GRAND DESIGNS

With the Euro 6 R&D drain behind them, truck manufacturers are spending on new technology. Ian Norwell visits Scania's centre, in Södertälje, outside Stockholm, to gaze at its vision of the future

In any industry there are always identifiable trends: currently, the big one in ours is autonomous driving (AD). Research efforts into platooning – where a lead truck takes control of followers – and single-truck AD are being vigorously pursued by, among others, Mercedes-Benz, Scania and Volvo, and a visit to Scania's Södertälje centre shows where this Swedish OEM is heading.

Lars-Gunnar Hedstrom, head of systems development at Scania, joined the company as a trainee in 1983 and rose to head of transmission control systems, with responsibility for the Opticruise AMT (automated manual transmission). It's been an interesting time to be in this particular hot seat.

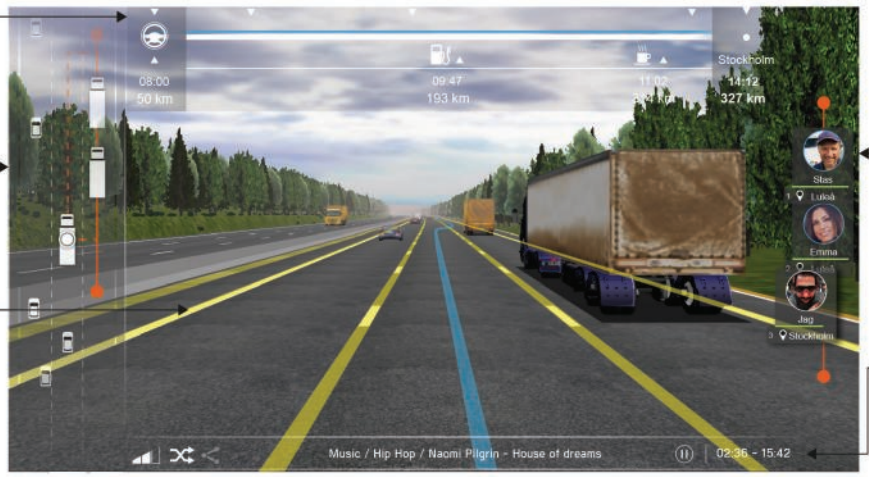
"Working on automated gearshifting technologies from 1985 to 1990, and retarder integration up to 1993, it was a fascinating journey," he agrees. "My guiding principle was always that we would be adding a small extra cost in hardware, but it should deliver much greater savings in cost of operation. Opticruise achieved that."

However, Hedstrom says one of Scania's key development goals for advanced driver assistance systems is now platooning. It's not a new idea, but on-highway trials are planned for 2018 between Sweden and Germany – the far-off date reflecting legislative issues.

The Scania Transport Laboratory has already conducted informal proximity driving trails to establish likely fuel economy benefits from closing the gap between convoy trucks. A 2.2 second gap – borderline unsafe at 56 mph – will win a 5% gain, says Hedstrom. Cut it to 1.5 seconds and it jumps to 7%, with a 10% prize waiting in the wings for those capable of reducing the margin to 0.5 seconds. But only electronically-linked vehicles could achieve that.

Incidentally, it's important to note that the lead vehicle in any such convoy is also a beneficiary. It may be pushing the air aside for its followers, but the massive reduction in rear turbulence is a win for them, too. And on-track, a 0.5 second gap doesn't look alarmingly close. Not in M6 terms anyway.

What about drivers themselves? A



Strategic Display
An overview of the entire journey showing distances, times, events, topography and an interactive map.

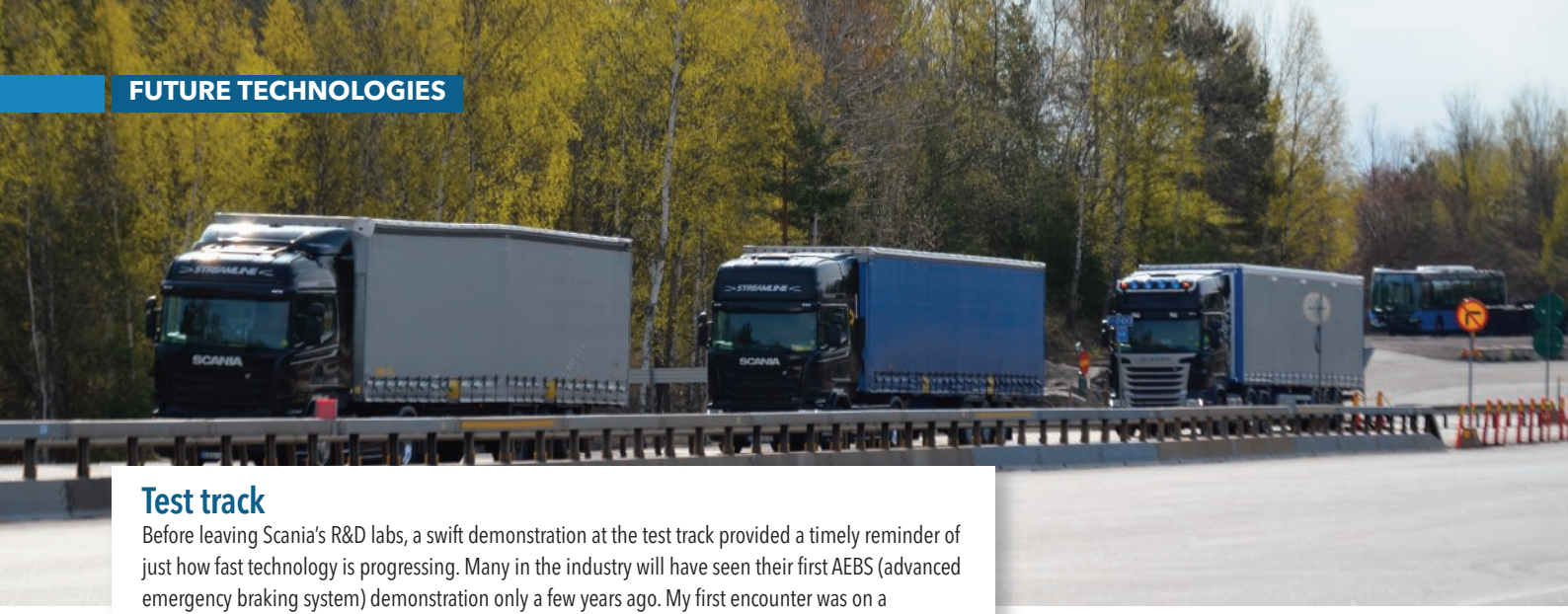
Birds-Eye View
This tactical display shows the surrounding traffic and its movements – including of the driver's own truck.

Augmented Reality
Highlights important information for the driver in the immediate surroundings, eg lane markings, obstacles and the immediate actions of the driver's own truck.

Auditory Display
The visual displays are complemented by a customised set of 3D auditory displays.

Convoy Display
A set of displays to support convoy driving. This includes a decision-support tool for selecting/rejecting potential convoys, as well as a social tool for coordinating rest stops and other activities.

Entertainment
For watching streamed video, playing music, creating playlists and playing games.



Test track

Before leaving Scania's R&D labs, a swift demonstration at the test track provided a timely reminder of just how fast technology is progressing. Many in the industry will have seen their first AEBS (advanced emergency braking system) demonstration only a few years ago. My first encounter was on a Mercedes-Benz track in Boxberg, where it seemed highly futuristic. I saw another at the Scania test track, but the fact is it has already become a formality, as AEBS will become a mandatory fitment for new trucks this November.

With that in mind, think about how soon platooning, AD and HUD systems may become realities. Meanwhile, Scania's test track revealed how the company is ticking big environmental boxes with a range of developments. Put through their paces were: a 26-tonne parallel hybrid distribution truck, which was virtually silent; and a 10-axle, 35-metre, 72-tonne combination that Scania's Transport Laboratory has been running on the highway. Sweden always seems to be first to push its national gvw limit in Europe – this month, it is being raised from 60 to 64 tonnes.

significant avenue of development at Scania is looking at what drivers do and how they react to different stimuli. For this, Scania has engaged the services of senior cognitive engineer Dr Stas Krupenia. "We understand that the driver's job has become more complex, and that stresses have changed," he says. Much of the physical grind has been mitigated by materials handling, and other health and safety-driven interventions, he explains, but the cerebral workload has increased.

"Drivers have to process huge amounts of new information to get the best from their vehicles," continues Krupenia, adding that traffic densities are forecast to increase 30% in western Europe by 2050, and that driver assistance systems will need to be much smarter. "There are smart traffic systems [think of M42 congestion-easing], but the real hope is with vehicles using the road infrastructure more effectively, by being more intelligent."

Accordingly, Krupenia's cognitive research has been examining which operational tasks can be automated, and the tactical operations (for example, route guidance) that might be added. Strategic aspects, such as interacting with other traffic, are the focus for the next chapter. What about taking the driver out of the equation altogether? "It's a long way off," he says. "Although we are aiming at connectivity between vehicles, you can still guarantee that the unexpected will happen."

Why? Because the human element is at once our weakest and our strongest suit. A driver doing something stupid on the road in front is the weak spot; the reacting driver's creativity the strength. "Our objective is to make the driver and the truck a better team, and our guiding principle is to represent complexity with simplicity," suggests Krupenia. That may sound trite, but it's being done already in military applications, and Krupenia's ideas seem to have taken at least some inspiration from the pilot's environment in Lockheed-Martin's F-16 fighter jet.

HEAD-UP DISPLAY

Head-up displays (HUD) have been around for nearly 40 years, but Scania sees a big new role for them in trucks of the future. The point: the Swedish giant doesn't want drivers spending time working out what's going on. That is where automated information systems come good, through massively refined presentation of data. Hence Scania's latest: one of the largest HUDs I've seen, occupying most of the windscreen itself.

At first sight, it is intimidating. Not only does it display dashboard data – removing the requirement for drivers to look down, even for fractions of a second – but it also provides visual and auditory reports. Those can include the proximity of surrounding vehicles, weather information, traffic conditions and safety alerts. It also reveals an overview of the journey, with distances, times, events, topography and an interactive map. And the birds-eye view shows surrounding traffic and its movements, including the driver's own truck, while augmented reality highlights important information in the vicinity, such as lane markings and obstacles.

These visual displays are complemented by a customised set of 30 auditory 'displays' set to several urgency levels. Icons will also support platoon driving, including a decision-support tool for selecting or rejecting potential convoy participants. And there is a 'social' area for coordinating rest stops. Incidentally, there's an entertainment and communication section, too. And the whole system can be customised to prioritise data according to driver needs. If this all sounds horribly complicated, drivers who have used it don't agree. Trials of a fully automated truck HUD in simulators show that professional drivers take to it remarkably quickly.

"For a truck to become fully autonomous, it is assumed that we will have full connectivity between all vehicles involved," comments Krupenia. As far as platooning is concerned, that clearly means more than meets the eye. Expect changes in truck technology way beyond the obvious. TE