DOWN, DOWN, DOWN

In recent times, downspeeding engines has become far and away the biggest trend in the wider market. That poses the question of whether downsizing for fuel economy might be worth considering as well. Lucy Radley spoke to the Swedish OEMs that offer 700hp+ engines

For many years now, the size of the engine in an average regional or long-distance tractor unit in this country has crept slowly upwards. At the very top end there is evidently still an appetite for really big horsepower – Scania updated its 16-litre V8 just last year, while Volvo continues to successfully market its own 16-litre power plant in the FH16.

But downspeeding is the modern trend. How do these two trends coexist? "Understanding what compromises can be made on vehicles is the key thing," says Scania's pre-sales technical manager Phil Rootham. "We see hugely diverse operations now: where we talk about vehicles operating at 44 tonnes, the time spent at maximum weight may be a smaller percentage than we first realise."

Vehicles may go out loaded and back empty, for example, do a lot of work at lower weights and only occasionally max out, or it may be a diminishing load operation. He thinks we're actually settling back around the old 10-horsepower-per-tonne mark now. "Maybe that's crept up to 11 or 12 these days, but predominantly it's in that 450-500 horsepower bracket that we see lots of fleets operating."

What has changed is what's behind that headline figure. "If I look at our latest 13-litre 420 Super engine [pictured above, and top right], it's only 50Nm behind where the 450 engine was, which we launched the current generation of trucks with," Rootham points out, "and the deliverance of that torque is at extremely low revs now, around 900rpm." Once that peak has been achieved, torque curves stay flat for much longer. Torque and horsepower are still linked, but the engine map can be managed better now, thanks to the electronic control systems available.

"The fact most of us are running engines around the 13-litre mark gives us enough displacement to keep the momentum in the engine, particularly in highway operations, that would allow for a bit more downsizing in power," Rootham states. "Generally, if you're in the same displacement level but one horsepower step down, it will do everything the horsepower step-up will do, but slightly slower, which is often good for fuel consumption." It's down to the operator to decide where the priorities lie.

"That also has to be blended with how quickly you can get away from the point where the drivers ask for everything the engine's got, because that's a heavy part of the map to be in from a fuel perspective," he points out. "Blending those two questions is quite

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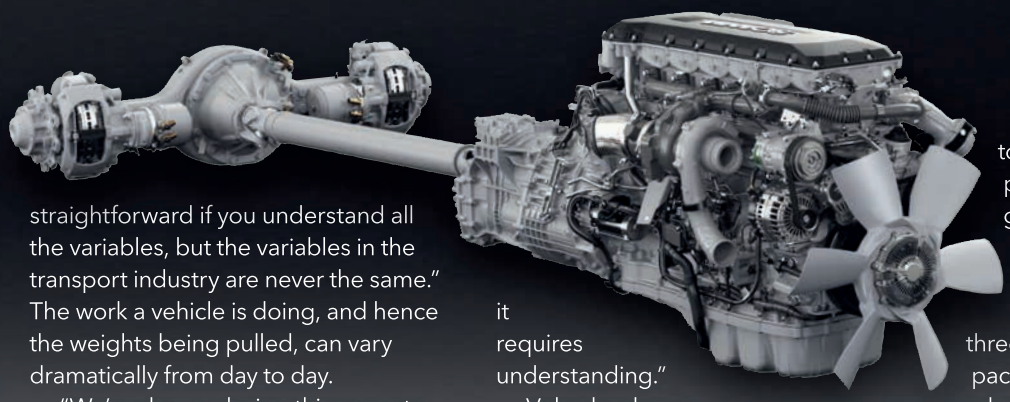
John Comer



straightforward if you understand all the variables, but the variables in the transport industry are never the same." The work a vehicle is doing, and hence the weights being pulled, can vary dramatically from day to day.

"We're always playing this game to understand how we can deliver the customer's performance expectations in terms of journey time and road speed next to fuel consumption," Rootham continues. "And that isn't just about engine sizing, it's about things like gearbox shift strategy, gear ratios, how quickly you can change, how you can predict what the topography looks like to maybe initiate an early change, which will then keep the engine within that peak torque platform."

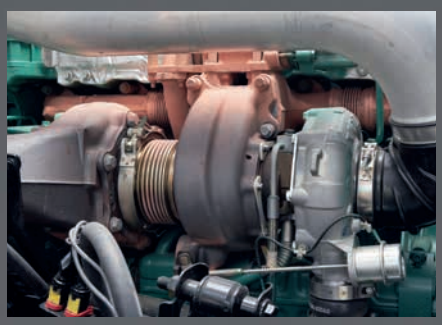
NOT SIMPLE

In other words, answering this question isn't quite as simple as first meets the eye. "There is opportunity to reduce engine size – in terms of horsepower, maybe not displacement – in some operations," Rootham confirms, "but in others it can mean you spend more time in the heavier use part of the fuel map, which will have the opposite effect." The most important thing is to understand the application and expectations for the vehicle. "You need to understand what compromises you're making for gains the other side of it, then you can blend the two together. So downsizing engines is possible," he concludes, "but it requires understanding."

Volvo has been seeing a downsizing phenomenon for a few years now, especially since the introduction of the FH I-Save with turbo-compounding in 2019. Aimed at those long-haul operators who value fuel economy above all else, it was initially available with the D13TC 13-litre engine at 454bhp or 493bhp, then a 414bhp was added to the line-up in 2022. The FH460 I-Save (pictured below) is documented as having broken UK sector fuel test records for 6x2 tractors on at least two occasions.

For context, over the last decade the preferred engine capacity badge on the regular FH door has slowly climbed from 480 (473bhp), through 500 (493bhp), to 540 (533bhp), but now the tide seems to have turned. John Comer, Volvo's head of product, revealed sales figures showing that out of all the FH tractors sold with 13-litre engines (so from 414-533bhp) it is the 460 (454bhp) which had the largest number of takers at 47%. Next came the 500 at 37%.

Breaking it down another step, 45% of those trucks were the turbo-compounding I-Save, and 70% of which were 460s. After all these years, Volvo's customers also seem to be settling back to around the old 10-horsepower-per-tonne mark beloved by previous generations, although that's where the similarity with the old days ends. Now it's all about the ability to generate high torque at three-figure rpm, then build an overall package to take the best possible advantage of that.



MORE THAN THE SUM OF ITS PARTS

"As well as better thermodynamic efficiency in the cylinder head design, we've also changed the rear axle ratio because we can optimise the torque so much better," Comer explains. "Now, with I-Save, where we can get additional torque in the hills through kinetic energy recovery, we can also use software to control the amount of torque on the flat." In other words, the truck will only ever use as much energy as it needs to, in order to accomplish the task – it will back itself off from full throttle where it can. "Dare I say it, the truck may be a little bit smarter than the driver!"

Once upon a time, a good driver would be looking as far ahead and around as possible to keep a 280 Gardner engine rolling at 38 tonnes. Predictive cruise does the same thing, but it can see far further down the road, so the truck can choose a gear-shifting strategy earlier. Many drivers find that difficult, because PCC will back off on a hill before they would, for this reason. The point, though, is that there's more to fuel economy than reining in the horses.

"You can't have an I-Save truck with a manual gearbox; you can't have it with a really deep rear axle because it's optimised for engine speed at 56mph and 44 tonnes, and you wouldn't have it without PCC on it," Comer says, in summary. "You have to have the whole package to get the results." Simply downsizing engines in isolation would be too simplistic an approach. TE