

# How to stop the slaughter of the innocents

Cars could be re-engineered to make them safer for pedestrians. But will car owners be willing to pay?

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TODAY a series of collisions will kill 50 pedestrians on the roads of the developed world. If this were a terrorist attack it would be headline news. But you will never hear about most of these victims – it is just a normal day on the roads.

Cars are increasingly being fitted with high-tech safety features such as anti-skid brakes and adaptive cruise control. But almost all these devices protect drivers and passengers rather than the most vulnerable road users – pedestrians.

Convincing car buyers to shell out on devices to protect themselves and their passengers can be difficult enough, says Robert LaGuerra of technology consultancy ABI Research in

Oyster Bay, New York. Persuading them to spend money to protect others is even more difficult.

"Surveys show that motorists are more likely to spend money on an advanced audio system than on technology to save their own lives. Pedestrian safety systems have had to be driven by legislation."

To this end the first phase of the European Union's pedestrian safety directive, which comes into force in October, has been designed to make cars a bit kinder when it comes to the crunch. All new models will have to comply with the legislation.

When a car hits someone the bumper sweeps their legs from under them. Their upper torso pivots onto the leading edge of the bonnet, and their head comes crashing down on the upper part

of the bonnet or the windscreen. These head injuries cause about 80 per cent of pedestrian deaths.

The first phase of the EU legislation will require a bumper that absorbs some of the energy of an impact, says Graham Lawrence, head of pedestrian safety research at the UK's Transport Research Laboratory (TRL) in Wokingham, Berkshire. "Bumpers will be taller and deeper and designed to cushion the impact, without transferring the force of the impact to the knee," he says.

A crumple zone on the bonnet will also help to absorb the energy of any impact and cut the severity of head injuries. In most cars this crumple zone can be created by designing a 10-centimetre space between the metal bonnet and the engine beneath. The space allows the bonnet to bend, unobstructed by the engine, and so absorb some of the energy.

## Impact sensitive

However, in some models there is no room to lower the engine – particularly in low-slung sports cars and some smaller cars. What's more, not all vehicle makers want to change the distinctive shape of their models. So several plan to comply with the new rules by installing a computer-controlled bonnet that can pop up by 10 centimetres, linked to an impact-sensitive bumper. This will not affect the styling of the car, says Richard Backhaus of Robert Bosch in Stuttgart, Germany, one of the companies developing pedestrian-friendly technology.

The company's software can filter out false alarms by analysing the output of sensors on the bumpers, including the location of the impact and the acceleration of the object struck, to distinguish between a pedestrian and a tree or lamp post. The system will also cut out at low speeds.

Japan is likely to introduce similar legislation in 2007, but the US is lagging behind, partly due to cost. "Consumer demand is questionable," says LaGuerra, "and costs are estimated to be in the range \$250 to \$450 per car."



There is also little public pressure. The US has a much lower proportion of pedestrians killed in road accidents than Japan and many European countries.

There is also a difference of perception between Europe and the US on bumper design, says LaGuerra. Under federal law, bumpers in the US have to emerge unblemished from an impact of 4 kilometres per hour with a solid object, such as a lamp post. Backed by tests on high-profile television shows, US motorists equate car safety with the bumper test. So car manufacturers make their bumpers extremely stiff.

But this means US bumpers are not pedestrian friendly. "When Transport Canada tested a [US] federal bumper, they broke the leg of a Japanese test dummy," says



Lawrence. Car makers like to sell their models all over the world, but it will be difficult to design a bumper that meets both US and European legislation, he says.

There has been a lengthy political battle over the second stage of the European legislation, which comes into force in 2010. The European Commission asked Lawrence and his colleagues at TRL to carry out a feasibility study of possible new requirements. The tests underpinning the first stage of the legislation are designed to protect pedestrians in collisions of up to 35 kilometres per hour. One of the TRL's key proposals was to increase the speed of the tests to 40 kilometres per hour, forcing car makers to introduce tougher modifications. The lab believes this would substantially increase

the number of pedestrians able to walk away from collisions.

However, the car industry convinced the European Commission that this would be unnecessary with "brake assist", which applies emergency braking more effectively than drivers can. Consequently stage two, the text of which has yet to be finalised, now makes only minor improvements to the energy absorption of bumpers and bonnets.

Safety campaigners had hoped that the second stage of the legislation would require cars to be fitted with external airbags, so that an impact with a pedestrian would cause an airbag on the bonnet to inflate. Ian Simmons, head of vehicle technology at TRL, carried out successful tests in 1999 on a car fitted with a standard

## "Motorists prefer to spend money on a good sound system"

airbag on its bonnet, in which the airbag cut the number of head injuries by 90 per cent and halved the number of chest injuries.

But motorists won't like external airbags because they damage the car's paintwork when they inflate. The Swedish airbag manufacturer Autoliv has been in talks with car companies about fitting them to their cars, says spokesman Mats Ödman. "But there are no firm contracts."

Whatever the decision taken on external airbags, other ideas could save even more pedestrian lives by

In the developed world, 50 pedestrians a day are killed in collisions with cars

avoiding an accident altogether. In 2007 the EU will start a research programme to develop a "collision-free" vehicle. This is likely to build on recent UK government research in which Simmons and his colleagues at TRL, working with the car maker Jaguar, tested a car fitted with infrared and radar systems that can give an early warning of a collision.

The car has three radar systems that use triangulation to pinpoint any object more than 20 metres away that could end up in the car's direct path. If the object moves closer, the infrared camera takes over, looking for warmth to tell if it is a pedestrian.

"This is very challenging research and we haven't got all the answers yet," says Simmons. "A tree in bright sunlight has much the same infrared signature as a human. Nevertheless the system got it right in 97 out of a 100 tests."

Video cameras, radar and infrared are becoming increasingly common on cars, to avoid hitting objects when reversing, for adaptive cruise control, and to prevent cars straying out of their lane. So adapting these systems to avoid hitting a pedestrian, or to minimise the consequences of a crash, is not complicated. "Once you have detected the possibility of a collision," says LaGuerra, "you can steer the vehicle away from it, or slow the vehicle down and so try to avoid a collision – or at least minimise the severity of an impending crash."

How many pedestrians can be saved by these technologies will depend partly on the power struggle between legislators and vehicle makers, and partly on convincing the public to rate pedestrian safety as highly as their own when buying cars. "An external airbag may damage the car's paint," says Hester Brown of the London-based safety campaign Living Streets. "But isn't that better than cleaning blood off your bonnet?" ●

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