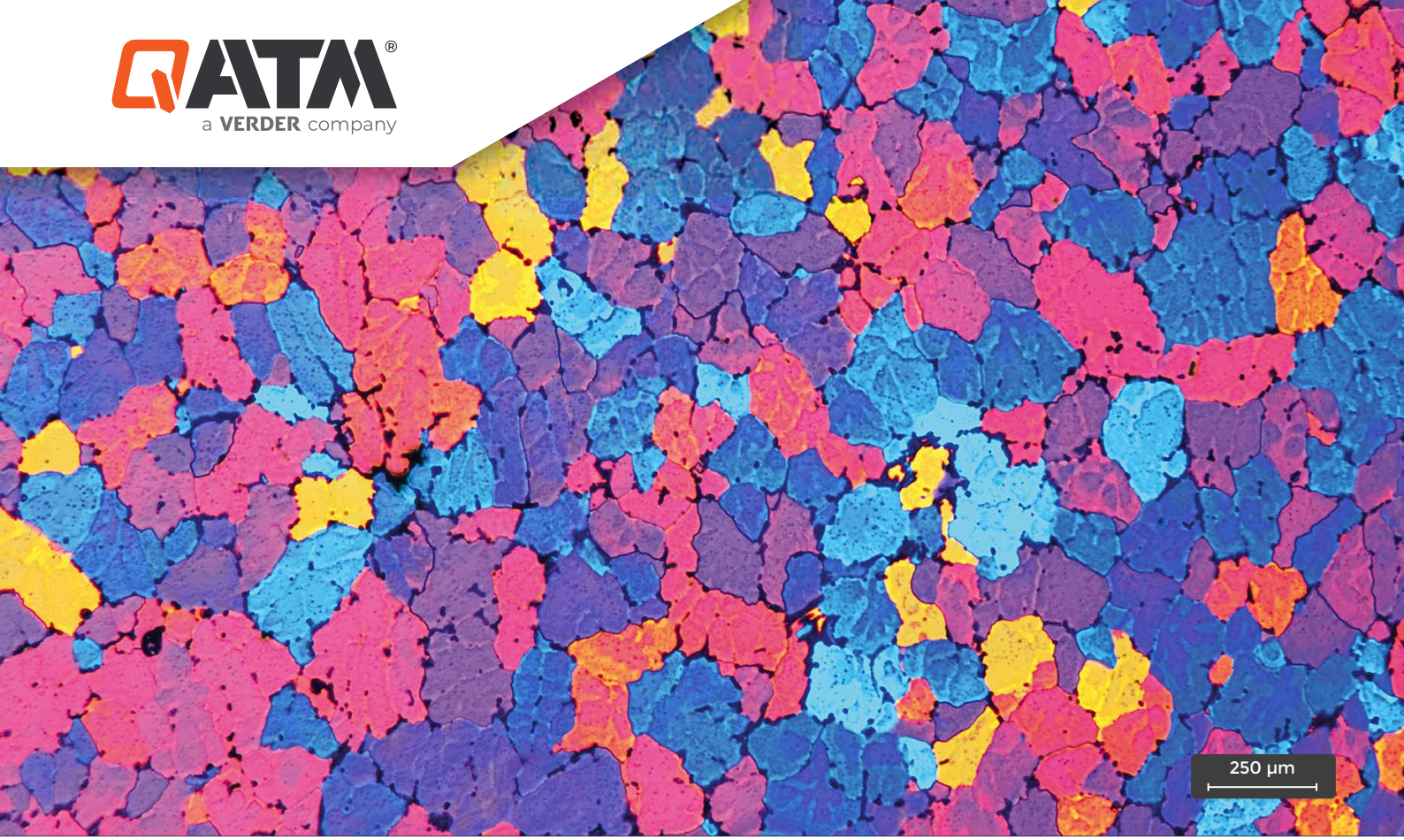

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WELDED ALUMINUM ALLOY

Objective :

The welded aluminum sample is to be prepared in order to be able to evaluate the basic structure and the microstructure in the weld seam area. For this purpose, the grain distribution and grain size are to be determined. The sample is to be prepared electrolytically (polishing and etching). The Qetch 1000 is used for this.
The electrolytic preparation is carried out on a previously cutted and mounted (cold embedding) sample.

CUTTING

Cut-off Machine Qcut 250 A

Device	Qcut 250 A	
Cut-off disc	NF-A-250SC	Item no.: 95012531
Coolant and anti-corrosion agent	Coolant and anti-corrosion agent	Item no.: 95004146
Clamping tool	- Qtool 80 Vario	Item no.: Z2231200
Cutting method	Horizontal cut (X-axis)	
Parameter	- Feeding speed - Pulse setting - Rotational speed of cut-off disc	0.1 mm/s Without pulse The rotational speed is constant. 3015 rpm by 50 Hz and 3100 rpm by 60 Hz
Note		

Recommendation for clamping tool – Qtool 80 Vario

Cold Mounting Material KEM 30

COLD MOUNTING

Mounting Material	KEM 30
Mixing ratio	2 : 1 (Powder : Liquid)
Hardening time	approx. 15 min
Mounting mould	PP, Ø 40 mm
Accessories	- Mixing bowl - Stirring rod - Dosing spoon
Notes	

The sample should only be mounted to the extent that the back of the sample remains free (see figure A or B). This allows the sample to be contacted directly during electrolytic etching.

Overview of the mounted sample

Figure A: Sample back is free for contacting

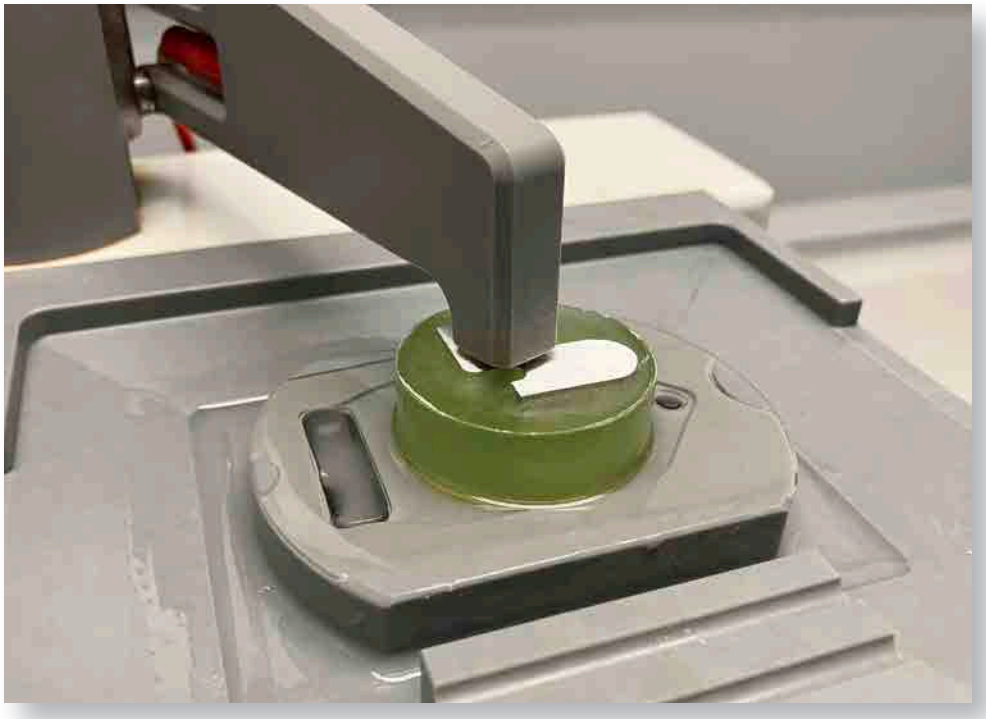
ELECTROLYTIC POLISHING AND ETCHING

Device	Qetch 1000

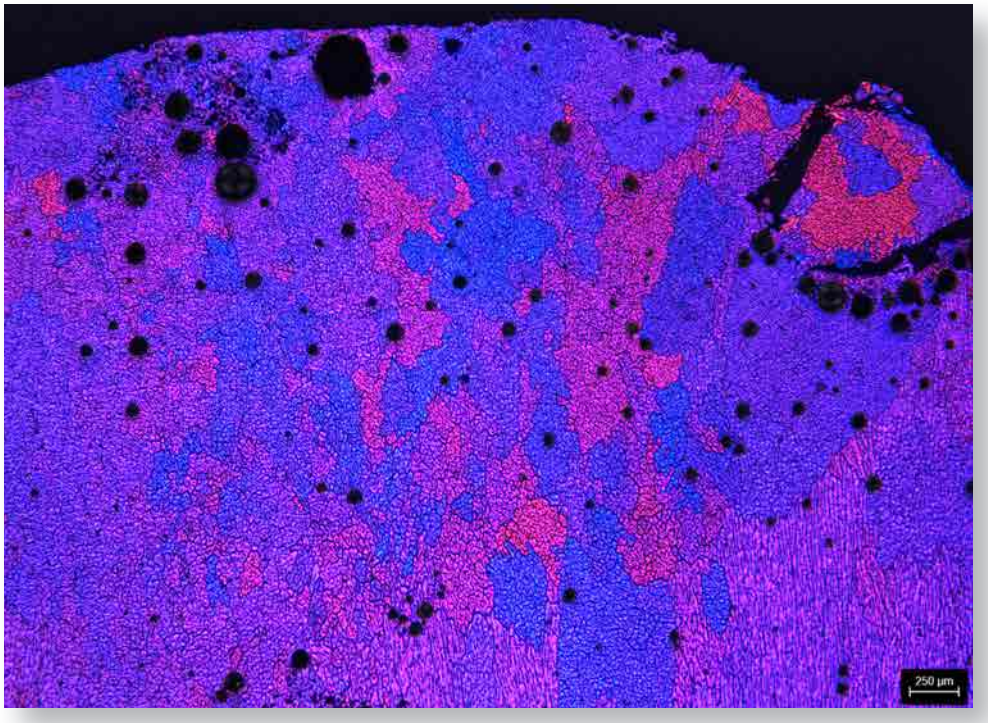
Electrolytic polishing and etching machine Qetch 1000

STEP	ELECTROLYT	VOLTAGE [V]	Pump power [%]	Mask [cm²]	Time [min]
Electrolytic Polishing					
Polishing (electrolytic)	Electrolyt K1	15	50	1.5	0:30
Electrolytic Etching					
Etching (electrolytic)	**BARKER** Etchant	20	60 - 65	5	1:00 - 1:30
Note	We recommend to pre-grind the sample with SiC-Paper, P320 or finer before the electrolytical polishing and etching process				

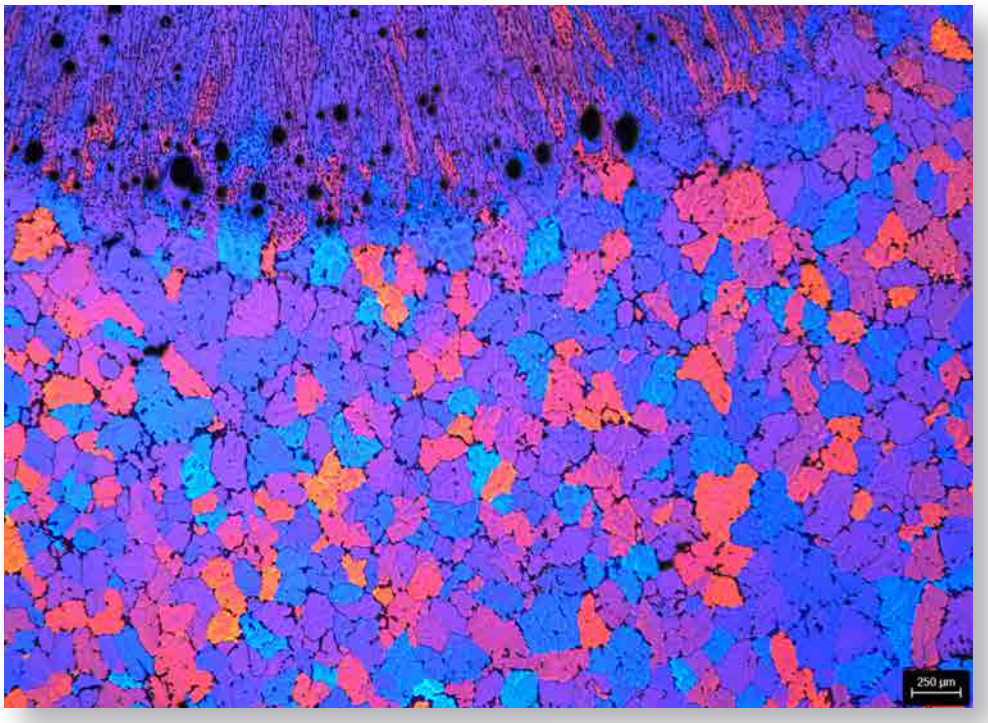
Figure B: Sample prepared for electrolytic processing. Recommendation for contacting the sample



Weld seam area after electrolytical BARKER etching. Pores can be seen as black dots - 25:1



Transition from weld seam to base material after electrolytical BARKER etching. The different grain colors can be seen due to different crystal orientation and filter setting on the microscope (analyzer filter + polarization filter with ¼ Lambda) - 25:1



Core area after electrolytical BARKER etching - 25:1

Conclusion

We recommend the silicon carbide cut-off wheel NF-A-250SC for the cutting process. During the cutting process, it is important that no heat is generated and no deformation occurs. Take care that a smooth cutting surface is achieved.

Any cold mounting resin can be used for the cold mounting process. We have used KEM 30 in this recommendation. A special feature to be mentioned here is that the back of the sample is not covered by the mounting resin. This ensures optimum contact with the sample. The electrolytic polishing and etching process can also be carried out on an unembedded sample.

To see the color structure, the microscope must have an adjustable analyzer filter and an adjustable polarizaton filter with ¼ lambda. Without these filters, the color structure cannot be seen.

OUR PRODUCT OF THE MONTH

Etchant BARKER, Item no.: 95006393

Find out more at
www.qatm.com