



For a drunk driving victim, the how and why of a crash are torturous questions often answered with scarce data, misinformation and conjecture.

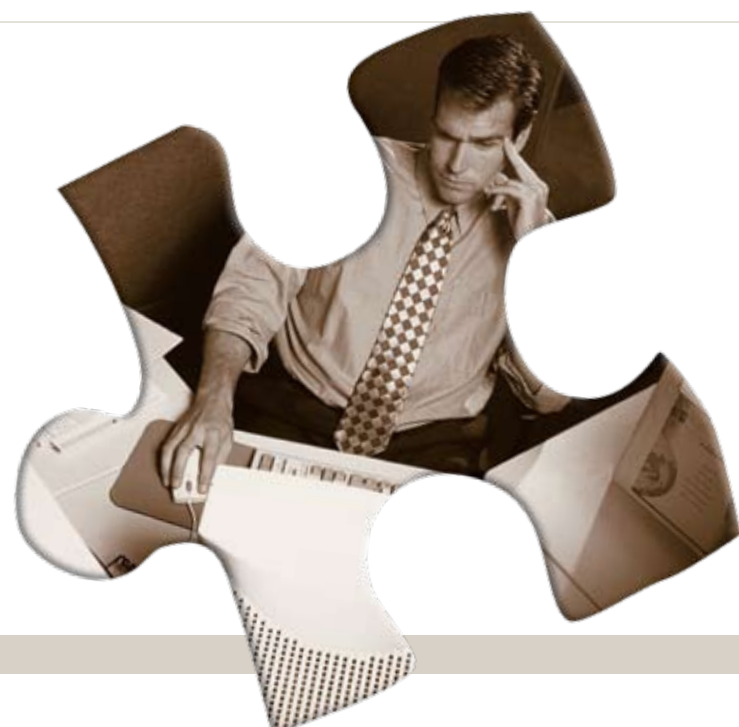
For a crash reconstructionist, the how and why of a crash are probing questions always answered with evidence, physics models and scientific analysis.

So if a crash reconstructionist can provide answers victims desperately need, why don't all drunk driving victims hire one? Exactly how does a reconstructionist so accurately reconstruct a crash that happened in mere seconds? And, is a reconstruction necessary for your drunk driving crash?

# Model Behavior

By Cole Martin, Freelance Journalist

Crash Reconstructionists Help Answer the How and Why of a Drunk Driving Crash



## When to Reconstruct

Crash reconstruction is like putting together a "jigsaw puzzle," says John Painter, a traffic safety consultant who specializes in crash reconstruction. "My job is to determine how two vehicles came together and why the crash happened—basically, why the drivers did what they did."

Sometimes police departments have their own on-staff reconstructionists. Sometimes it's wise to hire your own. "You want a crash reconstructionist if there are some issues of fact that are unresolved by witness accounts or other evidence," explains attorney Daniel Ragland. "If you think you may want to pursue a civil case, you should hire a crash reconstructionist as soon as possible. In some instances, the entire case rests upon the crash reconstruction analysis."

In a criminal case, victims can inquire whether a reconstruction is being done, but they cannot request one. If you suspect an investigation is not being properly handled, you have the right to seek an attorney who can then hire a reconstructionist to shadow the police.

In fact, leaving crash reconstruction solely to the police can be a gamble. Their skills and training vary greatly, Painter says, adding that crashes are only reconstructed if they anticipate prosecution. "You may have to conduct a shadow investigation, because you cannot count on them to collect all the evidence you will need."

Your reconstructionist's analysis also may interest the district attorney (D.A.). While you cannot force the D.A. to use the information, he or she may consider calling your reconstructionist as a witness.

The D.A.'s office determines the course of criminal cases, but you determine the course of a civil case. And that is why hiring a crash reconstructionist right away is essential—especially because civil suits can take several years to reach the courts. If you wait, evidence can be destroyed or disappear, witnesses can become difficult to locate and their memory of the event can fade, or you may find that the police who investigated the crash didn't collect adequate evidence.

"The immediacy with which you hire a reconstructionist to collect and preserve evidence before it goes away is the single most important thing," Painter says. "A reconstructionist can go to the scene before all the evidence has disappeared and document everything properly. You cannot rely on the fact that the police have documented anything because they will not release that information until the prosecution is over. You are in 'no man's land' if you trust what they have done is going to serve you well in a civil case."



Reconstructing a crash is not guesswork. It is a complex science involving physics, mathematics and technology to determine crush coefficients, energy calculations, deceleration forces, displacement, contact and induced damage, and even occupant motion.

Ragland agrees. “It is important for the reconstructionist to be able to go to the scene when it is fresh and not contaminated—when original data still can be collected. Otherwise, the reconstructionist has to use data from other people, which is not always complete.

“There also is a statute of limitation,” he says, “so you want to retain people to investigate while the evidence is available and there is an opportunity to determine how and why it happened.”

#### Collecting Evidence

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The first step in the process is reporting, which involves a police officer at the scene recording important information about the crash. This report gives the reconstructionist an idea of what occurred, and helps him plan his response to the scene.

The second step is “at-scene investigation.” If police officials feel a collision is serious enough to document roadway evidence, they will usually close the road to do this at the scene. If a reconstructionist is immediately notified of a crash while evidence of it is still visible on the roadway (this can be days or even months later), he will conduct an on-scene investigation where he determines—in reverse chronological order—where the vehicles

came to rest and what their paths were by examining the vehicles, skid marks, tracks and marks in the road.

The third step in the process is delayed-data collection. Whether the crash was two days or two years earlier, a crash reconstructionist still can collect additional evidence and data from the roadway, including any remaining skid or gouge marks and the geometry of the roadway, which is later used to build two- or three-dimensional models or drawings.

Similarly, a reconstructionist can gain valuable information from the vehicle—even if it is at the junkyard. While vehicle information can sometimes be gathered years after the fact, if a vehicle is seriously damaged, you may lose your window of opportunity if you don’t act quickly.

“If a car is not repairable, it will typically be sold for scrap within a month,” Painter says. “So if you don’t hire a reconstructionist immediately, he or she will be limited to looking at photographs of the car and be unable to collect evidence or conduct measurements of the vehicle.”

Ragland agrees. “Looking at the crashed vehicles is critical. You never want to allow disposition if you think a reconstruction is necessary, because once the vehicles are gone, you cannot recover that evidence.”

#### Seeking More Data

If the vehicle can be tracked down, crash reconstructionists look for two types of damage: contact and induced. Contact damage involves the areas where both vehicles touched each other during impact. Induced damage is the general deformation of the vehicle from the forces of the collision. The displacement—or crushed area—of various metal components of the car is measured and is important in determining impact speed.

The reconstructionist uses his vehicle measurements to create a scaled diagram of the vehicle in its damaged condition. A comparison to the vehicle in its undamaged condition reveals how much metal has been displaced or crushed. Thus, the reconstructionist can calculate the energy dissipated in bending the metal, which helps to determine impact speeds.

The analysis may also use crash test data—typically from federal government crash tests—to determine crush coefficients, or the stiffness of the vehicle, Painter explains. Those numbers go into the damage assessment as energy calculations.

Tire and skid tests also are conducted at this stage. An accelerometer—a machine that measures deceleration forces when locked brakes cause the wheels to skid—provides an estimate of the slipperiness of that particular road surface.

Reconstructionists recently have been able to access a treasure trove of information from the “black box” in some vehicles.

For example, some black boxes capture what the driver was doing five seconds before impact—including speedometer reading, throttle position, engine RPM and whether the brake light circuit was activated. This data is particularly helpful in determining how hard, if at all, the brakes were applied. This is key in establishing reaction times—an issue in drunk driving cases.

#### Professional Reconstruction and Analysis

After delayed data collection, the fourth step is professional crash reconstruction—the point at which the physics model is built. “The physics model is created by placing the

vehicles together on a scale diagram as they were at the time of the collision and then using skid distances, friction values, damage dissipation and other data to calculate vehicle speeds,” Painter says.

At his office, the reconstructionist analyzes vehicle damage, looking specifically at contact damage of the vehicle and the direction of force that crushed areas. Once he determines how the contact damage was displaced, an arrow is placed on both vehicles to indicate the direction of force. Based on Newton’s third law of motion—forces are equal and opposite—the two vehicles are put together so that the arrows are in equal and opposite directions. The arrows show how the vehicles interacted and how they would react during the impact process.

The vehicles—and their motions—then can be drawn upon a scale diagram of the crash scene consistent with other physical evidence, representing the vehicles at impact.

Next, the reconstructionist will compute vehicle speeds and analyze driver steering and braking. He also may evaluate whether one or both drivers reacted in a timely and proper manner.

If necessary, the reconstructionist may even be able to use the data he’s collected to determine who was driving at the time of impact—a crucial determination, since drunk drivers often claim that another occupant was driving.

The at-scene police officer has the best opportunity to collect forensic evidence to determine who was driving. However, a reconstructionist can make an accurate determination even if the evidence is not fresh by evaluating the physics of the vehicles. The direction of the force helps explain how individuals moved in the vehicle and what parts of the vehicle they would have contacted. Computer simulation can sometimes help establish where the driver should have moved during collision, and the injuries he should have sustained.

“In a computer environment, we put two vehicles in motion and run them into one another,” Painter explains. “The computer calculates the forces involved, how the vehicles moved and how they rotated. Once we have a good computer simulation of the vehicles, then we take those forces and put them into an occupant motion computer program, which can put virtual people in various seats in a three-dimensional model. We then watch how they would move relative to the forces of the vehicle, thus determining who was driving the vehicle at the time of the crash.”

This extent of a physics model is seldom necessary, but it is quite effective fighting the occupant-position defense.

During this phase of professional crash reconstruction, witness testimony also is considered. “Because witness testimony is highly fallible, we run it through the physics model to see if it is reasonable,” Painter explains. “When interpreted properly, physical evidence does not lie. That is why answering questions through physical evidence is our primary method of analysis.”

#### The Final Stage

The fifth and final stage of reconstruction is cause analysis. “Cause analysis is determining the ‘why’ of a crash,” Painter says. “This can be a somewhat subjective area because you’re trying to determine why the drivers did

what they did. We look at how people typically do things—a generalization of driver behavior.”

For example, from the time you see a hazard, deem it to be a threat, make a decision on what to do about it, and take your foot off the accelerator and press it on the brake pedal, generally about 1.5 seconds will elapse. Other factors reconstructionists consider in the analysis are driver training, fatigue issues and the various characteristics of the vehicle and the road.

Painter says, “For people in a drunk driving case, this area is extremely important because determining who was in violation of traffic laws is a function of how the crash occurred. The physics model shows that.”

#### Downsides

Crash reconstruction can be a tremendous help to those who are victims in a drunk driving crash. The process answers questions and can provide key evidence for a civil case.

However, hiring a reconstructionist can have downsides.

“If the results do not favor your case and you decide not to use the analysis, it could be used against you,” Ragland cautions.

Cost also is a factor, he says. “Depending on whom you hire, an initial investigation and opinion could run from \$2,500 to \$5,000. From investigation to testifying, the whole process could range from \$12,000 to \$15,000.”

Ragland also advises clients to take into consideration where the case will be tried and the type of people who live in the area. “A crash reconstructionist is an expert who has been hired to develop an opinion. He wasn’t there, didn’t see it happen, isn’t an eyewitness, and is using all these scientific, engineering and mathematical formulas. There are a lot of people who will listen to that and take it into consideration. There also are a lot of people who will reject it and say that it is a lot of hocus-pocus,” he says.

#### Better Safe Than Sorry

With all there is to consider, right after a crash you might not feel you’re able to make the right decision about hiring a reconstructionist.

“Even if you initially decide not to file a lawsuit, you still have the right to hire a reconstructionist,” Ragland says. “That way, if you get to the point in your grieving process that you do decide to pursue something in the civil area, it’s not too late; the evidence has been preserved.”

Painter adds another perspective. He looks at it through the eyes of the drunk driving victims haunted by unanswered questions.

“You are going through the grieving process and may not be interested in a civil suit,” he says. “But over the long run, you want to know how and why your loved one was killed or injured. That knowledge is reward in and of itself.”

