ESJ Humanities

# Possibility to Identify Bullets and other Components of the Cartridges by Consideration on Barrels and Projectiles Types

***Giorgi Dzindzibadze, PhD Candidate***
Grigol Robakidze University, School of Law, Tbilisi, Georgia
Workplace: Ministry of Internal Affairs of Georgia, Forensic-Criminalistics Department, Examination Division, Ballistic Expertise Section. Head of the First Subunit/Chief Expert

Doi:10.19044/esj.2022.v18n29p47

Submitted: 11 July 2022
Accepted: 19 September 2022
Published: 30 September 2022



*Cite As:*
Dzindzibadze G. (2022). *Possibility to Identify Bullets and other Components of the Cartridges by Consideration on Barrels and Projectiles Types*. European Scientific Journal, ESJ, 18 (29), 47. https://doi.org/10.19044/esj.2022.v18n29p47

## Abstract

There are three types of barrels - polygonal rifling, traditional (conventional) rifling, and smooth bore. Since the internal shape of each barrel is different, the projectiles passed in these barrels have different marks and some are more depicted than others. Identifying private signs is necessary for comparison. If such marks do not remain on the surface of the bullet, it will be unusable for the identification process, which is based on a comparison of general and individual marks. Although scientists have different opinions on this issue, some of them claim that it is possible to identify small shot fired from a smooth bore. This issue has been explored and reflected in this paper, and it is possible to conduct an identification research on bullets. The paper also focuses on the issues the expert should consider when identifying. It is probably clear to everyone that it is impossible to conduct research of this scale on objects (shots, pellets, plastic container) that do not have sufficient identification marks. A reasonable conclusion used in court as evidence should be based on a combination of durable individual barrel channel marks with other bullets or a combination of durable individual barrel marks of the experimental weapon. In some cases, the expert's conclusion is used as direct evidence in court and a wrong conclusion can result in the conviction of an innocent person.

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

**Keywords:** Polygonal rifling, traditional rifling, smooth bore, barrel, bullet, identification

## Introduction

In the process of investigating crimes, various evidence are always investigated and identified, since the latter is one of the main sources of information for the investigation. This is because when bullets are removed from the crime scene or removed from the body, the extent to which it is possible to investigate and identify individual studies on it is taken into consideration. In situations where a firearm, apart from bullets, is presented for examination or experimental bullets previously obtained from this firearm are stored in the appropriate service, it is possible to compare each bullets removed from the crime scene, including bullets from the body and test bullets, which in most cases is evidence in court. In this case, a special role is assigned to a specialist with highly professional knowledge about investigation of crimes that are committed using firearms. In order to do this, properly selected research objects are used.

Numerous papers have been devoted to the study of objects fired from firearms, but many of them have remained as theoretical researches and have not found practical application. This is especially true of papers dealing with the identification of objects fired from the barrel of a smooth bore weapon. These issues will be discussed in the article to examine cases and objects that allow specific identification studies to be conducted. Based on their credibility and high-level examination, the results can be used by the court as evidence in a criminal case.

Recently, firearms and ammunition have evolved. Civilians use weapons of various types and calibers, both smooth-bore and rifled, and many types of ammunition intended for them. The urgency of the topic is as a result of the increased number of crimes where firearms are used and the increased role of expertise in solving the problems of the investigation. It should be noted that, in most cases, criminals use illegal weapons. Experimental cartridge cases and bullets, obtained from these weapons, are not even stored in expert institutions, which, in turn, complicates the identification process. Also, there are frequent cases when crimes are committed using remade weapons, shortened shotguns, remade gas, signal pistols, and handmade firing devices.

The aim of the research is to classify the barrels of firearms and the components of different types of projectiles and cartridges fired from the barrel. Analysis of such issue, the type of barrel, and the type of projectile can be identified in case of firing. To achieve this goal, it is necessary to analyze the theoretical and practical knowledge that still exists on this issue and most importantly, the knowledge of the objects that are specifically subject to

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

identification, their individual private marks, identification process with other objects, and the credibility of the results of identification. This is because the results of the comparison, in a particular case, may be considered as direct evidence in court and form the basis of the judgment.

## Study Methods

Quantitative and qualitative research methods, as well as analytical research methods, are used in the article. First, it should be noted that quantitative research methods are extremely popular and widespread in a number of scientific disciplines, including social, technical, and natural sciences. In the quantitative research, many similar objects, bullets, and projectiles were examined. During the qualitative research, the properties of these objects and the features of the marks on them were also analyzed. During the analytical research, the opinions of various scientists regarding this matter were analyzed. However, some of their opinions were rejected and others were accepted with justification. This implies that research does not simply describe events, but also explains their causes.

## Used Equipment and Material Means

Automated Ballistic Comparison System known as "Balscan" was used. Experimental bullets were also obtained from the same firearm at different times. Remade firearm, handmade ammunition, and ammunition of various metals and damaged bullets were collected from the crime scene as well.

## Polygonal Rifling, Traditional (conventional) Rifling, and Smooth Bore Barrels

In order to address the identification of projectiles, it is necessary to consider the types of barrels of firearms. Knowledge of this is essential as it is necessary to determine how identification studies on projectiles are generated. The inner form of the barrel does the formation of the mark on the projectile. This means that the inner surface of the barrel as well as the shape and size of the projectile are significantly important.

Shotguns are generally smooth-bored. However, some older weapons were provided with a short length of rifling at the muzzle for use when firing solid slugs. This system of rifling was called “paradox rifling”. Rifling consists of a series of spiral grooves cut into the inside surface of the bore of the barrel, and these are placed there to impart a spin to the bullet through its longitudinal axis. This gyroscopic effect stabilizes the bullet during its flight, which prevents it from tumbling end over end and losing its accuracy. Identification of the type of rifling used in a barrel and the knowledge as to how it is produced can be highly significant for the investigation of a case and

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the interpretation of the results (Heard, 2013). In this type of shotgun, it is possible to shoot bullets, pellets, and shots. The barrel channel of such a weapon is smooth as it does not have lands and grooves, and the projectiles do not undergo obturation when they enter the barrel channel. As a result, it is difficult to identify them by individual identification marks.

Rifling in a barrel consists of “lands” and “grooves”. The grooves are the depressions cut away by the rifling cutter. The lands are the portions of the barrel that have not been touched by the rifling cutter and are, therefore, left standing proud. Some writers assign the invention of spiral grooved barrels to Gaspard Kollner, a gunsmith of Vienna, in the 15th century. Others fix the date at 1520 and attribute it to Augustus Kotter of Nuremburg. German weapons bearing the coat of arms of the Emperor Maximilian I and made between 1450 and 1500 have spiral grooved barrels, which are the earliest identifiable rifled weapons. Both straight and spiral forms of rifling are encountered in early weapons. Nonetheless, it is generally accepted that the straight form of rifling was to accommodate the fouling produced in these early black-powdered weapons. The number of grooves encountered can be anything from a single deeply cut rifling, up to twelve or more in micro-grooved rifling. The form of groove also varies and could be square, round, triangular, ratchet or even comma-shaped grooves. The actual number of rifling grooves appears to have little influence on the stabilising effect of the rifling (Heard, 2013).

In 1854, Whitworth patented the first polygonal rifling system, which overcame most of the problems and proved to be extremely accurate as well. Unfortunately, Whitworth did not have practical experience in the manufacture of weapons and was unable to produce guns with the consistency required. As a result, his invention was soon overtaken by others. The invention of the breech-loading weapon eliminated the problems of having to expand the bullet to fill the bore. The bullet could be made of the correct diameter to fill the bore and could be inserted into the rifling at the breech end of the barrel. In addition, instead of the deep grooving and a long, soft bullet necessary for easy loading and expansion at the breech of a muzzle-loader, shallow rifling and harder bullets could be used. This configuration resulted in more uniform bullets, higher velocities, better accuracy, and improved trajectory (Heard, 2013).

There are basically three types of barrels - polygonal rifling, traditional (conventional) rifling and smooth bore, which have different internal shapes. Therefore, the projectiles passed in these barrels have different marks of form and some are more depicted than others. Identifying private signs is necessary for comparison. If such marks do not remain on the surface of the bullet, it will be unusable for identification. This is because the identification process should be based on a comparison of general and

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individual marks. In the case of bullets, the first step is to determine the compatibility of a combination of durable individual barrel channel marks with other bullets or the combination of durable individual barrel marks of the experimental weapon. Professor Kyle rightly points out that identification for only the chemical composition and caliber of lead are inadmissible (Kiely, 2006, 2001).

Richard Safferstein also asserts that every firearms manufacturer chooses a rifling process that is best suited to meet the production standards and requirements of its product. Once the choice is made, the class characteristics of the weapon's barrel will remain consistent. This implies that each will have the same number of lands and grooves, with the same approximate width and direction of twist. Although these class characteristics permit the examiner to distinguish one type or brand name of weapon from another, they do not impart individuality to any one barrel as no class characteristic can do this. If one could cut a barrel open lengthwise, a careful examination of the interior would reveal the existence of fine lines or striations running through the length of the barrel's lands and grooves. These striations are impressed into the metal as the negatives of minute imperfections found on the rifling cutter's surface. They are also produced by minute chips of steel pushed against the barrel's inner surface by a moving broach cutter. The random distribution and irregularities of these markings are impossible to duplicate exactly in any two barrels. No two rifled barrels, even those manufactured in succession, have identical striation markings. These striations form the individual characteristics of the barrel (Saferstein, 2018).

The identification is based on the fact that the machine on which the weapon parts are made changes shape and the studies left on the firearms by these parts of the machine are microscopically different. Therefore, all the details, despite their similarity, have individuality, which can be seen with the naked eye (Burrard, 1962).

Freeman (1978) obtained three consecutively manufactured 9 mm caliber Heckler and Koch polygonal rifled firearm barrels. Freeman was able to correctly distinguish the questioned bullets from the consecutively manufactured Heckler and Koch polygonal rifled firearm barrels. It was established that consecutively manufactured gun barrels differ from each other and produce different signatures. The key limitation reported by Freeman reveals that one of the Heckler and Koch polygonal rifled firearm barrels used in his study did not mark as well as the other two (Thomas et al., 2013).

It is the formation of these marks on lead that is influenced by the shape of the inner surface of the barrel. More so, the shape of the inner surface of the barrel is as important as the type, size, and shape of the projectiles.

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**Types of Projectiles and other Components of the Cartridge**

A cartridge consists of a cartridge case containing the powder charge, a bullet (projectile) rigidly fixed in the mouth of the case, and the priming mixture introduced in the base of the cartridge case. Although the term "base" would seem to be the more appropriate, the base of the cartridge case is commonly termed "the head". The priming mixture is exploded by the impact of a hammer or plunger, and the flame thus produced is communicated to the powder charge. Ammunition assembled in the form of cartridges is termed "fixed ammunition". Cartridges can be obtained and loaded with shot or buckshot instead of a single bullet, while shotgun cartridges can be obtained and loaded with a single ball. Three types of fixed ammunition are used in small arms: pin-fire, rim-fire, and centerfire. Each type has its particular means for introducing and exploding the priming mixture (Gunther & Gunther, 2015). However, it should be noted that in modern times, pin-fire cartridges are almost no longer used, as well as cartridges without cases. Also, weapons that are charged from the front of the barrel are no longer used. Cartridges of this type, which have a single projectile, can be full jacketed, semi jacketed or non-jacketed. Full jacketed and semi jacketed bullets are coated on the outside with a layer of copper or other metal.

Cartridges may be special purpose, which, according to the Council of Europe directive, is prohibited in civil circulation. An example of such is ammunition with penetrating, explosive or incendiary projectiles (Council Directive, 1991). Regardless of the type of core the ammunition has, most of them, except the .22 caliber cartridges, have a jacket. These types of bullets are much better for identification than non-jacketed bullets since the identification marks on the jacket are better reflected. Non jacketed bullets have a lead core that is a relatively soft metal, and individual marks on it are easily removed as a result of contact with the object.

After firing, the lead core and jacket can be separated. In most cases, such jackets are usable for identification, but one land must be undamaged. As for the core, it is unsuitable for identification since it has no contact with the inner surface of the barrel when fired.

In addition to projectiles and gunpowder, shotgun cartridges may have wads, plastic containers, and shot cups. Its projectiles are shots, pellets, and slugs. Such cartridges are fired in a smooth-bore gun that does not have lands or grooves on the inside of the barrel. Also, no obturation occurs except in the case of slug. In most cases, only the plastic containers and shot cups have contact with the inner surface of the barrel.

As previously discussed, unlike rifled firearms, a shotgun has a smooth barrel. Thus, projectiles passing through a shotgun barrel are not impressed with any characteristic markings that can later be related back to the weapon. Shotguns generally fire small lead balls or pellets contained within a shotgun

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shell. A paper or plastic wad pushes the pellets through the barrel on ignition of the cartridge's powder charge. By weighing and measuring the diameter of the shot recovered at a crime scene, the examiner can usually determine the size of shot used in the shell. The size and shape of the recovered wad may also reveal the gauge of the shotgun used and, in some instances, may indicate the manufacturer of the fired shell (Saferstein, 2020).

In addition to factory-made ammunition, handmade ammunition is often used at the crime scene. Most of these types of ammunition have projectiles of inappropriate size, which makes it even more difficult to conduct ballistic examinations on them.

Therefore, the identification of bullets largely depends on the type of projectile, the type of manufacture, the condition and, most importantly, the inner surface of the barrel.

**Ballistic Examination of Projectiles Fired from Firearms and their Possibility of Identification**

The inner surface of the barrel of a gun leaves its marks on a bullet passing through it. These markings are peculiar to each gun. Hence, if one bullet found at the scene of a crime and another test-fired from a suspect's gun show the same markings, the suspect's gun is linked to the crime. These inner surface striations are important for bullet comparison, and it is significant to know why and how they originate (Saferstein, 2020).

Firearm identification techniques were first used in 1907 when members of the Frankfurt Arsenal were asked to determine which weapon was fired during a riot in Brownsville, Texas. Using enlarged photographs of the needle traces on the cartridge cases removed from the scene, they were able to determine which of the four guns they fired from. However, the technology was not yet sophisticated to identify bullet at that time (Sedlacek, 2012). According to Brian Hardy, it will be difficult to know when the gun was first identified. The bullets fired from the gun also had a certain number of equally spaced fields that was tilted and directed at the same angle (Heard, 2013).

The gun barrel is produced from a solid bar of steel that has been hollowed out by drilling. The microscopic drill marks left on the barrel's inner surface are randomly irregular and impart a uniqueness to each barrel. However, the manufacture of a barrel requires the additional step of shaping its inner surface with spiral grooves, a step known as rifling. The surfaces of the original bore remaining between the grooves are called lands. As a fired bullet travels through a barrel, it engages the rifling grooves. These grooves then guide the bullet through the barrel, giving it a rapid spin. This is done because a spinning bullet does not tumble end over end on leaving the barrel, but remains on a true and accurate course (Saferstein, 2020).

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When firing from a firearm, traces of lands on the inner surface of the barrel remain on the lead part of the bullet. These studies contain information on the number, height, and width of the fields (Bertovsky, 2018,). The focus here is on general signs, which can only be used for group identification.

Richard Safferstein rightly points out that bullets should be identified only on the basis of general and private marks. General marks are caliber, number of fields, and direction, while private (individual) marks include micro-relief in lands and groove (Saferstein, 2018).

Therefore, forensic examination is the first step in determining the compatibility of a combination of durable individual barrel channel marks with other bullets or the combination of durable individual barrel survey markings of the experimental weapon. It should also be noted, that when bullets and guns are presented for research, bullets are not compared to the original weapon. Yuri Orlov (2016) mentions that when it is impossible to study the properties of material evidence directly, comparisons are made with experimental samples taken from the object. For example, when identifying a bullet with a firearm, the lead studies are not directly compared to the barrel of the weapon, but rather to the experimental bullets obtained from the weapon. It should also be noted that in such cases, it is advisable to use bullets of the same manufacturer and material removed from the scene (Warlow, 2012). This will facilitate further research for the expert.

In addition, the process of identifying bullets involves a rather complex process in which the coincidences and differences of the general and private marks detected on their surface are determined. General marks include lead diameter (caliber), number of fields, direction, average width of fields, depth of surveys, the angle of inclination of the fields, as well as location and expression of primary studies arising from the barrel. On the other hand, private marks can be thought of as micro-relief in the lead fields and on the entire surface, which are expressed in the form of fine scratches and grooves. According to Robert Thompson, the successful completion of this time-consuming task depends on the knowledge and experience of an expert (Thompson, 2010). However, this should not be taken to mean that the expert is an omniscient and omnipotent person. Some authors point out that it is possible to identify a weapon with a shotgun bullet, a shot, a pellet, and a plastic container fired from a smoothbore gun. This, however, is an arguable statement. Nevertheless, some authors consider it to be a reality, since the expert may be asked the question: What time has passed since the last shot (Seleznev & Sysoyev, 2012)?

The book “Criminalistics of Socialist Countries” was edited by Professor Koldin (1986) and states that “The ability to identify firearms through shots and pellets has radically changed the tactics and methods of investigating relevant crimes” (p. 110). A similar entry is made in the book

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titled “Criminalistics”, which was edited by Filipov (2007): “With the development of forensic–ballistic examination methods, there has been the possibility of identifying a smooth-bore firearm with a slug. In the modern period, the possibility has been established and a methodology has been developed for the identification of smooth-bore firearms through pellets and shots” (p. 90-91). The authors discussed the possibility of identifying pellets and shots in the book “Criminalistics”, which was published in Moscow between 2005 and 2018. According to the authors, regarding identification issues, the investigator can ask the expert a question to examine whether a slug, a shot, or a pellet was fired from a particular weapon (Criminalistics, 2018; Balashov et al., 2005).

Back in 1972, the American Journal of Criminal Law and Criminology published an article titled "Identifying shots", where the authors point out that the identification of a shot fired from a smooth-bore firearm is seen as an unexplained problem.

In their opinion, scratches are observed on relatively large shot grains and it is possible to identify them. Notwithstanding, the authors also point out that the probability of repeating the same scratches is very small. Since the entire surface of the projectile is expected to touch the entire inner surface of the barrel, there is a greater chance that identification marks will remain on the projectile (Sinha & Kshettry, 1972).

The possibility of identifying objects fired from smoothbore weapons (slugs, shots, pellets and containers) is discussed in the article of Bakhtadze and Golenev (2019). Although the authors conclude that objects fired from smoothbore weapons can be identified, experimental studies are still needed

Leaving aside the practical aspect, it is highly doubtful even in theory to identify smooth bore weapons by containers. A container is a warehouse made of plastic material in which shots, pellets, or slugs are placed at the time of firing. At the moment of firing, high pressure is generated in the barrel. Thereafter, compaction of projectiles is placed in the container, which creates obturation and increases friction between the barrel channel walls and the container. Consequently, the temperature generated by the combustion of the gunpowder causes the walls of the plastic container to soften. After the shot, the micro-relief formed on the walls of the container loses its high temperature and cools down. Then the plastic hardens again and the shape of the micro-relief changes, which already in itself precludes the persistence of individual traits on it and its suitability for identification.

The rationale of some authors that smoothbore firearm can be identified by shot, pellet, and container is based on only small theoretical considerations. Every theoretical research and reasoning exists in order for it to find application in practice, otherwise it has no theoretical value either. Ideal conditions are created in the laboratory to conduct experiments and obtain

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experimental bullets without damaging them. Even under these conditions, it is almost impossible to obtain shots and/or pellets, which can be used for further identification. However, an identification study based on them will yield results. The focus here is not on shots and pellets removed from crime scenes because they are mainly made of soft metal and their shape and fragmentation changes upon contact with the objects. Despite numerous experiments and researches carried out in the laboratory, no experimental shots and pellets were obtained from the smoothbore weapon. Thus, the expert unequivocally concluded that they had been fired from the same weapon.

Unlike shots and pellets, it is possible to use only one slug fired from a smoothbore to identify a slug whose diameter is equal to or slightly greater than the inside diameter of the barrel channel, which is completely or partially obturated at the moment the slug enters the barrel. In this case, it would be ideal if the inner surface of the barrel have any defects, since the smooth surface of the barrel has no lands and grooves.

Aside from the barrel of a smoothbore weapon, it is often difficult to even compare bullets fired in a rifling barrel for a variety of reasons. When an expert has both bullets and firearms from the scene, it is possible in this case to obtain experimental bullets from cartridges of the same manufacturer that were used at the crime scene. However, it is much more difficult when the bullets of different manufacturers are presented from the crime scene and the weapon is not presented. This makes it impossible to obtain test bullets. In such cases, it is very difficult to compare objects with each other and to some extent, it depends on the experience of an expert.

It is widely believed in scientific literature that details of weapon, including the inner surface of the barrel, are made of relatively durable materials and retain their individuality for a long time. At the same time, everyone points out that details of weapon are changeable, just like all objects in the material world. Variability details is determined not only by exploitation but also by storage conditions. Complications of the identification process, in addition to the long exploitation of the weapon and the variety of lead metal, can be caused by the shape and size of the bullet, including additional marks on the bullet, which are generated before and after the shot. Ballistic scanner known as “Balscan” was used during the research.

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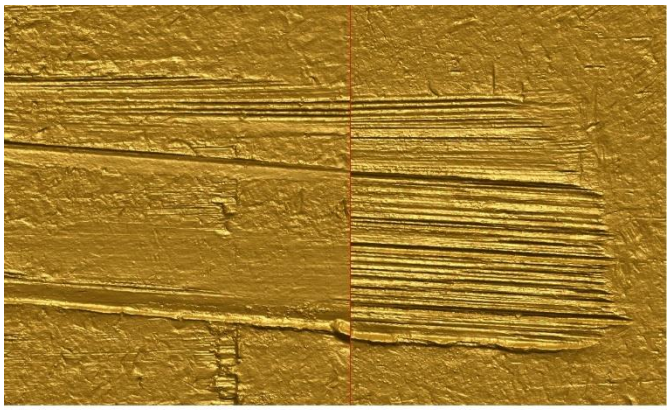
**Long Exploitation**

In the process of identifying, the expert compares most of the marks on the bullet and identifies similarities and differences. However, in the case of similarity of the majority of marks, it is possible to draw a conclusion that the bullet was fired from a barrel of a particular firearm. In other cases, the expert can only discuss general similarities.



Nagant. Test bullet. 2001 Nagant. Test bullet. 2020
Photo N1

As mentioned earlier, compared to the inner surface of the barrel, the jacket of bullet is made of soft metal, which ensures the durability of the marks formed on the surface of the bullet for a long time. Nevertheless, since all objects in the material world are changeable due to the conditions of long exploitation and bad storage, the inner surface of the barrel of the weapon also changes shape and new marks emerge on it or existing marks disappear. (Photo N1).

**The Shape and Size of the Projectile**

The reflection of individual identification marks on a bullet is highly dependent on the specificity of the projectile. In modern times, there are frequent cases when a partition, restraint or stopper is removed from the barrel channel of gas and signal pistols. Thereafter, it is possible to fire a projectile from this type of weapon, which is loaded in a handmade manner within a cartridge case of nominal caliber. The inner channel of the barrel of such a weapon is smooth.

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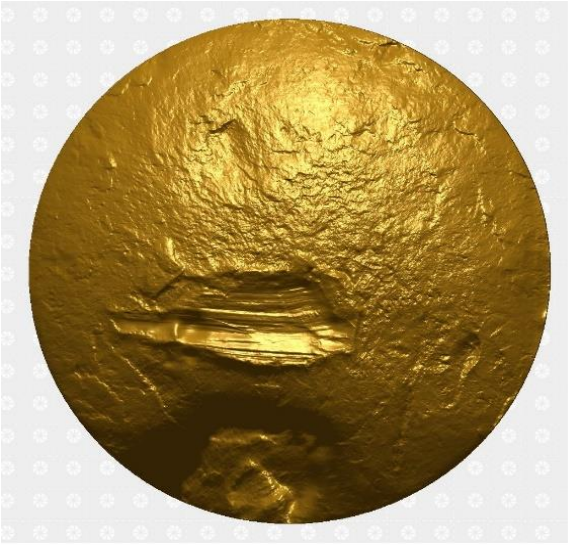

Handmade cartridge. Charged with 1 piece of shell. 9mm nominal caliber.

Photo N2

When firing such cartridges, the closer the diameter of the projectile is to the diameter of the barrel channel, the better the detection private marks will be. In this case, it would be ideal if the inner surface of the barrel have any defects, (Photo N2) since the smooth surface of the barrel has no lands and grooves. Like handmade cartridges, the same can be said for cartridges that are used for smoothbore weapon, since they are usually charged with different types of projectiles and other elements. At the moment of firing, they do not come into contact with the inner surface of the barrel, especially since the projectiles in modern cartridges are placed in plastic containers.

**Metal Variety**

When identifying bullets, it is important to consider the specifics of the metal used to make the jacket of lead. There are many enterprises in the world where both military and commercial cartridges are manufactured. Cartridge manufacturers have different technologies and they produce jacket of bullet using different technologies and metals. (Photo N3) Certainly, traces of relatively soft metal are easily imprinted and contain more information for identification.

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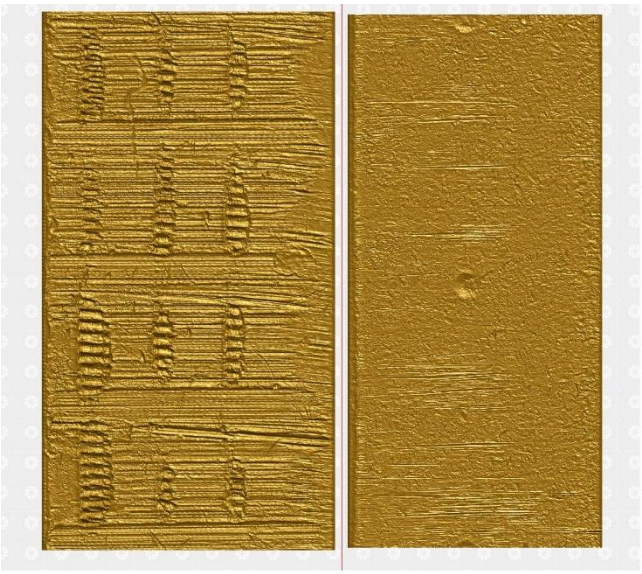


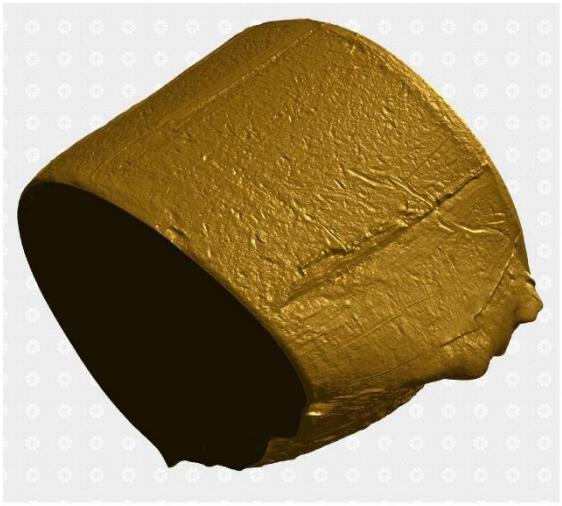
Nagant bullet. Nagant bullet.
Non jacketed bullet. Jacketed bullet.
Fired from the same barrel
Photo N3

When an expert from the crime scene presents both bullets and firearms, it is possible in this case to obtain test bullets from cartridges of the same manufacturer that were used at the crime scene. However, it is much more difficult when the bullets of different manufacturers are presented from the crime scene and the weapon is not presented.

**Additional Marks on the Bullets**

When identifying bullets, it is important to consider that many traces may be reflected on them before and after the shot (Mechanical damages resulting from contact with a solid object in the form of scratches), which do not belong to the weapon in which the particular bullet was fired. (Photo N4)

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431



Bullet, damaged after the shot.
Photo N4

There are frequent cases when a cartridge which was made many years ago (Including decades ago) is used at the crime scene and this cartridge has been changed by many owners since its manufacture. In such a case, the bullet may show multiple marks that formed before the shot. It should also be noted that after the shot, when the bullet hits a different object, additional marks will be reflected on it that do not belong to the barrel of the weapon. In many cases, the bullet could also have reflected marks from inner surface of the cartridge cases. This often happens when there is a separation of cartridge cases and bullet. These additional studies, however, complicate the identification process.

**Conclusion**

As previously mentioned, there are basically three types of barrels - polygonal rifling, traditional (conventional) rifling, and smooth bore. Since the internal shape of the barrels are different, the projectiles passed in these barrels have different marks of form and some are more depicted than others. Therefore, identifying private signs is necessary for comparison. If such marks do not remain on the surface of the bullet, it will be unusable for identification. This is because the identification process should be based on a comparison of general and individual marks.

The rationale of some authors that smoothbore firearm can be identified by shot, pellet, and container is based on only small theoretical considerations. Every theoretical research and reasoning exists in order for it to find application in practice, otherwise it has no theoretical value either. Despite numerous experiments and researches carried out in the laboratory, no experimental shots and pellets were obtained from the smoothbore weapon.

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As a result, the expert unequivocally concluded that they had been fired from the same weapon.

Aside from the barrel of a smoothbore weapon, it is often difficult to even compare bullets fired in a rifling barrel for a variety of reasons. When an expert has both bullets and firearms from the crime scene, it is possible in this case to obtain experimental bullets from cartridges of the same manufacturer that were used at the crime scene. Notwithstanding, it is much more difficult when the bullets of different manufacturers are presented from the crime scene and the weapon is not presented. This makes it impossible to obtain test bullets. In such cases, it is very difficult to compare objects with each other and to some extent, it depends on the experience of an expert.

It is widely believed in scientific literature that details of weapon, including the inner surface of the barrel, are made of relatively durable materials and retain their individuality for a long time. At the same time, everyone points out that details of weapon are changeable, just like all objects in the material world. Variability details is determined not only by exploitation but also by storage conditions. Complications of the identification process, in addition to the long exploitation of the weapon and the variety of lead metal, can be caused by the shape and size of the bullet, including additional marks on the bullet, which are generated before and after the shot.

In addition, comparison is a very difficult process. Therefore, common features that reflect the structural arrangement of the barrel channel must first be combined by common marks that reflect the degree of wear of the barrel channel. Also, appropriate (compatible) marks must be established on test and experimental bullets. Thereafter, private (individual) signs must be compared according to the micro-relief in the lands and on the surface. After this process, the expert can then establish a specific decision and formulate a conclusion about coincidence, non-coincidence or inability to resolve the issue. It is probably clear to everyone that it is impossible to conduct research of this scale on objects (shots, pellets, plastic container) that do not have sufficient identification marks. A reasonable conclusion used in court as evidence should be based on a combination of durable individual barrel channel marks with other bullets or a combination of durable individual barrel marks of the experimental weapon.

As previously stated, the expert's categorical opinion in some cases is used as direct evidence in court. Accordingly, the court is less interested in the probable conclusions, since the court must pass judgment on the basis of the conclusion and the combination of other evidence.

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

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