

BRAKE DOWN

According to accident research conducted in 2018, by Bosch, up to 34% of all accidents caused by heavy commercial vehicles could be avoided with advanced emergency braking systems (AEBS). Peter Shakespeare provides an update about the current state of the art

The technology that enables AEB was first trialled by Cadillac on cars in the United States in the late 1950s but was deemed too expensive to put into production. The forerunner of the modern forward collision avoidance system was demonstrated in 1995. But it was 2006 before the technology was demonstrated on commercial vehicles, the first in Europe being Mercedes-Benz on a 40-tonne Actros. Such was the positive impact of the demonstration that the system was eventually made mandatory on most new vehicles manufactured in the EU.

The latest update in performance criteria came in 2018, and it changes the speed differentials between the vehicle in front and the one following. According to AEBS Stage One - introduced in November 2015 - a truck travelling at a speed of 80 kph (50mph) must not collide with a vehicle ahead travelling at 32kph (20mph) or above. AEBS Stage One also requires a vehicle travelling at a speed of 80kph to have a maximum collision speed of 70kph when impacting a stationary obstacle. This legislation applied to new two- and three-axle large CVs with air suspension.

AEBS Stage Two was introduced in November 2018 and states that a truck travelling at a speed of 80kph must not

collide with a vehicle ahead travelling at 12kph or above. Stage Two also requires a vehicle travelling at a speed of 80kph to have a maximum collision speed of 60kph when impacting a stationary obstacle appearing ahead. The Stage Two legislation brought in scope two- and three-axle vehicles with rear leaf suspension. Four-axle vehicles are not currently in scope, but all of the vehicle OEMs offer AEBS as an optional extra on them.

HOW IT WORKS

Basic AEB systems rely on radar and radar-receiving sensors to detect and classify objects in front of a vehicle. When the closing distance and closing speed reach legally-set parameters, the system's software initiates a series of driver alerts and warnings, followed by braking actions, to prevent a collision. Most systems in use are Tier One supplier-developed and integrated with the vehicle OEM's platforms. Tier One suppliers include ZF, WABCO, Knorr Bremse, Delphi and Bosch.

For example, IVECO integrates WABCO's AEBS technology on its products. A spokesman outlined the capabilities of the system, which is structured on three intervention levels, depending on the predicted potential collision time. Level One involves visual

and acoustic warnings. This caution level warns the driver he or she is closing on the vehicle in front, so the driver can intervene to avoid the collision. Level Two continues to give the driver visual and acoustic warnings and initiates immediate braking action. This involves the system limiting vehicle power; it warns the driver by making a brief partial braking action. The driver can still drive the vehicle and correct the situation of risk. If the system reaches Level Three, it means the driver has taken no action. Visual and acoustic warnings continue, and a fully-automatic emergency brake application is made, which can help prevent or limit damage resulting from a possible collision.

The latest generation of Mercedes-Benz AEBS exceeds the legal requirements. It was developed by Daimler and is also available on FUSO



For vehicles travelling at speeds of up to 50kph, ABA5 is now capable of applying maximum full-stop braking in response to pedestrians crossing its path, approaching from the front or moving ahead.

products. Active Brake Assist 5 (ABA5) combines data from radar and a camera (both pictured below) and is standard on Mercedes' Actros and Eonic and optional on the Arocs construction range. Mercedes says ABA5 can detect vehicles ahead and stationary obstacles in the vehicle's own lane at vehicle speeds up to 90kph (56mph). If the system detects a dangerous situation, a three-stage reaction is immediately triggered. Visual signals and a loud beeping sound warn the driver. Partial braking with approximately 50% braking power is performed in order to reduce the speed, if the driver has not reacted beforehand. Maximum full-stop braking is initiated to bring the vehicle to a standstill, if the driver has still not reacted.

If the Mercedes-Benz system detects crossing pedestrians or people standing on the carriageway, the reaction chain is shortened even further. The driver is warned both visually and acoustically, but partial braking is simultaneously initiated autonomously. A brand spokesman explained that a new sensor fusion has dramatically improved the response to moving pedestrians for vehicles travelling at speeds of up to 50kph. ABA5 is now capable of applying maximum full-stop braking in response to pedestrians crossing its path, approaching from the front or moving ahead. This functionality, illustrated above, is said to be unique to the brand.

Volvo's latest system is Volvo Collision Warning with Emergency Brake. This



system was developed with a Tier One supplier and the latest enhancement was introduced for the legal change in performance in 2018. The most significant development, said to be unique to Volvo, was a distance alert using the heads-up display, with a red light projected on the windscreen, giving the driver a longer time to react. Volvo says this signal now flashes if the driver is too close. In addition, the distance alert in the heads-up display prompts drivers to review their following distance.

CAPABILITIES AND LIMITS

Volvo says it is important to highlight to the driver what the system can and can't do. Due to the fact it is a support system, the warning and pre-brake will always occur first. If the driver accelerates and steers around the object, the full emergency brake will not apply. Volvo adds that it is important to ensure that any trailer connected is compatible with the prime mover and has EBS connected. The radar and camera lens should be cleaned regularly to ensure full functionality, and it is important to remember that in bad weather, mist and fog and in the dark, the camera's capability is severely diminished.

The latest development of AEBS was launched in China in April 2021 by ZF. OnGuardMAX autonomously detects,

classifies and reacts to moving and stationary vehicles, motorcycles, bicycles and pedestrians at speeds as low as 20kph, although maximum reactive speed is the mandated 80kph. The launch came following ZF's acquisition of WABCO, and the new system features an advanced radar sensor and high-resolution dual-lens camera. Data is analysed by an image processing module. ZF says the system is controlled by proprietary software that can, if required, activate the ZF-supplied brake system autonomously. OnGuardMAX also provides safety functions such as Lane Departure Warning (see also p10) and Adaptive Cruise Control.

Finally, Mercedes-Benz Trucks has announced that its Active Sideguard Assist will be made available for right-hand drive markets. Currently only available for left-hand-drive Actros and Arocs, this feature is a development of Sideguard Assist, which alerts the driver to an obstruction or vulnerable road user in the passenger-side blind spot. Active Sideguard Assist alerts the driver via visual and audible warnings and also applies the brakes to prevent an accident. In right-hand-drive trucks, the system will protect pedestrians, cyclists or other road users down the left side of the vehicle, when making a left turn or conducting a lane change. [TE](#)

