Road Safety Information

November 2017

Pedestrian Protection

This factsheet outlines what measures can, and are, being taken to improve the design of cars so that drivers are less likely to hit pedestrians in the first place, known as active safety technologies, and measures so that when such collisions do happen, the pedestrian will suffer less severe injuries, known as passive safety technologies.

After a fall in pedestrian fatalities between 2014 and 2015, in 2016, the number of pedestrians killed in road accidents in Great Britain rose to 448, accounting for 25% of road deaths[1]. Table 1 below shows the number of pedestrian injuries in 2016. There were 15,976 child casualties of which 38% were pedestrians and 23,409 casualties involving people aged over 60, of which 18% were pedestrians.

Table 1: Police reported pedestrian injuries by severity, 2016, Great Britain[2]

	Fatalities	Serious Injuries	Slight injuries	All injuries
Children (0-15)	34	1,253	4,711	5,998
Young people (0-17)	43	1,414	5,392	6,849
Adults (18-59)	218	2,346	9,532	12,096
Adults (60+)	186	1,324	2,674	4,184
All pedestrians*	448	5,140	17,962	23,550

* Includes cases where age was not reported

How do you make cars safer for pedestrians?

Traditionally, vehicle safety has tended to focus on improving the protection that a car can offer to an occupant, but vehicles can also be designed to be safer for pedestrians if an accident occurs.

Pedestrian protection is achieved by designing the front of a vehicle so that pedestrians and other vulnerable road users are less likely to be injured if they are hit, and European legislation, Pedestrian Protection Regulation 78/2009, has now been introduced to ensure that all cars offer some level of protection. This legislation is expected to amended during 2018.

It will never be possible to design car fronts so that they do not injure pedestrians in all circumstances, but there is much more that can be done to change the shape and the stiffness of car fronts so that injuries are

less likely and less severe. The changes in the shape of many modern vehicle fronts, compared to older vehicles, has been influenced by pedestrian protection.

In general, vehicle designs can be modified to protect pedestrians by increasing the crush depth between the outer surface of the vehicle and hard objects underneath (such as engine parts), and also by modifying the stiffness of the vehicle's structure below the outer surface so that in an impact it absorbs as much energy as possible without causing injury.

An organisation called EuroNCAP has been conducting crash tests on cars for around 20 years. The cars that they test are given star ratings for the level of occupant and pedestrian protection that the car offers, and most manufacturers try to achieve the highest rating possible when designing their cars. Whilst the ratings for vehicle occupants have been steadily increasing, improvements in pedestrian protection have been less rapid - the majority of cars achieve less than half marks.

How can you test how safe a car front is?

There are many different approaches that can be taken. One manufacturer has developed their own pedestrian crash test dummy so that they can replicate what would happen in a crash. Computer programmes are also extensively used to model the front of vehicles and the dynamics of an accident.

The tests used by EuroNCAP and in European legislation use impactors that are fired into the car front at specific speeds. Impactors are used, rather than a pedestrian dummy, to ensure the repeatability of the experiment.

Real world studies which examined the frequency and severity of pedestrian injuries were used to determine which areas of the car front will be tested by the impactors - and so each impactor tests how much a car front will prevent a common real world injury.

The deceleration of the impactors is measured to assess the energy absorption characteristics of the different parts of the vehicle. The severity of the injury is dependent on the force that the vehicle exerts on the impactor during the test - the greater the force, the more likely the injury caused by the car front would be serious or fatal.

There are four specific tests that have been designed to test the vehicle front.

Lower legform to bumper

This test is designed to replicate the initial contact between a pedestrian and a car.

Generally speaking, most bumpers will hit a pedestrian below the knee. This can result in injuries to the bones below the knee (the tibia and the fibula). This test aims to reduce the incidence of these injuries by encouraging car designs with bumpers that deform and efficiently control the energy absorption on contact. The test also helps to prevent injuries to the knee, which can frequently result in long term disability.

Upper legform to bonnet leading edge

This test replicates the top of the leg contacting the leading edge of the bonnet. It also offers protection for an adult pedestrian's hip and also to the upper body or head of younger children.

Headform to bonnet test

The headform to bonnet tests are performed so that car designs will offer protection to both adult and child heads. The bonnet is the part of the car most likely to cause a head injury to a pedestrian in an accident.

Space must be created between the bonnet and engine components underneath in order to create a "safe" bonnet that will pass this test. The bonnet itself will also absorb some of the energy in a controlled manner to prevent injury.

In addition, by making the front of the car more forgiving, these tests go some way to help prevent injuries to cyclists and other vulnerable road users.

RoSPA's policy position

RoSPA calls for better protection for pedestrians. RoSPA believes that there should be a UK and European collision investigation programme that investigates collisions between all types of vehicles and vulnerable road users (pedestrians, cyclists and motorcycles).

When the European Commission reviews the Pedestrian Protection Regulation, RoSPA believes that the existing mandatory tests conducted should be retained (lower leg form to bumper and headform to bonnet). However, more tests should be mandated, including:

- Adult head to windscreen, with an impact speed of at least 40km/h
- An adult upper leg form against bonnet leading edge test
- Adult head to A pillar tests at 40km/h
- A test between vehicles with higher bonnet leading edges and a child's headform and a small adult's thorax[3]

References

[1] Department for Transport (2017) 'Reported road casualties in Great Britain: 2016 Annual Report'
URL: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/648081/rrcgb2016-01.pdf
Date Accessed: 24/11/2017.

[2] Department for Transport (2017) 'Table RAS30002: Reported casualties by road user type, age and severity, Great Britain, 2016'
URL: https://www.gov.uk/government/statistical-data-sets/ras30-reported-casualties-in-road-accidents
Date Accessed: 24/11/2017.

[3] European Transport Safety Council (2016) 'Position Paper: Revision of the regulation on protection of pedestrians and other vulnerable road users 78/2009'