

## USE OF A BREECHFACE TOOLMARK TO IDENTIFY FIRED CARTRIDGE CASES TO A S&W SIGMA SW40V

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**KEY WORDS:** Smith & Wesson SW40V, breechface toolmark, striated shear marks

### ABSTRACT

A Smith & Wesson Sigma SW40V in an inoperable condition was submitted for examination along with fired cartridge cases and bullets. Identification of evidence cartridge cases was made by using a toolmark of the breechface, duplicating the striated shear marks found on ejected cartridge cases.

### EVIDENCE

In a recent case, our laboratory received a request to compare a badly damaged S&W Sigma 40 caliber pistol to fired cartridge cases and bullets. In an attempt to destroy the evidence, the subject had drilled out the interior of the barrel, cut 1.25" off the barrel and frame, removed the serial number plate, cut through the trigger guard and frame, and cut off the grip just below the magazine release button. The cut end of the barrel and frame and the serial number plate were not submitted. (photo 1)

Marks on the rear of the slide indicate that the pistol was held in a vise with the slide locked to the rear while the barrel and frame were cut off just in front of the slide. Cutting through the frame at this location also served to remove the metal serial number plate.

### EXAMINATION

The burrs on the cut end of the barrel effectively prevented the slide from closing, thus eliminating the usual method of obtaining tests for comparison. A Mikrosil cast of the barrel showed deep concentric cuts, and in combination with the burrs at the cut end, precluded identifying the evidence bullets to the barrel. To obtain class characteristics from the barrel, a .41 caliber lead bullet was driven into the rifling to take on land and

groove impressions. Microscopic comparison to the evidence bullets confirmed matching land and groove measurements.

Within the time constraints of the trial date, I was unable to locate another SW40V, so that test fired cartridge cases could be obtained with the evidence slide mounted on an undamaged frame and barrel. After removing the slide from the pistol, a test toolmark was made of the breechface and firing pin to compare with the submitted cartridge cases. A piece of 1/4" lead wire was hammered flat and then polished smooth with 400 grit paper. The lead was placed on the breechface and held in place with firm downward pressure. With the firing pin safety deactivated, the firing pin was pulled to its most rearward position and then released, allowing it to strike the lead. Still maintaining downward pressure, the lead was pulled out of the breechface to produce the striated shear marks found on fired cartridge cases. (photo 2)

Microscopic examination of the lead test toolmark revealed striated markings on either side of the firing pin impression, as well as granular, 3-D marks inside the firing pin impression. Comparison of individual characteristics with the evidence cartridge cases easily established that they had been fired in the submitted Sigma pistol. (photo 3)

*(Continued on page 132)*

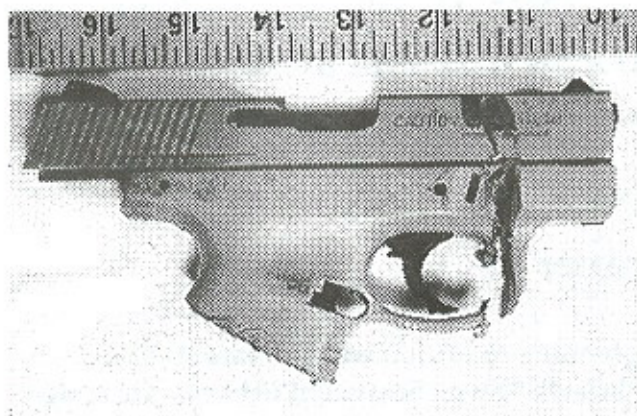


Photo 1

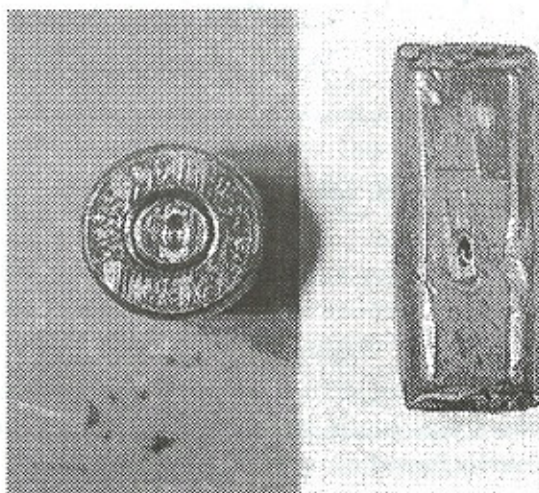


Photo 2

(Continued from page 131)

#### SUMMARY

Smith & Wesson uses a two step process to create the firing pin channel in the slide of the Sigma pistol. A round hole is drilled from the back of the slide, stopping short of breaking through the breech face. A punch and die operation cuts through the last bit of metal to form the rectangular firing pin opening. This process leaves burrs on the edges of the opening. As a final step, the burrs are smoothed with polishing stones in a vibratory tumbler.

The characteristic shear marks present on cartridge cases fired in Sigma pistols are the result of the design of the breech face in combination with unlocking and ejection mechanisms. After firing, the barrel must first unlock before recoil forces allow the slide to move to the rear. During unlocking, the case head is held firmly against the breech-face by the extractor. The "flow back" area around the firing pin impression is sheared against the edges of the firing pin channel by the lowering of the barrel and chamber during unlocking and ejection.

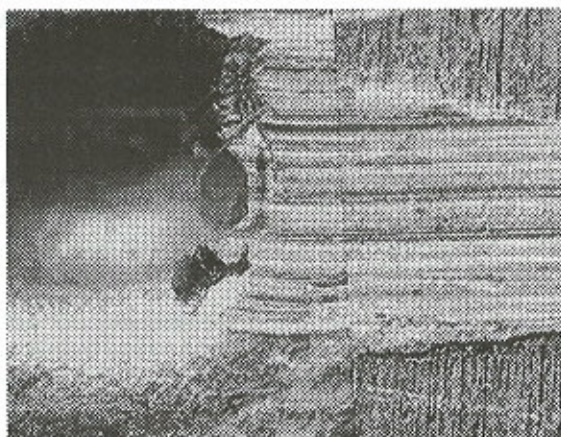


Photo 3