Ralph's Accident Reconstruction Newsletter: Volume 13, Number 2—Spring 2014

Santa Claus was very good to my daughter this past Christmas. One of her presents was a Lenovo Ideapad Yoga 13 Ultrabook. It features a Core i5 processor, 4 GB of RAM, and a 128 GB solid state drive. It boots very quickly and is silent in operation.

Another gift she received was a Savage Arms Lady Hunter rifle in .243 Winchester with a Vortex 4-12x40 scope. She has been wanting me to take her hunting, but she has previously only fired a .22 semi-automatic, which is not good for hunting any significantly sized game. When she can place a tight pattern in a paper target at 100 yards with her new rifle, I'll find a place to take her hunting.

She is also good with a bow and arrow. She's not strong enough yet to draw the bowstring with enough tension to kill large game (she just turned 13), but she's working on increasing the tension on the compound bow that Santa brought her in 2012. She might turn out to be a world-class marksman.

Santa was also good to me. I have an all-original Winchester Model 1892, complete with the octagonal barrel, but it's in an odd configuration: .25-20. I've always wanted a lever-action rifle in a modern caliber, so Santa got me a Marlin rifle with a 20-inch barrel and tubular magazine in .30-30 caliber. I haven't decided whether or not to put a scope on it—when I'm hunting game at a large distance, I'll probably use my .30-06 or my 7mm Remington Magnum.

Enough of my personal life. I wanted to mention those items because I'm pleased with my daughter. But the purpose of these newsletters is to disseminate information related to crash reconstruction and vehicle component failure analysis topics. The previous paragraphs were a way for me to sneak in photographs, because I'd rather not send a newsletter without some kind of graphic.

In my previous newsletter, I wrote about some basic metrics related to light and vision, and I wrote about some of the factors which make pedestrians difficult to see at night for drivers of motor vehicles. Pedestrian impacts occur much more frequently at night, and typically in the period three to four hours after sunset. Numerous researchers and analysts have studied the factors involved in lack of pedestrian conspicuity at night. Interestingly, various researchers have shown that the **reaction** time of older drivers is essentially the same as the **reaction** time for younger drivers. The difference in total response time in dark environments is that young people generally see better at night than older people and are, therefore, more likely to see a pedestrian at a greater distance or to observe a pedestrian that an older driver never notices. The effective **perception-reaction time (PRT)** of younger drivers in a dark environment, therefore, is generally shorter than the PRT of older drivers, because of the better night vision of the younger drivers. And you probably thought it was just because we're slow! At 64, my reflexes are still quite good, but my night vision isn't what it once was. It appears that memory is not the first or second thing to go as one ages, if one lives long enough. ☺ And yes, I'm 64, but I don't plan on retiring anytime soon—I have a 13-year-old daughter, as I wrote earlier, which probably means I'm going to have to work until I die or am disabled, whichever comes first.

Regarding the observability of pedestrians at night by drivers: I have just seen a short online video from BMW about the new laser high-beam headlights that are an option on the latest 8-series. Laser headlights will obviously improve forward visibility at night; it remains to be seen whether or not those laser high-beams or the LED headlights provide for greater awareness of pedestrians by drivers of 8-series cars, especially those pedestrians initially to the side of a motor vehicle but walking across its path when it is in close proximity.

Another aspect of pedestrian impacts is the speed of the pedestrian. As you might imagine, walking and running speeds of pedestrians can vary significantly, primarily with age. Many studies of pedestrian speeds have been conducted, and the results have been tabulated. One of the best references on the topic of pedestrian impacts, including walking and running speeds by age and/or sex, is *Pedestrian Accident Reconstruction and Litigation,* by Jerry Eubanks and Paul Hill, currently available through Lawyers and Judges Publishing Company, Inc. (their Web site is at www.lawyersandjudges.com) and perhaps elsewhere. This reference even has a table for speeds of people on roller blades. There are numerous other references on the topic of typical pedestrian speeds, but most will have essentially the same values or ranges.

On the Crash Data Retrieval front, would you believe Maserati? The 2014 American-market Ghibli and Quattroporte are supported by the Bosch CDR system with patch 12.1.1, which was released just before Christmas of 2013. I imagine that those Italian vehicles will be grossly underrepresented in the crash roll calls. When have you last seen a wrecked Lamborghini, Ferrari, or Maserati? I am impressed by the looks and price of the Quattroporte—still way above my pay grade, but reasonably priced for a premium Italian car, and the Ghibli is even less expensive.

Gasoline prices have been relatively stable for some time, and availability has not recently been a problem, so I have reduced my per-mile charge to $0.60. I had raised it to $0.80 per mile when gasoline was four-plus dollars per gallon, or more, when you could find some. I'm sure we'll see those prices again someday, but hopefully not too soon. My new fee schedule went into effect on January 1, 2014; the only change was the reduction in the mileage rate.

Not really accident-related, but the two 20-inch monitors that I've been using for many years had become somewhat dim, so I replaced them with two Asus 24-inch HD monitors with a 144 Hz refresh rate and a 1 ms response time. In order to run two large HD monitors at that refresh rate, I had to upgrade my video card: I bought and installed an EVGA GeForce GTX 760, a super overclocked card with 4 GB of GDDR5 RAM and dual-fan cooling. I originally had my desktop machine equipped with a 900-watt Quad SLI power supply, so all I had to do was pull out the old video card, insert the new one, connect power to the new card, re-connect everything, turn the machine on, and install the video drivers. I am pleased with the new monitors and video card.

I have written about tires before; perhaps it is time to write a little about them again, specifically about the useful age of a tire in typical car or light truck applications. At least one tire manufacturer says that tires can be used until they are ten years old. Other sources indicate that a tire should not be used past the age of six. I agree with the latter. You can tell the age of a tire by its serial number. The serial number will start with the letters "DOT." This indicates that the tire meets the requirements of the United States Department of Transportation. The next two characters, which can be any combination of letters and numbers, are an indication of who manufactured the tire and at what plant. (There are many more brands of tires than there are manufacturers.) The next two digits represent the tire size code. This will be followed by a group of up to four characters, typically letters; these are symbols used by the manufacturer of the tire. The last four characters are all numbers. (For tires made before the year 2000, the last four characters were actually only three, all numbers, with the first two digits representing the week of the year in which the tire was made and the final digit being the last number of the year of manufacture. When the system was first devised, cars rode on bias-ply tires, and nobody's car or light truck tires lasted ten years.) For any tire you are now likely to encounter, the last four digits represent the week of the year in which the tire was made and the year of manufacture: 3009 would indicate a tire manufactured in the 30th week of 2009. Note that a serial number is generally not unique to a tire: typically, all tires of the same size, type, and load rating made on the same assembly line at the same plant during the same week will usually have the same serial number. Also, some manufacturers put a portion of the serial number on the non-serial sidewall—the code will look correct, starting with the "DOT," but it will be lacking the four numbers at the end. Look on the other sidewall for the complete serial number.

Time can be a friend to some items; it is not a friend to tires. Air, moisture, heat, extreme cold, and sunlight work together to age the carcass. Cracks may appear on the surface of the sidewalls. Often, a well-aged tire will have cracks at the edges of the tread grooves, but those are not as obvious as sidewall cracks. The inner liner may have degraded to the point that more air is allowed to escape; it passes through the inner liner into the structure of the tire and may cause separations between body plies and/or tread plies. Although a tire is vulcanized by heat and pressure to become a cohesive structure, it is not homogenous: if you cut across a section of a tire, you can see the individual components, even though they are (usually) very well bonded to one another. A pneumatic tire is really a wonder of modern technology and manufacturing, and failure rates of modern tires are infinitesimally small, but tires don't last forever. They shouldn't be used longer than six years, if that long, in my opinion.

Although I have conducted numerous failure evaluations on commercial tires and large specialty tires in years past, I no longer have a tire spreader, the equipment to handle some of the larger tires (one tire whose failure I investigated weighed over one ton—I examined it by stepping inside it), or the space to store them. But I still conduct failure evaluations on car, light truck, and motorcycle tires; please call if you have any questions about my services.

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