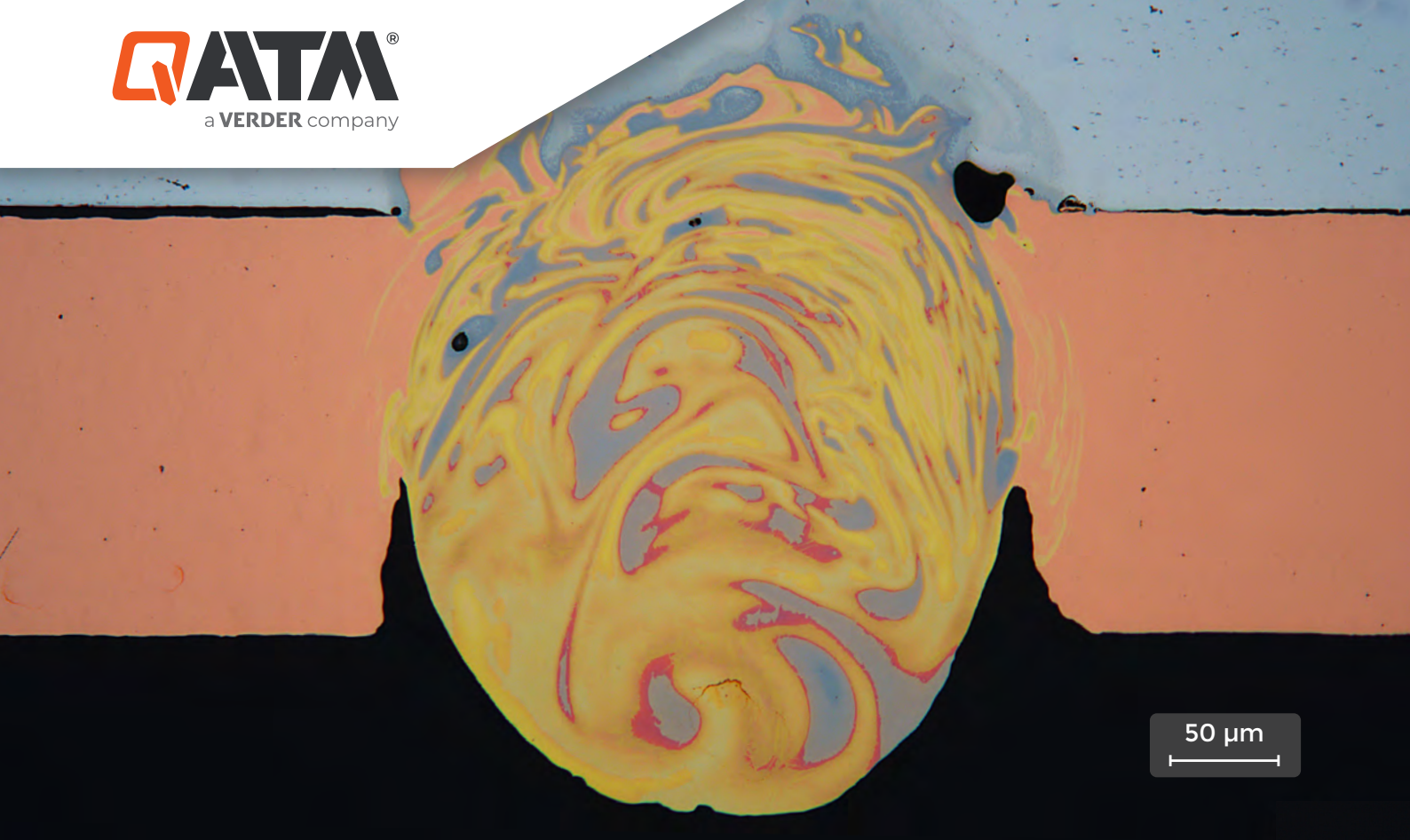




50 µm

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METALLOGRAPHIC PREPARATION OF A LASER WELD SEAM

Objective:

The weld seams on the sample sheets on the battery covers are to be prepared and analyzed in cross-section. The sheets are from steel and copper alloys.

CUTTING

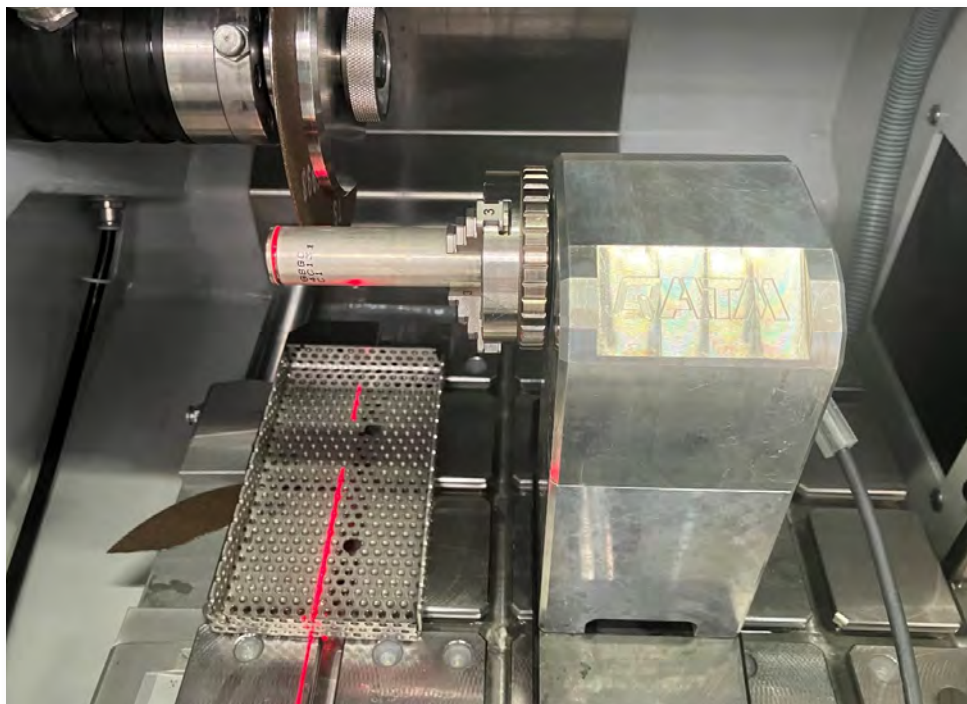


Precision cut-off machine
Qcut 200 A

Device	Qcut 200 A	
Cut-off disc	Al ₂ O ₃ cut-off disc	Item no.: 92002770
Coolant and anti-corrosion agent	QATM standard	Item no.: 95014281
Clamping tool	Rotation device type RD2	Item no.: Z1891001
Cutting method	Horizontal cutting (X-axis)	
Parameter	- Feed speed	0.1 mm/s
	- Pulse parameter	Without pulse
	- Cut-off disc rotational speed	3000 rpm

Notes

Clamping suggestion in the cutting machine



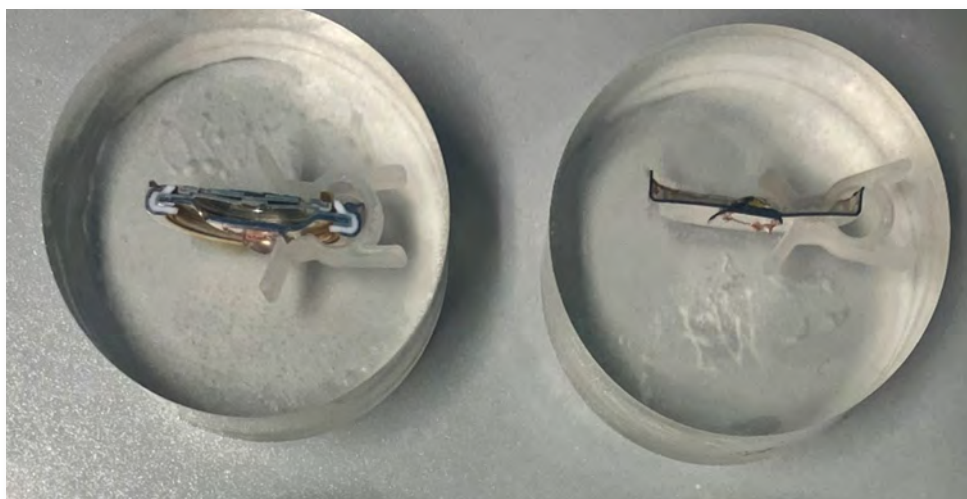
COLD MOUNTING



Cold mounting material KEM 20

Mounting Material	KEM 20
Mixing ratio	2 : 1 (Liquid : Powder)
Curing time	15 min.
Mounting mould	PP mould, Ø 40 mm
Accessories	- Mixing cup - Mixing stab - Dosing spoon
Notes	

The mounted samples





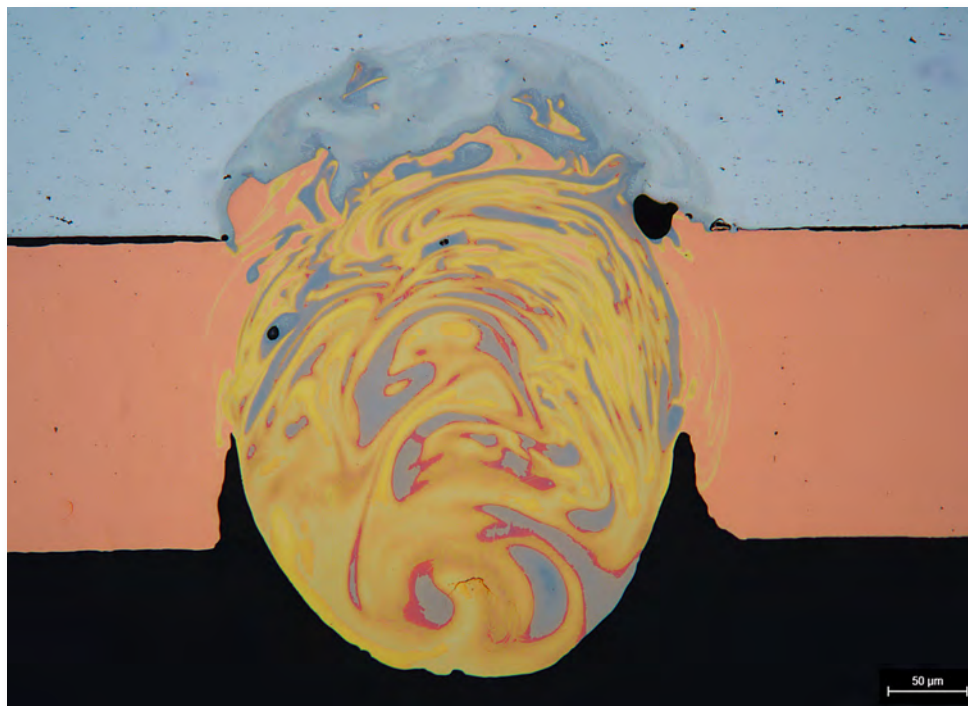
Automatic grinding and polishing machine Qpol 250 A1 ECO

GRINDING/POLISHING

Device	Qpol 250 A1 ECO	
Sample holder	6 x Ø 40 mm	Item no.: Z5445025
Pressure	Single pressure	

STEP	MEDIUM		 rpm	 rpm	 Single pressure N	 min
 Planar grinding	VEGA, 125 µm	H ₂ O	200	120 ►► Synchronous Rotation	30	Till the middle of the weld seam 5 mm in 5 min.
 Grinding	VEGA, 25 µm	H ₂ O	200	120 ►► Synchronous Rotation	30	1:00
 Pre-polishing	BETA	Diamond suspension 9 µm, Poly + alc. Lubricant	150	120 ►► Synchronous Rotation	30	5:00
 Polishing	GAMMA	Diamond suspension 3 µm, Poly + alc. Lubricant	150	120 ►► Synchronous Rotation	25	5:00
 Polishing	ZETA	Diamond suspension 1 µm, Poly + alc. Lubricant	150	120 ►► Synchronous Rotation	22	3:00
 Final polishing	OMEGA	EPOSIL F 0.1 µm	100	80 ►► Synchronous Rotation	20	2:00 (Rinsing time: 30 s)
 Etching (chem.)	3% alc. Nitric acid or Copper A					0:05 or 0:02
Notes	- Pre-dosing for Diamond suspension 9 µm, 3 µm und 1 µm: 3 s Dosing interval and dosing duration for Diamond suspension 9 µm, 3 µm, 1 µm: Every 30 s for 1,3 s - Pre-dosing for lubricant: 3 s Dosing interval and dosing duration for lubricant: Every 60 s for 1,3 s					

Microlaser weld on a copper sheet
after fine polishing.
*Thomas Strohmer, Application laboratory
ATM Qness GmbH, Österreich.*



Conclusion

The sheets on the battery covers were easily cut using the QCUT 200A and a rotary device.

The sections were mounted in KEM 20 mounting resin. KEM 20 is an MMA-based cold mounting material with a curing time of 15 min.

The samples were ground down to the center of the welds. To achieve this surface, a coarse-grained diamond grinding wheel (VEGA-125 µm) was used.

The samples were etched with nitric acid. Here, the etchant can only etch the steel sheet, the copper sheet remains unaffected. Another option is to etch the samples with copper A (FeCl₃). Here, both sheets were etched, and the root of the welds could also be analyzed. But the pores in the welds are not fully visible.