MIND THAT BUS!

Transport for London (TfL) has launched a comprehensive new safety standard that will result in major, mandatory changes to the capital's buses. Including everything from autonomous emergency braking (AEB) to improvements to frontal crashworthiness, their introduction will be staggered from 2019 to 2024, reports Steve Banner

Mayor of London Sadiq Khan is determined to cut the number of deaths and injuries caused by road accidents in the capital, and buses will have a key role to play in his ongoing campaign. Early last year he unveiled his Vision Zero approach to highway danger. The aim is for no one to be killed in or by a London bus by 2030, and for deaths and serious injuries caused by all road collisions to be eliminated from the capital's streets by 2041.

In addition, there is an interim target of a 70% reduction in the number of people killed or seriously injured in or by a bus by 2021/22. A total of 25 were killed by buses in London during 2015 and 2016 and a further 12,000 injured, mostly by slips, trips or falls, according to the London Assembly's 'Driven to Distraction' report published in 2017.

The new programme should play a role, but TfL admits its wish list is aggressive. "Not all the technologies are available immediately, and some will require development, so our bus safety roadmap gives manufacturers the time they will need to invest in these new features," says TfL director of bus operations Claire Mann. "This has been an evidence-based and collaborative project which has involved consulting with manufacturers and operators on technical feasibility, timelines and implementation."

The Transport Research Laboratory (TRL) has independently trialled many of the planned measures on TfL's behalf.

THE PLANS

One safety measure is already in force. ISA – Intelligent Speed Assistance – is now obligatory to ensure buses stick to the prevailing speed limit. This follows a trial commissioned by TfL two years ago on two bus routes.

Among those items on the compulsory list for 2019 are blind spot mirrors, reversing camera monitoring systems and driver assault screens. Also required will be acoustic vehicle alerting systems, which will warn vulnerable road users that a bus is in the vicinity, plus changes to the interior, including better anti-slip floor surfaces.

Some of these items are already installed in many cases, and all new electric and hybrid buses will have to be fitted with acoustic warning systems from 2022 anyway, throughout the UK.

2021 will see TfL mandate the use of compulsory interlocks to prevent buses from rolling away if the driver forgets to apply the parking brake. There will also be measures to prevent drivers from pressing the accelerator rather than the brake pedal. Mann and her colleagues want to see greater standardisation in this area to avoid the risk of drivers becoming confused by different pedal layouts or pedal feel, as they move from one make and model of bus to another.

More aids to make it easier for the driver to spot vulnerable road users will be obligatory, including blind spot camera monitoring. So will better protection against striking pedestrians with exterior mirrors or the windscreen wiper mounting points. This is likely to result in bulky rear view mirrors being replaced by cameras linked to an in-cab monitor (see also p31), and wiper mounting points being moved to the top of the screen or fitted with an energy-absorbing cover.

Further improvements to the interior will be required as well. TfL is especially keen on the use of seats with higher backs to lessen the risk of whiplash neck injuries if the driver has to brake hard, and on grab poles that will not

cause injury if somebody is thrown against one.

TfL is setting minimum head impact requirements, including the use of energy-absorbing materials under the front panels. Some of the other measures it has in mind include windscreens that slope more acutely, and more rounded front corners (pictured below). The idea is to lessen the risk that pedestrians will end up on the ground, and then run over.

Another measure TfL is keen to see developed is a mechanical or airbag device mounted under the bus that inflates on contact with a pedestrian. It cites as inspiration the BodyGuard system for trains developed by Bombardier. Mandatory AEB will arrive in 2024, along with more changes to bus design to give pedestrians a greater chance of avoiding serious injury if they are struck by one. Looking to the future, TfL suggests that AEB could be developed to prevent bridge strikes (see also *https://is.gd/feyeje*).

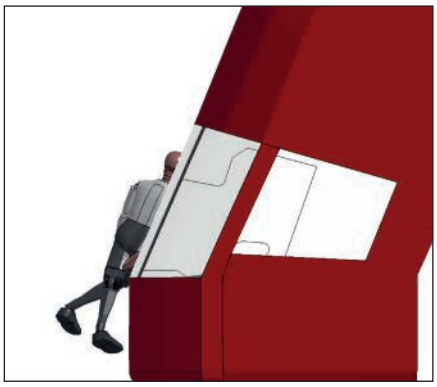
Reacting to the proposals, Cynthia Barlow, chair of road safety charity RoadPeace, says: "TfL's bus safety programme is a good example of tackling danger at source."

But, while applauding any attempt to improve transport safety, some months ago Optare's engineering director Alastair Munro expressed concern that installing AEB could result in injuries to standing passengers if the brakes are suddenly applied without warning, and they tumble over. And AEB may generate false positives; the risks of its doing so might require investigation.

In defence of the proposal, TRL vehicle safety and technology consultant Alix Edwards, who has been closely involved with the TfL project, makes the point that AEB applies the brakes with no greater force than a driver would use in an emergency. And she observes: "Remember that a balance always has to be struck between the casualties that might be avoided if AEB is applied, and any risk to people on the bus."

What all the foregoing steps have in common is that they will add to the cost of vehicles. Both TRL and TfL are aware of the cost implications of what is being proposed, says Edwards, and would not wish to make buses unnecessarily expensive. "Fewer casualties mean fewer insurance claims though," she points out; and that means cost savings.

In a collision, current buses tend to push an average pedestrian down towards the ground



Future buses will have a more sloped windscreen to try to deflect pedestrians

A STEP TOO FAR?

With the backing of TfL, a framework is being developed that will be used to assess any other ideas bus makers may have to improve safety, under the Safety Technology Initiative Award banner, Edwards says. "The evidence they come up with will be reviewed by a panel of experts," she observes.

But technology can be a two-edged sword. Munro at Optare has expressed concern that too much automation will eventually mean that bus drivers will no longer be able to exercise their own judgement in a crisis to the same extent as now, and that this factor could lead to safety being compromised.

He imagines an accident scenario where circumstances force a driver to collide with a car, but still allow him or her the freedom to choose which of several cars is hit. In this situation, can we trust the driver's instinctive preference to make the right decision, or should the driver's choice be constrained by an automated system? If so, can the system supplier be sure that it would do the right thing in every possible situation? If not, what percentage of mistakes should be deemed acceptable? TE