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Thank you very much for your support and kind cooperation! - Audri K. Kowalyk B. Ed.

Reading: 'Groovy' Gun Barrels

In any criminal case where a firearm has been used, there are many clues that are left behind, which can include a piece of the bullet (fragment), a casing, the weapon itself, bullet holes, or gunpowder residue. All of these clues can be used to match a suspect weapon with the scene of a crime. Bullets, casings, and bullet fragments left at a crime scene or within a victim all may have markings that were imprinted by passing through the gun they came from. Even though each barrel may be made the same way, differences in the metal composition and wear will result in <u>unique patterns</u> on a bullet and the casing that passes through the barrel.

Every barrel of every gun has different lands and grooves. The "lands" are the raised parts inside the barrel, and the "grooves" are the recessed portion; known as 'rifling' these are cut into the bore of a barrel of a firearm during production to increase the accuracy of that firearm. These lands and grooves force the bullet to rotate as it travels along it. When the gun is discharged, these grooves cause the bullet to spin as it travels the length of the barrel and thus stabilize the bullet during flight. At the same time, the expansion of the fired cartridge and the high pressures propelling the bullet through the bore of the barrel press and scrape the bullet against the rifling as it heads toward the muzzle. The fired bullet, as a result, will bear the negative impressions of the grooves in a rifled barrel; firearms examiners describe these marks as land and groove impressions. The number of lands and grooves, their size and shape, assist in determining the make and the type of weapon that was used.



Lands and grooves inside a gun barrel

When each barrel is produced, there are differences that are undetectable to the human eye but which appear under a microscope. The marks left on the casing and/or bullet are caused by the lands and grooves within a barrel, as well as finer scratches that have resulted from use or production. No two barrels will leave the exact same markings on a bullet (like a fingerprint). The Forensic Ballistics Expert may take the weapon in question and fire it into water and retrieve the test bullet. The test bullet is then compared to the fragment using a comparison microscope. If it is a match, a photograph may be taken for use as evidence in court.

Microscopic striations found on the surface of fired bullets are routinely used as a means to associate a bullet with a suspect weapon. This is possible because microscopic imperfections and the lands and grooves found in the gun's barrel create the striations found on the surface of bullets fired from the gun. Because these imperfections are randomly generated (during manufacture or due to wear), they are unique to each gun barrel. It is this uniqueness that enables the identification of bullets as having originated from a particular gun.

In addition to the gun barrel marks produced upon a bullet, a number of other impressions found on cartridge cases are crucial to firearms identification. Firing pin impressions, extractor marks, ejector marks, and chamber marks, when present and of sufficient in quality, are all features used by firearms examiners in their analysis. During the discharge of a firearm, the firing pin strikes the primer of a cartridge, creating microscopic contact marks and unique indentations.

Extractor and ejector marks are produced when the cartridge case is mechanically extracted from the chamber and ejected and are visible as fine striations and gouged impressions on the rim and head of the case. Chamber marks, parallel striations on the cartridge case caused by contact with the walls of the chamber of the firearm, also occur at this time. During discharge, these imperfections are transferred from the metal parts of the firearm to the bullet and cartridge case.

Casings contain information about the type of ammunition, stamped onto the base of the cartridge. But there is more information hidden on the casing. Parts of the firearm that come in contact with the casing may leave markings. Just like the marks left behind from the lands and grooves, these are unique and can be compared to the suspect weapon.

Worksheet: 'Groovy' Gun Barrels

Name: _____ Date: _____

- 1. Describe the nature of lands and grooves found in a gun.
- 2. State where the lands and grooves are found in a gun and list another name for them.
- 3. What is the purpose of lands and grooves?
- 4. Explain how land and groove impressions are created on a bullet/casing.
- 5. If two identical cartridges are fired from two identical models of a gun, will the land and groove impressions be the same on each bullet/casing? Why or why not?
- 6. If impressions on the surface of a bullet or casing are not visible to the naked eye, what else can be done?
- 7. What other types of markings can be found on bullets and casings?
- 8. What is the cause of a firing pin impression?
- 9. Describe what extractor and ejector marks look like on a casing.
- 10. What is stamped onto the base of all bullet casings?

KEY - Worksheet: 'Groovy' Gun Barrels

- 1. Describe what the lands and grooves in a gun.
- The "lands" are the raised parts inside the barrel, and the "grooves" are the recessed portion.
- 2. State where the lands and grooves are found in a gun & outline another name for these.
- Every barrel of every gun has different lands and grooves.
- Also known as 'rifling'
- 3. What is the purpose of the lands and grooves in a gun?
 - These lands and grooves cause the bullet to rotate as it travels along the barrel before leaving the gun.
- 4. Explain how land and groove impressions are created on a bullet/casing?

- When the gun is discharged, these grooves cause the bullet to spin as it travels the length of the barrel and thus stabilize the bullet during flight. At the same time, the expansion of the fired cartridge and the high pressures propelling the bullet through the bore of the barrel press and scrape the bullet against the rifling as it heads toward the muzzle. The fired bullet, as a result, will bear the negative impressions of the grooves in a rifled barrel

5. If two identical cartridges are fired from two identical guns – will the land and groove impressions be the same on each bullet/casing? Why or why not?

- No, because these imperfections are randomly generated (during manufacture or due to wear), they are unique to each gun barrel. It is this uniqueness that enables the identification of bullets as having originated from a particular gun.

- 6. If no impressions can be found with the human eye on the surface of a bullet or casing what can be done?
- A microscope can be used.
- 7. What other types of markings can be found on bullets and casings?
- Firing pin impressions, extractor marks, ejector marks, and chamber marks
- 8. What is the cause of a firing pin impression?

- During the discharge of a firearm, the firing pin strikes the primer of a cartridge, creating microscopic contact marks and unique indentations.

- 9. Describe what extractor and ejector marks look like on a casing.
- Extractor and ejector marks are produced when the cartridge case is mechanically extracted from the chamber and ejected and
 are visible as fine striations and gouged impressions on the rim and head of the case.
- 10. What is stamped onto the base of all bullet cartridges?

- Casings contain information about the type of ammunition, stamped onto the base of the cartridge. But there is more information hidden on the casing.