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ROAD TRAFFIC SAFETY: PROBLEMS AND SOLUTIONS

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Road safety aims to reduce the harm (deaths. Injures, and property damage) resulting from motor vehicle collisions. Harm from road traffic crashes is greater that from all other transportation modes (air, sea, space, off-terrain, etc.) combined. Road traffic crashes are one of the world's largest public health and injury prevention problems. The problem is all the more acute because the victims are overwhelmingly healthy prior to their crashes. According to the World Health Organization more than a million people are killed on the world's roads each year. The standard measures used in assessing road safety interventions are fatalities and Killed or Seriously Injured rates, usually per billion passenger kilometers. In the United States , crashes per million vehicle miles is typically used for road safety. According to the World Health Organization more than a million people are killed on the world's roads each year. Speed is a key goal of modern road design, but impact speed affects the severity of injury to both occupants and pedestrians. For occupants, Joksch (1993) found the probability of death for drivers in multi-vehicle accidents increased as the fourth power of impact speed (often referred to by the mathematical term δv, meaning change in velocity). Injuries are caused by sudden, severe acceleration (or deceleration), this is difficult to measure. However, crash reconstruction techniques can be used to estimate vehicle speeds before a crash. Therefore, the change in speed is used as a surrogate for acceleration. Interventions take many forms. Contributing factors to highway crashes may be related to the driver (such as driver error, illness or fatigue), the vehicle or the road itself. Interventions may seek to reduce or compensate for these factors, or reduce the severity of crashes that do occur. A comprehensive outline of interventions areas can be seen in Management systems for road safety. On neighborhood road where many vulnerable road users, such as pedestrians and bicyclists can be found, traffic calming can be a tool for road safety. Shared space schemes, which rely on human instincts and interactions, such as eye contact, for their effectiveness, and are characterized by the removal of traditional traffic signals and signs, and even by the removal of the distinction between carriageway and footway, are also becoming increasingly popular. Both approaches can be shown to be effective. Outside neighborhood roads, design features are added to increase motorized safety and mobility. These features come at increasing coasts; costs which include monetary amounts, decreased or discouraged usage by non-motorized travelers, as well as aesthetics. Benefits include a broader spectrum of occupational, cultural and entertainment options than enjoyed by more travel-liited generations. At the other end of the spectrum from neighborhood roads are motorways, which may be called freeways, limited access highways, Autobahnen, Interstates or other national names. Motorway have the best engineered features, limited access and minimize opportunities for conflict so are typically the safest roads per mile travelled and offer better fuel economy despite higher average speeds.

One method is to post special safety signage on the most dangerous highways. Better motorways are banked on curves in order to reduce the need for tire-traction and increase stability for vehicles with high centers of gravity. Most roads are cambered (crowned), that is, made so that they have rounded surfaces, to reduce standing water and ice, primarily to prevent frost damage but also increasing traction in poor weather. Some section of road are

now surfaced with porous bitumen to enhance drainage; this is particularly done on bands. These are just a few elements of highway engineering.Modern safety barriers are designed to absorb impact energy and minimize the risk to the occupants of cars, and bystanders. For example, most side rails are now anchored to the ground, so that they cannot skewer a passenger compartment, and most light poles are designed to break at the base rather than violently stop a car that hits them. Some road fixtures such as road signs and fire hydrants are designed to collapse on impact. Highway authorities have also removed trees in the vicinity of roads; while the idea of "dangerous trees" has attracted a certain amount of skepticism, unforgiving objects such as trees can cause severe damage and injury to any errant road users. The ends of same guard rails on high-speed highways in the United States are protected with impact attenuators, designed to gradually absorb the kinetic energy of a vehicle and slow it more gently before it can strike the end of the guard rail head on, which would be devastating at high speed. Several mechanisms are used to dissipate the kinetic energy. Fitch Barriers, a system of sand-filled barrels, uses momentum transfer from the vehicle to the sand. Many other systems tear or deform steel members to absorb energy and gradually stop the vehicle. Road hazards and intersections in some areas are now usually marked several times, roughly five, twenty and sixty seconds in advance so that drivers are less likely to attempt violent manoeuvres. Most road signs and pavement marking materials are retro-reflective, incorporating small glass spheres or prisms to more efficiently reflect light from vehicle headlights back to the driver's eyes.

In some countries major roads have "tone bands" impressed or cut into the edges of the legal roadway, so that drowsing drivers are awakened by a loud hum as they release the steering and drift off the edge of the road. Tone bands are also referred to as "rumble strips", owing to the sound they create. An alternative method is the use of "Raised Rib" markings, which consists of a continuous line marking with ribs across the line at regular intervals. They were first specially authorized for use on motorways as an edge line marking to separate the edge of the hard shoulder from main carriageway. The objective of the marking is to achieve improved visual delineation of the carriageway edge in wet conditions at night. It also provides an audible/vibratory warning to vehicle drivers, should they stray from the carriageway, and run onto the marking.

Most industrialized countries have comprehensive requirements and specifications for safety-related vehicle devices, systems, design, and construction. These may include:

- Passenger restraints such as seat belts – often in conjunction with laws requiring their use – and airbags
- Crash avoidance equipment such as lights and reflectors
- Crash survivability design including fire-retardant interior materials, standards for fuel system integrity, and the use of safety glass
- Sobriety detectors: These interlocks prevent the ignition key from working if the driver breathes into one and detects significant quantities of alcohol. They have been used by some commercial transport companies, or suggested for use with persistent drink-driving offenders on a voluntary basis.

According to the European Commission Transportation Department "it has been estimated that up to 25% of accidents involving trucks can be attributable to inadequate cargo securing". A great way to stabilize, secure and protect cargo during transportation on the road is by using Dunnage Bags. Safety can be improved by methods that encourage safe behavior, or reduce the chances of driver error. Some of these include:

- Compulsory training and licensing.
- Restrictions on driving while drunk or impaired by drugs.
- Restrictions on mobile phone use while on the move.
- Compulsory insurance to compensate victims.