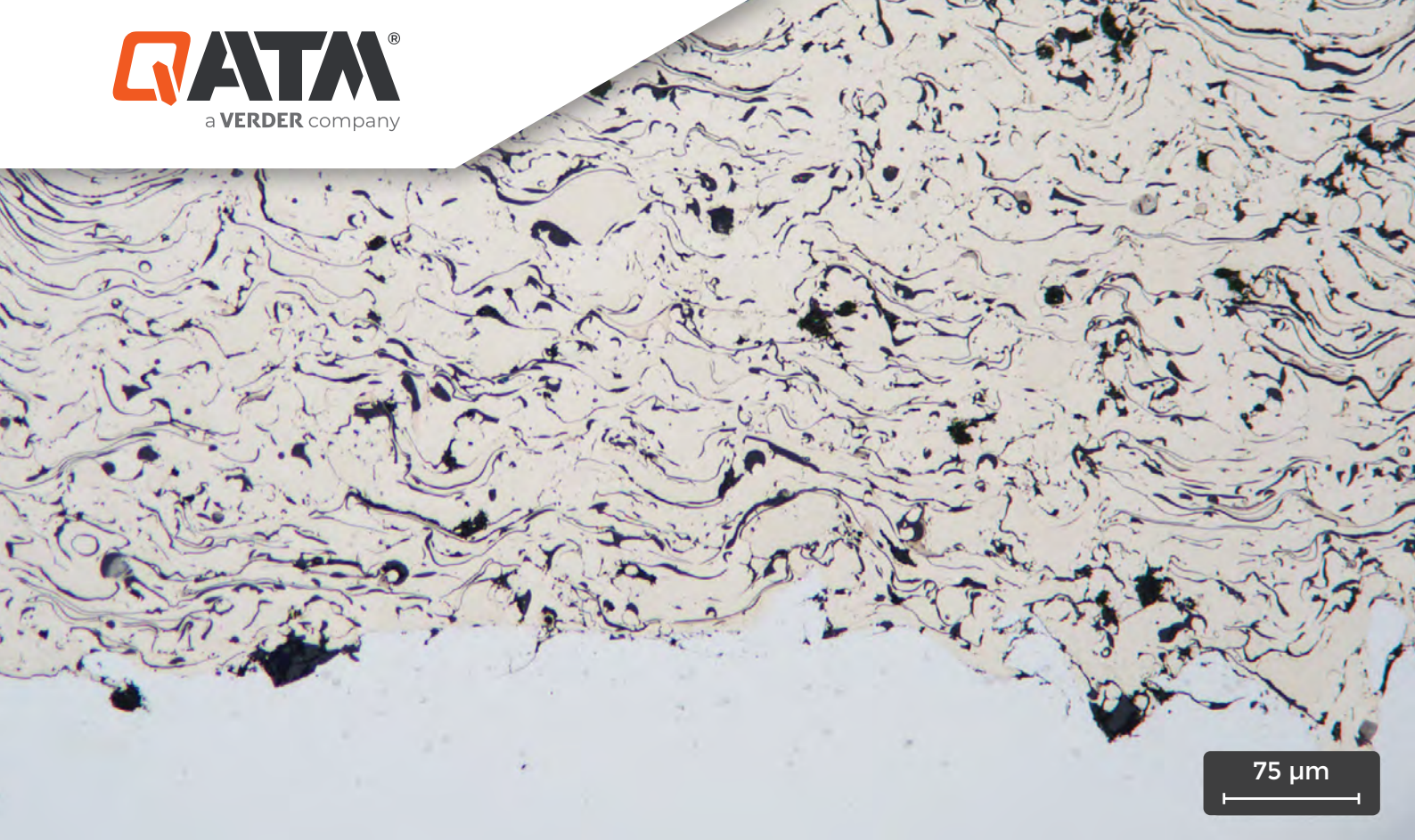




75 µm

ATM Qness GmbH
Emil-Reinert-Str. 2
57636 Mammelzen
Germany

Phone +49 2681 9539-0
E-Mail info@qatm.com

ATM Qness GmbH
Reitbauernweg 26
5440 Golling
Austria

Phone +43 6244 34393
E-Mail info.at@qatm.com

www.qatm.com

THERMAL SPRAY COATING – USING Al_2O_3

Objective:

The aim of the investigation is to prepare the thermal spray coating in such a way that the bond to the base material, the porosity of the coating, the layer structure and the layer thickness can be analyzed. The received sample can be seen on the right.



CUTTING



Precision cut-off machine
Qcut 200 A

Device	Qcut 200 A	
Cut-off disc	Corundum cut-off wheel	Item no.: 92002769
Coolant and anti-corrosion agent	ATM-CoolCut	Item no.: 95004146
Clamping tool	RECOMMENDATION 1 - Vertical Vice Single RECOMMENDATION 2: - Qtool 40 S - Easy-Clamping Base S	Item no.: Z2236009 Item no.: Z2270201 Item no.: Z2236030
Cutting method	Automatic longitudinal cutting method (with X-Axis)	
Parameter	- Feed speed - Pulse parameter - Cut-off disc rotational speed	0.1 mm/s Without pulse 4000 rpm
Note	- To avoid break-outs/damages of the coating, we recommend positioning the sample in the clamping tool in the way that it is always cutted "with" the coating (coating is to see)	

Clamping tool "Vertical Vice Single"
(RECOMMENDATION 1)



Clamping tool "Qtool 40 S"
(RECOMMENDATION 2)





Cold mounting material Qpox 92

COLD MOUNTING

Mounting Material	Qpox 92
Mixing ratio	100 : 23 (Resin : Hardener)
Curing time	approx. 12 h
Mounting mould	PP mould, Ø 25 mm
Accessories	- Mixing cups - Mixing Stick - Plastic Clips - Scale - Infiltration Unit
Notes	- please use the infiltration unit for the mounting process

The sample after mounting





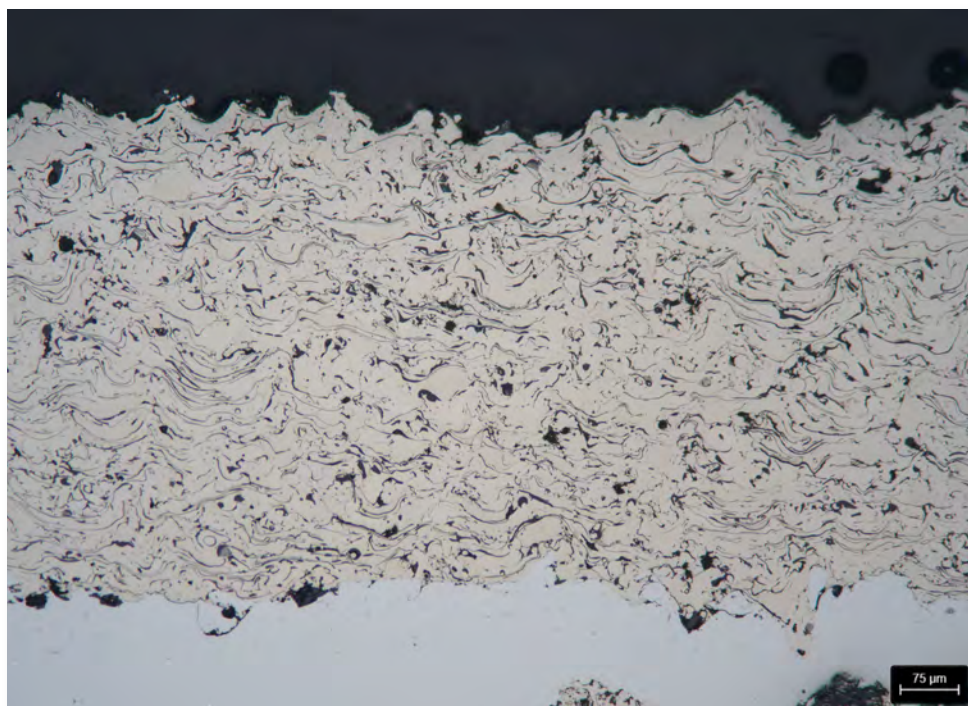
Automatic grinding and polishing machine Qpol 250 A1 ECO

GRINDING/POLISHING

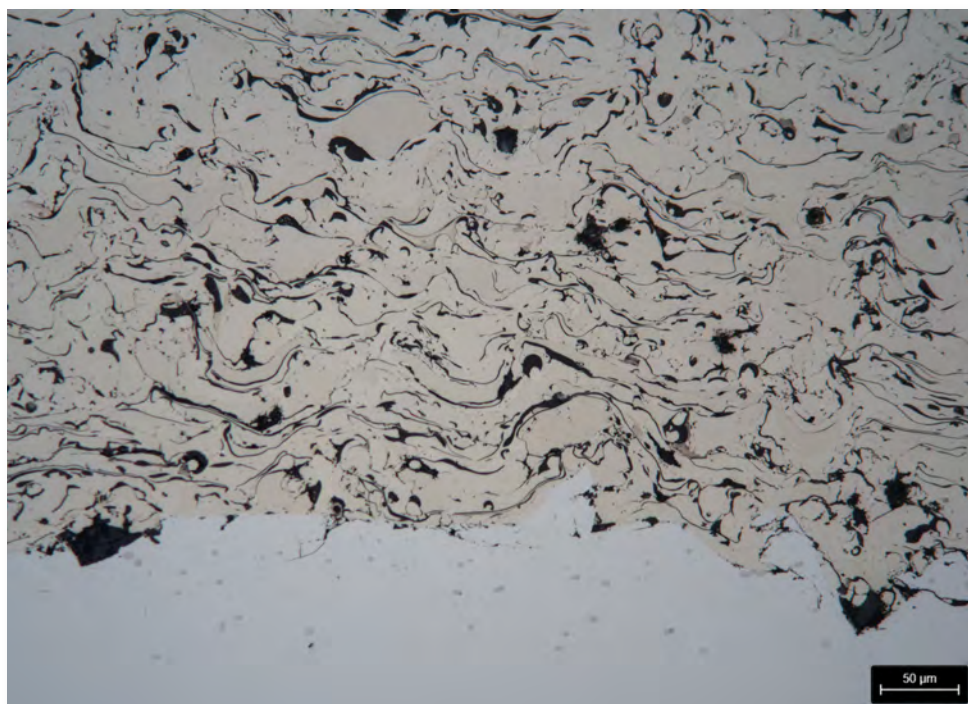
Device	Qpol 250 A1 ECO	
Sample holder	8 x Ø 25 mm	Artikelnr.: Z5445030
Pressure	Central pressure	

STEP	MEDIUM		 rpm	 rpm	 Central pressure N	 min
 Planar grinding	SiC paper with PSA back side, P320	H ₂ O	200	100 ►► Synchronous Rotation	45	0:30
 Pre-Polishing	CONTERO S	Dia-Complete Poly, 9 µm	150	100 ►► Synchronous Rotation	60	3:00
 Polishing	GAMMA	Dia-Complete Poly, 3 µm	150	100 ►► Synchronous Rotation	60	4:00
 Polishing	SIGMA	Dia-Complete Poly, 1 µm	150	100 ►► Synchronous Rotation	60	4:00
 Polishing	ZETA	Dia-Complete Poly, 1 µm	150	100 ►► Synchronous Rotation	60	1:00 - 2:00
Notes	- with the grinding step, SiC P320, 0,5 - 1 mm removal must be achieved - pre-dosing for 9 µm: 7 s - dosing interval and dosing duration for Dia. Suspension 9 µm: every 15 s for 1.5 s - pre-dosing for 3 µm and 1 µm: 3 s - dosing interval and dosing duration for Dia. Suspension 3 µm, 1 µm: every 25 s for 1.5 s					

Overview of the thermal
spray coating - 100:1



The thermal coating with very low porosity
and lamellar, uniform structure - 200:1



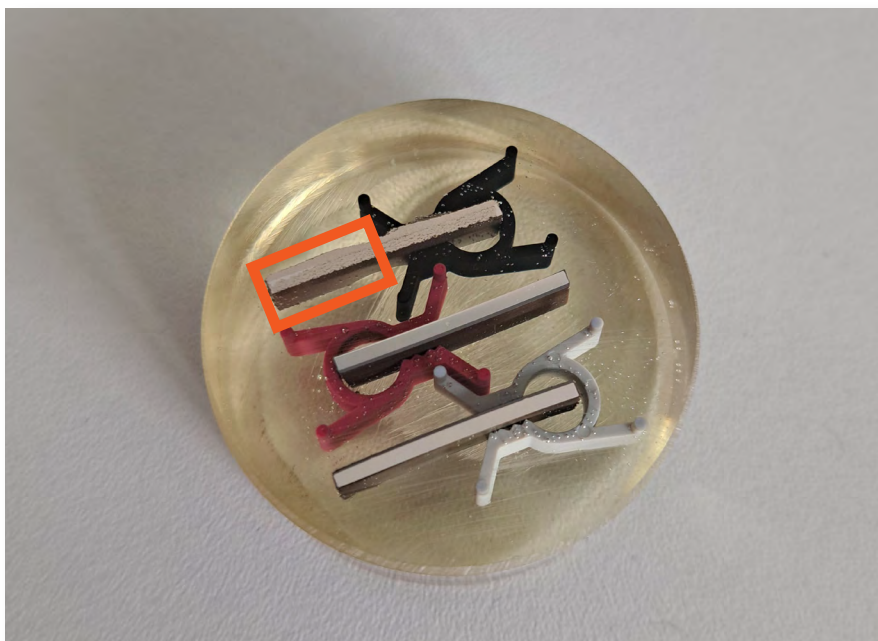


Automatic hardness tester
Qness 60 A+ EVO

OPTICAL ANALYSIS AND HARDNESS TESTING

Device	Qness 60 A+ EVO
Process	Phase analysis
Process	Hardness testing

Red marked area position
for highresolution image



High-resolution image [HRI] – 5:1

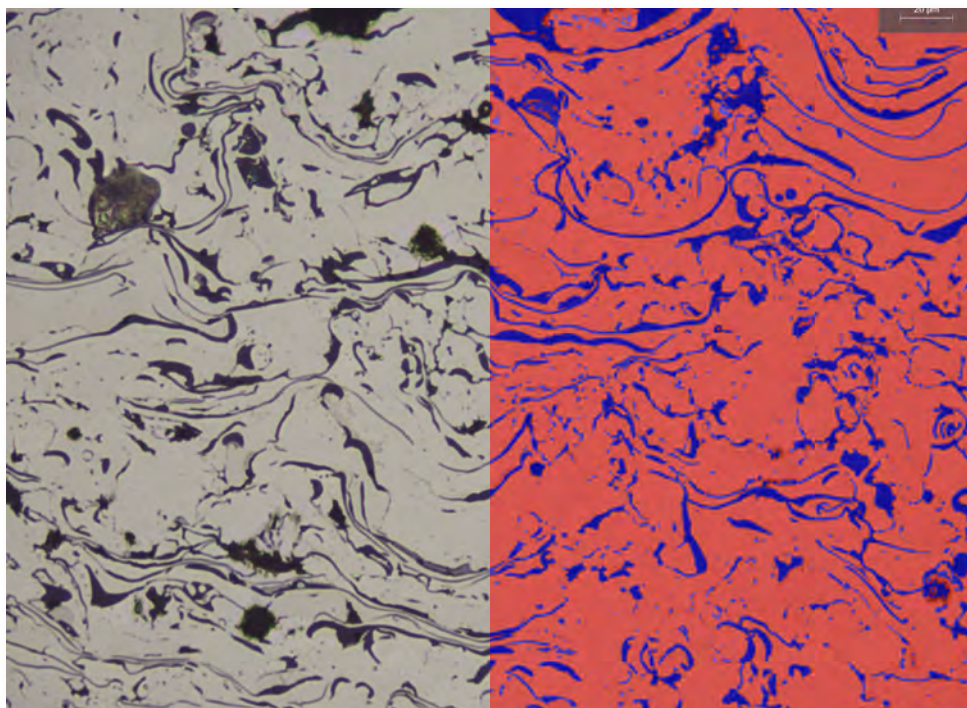


PHASE ANALYSIS

Device	Qness 60 A+ EVO	
Objective	20x HQ	Item no.: QSO095900
Software module	Qpix Inspect phase analysis	Item no.: QSO1711000

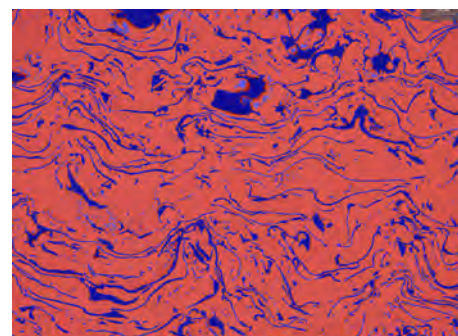
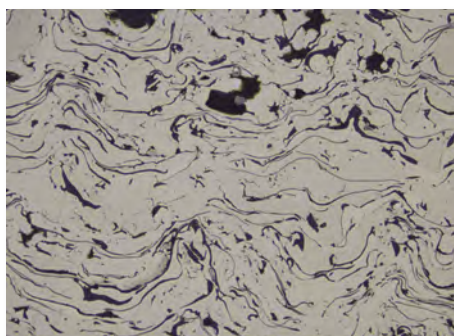
Thermal spray coating - 20:1

■ Al_2O_3 : 79.55%
■ Pores: 20.45%

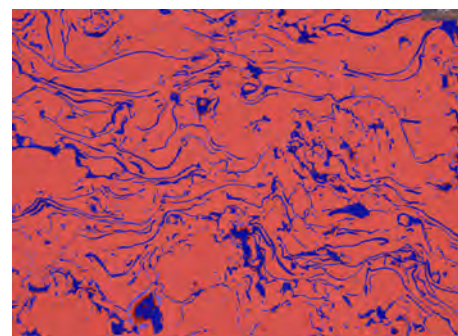
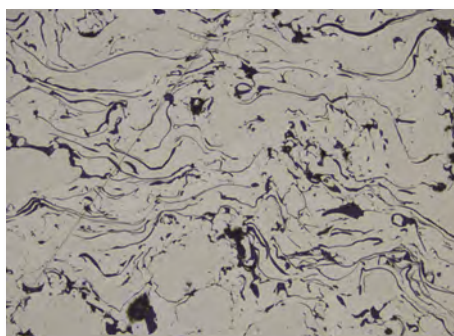


Additional images on the thermal spray coating - 20:1

Evaluation Top
■ Al_2O_3 : 79.67%
■ Pores: 20.33%



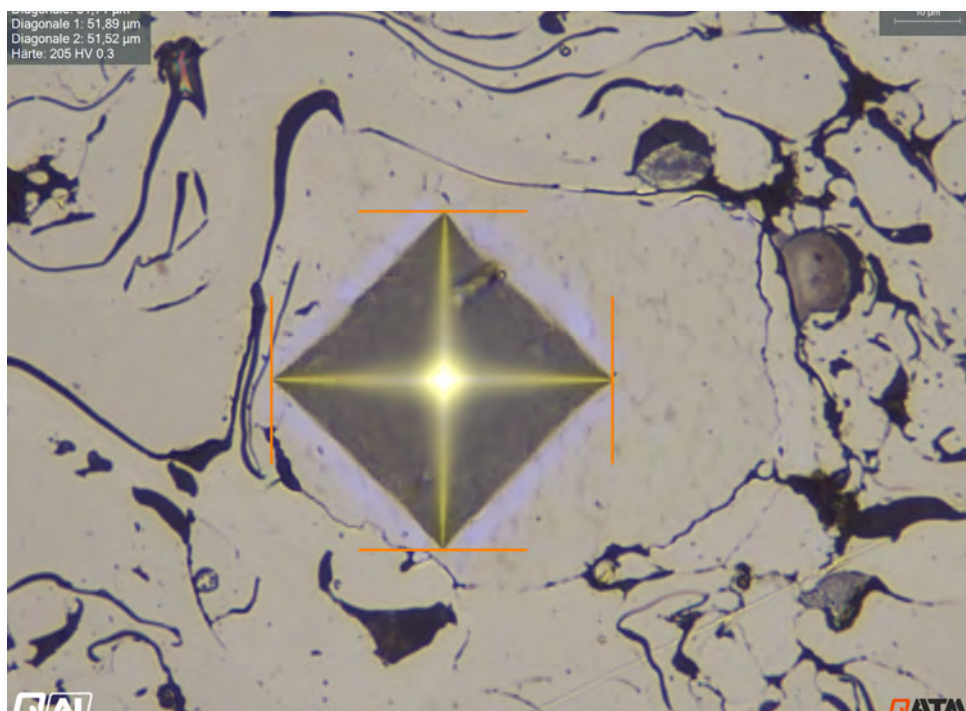
Evaluation Bottom
■ Al_2O_3 : 82.72%
■ Pores: 17.28%



HARDNESS TESTING

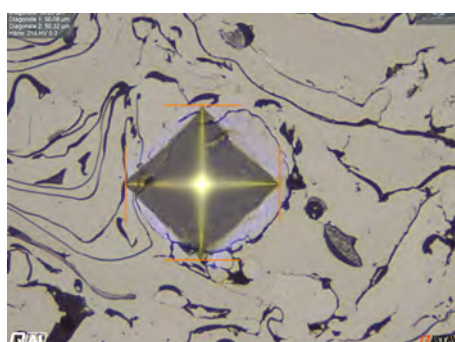
Device	Qness 60 A+ EVO	
Objective	50x HQ	Item no.: QSO096000

Test method HV0.3
208HV0.3

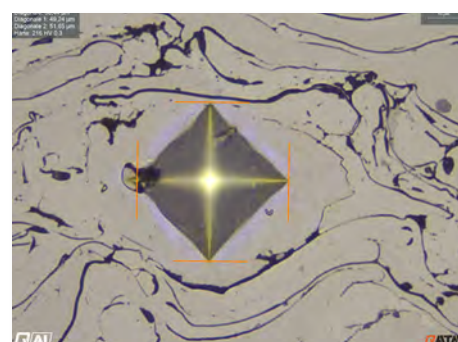


Additional hardness impression – 50:1

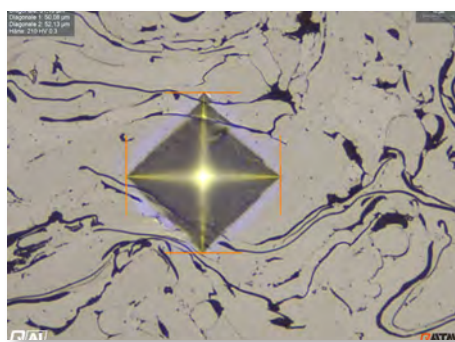
Evaluation top left
218HV0.3



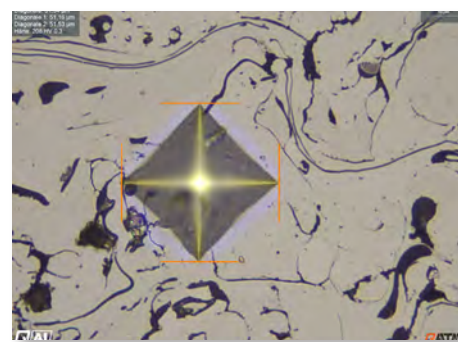
Evaluation top right
216HV0.3



Evaluation bottom left
205HV0.3



Evaluation bottom right
210HV0.3



Conclusion

The cutting process should be gently and accurate. Avoid damages or rough break-outs of the brittle layer. Fast feeding speeds or heat development should be avoided. The sample should be clamped in such a way that first the layer and then the base material can be cut.

We recommend to use the epoxy resin "Qpox 92" for the mounting process. To close cracks or pores use the infiltration unit.

To remove any damages or break-outs, a removal of at least 0.5 mm must be achieved with the first grinding step. The samples must be polished up to SIGMA 3 μm . To polish the samples without scratches - the polishing step with ZETA 1 μm must be used.

The samples can be analyzed without etching.

For microstructural characterization, the appropriate objective lens should be selected to obtain optimal imaging and measurement accuracy. For phase analysis, a 20x objective was applied and for hardness testing, a 50x objective was selected. The choice of magnification depends on the structural resolution required as well as the overall sample dimensions and required test method.

For hardness testing, the Vickers method HV0.3 is recommended. Indentations should be positioned carefully to avoid pores, cracks, or other microstructural defects that could compromise measurement accuracy.

To ensure reproducible results, the sample surface must be free from contaminants.