

HARDNESS TESTING IN POWDER METALLURGY

Hardness testing in powder metallurgy requires completely different parameters and procedures compared to classic hardness testing applications. Samples have to be prepared well to enable the hardness test. Powder has to be embedded in resin, e.g. with a hot mounting press, and afterwards the materialographic specimen has to be polished to obtain a clean surface for hardness testing.

SELECTIVE LASER MELTING (SLM)

Selective laser melting is used to produce aluminum alloys which have a much higher strength than the pure metal. In SLM, powdered aluminum is deposited in a thin layer (usually between 15 and 500 µm) on a base plate and then melted.

The components produced in this way have a hardness of 115 to 130 HV, which subsequently requires test forces >100 g. For the aluminum powder in our example, a hardness of 125 to 130 HV is to be expected, so that results with test forces >100g (HV0.1) comply with the Vickers DIN EN ISO and ASTM standard (standard requirement: Vickers indentation diagonal >20 µm).

If lower test forces are used on the hardness tester, testing of finer particles is also possible, but not in conformity with the standard.

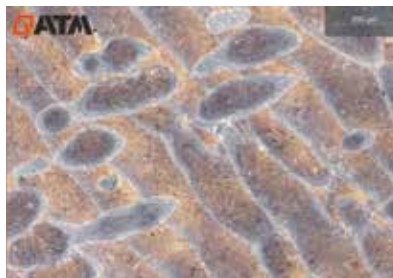


Fig. 1: The microstructure of the additively manufactured aluminium alloy - 5x

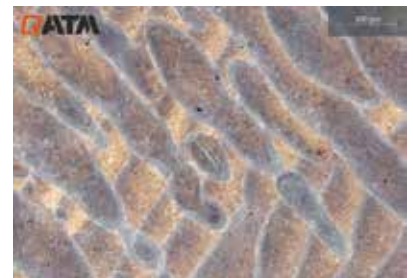


Fig. 2: Thickness of an additively manufactured layer, measured with the hardness testing software - 5x

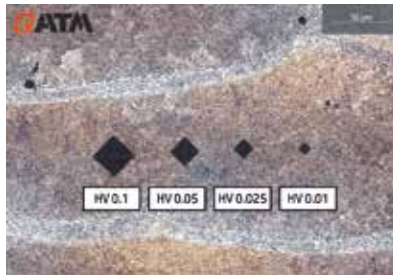


Fig. 3: Comparison of Vickers indentation sizes - 20x

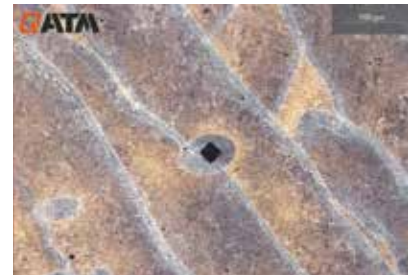


Fig. 4: Hardness: 129 HV0.1, tested in the center of the cross-section - 10x

QATM – HARDNESS TESTING

QATM is focused on the development and manufacturing of innovative high-end products for hardness testing. In addition to the wide range of versatile standard machines, QATM is also specialized in the planning and realization of customer-specific solutions.

- | Micro Hardness Testers
- | Rockwell Hardness Testers
- | Universal Hardness Testers
- | Clamping Fixtures
- | Customized Hardness Testers
- | Fully Automatic Hardness Testing Plants

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SOLUTIONS FOR ADDITIVE MANUFACTURING

REQUIREMENTS FOR HARDNESS TESTERS IN POWDER METALLURGY

- I Low Vickers test forces
- I High accuracy in slide and turret movement
- I Optical measurement system with high contrast at large magnification
- I Simple operation
- I Structured result management and reporting

CONCLUSION

For proving the quality of powder materials a powerful Vickers micro hardness tester like the QATM Qness 60 is needed. Depending on the amount of tested samples either the simple semi-automatic "M" version or the professional fully automated "A+" models are the perfect choice for powder material applications.

Depending on the test force and the surface preparation, the hardness testers are even able to use the integrated automatic image evaluation next to automatic brightness and focus adjustment. Reporting tool and export functions permit the creation of test protocols or data export to data management systems.

Micro Hardness Tester Qness 60 M EVO



The Vickers / Knoop / Brinell hardness tester series Qness 60 EVO takes micro hardness testing to a whole new level.

- I Wide test force range (0.25 g - 62.5 kg)
- I ASTM+DAkkS certified Vickers diamond included
- I Dynamic test turret with 8-position tool changer

Find out more at www.qatm.com

