

# Get the best from rail and road

There are reports that, despite worsening road congestion, the British government is preparing to axe subsidies to underutilised branch rail lines. If one lobby group, Transport Watch, has its way, branch lines would be converted into tarmac roadways open to all road traffic. This approach does not command much support, but the idea of "busways" does.

The Department of Transport (DoT) has proposed converting the 13-mile Severn Beach line near Bristol to a busway, and is considering a similar proposal for the 12-mile long, disused Cambridge-St Ives line.

The tracks would be ripped up and replaced with concrete channels which act as slots for small guide wheels fitted to single decker buses. These take over the steering from the driver and the tyres run on the top of the concrete runways. At the end of the busway the guide wheels are retracted and the bus simply joins the road network. Trenches at each end prevent cars, vans and motorbikes from using the busway.

However these buses are powered in future, their energy take would be higher than steel wheel equipment because rubber has a much higher CoF. Objectors also counter that it is less costly to restore rail track than construct a concrete runway, even one designed only for bus axle loads. In addition, rail track can cater for freight as well as passengers.

## Blade's cutting edge

What might fit the bill is an innovative, bimodal powered vehicle design, called BladeRunner, that takes advantage of rail's low rolling resistance to reduce fuel costs but is equally at home on the road and on urban tramways.

Passenger vehicles with rubber tyres and rail wheels are not new, but they are unimodal. On the Paris metro, some trains have rubber tyres and small (500mm dia.) rail wheels which run against a vertical steel beam on each side of the car for steering. The beams are about 600mm from ground level. There are two wheels in each of four wheel sets (ie eight per car). One metro line is now completely automatic and driverless. Others can run on "auto pilot," depending on the driver's commands.

## Customised bodies

BladeRunner can be configured as any type of freight lorry, such as a curtainside or rigid-walled trailer or chassis for containers and swap bodies, as well as a passenger bus, luxury coach, a car carrier or a car and passenger carrier.

BladeRunner is the brainchild of design engineering company Silvertip Design Ltd, working in collaboration with Don-Bur (Bodies & Trailers) Ltd. The two companies have had a working relationship for some time and previously collaborated on the SCM (steering correction mechanism) 16m long, tri-axle Magnum road trailer built by Don-Bur for an 18.75m long HGV (see pp26-7).

A study financed 75 per cent (£45,000) by the Department of Trade and Industry has shown that this bimodal concept is feasible and recommended that it goes ahead. There are no longer any government subsidies available to fund innovative rail vehicles.

So far Silvertip and Don-Bur have been unable to secure sufficient private sector funding to progress beyond a 1:8 scale working model to a full size prototype, for which 20-mile rail line between Northallerton and Red-

mire would be available for trials. It is run by Wensleydale Rail, a community rail line which re-opened for passengers in 2003.

## Both modes in mind

BladeRunner is described by Carl Henderson, its chief engineer and Silvertip director, as an optimised bimodal vehicle which comes to terms with the hard limits of road and rail. In rail mode, it runs on retractable rail axles fitted to the tractor unit and trailer bogie.

Loads are automatically distributed according to the power transmission needs. Only light rubber tyre contact is needed for normal motion because rolling resistance on rail is a fifth of that on road. Compared to an HGV fuel consumption is cut by ca. 40 per cent to 0.75 litres/100 kms.

For acceleration and braking more weight is transferred to the tyres, as the higher CoF means much shorter braking distances and faster acceleration than is possible with conventional rail vehicles. This makes it much easier to schedule services. In this respect, BladeRunner is similar to the Trucktrain concept from Trucktrain Developments Ltd.

BladeRunner is a bimodal, single HGV module while Trucktrain is a bi-directional rail only vehicle with 4 HGV equivalent of load. In both cases, truck-competitive acceleration and a high degree of load "parcelisation" compared to conventional rail freight are aimed at matching the frequency and flexibility of HGVs.

Normally a BladeRunner track would be flush with a concrete runway. At junctions with flush hardstanding, the vehicle can change route without relying on railway points. However, conventional sleeper and ballast track can also be used, says Henderson. The outer wheels are raised and the inner tyres run on the rail head. This has been verified with leading truck tyre makers.

BladeRunner can go off rail and steer past another vehicle or obstruction on a tramway. This could be important as serious efforts are being made on the Continent to utilise tram lines for freight in off-peak hours.

In Vienna, transport operator Wiener Linien is testing *GüterBim*, whereby a tram hauls a converted trailer mounted on bogies front and rear (see also *World-Cargo News*, November 2001, p21).

BladeRunner's rail axles allow for a degree of steering and this should cut rail maintenance costs and noise by reducing stick and slip and "hunting." Each rail axle adds about 0.5 tons of tare - not an issue for a passenger vehicle but potentially a problem for a truck.

## More load space

The issue for most truck operators today is not weight but cube and Henderson has designed a tractor unit which allows more cube by eliminating the air gap between headboard and cab rear.

Any type of cab can be fitted, such as a day cab or a sleeper cab. It is not mounted on the chassis frame but on a turntable coupling that pins to the front of the trailer. It has anti-yaw cylinders and offers full roll support at all angles.

This tractor unit is also envisaged for the SCM Magnum trailer. Henderson considers that the air gap is a major weakness of today's artics, because of wind resistance and loss of driver side visibility when turning. In addition, it is impossible to provide full roll support and this can lead to jack-knifing and even overturning.

All hoses are coupled auto-



Detail from BladeRunner 1:8 scale working model (flatbed trailer module)

matically from the cab. Every year hundreds of drivers are killed or injured round the world in accidents related to fitting air lines. The coupling also allows the cab to be moved up and down, so the tractor to be used as a "spotter."

All-told, a BladeRunner bimodal truck with the gapless coupling would weigh about 2.5 tonnes more than an HGV, but it provides substantial safety and operating benefits that outweigh the extra capital costs, argues Silvertip. It calculates that annual depreciation costs would be about 10 per cent higher (£3300) but operat-

ing costs savings would be ca. £7600/year (cf fuel savings).

As for passengers, it seems clear that even the most luxurious "pullman" type BladeRunner could be built for a fraction of the price of a modern passenger rail coach and cost far less to maintain. Similarly, the economics of rail sleeper services for passengers and cars would be transformed.

## Dedicated lanes

Henderson envisages a much wider application for BladeRunner than branch and minor rail lines. Narrow, designated lanes with rail lines embedded in the pavement would course the centre of major trunk roads.



BladeRunner configured as a passenger coach/autobus...

Existing communications and adaptive cruise control technologies allow vehicles to be grouped in convoys. Using designated telematic lanes, they can be coupled electronically into short convoys which move and brake as one.

According to Henderson, with a 2 second headway, BladeRunner can put around 3500 tonnes of cargo through a corridor (> 2 coal trains) in 5 mins 12 secs! Transferring HGVs to these lanes would result in major fuel cost savings

due to the reduced tyre drag and the fact that the lead HGV acts as a windshield for the others.

Corridor access/egress, staging areas, junction priority, collision avoidance, defective vehicles, emergency and rescue, etc can all be handled by today's traffic management systems. Advanced automated highway, freight and dual mode technologies are under consideration in North America, Japan and Europe as the drive for sustainable transport continues. □

...and as a B-Double using overhead catenaries for power to save truck diesel. Note (as above) the gapless tractor coupling

