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Customized weapons identification tests

Summary

The article raises the issue of individual weapons identification tests which can be performed, including when it is not possible to fire shots in order to obtain comparative material. The article describes one of such cases, involving bursting of the cartridge chamber of a shotgun during the shooting.

Key words: individual weapons identification, cartridge shell, cartridge chamber, shotgun, separation edge

Introduction

Weapons identification tests involve determining whether a given projectile or cartridge shell secured at the scene of an incident originates from a cartridge fired from a particular weapon. Usually, these tests are carried out in such a way that comparative material is obtained in the form of projectiles or cartridge shells that come from firing the weapon in question under laboratory conditions. The material obtained is then compared against the evidence. The case described herein did not fit within this standard practice.

Case report

The Toolmark and Ballistic Department of the Central Forensic Laboratory of the Police has received the following material evidence for testing: a damaged Belgian-made shotgun L. Barthe cal. 12/70, a ruptured and bent rim of cal. 12 cartridge and a ruptured shell body of such a cartridge. A cursory description of the event showed that during the shooting competition, the cartridge chamber of the weapon in question was ruptured and the shooter was injured. The decision to appoint an expert included a standard question: “Were

Fig. 1. Left side view of the shotgun.

Fig. 2. View of the cartridge rim.

the secured elements of the cartridge shell fired from the firearm submitted for testing?"

The examination started with a visual inspection of the weapon. A rupture was visible on the left side of the barrel. The outer surface of the barrel near the beginning of the rupture – about 115 mm from the barrel inlet – was slightly bulged, which indicates that in this particular position, the pressure inside the barrel exceeded the value corresponding to the permissible elastic limit of steel. As a result, the barrel material has been plastically deformed – the bulge mentioned above has been created, and a further increase in material stress has led to its rupture. It ran from the bulge to the barrel's inlet, from the upper part of the barrel, initially towards the outlet, and then turned diagonally downward, then further along the plate on the edge of the bolt hooks, so that the barrel's wall was rolled upward and exposed the inside of the cartridge chamber. Microscopic examination of the separation edges showed a regular structure of fine-grained steel without inclusions or corrosion. At the edge of the rupture near the plate, the yellow hard solder substance, which is usually used to connect the barrel assembly, was visible. The markings on the barrels indicated that the outlet of the damaged barrel was made in the form of a choke. The stamped markings also indicated that the barrels have undergone firing tests and can be used to fire cartridges cal. 12/70 with nitrocellulose powder, generating a standard pressure of 65 MPa, measured by the crush resistance method. A fragment of a wooden settlement piece was torn off on the left side of the action body's lock, similarly to the action body' left eyelet. The forend wood had large cavities and its fitting was bent. With a weapon in such a state it was possible to fire from the right-hand barrel of the shotgun.

The bent rim of the cartridge cal. 12 has a stamped inscription "NOBEL 12 SPORT 12", which indicated that the cartridge shell is French-made. The bend of the rim was similar in shape to the bend of the wall of a torn barrel. There was no primer on which the traces of the firing pin and, usually, the best traces of the action body's front part are preserved, allowing for individual weapons identification tests.

Other type of information could be derived from the inscription on the ruptured body of the cartridge shell cal. 12/70. It indicates that the cartridge originates from a batch produced for a Dutch distributor. The cartridge contained 32 grams of steel shot no. 4, and most importantly, it was designed for weapons withstanding the pressure of 1200 bar (120 MPa), measured with the use of piezoelectric sensor. Embedding traces on the

Fig. 3. View of the cartridge shell body.

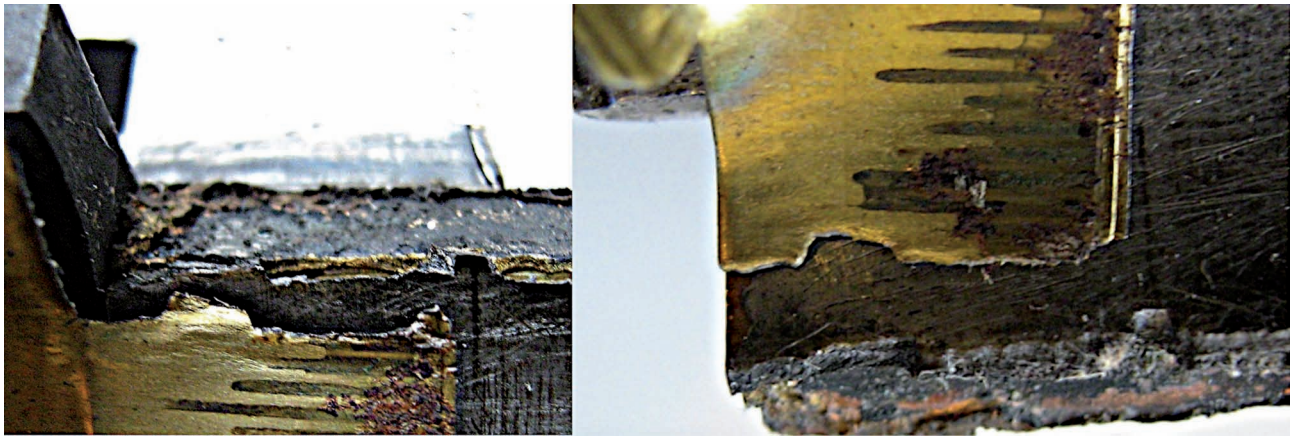

Fig. 4. View of the folded edges of the ruptured cartridge chamber and cartridge shell.

rim corresponded to the height of the shell submitted for testing, and the cartridge was closed by clamping in the form of an asterisk.

The data collected in this way allowed to make an assumption that the examined rim and cartridge shell were fragments of a cartridge designed for a weapon of a more durable construction than the evidentiary shotgun, and yet the cartridge was fired from its left barrel, which caused an accident. It was no longer possible to fire cartridges from the damaged barrel in order to obtain comparative material. A firing pin imprint could be made, but there was no material to compare it with, because, as described above, the primer of the fired and ruptured cartridge was missing.

If it is assumed that the submitted cartridge elements were the ones used for shooting and were present inside the cartridge chamber that was ruptured during the shot, the lines of separation of the cartridge chamber, the rim and the cartridge shell should be identical. It is worth reminding here that, during the firing, the cartridge shell is pressed against the inside of the cartridge chamber under the pressure of gunpowder gases. Next, the shell along with the cartridge chamber increase their diameters as a result of the chamber's elastic deformation and the shell's elastic and then plastic deformations. This means that after the pressure drop the chamber returns to its original dimensions, while the diameter of the shell remains increased – however, to the extent that the clearance between the shell and the chamber is maintained, allowing the shell to be removed freely from the chamber. In the case described herein, excessive pressure caused the material of the cartridge chamber to separate, and the resulting gap became a cutting edge for the shell material, as proved by microscopic comparison of the edges. The comparison of the separation line of the rim and the shell body made of plastic was also positive despite the phenomenon of "floating" of soft plastic.

Conclusions

Based on the results of the tests performed, it can be concluded that the submitted ammunition elements originated from a cartridge fired from the weapon in question. In such an unusual case, it was possible to perform individual weapons identification tests, based on the shapes of the separation lines of the shotgun and ammunition elements. It can also be stated that the damage to the evidentiary weapon was caused by an attempt to shoot off an incompatible cartridge, i.e. one that generates too high pressure. However, it is impossible to determine whether the shot was fired by mistake, due to the fact that a cartridge with dimensions characteristic of lower strength chambers generated the pressure typical of Magnum cartridges, or whether this cartridge was used deliberately to achieve a better result in the competition

Source of figures: Author

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