

Tactical vehicle rollover types, factors examined

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Rollovers are dangerous incidents, which have a higher fatality rate than other types of crashes. Reducing risks of rollover begins with a good understanding of what rollovers are, and how they can affect personal safety in vehicles. This article will help clarify why rollovers are so dangerous, and what causes them to happen and will help minimize chances of being injured or killed during a rollover crash.

Data from the Army's Combat Readiness Center indicate in the first three years of Operation Iraqi Freedom 317 Soldiers were injured or killed in rollovers of which 110 were fatal. Between January 2003 through April 2006, the Army experienced 405 rollovers in Army motor vehicles and 59 in Army combat vehicles. A study conducted by the Army Materiel Systems Analysis Activity in May 2005 indicated non-OIF and Operation Enduring Freedom rollover fatality rates were the same order of magnitude as civilian accident fatality rates; however, OIF/OEF rates were significantly higher from 12 to 42 times as high. The good news is that in recent months, these OIF/OEF rates have dramatically improved.

Rollovers are complex crash incidents and are particularly violent in nature. A study (EPICON RN 12-MA-03Z8-05) conducted by U.S. Army Center for Health Promotion and Preventive Medicine reported that

Soldiers in rollover accidents were 70 percent more likely to die than those in non-rollover accidents. Rollovers, more so than other types of crashes, reflect the interaction of man, machine and environment. So while vehicle type does play a significant role, other factors such as driver behavior and road and environmental conditions can cause a vehicle to roll over. The National Highway Traffic Safety Administration has completed a number of studies on rollovers and contends the following factors contribute to rollovers; these factors may also apply to tactical vehicle operations.

Factors:

1) Vehicle type. All types of vehicles can rollover. However, taller, narrow-wheel base vehicles, which have higher centers of gravity, are more susceptible to rollover if involved in a single-vehicle crash. The USACH-PPM study indicates Stryker vehicle occupants had a 6.9 times greater risk of a rollover-related injury compared to Humvee occupants. The frequency of Humvee rollovers remains the highest due to the greater number of Humvees and the significantly more miles traveled.

2) Speed. Fatal rollover crashes are speed-related more often than fatal non-rollover crashes. NHTSA data indicates that 40 percent of fatal rollover crashes involved excessive speeding. Additionally, nearly 1/3 of fatal rollovers took place where the posted speed limit was 55 miles per

hour or higher. Vehicle speed is most likely the most critical factor contributing to rollovers and the main factor by which the driver exercises the most control. Excessive speed for road conditions increases the sideways force and decreases driver response times.

3) Fatigue-impaired driving. Impaired driving skills due to fatigue can negatively affect judgment physical coordination, making it more likely to lose control of the vehicle.

4) Location. NHTSA data indicates rural roads tend to be undivided and without barriers. They are thus more likely to be the scene of a fatal rollover. Almost 1/3 of fatal rollovers occur in rural areas where the posted speed limit is typically 55 miles per hour or higher. Watch for curves and slopes on rural roads.

5) Routine driving. NHTSA data also suggest that over 90 percent of the vehicles in fatal, single-vehicle rollover crashes were involved in routine driving maneuvers (going straight or negotiating a curve) at the time of the crash. This further suggests driver behavior (distraction, inattentiveness, speeding, and impaired driving) plays a significant role in rollover crashes.

6) Single-vehicle crashes. NHTSA data show nearly 85 percent of all rollover-related fatalities are the result of single-vehicle crashes. This means the majority of rollover crashes and fatalities do not involve any other vehicle besides the one that rolled over, further suggesting that driver

behavior plays a significant role in rollover crashes.

Categories and types of rollovers.

Rollovers occur in one of two ways: tripped or un-tripped.

1) Tripped rollovers. NHTSA data show 95 percent of single-vehicle rollovers are tripped. This occurs when a vehicle leaves the roadway and slides sideways, digging its tires into soft soil or striking an object such as a pothole, curb or guardrail. The high tripping force applied to the tires in these situations can cause the vehicle to roll over. One of the best ways to avoid a rollover, therefore, is to stay on the road.

2) Un-tripped. Un-tripped rollovers are less common than tripped rollovers, occurring less than 5 percent of the time, and mostly to top-heavy vehicles. Instead of an object serving as a tripping mechanism, un-tripped rollovers usually occur during high-speed collision avoidance maneuvers.

The following types have also categorized rollovers.

1) Soft shoulder/ground gives way (fall initiated). This has sometimes occurred from unimproved roads, which may be near bodies of water.

2) Swerve to avoid pothole/object (maneuver initiated). Excessive steering induces the rollover.

3) Taking corner too fast (maneuver initiated). Speed and lateral momentum induces the rollover.

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