

PHOENIX ARMS (RAVEN) BREECH FACE TOOLMARKS

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Abstract

Comparison of four breech faces from a 25 caliber PHOENIX ARMS semiautomatic pistol.

Our laboratory recently received for comparison a PHOENIX ARMS 25 caliber semiautomatic pistol and a fired cartridge case for comparison. During the examination an article written by William Matty was recalled and reread, part of which is being reprinted for information purposes.

"The Raven Arms pistol has previously been described in this journal Vol. 9, No. 7). Prior to taking a tour of the Raven Arms plant, a Raven P-25 pistol (photo 1) was disassembled and examined. Of particular interest were the circular machining marks found on the breech face. The marks appeared to be concentric rings. To determine if the marks were in fact concentric, and not a spiral made by a pointed cutter like that normally used on a lathe, two Mikrosil casts of the breech face were made. The casts were compared on a comparison microscope. The machining mark transferred to the casts could be matched even when turned 180 degrees out of phase indicating concentric toolmarks (photo 2 and 3). Fired evidence cartridge cases from Raven pistols have been encountered in this laboratory and they have had impressions of the breechface on the primer. After the experience with the concentric striations on Smith & Wesson firing pins (see previous article in this issue) the method of machining was of interest. Could concentric striations ever be considered individual and therefore useful in firearms identification? The individuality of the Raven breech face toolmarks had to be established.

The breech face of the P-25, and its successor the MP-25, is a steel insert (photo) which is cast into the alloy slide. The steel insert, called a bolt, is subcontracted by Raven. As received by Raven the bolt is semi-finished with two sides ground flat at Raven Arms prior to casting the bolt into the slide. A rotary surfacing of the breech face is the operation which forms the concentric rings. This is the final machining affecting the breech face toolmarks. The surfacing is done on a Bridgeport-type vertical mill. The mill operator places a semi-finished bolt on a post secured to the mill table. A spinning cutter (a two-flute end mill) comes straight down to surface the bolt and cut the recess for the cartridge head. The mill operator controls the cutter feed with a handle like that of a drill press. The bolts are manually placed on, and removed from the locating post. Approximately 700 bolts are surfaced per hour. The cutter is sharpened about every six months.

Six bolts were collected from the mill as they were surfaced. The first three were collected in sequence and marked. An hour later three more were collected. By this collection method the change in toolmarks over the period of an hour could be observed if there was insignificant variance from one bolt to the next. This seemed to be a prudent method of collection in light of the results from the S&W firing pin study, and the fact that the cutting tool rarely needed sharpening.

In the laboratory the first two bolts collected were compared on a comparison microscope. The machining striations of the two breech faces were quite different (photo 5). Each bolt had unique toolmarks. To check the concentricity of the toolmarks on these bolts, casts were made and two casts of any one bolt could be turned 180 degrees out of phase and matched.

George Jennings, owner of Raven, had a possible explanation for the radical change in striations from one bolt to the next. He has noticed a fine build-up of metal on the cutting edge of the tool. Apparently metal is micro-welded to the cutting edge and broken off, possibly numerous times, on each cut. An actual change in the edge of the tool does not occur in this case as evidenced by the long interval between sharpening.

In view of the information derived from this study it is clear that breech face marks on cartridge cases fired in the Raven pistol may be used for identification purposes."

Recently, Raven Arms went out of business, and was replaced by Phoenix Arms located in Ontario, California. A call was placed to the firm and four bolts (photograph #1) were promptly sent to our laboratory for inspection. I was informed that the bolts were selected at random from a batch of 60,000 bolts. Mikrosil casts were made of the bolts and the same results that Matty observed almost ten years ago were achieved.

It has been the experience of firearm examiners here at our laboratory that the identification of fired cartridge cases fired in this family of guns is not always possible. This is possibly due to the pressures generated by the cartridge when the gun is fired, a dirty breechface, a hard primer or combination of the above. A test was conducted where four 25 caliber RAVENS were fired and the fired cartridge cases intercompared. The poor transfer of the concentric rings to the primer, resulted in not being able to exclude any of the four from one another based on the concentric rings alone. This is why we find it necessary to go on to additional individual characteristics (extractor, sidewall, firing pin impression) to form a basis of identification for this line of semiautomatics.

¹William Matty, RAVEN 25 AUTOMATIC PISTOL BREECHFACE TOOLMARKS, AFTE Journal Vol 16, No.3, July 1984

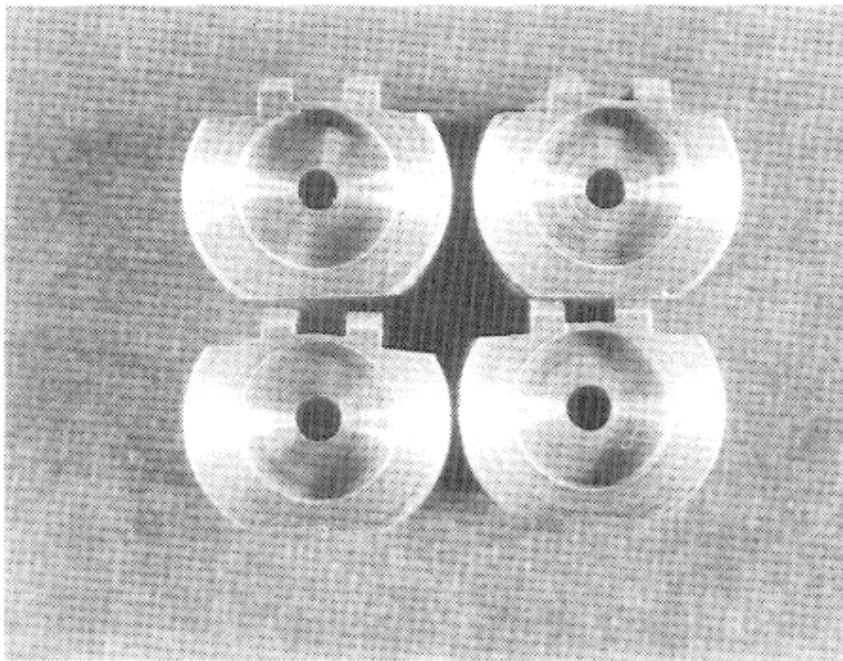


Photo 1