

Motor Vehicle Crash Analysis: Obtaining Honest Answers about Vehicle Collisions

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Honestly Speaking

“It wasn’t my fault” is the most often heard statement made by drivers at motor vehicle crash scenes. It is a rare occurrence when a driver will readily admit any degree of fault in a vehicle crash. The fact that a driver was speeding while talking on the phone and eating a hamburger when the crash occurred would not stop them from denying any wrongdoing. The information contained in this article will assist you with deciphering the true causes of crashes involving your organization’s drivers.

First Things First

The first thing that needs to be understood when it comes to motor vehicle crashes is that there are no silver bullets when it comes to trying to figure out the causes behind why a crash occurred; there are many variables. Very few crashes are strictly black and white. Most of them fall into the gray area. When coupling this fact with the deceptions being offered by the drivers involved, it is easy to understand that trying to assess the true causes of vehicle crashes can sometimes be a little tricky. Don’t lose heart. Reviewing all of the evidence and the facts of the crash will help you accomplish your goal. With some knowledge of crash causation and a good bit of fortitude, you can get to the truth.

Crash Investigation Basics

There are two factors involved with the basics of crash investigation. They are Physical Factors and Human Factors.

Physical Factors

Physical Factors may include, but not be limited to, traffic controls, road design, driver sight distance, vehicle failures, and weather.

Traffic Controls – Traffic controls include traffic signals, stop signs, yield signs, speed limits, pavement markings, warning signs or any other device or marking that directs or alerts drivers. When investigating a crash, you must determine what traffic controls affected the drivers involved. Did they have a stop sign? What was the speed limit? Were there road signs that

alerted drivers to approaching curves in the road? All of this must be considered and then compared to the driver's actions in relation to these traffic controls.

For example, if a driver ran off the road because they were not able to negotiate a curve, you may want to determine if there were warning signs in place at the approach of the curve. If there were no signs, you may be able to conclude that poor road design and the lack of signage were contributing factors in this crash. However, if there were warning signs in place, you can probably establish that the driver was not attentive to the signs and was traveling at a speed that exceeded the critical speed for that particular curve. If that is the case, you can then conclude that driver error was a main cause for this crash.

Determining what traffic controls were in place can be accomplished by reading the police accident report, by speaking with the investigating officer, and/or visiting the crash site. Or, if you have someone in the area where the crash occurred, you can have him or her visit the site for you.

Road Design – Road design can play a role in the cause of a crash. In example, if there is an intersection where 45-degree collisions are common, the design of that intersection may have something to do with why these crashes are occurring. Can the drivers see properly as they traverse the intersection? Is there proper signage and are the traffic lights timed properly? This information may not be available to you, but it is prudent to listen to driver complaints. If they are making claims that there were road design problems that contributed to the cause of the crash, check it out. Talk with the investigating police officer and learn if there is any credence to the driver's claims of poor road design.

Sight Distance – Sight distance can play a major role when determining why a crash occurred. This is particularly important at intersection crashes. What was the perspective of the drivers as they approached the area of the crash? Did they have a clear sight distance? Should they have been able to see the other vehicle prior to the collision? Things that have to be taken into account include obstructions such as poles, trees bushes and parked vehicles. It must be determined if there were any in vehicle sight obstructions such as items hanging from the inside mirror, items attached to the windshield, cargo, or passengers that blocked the driver's view. You also must consider reduced visibility due to weather and sun glare. For example, was the driver looking east at 7:35 AM on a clear morning? If so, it may be possible that the driver had the sun in their eyes and did not see an approaching vehicle. You must also look at the perspective of the approaching vehicle. Could that driver have seen the vehicle that was entering their path of travel? If so, could they have avoided the collision? When considering sight distance in a crash investigation, you must put yourself figuratively behind the wheel. You must think in terms of, what did the drivers see, or should have seen, as they approached the crash scene and as the crash occurred.

Vehicle Failures – Two of the most reliable systems on today's vehicles are the brakes and the steering. This fact does not dissuade many drivers from making claims that their brakes failed, or the car would not turn. In reality, the most common reasons why drivers have trouble stopping, or negotiating a curve is due to the fact that they were traveling too fast. It is easier to say - The vehicle didn't work right, than it is to say - I was driving too fast. Vehicle systems failures are somewhat simple to verify or discount. An inspection of the vehicle by a certified mechanic and/or a download of data from the vehicle's event data recorder (This will be discussed in

greater detail later in this article.) will provide you with the information needed to determine if a vehicle failure actually played a role in the cause of a crash.

Weather – There are three ways to control a vehicle – steering, braking and accelerating. If you are driving in bad weather, all of these can be adversely affected. As a crash investigator, you need to determine whether weather was the cause of a crash, or was it driver error.

Drivers like to deflect blame by stating that slippery road conditions due to the weather caused them to crash. There are times when that may be the case. What you need to find out is if the driver was driving the vehicle in a manner that compensated for the conditions at the time when the crash occurred. For example, let's say one of the drivers from your organization is involved in an intersection collision. In this crash your driver was not able to stop in time for a red light and slid into the intersection and was then struck in the left front fender by an oncoming vehicle. Your driver's claim is that, due to the wet and slippery road conditions, he could not stop as quickly as normal and this caused the crash. What you need to determine is if your driver had adjusted his speed and driving techniques to compensate for the slippery conditions. At first glance it seems obvious that he did not. But, you may want to dig a little deeper and find out how long it had been raining prior to the crash. Also, try to determine when was the last time there had been any appreciable rain prior to this particular storm. The reason is due to the slippery road conditions that exist at the beginning of a rainstorm due to grease and dirt that build up over time. This is especially the case when there has not been a rainstorm for some time. Also, these conditions typically occur at intersections where cars drop a good deal of grease and debris. Depending on how hard it is raining, these slippery conditions typically dissipate after fifteen to thirty minutes. If it had just started raining, and it had not rained for some time when this crash occurred, your driver may have more of a legitimate excuse than you first thought.

Human Factors

When discussing human factors involved in a crash investigation, there are many areas that need to be examined. These include, but are not limited to, driver actions both prior to and during a crash event, distractions, fatigue, intoxicants and schedules.

Driver Actions – There are five actions that a driver can take in order to avoid a crash. They are – braking, steering, accelerating, decelerating and use of an audible device, in other words – blowing the horn. You must ask your drivers what actions they took in order to avoid the crash. Once you obtain that information, you need to ask them when they took these actions. The reasoning behind this is, in order to determine at what stage of the crash event the driver reacted.

There are eight stages to every crash. These include: 1. Point of First Possible Perception – This is the point where a driver could have first perceived that a crash event may happen. 2. Point of Perception – This is the point where the driver realizes that a crash event is going to happen. 3. Action Point – This is the point where the driver takes action to avoid the crash. 4. Point of No Return – This is the point that, no matter what the driver does, the crash is going to happen. 5. Collision – This is when the vehicle makes impact. 6. Maximum Engagement – This is when the vehicle, and whatever it is colliding with are crushed together to the maximum capacity. 7. Disengagement – This is when the vehicle and whatever it collided with separate. 8. Post Collision Travel – This is the time immediately following the crash when the vehicle comes to a stop. Depending on the severity of the collision, this may be a controlled stop where the driver

directs the vehicle, or an uncontrolled stop where the vehicle rolls to a stop with no assistance from the driver. 8. Final Rest – This is the final position of the vehicle after it comes to a stop. Determining the actions of the driver, and comparing that with the stage of the crash when the driver reacted, will assist you in determining if the driver perceived and reacted in a timely manner. In example, a driver may relate that he applied the brakes to avoid another vehicle that pulled into his path of travel. The next question that should be asked is – When did you first see the other vehicle? If the driver states that he did not see the vehicle until it was directly in front of him, you may want to determine if the driver's sight line was obstructed. If the driver had a clear sight line, it may be possible that your driver was distracted prior to the collision and that is why he didn't see the oncoming collision. The crash may not be his fault, but if he had noticed the vehicle at the stage of - Point of First Possible Perception, he may have been able to avoid the crash.

Distractions - Driver distraction is getting a great deal of attention these days due to the use of cell phones and texting while driving. This attention is a good thing. Awareness of a problem is the first step in correcting it. However, there are far more distractions that occur with drivers than just cell phones and texting. There are two types of driver distraction. They are – Mental Distractions and Physical Distractions.

It is easier to determine if a physical distraction may have played a role in the cause of a crash versus trying to determine if a mental distraction was involved. If it is noted in an accident report that there was a smashed Big Mac on the windshield of the vehicle when the investigating officer arrived at the scene, you can probably surmise that the driver was having a snack while they were driving. With regard to cell phone usage, a check of phone records will help you determine what activities were occurring when the crash took place. If you, or someone for you, are able to conduct a post-collision examination of the vehicle, look for signs that the driver was pre-occupied while driving. Are there work items in the driver area? Are there food remains? Did the driver's laptop computer become damaged when the crash took place? If so, where was the laptop just prior to the crash that would have exposed it to this damage?

Mental distractions take place all of the time. All drivers can relate to driving to a location and having trouble recalling anything about the drive. In order to determine if your driver was focused on the driving task when the crash took place, ask them about their surroundings. Ask them what vehicles were behind them, in front of them and to their sides prior to the collision. Ask them what traffic controls were in place where the crash occurred. If they are unable to provide answers to most of these questions there is a good chance that they weren't thinking about driving as they approached the area of the crash.

Fatigue – The National Highway Traffic Safety Administration estimates that, in the United States alone, there are 56,000 fatigue related crashes annually. These crashes cause 40,000 injuries and 1,550 deaths. The National Transportation Safety Board advises that 52% of the commercial truck crashes that occur are as a result of fatigue. A study conducted in North Carolina revealed that 31% of the drivers interviewed during the study advised that they have dozed while driving. Considering all of this, do you think that any of the crashes that occur within your organization may be fatigue related?

There are signs and symptoms of fatigue related crashes. First, look at the time of day. There are two times within a twenty-four hour day when fatigue related crashes are most

common. They are between 2:00 and 6:00 AM and between 2:00 and 4:00 PM. Consider these times when trying to figure out how, and why a crash occurred. Also, look at the nature of the crash. Many fatigue related crashes involve run off the road collisions and lane drifting collisions. Also, try to determine what actions a driver took to avoid the crash. If you are able to determine that the driver took no action, or reacted far too late, it is possible that fatigue played a role in this crash. Ask your drivers about their sleep habits. Did they have enough rest prior to the crash? Are they prone to fatigue at certain times of the day? Are there any medical conditions that may contribute to fatigue? Are they taking any medications that may cause drowsiness? All of this information may help you determine if fatigue was responsible for a crash that you are investigating.

Intoxicants – When considering intoxicants with regard to the cause of motor vehicle crashes, be certain that you do not focus only on alcohol. Prescription medications, over the counter medications and illicit drugs also cause numerous collisions.

In the event of a drunk-driving related crash that is investigated by a police department, it is probable that the investigating officer will make an arrest for the violation. If this situation involves one of your organization's vehicles, there is obviously little more that you will need to do to conclude the cause of the crash. In these instances do not rely solely on the police accident report. Obtain a copy of the police arrest report and the criminal complaint in order to gain a full understanding of the events surrounding the crash.

Schedule/Rushing – There are numerous reasons why running late for scheduled appointments is dangerous and leads to crashes. When a driver is running late they are distracted. The majority of their focus is on the fact that they are late. They are stressed and with each red light and slow down in traffic, their stress level increases. This leads to speeding, pushing red lights and other reckless driving activities.

When investigating a crash involving one of your organization's drivers, question the driver about their schedule. Ask them where their last appointment was, when did they leave and when and where was their next appointment? Check the mileage between the locations of the appointments utilizing a mapping program so that you can determine if the driver may have been rushing in order to get there on time.

Common Crashes and Their Causes

In order to properly investigate car crashes, it is important to understand the most common reasons why collisions occur. The three most common crashes that happen each year are the strike from behind collision, the reverse driving collision and the intersection collision. The reasons why these crashes occur are as follows:

The Strike From Behind Collision – Following too closely and driver distraction are the two most common reasons why this type of crash occurs. As always, drivers must remain focused on the driving task when they are behind the wheel. With regard to following distance, under ideal dry road conditions, a driver should keep at least two-seconds of distance between their vehicle and the one they are following. With each worsening road condition, the following distance

should increase. Four-seconds on a wet road and six-seconds on a road with light snow cover. If there is heavy snow or ice, vehicles should be parked.

The Reverse Collision – Reverse collisions occur due to reduced sightlines to the rear and reduced skill levels of drivers. Considering this, drivers should avoid driving in reverse as much as possible. Utilizing pull through parking spaces whenever possible is the best way to avoid these collisions. In the event of a situation where a pull-through opportunity does not exist, drivers should back into a controlled parking space, rather than out into an uncontrolled lane of travel. If a driver does have to back up, they should take precautions that will decrease their chances of being involved in a reverse collision. Conducting a safety walk around prior to backing and tapping the horn prior to backing are two ways that will decrease the chance of a reverse collision.

Intersection Collisions - Drivers have a tendency of taking a “time out” when they stop at a red light. A driver must remain vigilant scanning ahead, behind and to the sides when stopped. Leaving escape space to the front is also important in order to avoid these collisions. When stopped behind traffic, a driver should stop back far enough so that they can see the rear tires of the vehicle in front of them touching the road. When stopped first in line, a driver should stop at least a half car length back from the intersection. By leaving escape space and scanning properly, a driver may have the ability to avoid the mistakes made by other drivers.

The Use of New Technologies in Crash Investigations

Event Data Recorders, Global Positioning Systems and Vehicle Telematics are all examples of new technologies that can assist an investigator in trying to determine the cause of a crash. Putting this newfound technology to use when investigating your organization’s collisions will provide you with information that was not available in the not too distant past.

Event Data Recorders (EDR’s)

Depending on the technology, the EDR’s in your organization’s vehicles may record speed, braking percentage, RPM’s and any system failures that occurred just prior to, and during a crash. Courts have ruled that the owner, or leaser of the vehicle owns the EDR information. Vehicle manufacture dealerships may be able to assist you with downloading the EDR information. You may also hire a crash reconstruction specialist to retrieve this information.

Global Positioning Systems (GPS)

GPS can assist an investigator with providing a vehicle’s start and stop times, mileage, and locations during any given trip when the GPS was used for that trip. Obtaining this information and then utilizing time and distance calculations can offer some insights in the speed the driver was traveling. Also, this information can assist in determining how long a driver was driving. If the driver had not stopped for an extended period of time prior to a crash, fatigue may have been a contributing factor.

Vehicle Telematics

There are various vehicle Telematics systems. These systems may utilize GPS technology and can provide advanced reporting capabilities that will provide important information that will assist you when investigating a crash. Some of these systems can alert you in the event of certain

driver activities such as speeding and reckless driving. The systems can also provide alerts for needed vehicle repairs and routine maintenance. It is easy to understand how this information will provide you with a great deal of data that will assist you with concluding how a crash occurred.

Putting It to Use

The following crash scenarios will assist you with utilizing the information that you just learned from reading this article. In each of these scenarios, you will be asked to determine what caused the crash, who was at fault, and what could the involved drivers do to avoid the collision. The answers to these questions will follow the scenario descriptions. Prior to reading the answers, think about the questions and see if your answers match those provided.

Scenario #1

A driver pulled into a parking space at an office complex where she had an appointment. When she parked, the space on her driver's side was unoccupied, and there was a compact car on the passenger side of her vehicle. When she returned, there was a van on her driver's side and a pickup truck on the passenger side. While backing out from between these two vehicles she was not able to see an oncoming car and her vehicle was struck on the right rear quarter panel.

What Caused the Crash? What Could the Driver(s) Have Done To Avoid the Collision? Who Was At Fault? The driver failed to find a pull through parking space. If a pull through space was not available, she should have backed into the space. She would have had a much clearer sight distance pulling out from between the vehicles, rather than backing out from between them. Also, if she had conducted a safety walk around she may have been more aware of the approaching traffic and other drivers may have seen her and realized that she was going to leave. She did not sound her horn prior to backing. Had she done so, other drivers in her vicinity may have been alerted to her movements and adjusted their driving accordingly. Obviously, in this scenario, the driver backing out from the space was at fault.

Scenario #2

A driver of a vehicle identified as vehicle 1, pulled up behind other stopped traffic at a red signal. The driver pulled close to vehicle in front of him. A driver of another vehicle identified as vehicle 2, was on the phone and did not realize in time that the traffic was stopped in front of him. This driver applied his brakes but was unable to stop in time. He hit vehicle number 1 which in turn pushed vehicle 1 into the stopped car in front of him.

What Caused the Crash? What Could the Driver(s) Have Done To Avoid the Collision? Who Was At Fault? The driver of vehicle 1 made the first mistake. He pulled too close to the vehicle in front of him. He had no escape space. He should have stopped far enough back so that he could have seen the rear tires of the car in front of him touching the road. The driver of vehicle 2 was obviously distracted and driving in a very careless manner and he caused this chain of events to take place. The driver of vehicle 1 could have possibly avoided the crash by leaving escape space open, and by scanning behind him on a regular basis. The driver of vehicle 2 holds a great deal of culpability for the obvious distracted driving violations that were taking place.

Scenario #3

A driver is traveling behind another vehicle on a two lane road and he is maintaining a proper 2-second following distance. It begins to rain and the driver continues to maintain a 2-second following distance on the car in front of him. Another vehicle on a side street pulls out in front of the lead vehicle. The driver of the lead vehicle is able to stop in time to avoid a collision with the car from the side street. However, the trailing vehicle is not able to stop in time and strikes the lead vehicle, pushing that vehicle into the car that pulled off the side street.

What Caused the Crash? What Could the Driver(s) Have Done To Avoid the Collision? Who Was At Fault? At first glance, it appears the driver of the vehicle that pulled out from the side street caused this crash. However, there was no crash between that vehicle and the lead vehicle. It was due to the inappropriate following distance of the trailing vehicle that caused the collisions to take place. If the driver had increased his following distance to 4-seconds when it began to rain, he probably would have been able to stop and the collisions would not have occurred.

No Singular Solution

As stated at the beginning of this article, and as these scenarios point out, there is no one solution in determining how or why a crash occurred. You must look at all of the evidence, both physical and human. Weigh all of that information and make a determination that is logical and based on all of the available data. Some investigations are easy; some are more difficult. You may find that there are times when you cannot form a definitive opinion regarding the cause of a crash. But, as stated earlier, don't lose heart. With each crash investigation you will gain more experience and knowledge that will assist you with getting to the truth.

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