



# ToolScan R360

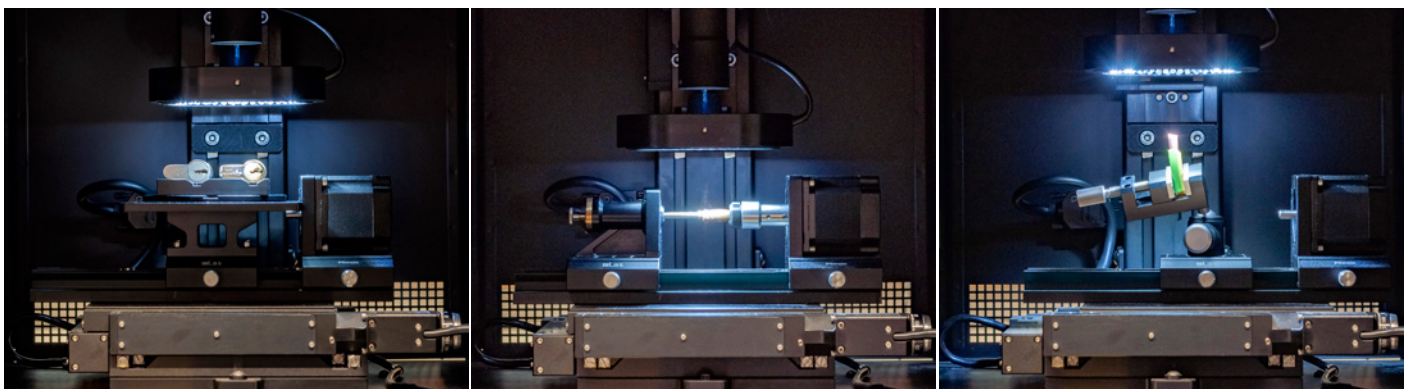
A COMPLEX SYSTEM FOR SCANNING OF TOOLS AND TOOLMARKS



ToolScan System is a complex solution for scanning, examination, and comparison of all kinds of toolmarks - striations, imprints, and physical matching. This includes toolmarks on cylinder locks, cuts in wires, cuts in tires, imprints of plier jaws, scanning of test impressions in lead, castings of toolmarks, direct scanning of jaws and blades, possibility to scan documents (signatures - line intersections).

Objects with non-translucent surface can be scanned in 3D in the form of a digital silicon casting. In this form, 3D profile of the surface can be separated from the texture (material properties, dirt) and any illumination direction can be simulated which significantly improves visibility of toolmarks. Translucent or untypical surfaces can be scanned as all-in-focus EDF 2D images with multiple illumination directions.

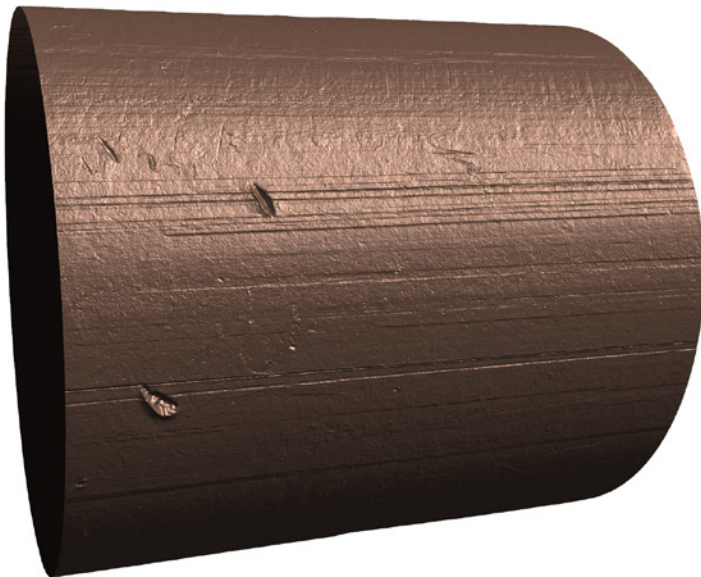
R360 variant of ToolScan also includes rotation stage with axis perpendicular to optical axis. This enables to scan cylindrical or deformed objects such as bullets, cartridge case surfaces, wires, or any other object with its diameter up to 8 cm. The system is equipped with a set of holders for any typical evidence.



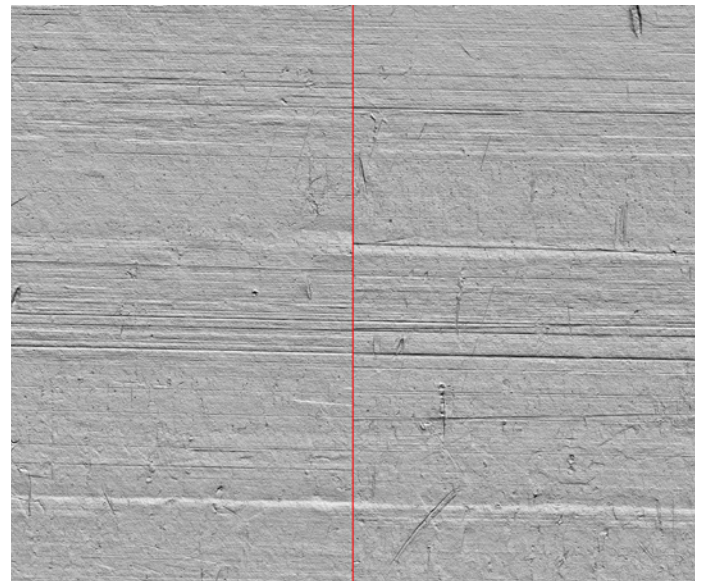
Detail of the stage using different type of holders for various evidences.

## SOFTWARE AND COMPARISON

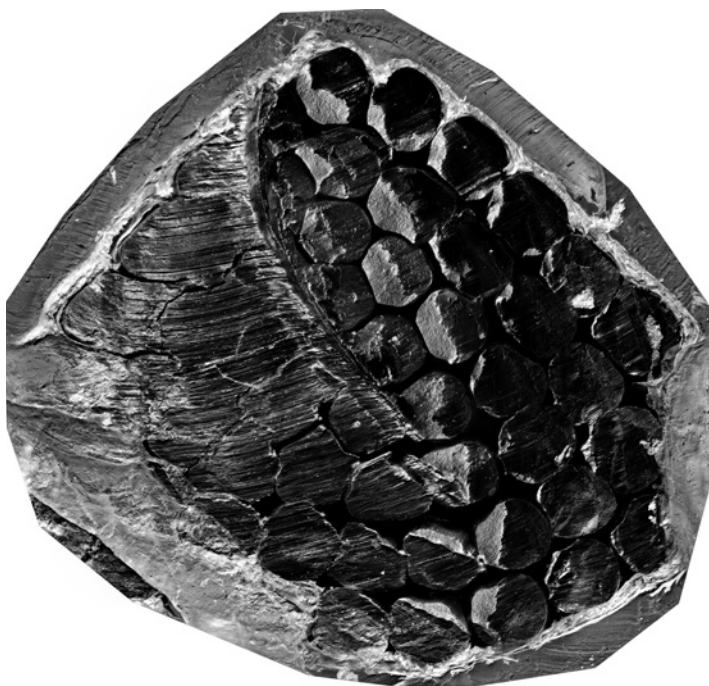
- Live examination of toolmarks in real time
- Quick preview scan, automatic 2D and 3D scanning
- Extended Depth of Focus (EDF) is used in conjunction with a photometric stereo method
- The resulting image represents digital representation of the evidence – this enables texture-free display, free 3D rotation and positioning, illumination variation, Z inversion
- Various comparison modes (horizontal, vertical, freely rotatable, and freely shaped split line, transparency, tiled mode with up to 16 objects side by side) – displayed in 2D or free 3D
- Illumination synchronization between compared images
- Measurements (distances, angles, Z-profile), annotations
- Images can be saved on network drives, X3P format is fully supported for import / export



Scanned surface of a copper cable, 6mm diameter.



Comparison of manufacture marks on a cable surface.

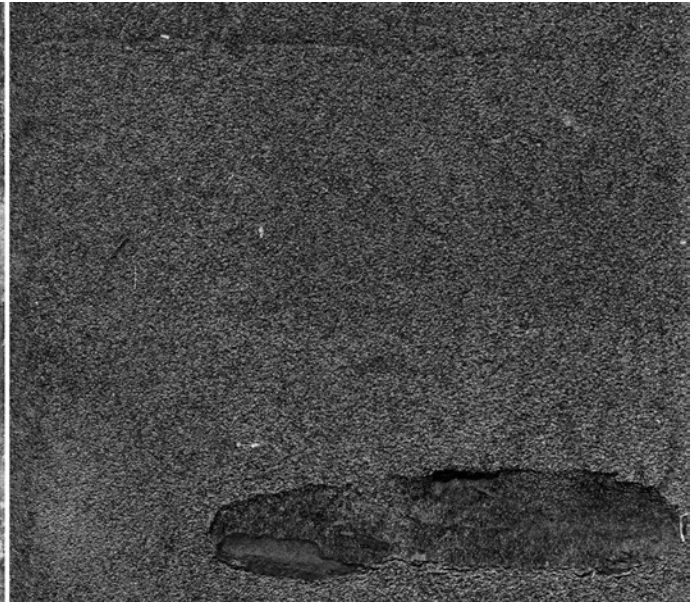
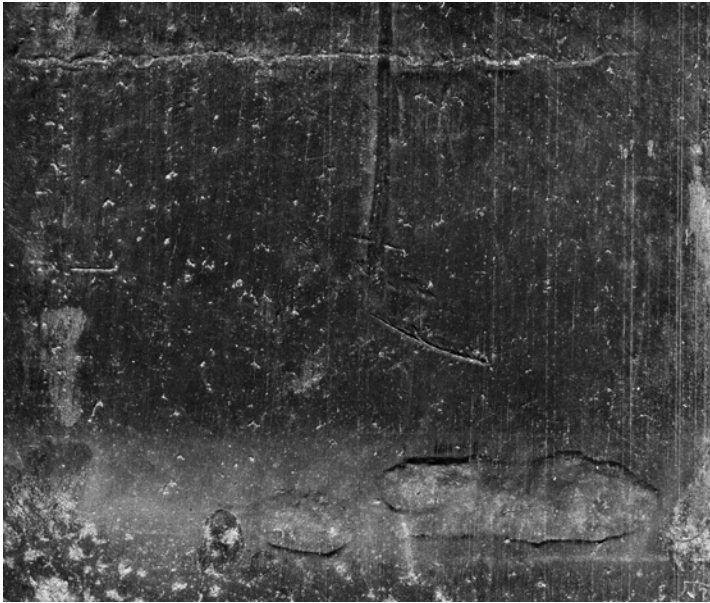
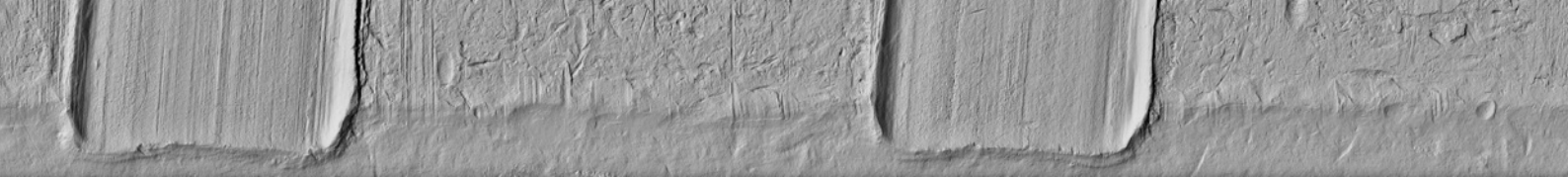


Cut cable with texture applied.

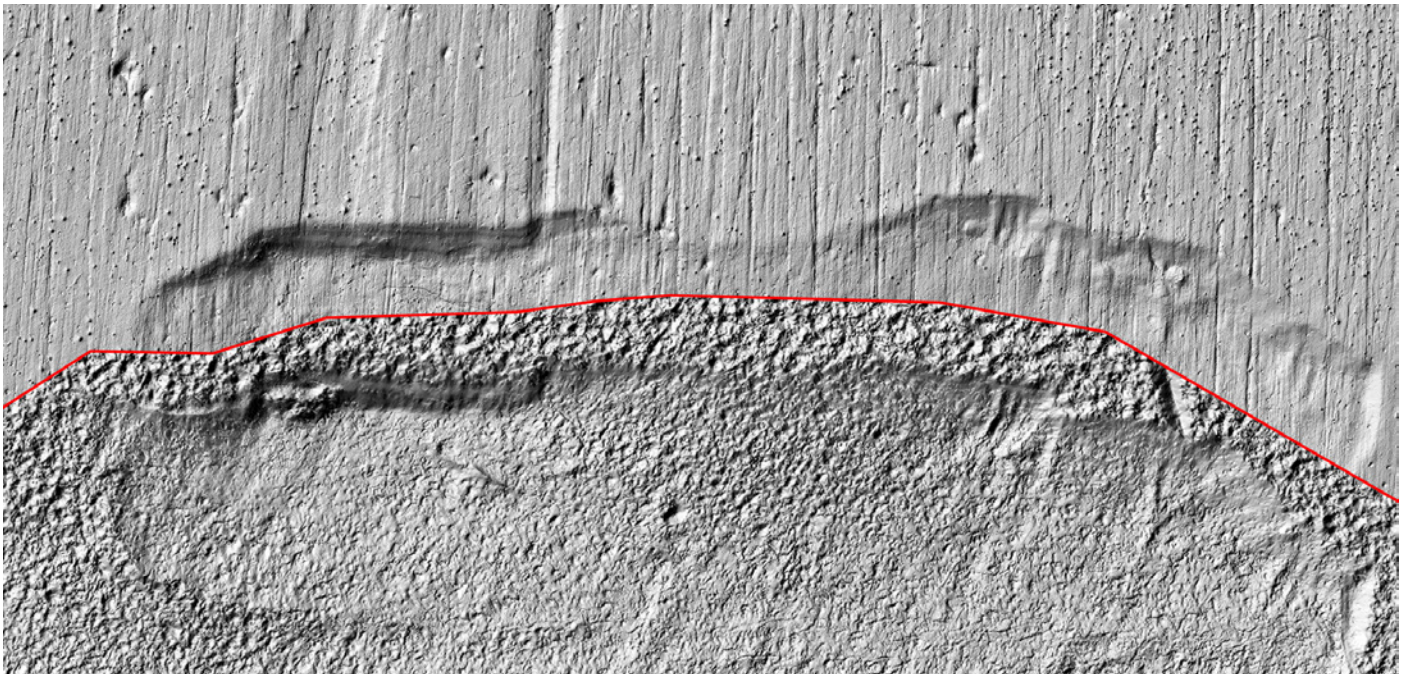


Cut cable without texture.

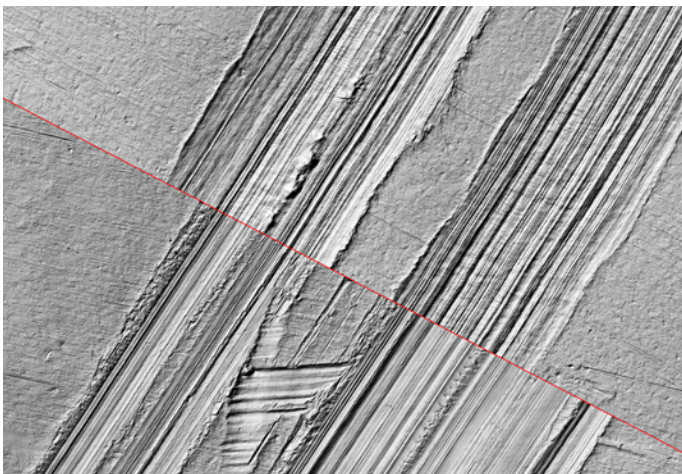




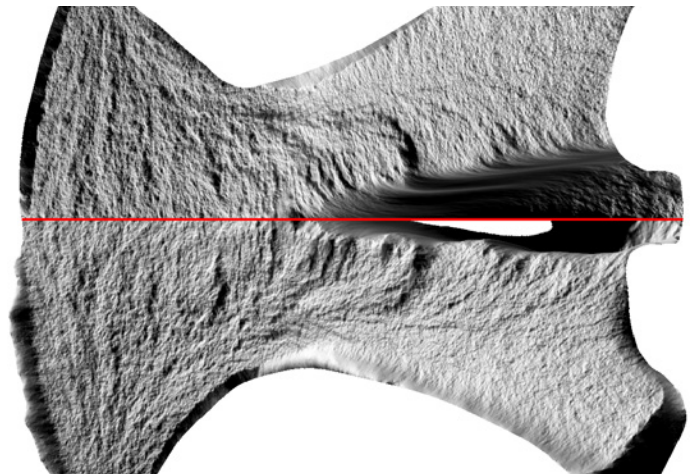
Toolmarks on cylinder locks made from a different material.



Comparison of toolmarks on cylinder locks in the comparison mode with a polygonal split line.



Comparison of screwdriver marks in metal with silicon casting of marks in the comparison mode with a freely rotatable split line.



Physical matching of 2 parts of broken drill in 3D.

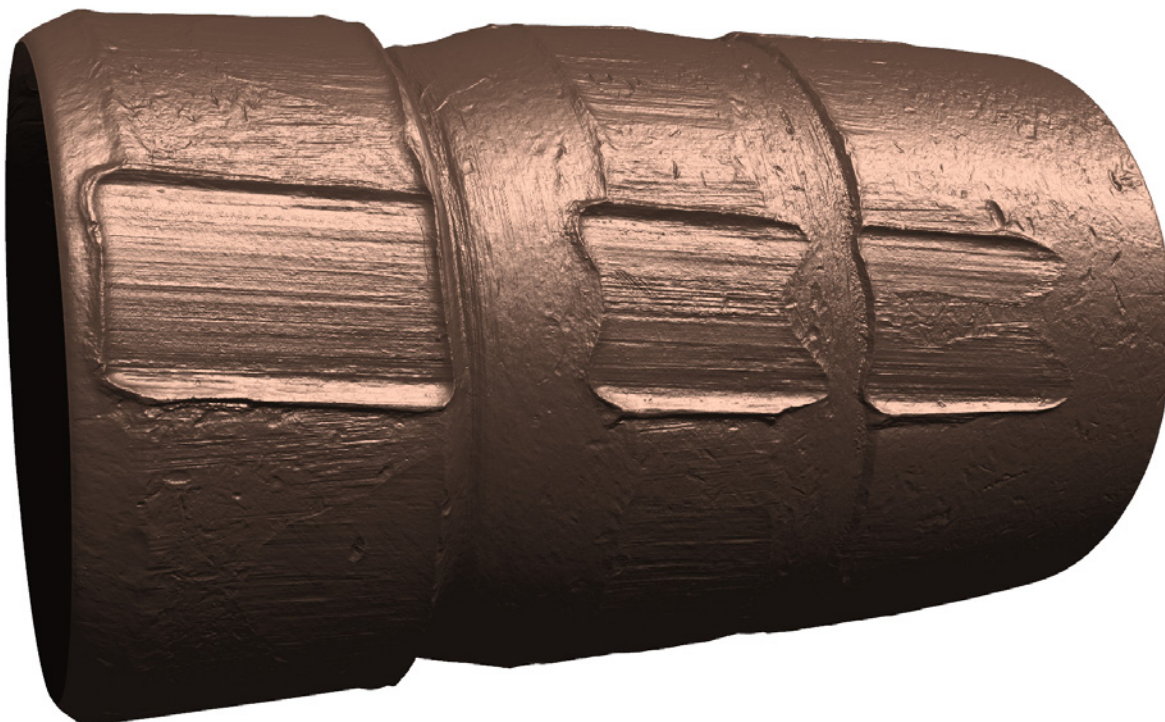


## SYSTEM SPECIFICATIONS

- System is delivered as complete solution including high performance PC with Windows 10 and 31,5" monitor
- Maximally versatile solution for toolmarks scanning and comparison
- Robust mechanical construction and stages
- Top quality telecentric lens
- Resolution: 3.07  $\mu\text{m}/\text{px}$ , magnification on a typical 31.5" 4K UHD monitor: 60x
- Segmented ring LED illuminator, laser autofocus
- Stage range: 10 x 10 cm, focusing range: 10 cm, rotation 360°

## TYPICAL 3D SCANNING TIMES

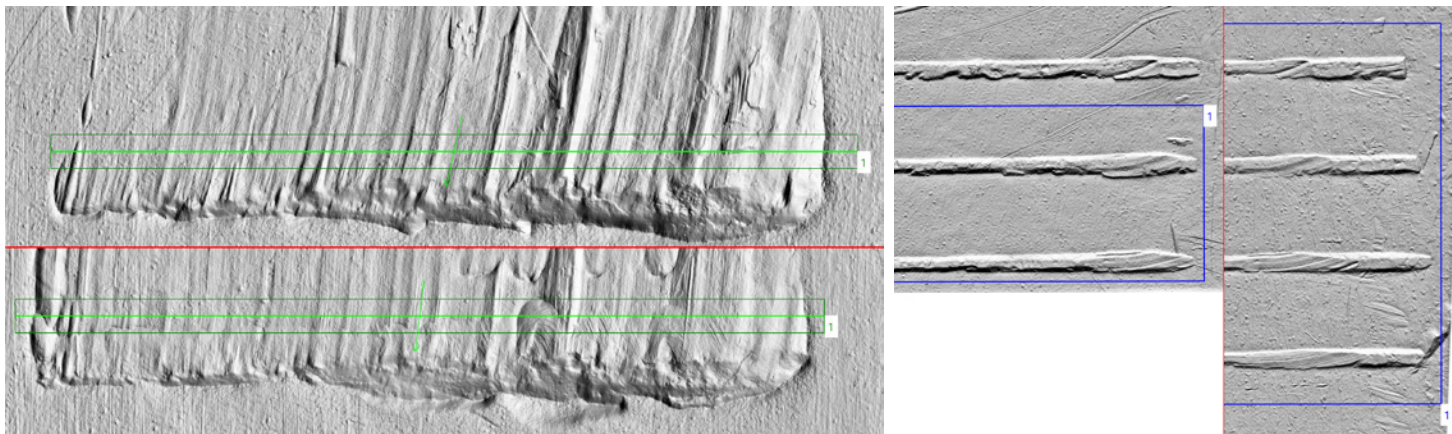
- Toolmark on flat objects, 100 mm<sup>2</sup> area: 1:00 min.
- Bullet 9 mm Luger, 5.7 mm stripe, 360°: 4:40 min.
- Cable 6 mm diameter, 24 mm length, 360°: 23:00 min.



Bullet of caliber 9.3x74mmR scanned in 3D.

## TOOLMARKS MARKING AND SEARCH

- Marking of striations and impression marks
- Automatic search and correlation based on marked areas



Marked striations and impressions on cylinder locks for correlation.