

“On an 8x4, the steering is fighting against the bogie, and tyre wear is also increased; on an 8x2 you won’t get the same amount of scrub as on an 8x4”

Martin Flach

Invasion of the **tridems**

The eight-legger is a long-established rigid truck chassis layout with which operators are comfortable. But there is room for change. It is being joined by rear-steer and multi-steer options offering the potential to improve manoeuvrability, reduce fuel consumption and increase payload. Toby Clark reports

The traditional 8x4 chassis consists of twin-steer axles up front and a double-drive rear bogie, the ‘2+2’ layout. However, the truck’s 32-tonne gvw poses limitations when it comes to manoeuvrability, points out John Comer, product manager at Volvo Trucks. He says: “One problem with 8x4s in this country is the minimum outer axle spread (OAS) requirement,” referring to the distance between front and rear axles. The 5-tonne-per-metre bridge formula mandates an OAS of 6.4m, for an effective wheelbase of around 5.1m.

By comparison, a truck with a three-axle rear bogie, with rear-axle steer, has an effective wheelbase of more like 3.7m; that improves the truck’s turning circle by 25%. This configuration, called ‘tridem’, as opposed to a tandem (dual) axle, is seeing applications beyond the usual tippers, in construction,

agriculture and – occasionally – logistics.

Comer argues that an 8x2 in this configuration should be considered a logical upgrade to a six-wheeler, with comparable turning circle and manoeuvrability, rather than being seen as a replacement for a traditional 8x4. “And with lifting axles,” says Comer, “in effect the 8x2 can become a 4x2 when it’s unloaded.”

Martin Flach, alternative fuels director for IVECO, urges customers of 8x4s to consider whether or not they really need that double-drive bogie. He observes: “A lot of operators go for double drive because that’s what they are familiar with, but they would be alright with an 8x2. The challenge is getting customers not to buy an 8x4 just because they’ve always had an 8x4.” He is clear about the

advantages of an 8x2 – particularly those with multiple lift and steering axles. “On an 8x4, the steering is fighting against the bogie, and tyre wear is the other thing: on an 8x2 you won’t get the same amount of tyre scrub as on an 8x4.”

According to Flach, it’s not just operators working exclusively on road who need to ask this question. He adds: “Hopefully we’ll see fewer 8x4s in construction,” reasoning that sites will try to avoid mud, which necessitates wheel-washing facilities. If so, he says, “you can unload on hard standing with the load being moved on site using a big crane.”

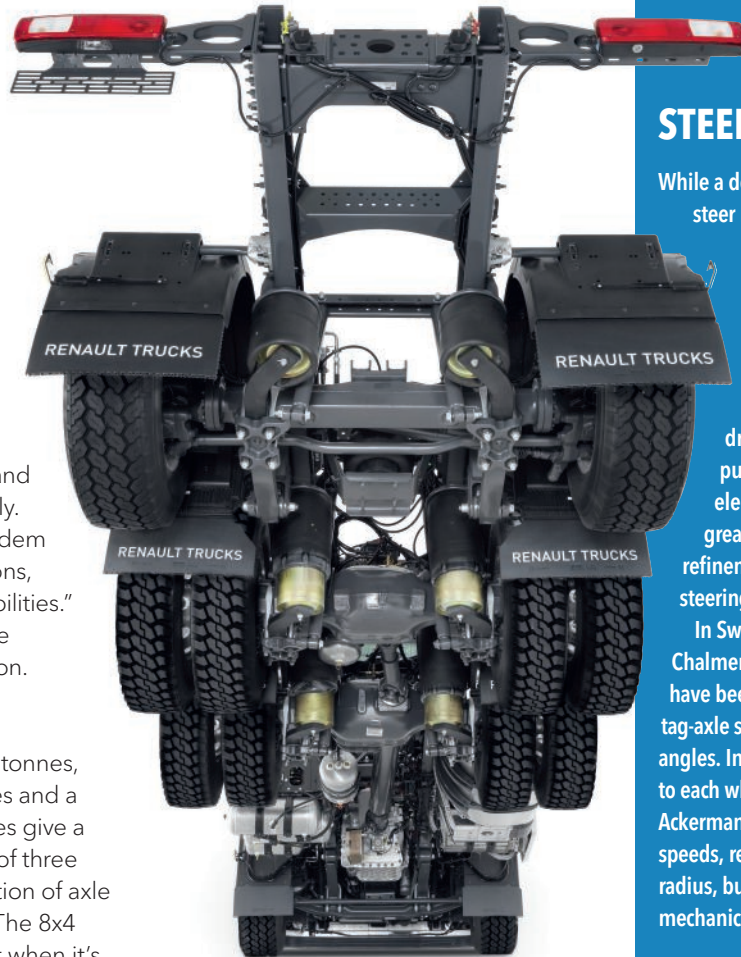
DAF, in fact, only offers tridem bogies as 8x2s, and marketing manager Phil Moon reckons this is not a limitation. He points out that the driver can lift axles



STEER AXLE DESIGNS

While a decade or more ago, command-steer rear axles would have been hydraulically or even mechanically linked to the front steer axle, now it is usually simpler – and certainly better in terms of packaging and weight – to use a hydraulic actuator driven by a PTO-mounted hydraulic pump. The system is controlled electronically. This also has the great advantage of being able to add refinements, such as speed-dependent steering response.

In Sweden, Volvo, AF Consult and Chalmers University of Technology have been looking at ways to enhance tag-axle steering by increasing steer angles. Independent steering actuators to each wheel would allow more accurate Ackermann-type steering geometry at low speeds, reducing tyre scrub and turning radius, but would sacrifice the fail-safe of a mechanical tie-bar.



to put more weight on the drive axle; often, he says, "the traction is there". The lack of tyre scrub means the truck "flows round corners" and makes the layout yard-friendly.

But, Moon warns: "The tridem is good for certain applications, but it doesn't cover all possibilities." The difficulty comes with axle ratings and weight distribution.

WEIGHT DISTRIBUTION

On a conventional 8x4 at 32 tonnes, twin 8-tonne-rated front axles and a rear bogie rated for 19 tonnes give a comfortable load tolerance of three tonnes and an even distribution of axle loadings. Observes Flach: "The 8x4 works very well as a concept when it's used with a tipper body with a front-end lift."

Tridem bogies may be nominally rated at 27, 30 or even 32 tonnes, but UK legislation (and road-friendliness concerns) limits the rating of an air-suspended three-axle bogie to 24 tonnes capacity. A steel-suspended tridem bogie rating is limited to even less, just 22.5 tonnes.

So to run at 32 tonnes gvw on four axles, a tridem with a conventional 8-tonne front axle has absolutely no load tolerance. For that reason, Moon points out that a 9-tonne rating is really the practical minimum for a front axle. Although 10-tonne steer axles are available, they can cause difficulties with wheel and tyre choice. So, with a tridem, Moon says, "the load has to be in a certain space. Capacity is restricted, and it is all biased towards the rear."

Another consequence of the tridem layout is a difference in handling: "If the centre of gravity starts to creep forward, you can overload the front axle," warns Moon, "but if it creeps backward you can underload the front axle."

He adds that tridems can have a tendency to understeer, so customers

need to pick an application where the centre of gravity is predictable and stable. Bulk tippers are an example, says Moon, but tridems are not really suitable for pallets. For these reasons, one of the most popular applications for tridems is concrete mixers; Volvo has supplied around 180 of them to Hanson alone.

"The key thing," says Martin Flach, "is that the driver needs to get used to a vehicle with multi-steer."

Also, as axles are lifted, the centre of rotation of the truck shifts – sometimes quite considerably. According to Phil Moon, it feels like a shorter vehicle. But he adds: "You do have to be aware that you don't catch the outside overhang." That said, 8x4 waste vehicles are often seen with tridem bogie consisting of a steering pusher axle in front of twin drive axles; the advantage of this set-up is that it reduces swing-out at the rear.

The 'clever' eight-legger may also have other applications. Moon suggests it potentially has uses in urban environments, noting that vulnerable road users such as cyclists are helped by a vehicle that does not have to swing right in order to turn left. However, he

is not convinced that these applications include logistics: "I think you come back to this weight distribution issue; the tridem's ability to compensate for non-uniform loads is limited."

But Moon does see a place for urban distribution using a different type of four-axle vehicle with rear steer: "The opportunity is there for steered trailers on artics; the articulated vehicle has a whole lot more scope than going from a three- to a four-axle rigid," he says. An 8x2 with three steered axles (OAS 6.47m) has a minimum wall-to-wall turning circle of around 9.9m. This is admittedly more than the 8.73m of an urban artic with a 9m single-axle trailer, but a metre less than even an 18-tonne 4x2 with a 6m wheelbase and a 9m body. So for load-critical applications, there might yet be a place for four axles in town. [TE](#)

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The go-anywhere truck – <https://is.gd/wikuha>
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London Lorry Route Approver (paid) service – <https://is.gd/finalo>