



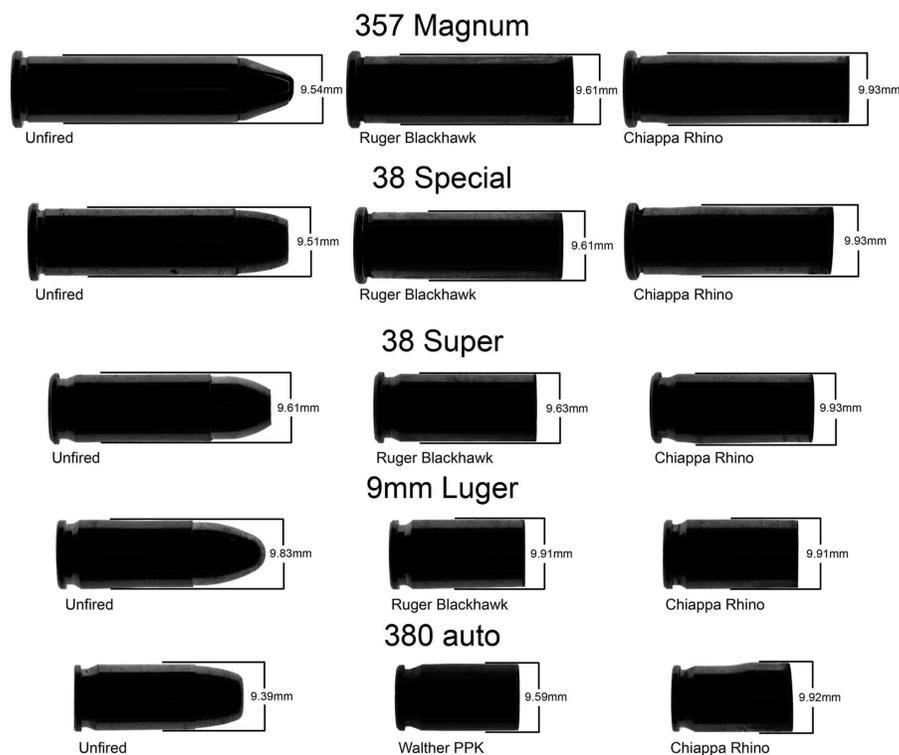
Identification and Recognition of Cartridge Cases from Multi-Caliber Firearms

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Obturation Characteristics

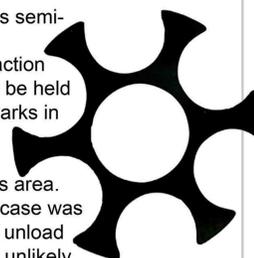
A cartridge case is always slightly smaller than the chamber that it is meant to be loaded into. When a cartridge is fired, the pressure contained within the casing will expand the casing, sealing in the gasses that force the projectile through the barrel. Normally this expansion is minimal and is nothing noteworthy unless the chamber shows signs of damage or is typical of that firearm. In the case where the cylinder has been machined to accommodate multiple calibers, as with the Chiappa Rhino that can accept and fire 357 Magnum, 38 Special, 38 Super, 9mm Luger and 380 acp, there will be significant obturation artifacts. These artifacts will appear as bulges in the casing and will be the diameter of the largest caliber accepted by the cylinder. With the re-chambered Rhino cylinder, every cartridge fired will show obturation artifacts that are the same size as the 9mm Luger case. The 9mm Luger case, however, will not show any abnormal obturation since that is the size the chamber was modified to match. The Ruger Blackhawk, conversely, uses an entirely different cylinder in order to fire 9mm Luger cartridges, so there are no apparent obturation artifacts.



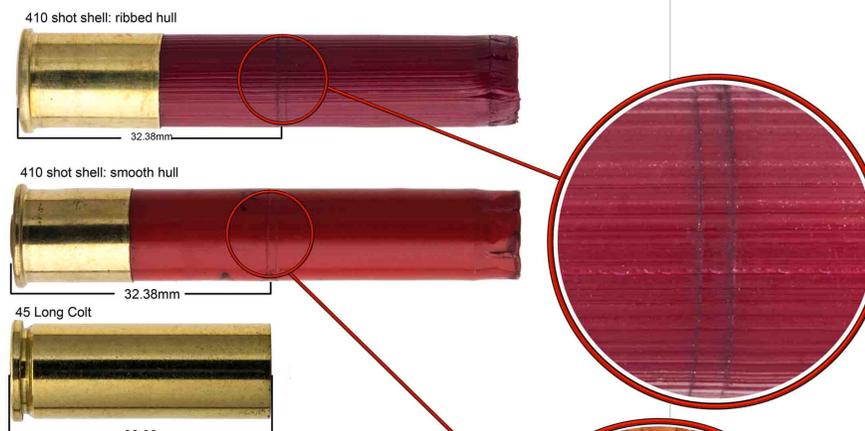
Multi-caliber handguns have been gaining popularity in recent years. Shortage of ammunition, versatility, and their use in video games and movies have contributed to this trend. These types of firearms are effectively blurring the lines of traditional class characteristics. Class characteristics have always been an important step in identifying the origin of a cartridge case, but not all class characteristics are absolute; a rimless cartridge isn't always from a pistol, a shotgun shell is not always fired from a shotgun, and a 380auto can be fired in a 357 magnum. Three different revolvers using different ways of chambering and firing several calibers were used to demonstrate that several types of cases can have the same breech face markings and to show how to recognize if a cartridge was fired from a multi-caliber handgun by obturation characteristics, chamber marks, and moon clip marks. The Smith & Wesson Governor is capable of chambering 45 Long Colt, 410 shotgun shells, and 45 ACP via moon clips. The Ruger Blackhawk SA can fire 357 Magnum, 38 Special, 38 Super, and 9mm Luger by using interchangeable cylinders. The Chiappa Rhino is a 357 Magnum revolver that has been machined to chamber 9mm Luger, and with the aid of moon clips, can also fire 38 Special, 38 Super, 357 Magnum, and 380 ACP in addition to the 9mm.

Moon Clips

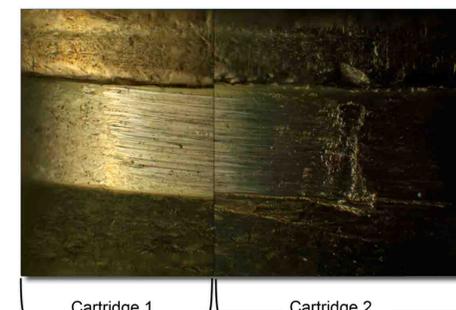
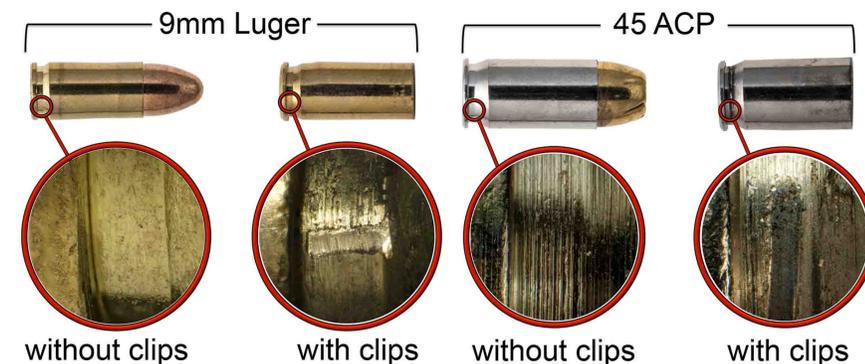
Moon clips are thin metal clips that allow a revolver to fire rimless semi-auto cartridges. These clips serve two purposes; they hold the cartridge in the chamber at the proper place, and aid in the extraction of the cartridge after being fired. Because the cartridge needs to be held firmly, the action of loading a cartridge into the clip leaves tool marks in the extractor groove of the case. Since the extractor groove is typically less than 1mm, it is highly unlikely that something else other than the clips or an extractor claw could make marks in this area. Having these marks would be a strong indicator that a cartridge case was fired from a revolver rather than a pistol. Although its possible to unload cartridges from a moon clip and use them in another firearm, it's unlikely considering the effort required to load and unload them. The Rhino and Governor both use moon clips in order to fire rimless cartridges, making their spent cases easily identifiable. The Blackhawk, however, uses interchangeable cylinders machined with headspace, eliminating the need for moon clips for chambering. In addition, because it is a Single-Action revolver, it also does not need them for extraction.



Chamber Marks

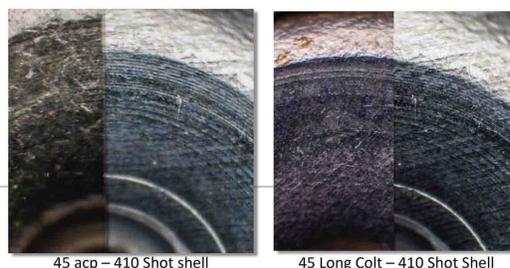


When a spent shot shell case is discovered, it is not normally associated with a handgun. However with the growing popularity of revolvers that fire both 45 Long Colt and 410 Shot Shells, such as the Taurus Judge and Smith & Wesson Governor, it should be a consideration. Because the chamber is shaped for the 45 Long Colt cartridge, it is slightly narrower on the second half due to the projectile being smaller in diameter than the case. This ridge is embossed into the side of the plastic hull of the shot shell during firing, making the recognition of that case being fired from a multi-caliber gun a fairly simple task.

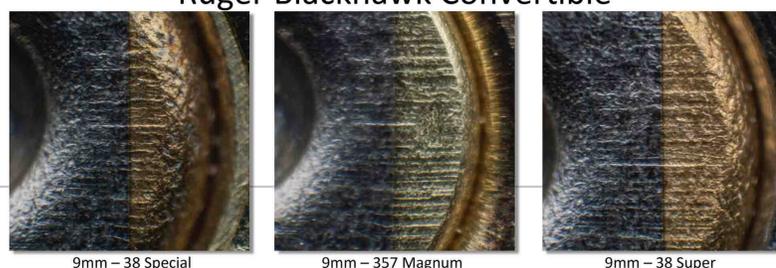


Moon clips leave toolmarks in the extractor groove, making it possible to match cartridge cases that were fired from the same moon clip and to the original clip itself. Since the extractor groove is so narrow, this channel is not prone to damage after being discarded unlike the head stamp area and cartridge side. This not only ensures the integrity of the toolmarks after they are made, but also provides an ideal surface for marks to be made upon initially.

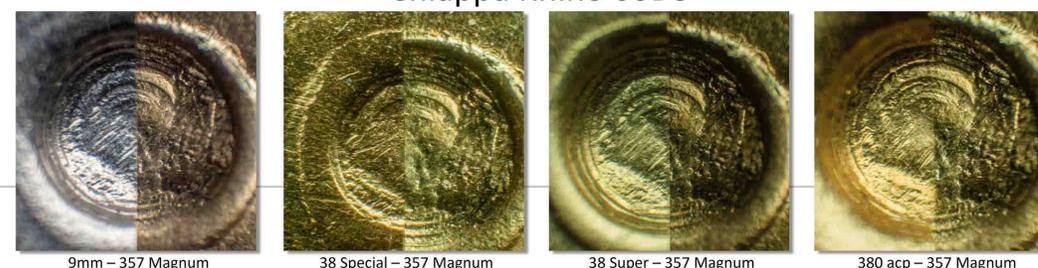
Smith & Wesson Governor



Ruger Blackhawk Convertible



Chiappa Rhino 60DS



Although there are many types of toolmarks that can be found on a cartridge case, only the breech face marks and firing pin can be evidence that a cartridge was fired from a firearm. Extractor and ejector marks are often used to make an identification, but their presence does not mean it was from a particular firearm as it may have simply been cycled through the action and then used elsewhere. Only the complete absence of an extractor mark would be an indicator of a rimless cartridge being fired from a revolver, while the absence of an ejector mark would not be as some pistols do not have an ejector pin, instead using the firing pin itself as an ejector. All three test guns provided breech face markings that easily identified them on all calibers used. The Ruger, however, is the only one that would leave no indication on a rimless cartridge such as obturation artifacts, moon clip marks, or chamber marks, other than the lack of extractor mark, that it was fired from a revolver. But even this is not even a strong indicator as many cartridges fired from pistols do not have discernable extractor markings. It is noteworthy that despite the Ruger's lack of markings, it did have the most identifiable breech face patterns on all calibers.