Details of Small Evidence Can Say Big Things

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Years of experience in examining evidence in motor vehicle collisions can have its benefits in being able to identify facts that would not be possible without that experience. Small bits of evidence that may appear to be inconsequential to the average eye, can speak volumes.

As an example, while examining the site of a recent intersection collision we found a small bit of evidence in the grass at the final rest position of one of the vehicles as shown below.

View of sliding tongue from a seat belt system lying on the ground at the final rest position of a collision-involved vehicle.

A closer view of the evidence is shown below and we can see that this is a “sliding tongue” or latch plate from a seatbelt system.

Closer view of sliding tongue.

Because the final rest positions of the two vehicles were substantial distance apart it is reasonable to believe that this piece of evidence was from the particular vehicle at this rest position and not from the other one.

We might wonder how this evidence came to be located here. For example, such a tongue does not just fall off a restraint system because its webbing passes through the access hole of the tongue. Thus, in order for the separation to occur there has to be somekind of separation of the seatbelt webbing. This separation could be from the collision forces but that would be rare. It takes tremendous force to cause a separation,

or there could be a sharp exposed piece of metal that could cause it, but those are extremely rare in the vicinity of a vehicle occupant where modern safety standards would prohibit such a happening. So, it is far more likely that the separation occurred because emergency personnel used their knife or scissors to cut the webbing to gain access to an injured occupant for transportation to an ambulance.

It is also highly likely that collision forces did not cause the webbing separation because this extreme force would exhibit itself in markings on the restraint system and particularly on this sliding tongue. And this leads us to the next area of discussion…loading marks on restraint systems from collisions forces.

But before that, look at the condition of this sliding tongue. It has dirt caked all over it. We can state that we examined this site only a few hours after the occurrence. So the evidence should be fresh. However, if you are aware of collision evidence you will be aware that, as this evidence sits for longer periods of time weathering occurs in the form of debris and dirt progressively lying over the evidence. So why is this tongue so caked with dirt? A likely conclusion is that, after cutting the seatbelt webbing emergency personnel spent some time at this location, tramping on the earth and stepping on this sliding tongue. So there was some concentrated action going on in the vicinity.

It is interesting to read the comments of many newer accident reconstructionists who become more and more reliant on the information contained in event data recorders ("Black Boxes") to tell them whether a seatbelt was worn to the point where they have no clue about how to look at a restraint system for evidence or what that evidence might mean. While we have made some initial steps to gain the interests of some of these persons it became clear that the issue passed over their heads as they delved back into the depths of their EDR reports. Anyway, our point is that this simple and singular piece of evidence can provide a large amount of information about the collision that occurred, how it occurred and what happened to the occupant who was wearing this restraint system.

The photo below shows the "front" surface of the tongue. There is no special reason to call it so but we use this as a convention to separate the discussion from the "back" surface. The front surface is the one that, when the seatbelt is buckled, is orientated away from the occupant's body.

View of front surface of sliding tongue.

Many years ago someone will little understanding of loading marks made reference to the metal portion of the tongue which is inserted into the buckle as the location where one should look for loading marks. This fairy-tale was bounced back and forth in the community of reconstructists for many years until further research papers in the 1990s began to appear from researchers who actually had some reasonable experience and began to set the record straight. The place to look for loading evidence on a sliding tongue is at the rectangular access hole through which the seatbelt webbing passes. What you should be looking for are diagonal striations in the melted plastic of the tongue which occur when the loaded seatbelt webbing applied a large force through that access hole during the impact.

Below is a closer view of the bottom corner of the front face of the sliding tongue showing a loading mark with a slight angle to its striations.

View of loading mark on the bottom corner of the front face of the sliding tongue.

The reason why there the striations in the loading mark on the front face of the sliding tongue are at a diagonal are several, but the most common reason is that the loaded torso (shoulder) belt comes to the access hole at an angle as it travels from the D-ring and across the occupant's torso. One can tell whether the tongue is from the driver versus the right front occupant by noting the angle of the striations because they will be (generally) at 90 degrees to each other. But there are many caveats.

For example, not all such loading marks will be at a diagonal for several reasons. One reason could be that the torso belt was not loaded or was not oriented at the expected angle. Reconstructionists should pay very close attention to such a condtion as it may relate to misuse of the restraint. At other times the impact force might be experienced directly to the side of the vehicle and the occupant travels directly sideways to the vehicle interior. In other instances the webbing might actually slip along the access hole, again indicating some complications that must be evaluated.

With respect to this intersection collision, it is generally observed that vehicles approaching at 90 degrees to each other from different roadways will collide in a fashion where one vehicle sustains frontal damage (called a “Front-Impacting Vehicle”) and one will sustain side damage (called a “Side-Impacted Vehicle”). Obviously that is not always true but in a large percentage of cases it remains true. So keeping in mind similar pre-impact momentums, the loading evidence on seatbelts from a Side-Impacted Vehicle will be different than those of a Front-Impacted Vehicle.

The photo below shows the backside of the sliding tongue.

View of backside of sliding tongue.

And the photo below shows a closer view showing the loading mark at the “upper” corner.

Closer view of the loading mark visible on the backside of the sliding tongue.

We do not want to prolong the discussion but, for the time-being, you should recognize that the loading mark you see in the above photos is from the driver's restraint system. But it would be difficult to recognize that it came from a vehicle that was struck in its side. Partly because this vehicle had a substantial forward speed producing a substantial deceleration along its longitudinal axis, thereby mimicking the conditions of a vehicle struck in its front end.

In general, experience is identifying small bits of evidence, and understanding what the evidence means, provides the investigator/reconstructionist with valuable information about how a collision occurred. Sometimes, when there are two or more vehicles to examine along with a large area of evidence at a collision site the investigator can be overwhelmed by the evidence, focusing primarily on the large facts, while failing to recognize the importance of little details.

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