

Forensic Investigation of Fired cartridge Cases



Cartridge cases are often the sole items left behind after a shooting incident and DNA traces from these can identify persons connected to the shooting.



Improvements to the DNA analysis of fired cartridge cases have been made in recent years, yet successful analysis of this important evidence type remains difficult.

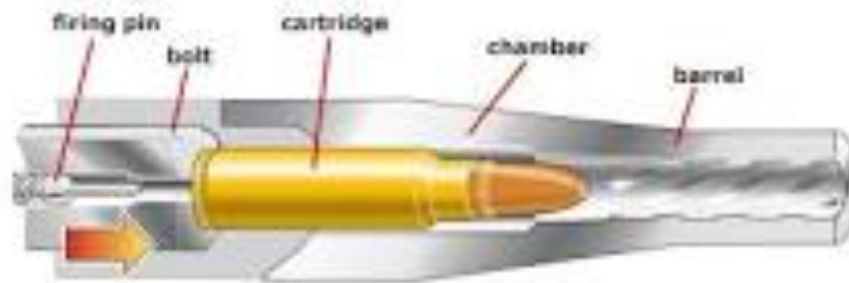
A variety of rifle cartridges :-



A variety of rifle cartridges: (1).17 HM2 (2).17 HMR (3).22LR (4).22 Win Mag R/F.22 WMR (5).17/23 SMc (6)5mm/35 SMc (7).22 Hornet (8).223 Remington (9).223 WSSM (10).243 Win (11).243 Win Improved (Ackley) (12).25-06 Remington (13).270 Winchester (14).308 Win (15).30-06 Springfield (16).45-70 Government (17).50-90 Sharps

What happens when a cartridge is fired?

A cartridge is inserted into the chamber. The action is closed, and the firing pin is pushed back and held back under spring tension. The trigger is squeezed, releasing the firing pin, which moves forward with great force. The firing pin strikes the primer, causing it to explode.



It can be used for test firing and distance determinations. Exactly duplicating the ammunition used may be critical. Document where such ammunition was found. If the number of cartridges are relatively few, they can be handled in the same manner as fired bullets.

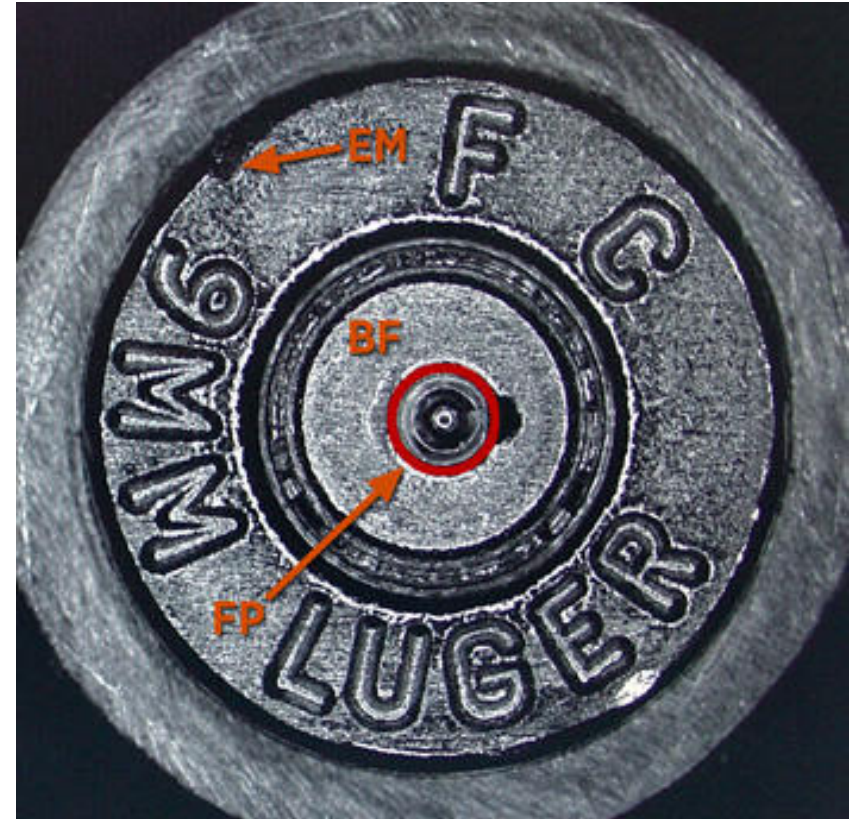
The Firing Pin, Extractor Pin, and Ejector Impressions

When a gun is fired, the firing pin strikes the center of the cartridge to ignite the primer and it is only then that the pellet is released. Just so you know, the primer is the volatile cap that is accountable for provoking the gunpowder when it is hit by the firing pin. Similarly, when the firing pin strikes the central ring of the cartridge case, it leaves a standard incision on it. This opinion being unique to the firing pin of a special gun can actually be used to link cartridges to specific firearms, just like the comparison of rifling marks with bullet striations. Besides, the extracting pin and the ejector inside a firearm that is responsible for ejecting the spent shell casing from the gun's chamber also create different opinions on the shell casing which are unique to a particular firearm.

Fired Case Examination

Fired cartridge case shows the three distinct marks, or 'signatures,' impressed on its surface when it was fired by a gun:

1. the firing pin impression (FP),
2. the breech face impression (BF)
3. and the ejector mark (EM).



Fired Case Examination Situations

Situation	Action
Recovered firearm without related evidence	Obtain pairs of test cartridge cases for later comparison by test-firing the recovered firearm.
Recovered firearm with related evidence	Obtain test cartridge cases or shotshell cases from an evidence firearm and compare to evidence cartridge cases or shotshell cases recovered from a crime scene to determine if the evidence firearm fired the evidence cartridge case or shotshell case.
Recovered evidence without related firearm	Compare evidence cartridge cases or shotshell cases recovered from multiple bodies or crime scenes to determine if the scenes are related to a single firearm.

Q1. Why is the cartridge case is important in the investigation?

When the firing pin strikes the cartridge case, a characteristic indentation is caused that can be used to link cartridges to a specific firearm.

Q2. How are cartridges and bullets are examined by the examiner?

It relies on unique tools marks left by various parts of the weapon including the firing pin. These marks are compared and examined by the examiner to examine fire the weapon using the same parts.

Q3. How are cartridges cases are compared?

They are compared to fired standards from a firearm using a comparison microscope as described on the bullet identification page.

Q4. What components will cause the cartridge to be marked?

Cartridge, which includes primer powder, gun powder, bullet and casing material that holds them all together.

Importance of Cartridge Case in the Criminal Investigation

The cartridge case shows the three distinct marks, or 'signatures,' impressed on its surface when it was fired by a gun: the firing pin impression (FP), the breech face impression (BF) and the ejector mark (EM).

If investigators recover bullets or cartridge cases from a crime scene, forensic examiners can test-fire a suspect's gun to see if it produces ballistic fingerprints that match the evidence. A fired bullet with rifling impressions from the barrel of a gun. He can compare all individual marks ; Striations, firing pin marks, and breechblock in can produce before the court as evidences.

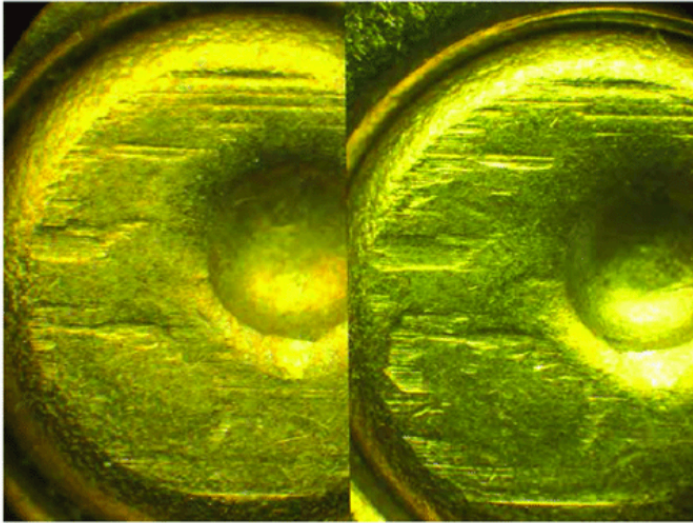
In forensics, ballistics is the science which helps deduce information admissible in the court of law or any other part of the legal system that is pertaining to the use of bullets in a crime. This is possible by the scientific analysis of bullets and bullet impacts to arrive at logical inferences about the incident. In layman's language, forensic ballistics involves the matching of recovered bullets and their casings to the firearm from which they are likely to have been fired.

Ballistic Fingerprinting – The Science of Firearm Ballistics

Ballistic or cartridge fingerprinting pertains to the examination of tool mark evidence, firearm, and bullet. This helps to conform to a bullet with the firearm it was fired with. Ballistic fingerprinting is based on the fundamental principle that there are unavoidable deviations on all firearms. These are marks created during the machining process and also from normal wear and tear.

Accordingly, every firearm generates a unique imprint on the shell casing it fires. This results in a bullet necessarily leaving a different pattern on anything it hits. Ballistic experts are helpful at verifying the type of firearm used in a crime by studying the marks left on a bullet or the effect left by it on a surface. They can even remove an obliterated serial number of the weapon to trace its registered owner.

Conclusion



Microscopic comparison of breech face detail on two cartridge cases

A careful examination of the firearm helps establish this claim, particularly trigger pressure – the force compelled to grab a trigger. A study published recently in *Forensic Science International: Genetics*, describes both a novel device for the collection and transport of fired cartridge cases and a new DNA recovery method that incorporates a rinse-and-swab technique.

There is no doubt that improvements to the DNA analysis of fired cartridge cases have been made in recent years, yet successful analysis of this important evidence type remains difficult.