Volume 1, Issue 2

CRASH TALK

IN THIS ISSUE

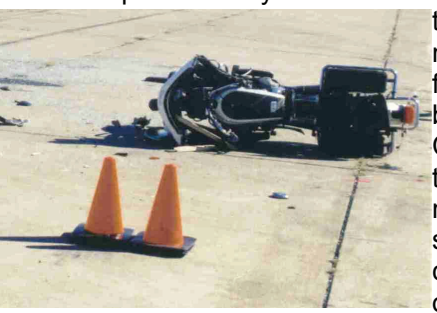
Was the Motorcycle Speeding?

By James W. Graham, P.Eng., Principal Engineer

It's springtime and motorcycles are back. There will be severe injury collisions involving motorcycles until the snow flies this fall. The typical question asked of our investigation engineers is whether or not the motorcycle was **speeding**.

Motorcycle crashes can leave forensic signatures in different ways than a car crash. The scientific techniques to apply for motorcycle speed calculations differ significantly from those for 4-wheeled vehicles. Four of the investigative approaches to speed calculations for a motorcycle are:

Skid: If there are skid marks, a speed loss can be calculated. The key is to determine whether the skid is from one or both tires. Most often, investigators see the signature rear-only braking tire mark (a lighter skid, often with a slight weave). From 50 km/h, a sport motorcycle with a skilled rider can brake to a stop in 12 meters using both front and rear brakes.



Conversely, a rider using only the rear brake will require 28 meters to stop from the same speed. Failing to identify the correct type of braking will give an erroneous speed.

Airborne Trajectory: Frequently, the impact involves a vehicle turning left across the path of a motorcycle. If the rider becomes airborne, a speed can be calculated. The calculation requires the rider take-off angle and height (via inspection of the bike), and the distance the rider is thrown (from helmet or clothing scuffs, or blood). From 50 km/h, a rider projected through the air at an angle of 30 degrees will land about 19 meters past the impact. Of course, this assumes no significant impact between the rider and vehicle along the way.

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Fork Deformation: For some styles of motorcycle, empirical test data can relate the impact speed with the extent of fork bending. On certain bikes an impact of 50 km/h into the side of a passenger car results in front fork deformation of 10 inches (25 cm).

Vehicle Rotation Angle: In specific cases where the motorcycle strikes a slow moving (turning) vehicle at the front fender or rear quarter panel the extent of vehicle rotation can be used to calculate the motorcycle impact speed. The impact speed can be calculated by computer modeling. The data required includes the mass of each vehicle (published specifications), the location of the impact on the vehicle and the degree of rotation (ideally tire scuff marks measured within a day or so of the event). A 50 km/h impact between the front of a 500 pound motorcycle and the rear of a Chevrolet Cavalier can rotate the Cavalier through 45 degrees on dry asphalt.

Other methods to investigate motorcycle speed include gear/RPM data, roadway curve radius, and maximum lean angle. Should an accident reconstruction involve a motorcycle, there are numerous independent methods to determine the speed. Ideally, the use of several approaches will corroborate the solution.

James Graham, Principal Engineer, has taken the IPTM course on motorcycle accident investigation (1995), has extensive skid test experience and has testified in several cases involving motorcycles.

Preserving Commercial Vehicle Electronic Data

By Martin J. Davidson, P.Eng.

In the last CRASHTALK issue we discussed the Event Data Recorder (EDR) technology available in today's cars and light trucks. Commercial vehicles differ because the EDR technology is implemented in the Electronic Control Module (ECM), and is not associated with vehicle air bag systems. On most commercial vehicles the ECM is located on the side of the engine and controls the electrical and mechanical components of the vehicle. The ECM receives inputs, processes the data to provide outputs, then stores key information for a period of time. For example, as a result of a collision, a damaged engine may release oil (or experience a drop in oil pressure) and trigger a fault code. The ECM would receive that information and then shut off the engine to minimize mechanical damage. This data, along with the other active inputs and outputs would then be stored in the ECM memory. The amount of stored data can vary from as little as 12 seconds to several minutes, and is manufacturer-specific. Unlike automobiles and light trucks, each commercial truck or bus that comes off the assembly line may be fitted with a variety of engine and transmission combinations supplied by third party manufacturers. At a glance, you cannot determine if a subject vehicle such a Freightliner, Peterbilt, or Western Star has the capability to store useful EDR information. The type of engine installed (Caterpillar, Detroit Diesel, Cummins, etc.) must be known. Additionally, the potential to retrieve information varies with the age and type of ECM, as well as with parameters set by the dealer or truck owner.

Typically, information which can be downloaded would fall within the following six categories:

- Calibration and Configuration
- Diagnostic Data
- Maintenance Scheduling
- Trip Data
- Event and Incident Data*
- Audit Trail Data

The amount of stored data can vary from as little as 12 seconds, to several minutes

* This is the area of interest for the collision investigator and could include information such as vehicle speed and whether or not the brakes were applied.

As part of a crash investigation, data retrieval can be performed in the field or at an approved repair facility by an authorized technician under our direct supervision.

Martin Davidson has 10 years of investigative experience with one of the largest commercial truck fleets in North America and has been with Graham Ryan Consulting Ltd for over seven years. We have trained commercial vehicle investigators in both Edmonton and Calgary offices. For timely response, Graham Ryan Consulting investigators are available through our 24-hour emergency pager at (403) 781-4375.

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Recalls

2006 Chrysler 300/Dodge Magnum/Charger; Possible brake line failure.

2004-2006 Chevrolet Colorado/GMC Canyon as well as the 2006 Isuzu I-280 and I-350; Brake lamps may not function.

Crash Corner

The 2006 Yamaha YZF-R1 motorcycle can achieve 139 km/h… in first gear. It has a top speed of 285 km/h.

An impact of 139 km/h can project the motorcycle rider 329 feet (100 meters) through the air.