

# Tram-trains: are they worth it?

Clarifying the position and description of tram-trains, Robert Davidson weighs up the pros and cons of a concept being increasingly discussed in the light rail arena.



There seems to be some misunderstanding in the UK as to what a tram-train IS and what it can DO.

A tram-train is not a simple way of replacing the UK's fleet of clapped-out diesel railcars, nor is it a way to reduce operating costs and improve services on lightly used lines. These objectives can be met by the innovative work being undertaken by the Department for Transport and Hertfordshire County Council (ably supported by Network Rail and consultants; here it is proposed that an already-electrified line should have the infrastructure upgraded following tramway precepts and recycled tramcars from the European mainland should be used for the service. If Network Rail looks at cost-effective ways of electrifying similar lines elsewhere, coupled with time separation to provide slots for freight, then we could see the emergence of some light rail lines in the UK similar to those seen in Switzerland. However, this is not tram-train.

A tram-train (see also *TAUT 865*) is a light rail public transport system where urban trams are able to run over railway tracks to access outlying commuter areas, offering seamless penetration directly into the heart of urban centres and the ability to serve traffic objectives remote from existing rail lines – without reducing the heavy rail network flexibility and routing options. It also offers a cost-effective solution to capacity constraints on key parts of the heavy rail network, by allowing local services to 'break out' into the street before reaching congested terminal stations.

## Established concepts

The idea of tram-trains isn't new; some of the great American interurban systems did this before the Great War. The concept fell out of use and increasing safety worries about mixing comparatively light weight tramcar and interurbans with heavy railway trains militated against the concept.

Saarbrücken pioneered the rebirth of the idea – operating LRT tramcars both on urban streets and sharing infrastructure with 'heavy' railway trains. As this concept proved successful, it was applied to operations in Karlsruhe and elsewhere. Karlsruhe upgraded and integrated a *Kleinbahn* (narrow gauge railway) into the network in 1961, they moved on to operation over a short length of lightly-used freight railway in 1979 and in 1989 this shared-use was extended over 4.4km (2.75 miles) of federal railway track to Hochstetten.

The line demonstrates all the features that make tram-train a success. It links major residential areas with the city centre and provides seamless access to important destinations; offices, shops, leisure facilities and the university. On the outer ends of the route, cars operate as a suburban train, running at relative high speed and with larger distances between stops. In the city centre they become conventional trams, running at a slower speed and with shorter distances between the stops. There are even some sections of mixed running with other road vehicles.

Of course tram-trains with improved performance offer a number of other advantages. Services can be speeded

In the Netherlands, the 54 single-voltage *RegioCitadis* on *RandstadRail* have already covered 11.4m km. A new order for 18 additional vehicles was placed in November 2008; they will be built at Alstom's Reichshoffen plant in France. Alstom



**FURTHER UK TRAM-TRAIN OPPORTUNITIES**

- Linking the inner end of the proposed Borders Railway with the Edinburgh south suburban line, the new tram could provide a direct link from new commuter housing, Park-and-ride site and the west Edinburgh business area, without going through congested central Edinburgh.
- A simple link from Starr Gate to Squires Gate would allow the modernised Blackpool tramway to serve St Annes and Lytham.
- A link at Meadowhall onto the line to Rotherham would extend Sheffield Supertram services.

It is pleasing to see that having abandoned the Penistone trials the DfT and NR are now pursuing the Rotherham option listed above. It is a great pity that more of the others are not being actively developed at the same time.



up, getting greater productivity out of machinery and manpower while improving the competitiveness of rail. Alternatively, additional request stops can be added along the line, improving service to the community – without compromising overall journey time. Analysis in Germany has also shown that tram-trains, with their greatly improved braking performance, can reduce the number and severity of level crossing collisions on secondary lines. Tram-trains can thus offer lower operating costs, improved passenger convenience, better commercial performance and improved safety. At the same time, the lines will continue to be available to heavy rail trains, whether diverted main line trains, specials or freight trains.

**Conversions require careful planning**

Simply converting an unpopular heavy rail line to tram operation will not result in overnight success. The ‘Manchester/Croydon miracle’ only happens when the line serves places people actually want to go. It requires careful and thoughtful planning to find the potential winners.

What tram-trains are NOT is cheap. The difficult procurement of a small number of diesel electric cars for the proposed Penistone trial showed that; tram-trains only offer high value when certain conditions are met. The advantage over separate trams and trains is that passengers travelling from outside a city need not change from train to other transport at a central station, though some passengers are displeased by replacement of regular trains with tram-trains, which usually lack amenities such as on-board lavatories.

**The concept needs:**

- 1) Early masterplanning to identify areas that will benefit from direct services into the urban centre, to produce the overall system layout, to allocate the roles of different transport modes and to identify the consequences for urban planning.
- 2) Serious understanding of any compromises, especially if integrating an existing urban tramway. Being more complicated in its project structure, it is highly dependent on supportive political and regulatory structures.
- 3) Close management. Combining two existing infrastructures and regulatory concepts will not be easy and can result in cost escalation if not carefully managed. Main cost factors are possibly regional electrification, increased tramcar crashworthiness requirements, signalling and detection installations, physical railway and tramway infrastructure links, creating tramway infrastructure from scratch or necessary adaptations of the existing networks.

Some of these issues are not as onerous as is imagined. Cost contained electrification is possible – as are stored energy options. Some railways have adopted the concept of

a ‘mobile power house’, coupled to an electric train at the end of the electrified section to allow the train to continue.

Increased crashworthiness adds weight and complication to a tramcar. It is far better to ask how many times collisions occur and finding methods of prevention than on increasing the likelihood of driver and passenger surviving them. This will lead to the introduction of improved signalling with active train stops, adding cost but increasing value if serious accidents can be prevented.

Adapting networks is not just a matter of enabling tramways to accept tram-trains, for although tramcars are narrower than trains their ‘boxy’ shape can give loading gauge problems under arched bridges. A further advantage is that they can relieve congestion on the railway network by getting local services out of busy main line stations. Thus converting the Marple and Glossop lines in the north of England to tram-train and routing them at Ashburys over Metrolink into the city centre could release up to four platforms at Manchester Piccadilly.

The opportunity value of this would probably pay for the whole tram-train conversion. Similar routing of many of the former ‘Blue Train’ routes onto the street in central Glasgow would relieve Central and Queen Street Low Level. Similar arguments could apply in Birmingham, Bristol, Edinburgh and Leeds.

So, tram-trains are NOT CHEAP and they are NOT SIMPLE. They require careful planning and consistent political support. But they can offer excellent value for money in improved public transport – both on lines served and in the terminal stations relieved of congestion. **TAUT**



Paris has also adopted the TramTrain concept, here an Alstom RegioCitadis unit is seen at Aulnay Sous Bois on the Paris T4 tramway line in April 2008.

Neil Pulling

Left: On the Eastern edge of Karlsruhe, KVV 916 is pictured at Grötzingen Oberausstrasse on 17 July 2009.

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