CHAPTER 16
TOOL MARKS
INTRODUCTION

- **Tool mark**—any impression, abrasion, or cut made when contact occurs between a tool and an object
  - An example of physical evidence
  - Even mass-produced tools have minor differences
  - The impressions **can link** the tool to a crime **scene** and potentially to the owner
TOOLS AND CRIME SCENES

Tools:
- increase our ability to handle manual tasks, but can also be used in crimes
- How can a tool used in a crime lead investigators to the criminal?
- Why is ownership of a tool used in a crime circumstantial evidence?
TOOL MARK IMPRESSIONS

Indentation Marks

• Result when a tool is pressed against a softer surface
• Tools usually leave distinctive marks
• The hardness of a tool influences the resulting marks left in the softer object
• May indicate the size of the tool used in a crime
TOOL MARK IMPRESSIONS

Abrasion Marks

• An object’s surface can be *ground or worn* away by a tool
• The *harder* object causes abrasions on the *softer* surface
• Indentation and abrasion marks sometimes occur at the same time

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TOOL MARK IMPRESSIONS

Cutting Marks

- Edged instruments can penetrate a softer object and separate it into parts
- **Cut marks** are produced along the edge as a surface is cut
### Tool Mark Impressions

#### Examples of Cut Marks on Bones

<table>
<thead>
<tr>
<th>Saw</th>
<th>Characteristics</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stryker</td>
<td>Circular areas of short radius; some overlapping marks</td>
<td>Few teeth marks</td>
</tr>
<tr>
<td>Band saw</td>
<td>Very smooth cut</td>
<td>Few teeth marks; straight fine cut; seldom overlapping marks</td>
</tr>
<tr>
<td>Hack saw</td>
<td>Overlapping marks</td>
<td>Tiny tic-tac-toe board look with thousands of squares</td>
</tr>
<tr>
<td>Chainsaw</td>
<td>Blade goes directly through bone; messy cut</td>
<td>Roughened edge</td>
</tr>
<tr>
<td>Table saw</td>
<td>Parallel, curved striations</td>
<td>Ridge grooves</td>
</tr>
</tbody>
</table>
TOOL MARK EXAMINATION

- Some experts specialize in tool mark investigations
- Evidence can include:
  - tool marks at the scene
  - the tool if left behind
DOCUMENTING THE EVIDENCE

- **Collect** tool mark evidence when possible
- **Photograph** the evidence with a measuring device to show **scale**
- Measure the **size** of the **impression**
DOCUMENTING THE EVIDENCE

• **Castings** preserve tool mark impressions
  - silicone or rubber-based casting materials
• Cast impressions retain the *unique* **indentation** marks made by a specific tool
DOCUMENTING THE EVIDENCE

• Take pictures and dust for fingerprints before applying casting material
  • Use magnetic dusting powder and silicone material
• The size of the impression should be measured and recorded.
COLLECTING AND PRESERVING A SAMPLE

• Correctly label evidence
• Wrap small objects with clean paper and place them in small containers or plastic bags
• Pack large objects in cartons or boxes
• Record—who, where, when, and why
• Maintain the chain of custody
ANALYZING TOOL MARK EVIDENCE

- Laboratory tool mark analysis identifies:
  - major **characteristics** defining the type of tool used in a crime
  - unique **characteristics** that might distinguish between the same kinds of tools
- Forensic comparison microscopes examine tool mark characteristics that match a suspect tool
Courts now require more than visual pattern comparisons

- **Tool mark databases** (with images acquired by forensic comparison microscopes)
- Algorithms to statistically analyze tool mark patterns
- Scanning tools measure the depth or height of tool marks and make a **contour map**.
- Same techniques used for ballistics/firearms examinations
TOOL MARK EVIDENCE
IN THE COURTROOM

• The tool mark witness prepares a written report to present to a jury.
• When available, provide:
  • Original evidence
  • Castings
  • Magnified images of tool mark comparisons
• Such evidence may link a series of crimes