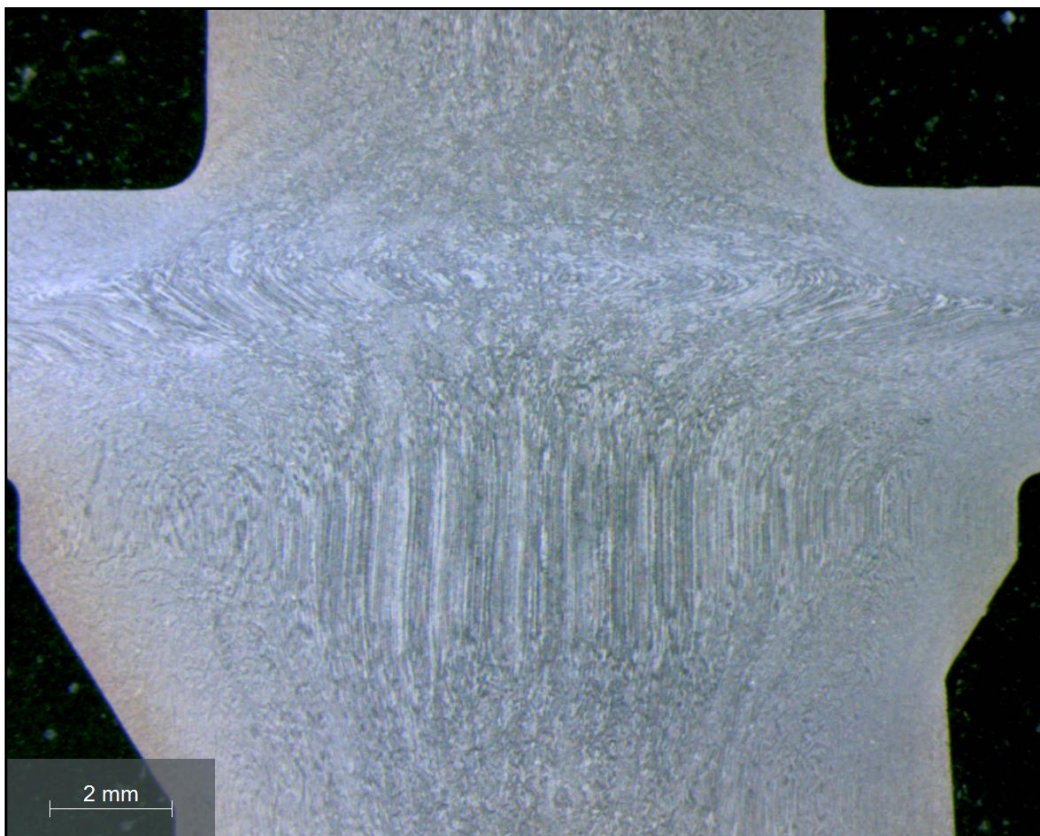


Figure 2: Another area of the same sample in figure 1 – 8 x.

## QATM-Preparation method

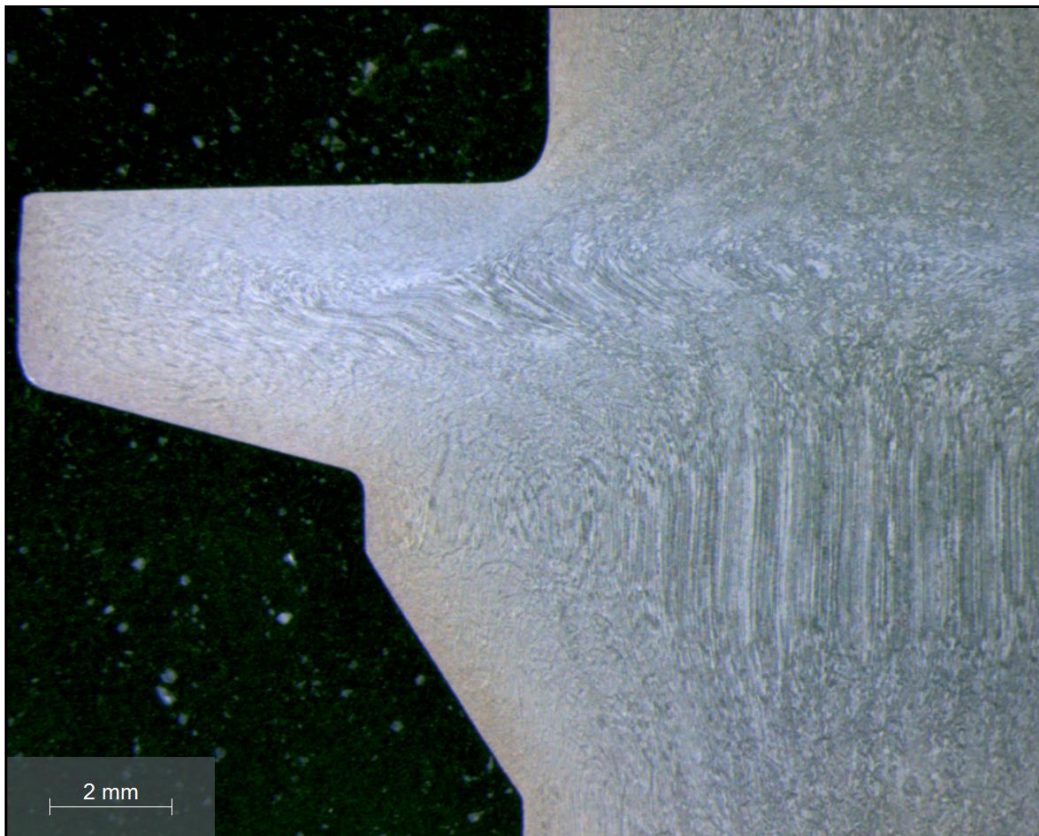


Figure 3: Another area of the same sample in figure 1 and 2 – 8 x.

# QATM-Preparation method

## Electrolytic polishing and etching

Device					
Qetch 1000					
Step	Electrolyte	Voltage [V]	Pumping power [%]	Mask [cm <sup>2</sup> ]	Duration [min]

### Electrolytic polishing

	Polishing (electrolytic)	Electrolyte K1	5	60	5	0:10
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### Electrolytic Etching

	Etching (electrolytic)	-	-	-	-	-
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Notes

## QATM-Preparation method

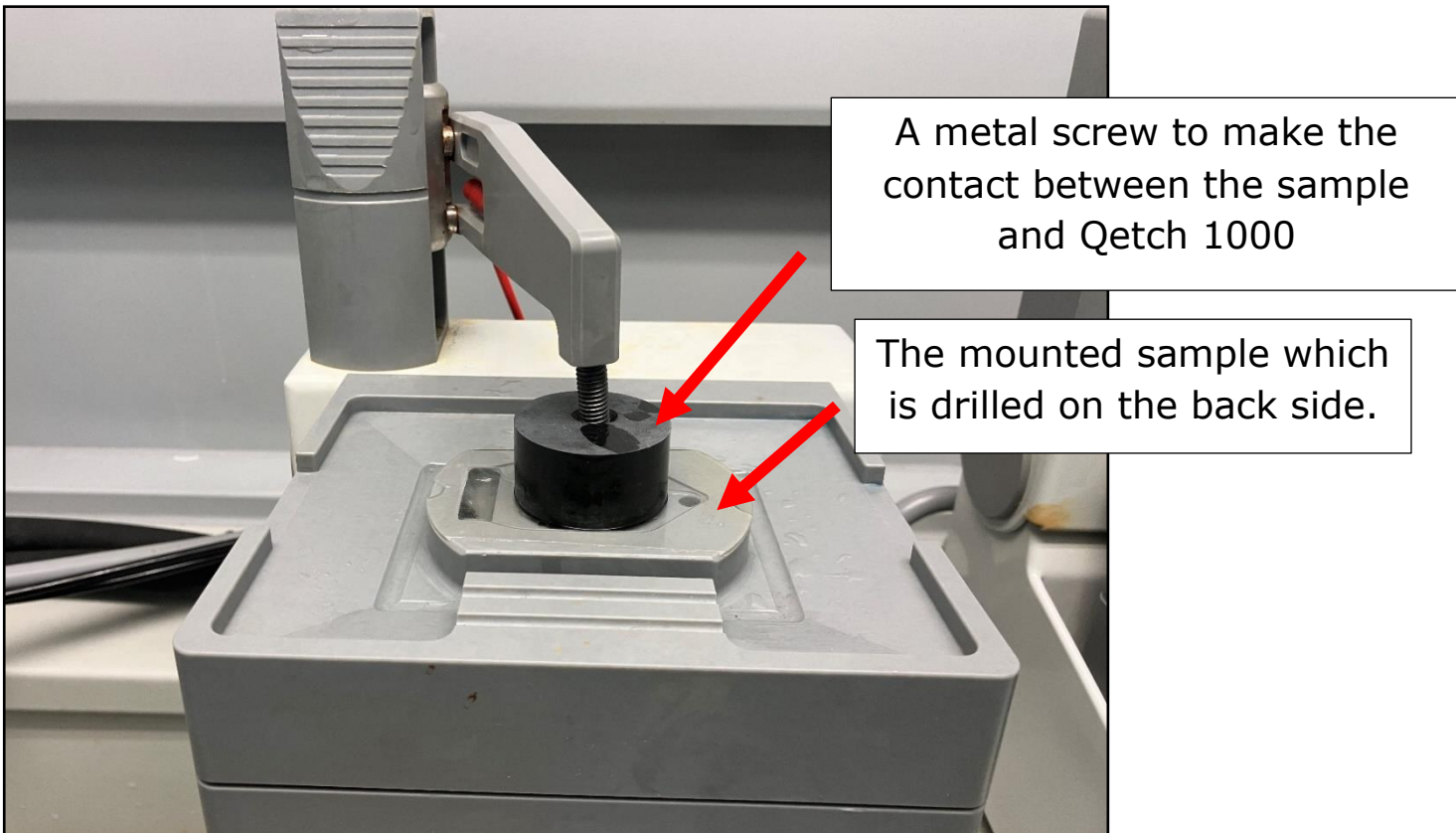


Figure 4: The layout of the electroplating: carried out with Qetch 1000.

**Note:** If the customer wants to prepare the samples only electrolytically in the future, there is no need to mount the sample. Here, the samples were mounted and drilled on the back, as normal and electrolytic preparation were to be carried out and compared.

## QATM-Preparation method

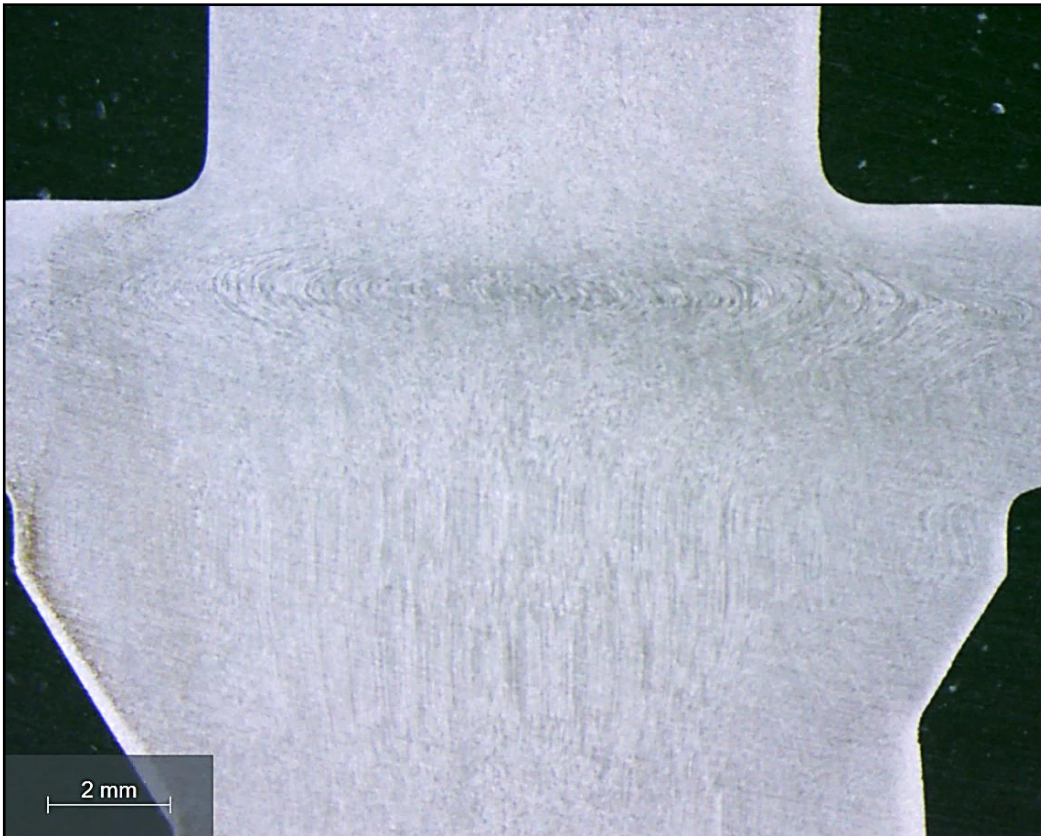


Figure 5: The deforming lines on the surface which can be compared with figure 2 are shown – 8 x. The sample was electrolytically polished and etched with 3% alcoholic Nital.

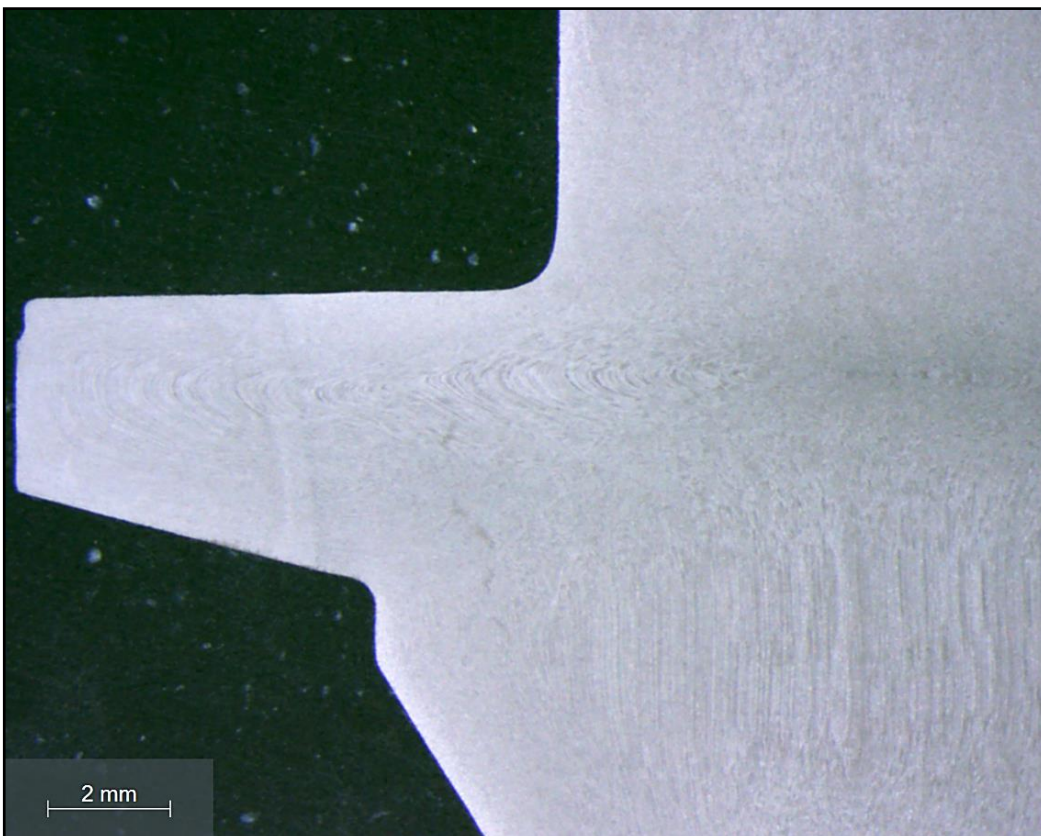


Figure 6: The deforming lines on the surface which can be compared with figure 3 are shown – 8 x.