13050 Comparison of Bullets

Background:
Forensic casework involving firearms and ballistics usually involves modern handguns, shotguns and rifles. Handguns include revolvers and semi-automatic pistols. Modern firearms are designed to accept cartridges of a specified caliber. A cartridge basically contains a powder charge, a projectile and has some kind of primer cap that is struck by a firing pin and a case to hold all of the components. When the primer cap is struck there is a small explosion which detonates a powder charge inside the cartridge. That detonation instantaneously releases a tremendous volume of gas which creates what is termed a "forcing cone." The forcing cone drives the projectile down the barrel and out the end of the barrel.

Modern pistols, revolvers and rifles have a "rifled" barrel, which means the barrel is designed to impart a twist to the projectile as it travels down the barrel. This twist is analogous to the twist given to a football when it is thrown in a spiral pass. The twist allows the projectile to travel further in a straight line.

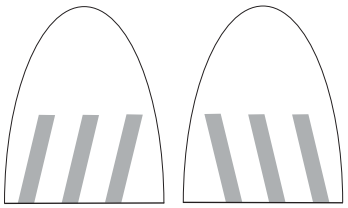

Figure 1

When a bullet travels down a rifled barrel there are features carved into its exterior by the inside of the barrel. First there are the lands (raised areas on the bullet caused by indentations in the barrel) and the grooves (cut out areas caused by raised areas inside the barrel) (Figure 2). Next, because of the rifling, there will be evidence of either a left or right twist imprinted on the bullet (Figure 1). The amount of twist and whether it is left or right, are all manufacturer characteristics. The number and width of the lands and grooves as well as the ratio of the width of the land to the width of the groove are also indicative of the manufacturer of the firearm. These features are consistent in guns of the same make and model, enabling a firearms examiner to determine which make and model of a firearm fired a questioned a spent bullet. As a gun is fired repeatedly, the barrel undergoes very tiny changes. The amount and type of change depends on what ammunition was fired and how frequently the gun was discharged. These changes produce a non-reproducible pattern of tiny changes to the appearance of the lands and grooves which end up appearing as markings on the spent bullet. These are tiny changes which don't affect the manufacturer's characteristics. They don't change the gross characteristics, only the fine details. It is these added fine details that allow the questioned spent bullet to be compared scientifically to the spent bullet from a reference gun. If there are enough individualizing characteristics present on both bullets, a firearms examiner may be able to declare that the same gun fired both.

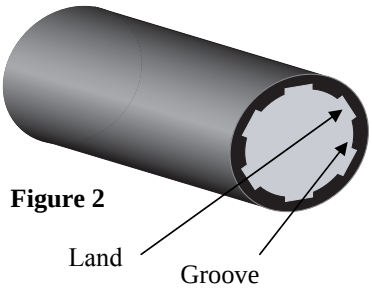

Figure 2

Objective:
Conduct comparisons of known and questioned bullets using a large manipulative.

Procedure:
1. Pick up the Bullet model marked "0" (Figure 3).
2. In Data Table 1, record the name of the sample, the twist imparted by the gun that fired it, and the relationship between the widths of the lands and grooves (equal widths, lands wider than grooves, grooves wider than lands).
3. Pick up the section of the bullet model marked "1".
4. In Data Table 1, record the name of the sample, the twist imparted during firing, and the relationship between the widths of the lands and grooves (as above).
5. If the twist and relationship between the lands and grooves match "0" then align the protruding magnet of the "1" section with the bottom of the "0" section.
6. Slowly rotate "1" until the lands and grooves are EXACTLY aligned. If you find an alignment, check to see if all other corresponding pairs of lands and pairs of grooves also exactly align. If you find such an alignment, check to see if the striations or markings that you observe form an uninterrupted path between "1" and "0" for all corresponding pairs of lands and pairs of grooves.
7. If you find an alignment where all of the lands and grooves are exactly the right corresponding widths and where you see uninterrupted paths of striations lines between "1" and "0", you would declare "Match." If you don't find any rotation that both aligns the lands and grooves and also forms uninterrupted striations, then you would declare "No Match." Record which attributes did not match in the comments column.
8. Record your conclusion in the corresponding place in Data Table 1.
9. REMOVE the "1" section and replace it with the "2" section.
10. Repeat Steps 4-8 for "2."

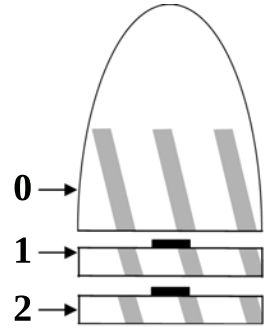

Figure 3