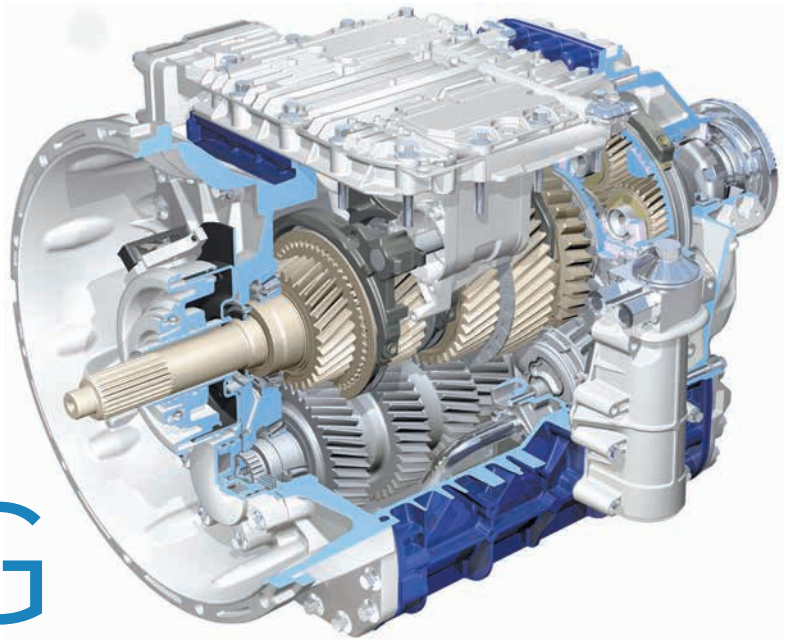
With automated manual gearboxes dominating the heavy truck market, is there room for innovation lower down the weight scale? Richard Simpson investigates



STICK SHIFTING

Automated manual transmissions are now accepted as standard fitment in the heavy segment of the British commercial vehicle market. It's taken some time to get there, with pioneers such as the Mercedes-Benz EPS (Electronic Power Shift) having a mixed reception at best back in the 1980s and '90s, but any buyer who now wants a tractor unit with a conventional gearstick has to at very least put a tick in an options box when ordering their truck.

The original motive behind the introduction of the automated manual transmission (AMT) was concern over the ability of conventional synchromesh gearboxes to handle the increased torque generated by the then-new Euro I diesel engines, while retaining an acceptable shift effort for the driver. Plus there was a desire to offset the extra weight of the engine intercoolers and other equipment needed to control exhaust emissions by replacing a heavy mechanical linkage with electronics.

Manufacturers also benefitted from 'plug-in and play' gearbox installation on the production line, while, assuming the system worked properly, the driver had a reduced workload, and benefitted from the removal of the gearstick from the cab, which reduced noise and vibration, and made cross-cab access easier.

As emissions legislation drove the introduction of electronic engine management systems, so it became easier for engine and transmission to 'talk' to one-another through CAN-Bus connections. Now there was another benefit from EPS, this time for operators. It smoothed out the differences in fuel consumption between the best and worst drivers, giving a saving overall.

BETTER AND BETTER

As the technology improved, further beneficial development occurred. The engine and gearbox data connection became so good that the heavy synchronisers could be removed from the transmission design, making for a lighter gearbox with a faster shift. Clutch life was extended too. Fuel consumption continued to improve. And drivers, who were previously sometimes bemused by the choices made by an AMT left to its own devices, report that the latest designs need very little human intervention.

With two-pedal driving now standard across the heavy truck fleet (with well over 90% of the market), it is perhaps surprising that gear levers and clutch-pedals are still found in larger quantities in the medium and light truck markets. After all, lighter vehicles are more likely to be doing shorter journeys in heavier traffic with more stops and starts than their larger counterparts.

So, what's been stopping the outright dominance of AMT?

Phil Moon, marketing manager at UK market leader DAF Trucks, highlights conservatism among some of the largest fleet buyers: "They want a truck that anyone can jump in and drive without further training, and for many rigid truck drivers that means a manual."

However, Moon sees an increasing transition from manual to automated transmissions in the 7.5 to 18-tonne GVW segment. "Manual gearboxes are still standard for us on engines from the PX4 up, until you get to the MX-11, and 18 tonnes or more," he asserts. "However, in 2017 DAF switched to the then-new ZF Traxon automated box as standard on the heavy trucks, and as the technology has become more widespread, it has worked its way increasingly down the weight range.

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"Manuals have held on at the lighter weights partly because there was a perception – which is no longer really

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accurate – that the automated boxes were not as good in the cut-and-thrust of urban deliveries, and that drivers who were familiar with manuals would need some retraining to cope with an automated transmission. But the automated 'boxes are taking an increasing share of the lightweight rigid market as confidence and performance improve, although some of our large fleet customers are still firmly wedded to the manual."

DAF offers three standard transmissions up to 18 tonnes. The lightweight LF City has a five-speed Eaton Fuller in manual form only, which is unique to that truck, as is its PX-4 engine (shown at left in picture, right). Most of the remaining products using the larger PX engines have the manual ZF EcoLite six-speed 'box as standard, although from 18 tonnes up, the nine-speed ZF EcoMid is available, which gives a greater spread of ratios.

"There is an AMT version of the EcoLite," Moon says. "This has an AS-Tronic module over an otherwise standard box, unlike the 12-speed ZF Traxon, which is only available as an AMT, and has no synchro gears. The Traxon is used with the big MX-11 and 13 engines."

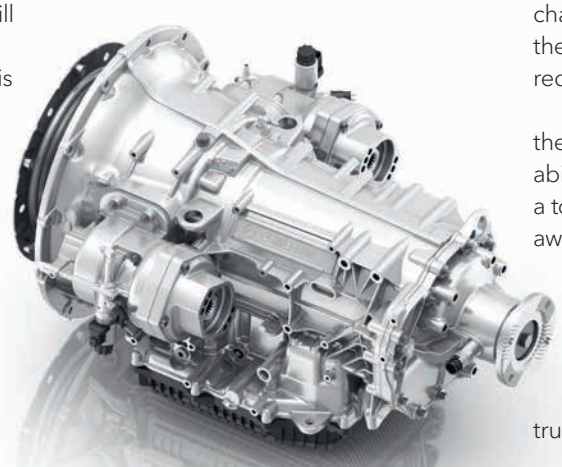
Full autos, in the case of DAF from Allison, are fitted to less than 4% of LFs produced, and an even smaller percentage of heavier trucks. Even in the municipal sector, while the Allison is still the default choice for residential work, for trade waste an automated manual is increasingly popular, Moon says.

AMTS RULE

That's an experience which is echoed elsewhere. Volvo Trucks set the pace with the introduction of its I-Shift ATM in 2001 (pictured, p27). This is now standard fitment on FH, FM and FMX trucks. Further down the weight scales, the FE has either a 12-speed I-Shift or nine- or six-speed manuals, while the FL has either a six-speed manual or the I-Sync six-speed AMT.

On the full-auto front, FE and FL can both be ordered with AL306 Alison 'box, and the FM and FMX with the Volvo PT2606 Powertronic: a full auto 'borrowed' from Volvo Group's construction machines. (However, Volvo says it has had no requests for full auto 'boxes outside the fire and municipal sectors.)

Notwithstanding this apparent lack of demand, ZF, which is the largest proprietary transmission manufacturer in the European truck and bus market, has launched a fully-automatic contender into the market. The PowerLine (pictured below) is aimed at a broad range of vehicles, including buses and coaches, and is based upon a design used in very large pick-ups and SUVs beloved of the American market. But in Europe ZF also hopes to see it used in on trucks with engine torques of up to 1,355 Nm.



ZF argues that with eight ratios in its planetary gearset, the PowerLine will shift faster than the six-speed competition, and save 10% or more fuel thanks to the greater ratio spread. It can be fitted with engine-speed PTOs at the three and nine o'clock positions.

Advanced control enables it to skip-shift when necessary, and the non-wearing torque converter is bypassed early by a lock-up clutch. Long fluid change intervals and an oil filter that lasts the life of the transmission will further reduce cost, according to ZF.

One factor which may start to tip the balance in favour of full autos is the ability of the torque converter to act as a torque multiplier when a vehicle pulls away. Renault Trucks specifies an Allison transmission on its spark-ignition gas truck for just this characteristic, and the increasing popularity of alternative fuels may yet pave a way for full autos in mainstream trucking. TE