

Accident Reconstruction of Road and Vehicular Cases

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What is Forensic?

The word "forensic" comes from the Latin word "forensis" meaning “ of or before the forum relating to debate or discussion before a group or body constituted to resolve a dispute or an issue or matter:"

1. Relating to or to be used in, or for appropriate for courts of law or public discussion or argumentation.
2. Relating to the application of scientific principles and technology in the investigation and establishment of facts or evidence in a court of law.

Few laws of accidents

- **Section 80 IPC:** Accident in doing a lawful act- Nothing is an offence which is done by accident or misfortune, and without any criminal intention or knowledge in doing of a lawful act in a lawful manner by lawful means and with proper care and caution
- **Section 279 IPC:** Whoever drives any vehicle, or rides, on any public way in a manner so rash or negligent as to endanger human life, or to be likely to cause hurt or injury to any other person, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to one thousand rupees, or with both

Today we will focus on different types of vehicular accidents and the relevance of forensics in accident reconstruction

Types of vehicular accidents

- Side-Impact Collisions.
- Rear-End Accidents
- Vehicle Rollover
- Multiple Vehicle Collisions
- Sideswipe Accidents
- Collision etc.



- Vehicular collisions can also lead to fire



Importance of forensics

Importance of forensics in accident reconstruction

- In cases of vehicular accidents, several versions of the incident is narrated.
- With the help of forensics, the accident is reconstructed to understand **the 6w (Who, What, Where, When, Why and hoW)** of the accident would have actually occurred.

Common causes of accidents

- Over speeding
- Drunken driving
- Driver distraction
- Red Light jumping/other traffic rule violation
- Avoiding Safety Gears like seat belts and helmets
- Avoiding animals/people on the road



Importance of accident reconstruction

When an accident does occur, it is important to investigate it thoroughly, especially if someone has been injured or killed or if a crime has been committed or if the property/vehicle has been damaged. Reconstructing an accident is a key element of such investigations.

- For Insurance Claims
- To ascertain the truth and punish in case of wrong doers

Role of a forensic scientist

- Site examination
- Vehicle examination
 - At the site
 - Secondary location (workshop/garage/road side) etc.

Vehicle at the incident site



Vehicle at a secondary location



Vehicle moved to a workshop

Vehicle moved to a dump yard



Locard's Exchange Principle

“Every contact leaves a trace”

In case of an accident of a vehicle with a stationary or moving object, there will be always be transfer of material/paint or some form of other trace materials onto the vehicle and other object/vehicle in question

Examples of site conditions

- Road skid marks



- Collision with a stationary object- tree



- Collision with a stationary object- flyover barrier



Vehicle collision resulting in fire

- Upon collision of a vehicle with a stationary or moving object, more times than one, it results in fire due to rupture of electrical wires leading to short circuit or frictional sparks coupled with leaking fuel, motor oil etc. leads to ignition of fire.

Example- 1

- Truck collided with a tanker, lost control, tyres dislocated and skid on the road. Electrical wires got ruptured and sparks generated leading to fire.



Example - 2

- Vehicle collided with a tree in an attempt to save a stay Nilgai on the road and resulted in fire.



Types of examinations at site

- The purported site should be carefully examined to determine if the accident has in fact occurred at that location
- Physical examination of the object(s) in question
- Measurements — of damages/skid marks/burnt marks etc.
- Collection of physical evidence— paint/rust/burnt debris etc.

Collection of circumstantial and corroborative evidences

- Interaction with eye witnesses
- Interaction with driver(s)/passengers
- Interaction with localites/residents/shops
- Verification of CCTV footage/video recordings etc.
- Collection of toll receipts/other documents if available
- Interaction with authorities such as police/fire department etc. to gather any relevant information

Vehicle examination

The vehicle in question should be carefully examined for several different aspects to ensure accurate reconstruction of the incident

- Dents/collision/impact marks
- Damages sustained
- Fire travel patterns



Commonly carried out laboratory examinations

- Scanning electron microscopy-energy dispersive X-ray analysis (SEM-EDX) - to examine transfer of paint samples
- Stereo microscopic examination- to check burnt electrical wires for electrical short circuit
- Gas chromatography- Mass spectrometry- to check for the presence of fire accelerants

DNA examination- cases of suspected driver change

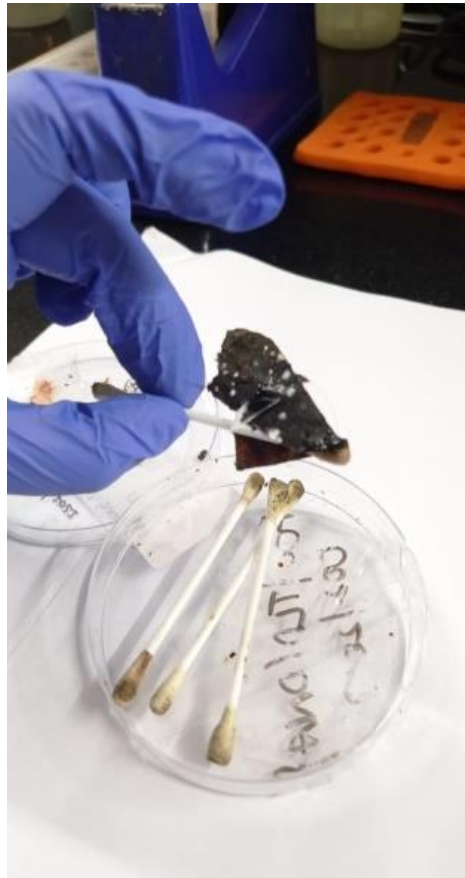
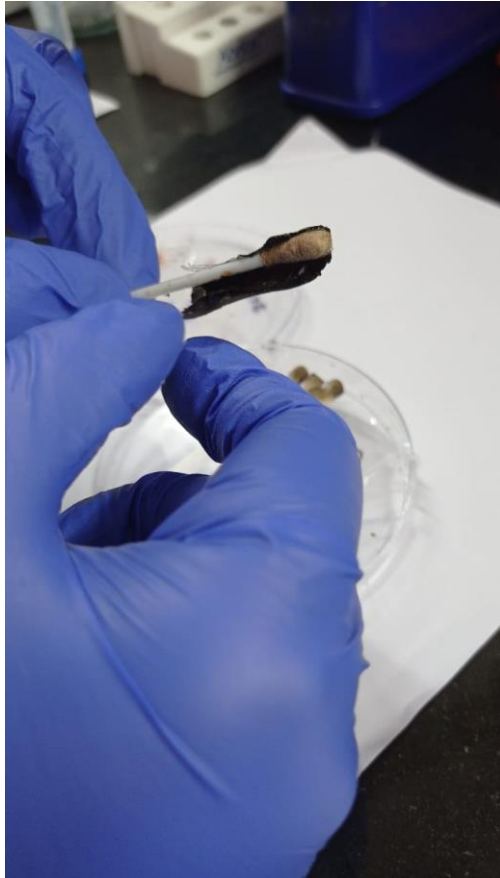
- DNA analysis- In some cases of accidents, it is often suspected that the driver being represented might not be the one really driving the vehicle. In such cases, DNA examination is conducted to determine if the blood/hair sample collected from the damaged vehicle (driver's side) actually belongs to the person in question or was he implanted in place of another.

- These are often seen in cases where the person driving is underage or does not have a valid driving license



Case study- 1

- A tipper carrying load was plying from Mumbai to Kochi.
- The driver was present in the vehicle along with a cleaner.
- In a jungle area, the truck reportedly met with an accident on the driver's side while trying to save a stray cow on the road at about 11:00 pm in the night.
- The cleaner was found to have sustained more damage despite less damage to the co-passenger side which raised suspicion.



Result

- DNA examination of the blood sample found in the driver's side revealed that it belonged to the cleaner indicating that he was in fact driving the vehicle during the accident.
- As the cleaner did not have a driving license, the driver falsely stated that he was driving the vehicle.



Case study- 2

- A car which met with an accident was reportedly being driven by Mr. X.
- While driving, a vehicle reportedly came in the opposite direction and to manoeuvre, the car took a turn and collided with the divider on the front left side.
- The co-passenger Mr. Y could not get out from the left door. So he also got out from the driver's side. Mr. Y's injury was found to be more than Mr. X.

- While getting out, Mr. Y's blood fell on the air bag in the driver's side. It was corroborated by DNA analysis.



Chassis number restoration

- In certain cases, the come across vehicles suspected to have altered the chassis number
 - for insurance claims
 - for use in criminal activities.
- Chemical etching process is used to identify the underlying original number of the chassis

Case Study

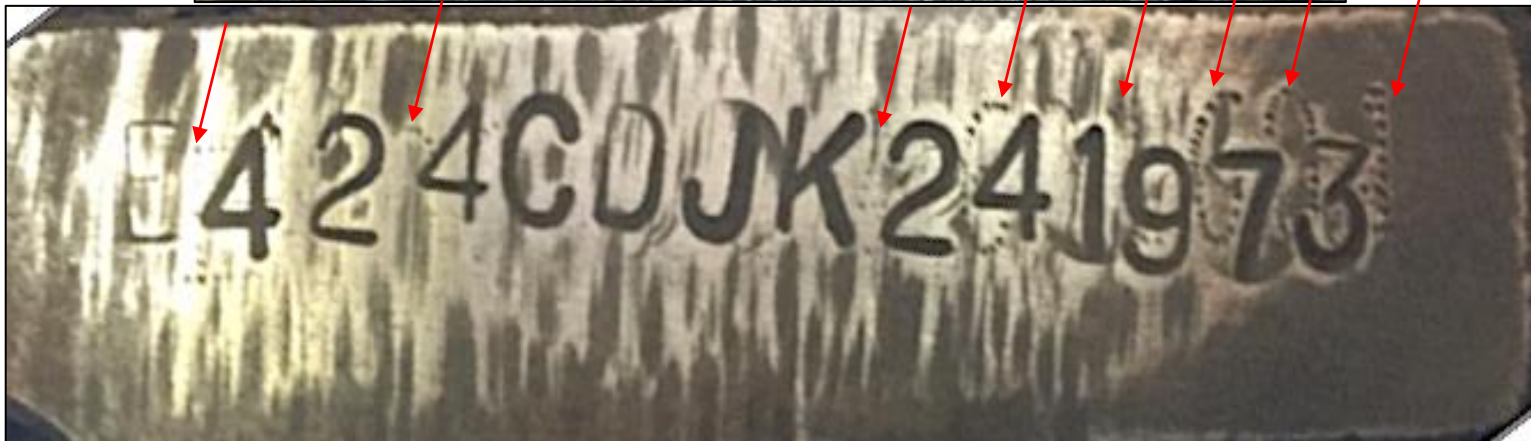


Suspected vehicle

Current chassis number



Restored chassis number



Interesting cases

Case Study - 1

- A Toyota Fortuner was said to have met with an accident Dushara Bagh flyover, Lucknow-Faizabad Road, Uttar Pradesh at 1:00 am by crashing onto the divider from the driver's side while trying to save a stray animal.
- The car tumbled towards its right about 2-3 times and stood on its roof.
- The driver did not sustain any major injury.

Views of the damaged car



Analysis results

- The Expert team inspected the vehicle and collected paint samples, rust samples and soil samples.
- Results indicate that the object with which the vehicle collided could have been of metallic body with high iron/magnesium content such as the carriage of trucks confirming that the incident vehicle crashed and slid underneath the carriage of a heavy vehicle such as trailer/trolley/load body of truck

Analysis results

- The results of SEM-EDX analysis of soil sample indicated presence of elements in high quantities which are not found in sample of soil collected from the vehicle indicating that the vehicle had met with an accident at some other location
- Rust analysis of the rust collected from the vehicle indicate that the rust formation at the affected parts had occurred several days prior to the reported accident.

Reconstruction

- The Expert team then compared the damaged vehicle with the pre inspection photographs and found several differences indicating that the two were in fact different.
- The maximum damage was observed in the rear right side of the vehicle. The findings were contradictory to the description of incident given by the Insured which would have resulted in damages of different pattern and location

- Thus based on the physical, circumstantial and corroborative evidences, it was inferred that the vehicle which was reported to have met with an accident is different from the one shown in the pre inspection photographs and the cause, time and manner of accident of the vehicle inspected by the Expert team does not corroborate with the version of incident stated by the insured and driver



THANK YOU