Run-off-the-Road Crashes

What has caused the large increase in this problem?

By

Dennis Trusty

March 29, 2010
What is ABS?

• ABS stands for Anti-Lock Brake System

• ABS was initially developed for Aircraft

• ABS was first installed in cars in Europe
What does ABS do?

• ABS measures wheel slip when brakes are applied.

• ABS modulates the pressure on the brakes to limit wheel slip.

• ABS prevents wheel lock-up to maintain steering control under extreme braking.
How does ABS affect vehicle operation?

• Drivers are more likely to steer their car away from an object with ABS

• Without ABS the front wheels can lock preventing steering; the vehicle will go straight and may strike the object in front of it
• To prevent wheel lock-up ABS will pulse the pressure on the brakes allowing the wheels to rotate instead of skid.

• With ABS the wheels do not lock-up; stopping distance can increase substantially on unfavorable surfaces
  – Stopping distance can increase up to 60%
How has ABS affected Run-off-the-road Crashes?

• Studies from around the world indicate that vehicles equipped with ABS are up to 40% more likely to be involved in a Run-off-the-Road Crash.

• When an ABS vehicle leaves the travel lane and goes on a soft surface the stopping distance increases.
  – A Canadian study indicated the stopping distance went from 77 meters without ABS to 117 meters with ABS.
• Once a vehicle leaves the roadway and is traveling on a soft surface the increase in stopping distance with ABS represents a much greater chance of striking an object along the roadway.

• It also means the ABS vehicle will be traveling at much higher speeds for a much longer period of time.
• Because vehicles equipped with ABS must travel longer to stop on soft surfaces and are traveling at higher speeds during this longer period of time; these vehicles are 40% more likely to be involved in a Run-off-the-road crash.

• For SUV’s and Pickups there is a much higher risk of rollover.

• Adding to this problem, roof strength of SUV’s and Pickups have been less capable on average of withstanding a rollover without appreciable damage.
• Earlier ABS systems did not operate as efficiently as recent systems

• Drivers of early ABS equipped vehicles may not have applied the brakes properly
  – To apply the brakes on an ABS equipped vehicle you should stomp on the brake pedal and continue to push the brake pedal firmly
• On rural roads with vehicles traveling at higher speeds, ABS has meant a higher rate of Run-off-the-road fatalities and Intersection fatalities.
  – ABS vehicles have increased single-vehicle crashes
    • ABS causes a 10% increase of fatalities in single vehicle crashes
  – ABS increased by up to 39% Rollover Risk
    • Increased fatal rollover risk by up to 60% on unfavorable surfaces (gravel, sand, grass, wet, slush, icy or snow-covered)
What is the good news?

• Electronic Stability Control (ESC) is being added to most new vehicles beginning in 2011.
  – ESC measures the Steering Wheel angle
  – ESC measures the Yaw Rate of the vehicle
  – ESC measures the Lateral Acceleration of vehicle
  – ESC measures wheel slip
• ESC can control the brake on individual wheels

• ESC can reduce engine speed

• If ESC senses the vehicle is not turning as much as the steering wheel angle indicates it should be turning (measuring the Lateral Acceleration); the inside rear brake is applied to help turn the vehicle (and the engine speed may be reduced)

• If ESC senses the vehicle is turning more than the steering wheel angle indicates it should be turning (by measuring the Yaw Rate of the vehicle); the front outside wheel brake is applied (and the engine speed may be reduced)
What Effect does ESC have on Crashes?

- ESC reduces fatal crashes involving a single vehicle by 36%

- ESC reduces fatal crashes involving SUV’s, Pickups, and Vans by 63%

- Fatal single-vehicle rollover crashes are reduced by 70% for cars and 88% for other vehicles
What to do in the mean time?

• Promote purchase of Electronic Stability Control equipped vehicles
  – Limited number of vehicles prior to 2000 model year are available
  – Many late model SUV’s and luxury vehicles are equipped
  – Manufactures use many different names for their own brand of Electronic Stability Control

• Promote purchase of side curtain airbag equipped vehicles

• Promote use of seat belts

• Educate people on the danger of ABS on unfavorable surfaces
• Information used in this presentation obtained from:
  – Canadian Automobile Association
  – Royal Automobile Club of Victoria Ltd (Australia)
  – National Highway Traffic Safety Administration
  – Insurance Institute for Highway Safety