

Developments at ZF TRW and Wabco look set to take safety technology - and indeed autonomous trucks - to the next level. Ahead of the IAA Show, Brian Tinham takes a look

SEE, THINK,

Safety systems are seeing developments like no other aspect of transport technology, with the possible exception of hybrid powertrains. Everything from ADAS (advanced driver assistance system) to in-cab camera- and radar-based vulnerable road user monitoring (and control) equipment and TPMS (tyre pressure monitoring systems) is getting better and cheaper.

Much of this is now required under European law - unlikely to be repealed after Brexit - for new truck registrations. Think of AEBS (autonomous emergency brake systems) and LDWS (lane departure warning systems). Other equipment is also as close to mandatory as makes little difference in the wake of CLOCS (Construction Logistics and Cyclist Safety). Blind spot mitigation systems provide good examples. Add to these the importance of safety and compliance for operators' directors, and the trend towards driver alerting and/or active intervention seems unstoppable.

But there's more. Another driver at the more sophisticated end of the spectrum concerns the movement towards autonomous vehicles (AV), as evidenced by the Truck Platooning Challenge. That saw convoys of semi-automated trucks from most of the OEMs converge on Rotterdam early in April. And although many hauliers' senior people don't see AVs emerging any time soon (33% of delegates at May's Microlise Transport Conference believe they won't work), latest developments paint a different picture.

Last month, ZF unveiled HDA (highway driving assist) and EMA (evasive manoeuvre assist), the latter developed with Wabco. Each is aimed at improving safety - on long haul and in urban environments - specifically for tractor-trailer combinations. And both are billed as representing the next generation of active safety systems on the road to full AV.

According to Mitja Schulz, senior vice president and general manager for

commercial steering systems at ZF TRW (formed following the merger of ZF and TRW last year), HDA is designed to keep trucks in their lanes and at safe distances from vehicles in front. Meanwhile, Dr Christian Wiehen, chief technology officer at Wabco, explains that EMA will automatically steer combinations around unanticipated hazards, such as halted motorway traffic ahead, so helping to mitigate serious rear-end collisions.

HDA and EMA both harness front-facing cameras and wide-angle radar to scan the road ahead for obstacles and lane markings. "If the markings are missing on one side of the road, the system ... calculates them," says Schulz, brushing aside an obvious criticism. Together, these provide real-time inputs to on-board intelligent control units that, in turn, drive corrective automatic braking and steering.

CONTROLLED STOP

HDA builds on ZF's AEBS and ESC (electronic stability control) systems, managing the foundation brakes and the firm's TraXon hybrid automatic transmission (including its predictive shifting strategy PreVision GPS) to maximise retardation. Meanwhile, EMA assumes direct control of the steering wheel via ZF's latest electro-hydraulic ReAX power steering system.

Essentially, this function is an extension of Wabco's existing automatic OnGuardActive emergency braking and stability system. It takes control if it sees the AEBS or driver braking as insufficient, directing truck and trailer safely toward an open lane or the hard shoulder, even at full speed, to prevent crash impacts.

"Our function simultaneously



ZF and Wabco: automatic emergency braking - and now steering, too

ACT



evades, brakes and stabilises [the entire combination] automatically at all speeds, with any load and any type of semi-trailer," states Schulz. "This function helps to avoid rear-end collisions. It helps us to come one step closer toward our overriding target of Vision Zero [accident-free traffic]." And he makes the point that drivers instigating such emergency avoidance without assistance are prone to under- or over-steer, potentially making dangerous situations catastrophically worse.

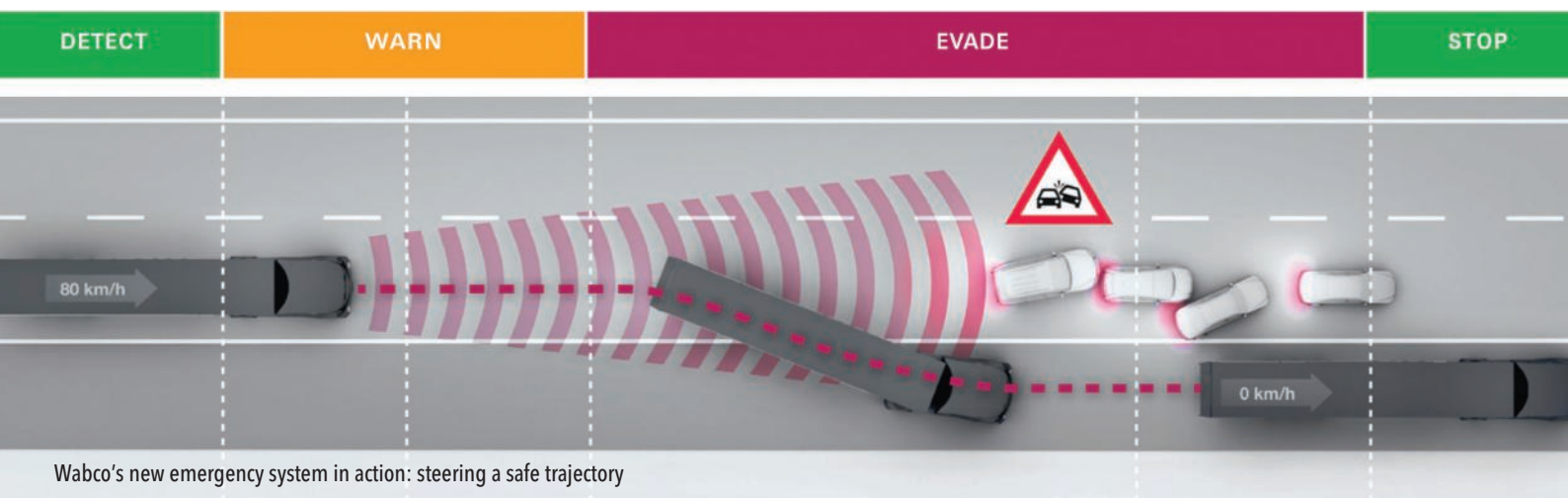
In a little detail, HDA at Level 1 warns the driver acoustically and visually of a

danger situation. Level 2 then vibrates the steering wheel, also moderately decelerating the vehicle. Finally, Level 3 initiates a full emergency stop with roll-over protection. Simultaneously, the steering system interprets sudden evasive manoeuvres at Level 1 as a command to start EMA. Its control software then constantly calculates the optimal evasion route and adjusts the steering angle to correct for variances between calculated and real trajectories.

"Evasive manoeuvre assist demonstrates Wabco's and ZF's leadership in developing safety

technologies for commercial vehicles," comments Wabco's Wiehen, adding that it represents another milestone on the road to driverless vehicles. "We can have HDA ready for volume production in approximately two years," comments Schulz. "By then, it will be absolutely realistic for it to meet all requirements needed for truck platooning."

Both options have now been fitted on ZF's prototype Innovation Truck 2016, to be unveiled at the IAA commercial vehicle exhibition (22–26 September, Hanover, Germany). They are expected to be on price lists by 2018.



Wabco's new emergency system in action: steering a safe trajectory

Safety systems update

TPMS (tyre pressure monitoring systems), from the likes of Michelin and TyrePal, alert drivers to tyre pressure and temperature problems on multiple tyres, via in-cab monitors – saving fuel but also warning of potential blowouts.

Blind-spot vision systems are available from several suppliers, with side, rear and birds-eye camera systems linked to data recording and telematics. Stoneridge's latest are MirrorEye and TopEye, which replace mirrors with cameras and in-cab displays. These also incorporate defrosting and night vision, as well as image handling to minimise glare.

Smartwitness offers its TruckProtect, with four front near-side proximity sensors that alert drivers whenever pedestrians or cyclists are present in the blind spot, automatically triggering an in-cab monitor. Rear sensors with audible and visual display can be added to trailers.

Innovative Safety Systems (ISS) markets its Cyclecar and 360 degree CCTV hard disk recording equipment. For cyclists, an illuminated sign and speaker alerts them that the vehicle is turning left; for drivers, intelligent sensors and displays warn that a cyclist is approaching.

Meanwhile, ZF's latest concept truck also features the firm's latest TraXon transmission (replacing the AS-Tronic) in its hybrid configuration. That comes with a 120kW, 1,000Nm electric motor plus a separating clutch in the bell housing, delivering everything from energy recovery to start/stop, boosting and auxiliary power. From an advanced safety perspective, though, ZF says it also enables the world's first autonomous, emission-free loading dock truck system.

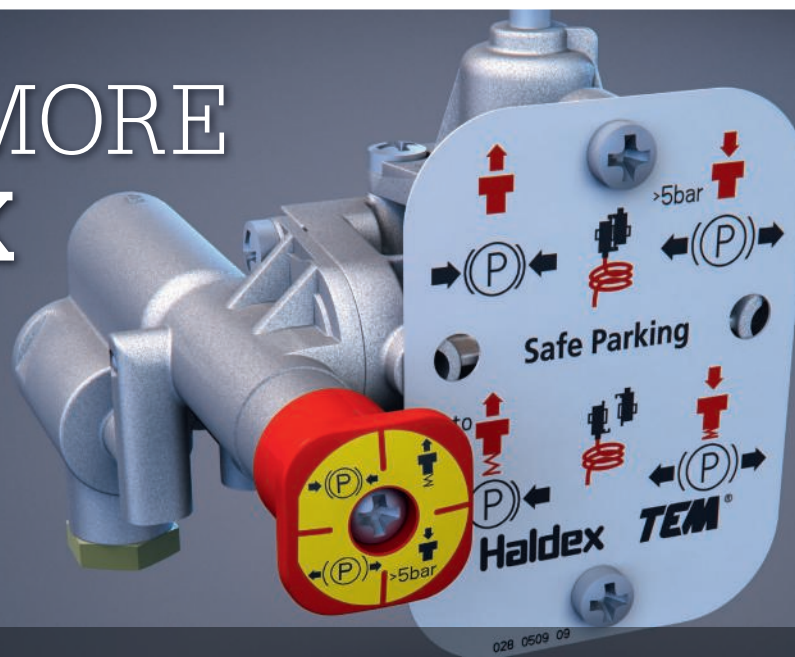
Winfried Gründler, head of driveline technology at ZF's commercial vehicle division, explains that, again, this relies on sensors and networked intelligence. However, noting that fitting operators' entire trailer fleets with sensors would be

too costly, he says loading bay cameras will instead detect targets on the rear of manoeuvring trailers. A computer at the depot then calculates the desired truck trajectory and transmits data to the combination via Wi-Fi and telematics.

The control system then takes over, harnessing the ReAX electric power steering and TraXon hybrid to steer and drive the truck up to the loading dock. The development builds on the 2014 ZF concept truck, which did much the same but under remote manual control.

Incidentally, given that during the initial manoeuvring phase, the trailer target could be obscured from the camera, trailers can also be tracked and controlled using GPS data. **TE**

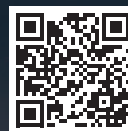
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