# Sound approach

**Tomorrow's delivery trucks will have to be safer, greener and quieter, too. But how do you create a noise standard when there are so many sounds in and around a truck? Brian Weatherley hears how**

With the recent unveiling of TfL's (Transport for London) Direct Vision Standard, the monopoly on who decides how a truck should be built, currently held by the DfT (Department for Transport) and Brussels, looks increasingly shaky. And while the new standard is not expected to come into force until 2020, and will only apply to trucks driving in the capital, it nevertheless represents another landmark shift.

TfL isn't only interested in driver vision though. Within its LoCity emissions programme the Low Carbon Vehicle Partnership, aided by Millbrook, is also working on a benchmark definition for low-emission vehicles (LEVs) that could ultimately be adopted as a standard for such vehicles running in London. And along with being safe and green, trucks working in London will also have to be quieter if they're to deliver in off-peak hours.

So it's hardly surprising that TfL is also interested in developing an HGV noise standard. But how do you come up with sensible criteria and who should draft such a standard? Moreover, why have a new standard when there's already EU legislation governing vehicle noise? (see panel opposite).

For Phil Roe, DHL's vice president for innovation, strategy and business development, the answer is simple: you only ever buy a vehicle once. "To meet the challenges of delivering into busy urban areas, whether it's being safe, clean or quiet – as well as being economic, so cities don't become really expensive – you have to solve that problem once," he explains.


So the end-game needs to be a common standard for safety, emissions and noise, applicable to all CVs. "If you deal with these problems in separate buckets you might get a vehicle that is cleaner and safer but won't be quieter. And if that's the case, you won't be able to use it over the number of hours you need to operate to keep the cost down."

Given that we're surrounded by sound, what exactly is noise that 'disturbs'? Lisa Lavia, managing director at the Noise Abatement Society, describes it neatly as the wrong sound at the wrong time in the wrong place. As a longstanding partner of TfL, NAS has been working on several noise reduction projects for delivery vehicles, including within the Retiming Deliveries Consortium, which involves major fleet operators.

## SOUNDSCAPE

Historically, HGV noise levels have been based on limits measured in decibels. But in future, noise nuisance looks likely to be determined using an assessment and design concept known as 'soundscape'. This applies a holistic approach in which every sound generated and propagated in the immediate area of, say, a busy high street or distribution centre, is measured to build up an overall audio picture. The point: individual noise sources (including

trucks) can be tagged and analysed as either creating a specific nuisance, or simply contributing to ambient noise.

As Lavia explains: "It's identifying the sources and characteristics of the noise and, more importantly, understanding their effects on people living in that space. And looking at it from an urban planning perspective and supporting the intended uses of the space." Thus, with soundscape there are no prescribed levels, rather what's considered 'good' or 'bad' contextually.

Lavia again: "The first thing to do is assess the environment and say 'Is what's happening appropriate to the space?'. Most people exposed to delivery noise, or traffic noise, tend to consider that an 'unwanted' sound. What we're saying is not that all traffic noise is bad; rather is it wrong in the context of the actual or desired soundscape?" Which is clearly a more flexible approach.

Indeed, using soundscape acousticians can quantify noise from delivery vehicles, establishing that much-needed 'context', and harnessing it early in the planning stage. "With the right design principles, theoretically, you could have a sleeping environment next

to what's traditionally understood as 'noisy environments'," says Lavia. "Plainly, specifications should happen at the design stage. Soundscape's primary value isn't as a remedial measure."

So soundscape isn't an off-the-shelf acoustics assessment waiting to be used by operators keen to deliver out-of-hours. Additionally, right now, it remains an emerging science with the standards still being developed. "Before soundscape can be used in a mainstream way it has to be tested and evidenced to prove the concept works," states Lavia. Moreover, a new generation of acousticians, and

## TYRE NOISE

Last November new tyre noise rules were introduced based on current EU tyre labelling, which rates levels using bars or waves. "When labelling started in 2012 it was known that for noise there'd be a second phase," comments Rob Blurton, technical manager for Michelin Tyre's truck and bus division. "We've now moved from a maximum of three waves to two on the label of all new tyres manufactured from 1 November 2016." However, Blurton reports that across Michelin's portfolio of CV tyres, 79% are already rated at one wave – meaning three decibels below the current minimum standard.

You might imagine large block tread tyres used on construction vehicles to be noisier than those on long haul vehicles. Not so, says Blurton. "Obviously, our X-Line long distance and high average speed low rolling resistance range are within that one bar category. But a number of products from our urban range, as well as our most popular bus and coach tyres, regional and robust on/off road construction type tyres, are also all one wave. And we design our tyres so they emit low noise throughout their life – not just when they're fitted new."

Interestingly, along with the road surface, vehicle speed, acceleration, tread design and tyre construction, under-inflation can influence noise. That is because resulting abnormal wear patterns generate resonances – a phenomenon particularly noticeable on coaches. Blurton expects further noise reductions on future Michelin products.

"It would be pointless bringing out a tyre that's got one wave if the next generation has two. We're always striving to improve and keep that balance in performance between tread grip, longevity, mileage and robustness, without compromising anywhere else. We're always improving the design to make them better in either all or some of the aspects that come with labelling, as well as others."

***"Before soundscape can be used in a mainstream way it has to be tested and evidenced to prove the concept works"***

Lisa Lavia

'urban sound planners' will have to be trained to use it.

For the moment, then, soundscape is work in progress. "We'd love nothing more than to say here it is and here's how to do it, because its potential to solve difficult problems is huge," reckons Lavia. "But, equally, we don't want to promote bad practice. We're involved in drafting the standards and conducting applied research to help further develop and evidence the science."

And she offers a useful analogy. "Some 10–15 years ago it was widely accepted that there was an air quality problem. However, understanding how best to measure it, assess it and legislate for it followed over a number of years. Soundscape will be very similar."

How long before soundscape can be universally applied as a noise-measuring standard is anyone's guess. But based on early trials with DHL, Roe is convinced it has real value. "The soundscape system is the way forward. It's been used on the Retiming Consortium: we've used it with a leading food retailer and also a non-food retailer and it really works well."

Roe is also convinced NAS is the best placed to lead on soundscape. "They're neutral, and they understand better than anyone else the issues of doing work while not being a nuisance. The advantage of having a soundscape standard for, say, a street would be that we could then define an acceptable way of working. And part of soundscape is actually talking to residents."

## Win-win on noise

**NAS chief executive Gloria Elliott reckons the perfect delivery vehicle standard would be almost silent. However, she adds pragmatically: "This is unrealistic for now, but the aim should be to encourage the swift development of low-noise transport technology."**

**But she also insists that quiet vehicles should be just one part of the solution. "A silent vehicle would still not guarantee delivery without disturbance. Low-noise equipment is also essential. The key factor is driver and colleague noise-awareness training. Without it, the rest may be a wasted investment."**

**Elliott believes the logistics industry and manufacturers have come a long way in developing quiet solutions that support anytime deliveries. "Now we need joined-up thinking between local authorities and a level playing field that allows off-peak deliveries across distribution areas as long as the quiet vehicles, quiet equipment and colleague training are all in place. In short, that must be the gold delivery standard. Then we'll see a delivery culture at its unobtrusive best."**

### SOUND SOLUTIONS

Meanwhile, however, operators still have to deliver goods into urban environments where noise pollution is a 'statutory nuisance'. So what can they do now to reduce their sound footprints? One option is to specify low-noise kit, certified to the NAS-launched 'Quiet Mark' or the Dutch PIEK standard. To achieve the latter, bodywork and ancillary equipment must function while emitting under 60dB(A) at 7.5 metres from the source. Under the PIEK protocol, 'It's deemed suitable for out-of-hours delivery that will not cause noise disturbance to nearby residents'.

PIEK also operates a 'Quiet Truck' certification scheme for chassis with a maximum noise (measured during acceleration and normal driving) of no more than 72dB(A). DAF's 'Silent' XF, CF and LF models meet the Quiet Truck standard. Iveco is also working on PIEK certification for its already quiet Stralis NP natural gas-powered vehicles – although Iveco UK & ROI product director Martin Flach believes current noise standards need revising. "The EU noise test is too much focused on drive-by and not really representative of vehicles in urban environments. PIEK is the best starting point but we need a UN standard we can all work to."

Per-Uno Sturk – regulation and feature specialist for noise and vibrations with Volvo – offers another view. "The current ranking of the sources of a vehicle propelled by a combustion engine is the engine first, gearbox second, tyres third, exhaust fourth and 'others' [for example, prop shafts] fifth." While each source varies according to vehicle type and use, not surprisingly the engine is still the most important. However, as emission reduction systems add ever more complexity to the exhaust gas flow, Sturk reckons they can help mitigate noise. TE

## Brussels going lower

**The current EU maximum drive-by noise limit for heavy duty (N3) trucks over 12 tonnes is 79dB(A) for those with engines below 150kW (201bhp). That rises to 81dB(A) for those between 150–250kW (201–335bhp). And it rises gain to 82dB(A) for trucks of more than 250kW.**

**However, a further Phase 2 tightening will take place on new type approvals from 1 July 2020 (new registrations from 1 July 2022), which will see those limits reduced to 77, 79 and 81dB(A) respectively. Under Phase 3, in July 2024 (new type approvals) and July 2026 (new registrations), they will be further reduced to 76, 77 and 79dB(A).**

**The European Commission confirms: "In general, the limits will be reduced by 2dB(A) every four years from July 2016 for new vehicle types." The EC also intends to carry out a study on sound level limits by 1 July 2021 based on vehicles meeting the latest regulatory requirements. "On the basis of the conclusions of that study, the Commission shall, where appropriate, submit a legislative proposal."**