RUDNY & SALLMANN FORENSICS NEWS

Fall 2022 Newsletter

ACCIDENT STATISTICS - 2021

Even though overall vehicle miles decreased in 2020 there was a 23% increase in the motor vehicle fatality rate from 2019 to 2020. Per National Highway Traffic Safety Administration (NHTSA) projections the rate of fatalities per million miles traveled essentially remained unchanged from 2020 (1.34) to 2021 (1.33). However, NHTSA projections for 2021 show a significant increase in motor vehicle crash fatalities as well as an increase in overall miles traveled versus 2020. In fact, the 10.5% increase in fatalities from 2020 (38,824) to 2021 (42,915) results in the highest number of fatalities since 2005. This increase is also the highest annual percentage increase in the NHTSA Fatality Analysis Reporting System's history.

As part of this increase the following categories showed noticeable increases from 2020 to 2021:

- Fatalities in multi-vehicle crashes up 16%
- Fatalities on urban roads up 16%
- Fatalities among drivers 65 and older up 14%
- Fatalities in crashes with at least one large truck up 13%
- Pedestrian fatalities up 13% (continuing an increasing trend since 2009)
- Daytime fatalities up 11%
- Motorcyclist fatalities up 9%
- Bicyclist fatalities up 5%
- Fatalities in speeding-related crashes up 5%
- Police-reported, alcohol-involved fatal crashes up 5%

Figure 1. Motor vehicle fatalities by month

https://www.nhtsa.gov/press-releases/early-estimate-2021-traffic-fatalities

EVENT DATA RECORDER UPDATE

The National Highway Traffic Safety Administration (NHTSA) is currently proposing an update to its regulation for motor vehicle Event Data Recorders (EDRs). Federal Regulation 49 CFR Part 563 went into effect on September 1, 2012 and required EDRs to record 5 seconds of pre-crash data at a frequency of 2 samples per second. The proposed update to the regulation will increase both the pre-crash time and the frequency of data samples. The pre-crash time is proposed to increase from 5 seconds to 20 seconds. The frequency of data samples is proposed to increase from 2 samples to 10 samples per second. These increases were driven by a desire to capture the pre-crash driver actions across a greater portion of possible accident scenarios. Of the accidents studied by NHTSA increasing the pre-crash time to 20 seconds covered the 90th percentile of recording duration for the cases reviewed. NHTSA analysis shows that the additional data collected ought to be able to be stored in unused memory on many existing Airbag Control Module (ACM) memory chips.

Comment period for this proposed update closed on August 22, 2022. The timeframe for the proposed EDR regulation update would be effective on September 1, 2024, if the final rule is published on October 1, 2022.

NHTSA estimates that 99.5% of model year 2021 passenger vehicles currently have regulation compliant EDRs. The likelihood grows every year of at least one if not multiple vehicles in an accident having downloadable data to reconstruct an accident. If you have any questions about downloading and interpreting EDR data or would like to discuss the potential for recovering EDR data please do not hesitate to contact us.

Figure 2. EDR data imaging using a Bosch CDR interface

Rudny & Sallmann Forensics of Illinois, LLC
1202 W. Marion Rd., Arlington Heights, IL 60004
Office: 847-244-8868
Mobile: 484-343-0110
santelereng@gmail.com
rseng.com

EVENT DATA RECORDER ANALYSES

Even though there is a proposed change to add capabilities for more recorded data, the current Event Data Recorder regulation can provide significant information related to vehicle performance and driver actions.

The role of the EDR is typically filled by the vehicle's airbag control module (ACM). Although the primary role of the ACM is to detect impacts and deploy restraint devices, the measurements needed to fulfill those functions can be recorded to also meet the EDR regulation.

An ACM commonly records two types of events – ***Deployments*** and ***Non-Deployments***. Deployment events deploy airbags and non-deployment events do not deploy airbags but utilize other restraint devices such as seat belt pre-tensioners or active head restraints. Typically, an airbag deployment will 'lock' the events in the ACM's memory. Non-deployment events do not deploy airbags but can be recordable events by the ACM. These non-deployment events are usually not 'locked' in the ACM's memory and can be overwritten by subsequent events. ACMs will usually have the ability to record at least two events and some can record 4-5 before overwriting prior unlocked events. It should be noted that not all crashes will trigger airbag deployments, particularly if an airbag deployment would not be beneficial to occupants. An example of this could be a rear impact. The rear impact would not deploy the driver's steering wheel airbag, but could trigger an active head restraint to act – this would likely record as a '***Non-Deployment***' event by the ACM.

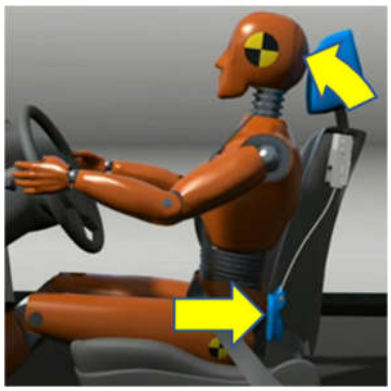

Figure 3. Example of Active Head Restraint action due to rear impact

If the rear impact was strong enough to send the vehicle forward into another vehicle the frontal impact threshold could then be met, which would deploy the driver's airbag(s) and set a '***Deployment***' event. This scenario would likely result in two events recorded:

1) '***Non-Deployment***' event for the initial rear impact
2) '***Deployment***' event for the subsequent frontal impact

If both of these events were recorded by the ACM each event would have its own set of pre-crash data and the ACM would also record the time elapsed between the two events. By analyzing and combining both sets of pre-crash data and the time between the events we can put the pieces of the puzzle together to determine how the accident occurred. Some of the data elements recorded that we can use for this analysis include: indicated vehicle speed, brake pedal use, accelerator pedal position, engine rpm, steering input, ABS activity, Stability Control activity, number of events recorded, and time between events.

Another useful parameter recorded by the ACM is ***seat belt use***. In a recorded event, the ACM will document safety belt status for the driver and front passenger. This can be compared to physical evidence observed in the vehicle such as: is the seat belt loose or taut and tight against the adjacent pillar, does the seat belt operate normally or is the belt locked, have seat belt pre-tensioners fired, is there evidence on the belt or rings associated with an impact.

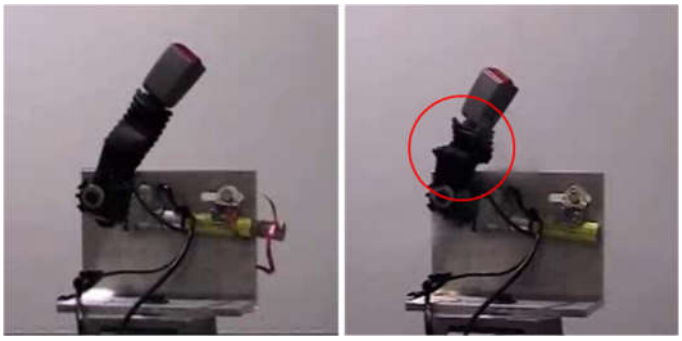

Figure 4. Seat belt pre-tensioner not deployed (left), deployed (right)

EDR data can also be used for an ***Accident-Avoidance Analysis***. Driver actions such as if the cruise control was in use, when the accelerator pedal was released, when the brake pedal was pressed, and the steering input are all recorded data by the ACM. These data can be used to determine approach speeds, swerving, and braking actions as part of the avoidance analysis.

EDR data should be compared with physical evidence to understand if the data is applicable and then determine what happened in an accident. We are available to assist you to access EDR data and gather physical crash evidence. Utilizing all available information, we can provide a thorough analysis of a crash.

We hope you will find this information helpful. As always, if you have any questions about any of the topics presented, we will be happy to speak with you without obligation.

Rudny & Sallmann Forensics of Illinois, LLC
1202 W. Marion Rd., Arlington Heights, IL 60004
Office: 847-244-8868
Mobile: 484-343-0110
santelereng@gmail.com
rseng.com