

# Ranging far and wide



All the truck makers are treating the construction logistics sector more seriously these days, with chassis tailored for the task. First, Ian Norwell reports on new developments in the Arocs range from Mercedes-Benz

**M**ercedes-Benz has always had a construction chassis offering, as the vintage fleet on show at its Wöerth factory in Karlsruhe, Germany demonstrated. My trip to its Gaggenau off-road test and demonstration centre was designed to show off the Daimler brand's current construction range, centred on the Arocs product.

Looking at that offering, it's easy to overlook its Atego; that would be a mistake. They might not have the presence of the six- and eight-wheelers, but sub-16 tonne chassis are used plenty for tough construction duties at lower weights. From 7.5 to 16 tonnes gross, there are 4x4 Ategos, too. Their OM934 (5.1 litre), and OM936 (7.7 litre) high-torque engines deliver from 153bhp to 294bhp, with seven power options. There are various six, eight and nine-speed automated manual transmissions (AMTs) for job-matched applications. There's a traditional manual gearbox, too, although with the variety of PowerShift 3 AMT driving programs available, I'm not sure why you'd need one.

Turning to their larger sibling,

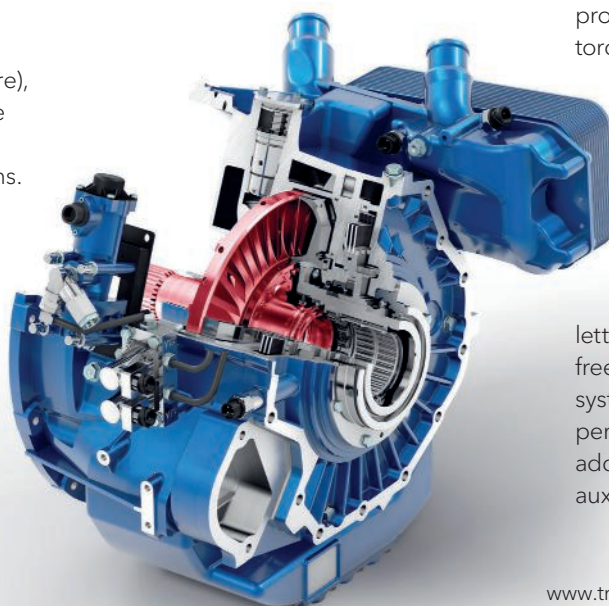
I have driven Arocs a number of times before, and found that the range of cabs it can muster gives it multiple personalities.

With the two traditional cab widths of 2.5 and 2.3m, three cab lengths, as well as choices of engine tunnel height, and the option of a flat floor at 2.5m (although that is not recommended for messy construction work), operators can have a choice of 14 cabs. Chassis options are also comprehensive, ranging from a 4x2 rigid, up to a brutal 8x8, including tractors and tridems along the way. While the truck has been around for a while, there are

new developments in engine outputs, transmission and braking.

First, there are two new engine outputs available for Arocs users, one from the 10.7-litre OM470, and one from the 12.8-litre OM471. They've each been updated so that operators can pinch a new top power slot without adding the weight of the next bigger engine up the line. The former takes on a new 449bhp/2,200Nm rating, and the latter now achieves 521bhp/2,600Nm. Their big brother 15.6-litre OM473 unit remains unchanged, still with three ratings: 508bhp, 570bhp and 615bhp. Torque tops out at 3,000Nm. Remember, too, that these engines also provide an additional 200Nm of 'top torque' in the highest gears.

But engine developments have almost taken a back seat, considering other innovations. First is Daimler's joint development, with transmissions specialist Voith, of the turbo retarder clutch (TRC), also known as VIAB, abbreviating the initial letters of the German words for 'wear-free integrated starting and braking system' (pictured, left). Second, a higher-performance engine brake has been added. Third is a hydraulic front-axle auxiliary drive for tractors. Accepting that





## ENGINE BRAKING

To underscore the need for safe, efficient and inexpensive retardation, the Arocs comes with a standard three-stage engine compression release (CR) brake offering up to 350kW power. Its high-performance engine brake now punches out up to 475kW. This version

is sufficient on most duty cycles, but to restrain high STGO gross weights, the TRC's extra retardation can be added. To ease the strain on the transmission, the total power of the two high-performance brakes is deliberately limited to 720kW.

Also, drivers need to be mindful of the reverse torque going back up the transmission, as un-driven axles will be un-braked in this mode. That's fine in an 8x8 or 8x6, but the burden on tyres and drive shafts on an 8x4 in slippery conditions will be higher, needing more care from the driver.

The CR engine brake is a licensed design from Jacobs Vehicle Systems of the USA, offering probably the most familiar name in this technology niche: the 'Jake brake'. It is currently promoting an upgraded development, the high pressure density (HPD) brake. Having tested that in July 2016 on an Actros test vehicle, I found that Jacobs' claims of a doubling braking force were substantiated.

If Jacobs can sell its HPD to Daimler, the TRC would remain an STGO device. Who will get there first?

The on-road manners of off-road trucks are improving all the time, and the Arocs is at the vanguard of this delivery. The range of cabs, engines, chassis layouts, driving programs and braking systems leave no stone unturned. [IE](#)

the Mercedes chassis offering is a robust affair – even more so in multi- and all-wheel drive configurations – these three innovations bear closer examination.

## WEAR-FREE ENGAGEMENT

The TRC has been long in development, eventually appearing in early 2014 on Daimler's SLT heavy transport series (Actros- and Arocs-based), operating at up to 250 tonnes. Daimler's initial exclusivity agreement with Voith has now expired, but the software and controls involved are very complex, and bespoke to the truck they are installed in. That could be a barrier to sale for other OEMs, which would be a shame, but if Voith were to invest in cracking the technical issues, it might be able to unleash the product on the truck market generally. If that is the plan, it needs to move quickly, as advances in AMTs, and all manner of other transmission devices, are on a roll. It's also a big-ticket item, at around €10,000 – although with production volumes the price would fall.

TRC is a clever combination of a fluid coupling, a dry clutch and a retarder. When the driver steps on the accelerator, compressed air pumps fluid into the TRC, establishing a frictional connection between engine and transmission input shaft, in the same way as a conventional

automatic torque converter. This offers the benefit of fast, yet wear-free, transmission with high slip at full engine torque of up to 3,000Nm. The quantity of fluid is controlled, enabling torque transmission to be adapted to the individual driving situation and the accelerator position. As soon as the truck is moving at a speed that equates to first or second gear (depending on terrain), the transmission fluid is discharged from the housing by means of centrifugal force. Having done its job of getting the truck on the move without using friction surfaces, now the conventional friction clutch can take over. The surfaces close at the same speed, so wear is negligible.

Descents are controlled by fixing the turbine wheel in position, and pumping fluid into the housing once again. But in this case the TRC acts as an effective engine-speed retarder. In this mode, it gives an additional 350kW of retardation effort. A lighter-duty version of this component could theoretically consign the dry friction clutch to history. The TRC is now available in Arocs RHD chassis, but you'll need to be on very heavy-duty work to justify the cost.

