Possibility to Identify Projectiles and Other Components of the Cartridges by Consideration on Barrels and Projectiles Types

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Abstract

There are basically three types of barrels - polygonal rifling, traditional (conventional) rifling, and smooth bore, accordingly, the internal shape of the barrels is different. Therefore, the projectiles passed in these barrels have different marks of form, some more depicted, some less so. Identifying private signs is necessary for comparison. If such marks do not remain on the surface of the bullet, then it will be unusable for identification, because, the identification process should be based on a comparison of general and individual marks. This issue has been explored and reflected in the article, in which case it is possible to conduct identification research on bullets. The article also analyzes what 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 containers) that do not have sufficient identification marks. Reasoned conclusion, which should be used in court as evidence, should be based on a combination of

durable individual barrel channel marks with other bullets, or with a combination of durable individual barrel marks of the experimental weapon.

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

Introduction

In the process of investigating crimes, various pieces of evidence are always investigated and identified, if possible, as the latter is one of the main sources of information for the investigation. This is especially true of bullets removed from the scene, or removed from the body, how to the extent that it is possible to investigate and identify individual studies on it. In the event, besides a bullet, that a firearm is presented for examination, or experimental bullets previously obtained from this firearm are stored in the appropriate service, it is possible to compare with each other bullets removed from the crime scene, 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, who participates investigation of crimes, committed using firearms and its important properly selected research objects.

Numerous papers have been devoted to the study of objects fired from firearms, but many of them have remained only theoretical research 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, in what cases and on what objects it is possible to conduct specific identification studies, the results of which, based on their credibility and high-level examination, can be used by the court, as evidence in a criminal case.

Recently, firearms and ammunition have evolved. In civilian use are 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 determined, first of all, by the increased number of crimes, where firearms are used, and naturally, 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 and signal pistols, and handmade firing devices.

The aim of the research is to classify the barrels of firearms, also, as well as the components of different types of projectiles and cartridges fired

from the barrel. Analysis of that issue, of which type of barrel and of which 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, knowledge of specifically which objects are subject to identification, what are their individual private marks, according to which they are identified with other objects, how credible are the results of the identification, since the results of the comparison, in a particular case, may be considered as direct evidence in court and form the basis of the judgment.

Used equipment and material means:

Automated Ballistic Comparison System "Balscan", experimental bullets, obtained from the same firearm at different times, remade firearm and handmade ammunition, ammunition, made of various metals and damaged bullets, collected from the crime scene.

Polygonal rifling, traditional (conventional) rifling, and smooth bore barrels

In order to talk about 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 formation of the mark on the projectile is done by the inner form of the barrel, consequently, both the inner surface of the barrel and the shape and size of the projectile is important.

Shotguns are generally smooth-bored, although 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 there to impart a spin to the bullet through its longitudinal axis. This gyroscopic effect stabilizes the bullet during its flight, preventing it from tumbling end over end and losing its accuracy. Identification of the type of rifle used in a barrel, and knowledge of how it is produced, can be highly significant for the investigation of a case and an 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, it does not have lands and grooves, and the projectiles do not undergo obturation when they enter the barrel channel, consequently, it is difficult to identify them by individual identification marks, it is almost impossible.

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 not touched by the rifling cutter and are, therefore, left standing

proud. Some writers assign the invention of spirally 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 Emperor Maximilian I and made between 1450 and 1500 have spirally grooved barrels and are, in fact, the earliest identifiable rifled weapons. Both straight and spiral forms of rifling are encountered in early weapons, although 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, with square, round, triangular, ratchet, or even comma-shaped grooves. The actual number of rifling grooves appears to have little influence on the stabilizing 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).

As we can see, there are basically three types of barrels - polygonal rifling, traditional (conventional) rifling and smooth bore, accordingly, the internal shape of the barrels is different. Therefore, the projectiles passed in these barrels have different marks of form, some more depicted, some less so. Identifying private signs is necessary for comparison. If such marks do not remain on the surface of the bullet, then it will be unusable for identification, because, the identification process should be based on a comparison of general and individual marks. In the case of bullets, the first step is in determining the compatibility of a combination of durable individual barrel channel marks with other bullets, or with a combination of durable individual barrel marks of the experimental weapon. Professor Kyle rightly points out, that identification of only the chemical composition and caliber of lead, is inadmissible (Kiely, 2006) (Kiely, 2001).

Richard Safferstein rightly points out 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, however, the class characteristics of the weapon's barrel will remain consistent; each will have the same number of lands and grooves, with the same approximate width and direction of the 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; 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, many running 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, or they are 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 and changes shape, therefore, the studies left on the firearms by these parts of the machine are microscopically different, so all the details, despite their similarity, have individuality, which in some cases, it can be seen with the naked eye (Burrard, 1962).

Freeman (1978) obtained three consecutively manufactured 9mm caliber Heckler and Koch polygonally rifled firearm barrels. Freeman was able to correctly distinguish the questioned bullets from the consecutively manufactured Heckler and Koch polygonally rifled firearm barrels demonstrating that consecutively manufactured gun barrels differ from each other, producing different signatures. The key limitation reported by Freeman was that one of the Heckler and Koch polygonally 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 a lead that is influenced by the shape of the inner surface of the barrel. Along with the shape of the inner surface of the barrel, the shape, type, and size of the projectiles are also important.

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. The base of the cartridge case is commonly termed the head, although the term base would seem to be the more appropriate. 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 which are loaded with shot or buckshot instead of a single bullet, and shotgun cartridges can be obtained 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 a special purpose, which, according to the Council of Europe directive, is prohibited in civil circulation. Such is ammunition with penetrating, explosive or incendiary projectiles, and the projectiles for such ammunition (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, as the identification marks on the jacket are better reflected non-jacketed bullets have a lead core, which is a relatively soft metal, with 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 used for identification, but, one land must be undamaged. As for the core, it is unsuitable for identification, as 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 the 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. It, therefore, follows that projectiles passing through a shotgun barrel is 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 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 the 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.

As we will see below, 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. Because these inner surface striations are so important for bullet comparison, it is important 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, but by that time the technology was not yet sophisticated to identify bullets (Sedlacek, 2012). But, as Brian Hardy points out, it will never be known, when the gun was first identified and when it was first noticed that the bullets fired from the gun had a certain number of equally spaced fields, 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 in themselves impart 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 instead on a true and accurate course (Saferstein, 2020).

When firing from a firearm, traces, of land on the inner surface of the barrel, remain on the lead part of the bullet. These studies contain information on the number and height and width of the fields (Bertovsky,

2018, trans.). The author here focuses 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, a number of fields, direction, and private (individual) marks including micro-relief in lands and grooves (Saferstein, 2018).

Therefore, the forensic examination is the first step in determining the compatibility of a combination of durable individual barrel channel marks with other bullets, or with a 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. As Yuri Orlov points out when it is impossible to study the properties of material evidence directly, in this case, 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 (Orlov, 2016, trans.). It should also be noted, that in such cases, it is advisable to use bullets of the same manufacturer and material, as removed from the scene (Warlow, 2012). This will facilitate further research for the expert.

As we have seen, 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, the average width of fields, depth of surveys; The angle of inclination of the fields; Location and expression of primary studies arising from the barrel; location. Private marks can be thought of as micro-relief in the lead fields and on the entire surface, expressed in the form of fine scratches and grooves. And here we really have to agree with Robert Thompson, since the successful completion of this time-consuming task really depends on the knowledge and experience of an expert (Thompson, 2010), but this should not be taken to mean that the expert is an omniscient and omnipotent person. I can not agree with the authors who 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. also, some authors consider being a reality, noting that the expert may be asked the question: What time has passed since the last shot (Seleznev & Sysoyev, 2012, trans.)?

In the book „Criminalistics of Socialist Countries“, edited by Professor Koldin (1986), we read: „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 Criminalistics, 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 talk about the possibility of identifying pellets and shots in the books „Criinalistics“ published in Moscow in 2005 and 2018. According to the authors, regarding identification issues, the investigator can ask the expert a question: Whether a slug, a shot, a pellet was fired from a this or that weapon (Criminalistics, 2018, trans.) (Balashov et al., 2005, trans.).

Back in 1972, the American Journal of Criminal Law and Criminology published an article entitled "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, according to which it is possible to identify them, but, the authors also point out that the probability of repeating the same scratches is very small, this requires that the entire surface of the projectile touch the entire inner surface of the barrel, at which point 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 article of G. Bakradze and V. Golenev. The authors conclude that objects fired from smoothbore weapons can be identified, although experimental studies are still needed (Bakhtadze & Golenev, 2019).

Leaving aside the practice, even in theory it is highly doubtful to identify smooth bore weapons by containers. A container is a warehouse made of plastic material in which a shot, pellets, or slugs is placed at the time of firing. At the moment of firing, high pressure is generated in the barrel, compaction of projectiles placed in the container, creating obturation and increasing friction between the barrel channel walls and the container, which, together with the temperature generated by the combustion of the gunpowder, causes the walls of the plastic container to soften. The micro-relief formed on the walls of the container after the shot loses its high temperature, it cools down, 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.

Reasoning of the authors who point out that smooth-bore firearms 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 for conducting experiments and obtaining 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 and an identification study based on them will yield results. We are not talking about shots and pellets, removed from the crime scene, moreover, they are mainly made of soft metal and change their shape and fragmentation upon contact with the objects. Despite numerous experiments and research carried out in the laboratory, no experimental shots and pellets were obtained from the smoothbore weapon, in comparison with which the expert unequivocally concluded that they had been fired from the same weapon.

Unlike shots and pellets, it is possible to use only a 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 and 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 has any defects since the smooth surface of the barrel has no lands and grooves.

Not only from the barrel of a smoothbore weapon, but it is also often difficult to even compare bullets fired in a rifling barrel for a variety of reasons. When an expert presented from the scene both bullets and firearms, in this case, it is possible to obtain experimental bullets from cartridges of the same manufacturer that were used at the crime scene, even, cartridges from different manufacturers were used at the scene. It is much more difficult when the bullets of different manufacturers are presented from the crime scene, the weapon is not presented and therefore it is 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 the scientific literature that details of weapons, including the inner surface of the barrel, are made of relatively durable materials and retain their individuality for a long time, but at the same time everyone points out that, like all objects in the material world, details of weapon are changeable. 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 additional marks on the bullet, generated before and after the shot and the shape and size of the bullet. The ballistic scanner „Balscan“ was used during the research.

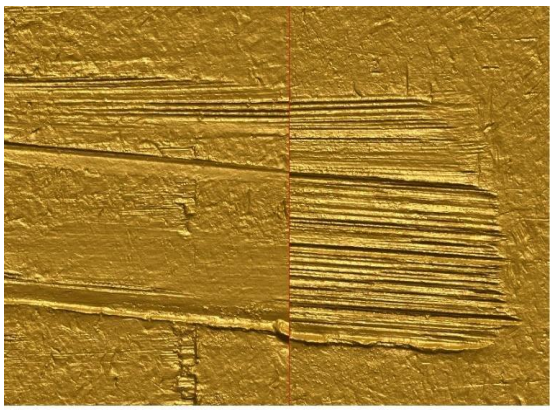
Long exploitation

In identifying, the expert compares most of the marks on the bullet and identifies similarities and differences. Only in the case of the similarity of the majority of marks is it 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. As mentioned above, compared to the inner

surface of the barrel, the jacket of the bullet is made of soft metal, which ensures the durability of the marks formed on the surface of the bullet for a long time, but, 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, new marks are emerging on it or existing marks are disappearing. (Photo N1)

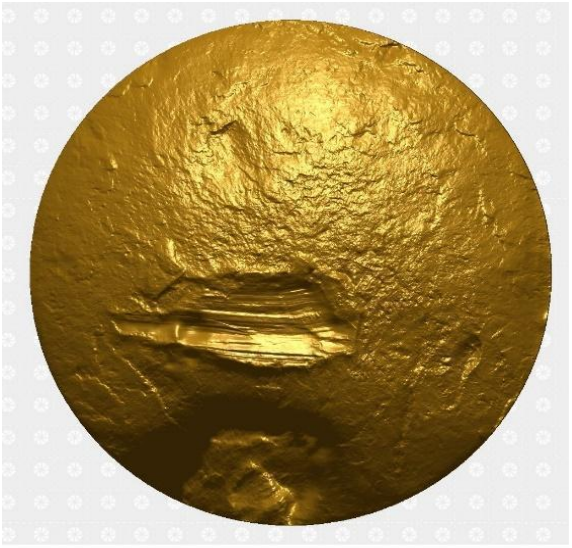
The shape and size of the projectile

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, after that, it is possible to fire a projectile from this type of weapon, which is loaded in an handmade manner in a cartridge case of nominal caliber. The inner channel of the barrel of such a weapon is smooth. When firing such cartridges, the closer the diameter of the projectile is to the diameter of the barrel channel, the better the detection of private marks will be. In this case, it would be ideal if the inner surface of the barrel has 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 for smoothbore weapons, 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.



Nagant. Test bullet. 2001 Nagant. Test bullet. 2020

Photo N1



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

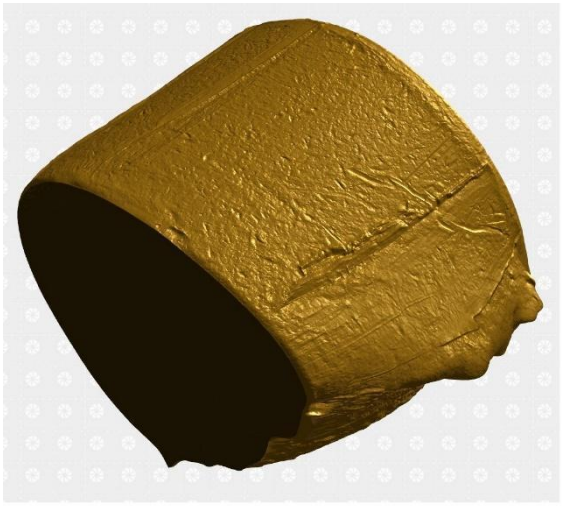
Photo N2

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 produce jacket of bullets using different technologies and metals. (Photo N3) Of course, traces of relatively soft metal are easily imprinted and contain more information for identification. When an expert from the crime scene presents both bullets and firearms, in this case, it is possible to obtain test bullets from cartridges of the same manufacturer that were used at the crime scene. It is much more difficult when the bullets of different manufacturers are presented from the crime scene, the weapon is not presented and therefore it is impossible to obtain test bullets, or test bullets were obtained earlier from the weapon, and at the time of identification, the expert is no longer able to obtain test bullets from the weapon.

Additional marks on the bullets

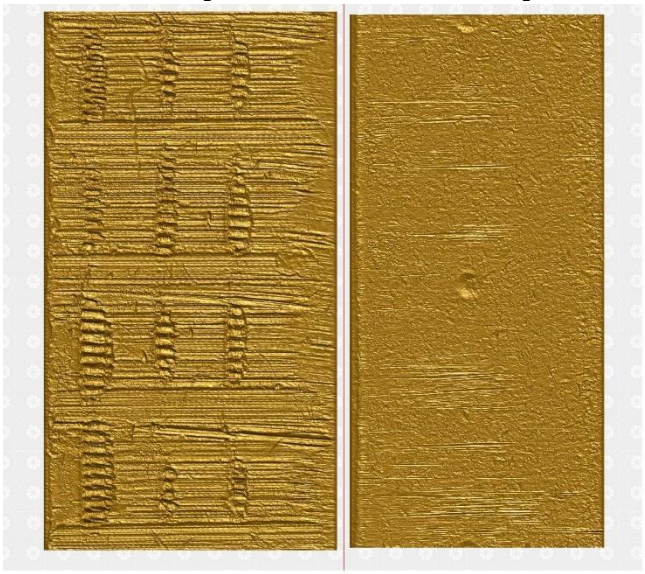
When identifying bullets, consider, that many traces may be reflected on them, which can be reflected both before and after the shot (Mechanical damages resulting from contact with a solid object in the form of scratches, including, possibly intentional) and they did not belong to the weapon in which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



Bullet, damaged after the shot.
Photo N4

There are frequent cases when a cartridge made many years ago (Including decades ago) is used at the crime scene and this cartridge has been changed 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, on the bullet is also reflected marks from the inner surface of the cartridge cases, when there is a separation of cartridge cases and bullet. These additional studies complicate the identification process.



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

Conclusion

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

The reasoning of the authors who point out that smooth-bore firearms can be identified by shot, pellet, and the 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 research carried out in the laboratory, no experimental shots and pellets were obtained from the

smoothbore weapon, in comparison with which the expert unequivocally concluded that they had been fired from the same weapon.

Not only 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 presented from the scene both bullets and firearms, in this case, it is possible to obtain experimental bullets from cartridges of the same manufacturer that were used at the crime scene, even, cartridges from different manufacturers were used at the scene. It is much more difficult when the bullets of different manufacturers are presented from the crime scene, the weapon is not presented and therefore it is 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 the scientific li terature that details of weapons, including the inner surface of the barrel, are made of relatively durable materials and retain their individuality for a long time, but at the same time everyone points out that, like all objects in the material world, details of weapon are changeable. 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 additional marks on the bullet, generated before and after the shot and the shape and size of the bullet.

We must not forget that comparison is a very difficult process. Common features that reflect the structural arrangement of the barrel channel must first be combined; Combining common marks that reflect the degree of wear of the barrel channel; Establishing appropriate (compatible) marks on test and experimental bullets; Then begins the difficult process of comparing private (individual) signs according to the micro-relief in the lands and on the surface. Only after going through this difficult process does the expert go to 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 containers) that do not have sufficient identification marks. Reasoned conclusion, which should be used in court as evidence, should be based of a combination of durable individual barrel channel marks with other bullets, or with a combination of durable individual barrel marks of the experimental weapon.

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