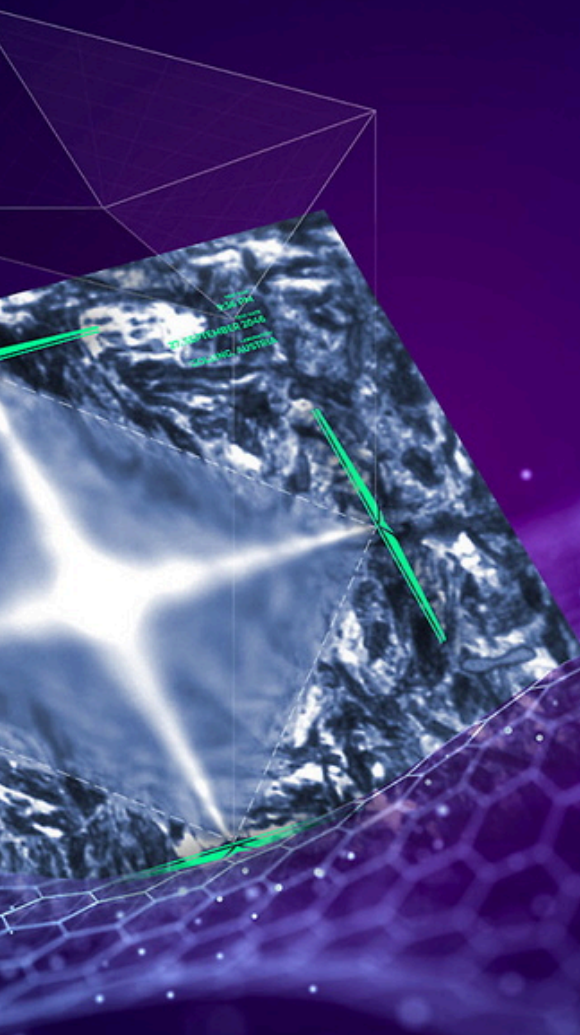


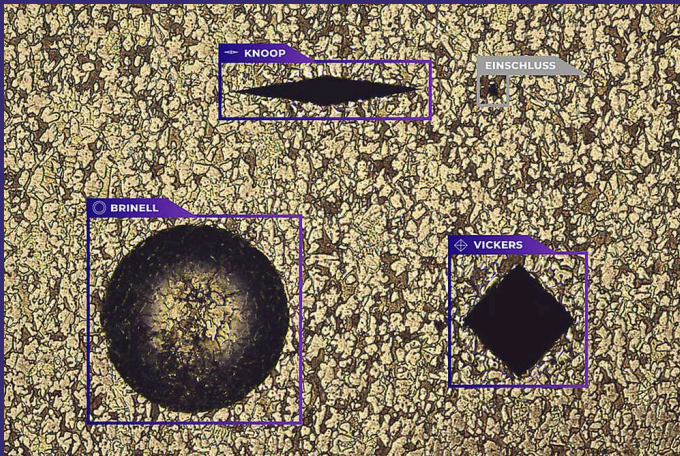


## REVOLUTIONAIRE BEELDANALYSE MET AI TECHNOLOGIE VOOR QPIX CONTROL2

VOLAUTOMATISCHE DETECTIE EN EVALUATIE, ZELFS MET MOEILIJKE  
OPPERVLAKKEN



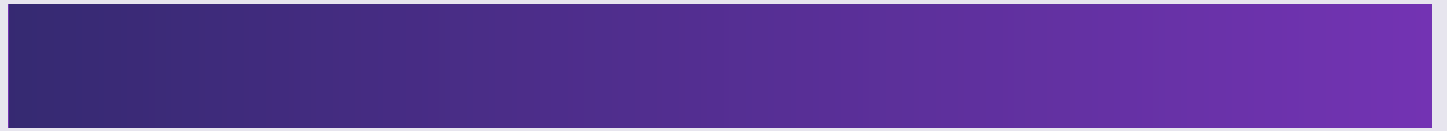
**QAI**



## AI-SUPPORTED OBJECT RECOGNITION: FASTER, MORE ACCURATE, MORE INTELLIGENT.

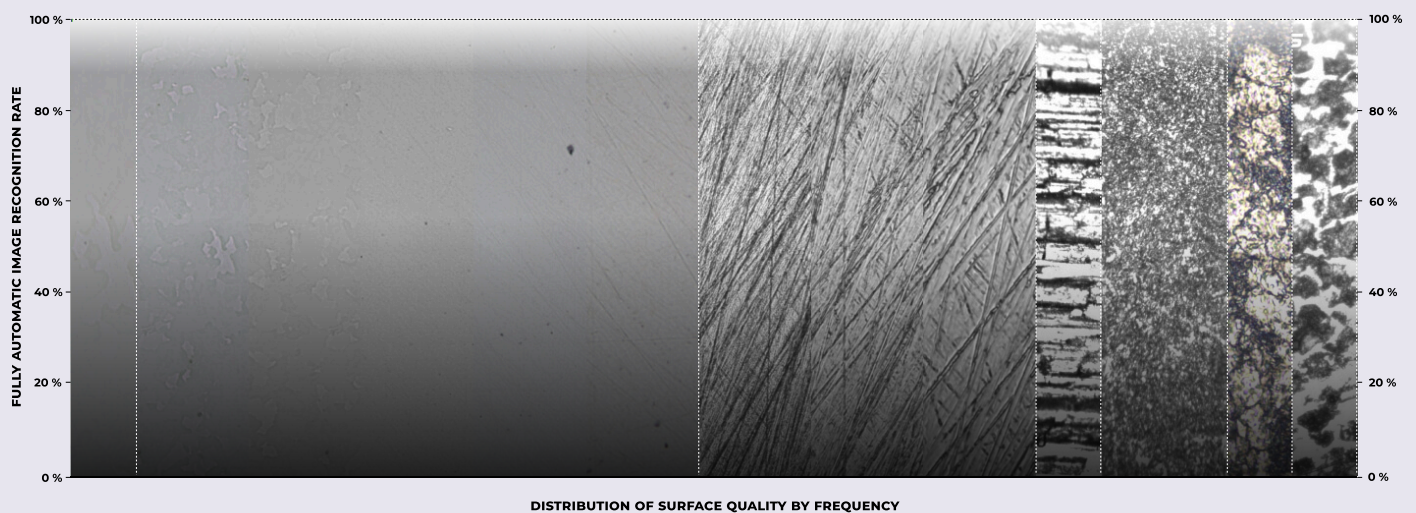
Discover the future of hardness testing with our groundbreaking AI integration, QAI. Our technology sets new standards in precision and efficiency by utilising cutting-edge AI models specifically designed for the challenges of Vickers, Knoop and Brinell hardness testing. The QATM quality standard and the ability to guarantee increased performance through retraining make QAI second to none in the industry.

Experience a level of automation never seen before: our AI automatically and accurately detects hardness test indentations – even on the most challenging surfaces. Say goodbye to manual intervention and hello to efficiency that paves the way for innovation. With our unrivalled accuracy and success rate, we offer you the ultimate competitive advantage. Revolutionise your hardness testing with our QAI – the future belongs to the pioneers!



This image evaluation is used in all areas of hardness testing, generally increasing the recognition rate, finding indentations in an image, and the quality and accuracy of the evaluation and analysis.

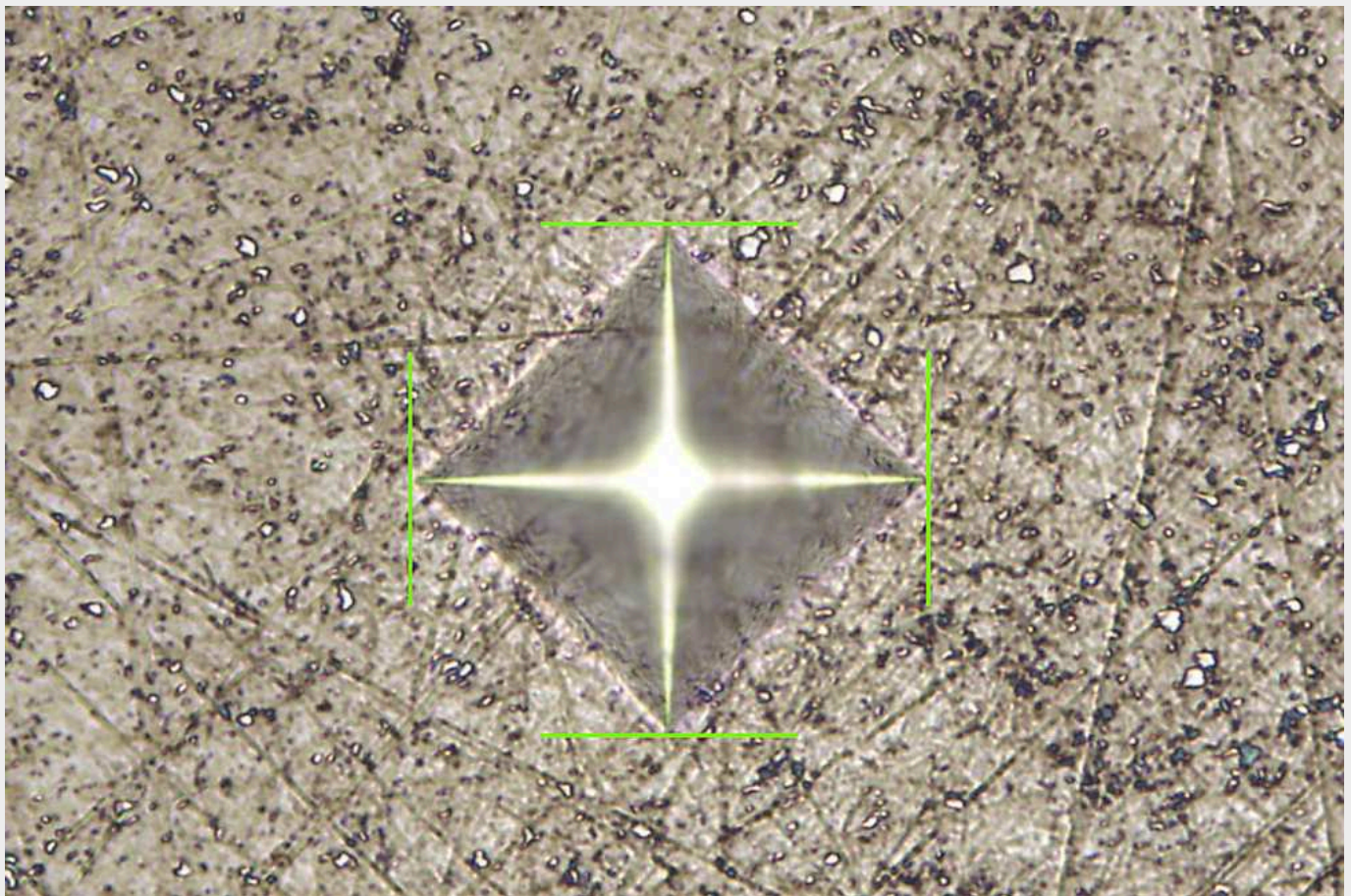
AI-based image evaluation significantly improves the quality of hardness test indentation detection.



## VARIOUS MATERIALS AND SURFACE TREATMENTS

## EXAMPLES OF SURFACES WITH CHALLENGING CONDITIONS

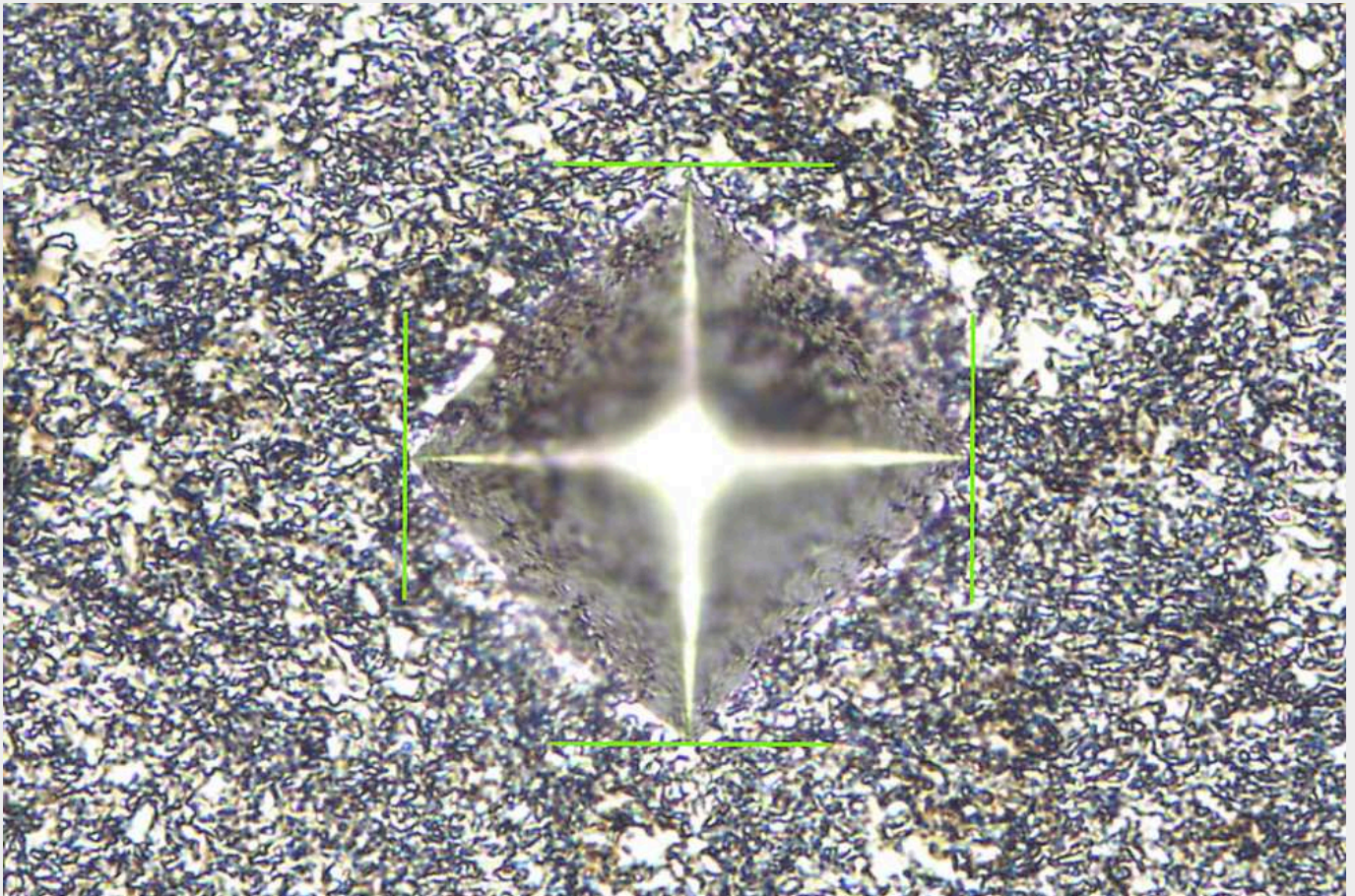
The QAI offers greater added value for rough, grinded and etched surfaces. Especially with difficult material surfaces or etched surfaces, the recognition rate could be increased enormously.



### LOW CONTRAST ON STEEL MATERIAL

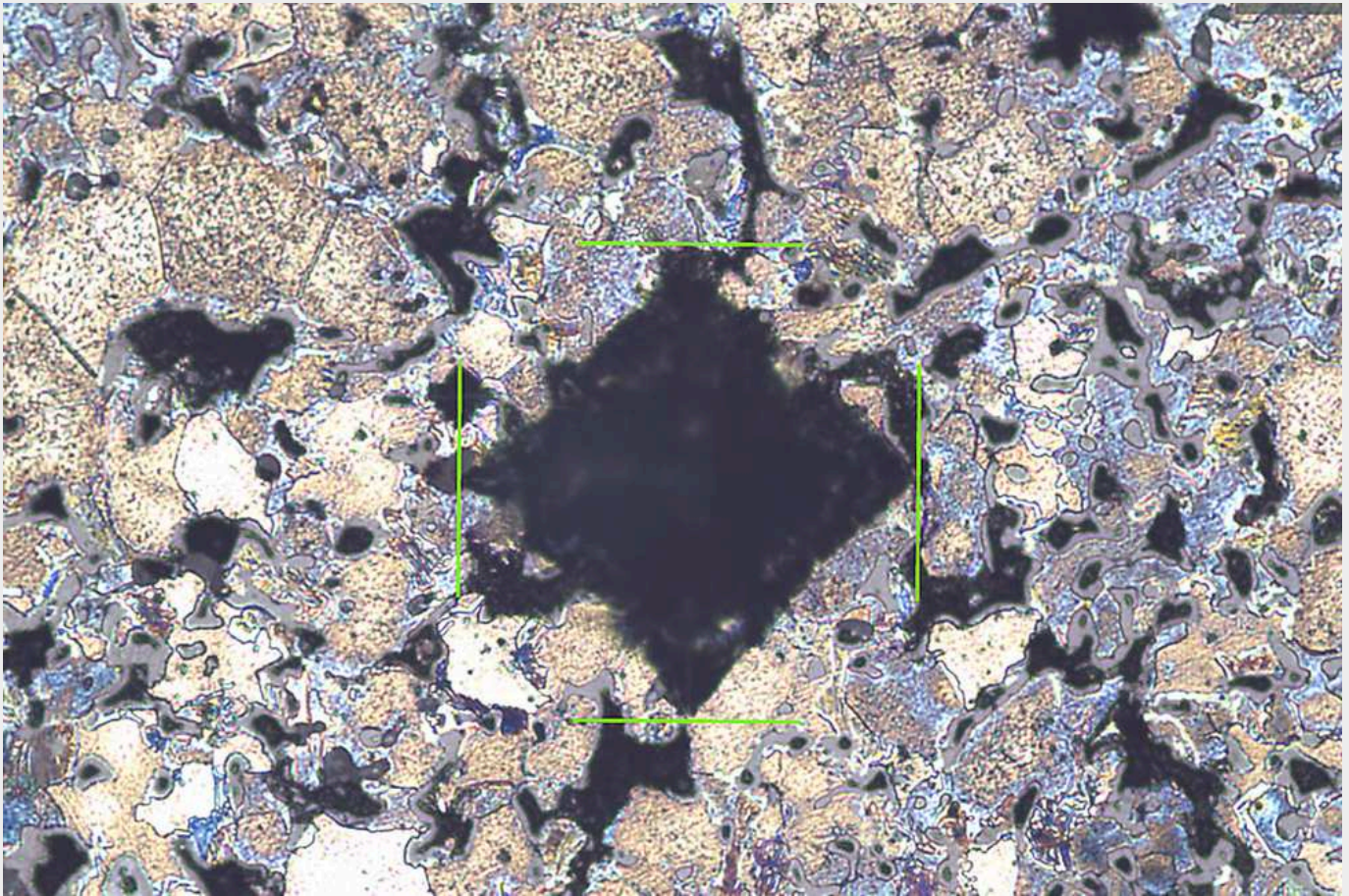
| Hardness: 725 HV1

| Preparation: grinded P1200 /  
polished 1  $\mu$ m



**LOW CONTRAST ON ETCHED SURFACE ON STEEL MATERIAL**

| Hardness: 309 HV0.5  
| Preparation: grinded P1200 /  
polished 1  $\mu$ m



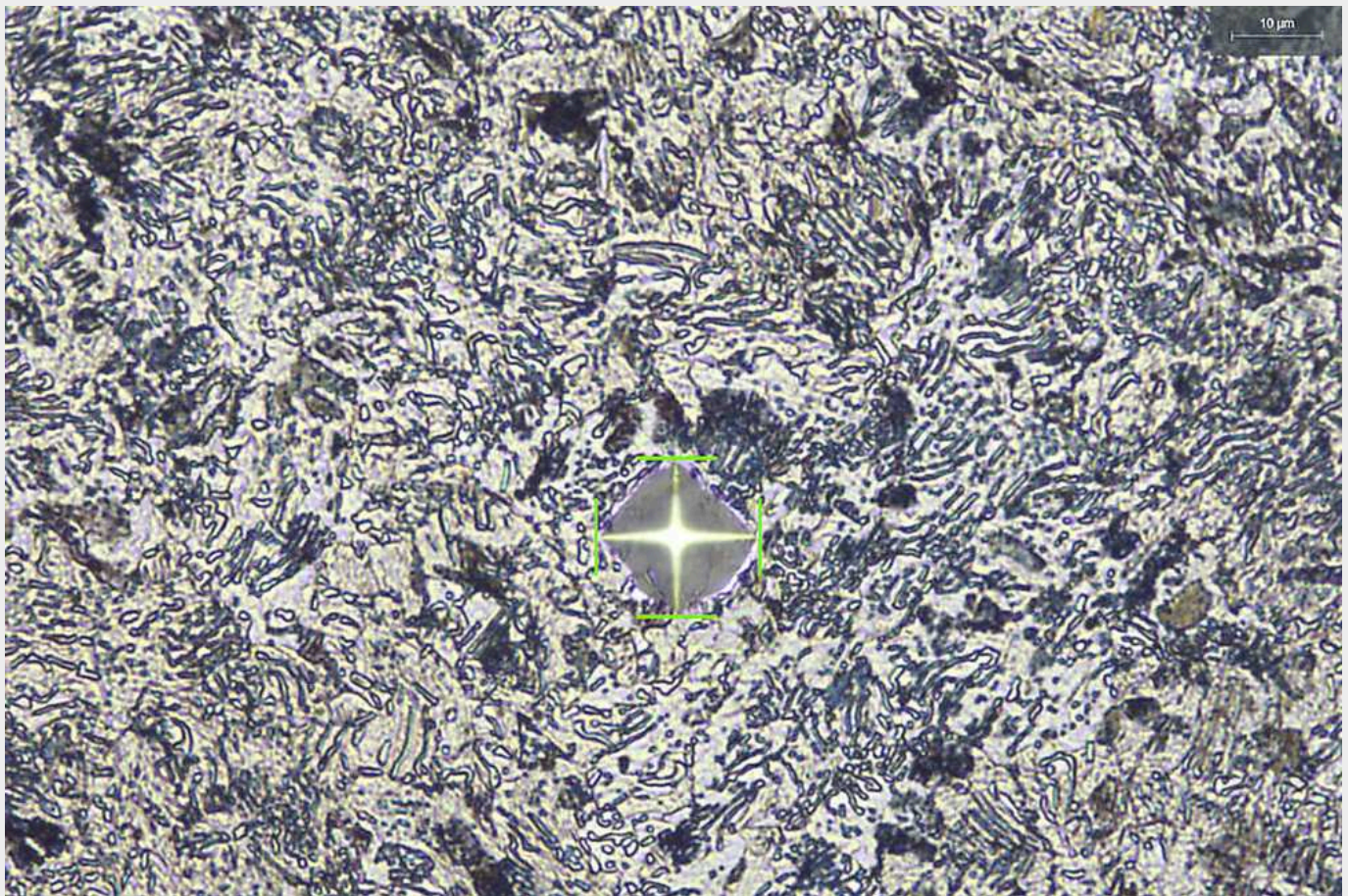
**LOW CONTRAST ON ETCHED SURFACE ON CARBON STEEL**

- | Hardness: 121 HV1
- | Preparation: polished 1  $\mu$ m



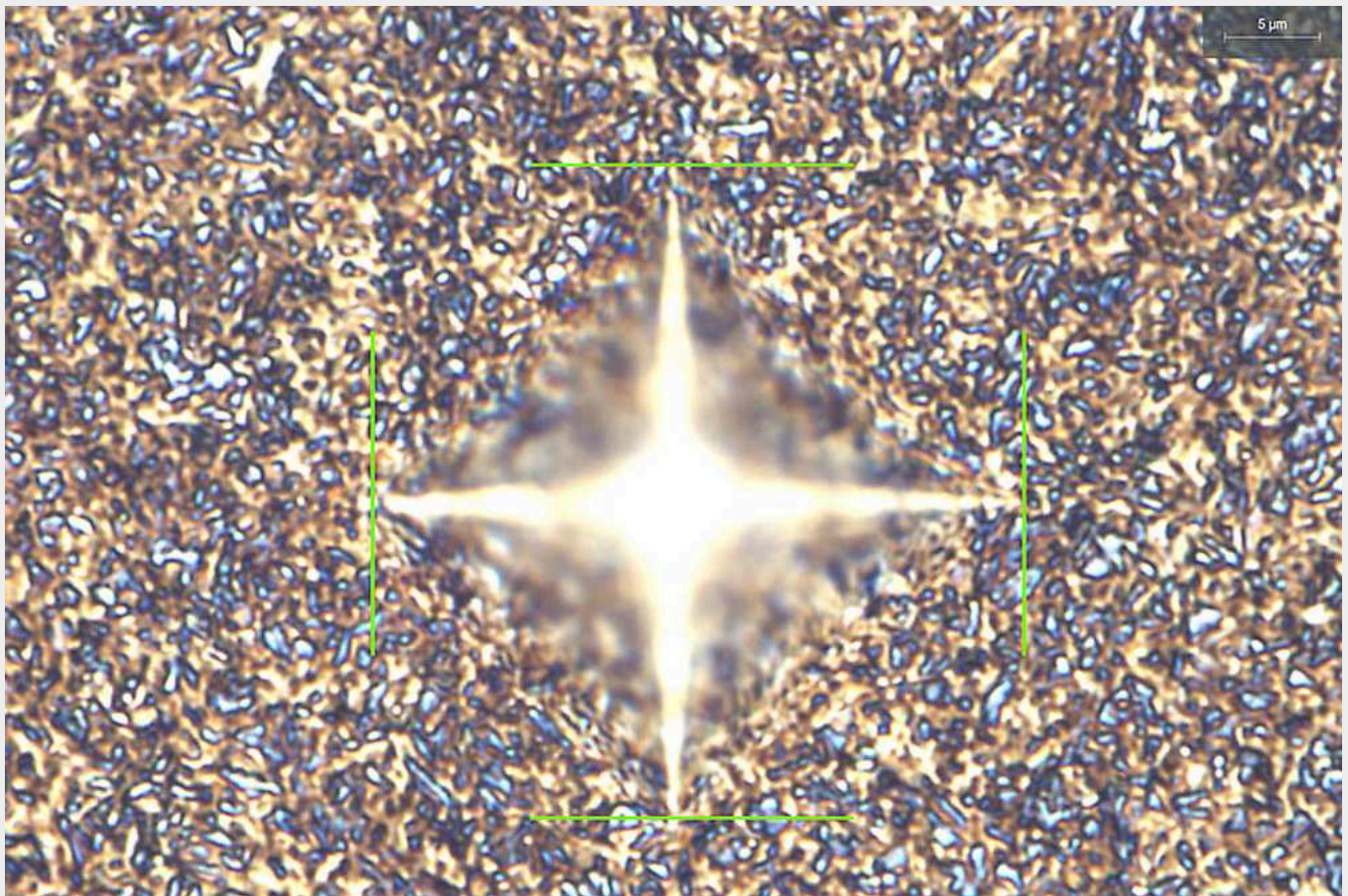
**LOW CONTRAST ON ETCHED SURFACE ON CONSTRUCTION STEEL**

- | Hardness: 235 HV0.5
- | Preparation: grinded P1200 / polished 1  $\mu$ m



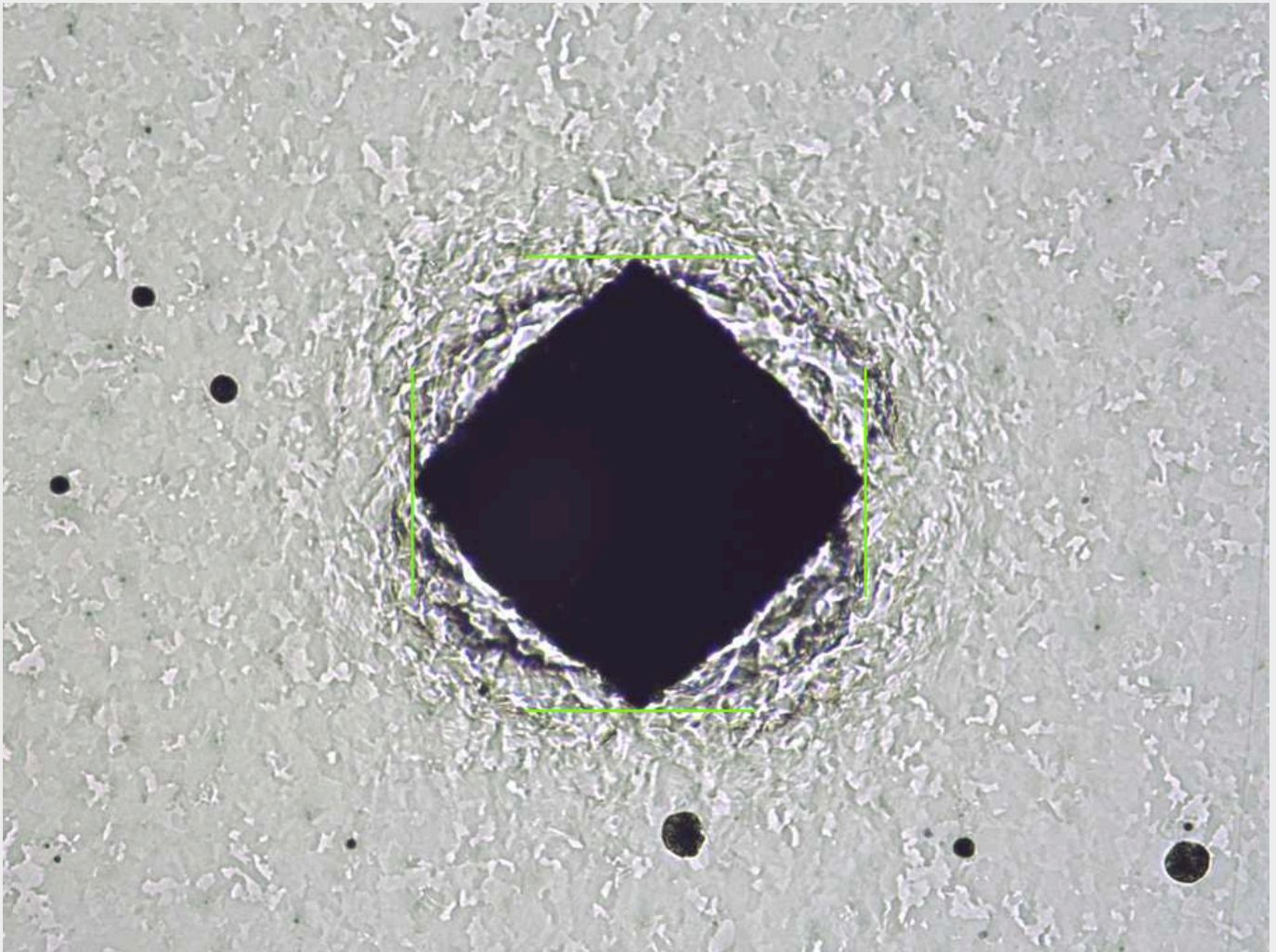
### ETCHED SURFACE ON STEEL MATERIAL

- | Hardness: 305 HV0.5
- | Preparation: grinded P1200 / polished 1 μm



### LOW CONTRAST ON ETCHED SURFACE ON STEEL MATERIAL

- | Hardness: 837 HV0.5
- | Preparation: grinded P1200 / polished 1 µm



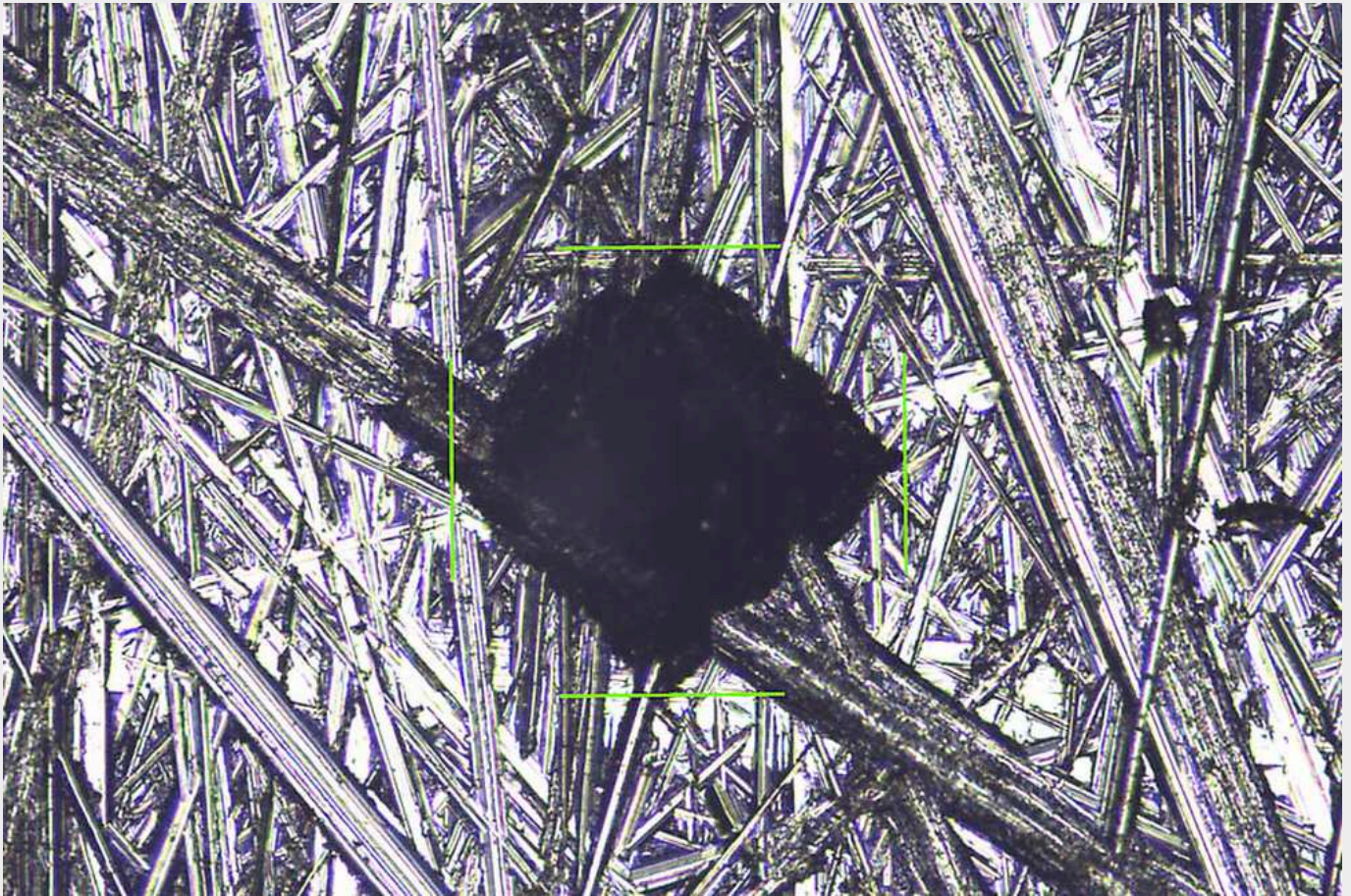
**BIG DEFORMATION/BULGING ON STEEL MATERIAL**

- | Hardness: 263 HV10
- | Preparation: polished 1  $\mu$ m



### **SMALL INDENTATION ON CAST IRON**

- | Hardness: 361 HV0.01
- | Preparation: polished 1  $\mu\text{m}$



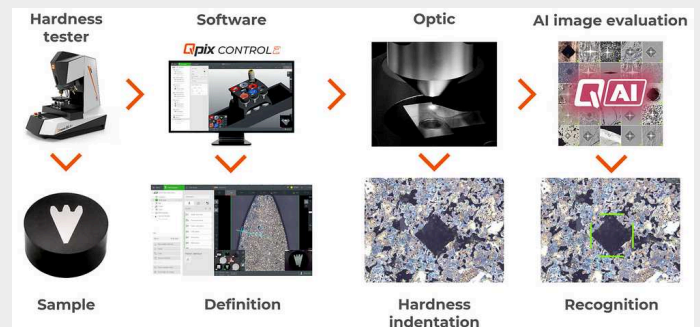
### **ROUGH SURFACE ON STEEL MATERIAL**

- | Hardness: 287 HV10
- | Preparation: grinded P80

## ADVANTAGES OF USING QAI

QAI image evaluation is fully integrated into the QpixControl2 operating software and replaces the current image recognition algorithm.

- | Increase in the quality of image evaluation
- | Increase in the hit rate
- | Increased automation by minimizing manual interaction
- | Time savings for manual checks thanks to the increased hit rate
- | With the same indentation image, the result with the QAI always remains the same



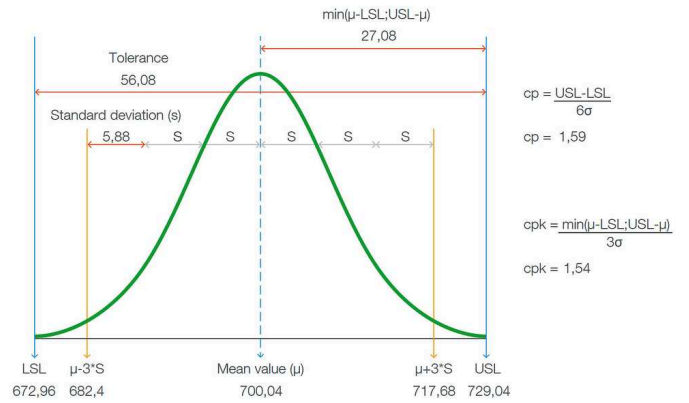
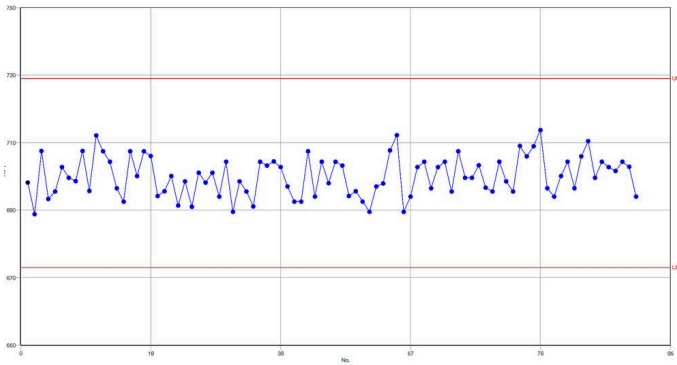
## IMPROVEMENT THROUGH QAI

The use of QAI image recognition has also increased the repeatability and systematic deviation of the machine. The accuracy of the evaluation has a major influence on the relative repeatability of the machine.

### Comparison between Classic evaluation and QAI evaluation

90 Hardness test points on a test block HV1 value 701 HV. The different evaluation modes are carried out on the same 90 indentations.

## CLASSIC EVALUATION

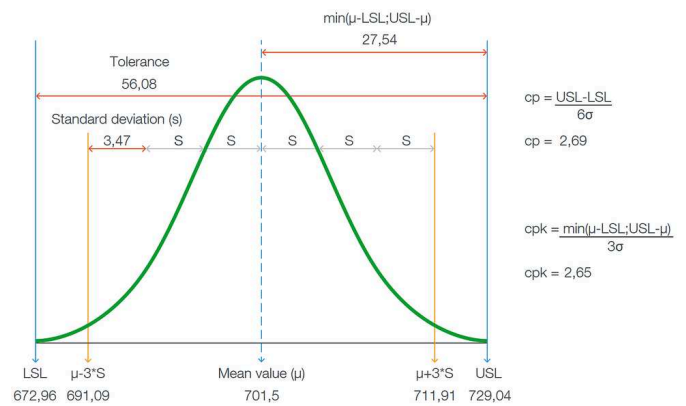
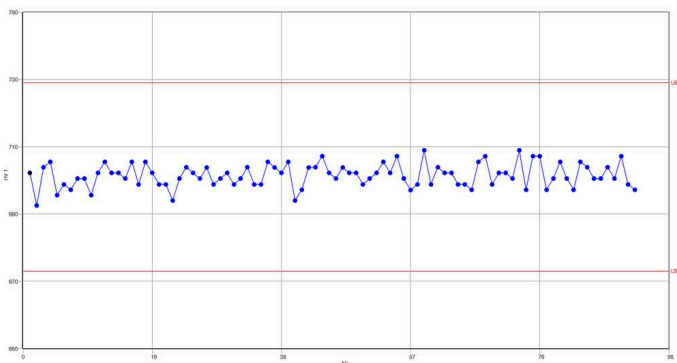


Mean value	Range
<b>700,04</b>	<b>24,90</b>

Hardness min.	Hardness max.
<b>688,80</b>	<b>713,70</b>

Standard deviation	Results OK
<b>5,88</b>	<b>90</b>

## QAI EVALUATION



Mean value	Range
<b>701,50</b>	<b>16,40</b>

Hardness min.	Hardness max.
<b>692,50</b>	<b>708,90</b>

Standard deviation	Results OK
<b>3,47</b>	<b>90</b>

## WE CARE ABOUT YOUR DATA

The AI and its image recognition runs exclusively locally on the PC and only within the QpixControl2 software, all data is offline and does not require internet access.

The AI model cannot develop and learn on its own; this function and work can only be performed by QATM, which ensures that only a certified QAI is used on the device. A hardness tester must work in accordance with the standards, therefore these results must be verified by us.

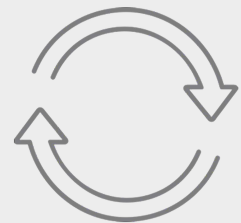
All data is stored locally on the PC and in the software, there is no data exchange with QATM. The QAI results are always the same.



**100% offline solution**



**100% local data**



**No continuous development of  
the QAI on the machine**



**SHH - QAI IS CURRENTLY  
TRAINING WITH THOUSANDS  
OF INDENTATION IMAGES...**

## THE MOST FREQUENTLY ASKED QUESTIONS ABOUT QAI – ANSWERED BY OUR EXPERTS

**DOES THE HARDNESS TESTER NEED TO BE RECALIBRATED AFTER THE UPDATE AND USE OF QAI?**

NO. The AI-based image recognition does not affect the optical system. The magnification, camera, and lenses remain unchanged. QAI analyzes the captured image and detects the hardness test indentation. The evaluation and measurement process follow the same principles as conventional hardness testing software.

**IS THERE A REQUIREMENT FOR SAMPLE PREPARATION IN COMBINATION WITH THE AI?**

NO. The relevant standards (DIN EN ISO, ASTM) specify requirements for sample preparation but do not define surface quality parameters such as roughness values (Ra/Rz). In general, the surface should be prepared appropriately for the Vickers hardness test, depending on the applied load. The indentation and its edges must be clearly visible.

**CAN PREPARATION EFFORTS BE REDUCED WHEN USING AI?**

Possibly, yes. QAI image evaluation can detect hardness indentations even on lower-quality surfaces. We recommend maintaining your current preparation process initially. However, step-by-step optimization is possible and should be validated accordingly.

Important note: The customer is responsible for defining and verifying their process. QATM can provide guidance and support.

**IS IT POSSIBLE TO PERFORM A HARDNESS TEST ON ETCHED SURFACES?**

YES. Technically and from a software perspective, direct hardness testing on etched surfaces is possible. QAI image evaluation can achieve very good detection rates even in these cases. However, standards recommend performing hardness tests on non-etched surfaces. The final responsibility for process validation lies with the customer.

**DOES THE QAI REQUIRE AN ACTIVE INTERNET CONNECTION?**

NO. The AI and image recognition operate entirely locally on the PC within the QpixControl2 software. All data remains offline, and no internet access is required.

**CAN THE QAI MODIFY ITSELF INDEPENDENTLY?**

NO. The AI model cannot develop and learn itself independently. In the case that the QAI software cannot recognize hardness test indentations, there is the possibility to relearn the QAI by QATM.

[www.qatm.com/qai](http://www.qatm.com/qai)

## BESTELGEGEVENS