Criminalistics Section

Louisiana State Police Crime Lab

Fracture Comparison Analysis

CSI Unit

WHAT

Fracture Comparison Analysis is the process of comparing two or more broken, torn, or separated items/objects/surfaces through physical, visual, or microscopic means, that can permit one to conclude whether the objects were once one entity.

HOW

Fracture Comparison Analysis is performed by crime scene investigators or firearms analysts who are trained and responsible for determining if two broken or fractured items/objects/surfaces were once one entity. Generally, fracture comparisons are performed between broken pieces of evidence from an *unknown* source, located at a crime/crash scene, to evidence from a *known* source, a specific object or vehicle.

This analysis can be conducted in a manner similar to putting together jig-saw puzzle pieces or may require tedious examination under a stereoscope or comparison microscope. First, the analyst must look for class characteristics which may indicate the known and unknown pieces originated from a common or similar source item. Examples of class characteristics include size, shape, color, composition, and curvature. Next, the analyst examines any agreement in individual characteristics, which include scuffmarks, abrasions/scratches, trace evidence, and the overall hills and valleys of the fracture line. If both the class and individual characteristics are in agreement, then the pieces originated from one object/surface as a whole.

WHY

The laboratory aids state and local law enforcement agencies in comparing unknown fractured, broken, or torn items to known items/surfaces to determine if they were once one entity. This aids the investigation by establishing whether pieces recovered at a crime scene were originally once part of a known entity that had been damaged. If “matched” there is a possibility of linking those items or people to a crime.

Fracture Comparison

Analysis

Staffing

Eight analysts are currently authorized for Fracture Comparison Analysis assigned to the CSI and Latents Units. There are an additional fourteen analysts from multiple disciplines throughout the lab that are currently authorized to assist in on-scene documentation of fracture comparisons.

Requests for Fracture Comparison Analysis are generated by law enforcement agencies and by the laboratory's CSI Team response from crime scene/vehicle exams. Average number of items submitted for fracture comparison analysis is 80.

Classifications

Fracture comparisons can result in either Identifications, Exclusions, or Inconclusive. A systematic approach is used when comparing fractured/broken/torn edges of an item and class and individual characteristics are used to determine a conclusion.

Fractured pieces that have an agreement of a combination of individual characteristics and all discernible class characteristics where the extent of agreement exceeds that which can occur in the comparison of other sources is considered an identification that the two pieces once were one.

Fractured pieces with dissimilarities in class characteristics (that cannot be explained by further damage or wear and tear after the separation may have occurred) will not share individual characteristics, and will therefore be excluded as having come from the same source.

Fractured pieces with incomplete/missing pieces or insufficient detail within the fracture or tear, can result in an inconclusive determination. This conclusion can be due to some agreement of individual characteristics and all discernible class characteristics, but insufficient for an identification; agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility; or agreement of all discernible class characteristics and disagreement of individual characteristics, but insufficient for an elimination.

Interesting Facts

Fracture Comparison Analysis can only be performed on pieces that have some manner of a fractured or separated edge; it cannot be definitively performed on objects that fasten together via any clasp, peg, buckle, etc. An example would be, a broken turn signal lens fragment collected at a hit and run scene (unknown) may be compared to the remaining lens fragments on the suspect vehicle (known).