In February, I learned of a video documentation of a crash of a Lamborghini Huracan which occurred in Hungary last September. The passenger recorded some of the travels and the beginning of the crash on a mobile phone. http://google.com/newsstand/s/CBIwkt3WgCA should take you to the Web page which shows some stills and the video. When I visited the Web page, the second image had an arrow in the middle for beginning the video. Driver lost control when the car was traveling 208 mph on a public road. Just another example of a person with more money than sense. Surprisingly, both occupants survived the incident, but the passenger received serious injuries. The driver was able to remove the passenger from the wreckage before fire consumed the remains of the car. The image below shows the burned remains at the final position. The investigating police officers may have had to send out for more chalk to mark up this crash scene!

I was recently involved in a criminal defense case in which the driver of a pickup truck which struck a sedan whose driver had turned left across his path before the pickup struck it was initially not charged with any traffic violation. However, one of the officers in the investigating police agency had a Bosch Crash Data Retrieval (CDR) Toolkit with very outdated software, and he downloaded the data in the airbag control module (ACM) of the pickup. When the data in that ACM showed a pre-crash speed of nearly 90 mph, that officer then manipulated aspects of the recorded and documented physical evidence to come up with a calculated reconstruction speed near the speed indicated in the ACM. The pickup driver was then charged with vehicular homicide. I was retained by the attorney who represented the defendant. Although virtually all components of physical evidence were no longer available at the time I was contacted, I was able to use the site data which had been gathered by that law-enforcement agency to calculate a pickup speed of 57 mph at impact. There was no evidence of pre-collision skidding, and the sudden turn by the driver of the sedan was such that the driver of the pickup truck would have had very little time to perceive and react to the hazard of the sedan crossing his path. The data extracted from the ACM gave the number of ignition cycles at event but not the number of ignition cycles at download. In those modules which give both numbers, the similarity of those two ignition cycle numbers can document that the data set from the ACM relates to the crash which was just experienced by that vehicle. In modules which only give the number of ignition cycles at event, there is no reliable method of relating the data in the ACM to the crash in question without a thorough and proper reconstruction of the crash. And therein lies the problem with this situation—instead of conducting an impartial, accurate reconstruction based on the collected field data, that field data set was deliberately misinterpreted to allow calculations which resulted in a speed near the speed shown in the ACM data. After I presented a report which included a critique of the agency's calculations as well as my analysis and also provided video copies of selected staged collisions, the matter was quickly settled. In my opinion, the district attorney's overzealous attitude prevented this from being completely dismissed, but it was settled with the defendant paying a relatively nominal fine. This same jurisdiction was one in which, some years ago, a man had been convicted of vehicular homicide based on very poor investigation and unfounded analysis by the same law-enforcement agency and the same district attorney. Apparently, the jury in that case was unable to understand the subtleties of the deceptions by the officers and district attorney, despite my best efforts to reveal them, and the jury convicted the man based on vapor turned into reality by local and state law enforcement. I did not share this to disparage all law enforcement officers—many are well-trained and interested in truth and justice, not smoke and mirrors—but there are still some jurisdictions in which justice is in the luck of the draw, not in the facts. (This is not the only law-enforcement agency or jurisdiction in which I have found cases of charges being filed based on improper or inadequate interpretations of physical evidence.)

Another reason I wrote about this incident was to demonstrate that data contained in an ACM after a crash may not pertain to the crash which just occurred. I now have no way of determining when or how the data set in that truck's ACM was created, but it obviously was present before the crash with the sedan. Although ACMs in many vehicles are supposed to be replaced after a deployment, that replacement is not necessarily essential to proper future functioning of the ACM. In other words, the ACMs from at least some GM vehicles which have a locked deployment event can still command a deployment at a future time, but most such modules will only record one deployment event, locking that event and preventing a subsequent deployment event from being recorded. I am certain that this was the case with the pickup truck, but the owner had bought this relatively old, used truck only one month before the crash and had no knowledge of the vehicle's history. The number of ignition cycles at event (when the high pre-crash speed was recorded and locked) was quite low for a vehicle of its age and, as I described above, data in the ACM did not agree with a numerical analysis of physical evidence at the scene.

I had another interesting case recently which involved CDR from a Toyota. This car was equipped with driver and front-seat-passenger airbags only, and the ACM only monitored and recorded the longitudinal component of acceleration. The Toyota was struck on the left side. Although side impacts of moving vehicles will usually result in some change in forward motion,

that change in velocity is usually small compared to the lateral change in velocity which results from the impact. The longitudinal changes in velocity which occurred during the side impact created a record in the ACM, but that acceleration was not sufficient to fire the airbags, and the recorded changes in longitudinal velocity were not helpful in reconstructing the crash.

One never knows what is or isn't in an ACM until the interrogation. Many very new vehicles contain side airbags, curtain airbags, and seat-belt pretensioners, and the ACMs monitor and record both the longitudinal and transverse (lateral) accelerations. There are some vehicles which also monitor and record yaw (rotation about the center of mass) rates. Some GM vehicles are equipped with a separate roll-over sensor (ROS) which records data that can be accessed with the Bosch CDR Toolkit. CDR is becoming increasingly technical and requires ever-greater hardware components, frequently upgraded software, and ongoing education.

Most people understand how the typical reciprocating engine works: the piston goes down while the intake valve is open to allow ingression of a fuel-air mixture, the intake valve closes while the piston goes up to compress the mixture, the mixture ignites, forcing the piston down to deliver the power stroke, and the exhaust valve opens while the piston comes up to expel combustion products. In a gasoline engine, a spark plug ignites the fuel-air mixture; that is called the Otto cycle after the man who developed it. In a Diesel engine, the process is the same, but the fuel is different, and the compression ratios are higher, causing the air-fuel mixture to get so hot in compression that it ignites the mixture without a spark, although some engines have glow plugs to help with a cold start. That process was developed by an engineer named Diesel. There is a third cycle available for reciprocating engines: the Atkinson cycle, named for the man who invented and patented it. The Atkinson cycle completes the four phases of an Otto cycle with only one rotation of the crankshaft rather than two; a good description of the Atkinson cycle can be found at http://auto.howstuffworks.com/atkinson-cycle-engine.htm. A big advantage of an Atkinson cycle engine is better efficiency compared with the Otto cycle; a big disadvantage is that the power output is less than what is achieved by a similarly sized Otto-cycle engine. But Lexus has combined both cycles in one engine in the 2016 GS-F, introduced at the North American International Auto Show. The engine functions in Otto cycle when more power is needed; when less power is needed, it operates in Atkinson cycle. This allows the engine to produce 51 more peak horsepower than its previous generation while still maintaining essentially the same mpg rating. Most of you are probably aware that late-model pickup trucks with V8 gasoline engines use cylinder deactivation to improve overall fuel economy; these systems do improve overall economy and seem to be providing the same durable and reliable engines to which we have become accustomed. It will be interesting to see how well the public accepts the Otto-Atkinson engines and if they will be durable and reliable.

Thank you for reading my latest newsletter. I finally obtained a recent photograph of my family, taken in January of this year, to place in the newsletter. It is in the panel to the right of this text, near the bottom. At least two of the people in that photo are good-looking! ☺

Ralph Cunningham, Inc.
Accident Reconstruction
www.RalphCunningham.net

Collision Analysis

On-road/Off-road

Pedestrian/Bicyclist

Motorcycle Collisions

Bosch Crash Data Retrieval

Lamp Filament Evaluations

Conspicuity Evaluations

Tire Failure Evaluations

Brake/Steering Evaluations

Seat Belts/Airbags

1804 Thornhill Pass, SE
Conyers, GA 30013
770.918.0973
Fax: 770.918.8076

Ralph Cunningham, Inc.
1804 Thornhill Pass, SE
Conyers, GA 30013