

AUTOMATED FIREARMS BALLISTICS TECHNOLOGY

As with fingerprints, every firearm has unique characteristics. The barrel of a weapon leaves distinct markings on a projectile. The breech mechanism also leaves distinct markings on the cartridge case. These markings are produced by the breech face itself, the firing pin, extractor, and ejector. Firearms examiners are able to examine bullets and cartridge casings to determine if they were expelled from the same firearm. It has been a tedious, time-consuming process for firearms examiners to compare suspect bullets and cartridge casings recovered at crime scenes or from a recovered firearm to the vast inventory of recovered or test-fired projectiles and casings. The severe stress and eye strain on the firearms examiner slow the process. Therefore, realizing that the present examination techniques were antiquated, ATF and the Department of Treasury recognized the potential benefits to law enforcement that innovative computerized, crime-fighting technology can provide. This investment is currently being utilized as an information super highway in the solving of firearms-related violent crimes by ATF and participating law enforcement agencies. Since January 2004, ATF is under the United States Department of Justice.

BALLISTIC COMPARISON SYSTEM

Currently, ATF is utilizing a unique ballistic comparison system that allows technicians to digitize and automatically sort bullet and shell casing signatures and aids in providing matches at a greatly accelerated rate. The equipment expeditiously provides investigators with leads to solve greater numbers of crimes in a shorter period of time.

The Integrated Ballistic Identification System (IBIS) provides a single system capable of comparing both types of ballistic evidence found at crime scenes. This integrated and automated imaging system permits a technician to enter and review large numbers of fired bullets and expended cartridge cases and cross-reference hits made from each system for examination by a firearms examiner. Statistics collected by ATF's National Tracing Center (NTC) indicate that revolvers and semiautomatic firearms are traced with nearly equal frequency by law enforcement agencies.

The ballistic comparison of crime scene bullet or cartridge casing evidence can be automatically compared with other bullet or cartridge casing images previously entered into the system. The ballistic comparison system does not positively identify (match) bullets or casings fired from the same weapon--that must be done by a firearms examiner. However, the system does produce a short list of candidates for the match. The numerical probability of a match is given for each candidate on the list eliminating the need for the examiner to visually compare unlikely candidates. By doing automated searches, the system speeds up and optimizes time spent on comparisons. The best evidence in linking a firearm to a specific crime is matching the recovered projectile and cartridge casings to the suspect firearm.

The IBIS consists of two separate work stations--a Data Acquisition Station

and an Image Analysis Station. These stations operate in an independent manner. The Data Acquisition Station is used to collect image data. It does not retrieve and compare images. Laser optics focus on the bullet's land markings, and a computer digitally maps and records the significant areas on the bullet's surface. These areas are selected and optically "marked" by the technician as the bullet is viewed while being rotated. Shell casings are much simpler to acquire requiring no manipulation of the specimen. Either a firearms examiner or a technician can be trained to enter data from crime scene bullets and casings.

The system is designed to be operated by a technician with no previous computer experience. The firearms examiner's only contact with the system can be after all the data has been entered and correlated. At this point, the firearms examiner will review the scores and view only those with significant scores at the Signature Analysis Station (SAS). The SAS runs the image comparison software, and it houses the data base of images generated by the Data Acquisition Station. One analysis station can handle the data from several acquisition stations. Data can be manually transported and entered into the analysis station from a disk or electronically transported through a communication line.

As stated earlier, the system does not make identifications; the firearms examiner must make the identification if two bullets or cartridge cases come from the same firearm. Since, the system produces a list of scores that indicate the relative and quantitative probability of a match (high to low), the firearms examiner can retrieve selected images for evaluation on the video screen. If the image on the screen looks as though a match could exist, the firearms examiner inspects the specimens on a comparison microscope to confirm the match.

Recently ATF purchased the newest technology, IBIS BrassTrRAX. The new IBIS BrassTRAX Systems will help ATF move NIBIN into a new era of crime fighting. Utilizing IBIS technology, BrassTRAX is a highly-automated desktop acquisition station that collects images of fired cartridge cases and forwards them to be searched against the NIBIN Database.
