Active safety systems are already here and shortly to be mandated. Brian Tinham reports from Heyford Park on developments

STOP ON A

Fleet operators, policymakers and transport journalists were treated to real world demonstrations of active safety technology for trucks and cars last month. At an event staged by Thatcham Research, at Heyford Park, in Oxfordshire, we watched as first a Dennis Eagle Elite 6 RCV (refuse collection vehicle), then a fully-laden Volvo FH tractor-trailer combination and finally a 7.5-tonne DAF LF dropside were repeatedly driven fast at a dummy car dragged ahead of them at circa 10mph by a Land Rover Discovery.

MASSIVE MITIGATION

In the vast majority of cases, each truck's AEBS (autonomous emergency braking system) kicked in, detecting the dummy and bringing the vehicle to a controlled emergency stop without the driver applying the brakes. Occasionally, when the trucks were driven particularly aggressively towards the 'target', there was a minor impact. However, it was massively mitigated and, had these been real incidents, the occupants may have been shocked, and their vehicles damaged, but they would have escaped serious injury.

Impressive, yes, but it is the technology and rationale behind this and other advanced driver assistance systems (ADAS) – as well as the impending legislation governing OEMs' and operators' adoption – that matters here. From a technology perspective, sensors involved in implementing systems such as AEBS, LDWS (lane departure warning systems) and blind spot warning systems include radar (for distance and speed resolution), cameras (for target classification) and, in some cases, LIDAR (laser-based light detection and ranging). In operation, sensor data is effectively fused and processed to detect potential collisions in real time, and, in the case of AEBS, to trigger a phased automatic response that prevents or mitigates impacts with stationary and/or slow-moving targets.

As for the rationale governing system developments, as Volvo's accident research team leader Peter Wells explained, it's about understanding the kinds of accidents, their frequency and causes – and then focusing on systems best able to mitigate the effects. "For trucks, more than 50% of accidents involve vehicles going off-road, due to roll-overs or taking bends too fast," he said. Hence the value of early work on ESP (electronic stability program) systems, which are not only enabling technology but have also reduced single-vehicle incidents by some 25%, according to Thatcham's research.

AEBS just addresses rear-end collisions, which for trucks only represent some 15% of accidents (far greater with cars and vans). However, again according to Thatcham, in impending impact situations most drivers only apply 70–80% braking force. AEBS applies 100% (and hence the impressive statistics for accident and injury reduction in the car market, where

SIXPENCE

AEBS are increasingly being offered). That said, everyone agrees that most accidents are caused by human error – which is why active safety systems are designed primarily to regain driver attention, and then to act if all else fails.

AHEAD OF THE GAME

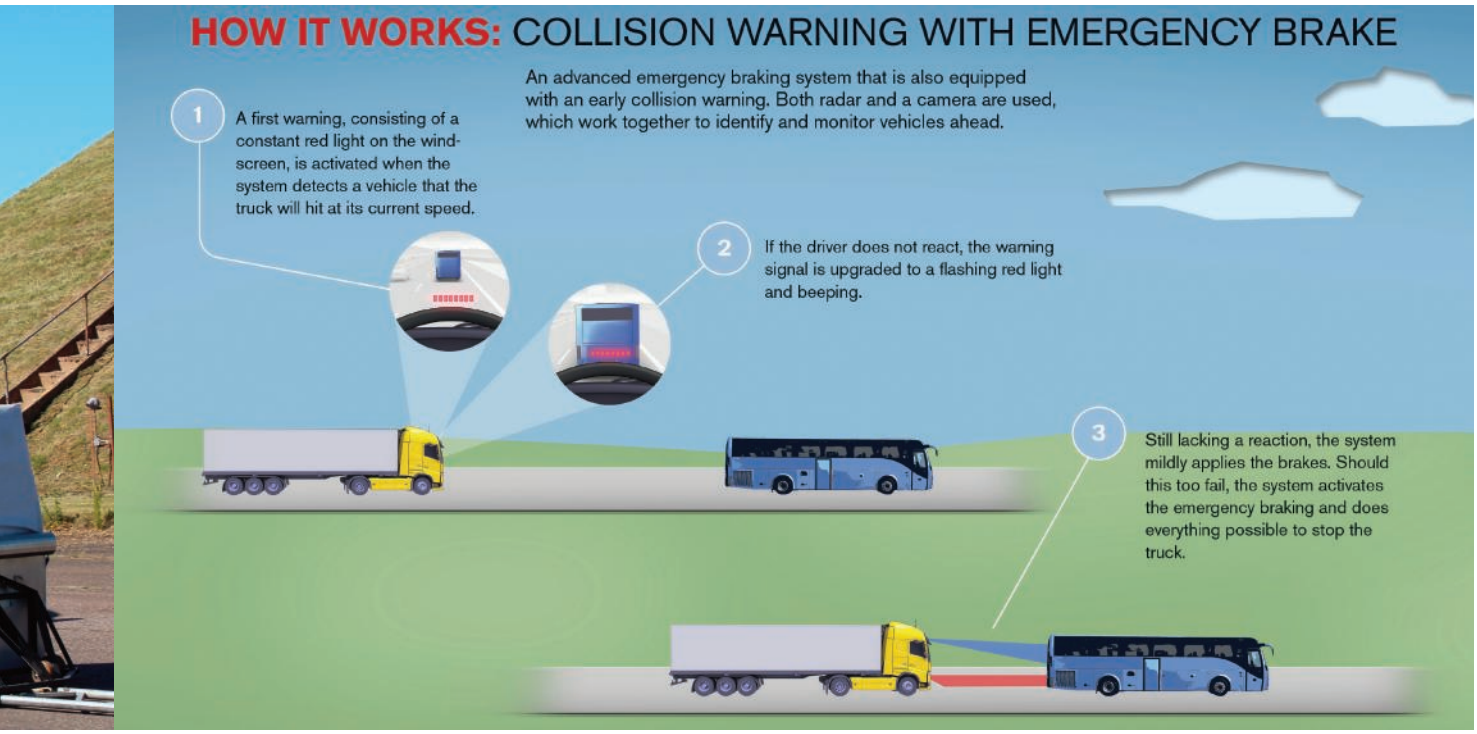
As for implementation, each vehicle manufacturer's AEBS may be subtly different, but all are programmed to first warn the driver (audibly and/or using haptic/tactile feedback) of an impending collision – in line with the EU's General Safety Regulation (GSR). Then, if he or she takes no evasive action, they first dip the brakes once before applying full emergency braking under AEBS/ESP control.

Surprisingly, the performance requirements of the first stage legislation, which comes into force on 1 November 2015, are not to the standard demanded for a Euro NCAP five-star rating in the automotive world. GSR requires a minimum speed reduction of 10 or 20kph (according to EU approval level – see panel, page 14) when driving towards stationary targets at 80kph, and then 50 or 70kph for moving targets (again depending on level). However, most truck manufacturers have risen to the challenge and are already offering AEBS that go way beyond this.

For example, the AEBS demonstrated by Volvo at Heyford Park was capable of reducing the truck's speed by 50kph for collision avoidance. And, according to Wells, this OEM's latest system for the Volvo FH is designed to deliver an 80kph speed reduction.

All well and good, but there is one commercial vehicle class notable by its almost complete absence when it comes to active safety systems – and that is vans. With the exception of some Ford and Mercedes-Benz vehicles, vans have seen virtually no AEBS. As Matthew Avery, research director at Thatcham, put it, that's because "while Euro NCAP is doing a great job in rating cars and regulations are driving the truck market, no one is looking at vans".

That, he said, is about to change though, as Thatcham starts working with insurance companies to drive downgrades in van insurance group ratings for those fitted with AEBS. "That will deliver an incentive to drive fitment



Volvo describes its technology as involving multiple radar sensors, cameras, LIDAR and ultrasonic instrumentation, together providing a 360-degree real-time view of the vehicle's surroundings

Advanced driver assistance systems (ADAS) in action: vehicle line-up at Heyford Park, in Oxfordshire, as Thatcham Research stages live demonstrations of trucks, vans and cars equipped with a range of new technology, tackling everything frm AEBS to autonomous traffic-following control

of AEBS to vans. It will take a long time, though, so we need more pressure on van manufacturers."

Meanwhile, work on more advanced AEBS technology is continuing apace. Next up will be automatic pedestrian and cyclist detection systems capable of following up to 50 moving targets in real time – for example, in urban and city streets – and automatically stopping vehicles. Avery made the point that it's more difficult to detect such vulnerable road users, not least because of their random behaviour, compared to vehicles. However, he told delegates that systems are currently emerging from the likes of Bosch and Continental that will soon be capable even of detecting children running from behind parked cars.

AUTONOMOUS VEHICLES

Ultimately, all of these technologies – plus vehicle-to-vehicle and vehicle-to-infrastructure communications – provide the building blocks for safe autonomous vehicles. And they may come sooner than many believe. Although projects such as the self-drive pods in Milton Keynes and Coventry, Greenwich Meridian and Bristol may not yield full driverless vehicles on British roads before, say, 2025, the transport industry has other ideas.

Back in April this year, two of Daimler's Freightliner Inspiration trucks, equipped with its intelligent Highway Pilot system, became the world´s first autonomous trucks to be licensed for operation on public roads in Nevada, USA (*TE* June 2015, page 5 and *TE* July 2015, page 24). And the car industry is also moving fast. In 2017, Volvo, says it will put 100 cars on the streets of Gothenburg, Sweden, under its DriveMe self-driving vehicles project.

Volvo describes its technology as involving multiple radar sensors, cameras, LIDAR and ultrasonic instrumentation, together providing a 360-degree, real-time view of the vehicle's surroundings. The system will also be connected to GPS and a cloud based 3D digital map continuously updated with traffic data. What's more, this company and others are forecasting commercially available systems on 2018–19 vehicles.

"We're going from feet off, to hands off, to eyes off, to brain off," quipped Avery. And that future may be coming soon. TE

AEBS regulations

EU regulations governing advanced driver assistance systems (ADAS) have been in force since November 2013, with the first stage of EC Regulation 661/2009 (General Safety Regulation) requiring the fitment of AEBS (autonomous emergency braking system), LDWS (lane departure warning systems) and ESP systems on virtually all new truck, bus and coach types – M3 and N2 categories over 8,000kg gvw, as well as N3 types equipped with pneumatic or air/hydraulic braking plus pneumatic rear suspension (exceptions include urban buses and off-road vehicles).

Under this ruling, from 1 November 2015 the above active safety systems will be mandatory on all such new vehicles, including road-going N3 vehicles with two or three axles and rear air suspension, but excluding off-road N3G trucks with four or more axles and vehicles with rear leaf suspension. Then under the regulation's second stage, from 1 November 2016, AEBS will be extended to M2, M3, N2 and N3 vehicles, other than those already exempted, for new types, followed by all new vehicles from 1 November 2018.

Not only are there two stages, but also two levels. For M3, N2 over 8,000kg gvw and N3 vehicles, AEBS performance requirements for the second stage are more demanding than those in the first. Meanwhile, with the advent of EU Regulation 2015/562 in April, amending 347/2012 (technical requirements and test procedures for AEBS), lighter weight vehicles with hydraulic braking systems and non-pneumatic rear axle suspension systems, including M2 and N2 vehicles not exceeding 8,000kg gvw, will also be covered, but with less stringent performance requirements.