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COVERT SURVEILLANCE

The technology behind the tradecraft

Taking ballistics analysis to the next level

Gary Mason reports on competing forensics systems designed to compare ballistics in the US

- Forensic ballistics comparison technology dates back to 1990s
- The introduction of 3D technology has transformed the science
- Developers are working on hand-held units to use at crime scenes

BALLISTICS comparison technology, developed for US law enforcement, has a long pedigree.

In the 1990s, the FBI and the Bureau of Alcohol, Tobacco and Firearms (ATF) developed two separate systems to store and analyse images taken from spent shell casings found at crime scenes.

The FBI system, called Drugfire, and the ATF system, known as IBIS (Integrated Ballistics Identification System), were incompatible with each other and a decision was made that one system only, IBIS, should form the basis of a national system.

IBIS, developed by Forensic Technologies Inc, uses electronic and optical technology to digitally compare evidence stored in the database. Initially, IBIS equipment photographs the surface of fired bullets and casings from crime scenes and laboratories. Upon entering a new image into the database, the system searches for a match by using advanced mathematical algorithms to correlate the new image against previously stored images. A forensic examiner then visually compares the matched images on a computer monitor.

Networked technology

The system, which was developed by a Canadian-based company Forensic Technology Inc, is now the cornerstone of the National Integrated Ballistics Information Network (NIBIN) in the US. IBIS systems have been installed in nearly 250 US crime laboratories as part of the NIBIN programme and, exported to more than 30 countries outside the US.



HIGH PRECISION: A Swiss-built interferometer scans the surface of the expended cartridge cases with a six-pack cartridge case holder

But last year a new player came into the market. The Alias system is the brainchild of Mike Barrett, a former forensics firearms examiner for the Royal Canadian Mounted Police (RCMP). He is now president of Pyramidal Technologies which is marketing the system to law enforcement agencies around the world.

He says he developed the system after attending an IBIS course in 2006 and coming away with a

toolmarks as small as two microns width, 1/50th the diameter of the average human hair.

The system includes computer hardware, software and a high precision Swiss built interferometer that scans the surface of expended cartridge cases with a six-pack cartridge case holder.

'By manipulating a digital clone of a cartridge case or expended bullet, which is what Alias creates, an examiner performs an in-

'Established forensic ballistics tools may have reached their limits'

view that forensic ballistics technology had not really developed much since the FBI and ATF pioneered the technology in the 1990s. 'Established forensic ballistics tools may have reached their limits,' he says.

Alias is a portable, measurement instrument and analysis tool for use by forensic ballistics and firearms examiners that creates and compares 3D models of fired cartridge cases and spent bullets. According to Mr Barrett, the technology can measure and examine

depth analysis without any chance of contaminating the actual evidence,' says Mr Barrett.

'The system also has an advantage over a comparison microscope when trying to match a clean cartridge case with one that is tarnished or corroded. Because Alias presents a topographical map and volumetric model of the ballistic specimen, physical appearance to the human eye is not an impediment.'

Because it cuts down on the amount of work humans need

to do to match bullets to crime scenes and guns, the developers say the system lets crime-scene investigators do their work more efficiently and, potentially, cut down on the amount of time taken to gather evidence to solve crimes.

3D leap

Meanwhile the developers behind IBIS maintain the system continues to develop with the technology that it uses particularly in providing 3D analysis. 'IBIS has undergone numerous changes and improvements over the years,' says a spokesman for Forensic Technologies Inc.

The company has developed BULLETTRAX-3D – a 3D bullet imaging station and MATCHPOINT+ a comparative analysis station for examining 2D and 3D images. It has also launched a 3D cartridge case imaging station known as BRASSTRAX-3D. The new 3D systems can be integrated into IBIS systems already used by law enforcement agencies, the company claims.

'This is made possible because both product families utilize standard configurations to capture 2D images, making data sharing and cross correlation possible between the product families,' the company says. 'Recent scientific studies indicate that three-dimensional imaging is a must-have for better firearms identification.'

The logical next stage for forensic ballistics systems could be the development of a hand held device. Mr Barrett says his company is already looking at this.

'The next thing that we are working on is a handheld unit that will generate investigative leads at the crime scene,' he says. 'You can imagine something like an iPad – a little black box scanner attached to it, and you send the information wirelessly to a hub.'