

# motorcycle accidents - Your questions answered

## Explain motorcycle braking

- **Motorcycles are very different from cars being much more complex in many areas**
- **The calculated speed of the motorcycle will vary depending on the mode of braking**
- **A significant proportion of riders do not use front braking in emergencies**
- **Sliding motorcycles can decelerate at very different rates**
- **Establishing where rider and pillion landed can be useful for speed calculations**
- **The deformation suffered by the motorcycle and the car can be used in speed calculations**

Motorcycles are very different to cars when it comes to braking. The system as a whole has a high centre of gravity and a short wheel base. This means that under braking there is a great deal of weight transfer on to the front wheel. The front brake is therefore the most important brake when it comes to emergency situations. There is a problem with stability, though, because the front wheel is also the steered wheel and there is only one of them. If the front wheel is locked then steering and stability are lost and the motorcycle will soon topple over. There is therefore reluctance for some riders to use the front brake firmly, if at all, in emergency situations.

Research shows that about two thirds of riders will use both brakes for firm and emergency braking. Because of these differences in braking, very different deceleration rates can occur for different riders faced with an emergency. Good braking of both wheels can result in decelerations up to 1.0g. Locking of the front wheel will drop this down to 0.7g, and this fear of front wheel locking means that most riders will only achieve about 0.5 to 0.6 when using both brakes. Those who don't use the front brake at all will only achieve about 0.4g. Having a pillion passenger actually helps achieve a great deceleration as the pillion helps reduce the amount of weight transfer to the front wheel, making the rear brake more important. Establishing how a rider uses their brakes can be an important factor in any reconstruction of a motorcycle accident.

## How is the speed of the motorcycle calculated?

There are various methods that can be employed, which depend on what evidence is found at the scene of the accident. Skid marks left on the road surface can be used so long as the braking method used by the rider is known. If it is not known which brakes were used, then this will result in a wider band of calculated speeds. Because skid marks are used at the end of any calculations a wide difference in deceleration rarely means a wide range of calculated speeds. If the motorcycle slid along the road, then in the absence of gouges along the slide marks the motorcycle probably decelerated at a rate of about 0.3 to 0.4g. If the road was gouged then the deceleration rate can be significantly higher.

Where the take-off and landing points of riders or pillion is known, then standard projectile motion equations can be used. For this, the launch angle has to be known. Research has been carried out in this area which suggests that the launch angle of a rider is between 15 and 25 degrees, and the pillion is between 18 and 45 degrees.

When a motorcycle collides with the side of a car, often occurring at junctions with the car turning or emerging into the path of an oncoming motorcycle, the car will suffer deformation of its side structures, and the wheelbase of the motorcycle will be shortened. If the damage to both vehicles is measured (in centimetres), then the speed of the motorcycle at impact (in metres per second) will be between 2.1 and 2.6 times the square root of the combined deformation.

Other rare situations can occur, such as the foot rest or stand scoring the road surface as the motorcycle is cornering under heavy lean. Measuring the radius of curvature of the score marks can be used to calculate the speed of the turn.

## **What about wobble and weave?**

- *Wobble is high frequency and can occur at all speeds*

Wobble and weave are mechanical vibration problems involving repeated cycles of motion. Wobble is counter twisting of the frame around the steering head. The front frame is considerably lighter than the rear and so does much of the moving. Wobbling can occur at all speeds, but stiffening of the frame causes wobbles to reduce at lower speeds, and increase at higher speeds. Wobble can also be reduced by the rider gripping the steering hard. Wobble is a relatively high frequency phenomena being at about 8 cycles per second.

- *Weave is low frequency and only occurs at high speed*

Weave is at a frequency of about 3 Hz (cycles per second), and only occurs at high speed. Being at a lower frequency it is possible for a highly skilled rider to stabilise a weave before it goes out of control.

- *Witness evidence can be used to establish the mode of loss of control*

Witnesses describing the back end of the motorcycle swaying side to side are describing weave. If it is established that the motorcycle suffered a wobble but the rider was not able to regain control then it may be that the highway maintenance authority were negligent. If one is considering a Claim against the road maintenance authority, though, one needs to be very careful. Tyre pressures and condition are significant in the cause of these instability problems, as is the condition of the suspension, the steering head bearings, fork oil and dampers. It may also be that a gust of wind or steering movement to avoid an obstacle in the road initiated the problem.

- *Many vehicular factors can be influential on wobble and weave*

## **What information do I need in a motorcycle accident claim?**

The police report containing any scene evidence such as skid, scrape and slide marks is vital. Hopefully the Police will also have taken photographs and prepared a plan of the accident scene. If an accident investigation officer has prepared a report then that should be obtained as it will probably detail the types of scene marks found and their lengths, etc.

- *The police report should detail the marks found at the scene*

It is very rare for police officers or police vehicle examiners to measure the amount of deformation suffered by a car and motorcycle. Such evidence can be used to calculate the speed of the motorcycle at impact. Efforts should therefore be made to preserve the vehicles and to have them examined in their damaged state before they are released, repaired or scrapped (if they haven't already been).

## **Free initial discussion and assessment**

- *Try to have the vehicles preserved in their damaged state so they can be examined*

If you wish to discuss any cases free of charge, want to send a file for a free assessment, or want a quote or to instruct us, please use the contact details below.

**With our compliments**

- *If the vehicles are no longer available, try to obtain photographs*

**S P Associates  
1 Dover Avenue  
Worcester  
WR4 0LA  
DX 716301 Worcester 1  
Tel/fax: 01905 757187  
E-mail: [steveparkin@onetel.net](mailto:steveparkin@onetel.net)**