

Athena Research & Consulting



You Don't Have to Accept It in Silence: Challenging Firearms Identification Evidence; and Those Who Deliver It

Presented by

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John Nixon Bio

John Nixon has submitted affidavits relating to the reliability / admissibility of tool mark comparisons in a number of cases, including the case of Bill Macumber v State of Arizona – thanks to the Arizona Justice Project Mr Macumber is now free after being incarcerated for 38 years [1]. John Nixon was part of an Innocence Project team who, in 2007, exposed 30+ years of perjury & scientific misconduct by a Maryland Crime Lab Senior Firearms Examiner. John Nixon worked for the UK government as a scientist & professional engineer before moving to the US, where he now practices as an independent consultant. He holds a First Class Honors degree in Mechanical Engineering, and a Master's degree in Business Administration. He specializes in technical support in both civil and criminal litigation. He has testified in many state and federal courts in the US, and in his native UK. He is an NRA certified firearms & personal protection instructor and range safety officer. In addition to authoring two munitions patents, he has published numerous research papers & articles in the areas of forensic firearms & ballistics, weapons systems, explosives, and shooting incident reconstruction. He has presented many training seminars and research papers to members of the legal profession, forensic scientists, professional engineers, investigators, LE, and students. He has presented ten papers at American Academy of Forensic Sciences Annual Meetings. He has worked for the prosecution / plaintiff and defense, in both the civil and criminal arenas – including many death penalty cases. His clients include federal, state, & foreign governments, insurance companies, defense contractors, DOD, law enforcement agencies, and private attorneys. John Nixon is a Fellow of the American Academy of Forensic Sciences, a Fellow of the Institution of Mechanical Engineers, a Fellow of the Chartered Management Institute, and a Member of the International Society of Explosives Engineers.

[1] This case is recounted in the book, 'Manifest Injustice', written by Pulitzer Prize winning author, Barry Siegel. Published by Henry Holt & Co, 2013.



Revolver



Double Action Operation
Trigger Both Raises and Releases Hammer

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Semiautomatic *P*istol



Slide Forward, Ready to Fire

Note the loaded magazine to the left, this needs to be inserted into the grip



Slide at Rear of Cycle

Note that the slide cycles to this position each time a shot is fired, it ejects empty on way back, and feeds a live round from magazine on way forward



*P*istol *A*mmunition



Pistol Ammunition Calibers
(22, 25, 32, 9mm, 38 Special, 357 Magnum, 40 & 45)



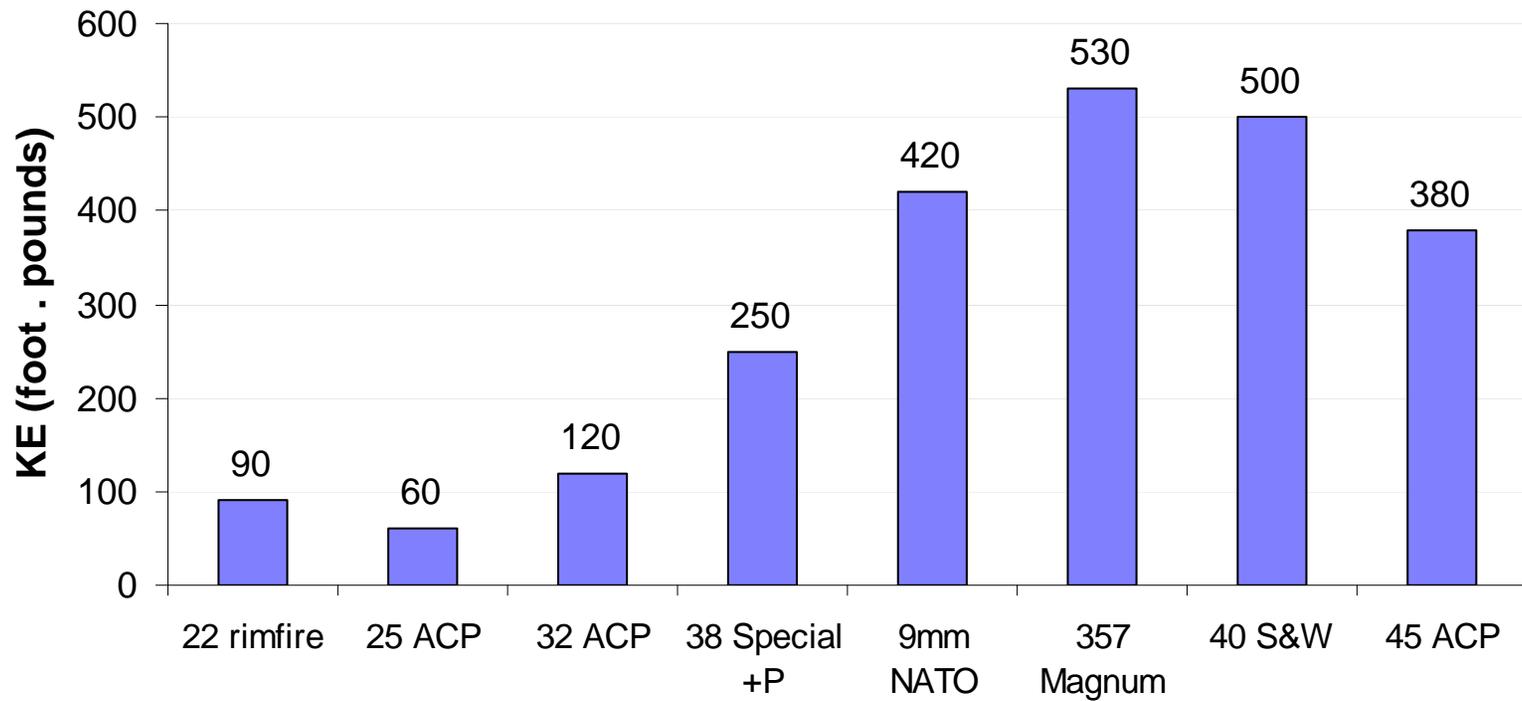
Ammunition *C*omponents



**5.56mm (223) & 7.62mm (308) Rifle Ammunition Components
Bullets – cases – primers (propellant not shown)**



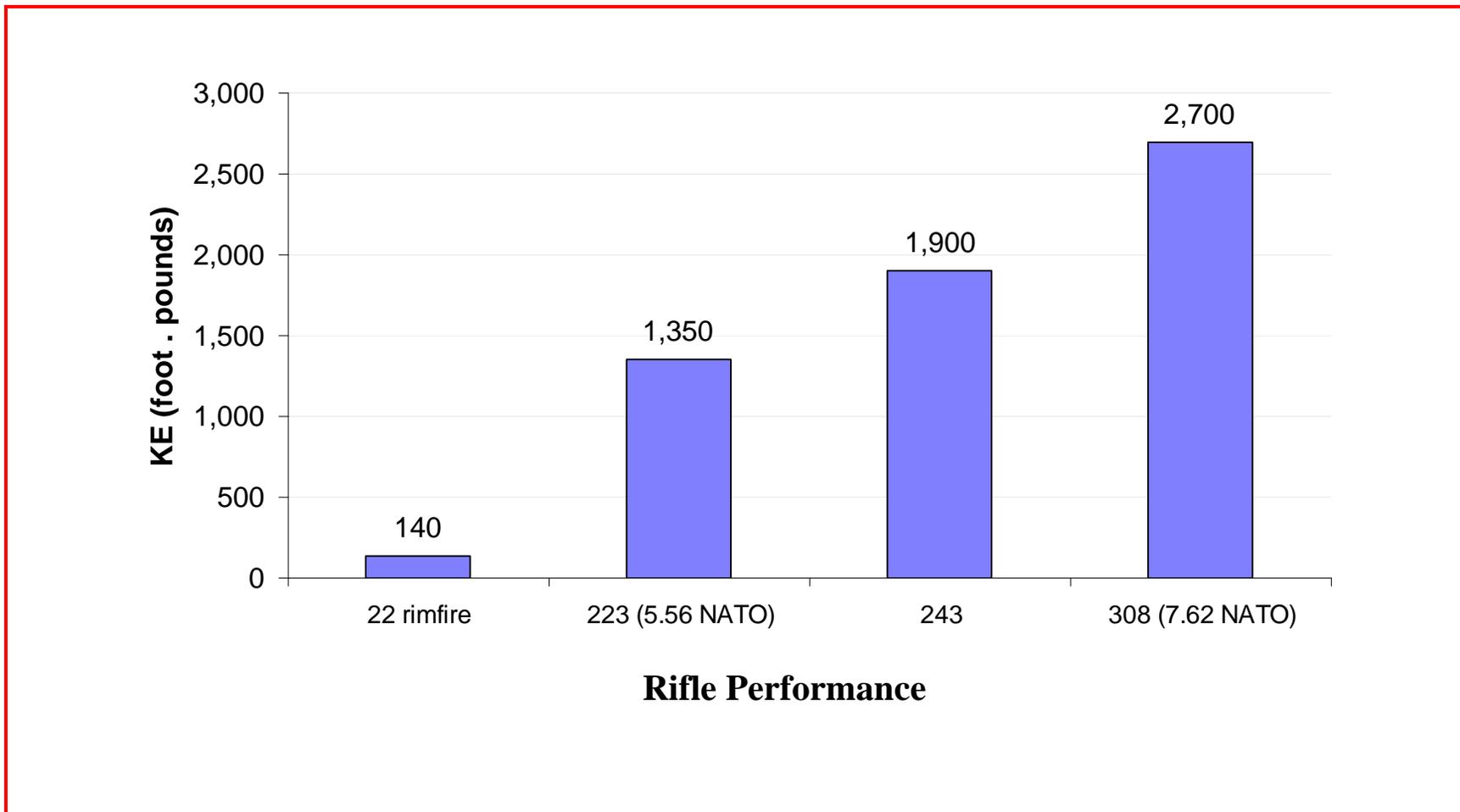
*K*inetic *E*nergies



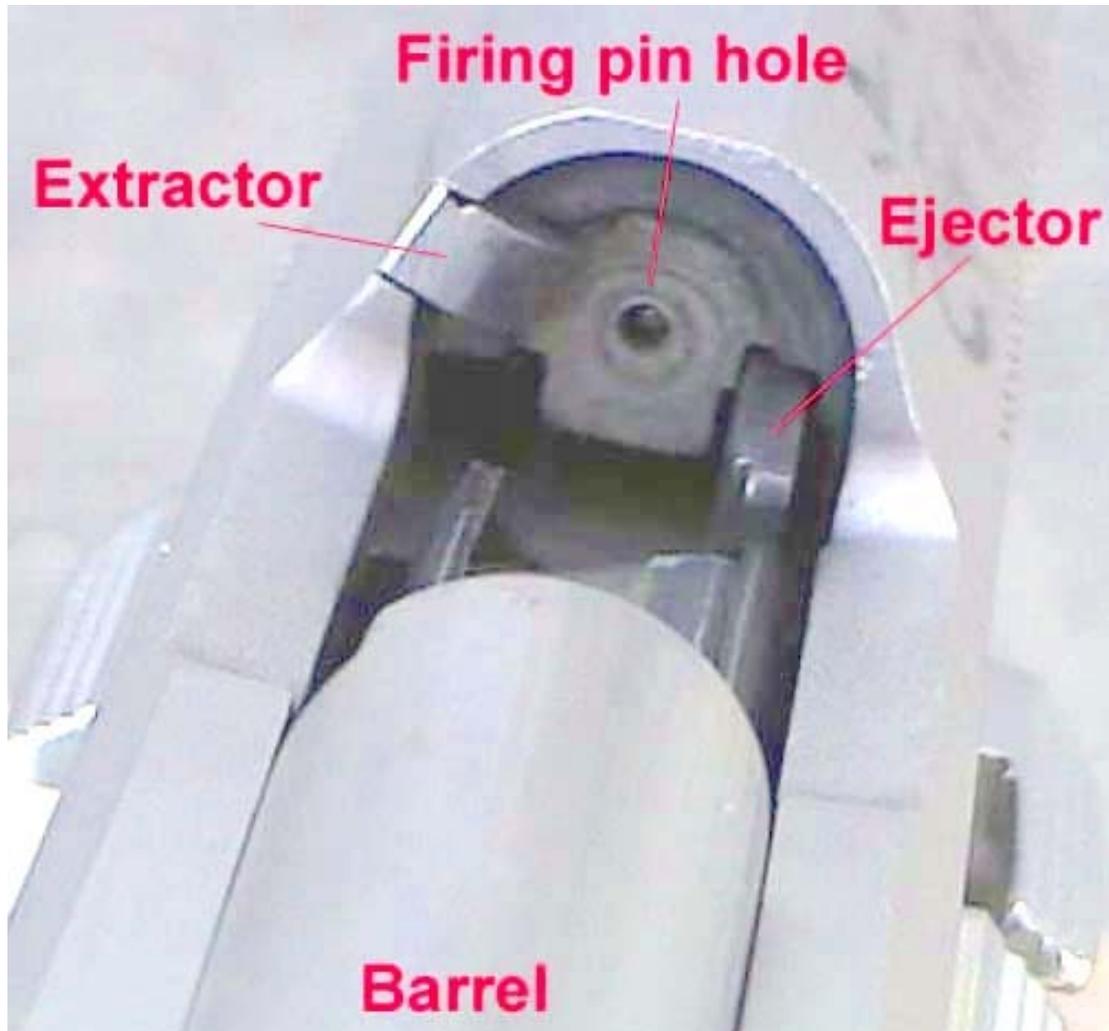
Handgun Performance



*K*inetic *E*nergies



Toolmark **A**nalysis



Key 'toolmark' components in a semi-automatic handgun

- *Breechface**
- *Extractor**
- *Firing pin**
(firing pin is just inside hole)
- *Ejector**

Note:

The direction of bullet travel would be out of the page and slightly down in this example



*T*oolmark *A*nalysis



View Directly from Front of Conventional Barrel



*T*oolmark *A*nalysis



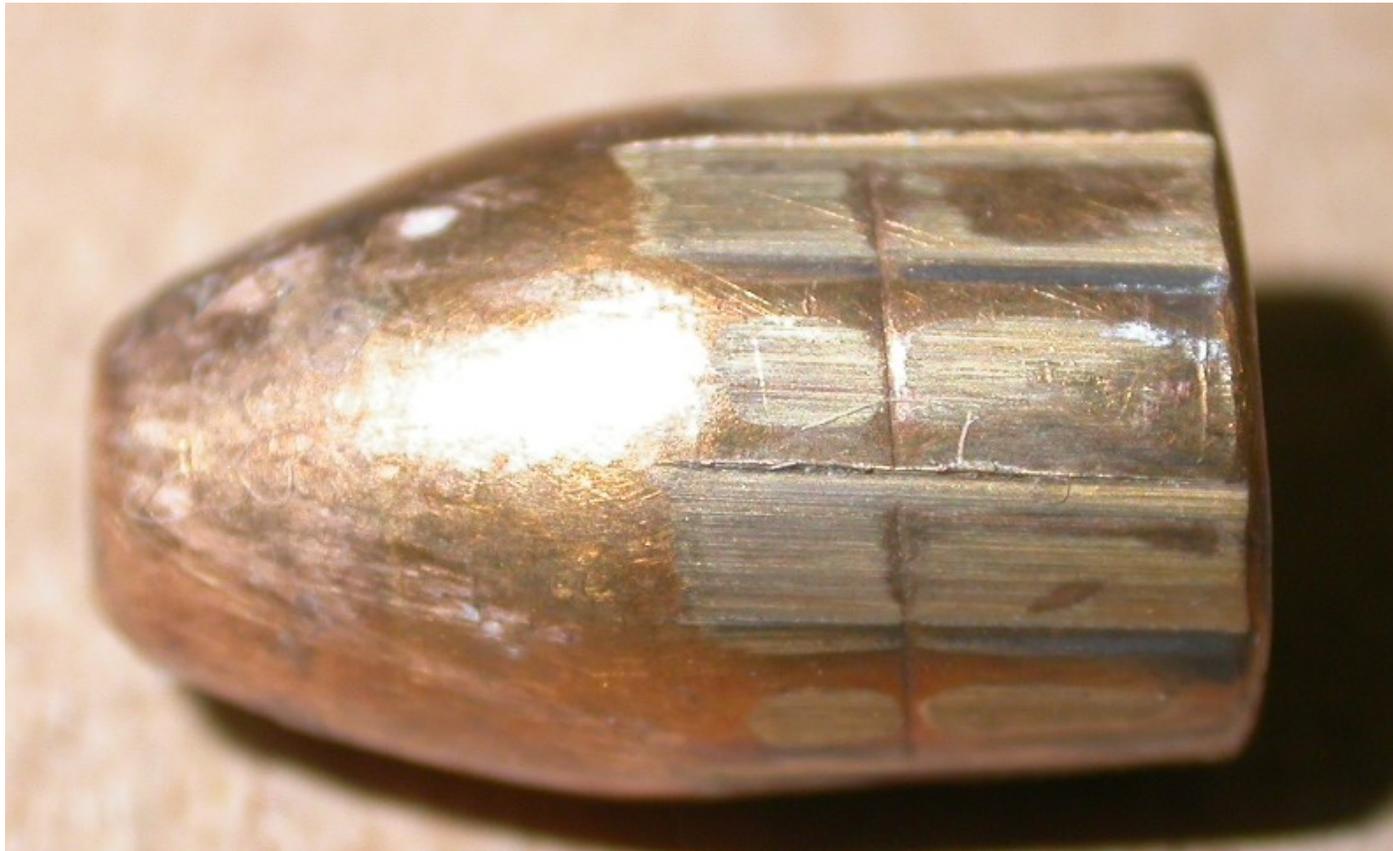
Barrel Cross Section
Note Lands & Grooves

Picture Looking Down a Barrel
Note the Spiral Geometry of the
Lands and Grooves





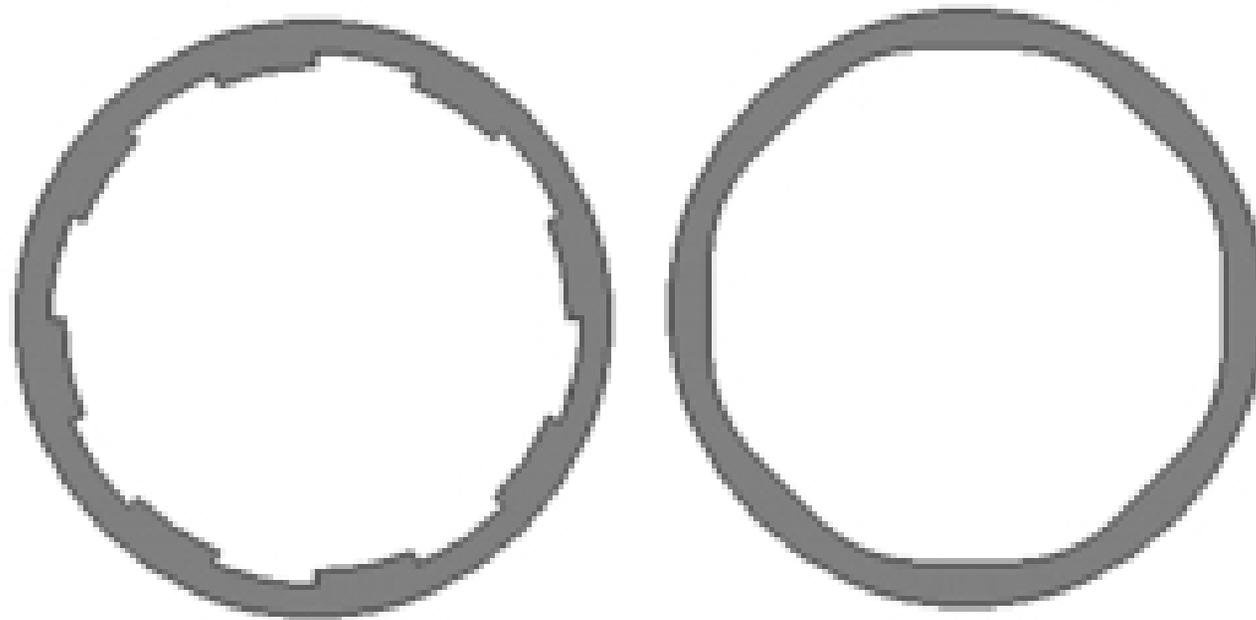
*T*oolmark *A*nalysis



Fired 9mm Bullet Showing Lands & Grooves



*T*oolmark *A*nalysis



Conventional v Polygonal Rifling
Typical pistols with polygonal rifling are
Glock, Kahr, IMI, H&K



*T*oolmark *A*nalysis



Conventional Bore v Glock (polygonal) bore



*T*oolmark *A*nalysis



Bullet from Conventional Barrel v Bullet from Glock



Toolmark **A**nalysis

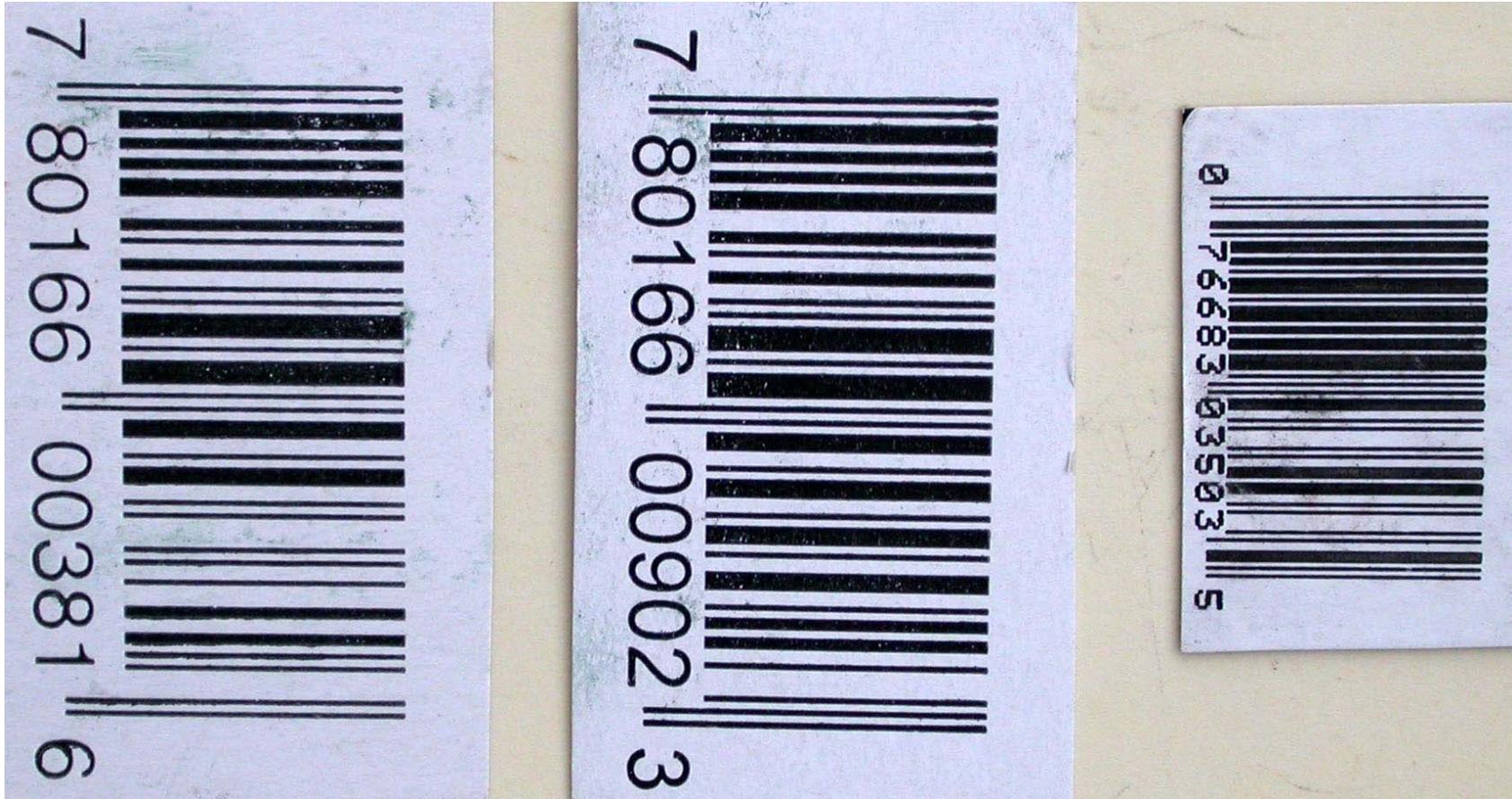
Comparison Microscope

**Enables side-by-side or
Overlapping views of two
objects**





Toolmark *A*nalysis



3 bar codes; A, B, C – 2 similar, one very different



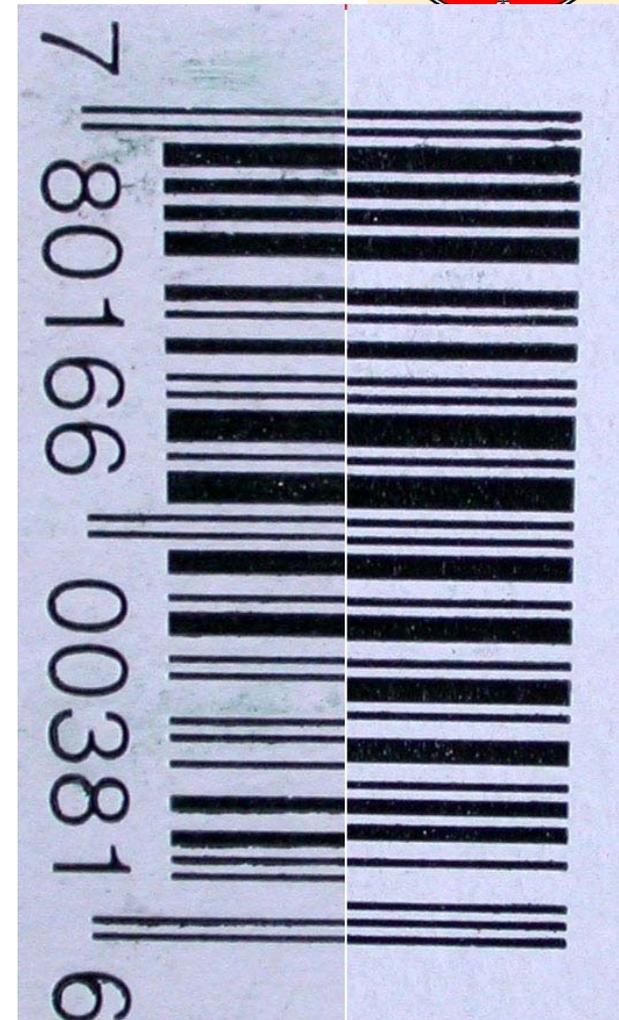
Toolmark **A**nalysis

2 bar codes

A Compared to B

No Match

**Class Characteristics Same,
but
Individual Characteristics Different**



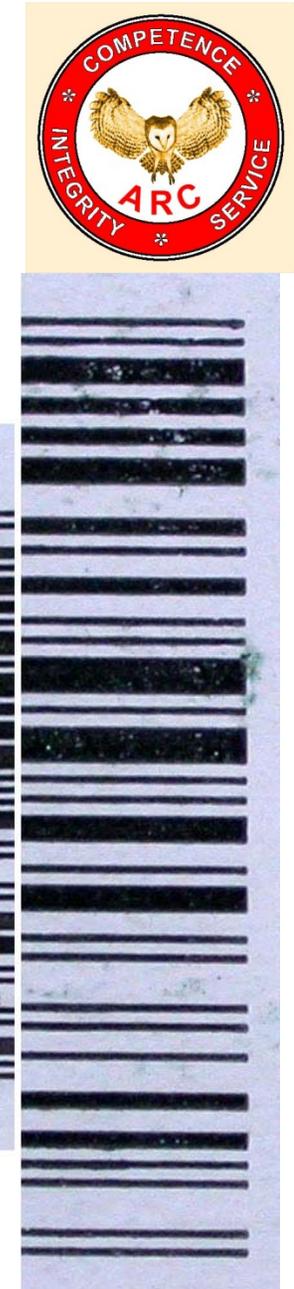
Toolmark **A**nalysis

2 bar codes

C Compared to B

No Match

Class and individual Characteristics are Different





Toolmark **A**nalysis

2 bar codes

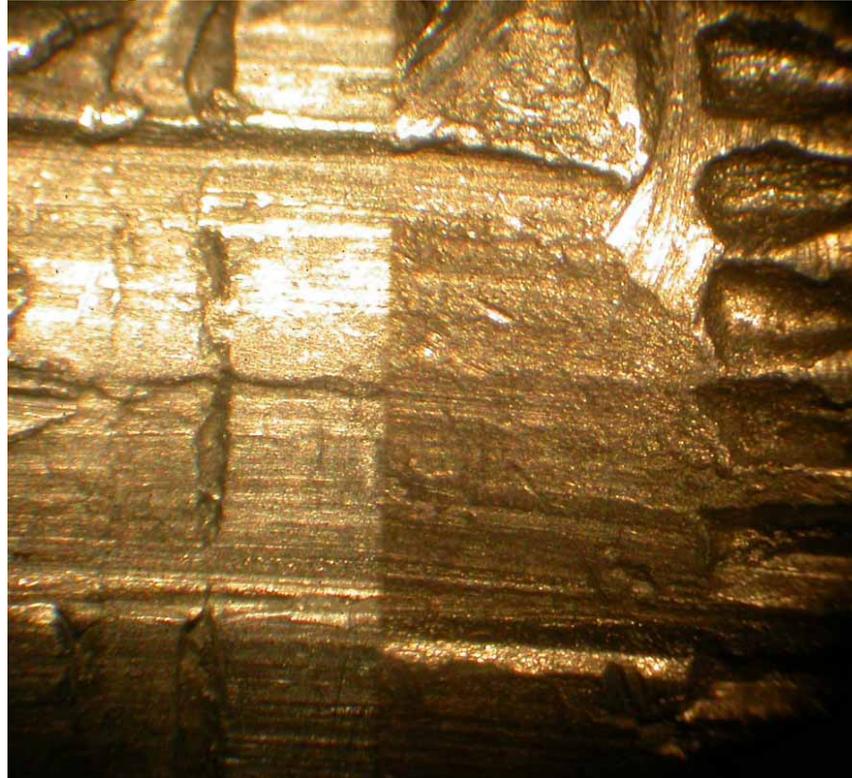
A Compared to A

Match

Class and individual Characteristics are Same



*T*oolmark *A*nalysis



**View Through Comparison Microscope Showing a non-Match
Between Two 38 Bullets**



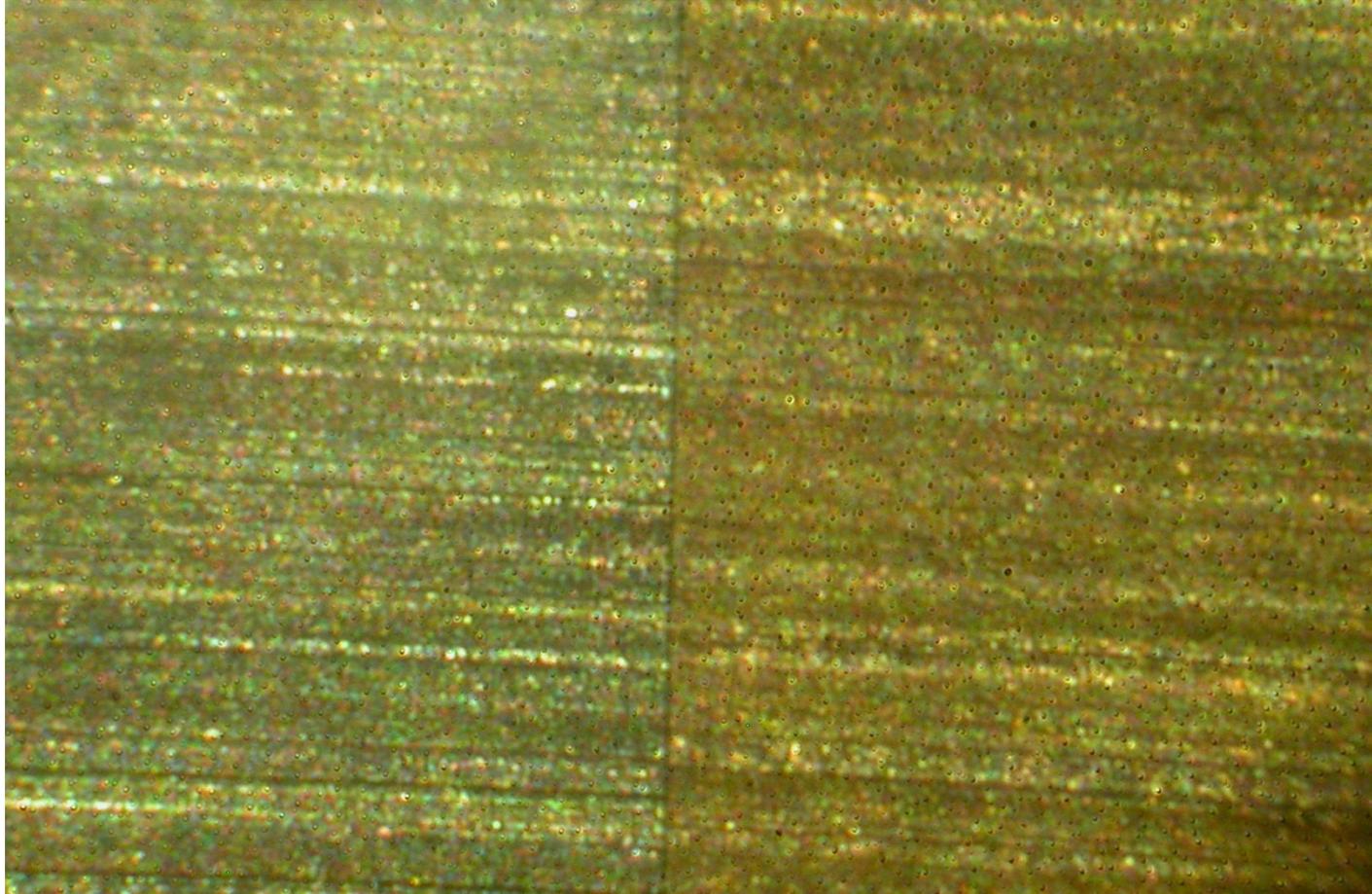
*T*oolmark *A*nalysis



Fired 9mm Bullet Showing Lands & Grooves



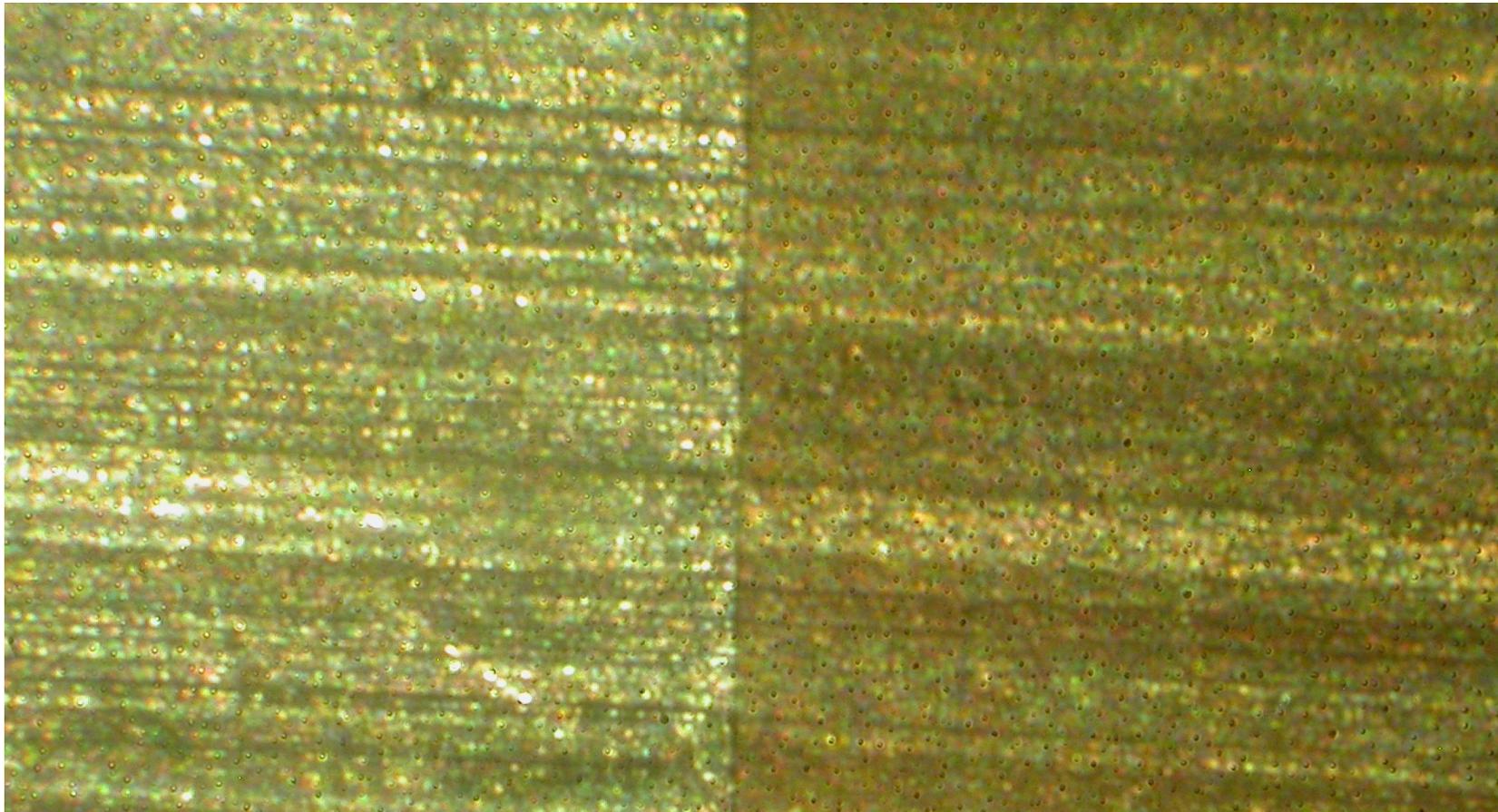
*T*oolmark *A*nalysis



View Through Comparison Microscope Showing a non-Match



*T*oolmark *A*nalysis



View Through Comparison Microscope Showing a Match



*T*oolmark *A*nalysis



Fired Cartridge Case Head

Note the firing pin strike mark in the center of the primer



*T*oolmark *A*nalysis



Extractor Mark Under Rim of 45 Auto Case



Toolmark **A**nalysis



Ejector Mark on Head of 45 Auto Case



Case Study



Ex7 E3



JN Test Fire

From Different Guns

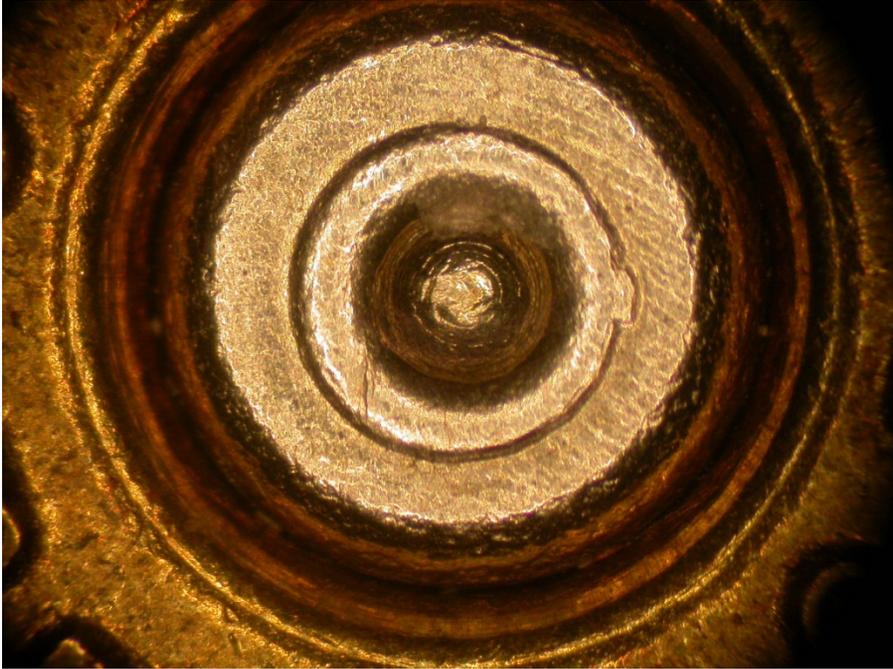


Ex7 E2

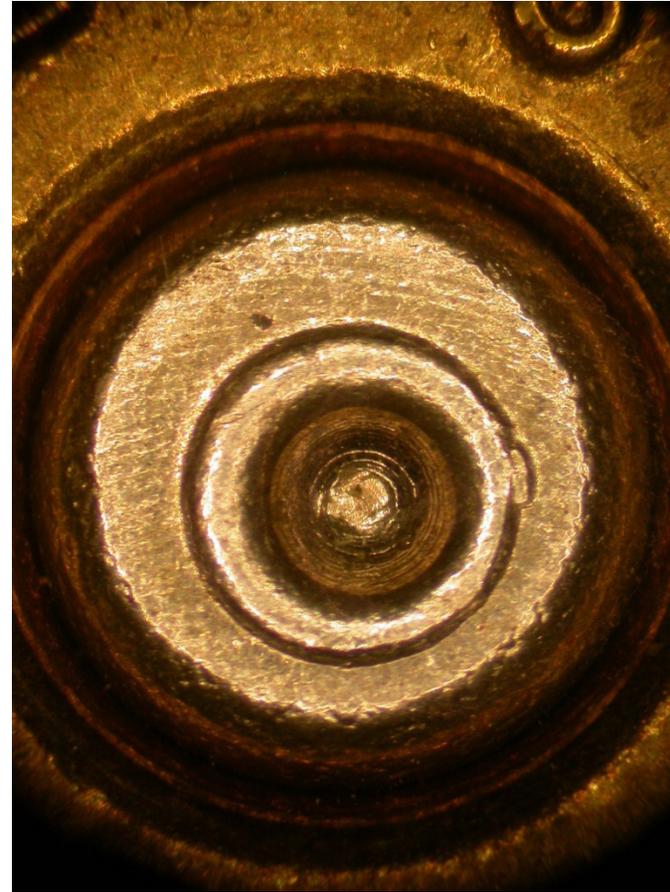


Ex7 E8

Same Gun = Same FP and BF Marks

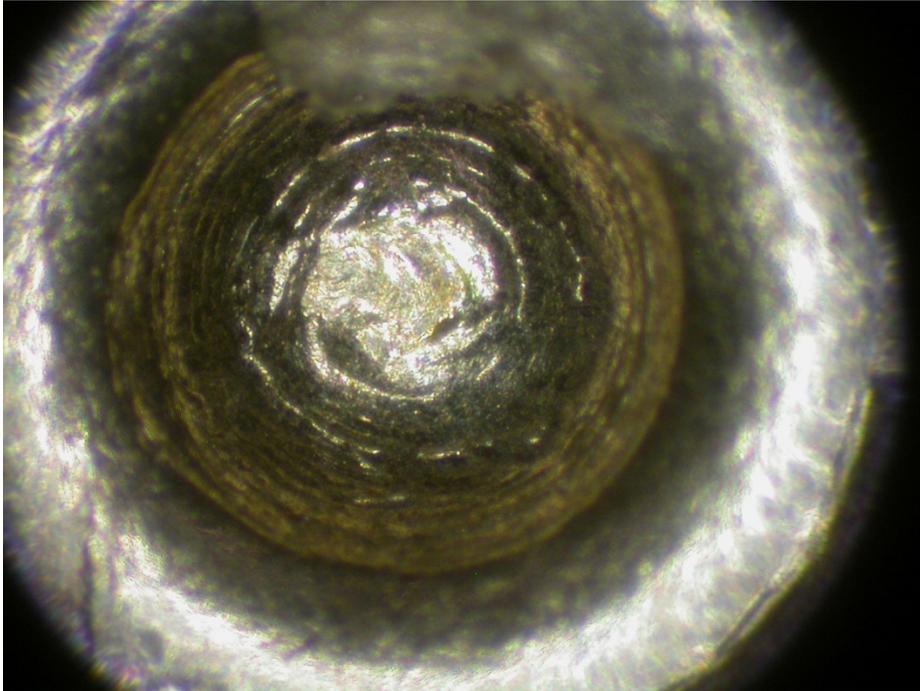


Ex7 E2

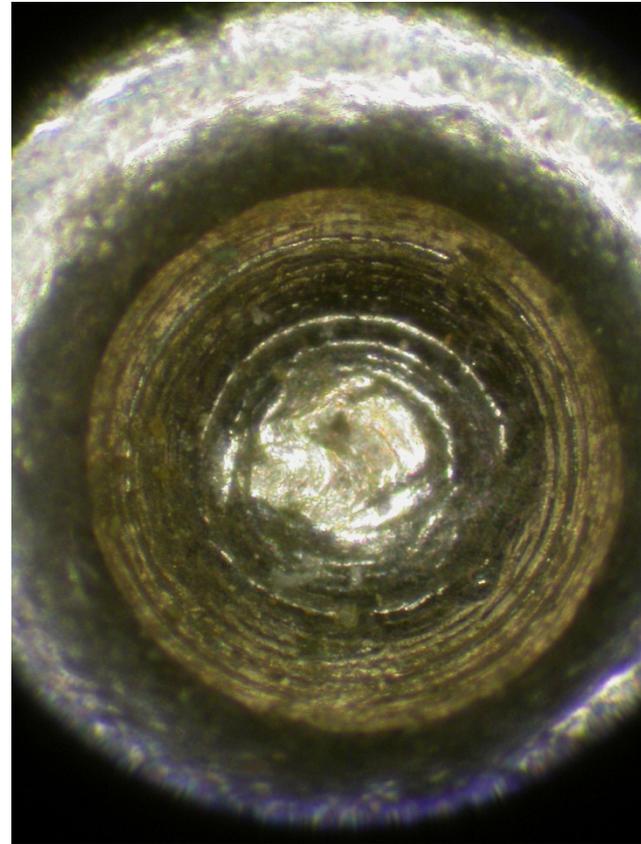


Ex7 E8

Same Gun



Ex7 E2



Ex7 E8

Same Gun

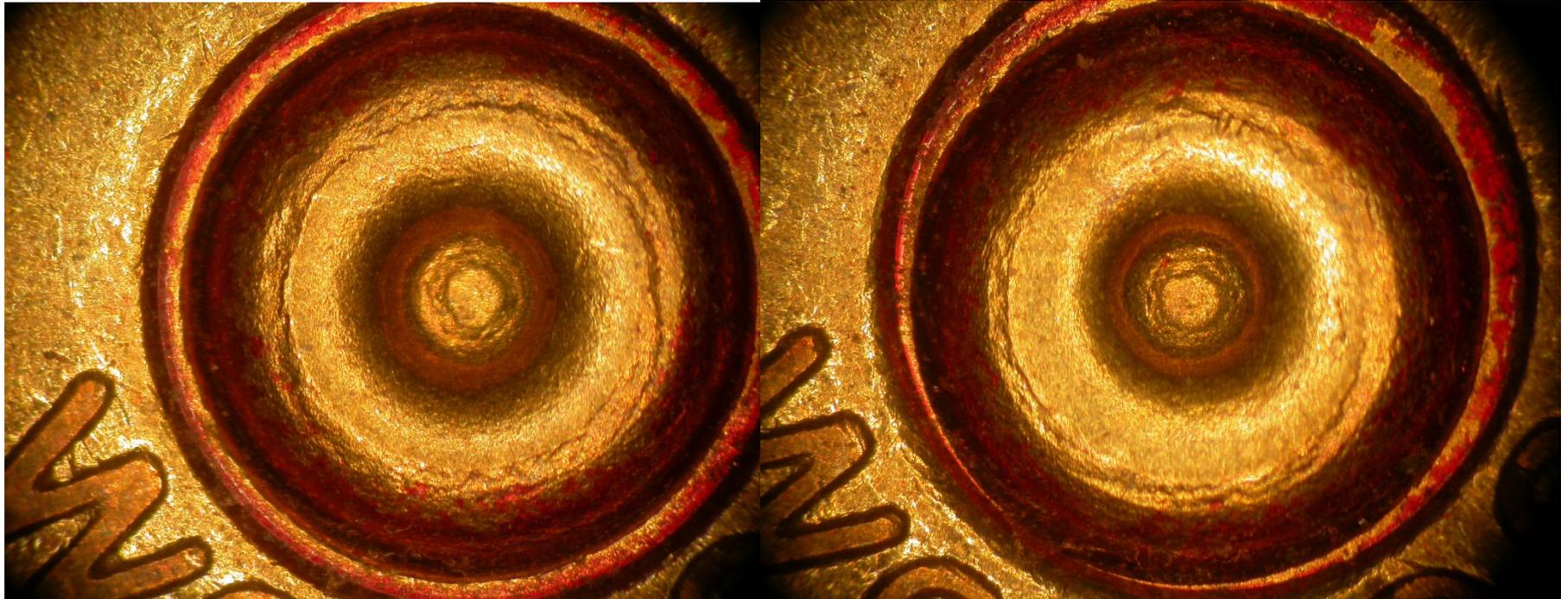


JN1



JN2

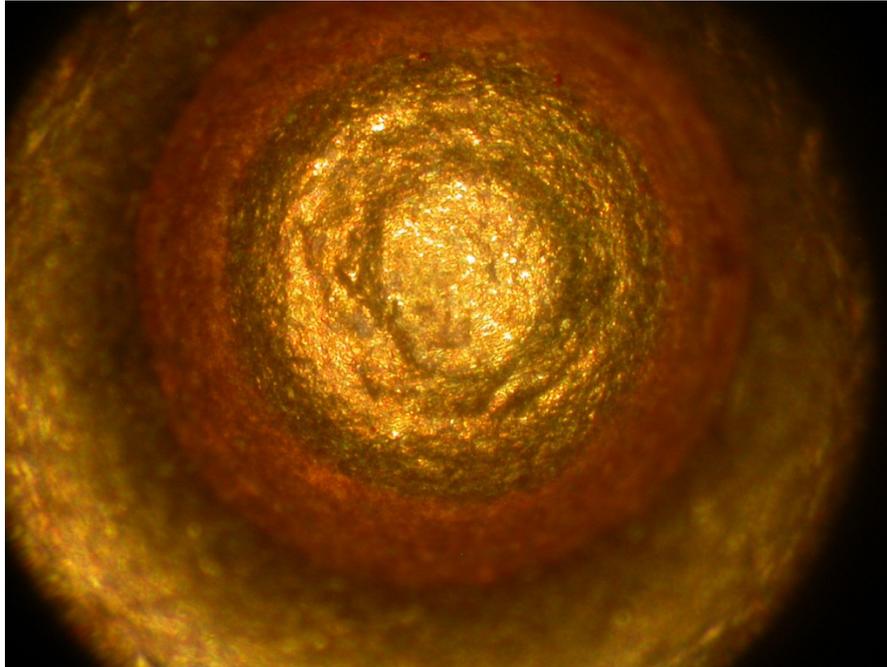
Same Gun = Same FP and BF Marks



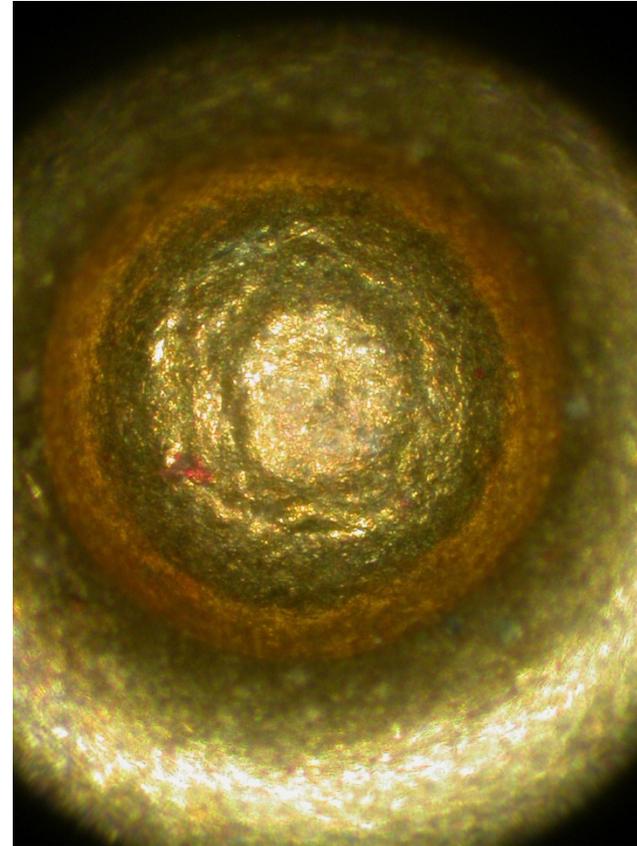
JN1

JN2

Same Gun = Same FP and BF Marks



JN1



JN2

Same Gun = Same FP Marks Shown

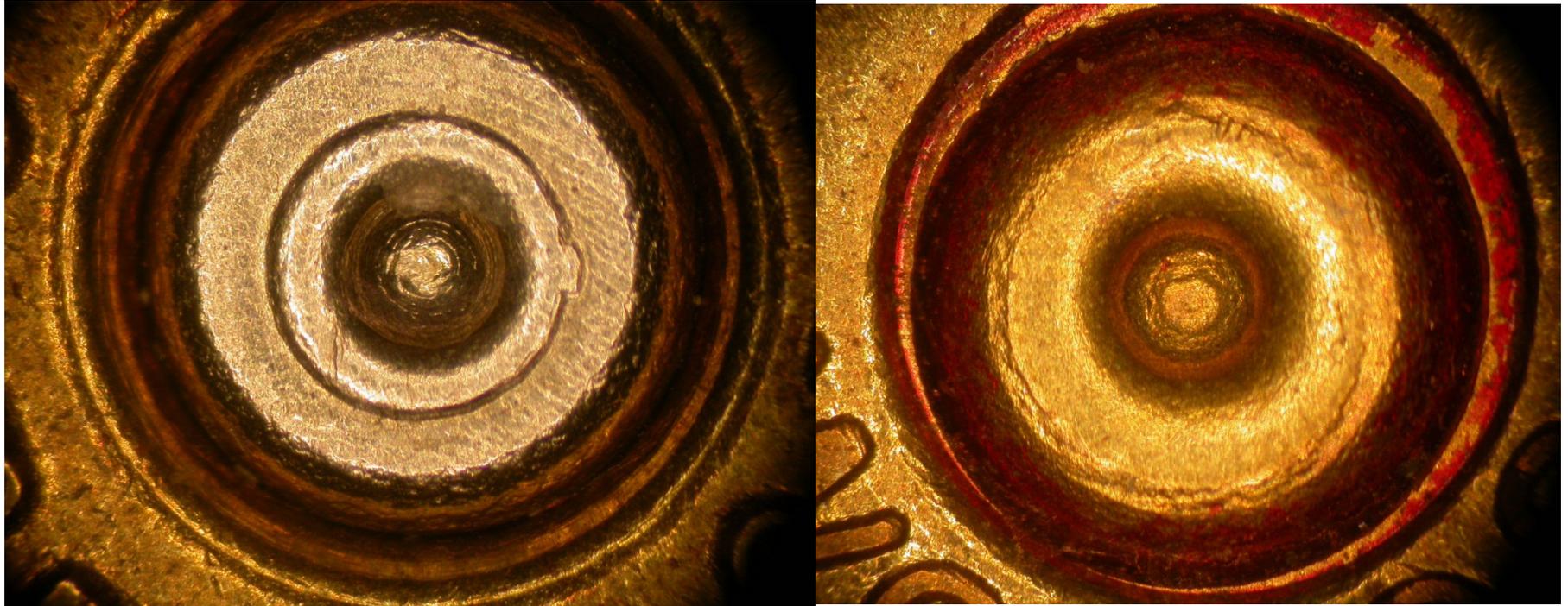


Ex7 E2



JN1

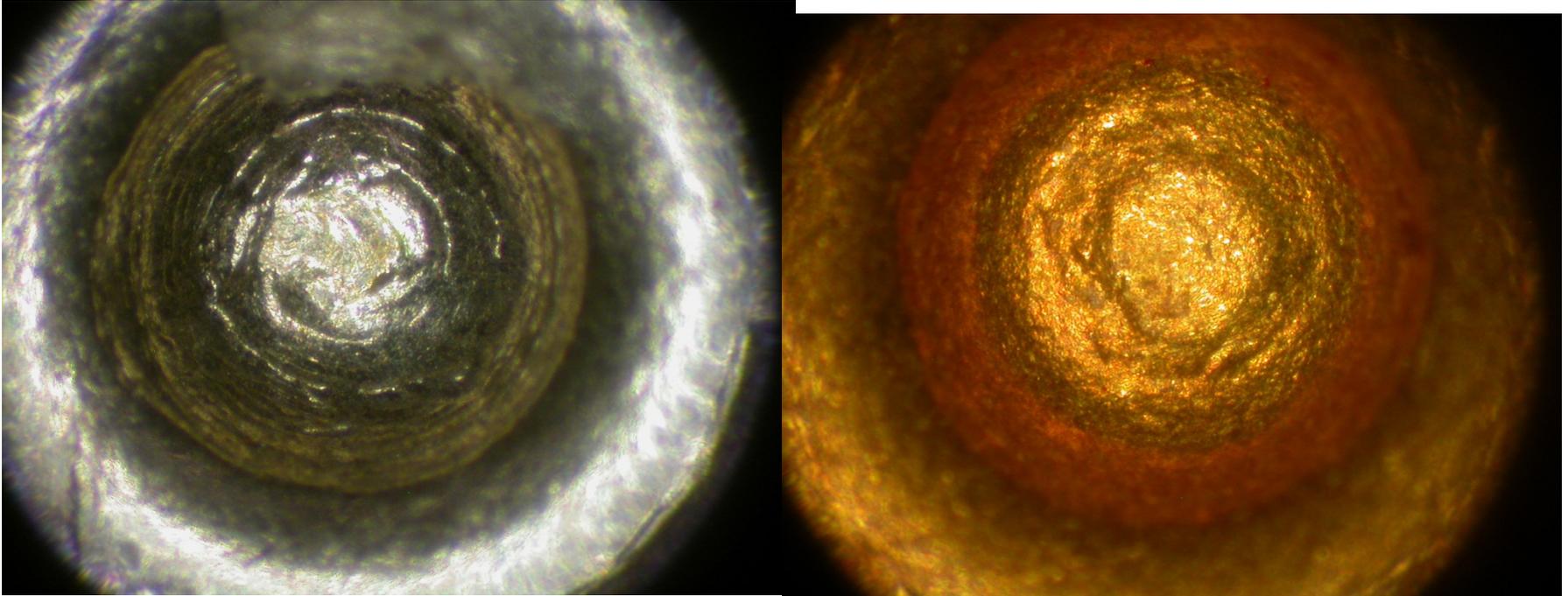
Different Guns



Ex7 E2

JN1

Different Guns



Ex7 E2

JN1

Different Guns