

ADMISSIBILITY OF TOOLMARKS AS EVIDENCE

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INTRODUCTION

MEANING OF TOOLMARKS:

In forensic science, fingerprints and hair strands can be used inimitably as an evidence to encounter the suspects in a crime. Similarly, a toolmark is an evidence that aids in the progress of the investigation process as the nature of the crime and the tool used to commit the crime can be well comprehended. A toolmark is a print or an impression which has been either punched, engraved, or molded mark on a surface. This may be caused due to a blunt, abrasion, incision, notching, insertion, engraving or grooving². The profundity and precision of the tool mark depends on the intensity and the angle at which the tool intersects the object and the nature of the two contracting surfaces. Simultaneously, if the impacted surface is rigid, it may also damage the tool and/or may create its marks on the tool³. The grinding process used in manufacturing tool marks create a fine-grain parallel abrasion mark on the tool called striae which is exclusive to every tool and can be used to identify a tool⁴. Tool marks are physical evidential clue that are often available at the scene of occurrence. Some of the tools which tend to leave such a mark are screwdrivers, jimmies, guns, crowbars, axes, knives, chisels, maces, stones, and bricks, etc. Tool marks bear two types of characteristics which can be classified in class tool marks and individual tool marks. The class tool marks typically allow the expert to examine and identify what type of tool it belongs to and how the mark was created, but they cannot do not authorize for the identification of the exact tool that created the print. The class tool marks can be classified on the basis of mode of creation and nature of marks. Whereas, individual class tool marks also known as accidental characteristics, allow the expert to identify the striations and small peculiarities unveiled by the tool that are unique to each tool. They permit definite linkage of the tool with the indiscriminating marks and consequently with the perpetrator of the crime⁵. Tool marks have

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² B. R. Sharma, *Forensic Science in Criminal Investigation & Trials*, (337) (LexisNexis, Gurgaon, 6th edn., 2020).

³ *id.* Pg. 337.

⁴ Amy B. Hoeksema, Graduate Theses and Dissertations, *Statistical Methods for the Forensic Analysis of Striated Tool Marks*, 13383 (2013).

⁵ B. R. Sharma, *supra note 1*, 347.

great evidentiary value and are enormously valuable in criminal investigation, firstly, as criminals often have a tendency to use tools for committing burglaries or other heinous crimes like, murder⁶. Secondly, tools usually are made up of hard material and the surfaces on which they leave marks are comparatively softer that more often doesn't damage the tool which can be helpful in reproducing these marks almost indefinitely. Lastly, an offender tends to use the same set of tools in the commission of same type of crimes and if the tools from various crimes are compared inter se and found identical, the crimes are inter-linked.⁷ Before analyzing the permissibility of toolmarks as an evidence, first, we must understand the basis of admissibility of any physical evidence.

The general rule of admissibility of physical evidence was laid down in the case of *Daubert v. Merrell Dow Pharmaceutical*⁸. The case of *Daubert v. Merrell Dow Pharmaceutical* rejected the "general acceptance" test of *Frye v. United States*⁹ and had laid down certain principles which were to be followed in ruling on the admissibility of proffered expert opinion testimony which will be further explained through the course of the research paper. Questions of the admissibility of firearm and tool mark opinion evidence did not develop immediately after the *Daubert* decision but gradually the defense began to challenge the evidence in criminal cases during the early 2000's¹⁰. The fundamental assumptions underlying firearm and tool mark identification evidence are uniqueness and reproducibility¹¹. In the year 1985, the Criteria for Identification Committee formalized the AFTE (Association of Firearms and Toolmark Examiners) Theory of Identification as it relates to tool marks. The theory articulates three principles that provide the conceptual basis for comparing toolmarks for the purpose of identifying them as having a common source¹². Prior to elucidating the admissibility of toolmarks as an evidence in any court of law, it is necessary to understand the nature of toolmarks as tools of different categories create different marks which can easily identified by

⁶ B. R. Sharma, *supra note 2*, 347.

⁷ B. R. Sharma, *Forensic Science in Criminal Investigation & Trials*, (424) (LexisNexis, Gurgaon, 5th edn., 2005).

⁸ *Daubert v. Merrell Dow Pharmaceutical*, 509 U.S. 579 (more)113 S. Ct. 2786; 125 L. Ed. 2d 469; 1993 U.S. LEXIS 4408; 61 U.S.L.W. 4805; 27 U.S.P.O.2D (BNA) 1200; CCH Prod. Liab. Rep. ¶ 13,494; 93 Cal. Daily Op. Service 4825; 93 Daily Journal DAR 8148; 23 ELR 20979; 7 Fla. L. Weekly Fed. S 63.

⁹ *Frye v. United States*, 54 App. D.C. 46, 47, 293 F. 1013, 1014, 1923.

¹⁰ Betty Layne DesPortes, *Firearm and Toolmark Opinion Evidence: Admissibility of Opinions After Daubert and the NAS Reports*, available at: http://benjamindesportes.com/pdfs/Firearm_Toolmark.pdf (April 2, 2020, 12.00 PM).

¹¹ *ibid.*

¹² William A. Tobin and Peter J. Blau, *Hypothesis Testing of the Critical Underlying Premise of Discernible Uniqueness in Firearms-Toolmarks Forensic Practice*, *Jurimetrics.*, Winter 2013, Vol. 53, at 121-142.

the experts as these marks are unique. Though not really in practice but, collection and evaluation of toolmarks are extremely essential in criminal cases as these marks will help in identifying the accused directly, just like how hair, track marks, fingerprints lead us to the accused.

NATURE AND IMPORTANCE OF TOOL MARKS

NATURE OF TOOLMARKS:

Upon the basis of the disposition or outlook, toolmarks can be categorized into 3 main types, namely;

1) COMPRESSION MARKS:

Also known as indentation mark, it is a mark created by the tool when it is pried or forced into a surface which enables it to leave behind a deleterious impression of such a tool¹³. Such an impression is caused without a sliding motion. The unmitigated impression of the tool (i.e. outline) along with its exclusive marks and imperfections are embedded on the surface. The individuality of the toolmark depends on the surface of the tool, surface on which the mark has been embedded and the intensity of impact¹⁴. For example; the screwdrivers, knives, hammers, punches, dies, metallic seals and stamps, jimmies, axe, etc. create such marks.

2) SLIDING MARKS:

The other characteristic of toolmarks are that they render sliding marks on the surface because of the intensity or pressure along with the sliding contact of the tool with the surface. It is abraded in a precise manner reliant on the asymmetries of the surface of the tool and these marks are embedded in the form of *striations*¹⁵. For the apprehension of marks as sliding marks, angle of impact, force used during the course of impact and the nature of surface are essential. For example; chisels, can-openers, crowbars, pliers, wrenches, spanners, axes, swords, knives, scissors, etc. create such marks.

¹³ B. S. Nabar, *Forensic Science in Crime Investigation*, (220) (Asia Law House, 3rd edn., 2011).

¹⁴ B. R. Sharma, *supra note 3*, 339.

¹⁵ B. S. Nabar, *supra note 1*, 221.

3) REPETITIVE CUT MARKS:

These are marks which are produced by the recurring operation of the tool on a particular surface and the marks embedded are extremely unique as the intrinsic features of the tool are placed on the marks. Upon examination of the mark, the type of tool used to render that mark can be identified¹⁶. For example; saw, drill, hacksaw, file, etc. create such marks. Toolmarks may not always be embedded separately or in isolation, there can be a combination of two types as well. For example, a screwdriver blow has a chance to leave a compression mark, and if at the same time it slides on its edges it may leave sliding marks¹⁷.

SIGNIFICANCE OF TOOLMARKS:

Toolmarks have profound evidentiary value in criminal reconnaissance for the ensuing reasons;

1) FREQUENCY:

For the commission of a crime, any person would go with a weapon or a tool, either to break open with the doors, windows or cars or to attack a person. For e.g.; if the criminal wants to pry open a window then, he will use a crowbar or a screwdriver; if he wants to open the door of a house, he will use a master/ghost key. Henceforth, the manifestation of toolmarks in any crime scene is obvious and unanimous¹⁸.

2) PERMANENCY:

Toolmarks leave their impressions easily on surfaces that the tool interacts with, as these tools are usually made out of tremendously hard materials; like metal, and the surfaces with which they interact are moderately gentler to enable it to operate effectively. If during the course of commission of crime, the tool may not have been damaged to a palpable extent or post the commission of crime, if it has not been mishandled and preserved appropriately, it is easy to reproduce the marks for an indefinite period¹⁹. Henceforth, even after a reasonably long time, the criminal can be traced out using these toolmarks.

¹⁶ Dr. Rukmani Krishnamurthy, *Introduction to Forensic Science in Criminal Investigation*, 370 (Selective & Scientific Books, 1st edn., 2011).

¹⁷ *id.* Pg. 221.

¹⁸ B. R. Sharma, *supra note 1*, 424.

¹⁹ *id.* Pg. 424.

3) INDIVIDUALITY:

Regarding the production of the tool - Within a particular category, for e.g.; screw driver of a specific size and shape, all are produced using the similar materials and using the same techniques, yet, not every tool is precisely the same as there can be an extra mark or an extrusion or some imperfection that has been embedded on the tool while manufacturing or most importantly, there is number given to each tool which is definitely unique to that particular tool.

Regarding the tool post commission of crime – Toolmarks like fingerprints, foot and footwear marks and marks on bullets and cartridges postulate an explicit connection between the crime and the criminal. For example, if a piece of wire was stolen for the crime scene, it can be said that it was cut. The cut piece of wire left at the crime scene would be sent to the laboratory, upon examination, the tool that had been used to render the mark can be ascertained, with which the criminal can be identified accurately²⁰. Further, using fingerprints and footmarks there can be a distinction made between human beings and animals. Also, such marks leave the specific ridges that are unique to every individual.

4) LINKAGE:

A criminal always inclines to utilize the constant set of tools or weapons for the commission of the crimes of similar nature and type. If all the crime scenes are compared along with the toolmarks entrenched in the crime scene then there can be a linkage established between the crime and criminal²¹.

5) RECONSTRUCTION:

A judicious analysis of the nature, position, direction and number of tool marks will aid in the reconstruction of the crime which will be helpful inter se to verify the prosecution side as well as the defence side version of arguments²².

²⁰ *id.* Pg. 424.

²¹ Dr. Rukmani Krishnamurthy, *supra note 1*, 366.

²² B. R. Sharma, *supra note 2*, 424.

ADMISSIBILITY OF TOOL MARKS AS EVIDENCE

Legal opinion on the admissibility of toolmarks is not abundantly available in India, as a lot of experts prefer to collect and examine the fingerprints, track marks or any DNA related evidences which is much more straightforward in tracing the culprit. It is essential to comprehend the admissibility of expert scientific evidence and testimony in the court of law prior to comprehending the admissibility of toolmarks. In the United States, a lot of significant cases have been convened which elaborate on the admissibility of a physical evidence and testimony. The major rulings given by US courts are;

- 1) **FRYE TEST**²³ – The judgment was given by the District of Columbia Court of Appeals in the year 1923, wherein, it set a grounds for the admissibility of scientific evidence by stating that, only such an expert testimony would be admissible if the principles on which it is based were “generally accepted” by the scientific community²⁴.
- 2) **DAUBERT CASE**²⁵ - The *Frye test* had been overruled in this case which was passed in the year 1993 and the court outlined certain criterions for admissibility of a scientific evidence which they believed are significant. These criteria were not exhaustive, but if even one of these following grounds were not satisfied it was held inadmissible²⁶;
 - a. Has the technique or theory been scientifically tested?
 - b. Does the technique or theory have a known or potential error rate?
 - c. Has the technique or theory been subjected to peer review and publication?
 - d. Is the technique or theory subject to standards governing its application?
 - e. Is the technique or theory generally accepted by the relevant scientific community?

The experts have applied these criterions to the toolmark identification and thus, it is currently an admissible evidence in the court of law. The AFTE (Association of Firearm and Toolmark examiners) has manuals and guidelines that include the standards and principles set forth for the

²³ *Frye v. United States*, 54 App. D.C. 46, 47, 293 F. 1013, 1014, 1923.

²⁴ Association of firearm and Toolmark Examiners, available at: <https://afte.org/resources/swgun-ark> (April 6, 2020, 8.30 PM)

²⁵ *Daubert v. Merrell Dow Pharmaceutical*. 509 U.S. 579 (more)113 S. Ct. 2786; 125 L. Ed. 2d 469; 1993 U.S. LEXIS 4408; 61 U.S.I.W. 4805; 27 U.S.P.O.2D (BNA) 1200; CCH Prod. Liab. Rep. ¶ 13,494; 93 Cal. Daily Op. Service 4825; 93 Daily Journal DAR 8148; 23 ELR 20979; 7 Fla. L. Weekly Fed. S 63.

²⁶ Association of firearm and Toolmark Examiners, *supra note 1*.

toolmark identification; like AFTE Technical Procedures Manual, AFTE Theory of Identification, SWGGUN guidelines, etc. Further, scientific journals like the AFTE journal and Journal of Forensic Science have and still keep conducting rigorous peer-reviews prior to the publication of the journals and manuals. Henceforth, it can be said that toolmark identification is a generally accepted principle admissible in the courts.

To examine the marks and declare the identity of a common source is enormously complicated and no generalization can be rendered regarding this as each and every tool varies from one another²⁷. The expert opinion is very much important in case of examining the toolmarks embedded in the scene of occurrence, especially with indentations, as even a sole formation that portrays the characteristic of the tool, is enough evidence to prove in the court of law²⁸. Further, in case of scrape marks, one shall be vigilant against being misrepresented by accidental match of a few lines, as there should be persistence in the lines when tested rather than deviations in the marks. Those striation marks which exemplify fine lines are reliable than abrasive lines²⁹. Also, in glass fragments, stone pieces and other hard substances, mechanically fit even through one millimeter is sufficient to constitute the identity if the common source³⁰.

As vindicated formerly, the originality and facets of any tool mark depends on the force applied on the tool, the angle or position of the tool, the surface of the tool (including its imperfections) and the nature of the surface on which the tool created a mark. The two major advantages of a toolmark to be used as an evidence is that;

- 1) A tool creates a grave impact on the surface with which it interacts leaving behind a perpetual mark of itself which can be lifted at any time.
- 2) Since every tool is different from one another and has some or the other uniqueness, upon extensive examination by the expert, a tool can be precisely identified which traces back to the criminal who committed the crime.

In a blind murder case, the dead body of a young girl was found in a graveyard. The only evidence she carried on herself of the accused, was a characteristic bite mark on her breast. The police investigations showed that she did not belong to that area and a nobody has seen her

²⁷ B. R. Sharma, *supra note 4*, 356.

²⁸ *id.* Pg. 356.

²⁹ *id.* Pg. 356.

³⁰ *id.* Pg. 357.

before in that area. Upon logical considerations, the police believed that the girl had come to that place with a boy from some nearby college. He could be the likely killer. The experts had obtained the dental casts from all the boys of the college. Most of them could be easily eliminated and only about half of the boys were left to be investigated. Several expert dentists examined the mark and the casts obtained from the boys and upon due deliberations, they identified that one cast of the teeth which had caused the mark. The accused was given death penalty only on the sole evidence of the bite mark³¹.

The basis for identification in toolmark identification is founded on the principle of uniqueness as described by Kirk through Tuthill; wherein all objects are unique to themselves and thus can be differentiated from each other³². Moreover, it also depends on the theory that when any hard material (i.e. a tool) comes in contact with a softer material (i.e. the surface), it is natural that the tool will leave its marks over the surface.

TOOLMARK IDENTIFICATION: PRE – DAUBERT

- 1) In *State v. Fasick*³³: The Washington Supreme Court held that it is inadmissible for an expert to identify a particular knife as the source of cuts on branches³⁴.
- 2) In *State v. Clark*³⁵: As a contradiction to the previous case, the court upheld the admission of an expert testimony that the defendant's knife had made the cuts on branches. It was comprehended that the opinion in this case pertaining to the admission of forensic identification testimony as a sign of scientific progress and misleadingly analogizes toolmark to fingerprint identification³⁶.
- 3) In *United States v. Bowers*³⁷ - The court held that the toolmark identification rests upon the scientific basis and is a reliable and accepted general procedure³⁸.
- 4) In *Commonwealth v. Graves*³⁹: The expert did not make any unique testimony different from the other cases but he testified that though the defendant's fingernail cannot be characterized

³¹ *id.* Pg. 356.

³² The Foundations of Firearm And Toolmark Identification, available at: https://www.nist.gov/system/files/documents/2016/11/28/swggun_foundational_report.pdf (April 10, 2020, 6.30PM).

³³ *State v. Fasick*, 149 Wash. 92, 270 Pac. 123, 1928.

³⁴ Association of firearm and Toolmark Examiners, *supra note 2*.

³⁵ *State v. Clark*, 156 Wash. 543, 287 Pac. 18, 1930.

³⁶ Association of firearm and Toolmark Examiners, *supra note 3*.

³⁷ *United States v. Bowers*, 534 F.2d 186, 193, 9th Cir., cert. denied, 429 U.S. 942, 1976.

³⁸ Paul C. Giannelli, *Firearms and Toolmark Evidence*, School of Law Case Western University, Faculty Publications, (1985).

³⁹ *Commonwealth v. Graves*, 461 Pa. 118, Pa. 1975.

as unique still, there is a high probability that this nail or any nail of this shape has rendered this scratch on the victim’s neck. Upon further examination, the expert asserted that the defendant’s fingernail is the source. The court upheld the admissibility of the testimony given by the expert, giving the reasoning that the recognized field of toolmark examination extended to wound marks herein referred as toolmarks, whether made by firearms, knife, blunt instrument or fingernails and accurately identified the issue of the case that the defendant’s nail caused the scratch⁴⁰.

TOOLMARK IDENTIFICATION: POST – *DAUBERT*

- 1) In *Commonwealth v. Foreman*⁴¹: The Pennsylvania Superior Court held that the *Frye* objection to the admission of toolmark identification testimony would not have been admirable. Without contemplating scientific issues, the court stated that “this court has previously held that tool mark identification is a scientifically recognized area for expert testimony.” The court then held that, because prejudice had not been shown, counsel was not ineffective for failing to object to testimony that metal punch stamps were the source of altered serial numbers⁴².
- 2) In *U. S. A. v. Kevin William Harpham*⁴³: The US District Court in this case was dealing with the motion for *Daubert* hearing to exclude toolmark evidence of a crimping plier identified in the fabrication of an improvised explosive device. The judge in this case concluded that toolmarks are reliable by stating that⁴⁴:
 - a) Toolmark identification like any other “match” evidence, for e.g. handwriting, cannot be considered as a novel technique as it has been an investigative tool for a long time.
 - b) The dearth of universal guidelines or standards on plier marks doesn’t debar them as an evidence.
 - c) The lack of consensus amongst scientists and the undeniable perception that there is room for improvement in the area of tool mark identification does not mean that such evidence cannot minimally satisfy *Daubert*.

⁴⁰ Association of firearm and Toolmark Examiners, *supra note 4*.

⁴¹ *Commonwealth v. Foreman*, 18 P. 1268, Mass. App. Ct. Oct. 11, 2019.

⁴² Association of firearm and Toolmark Examiners. *supra note 5*.

⁴³ *United States v. Harpham*, No. 12-30063, 9th Cir. 2014, 564 Fed. Appx. 907, 9th Cir. 2014.

⁴⁴ Association of firearm and Toolmark Examiners, *supra note 6*.

TOOLMARK IDENTIFICATION: INDIAN SCENARIO:

1) In *H. P. Administration v. Om Prakash*⁴⁵: In this case, a button was recovered which gives a direct clue to the presence of the accused at the time when the offence was committed. The experts had matched the upper button that was recovered from the accused with the button that was recovered from the room where the deceased was murdered. The report of the forensic expert held that button is from the accused's coat. Upon completion of examination, the accused denied that the coat belonged to him and the learned advocate stated that the memos relating to recovery which were signed by the accused, were all fake. The experts had convinced the court by saying that the recovery was done on the 1st itself therefore, there is no point in faking it on the 7th. Also, that the coat and sweater was recovered from his room and there can be no doubt regarding the ownership of the coat and sweater⁴⁶.

CONCLUSION

The science of toolmark identification is an applied science often operated for forensic purposes to aid the criminal justice system for description to a court of law. A criminal often renders the use of any tool for the commission of a crime either to break open through a door or window or to cut the fencing wires or to dig a hole through the wall. Henceforth, these tools render a mark which is mostly permanently embedded on the surface on which they use the tool. It is mostly comprehended that the nature of the toolmarks depends on the nature of the crime⁴⁷. For example; if any telephonic or electric wires are stolen, then there will marks of cutting instruments found on the left-over surface of such wires. If the accused makes an entrance by breaking the window, there is a high possibility that accused's clothes may have glass fragments.

Toolmarks are ordinarily visible to the naked eyes of a man but small cuts or scrapes may be visible upon placing of a light over it⁴⁸. They can be available on any surface or material that comes in contact with a tool, like; stone, paint, earth, paper, cloth, sealing wax, plastics, wood, metal, etc. There are several scientific techniques that can be utilized for the collection and evaluation of the toolmarks formed at the scene of crime. Several standards and guidelines have to be maintained while collecting the toolmarks from the crime scene, also, the packing of these

⁴⁵ *H. P. Administration v. Om Prakash*, AIR 1972 SC 975.

⁴⁶ B. R. Sharma, *supra note 3*, 440.

⁴⁷ B. S. Nabar, *supra note 2*, 221.

⁴⁸ B. R. Sharma, *supra note 4*, 431.

marks have to rendered cautiously so that it does not damage these marks. It is said that toolmarks are permanent and can be retrieved from the scene even after a long time, but, once a mark has been collected from the scene, the second time the exact same mark will not be collected as the specific intrinsic would have been lost.

In India, forensic science is still a developing subject and not many experts are being fully utilized in solving the case laws using the evidences available on the scene of crime. Along the course of this research, it can be comprehended that, by harnessing proper standards and methods, toolmarks can also be an exceptionally admissible evidence used to fight a case in the court of law. A toolmark can also be regarded as an essential evidence which will trace back directly to the culprit upon proper examination, just like fingerprints, footprints, hair, fiber, and track marks. It is imperative to have a check against fraudulent testimony, therefore, numerous courts have expounded criterion for the approval or rejection of the presentation of expert testimony. Such guidelines have also evolved over the years and now it relies upon the judges with the final decision regarding the reliability of the assertion in issue. Toolmark identification has constantly been via the legal analysis and has provided help for the communities around the world in solving crimes.

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