B93 Comparing the Performance of IBIS and Bullet TRAX-3D™ Technology Using Bullets From Ten Consecutively Rifled Barrels

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After attending this presentation, attendees will understand the basic principles of the operation of IBIS and BulletTRAX-3D™ and their ability to match fired bullet pairs.

This presentation will impact the forensic community and/or humanity through the new 3D technology of BulletTRAX-3D™ which has the ability to link many more crimes involving firearms.

The majority of papers published on the Integrated Ballistics Identification System (IBIS) to date have focused on its ability to link cartridge cases. Few studies have been done to examine the performance of IBIS with bullets. Those that have been undertaken, suggest that IBIS is less effective when it comes to its ability to link bullets fired by the same weapon. It is proposed that the new technology of BulletTRAX-3D™ will result in better characterization of the bullet's surface and this in turn will translate into improved results over those observed to date with IBIS.

Ten consecutively rifled Para-Ordnance P10-45 handgun barrels were test fired to obtain reference sample and known match sample pairs for upload onto the IBIS and BulletTRAX-3D™ bullet acquisition systems. Forty bullets were uploaded in total, twenty copper-jacketed bullets, and twenty lead bullets, to account for the variations in the manner in which markings are reproduced on bullets of different metal compositions. The bullets were uploaded into a database, which contained 476 entries of the same caliber and rifling characteristics (.45 calibre bullets with six lands and grooves with a left-hand twist). Ranked correlation lists were examined to determine if the two systems could link reference samples to their known match and where in the list that identification was made (within the top 10, within the top 20, or outside the top 20 positions). It is important to examine where in the list matches appear as an operator may miss potential hits if they appear too far down the list.

For copper bullet correlations, both IBIS and BulletTRAX-3D™ identified all reference samples to their known matches within the top 10 positions. BulletTRAX-3D™ performed significantly better with lead bullets and inter-composition comparisons. For lead bullets, BulletTRAX-3D™ identified all reference samples to their known match in the top 10 positions. IBIS on the other hand, identified only 30% of reference samples to their known match in the top 10 positions and 70% outside of the top 20 positions. For copper to lead comparisons, IBIS identified 20% of reference samples to their known match in the top 10 and 80% outside of the top 20. BulletTRAX-3D™ identified 90% of the reference samples to their known match in the top 10 positions and 10% in the top 20. IBIS fared slightly better with lead to copper comparisons than it did with copper to lead comparisons. For lead to copper comparisons, IBIS located 20% of matches in the top 10, 60% in the top 20, and 20% outside the top 20. BulletTRAX-3D™ was again superior as it identified 90% of matches in the top 10 positions and 10% outside the top 20.

BulletTRAX-3D™ was found to perform better than IBIS in the comparison of lead bullets and inter-composition comparisons. BulletTRAX-3D™ also produced images of superior quality and includes a graphical representation of each image that is not available with IBIS. This provides further visual support to aid in the identification of potential hits.

IBIS, BulletTRAX-3D™, Fired Bullets