Electronic highways

Scania is among the most passionate and innovative when it comes to developing sustainable transport. Ian Norwell went to its Södertälje headquarters, near Stockholm, Sweden, to witness latest ideas

How our road infrastructure is used will certainly change in the future; only the rate of that change remains uncertain. However, it's likely to be faster than many think, particularly given recent reports on platooning and autonomous driving (AD) on European highways (*Transport Engineer*, May 2016, page 6). Few might have expected technological and legislative innovation so soon. Yet now, most of the truck makers are looking in this direction and others offering a new take on sustainability.

For Scania's head of R&D Claes Erixon, AD will come, but in distinct stages, with each paving the way for the next. "Putting full-blown AD on the highway as a first move is not the scenario we envisage," he says, explaining that widespread deployment is likely first off-road. And he cites quarries and mining operations. Why? Not because of safety differences so much as their closed – and hence more controllable – environments.

To that end, Scania demonstrated a pair of autonomous tipper trucks at its Södertälje HQ, working with a wheel loader and a frame-steered dump truck in a quarry scenario. The AD tippers followed a 3km prescribed route, loading and tipping as required. They were not so much controlled as simply monitored, from a command centre – with a white collar worker in the corner of a temporary building watching screens showing truck movements, with real-time locations and in-cab views.

Granted only a pair of tippers and loaders was involved, but the approach could apply equally to much larger vehicle numbers. And as the trucks made their way about the site, it didn't take much imagination to envisage this technology being employed for real.

Also, while each truck had its driver, they made no contribution. Add in an autonomous wheel loader and the scenario would be complete.

The fact is, this technology is getting familiar. An automation control unit, multi-lens camera, electronically assisted steering, short- and long-range radars, inertial and wheel speed sensors, a GPS unit plus a mobile data link all conspire to manage the process accurately and safely. Doubters need only consider that men in air-conditioned offices in Creech air force base, Nevada, fly combat missions with remotely piloted aircraft (drones) from bases across the globe – which makes AD tippers in Södertälje appear a little behind the curve, not in front of it.

For Jon Andersson, Scania's head of strategy and planning for autonomous transport, a progression from off-road is entirely logical. "There will be some parallel development, of course, but

"Looking at my C+E licence, digital tacho card and DQ card, I do wonder how much longer they will be required"

when systems have been proven off-road, the path will be laid to automated platooning on trunk routes, then automated bus services and finally urban distribution," he predicts. "The more complex the 'trafficscape', the greater the challenges. But there is no doubt they will all be met."

5G CONNECTIVITY

As for Scania's bigger picture of connectivity – with movements of freight and people via shipping, rail, air and road all synchronised – that closely matches Daimler's. Dr Wolfgang Bernhard, truck and bus director at Mercedes-Benz, forecasts the future as less about connecting people and more about connecting objects via the web.

Either way, Scania is not rowing alone. The Swedes have reeled in expertise from universities, logistics consultants and technology developers such as Ericsson. Indeed, Scania is the first to test this communication giant's new 5G electronics under a project aimed at boosting the reliability of platooning. "The new test equipment allows for a high quality mobile network service, with low latency and high bandwidth, where a lot of data can be transferred quickly and reliably," explains Anders Ställberg, Scania project director for city automation.

Low latency is the key. It allows virtually zero delay between inputs received and remote outputs generated. Such real-time communications should allay fears among those who feel that mobile data performance is not yet up to AD and platooning. "Projects like this need priority communications," agrees Ställberg. "They cannot afford to fight for bandwidth in pre-5G networks with users who are streaming videos, music or games. It's too important."

Understatement for sure, but 5G, and the inevitably faster systems that follow, represent the real enablers that finally eliminate drivers, their seats and conventional instrumentation. Judge Dredd-style graphics on Scania's displays showed a tipper truck with the cab swept away. Speaking to the development team, I would be reluctant to say how far away this is. But I get the feeling that you soon won't need binoculars. TE

No silver bullet

Acknowledging that it is unwise to pursue a single technology trial in search of improved transport economies, Scania's sustainable transport research is mining several seams. "Increasing energy efficiency still involves making further improvements to the powertrain," explains Magnus Höglund, director of sustainable truck transport at Scania.

Research, he says, is forging ahead bringing CO_2 reductions of up to 90% – for example, from HVO (hydrotreated vegetable oils) – while both trucks and buses are being groomed for electrification. A hybrid tractor unit with a pantograph over the cab roof is not an April fool, and neither are plug-in hybrid buses with inductive charging at stops. A field test for the latter is in commercial operation now, and real traffic starts in November this year.

Scania's transport laboratory – its in-house haulage operation – also continues to impress. Platooning is the next step here, and the three 10-axle drawbars running between Södertälje and Malmo on a special permissions trial until the close of 2017, make Daimler's convoy (of three five-axle Actros artic combinations) look a little short. But competition is a powerful force, and the big winners in this bout should be the environment and the economy.