

FIREFORMED CHAMBER STRIATIONS ON RIMFIRE CARTRIDGE CASES

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Fireforming, or the expansion of a cartridge case during discharge to conform to the dimensions and irregularities of the chamber, is a useful tool in rimfire cartridge case identification. When insufficient breech face and firing pin impression detail prevents an identification from being made, it is possible for the firearm examiner to turn to fireformed chamber striations, on the case body, to make the identification.

Rimfire cartridge cases have the unique distinction of being non-reloadable. It is this characteristic of rimfire cases that makes fireformed chamber striations an unimpeachable characteristic useful in calling identifications. Whereas centerfire cases may display fireformed chamber striations, the markings observed may have been placed on the cartridge case during a previous firing in a different firearm. Rimfire cartridges can be fireformed only once, and the striated markings placed on the cases during extraction are indicative of that firing.

Fireformed chamber striations should not be confused with striations left on cartridges and fired cases when they are loaded into and extracted from a rusty chamber. Rough or rusty chambers, particularly those which cause difficult loading and extraction, leave a great deal of chambering striations which to the unwary examiner may appear to be fireformed striations. The distinction in determining whether chamber striations are the result of fireforming or merely the result of a rough or rusty chamber is made during the examiner's collection of tests. Test fired cartridges may show a great deal of fireformed chamber striations. A similar cartridge loaded into the firearm and extracted without firing will show few if any chambering marks.

When a series of fired test cartridges reveals chamber striations identifiable to fired evidence, then the examiner must make a sufficient number of test chamberings with similar ammunition before he can determine whether the marks were made by fireformed extraction or by the normal chambering and extraction of the cartridge. For example, in a recent case, four fired test shots showed a great deal of fireformed chamber marks. These marks matched well with those on a number of submitted fired cases (Photo 1). An additional ten live cartridges, from the same box as the four test shots, were chambered and extracted from the weapon. None of these test chambered rounds showed more than an occasional single line scratch here or there (Photo 2). It was obvious that fireforming would be required to expand the case sufficiently to pick up the great deal of detail seen in the fired tests.

The location of these marks appears to be rather consistent. Areas which undergo the greatest expansion during firing are the most likely places to find fireformed chamber marks. Oftentimes a rimfire case will exhibit what appears to be a slight bulge a short distance away from the reinforced rim area. This bulge, possibly the result of partial extraction when high chamber pressures exist, is the most likely area to find fireformed chamber marks. As the cartridge is being extracted, high chamber pressures may cause a temporary ballooning of the unsupported case. This ballooning would cause the case to scrape the lip of the

chamber, leaving relatively deep striations. I refer to this theoretical ballooning as temporary because test shots showing fireformed chamber marks fail to pick up a significant amount of new marks when the fired case is rechambered and re-extracted. The failure of the fired case to pick up significant additional striations supports this theory. Apparently the resiliency of the cartridge case causes it to snap back close to its original dimensions.

As with other areas examined on fired evidence, not all test shots will show sufficient fireformed detail for identification purposes. What is significant, however, is when none of the test chambered rounds show similar marks. That is why it is important for the examiner to make a sufficient number of test chamberings with similar ammunition until it is ascertained that chambering alone without firing fails to leave similar marks.

The phenomenon of fireforming has the potential of leaving significant detail useful to the firearm examiner. It is the examiner, aware of the presence, origin, and potential pitfalls of this type of examination that can use this detail in determining whether a firearm fired a particular rimfire cartridge or not.

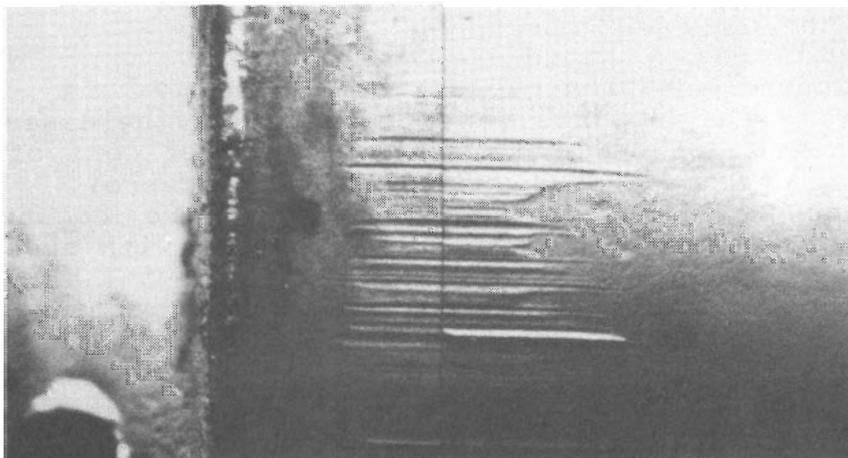


Photo 1 Evidence and test shot showing fireformed chamber striations.

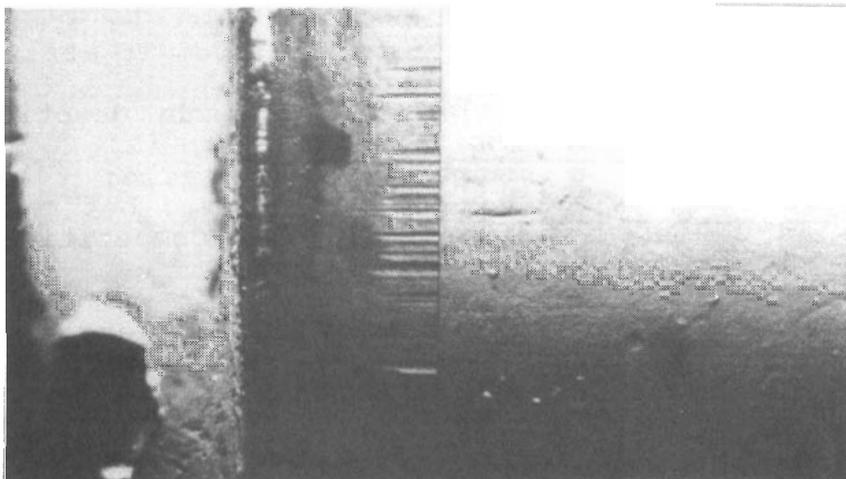


Photo 2 Evidence and test chambered live round