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DMS the ‘awakening giant’ of ADAS safety

Though applicable to practically all vehicles, driver monitoring systems could prove especially valuable in the commercial vehicle sector. [By Jack Hunsley](#)

More automakers and suppliers are investing heavily in advanced driver assistance system (ADAS) development, a suite of products seen by many as a crucial first step towards the automotive industry’s Vision Zero ambitions. The growing consensus is that for any ADAS platform to function optimally, the presence of an in-vehicle driver monitoring system (DMS) is unavoidable. The commercial vehicle segment is no exception.

The giant awakes

As Mike Lenné, Chief Science and Innovation Officer of DMS developer Seeing Machines, told Automotive World, there has been huge momentum and growing enthusiasm behind DMS adoption in recent months. “DMS is the awakening giant of ADAS,” he said, pointing towards growing regulatory impetus to deploy the technology in future vehicles. “The number of automotive RFQs has increased markedly and that’s not just a post-COVID effect, that’s in direct response to what we’re seeing as led by Europe with the regulation of DMS technology and now imminently the release of NCAP protocols that will reward OEMs that pursue DMS. It is absolutely DMS’s time in the sun.”

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In Lenné’s view, this ramp up of interest in DMS can be credited to the arrival of Level 2 autonomous driving platforms. He says that the need for human drivers and ADAS platforms to work in tandem in a Level 2 vehicle, as well as the understanding that Level 3 vehicles must be able to conclude whether a human occupant is in a fit state to retake control of the vehicle at a moment’s notice, necessitate some form of driver monitoring.

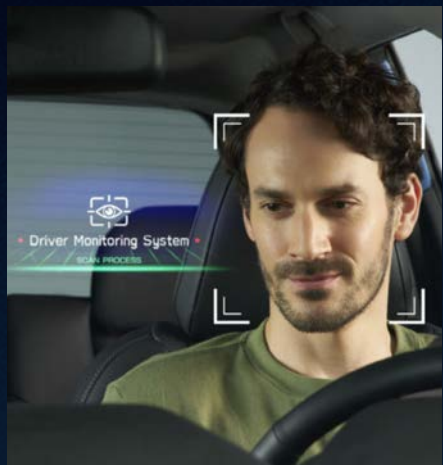
“Level 2 driving has done one fantastic thing in my view: it has put a driver facing camera in the vehicle,” Lenné told Automotive World. “This has been done not just to address safety problems with Level 2 but more importantly the safety issues that we have known about for over a decade.” He notes that these issues are primarily driver distraction and drowsiness.

Stakes raised

A fatigued and/or distracted driver at the wheel of a passenger car can pose an immediate threat to other road users, their passengers and to themselves. However, should this driver be in control of a heavier and more difficult to manoeuvre CV, then the stakes are raised even higher. This is partially why developers like Seeing Machines first focused on providing DMS products to the CV sector, with Lenné describing DMS's use here as "critically important" for improving overall road safety. "For CV operators, fatigue is the number one safety issue," Lenné told Automotive World. "We've published research that shows our technology reduces fatigue events by more than 90%. If you can tackle the major safety risks for commercial fleets, you're doing good work."

As Lenné noted, though DMS's use should ideally be universal, the CV segment poses some unique challenges and opportunities. On the latter, the early adoption of DMS technology by commercial fleets has offered developers such as Seeing Machines access to huge amounts of data that is proving valuable in advancing the technology's sophistication. For instance, Seeing Machines now has approximately 30,000 trucks operating its technology around the world. "That has given us eight billion kilometres of data," said Lenné. "In the DMS development world, data is a very sought-after commodity. The fact that we have these devices in the field around the world gives us a unique advantage from a development viewpoint, in addition to of course supporting our customers and improving safety."

Another plus is the opportunity to give fleets real-time insight as to their employed drivers' attentiveness, as well as the option to intervene if needed. For instance, in a commercial setting, fleet managers can see when their drivers are growing distracted or drowsy and, should this be the case, send messages to the vehicle to ask the driver to remain attentive or pull over. "That industry is heavily regulated when it comes to hours of service and safety management so there are different countermeasure options that are available, including coaching," added Lenné.



As for the main challenges, Lenné points to price sensitivity and driver acceptance—this latter issue has already proven a sticky subject in the CV sector. "This technology will take off if it does two things: if it solves a genuine safety problem, which we know it will, and if it is designed in a way that it doesn't buzz the driver multiple times per hour when they shouldn't be buzzed," said Lenné. "The issue of false positives is critically important."

From identifying to acting

Increased fleet adoption and regulatory impetus to mandate DMS technology are both promising trends, however, simply using DMS to identify when a driver is distracted is only one part of the puzzle. The end goal for DMS is for it to not just monitor and warn the driver if needed, but also to act as the final safety net in combination with assisted and autonomous driving systems.

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For example, giving a scenario of a driver falling asleep at the wheel, Lenné talked Automotive World through how a DMS platform can not just warn a driver but act as an active safety instigator. DMS’s first role here is to assess the driver’s attentive state.

Once this information is collated, it must then enact an appropriate safety measure dependant on the driver’s condition, a process that does not have one fixed solution: Lenné notes, for instance, that the use of a visual cue to recentre a driver’s attention may not be particularly useful if said driver is falling asleep.

“We have found in our R&D and application in the field that seat vibrations and audio in the cab are the more effective ways to warn a driver,” he added. Ideally, a vibration, audio and/or visual cue should do the trick, but what happens if the DMS system is unable to refocus the driver’s attention on the road in time?

Here, it is vital that DMS is integrated with any installed ADAS products so that it can absolutely be DMS’s time in the sun.

Quickly request features such as automatic emergency braking, lane keeping assistance or forward collision warning systems to take control as a last resort. “What we’re seeing with the Euro NCAP protocols, for example, is that you’ll get some reward for warning the driver but to get the full reward you need to have an integrated vehicle response,” said Lenné.

“
If the vehicle knows the driver is directing their attention off road and there is a looming threat in front of the vehicle, the vehicle will stop and prevent that rear-end collision if the driver doesn’t.”

Going forward, expect ADAS and DMS to advance and deploy in tandem. With ADAS and especially Level 3 autonomous driving raising serious questions over legal liability in the event of a crash, OEMs planning to deploy these systems will need to know if the driver in question is attentive before delegating control.