

# Tool Mark Impressions

Forensic Science

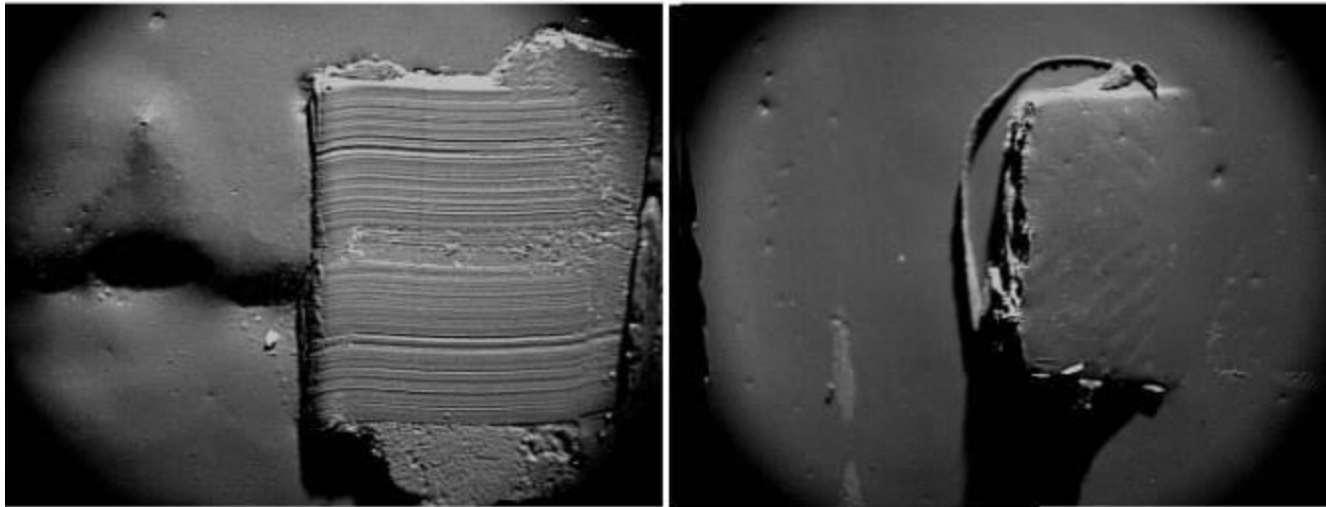
# Definition

- **Any impression, cut, gouge, or abrasion caused by a tool coming into contact with another object.**
  - *Criminalistics: An Introduction of Forensic Science (9th edition)*
- “When an intrusion occurs, a variety of tools are used to exert a rather large amount of force (exploit, brute force, other means of gaining access) in attempt to gain access to the victim. We commonly recover these tools on investigation, but in order to reconstruct the incident we need to be able to determine how they were used during the attack, their purpose, and that the attacker did in fact use them. This is where tool marks come in to play.”
  - <http://forensicir.blogspot.com/2007/12/tool-mark-evidence.html>

An important feature of tools used in identification are serial numbers. A serial number is a unique number assigned to an object for: identification purposes.

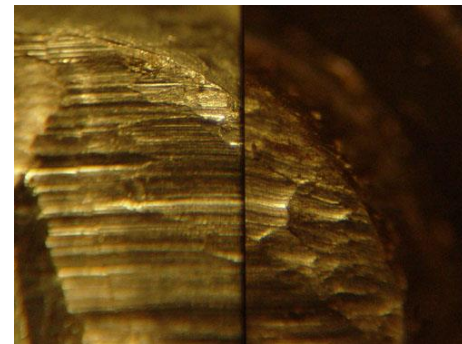
# Tool Mark Evidence

- Certain **defects** or **patterns** may be left on a tool when it is made or used, which can be used to find matches between evidence at a crime scene and tools or objects found at a suspect's home.



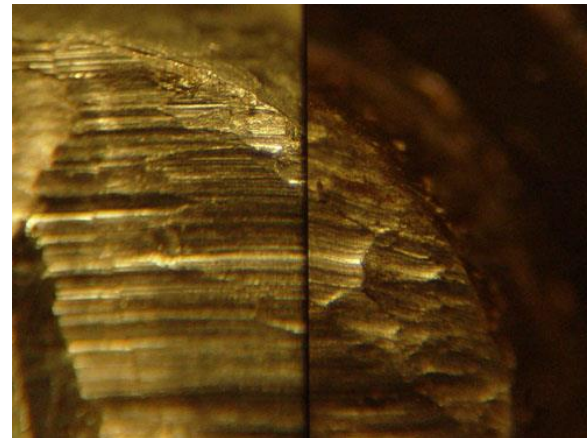
# Class and Individual Characteristics

- Class: Characteristics that belong to a the general range of items
  - Type of impression
  - General Shape
  - General Dimensions
  - Do not permit identification of exact tool used
- Individual: The striations and small particularities exhibited by the tool that are individual to one unique tool
  - Consist of small (commonly microscopic) indentations, ridges, and irregularities present on the tool



# Tool marks can be classified two ways:

1. **Impressions** – As a tool hits a softer surface, the shape of the tool and imperfections in its surface may be left behind as an impression.
    1. Sometimes called molded impressions
  2. **Scratches** – As a tool moves across a surface, it may leave ridges or striations behind.
    1. Sometimes called slipped impressions
- NOTE: Some tool marks are a combination of both types.



# Categories of Tool Mark Evidence

## 1. Striated :

- Two objects scrape against each other and the tool leaves a mark on the opposing object or vice versa.
  - This is typically seen as lines from the marks (i.e. pliers)
  - The harder object will leave the mark on the softer object.

## 2. Crush or cut marks:

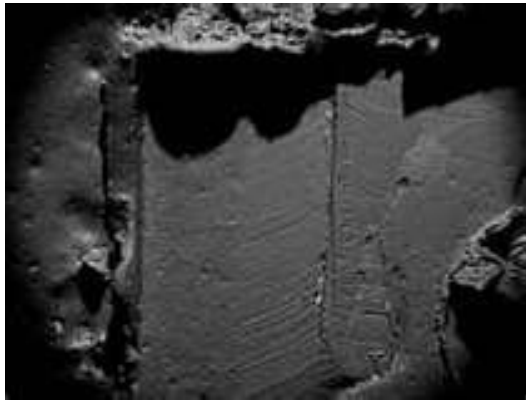
- When a tool exerts force on both sides of the object and crushes or cuts it. (i.e. bolt cutters)

## 3. Multi stroke:

- A tool used in a repetitive movement will leave multiple stroke marks. (i.e. saw)

# Features to analyze:

- **Dimensions** of the impression
- Ridges or striation **patterns**
- **Defects**, such as nicks and chips
- **Paint** chips or **metal** shards left on a tool



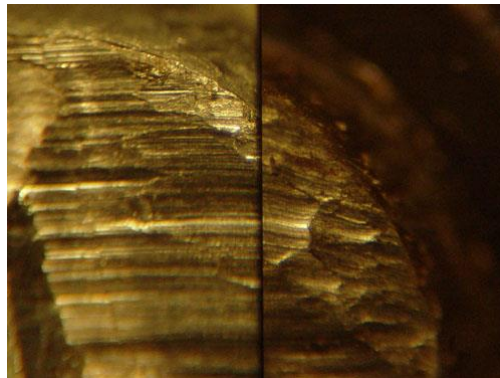
# Examination of Tool Marks

1. Toolmark is observed, measured, and described.
2. A photograph perpendicular to the toolmark is taken using oblique lighting.
  - provides a permanent record of the class and some individual characteristics of the toolmark.
3. If the support onto which the toolmark is located cannot be collected as evidence, a cast of the toolmark is made.



# Examination of Tool Marks

4. Comparison process starts.
  1. The tool is observed and photographed.
  2. Comparison tool-marks are made with the tool on a soft material so that extra marks are not created on the tool.
  3. A comparison microscope is used to perform the comparison process.
    1. The incriminated toolmark is placed on the left side of the microscope and the comparison mark on the right side. If a match exists between the individual characteristics, the common origin between the incriminated toolmark and the tool is established.





2



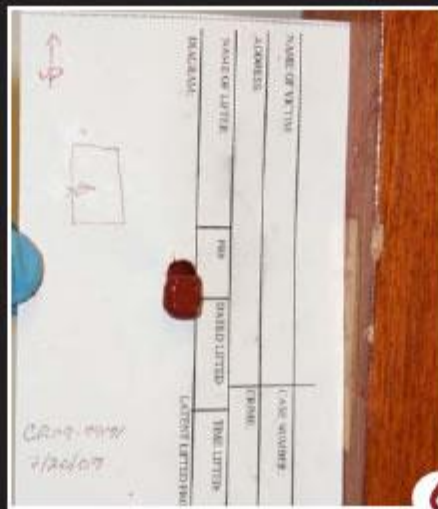
3



4



5



6



7

**Figure 2:** Photograph of the tool mark with scale. **Figure 3:** Misting the outlined tool mark area with silicone emulsion spray. **Figure 4:** Injecting polyvinylsiloxane into the tool mark. **Figure 5:** Fingerprint card placed over the impression material and adhered to the orthodontic wax. **Figure 6:** Labeled fingerprint card. **Figure 7:** Final impression.