New hardware again! Those of you who have read my newsletters since I began writing and mailing them may remember that I set up a system for taking overhead shots of cars and light trucks in the field. Back then, all photographs were taken with 35 mm film. (I wish I could still shoot film, because film takes a better picture than the best digital camera, but I reached a point where I couldn't find anyone to make high-resolution digital images from my film negatives, so I had to bite the digital bullet and deal with the pain.) Because I was using a Minolta auto-exposure body, in order to make the system work I had to add a motor drive, wireless remote control, and 20-mm, f/2 lens. The weight of that camera with those accessories was such that it was difficult to take the overhead pictures under the best of conditions, and impossible under most conditions I encountered at salvage yards, so I simply stopped using it after a brief period of time. The digital camera that I am now using, a Sony A900 with a 28-75 mm, f/2.8 (constant aperture) lens is almost as heavy as the Minolta film camera, due to the features of the Sony camera body and the weight of the long, three-inch-diameter lens. But I have found something that will work for me.

The image above shows the new camera that I'm going to try to use with the existing hardware for taking overhead photographs. This camera only weighs five ounces, including the battery and an SDHC card. It features a 14-megapixel image sensor and a 5X zoom lens, from 5 mm to 25 mm focal length (35 mm film equivalency 28 to 140 mm). It has a built-in flash and can be operated with an infrared Pentax waterproof remote. Features include image stabilization and numerous digital effects. It will also shoot wide-screen HD movies at 720p. The body is chrome-plated aluminum. This Optio S1 camera should provide me with many years of good use (unless I drop it ☺).

Another item from years ago was my prediction that cars would soon have 42-volt electrical systems, a prediction which I recently had to retract, due to the proliferation of electric and hybrid vehicles with greatly varying electrical configurations—most with batteries in multi-hundred volts. Now, a company called Control Power Technologies is promoting the benefits of vehicle electrical systems based on a 48-volt standard configuration, to include both all-electric vehicles and hybrid vehicles. Standard voltages for all road vehicles would provide industry-wide benefits, including the elimination of the very-high-voltage systems now in use in some hybrids, which high voltages can pose serious injury hazards. Features of the 48-volt system include a Speed-Start starter-generator for stop-start applications, allowing extremely rapid engine starting for that operating mode and very efficient regenerative braking. Other components under development by that company are a liquid-cooled generator driven by an exhaust-gas turbine and a liquid-cooled electric supercharger. Vehicles with 48-volt electrical systems could be developed for simultaneous manufacture with current 12-volt electrical systems, allowing for new components to be phased in while existing stockpiles of 12-volt components are eventually eliminated. It will be interesting to see if this technology finds acceptance among automobile manufacturers.

At a recent civil trial where I was testifying for the defendant in a motor-vehicle-related fatality, the plaintiff's attorney did not cross examine me on any points of fact, conclusion, or opinion I had expressed during direct examination. Instead, he spent over half an hour "attacking" me as being a defendant's expert. He never used the terms "defendant bias" or "defense bias," but he did everything he could to imply that I was distinctly aligned with that predilection. As most of you (perhaps all of you) know, I do more of my trial-related work for defendants than for plaintiffs, but I will work for anyone who wants an objective evaluation based on the available evidence and is willing to pay the bill. The tools and techniques I use work as well for plaintiffs as for defendants, although some categories of claim lend themselves to using available documentation and/or testing for defense—for example, the low-speed rear-end impact which leaves no evidence of contact between the two vehicles but for which the occupant(s) of the struck vehicle allege grievous injuries--always to soft tissue, which injuries cannot be medically proved or disproved by any method presently known to physicians. I wouldn't be working for a plaintiff in that particular type of case, not because I have a defense bias, but because my forty-plus years of experience (and a few minor rear-enders of my own) tell me that a person is not going to be injured when the closing speed is so low that no damage is done to either vehicle. That's one type of incident for which I would never be working for the plaintiff, but many of the crashes I investigate and analyze could be on behalf of either. The conclusions will be the same, regardless of who I'm working for. I feel that it is necessary to put this statement in writing in one of my newsletters to defuse any future attempts to depict me solely as a defendant's expert—I'm sorry if I bored you with this paragraph.

Bosch keeps moving forward with new software and hardware. As of this writing, the latest software release is 8.1.1. I recently analyzed a collision in which a motorcycle sideswiped a minivan and displaced it off the street as a result of that sideswipe. As a general rule, sideswipe collisions cannot be numerically evaluated on an energy basis, and there rarely is sufficient data to allow a momentum reconstruction. In this incident, however, the impact had caused deployment of airbags, and the minivan had event data recorder capabilities in its airbag control module. I imaged the data in the airbag control module, which gave me a delta-v for the minivan. Using that value of delta-v and the known masses (weights) of the two vehicles, I was able to calculate the loss of momentum which occurred to the motorcycle during the sideswipe. Adding the speed loss which occurred during pre-impact skidding and the speed loss which occurred between point of impact and point of rest, I was able to calculate a probable minimum speed of the motorcycle, which was nearly twice the posted speed limit.

Many of you are probably aware that Suzuki has decided to stop selling cars in the United States. However, Suzuki had already arrived at an agreement with Bosch regarding crash data retrieval, and Bosch will continue to support those Suzuki automobiles which were manufactured and sold through the 2013 model year; the cables and the software have already been purchased by those of us who keep our Toolkits up to date. Covered Suzukis include the 2007 through 2010 XL-7, some of which included a rollover sensor; the 2012 and 2013 Equators; and the 2013 Grand Vitara, Kizashi, and SX-4. Typical data which may be contained in an ACM in a 2013-model-year Suzuki include deployment times, crash pulses, and pre-crash data such as road speed, throttle position, engine speed, and steering input. Since Suzuki automobiles were never sold in large numbers, there may never be an occasion to interrogate the ACM in one of them. But I am prepared, if such an interrogation becomes necessary or desirable.

There will be interesting challenges ahead for automobile manufacturers as they work to develop vehicles and systems to achieve the corporate average fuel economy (CAFE) requirement of 54.5 mpg for the 2025 model year. We are already seeing some smaller and unique engines, such as three-cylinder designs; transmissions with seven or more gears (speed ratios); and lighter bodies and suspensions using high-strength steel, aluminum, and, in the case of high-end cars, carbon fiber.

Engines have an optimum rotational speed for highest efficiency: On the one hand, they are most thermodynamically efficient at wide open throttle; on the other hand, higher engine speeds increase internal-friction losses and fluid-friction losses as air enters and exhaust gasses exit. But, at very low engine speeds, throttling losses are very high. Considering all losses involved in moving an automobile by its own power and optimum engine efficiency, most gasoline-fueled vehicles currently in production get their best fuel economy at road speeds above 40 mph and below 60 mph. The main advantage of having more speed ratios in a transmission is that computer control of engine speed versus load can help keep the engine operating at or near its most efficient rotational speed for a wide range of road speeds. But the transmissions with nine speed ratios won't fit in the smallest cars currently manufactured, which is why cars like the Chevrolet Sonic can't reach the 40-mpg fuel efficiency of the Chevrolet Cruze. The Ford Fusion and the Chevrolet Malibu also offer better aerodynamics than the smaller cars, allowing them to achieve similar fuel efficiencies despite their larger size and greater mass. In many modern vehicles, some additional mass does not reduce the highway fuel efficiency, but city fuel economy will suffer compared to a similar but lighter vehicle, because more kinetic energy will be dissipated by braking and must then be restored as the car resumes normal travel.

What will 2013 bring? It is difficult to predict, because some of the best designs and technologies don't get accepted by the public; if the public won't buy it, manufacturers can't afford to make it. I believe we'll see a few more manufacturers on the Bosch CDR wagon: BMW (surprise!), Rolls Royce, and Volvo are expected to be included within 30 days. Please contact me whenever you have a question or a need regarding vehicle-related forensic issues.

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