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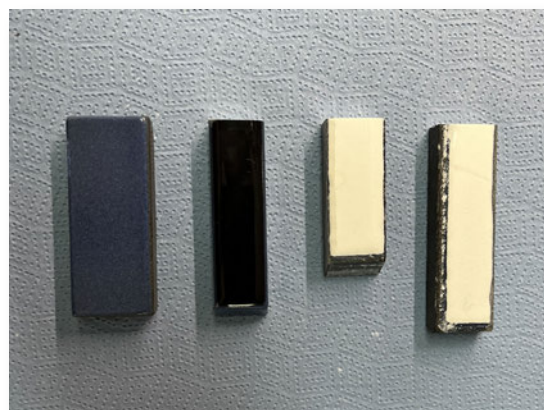
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METALLOGRAPHIC PREPARATION OF A STEEL SAMPLE WITH TWO LAYERS OF ENAMEL

Objective:

According to DIN 50902, enamelling is the application of a vitreous silicate material (the enamel) to a pre-treated metal. The enamelled metal samples should be cut using a wet cutting machine without any chipping. The cut sample should then be examined under a microscope immediately after cutting.

In order to observe in detail the bond to the substrate, the structure of the individual enamel layers, as well as the pore distribution and pore size within the glass layers, the samples were additionally ground, polished and then etched with Nital (3%).



Samples as received

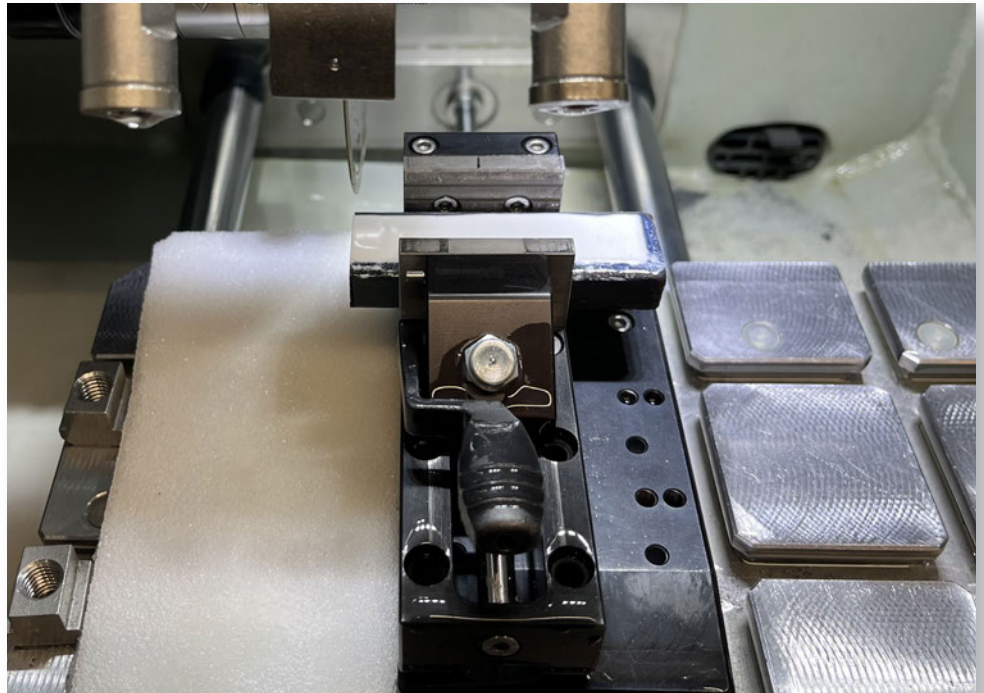
CUTTING



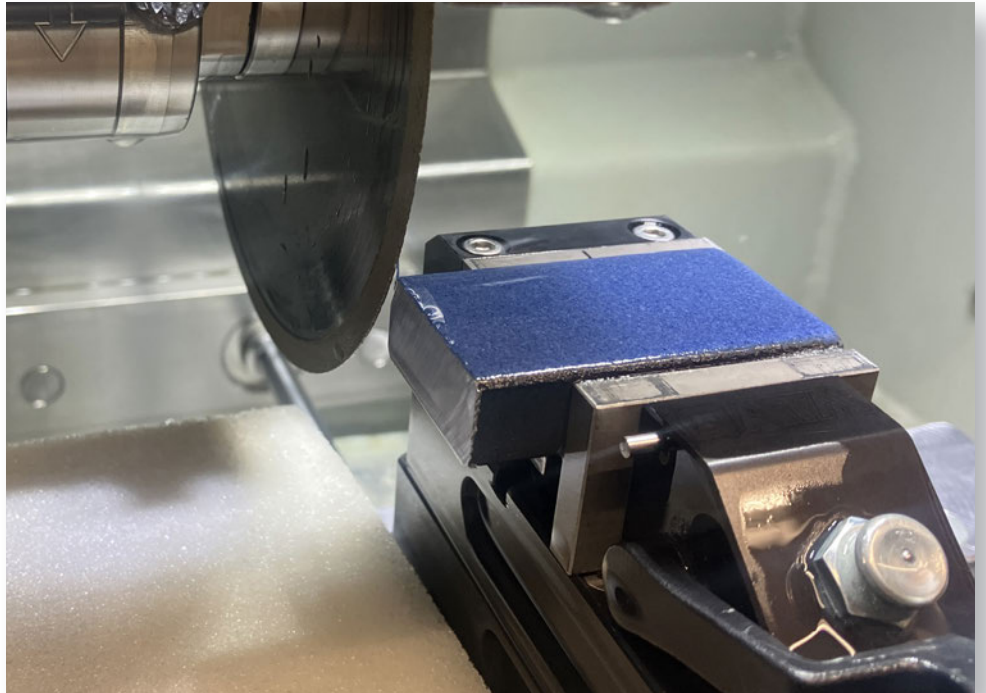
Precision cut-off machine
Qcut 200 A

Device	Qcut 200 A	
Cut-off wheel	Diamond precision cut-off wheel ø 150 mm	
Anti-corrosion coolant	Anti-corrosion coolant, Standard	
Clamping tool	- Qtool 40 - Easy clamping plate	
Cutting method	Horizontal cutting (x-axis)	
Parameters	- Feed speed 0.7 mm/s - Pulse parameter +0.1 / -0.2 mm - Cut-off wheel rotational speed 4000 rpm	
Notes	- The parts should be clamped in places where there is no layer of glass. - Foam should be used on the table to protect the cut-off parts when they are removed.	

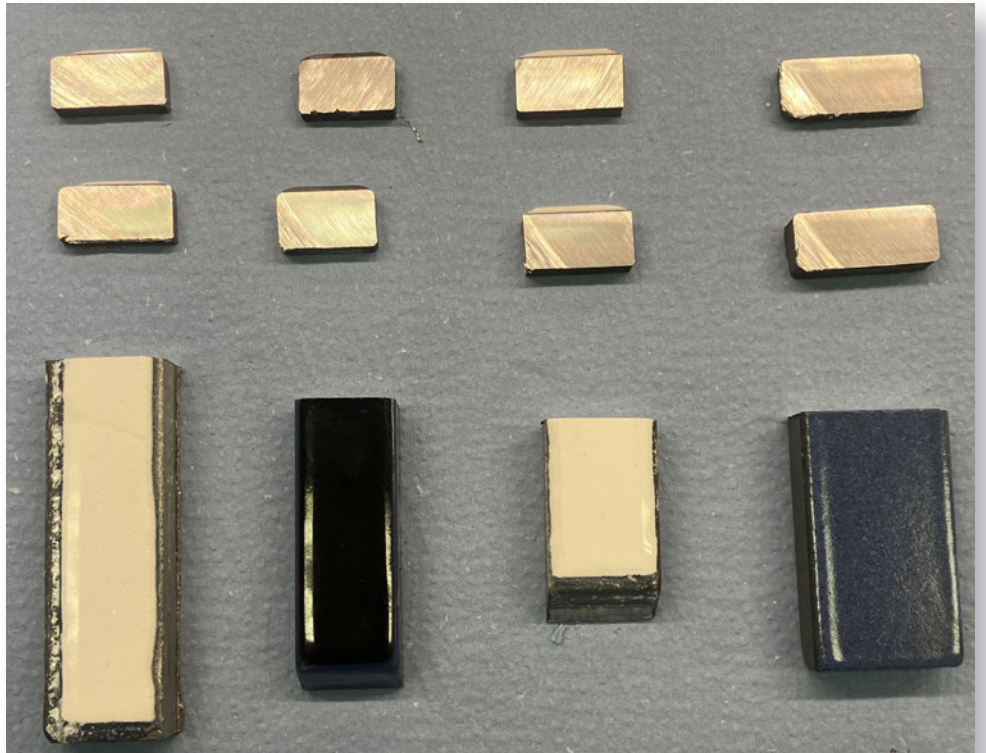
Clamping overview of a sample



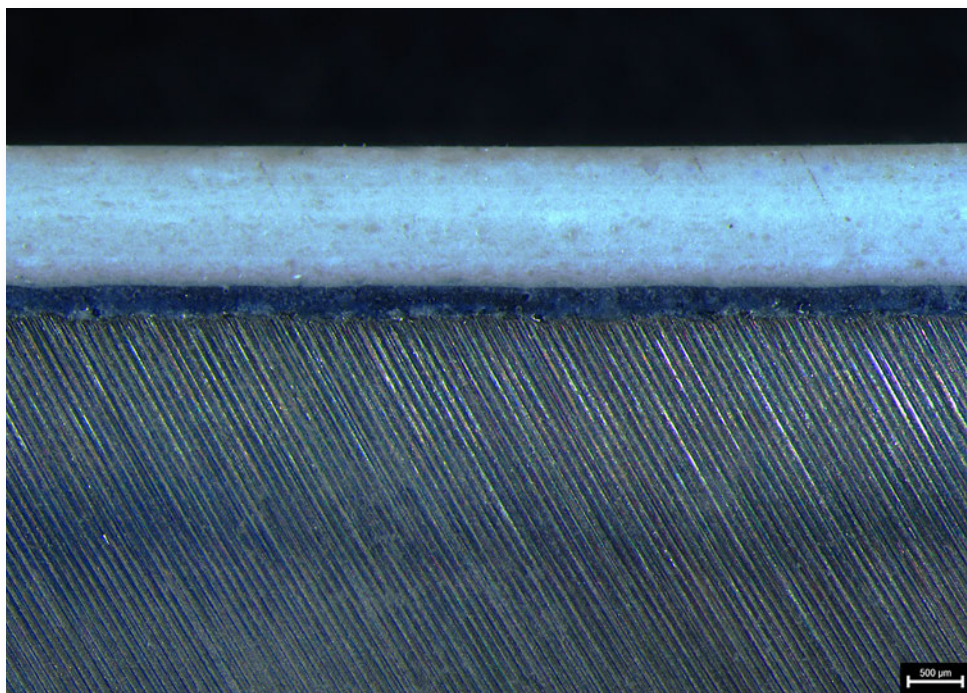
Clamping overview of an additional sample



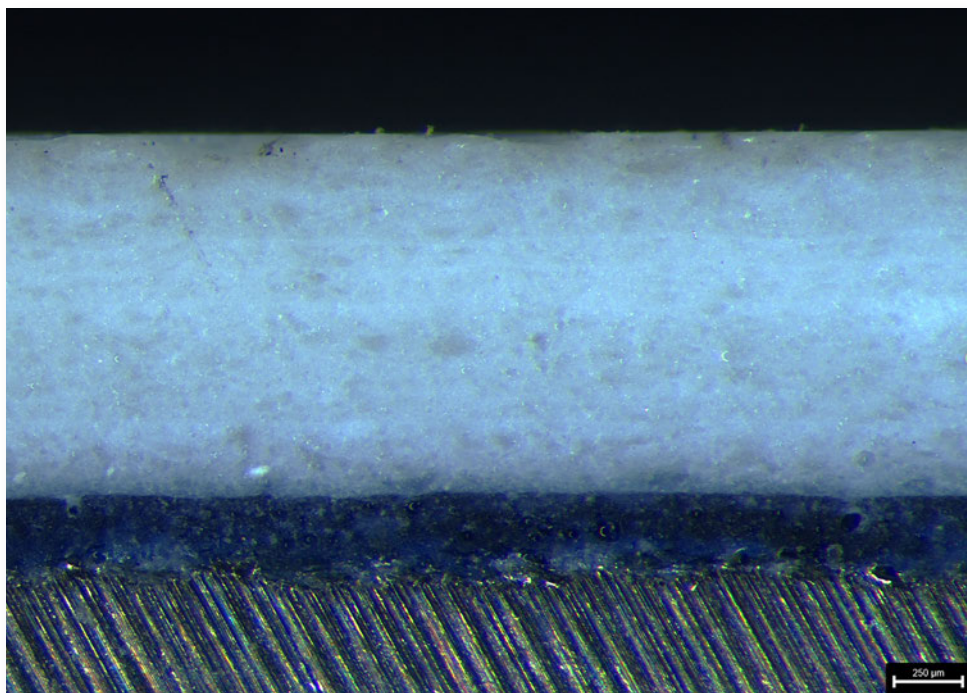
The cutted samples



The layer viewed under a stereomicroscope
after cutting - 20:1



The layer viewed under a stereomicroscope
after cutting - 50:1





Cold mounting material Qpox 93

COLD MOUNTING

Mounting Material	Qpox 93
Mixing ratio	100 : 26
Curing time	8 - 12 h
Mounting mould	Qmould Clear Ø 40 mm
Accessories	- Infiltration unit - Mixing cup - Mixing stick
Notes	

The mounted sample





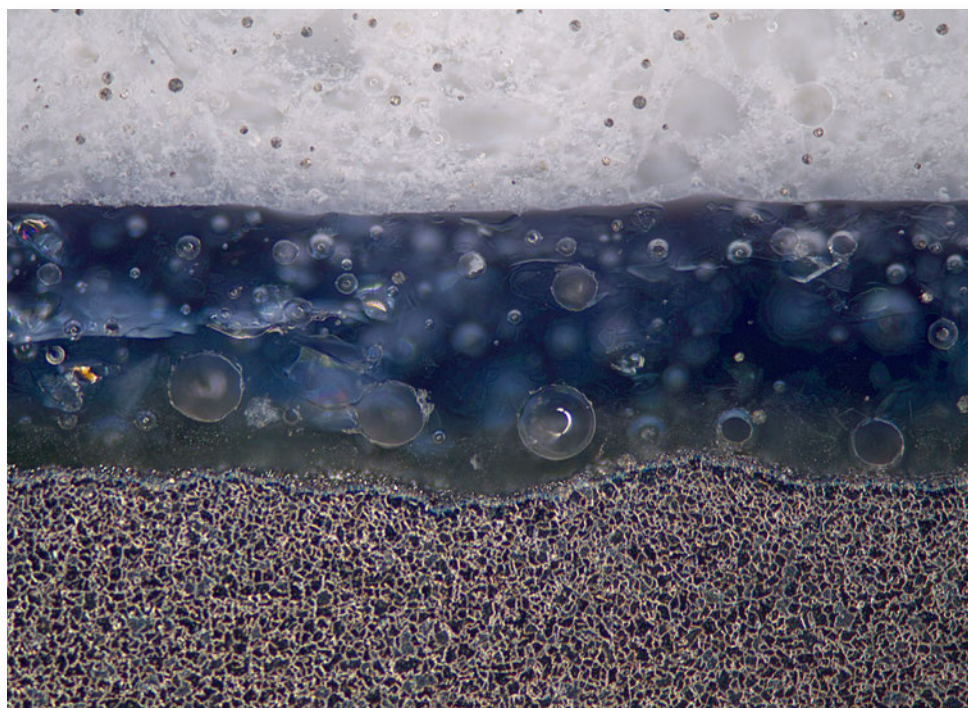
Automatic grinding and polishing machine Qpol GO 1

GRINDING/POLISHING

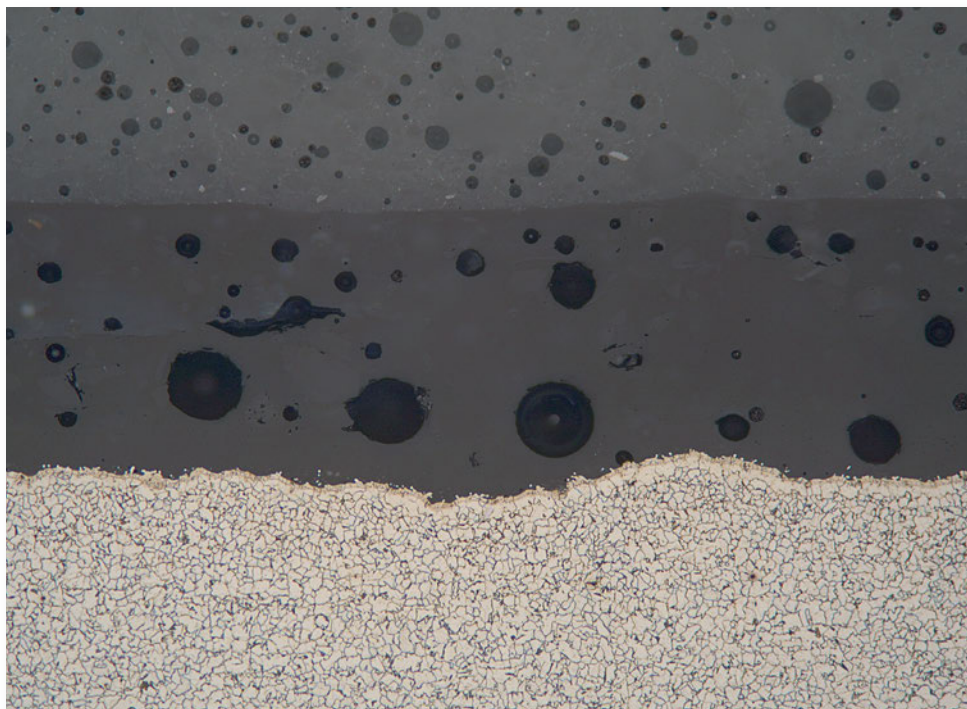
Device	Qpol GO 1	
Sample holder	6 x Ø 40 mm	Item No.: Z5445025
Pressure	Single pressure	

SCHRITT	MEDIUM		 rpm	 rpm	 Single pressure N	 min
 Planar grinding	SiC-Paper P320 + Quick-Tap	H ₂ O	200	120 ►► Synchronous Rotation	30	Till Flat 2:00
 Grinding	SiC-Paper P600 + Quick-Tap	H ₂ O	200	120 ►► Synchronous Rotation	30	2:00
 Pre-Polishing	BETA	Dia-COMplete Poly, 9 µm	150	120 ◄◄ Counter Rotation	30	6:00-8:00
 Polishing	GAMMA	Dia-COMplete Poly, 3 µm	150	120 ►► Synchronous Rotation	30	6:00
 Polishing	ZETA	Dia-COMplete Poly, 1 µm	150	120 ►► Synchronous Rotation	25	2:00
 Etching (chem.)	Etchant Alcoholic nitric acid, 3% (Nital)					0:05
Notes	- Pre-dosing for 9 µm, 3 µm and 1 µm: 3 s - Dosing interval and dosing duration for Diamond Suspension 9 µm, 3 µm, 1 µm: Every 35 s for 1,3 s					

Dark-field image of the sample -
1 µm-polished and etched with 3% Nital, 100:1



Bright-field image of the sample –
1 µm-polished and etched with 3% Nital, 100:1



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