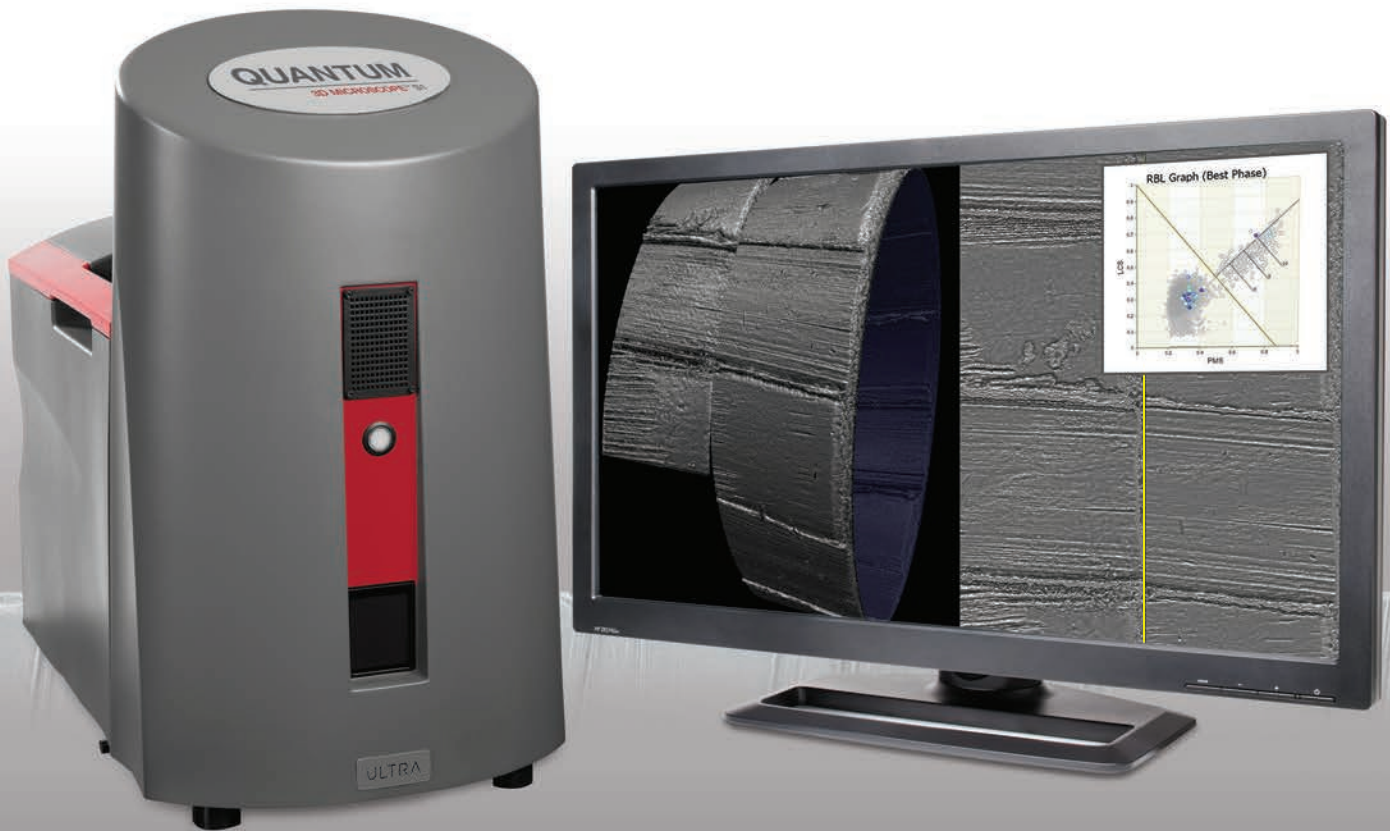


# QUANTUM

3D MICROSCOPE™

Powered by IBIS® Technology



TAKE FIREARM AND TOOL MARK  
IDENTIFICATION TO THE NEXT LEVEL

Bring more objectivity to common source opinions

ULTRA.

# QUANTUM

## 3D MICROSCOPE™

### For Firearm and Tool Mark Identification

The Quantum 3D Microscope has capabilities beyond conventional comparison microscopes for firearm and tool mark identification.

Quantum provides firearm and tool mark examiners with the best 3D visual and quantitative tools for common source determination.



### Bullets and Other Small Objects

Quantum's S1 model captures the rifling marks on fired bullets, and tool marks on other small objects such as press marks on pills and tablets, chamber, extractor, and ejection port marks on cartridge cases.

### Support Expert Conclusions with Objective Methods

Firearm and tool mark identification is evolving and now requires 3D measurements to support expert conclusions with objective methods providing confidence levels and error rates.

### Powered by IBIS® Technology

Quantum capabilities derive from the 3D technology innovations in IBIS Search networks developed over more than a decade.

While IBIS Search focuses on finding the needle-in-the-haystack (previously un-related firearm crimes), Quantum focuses on evaluating and quantifying the strength of agreement in common source determinations.



INTEGRATED BALLISTIC IDENTIFICATION SYSTEM



Crime evidence

Suspect firearm recovered

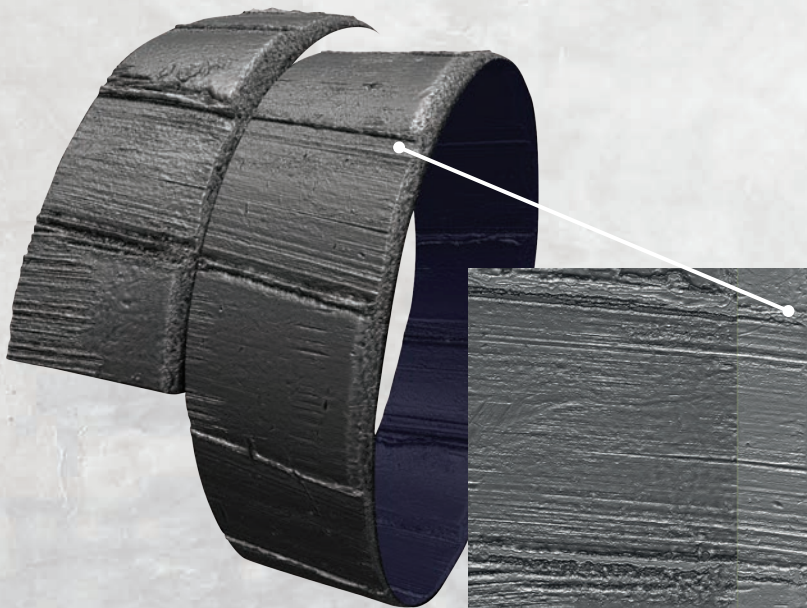
Test fired bullets



### 3D Acquisition



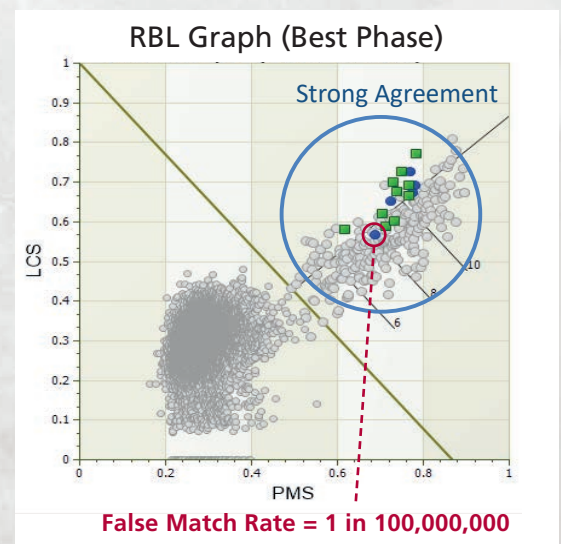
### 3D Comparison Viewing



3D Shape View

3D Surface View

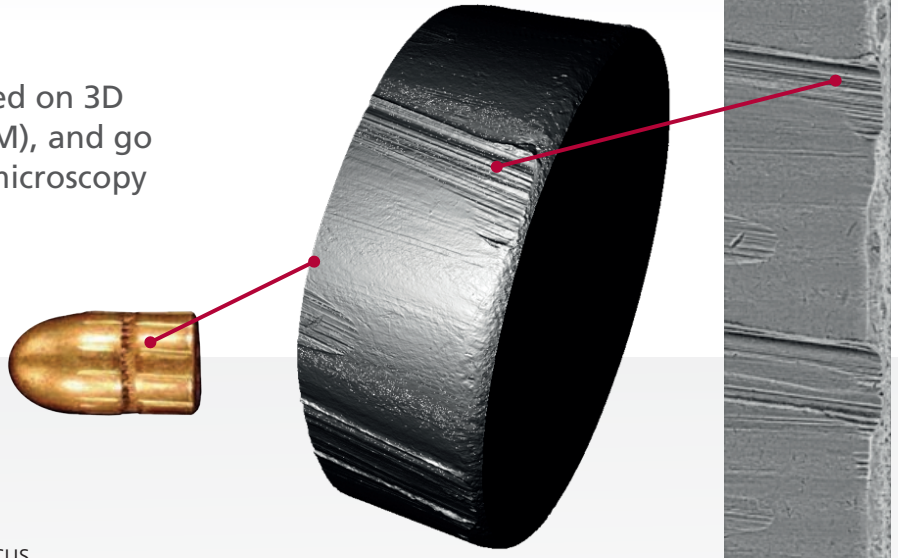
### Quantitative Analysis





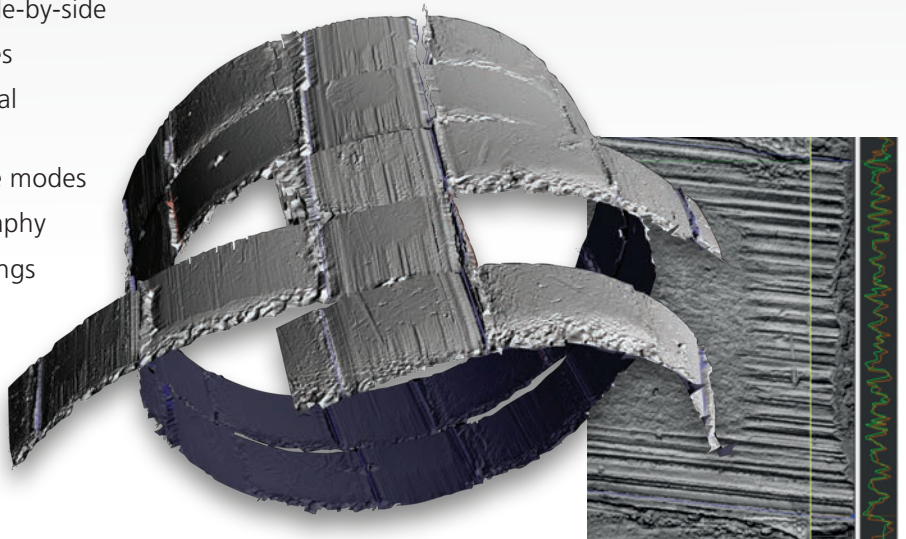
# 3D COMPARISON VIEWING

New capabilities are emerging based on 3D virtual comparison microscopy (VCM), and go beyond conventional comparison microscopy to do more with less effort.

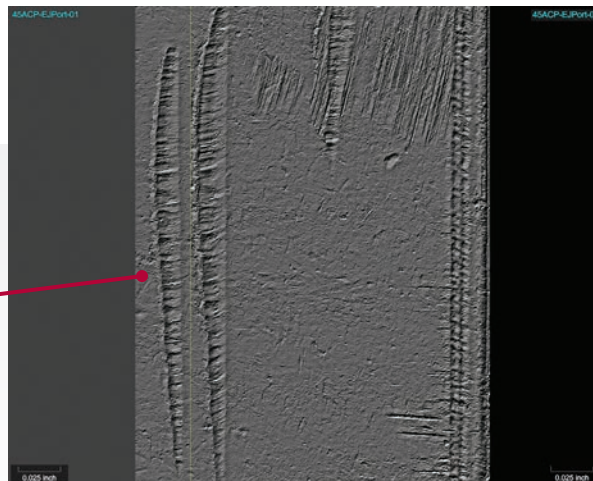


## Features

- Surface view and shape views, always in focus
- Up to 6 simultaneous objects compared side-by-side
- Hairline moveable across overlapped images
- Horizontal side-by-side view and in a vertical top-bottom view
- Overlap, move, and rotate in locked or free modes
- Sectional line profiles show precise topography
- Visual enhancements emphasize the markings
- Bullet best match assistance aligns the similarities
- Simulated lighting and surface reflectivity options
- Annotate comparisons



Bullet Comparisons



Ejection Port Marks Comparison

# QUANTITATIVE ANALYSIS

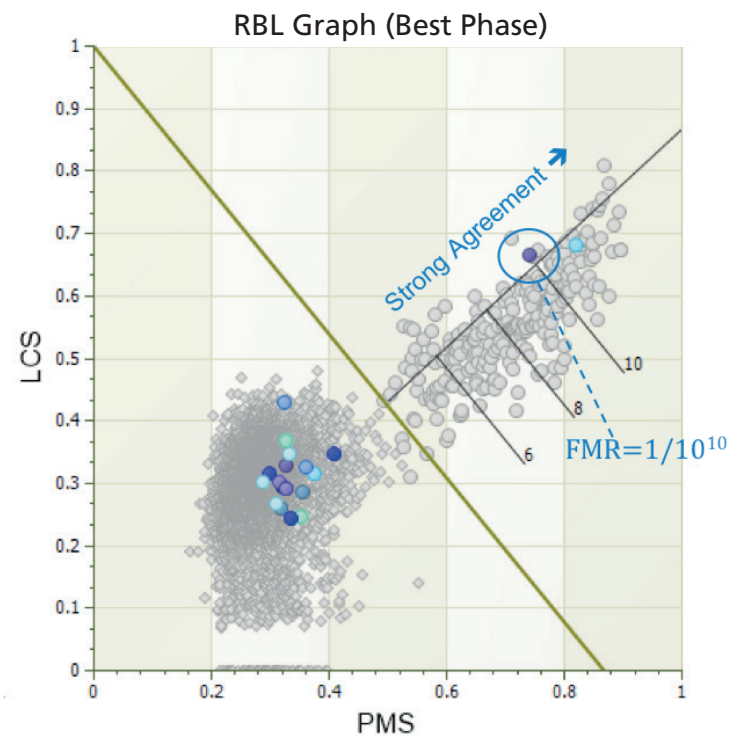
Compare unknown evidence bullets and known source firearms.

The strength of common source similarity is represented graphically using Ultra's innovative RBL Graph<sup>1</sup>.



## RBL Graph

- The RBL method visually demonstrates quantifiable differences between matching and non-matching conditions
- Correlation algorithms provide line counting and pattern matching scores (LCS and PMS)
- Best phase and Best LEA modes
- False Match Rate (FMR) provides a reliable error rate to support expert testimony. Currently for conventional rifling, with plans to expand.

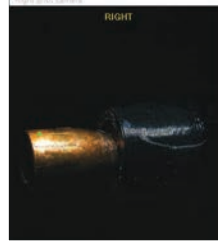
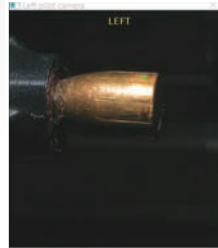


The False Match Rate (FMR) for a given similarity score represents the probability that two bullets that were not fired from the same firearm would generate a greater score.

## 3D Microscope Technical Characteristics

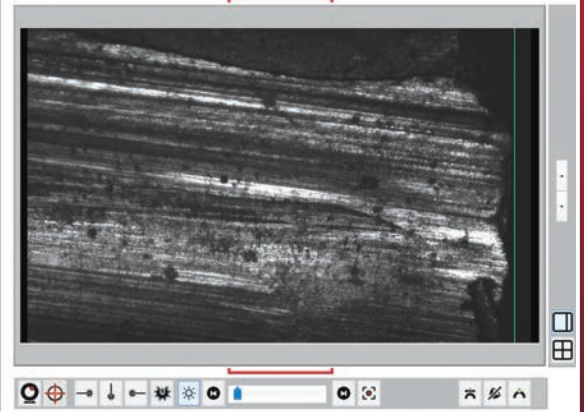
- Non-Linear Photometric Stereo 3D sensor capable of measuring purely specular surfaces and diffusive surfaces (patented)
- Pilot cameras with smart positioning function
- Intelligent surface tracking for full object wraparound or across section fragments
- Surface width: 2.8 mm
- Lateral resolution: 2.98  $\mu\text{m}/\text{pixel}$   
Depth resolution: Less than 0.3  $\mu\text{m}$
- Calibration to traceable standards
- Object dimensions: up to 50 mm long and 28 mm diameter, including all bullet calibers (0.17 to 0.50)

Left pilot camera



Right pilot camera

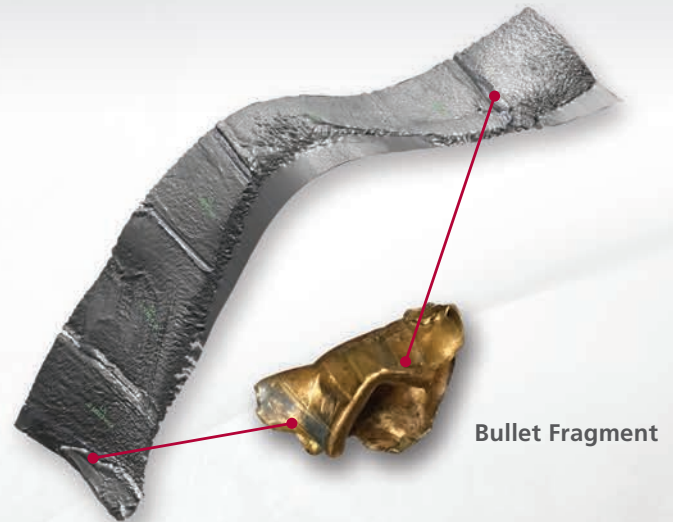
**QUANTUM**  
3D MICROSCOPE™ S1



Live camera view

## Flexible Data Management

- Organize captured data and results in workspaces
- Easily document the work product in notes
- Output images, screenshots, notes, and results for expert reports and external information management systems
- Import and export 3D acquisition data in native image formats and X3P



Bullet Fragment



## Dual-Purpose with IBIS

The Quantum 3D Microscope's acquisition unit can be shared as part of an IBIS BULLETRAX acquisition station for bullet entries onto an IBIS Search Network.

This can be advantageous if the dual-purpose use of the equipment can accommodate the volumes of IBIS bullet entries and of the 3D microscope casework.



## Customized Mounting Stubs

A set of 10 customized stubs enables easy mounting of objects of various shapes and sizes. All calibers of bullets can be mounted, including pristine test fires, as well as damaged and fragmented evidence.



Stub is magnetically secured to shaft and automatically retracts



Set of 10 customized stubs

## Standalone and VCM Extensions

The standard Quantum 3D microscope is a standalone workstation. Alternatively, acquisitions can be provided to separate workstations via workspace files.

For example, this allows a technician to acquire the physical evidence from multiple cases, so that examiners can work in parallel on VCM and Quantitative Analysis.



ACQUISITION

### CUSTOMER NETWORK



VCM = Virtual Comparison Microscopy



### ACQUISITION UNIT

#### DIMENSIONS (W X H X D):

61.7 cm x 37.5 cm x 57.9 cm  
(24.3" x 14.8" x 22.8")

#### ACQUISITION UNIT WEIGHT:

33 kg (72 lb)

## Training, Proficiency Testing and Research Studies

- › 3D topography data provides reliable measurements
- › Acquire objects once, and freely view and share
- › Build training sets and reference sets
- › Perform studies to advance the firearm and tool mark identification discipline
- › Collaborate in community research projects based on shared 3D data

# QUANTUM

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Innovating today for a safer tomorrow

ULTRA.

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