

Plenty of

Have you considered what sort of antics you might be running in five years' time? The engineering of 'heavies' (the category encompassing most tractor units) has lately been typified by the steady, incremental development of mature products. But, given that, in the next two years, all European manufacturers must introduce substantially different models, we may well witness a new step change. And while these vehicles might not be wholly dissimilar on the outside, there are certain to be huge changes underneath.

As Tony Pain, DAF's marketing director in the UK, suggests, the principal, although not sole, prompt to this change is imminent Euro 6 emissions legislation. Indeed, he believes that the impact of the new rules will be simultaneously greater than all the engineering innovations of Euros 2 to 5 combined. Although many truck makers are currently playing their cards pretty close to their chests, Pain is refreshingly forthcoming. "The ubiquitous problem confronting truck designers is a greatly increased cooling requirement to facilitate the lower combustion temperatures necessary to reduce emissions, especially NOx," he asserts.

"The lower temperatures and higher fuel pressures used to achieve reductions in NOx and particulates respectively are also likely to be supplemented by sequenced fuel injection to improve burn timing," states Pain. Why? "Because an SCR [selective catalytic reduction] catalyst can only take out so much NOx," he says. Either way, though, he estimates that Euro 6 engines will need 30–40% more cooling for the EGR (exhaust gas recirculation) system to work effectively.

Large radiators with a bigger surface area seem probable, he says – square rather than, as currently, oblong in shape, and needing higher mounted cabs and front chassis frame modifications to accommodate them. However, it appears unlikely that air scoops will replace grills on the front panel (as on racing trucks), simply because vehicles still require cooling when idling and when climbing hills at slow speed.

So cabs may have to go up, in order to avoid engine tunnel incursion into the interior space, which would otherwise reduce cross-floor mobility. Drivers with sleeper cabs will no longer tolerate a 'dog kennel' in the middle.

Might a higher-mounted COE (cab over engine) design cause aerodynamic problems? Pain thinks



not: "It'll still be below 4m, and most manufacturers already use fairing and spoilers," he maintains. However, just as now, matching the tractor unit to the trailer profile, and coupling as close as possible, will remain critical to minimising wind resistance and maximising mpg.

Race against time

Although opinions in the industry are split, there's currently concern that laudable and mandatory efforts to reduce exhaust emissions might also reduce mpg. Consequently, between now and the new models' debuts, manufacturers are also working hard to optimise fuel returns, deploying a wide range of initiatives.

"For example, you don't want cooling fans running all the time, as it takes a couple of horsepower. Even if it's electrically powered, that energy has to be generated, so it's likely to cut in and out instead," predicts the DAF man. That's not as simple as it sounds: controlled switching will

front

Trailer manufacturers continue to adopt aerodynamic revisions to reduce drag and fuel costs, but what about the cab? Dave Young looks at impending advances in tractor units

require changes in electronic sensors and ECUs, while on-board digital monitoring of NOx will have to be extended to particulates.

According to Pain and several of his peers (most of whom preferred to remain nameless), the crucial pursuit of fuel economy could also see the introduction of technologies such as advanced injection systems and fuel pumps, clutched compressors and alternators and even stop/start engine control mechanisms. All have been made possible by ever more sophisticated software and steadily multiplying sensors throughout the driveline.

Additionally, automated gearshifts seem set to become even slicker, while more composites may be harnessed in construction to save weight and hence also energy. For the same reason, engines may employ smaller quantities of lubricating oil. "The key task between now and the [Euro 6 tractor unit] launch is to offset fuel consumption against capital cost and weight," summarises Pain.

More optimistically, Nigel Butler, commercial director at Renault Trucks UK, says: "I wouldn't write

off Euro 6 from a fuel perspective at this stage. Everyone's working very hard on consumption." However, he admits that unladen weight must be reduced to accommodate the emissions standard's undoubted drive towards the 'holy trinity' of EGR, SCR and closed particulate trap emissions management for all new trucks.

What's more, he and others also concede the space argument, agreeing that shoehorning the active particulate trap (similar in size to an AdBlue catalyst and not unlike another silencer in appearance), EGR, SCR and heat rejection equipment into existing body dimensions could pose problems. But opinions differ on the impact of these requirements.

"I don't necessarily see cabs being radically different on the outside [or] above the engine tunnel," says Ray Cattely, manager of legal and environmental engineering at Volvo Trucks UK, for example – although he accepts that drivers may face a longer climb into their seats. For him, chassis packaging will become more of an integrated art, in

Design concepts, such as DAF's XFC, highlight the possibilities of streamlining tractor units



Meanwhile, behind the rear bulkhead

It's late, due to a slow ISO and type approval ratification process, and an overall CV market downturn, but Jost's award-winning, Susie-free coupling system could be commonplace on Euro 6 tractor units in the next few years.

Ten years in the making (and in-fleet testing) and reported in *Transport Engineer* back in 2009, the twin objectives of driver safety (trailer coupling is a major cause of accident and injury) and operational efficiency could see the Jost KKS system entering volume production in Europe.

Fitted on line (retrofit is impractical) and initially functioning as a dual-equipped link to allow both compatible and incompatible trailers to be hitched, KKS is a compact and robust interface of truck/trailer pneumatic and electrical connections.

The Jost auto-coupling system uses sensors to locate plug-in systems immediately adjacent to the king pin and fifth wheel, ensuring the connections align and engage properly, even on uneven ground or at an acute angle. Meanwhile, on the tractor, a wedge-shaped device, located below the fifth wheel coupling, engages with a similar profile plug directly behind the kingpin – all the while monitored by the driver on an in-cab display. When used in conjunction with electrically operated landing legs, the driver needs only to leave the cab to make statutory checks.

KKS is likely to be most useful to secondary distribution and trunking fleets with frequent trailer swaps, rather than those on pan European long hauls. Own account operators, such as supermarkets, may find it easier to pass on the inevitable additional cost of such a sophisticated and long-awaited device.



stark contrast to the traditional bolt-on approach. Why? Because the additional particulate trap will compete to find space with the fuel and air systems, AdBlue tank, batteries, exhaust system etc – particularly on UK 6x2 tractor chassis.

Incidentally, he also points out that any resulting increased loading at the front end may also mean larger tyres, higher front axle weights, and chassis frame and suspension modifications. Volvo already uses straight six inline engine blocks, partly for space reasons, but makers offering V8 and V10 blocks may have more problems, particularly with the EGR and SCR combination, with their additional piping trunks and manifolds.

That said, Dave Ririe, product manager at Renault Trucks UK, thinks heat shielding material requirements could be much as present, but predicts a larger airflow gap between cab and engine. The one exception: in the interests of noise reduction.

Take your pick: what seems certain is that the use of two emissions technologies, the active particulates filter, other mechanical refinements and the

associated computing is going to increase tractor unit purchase prices – as may another less well known piece of upcoming legislation. In 2014, Europe-wide statutory changes enact a mandatory requirement for lane departure warning, active emergency braking and stability systems (currently optional extras) to be fitted as standard.

Collectively, there are also implications for the workshops, the aftermarket, drivers and fleet managers planning new vehicle purchases. “The diagnostic technician is already king of the workshop,” observes Pain – and is likely to be more so, he suggests, when operators are faced with the kinds of kit expected on all tractor units. There will also be opportunities for additional service revenue for workshops – which won't please vehicle operators. Eminox, for example, is already working on workshop systems to assist with filter cleaning for servicing Euro 6 engines.

From the driver's perspective, there will be even more digital readouts to monitor and checks to be made. “Driving will be more of a thinking person's job,” suggests Pain. Those behind the wheel of next generation prime movers need to be confident with computer interfaces, as techniques such as ‘driving by ear’ recede into the past. Interestingly, Pain also predicts that, to retain experienced drivers in the road transport industry, cab interiors will have to become even better appointed and gadget-friendly (expect Bluetooth updates).

As for buyers, tractor unit sales have led the way out of recession, albeit with less demand for big power (over 500bhp) tractor units – a fact attributed to contemporary engines' higher, flatter torque at lower revs (it is widely accepted that the 460bhp fleet benchmark has a similar output to earlier 500bhp models). With looming Euro 6 requirements, the industry is now bracing itself for an additional surge in tractor unit orders, as operators look to purchase the last of the Euro 5 trucks before the deadline. That is expected to cause a significant increase in lead times, and Pain and Butler are joined by the SMMT in urging fleet managers to consider this implication for their acquisitions, and plan early.

“Euro 5 demand will pick up dramatically over the next two years in the run out of production,” comments Pain. “Euro 5 trucks are a known quantity; there have been very few specification changes; and operators won't suddenly find themselves buying an out-of-date truck,” he explains.

“Euro 6 will be introduced in 27 countries on the same day. It'll be hard for European manufacturers – and, in particular, their parts suppliers – to meet demand. All manufacturers must stop building Euro 5 trucks by September 2012. So the fact is that the threat of an increase in the price of Euro 6 trucks ... is bound to have an impact on 2012 registrations as operators forward order [Euro 5s].” **TE**