



DUAL-MODE TRANSIT : IMPROVED PENETRATION, LOWER COST

INTRODUCTION

Several towns and cities throughout the world are improving their transit services by developing either a dual mode transit mode or alternatively a form of electro-diesel operation. Strong incentives exist for further development of what has become known as the tram-train concept, a concept which is permitting a more intensive use of existing infrastructure.

The tenacity of transit engineers in Karlsruhe (Germany) led to the successful development of what many experts had considered to be a technical impossibility. The resulting dual-voltage know-how has permitted Karlsruhe to take an undisputed lead in developing its network of tram-train services.

Britain's failure to follow up on this lead may well be at the heart of our current funding crisis, a crisis that has stopped all light rail and Supertram expansion plans "in their tracks".

EXAMPLES OF TRACK SHARING IN UK

Up to about 50 years ago track sharing could be seen in various parts of Britain but had little future after the tram scrapping era.

Glasgow was a place where tram-train operation was an almost daily occurrence with steam engines hauling railway wagons to the shipyards through suburban streets and using the trams tracks. This type of action was the reason for Glasgow choosing 4'- 7 $\frac{3}{4}$ " as its tramway gauge instead of standard 4'- 8 $\frac{1}{2}$ " (1435 mm). It then permitted the flanges of the railway wheels to ride in the grooves of the tram rail.

Blackpool also allowed its sleeper tram tracks near Thornton Gate to be used by railway coal wagons to a coal merchants yard. Although the trams are still running, the railway connection and branch line no longer exists. It is of interest to note that the electric steeple-cab locomotive is still earning its keep on the tracks of the Crich National Tramway Museum.

Just as freight on tram tracks is a distant memory in UK, Dresden (Germany) has recently introduced a four-section cargo tram specially designed to carry car parts to a Volkswagen factory (1). The bidirectional tram carries the equivalent of three lorry loads on a 25 minute journey through the city.

TRAM-TRAIN PASSENGER OPERATION

The Swansea and Mumbles line in Wales, originally steam operated, broke tradition by building some extra large double-deck trams and including some railway type features in the design. Although being operated over standard gauge tracks and being railway connected, the service did not actually share with railway rolling stock. After abandonment, one tram was brought to Leeds to carry passengers on the steam operated Middleton Railway. This never happened because the vehicle was attacked by vandals and damaged beyond repair.

Another example was in Lincolnshire where until 1961 the Grimsby and Immingham Electric Railway, not unlike a North American Interurban, operated a service with strong railway characteristics and mainly over electrified railway tracks. Although with short sections of street track, no connection was ever made with the tram system in Grimsby.

Some 40 years later, an interesting tram-train development in New Jersey (USA) saw trams and freight trains sharing the same tracks. A well established freight line was modified to operate during the day as a diesel powered tramway and a freight line at night after the last tram had run (2).

SHARED INFRASTRUCTURE IMPROVES PENETRATION AND SAVES MONEY

No matter how efficient a regional railway, if it only serves fringe locations (for instance, Ripon in North Yorkshire) it will attract few passengers and be at risk of closure. As already described, Karlsruhe's tram-train experiments were an immediate success. This recipe of improved penetration was soon copied elsewhere in Germany.

Saarbrücken (Germany) used the dual voltage design to permit tram-trains to leave the electrified railway tracks when close to the city centre and pass through the streets as a tramway (3).

Kassel (Germany) is planning to connect the railway tracks running into its Hbf (main railway station) with its tramway system and operate a tram-train service through the CBD. This will be very helpful because many express railway services now only stop at the new station at Wilhelmshöhe and thus by-pass the Hbf terminal tracks. Zwickau (Germany) recently turned the tram-train concept "on its head" by laying a third

rail alongside a metre gauge tram line so as to permit a standard gauge diesel train service to use city streets to reach the CBD.

Nordhausen (Germany) has recently taken delivery of some dual mode trams (electro/diesel) to permit a through service from its metre gauge tram system to Ilfeld via the metre gauge Harz railway network.

Paris (France) is converting the Aulny-Bundy railway line east of Paris to permit tram-trains (25kv AC/750v DC) to operate a local service.

Rijn-Gouwe (Netherlands) is experimenting with tram-train operation from Gouda towards Leiden so as to follow-up with street track extensions to the North Sea resorts of Katwijk and Noordwijk.

CONCLUSION

Many tram-train services are now at the planning stage in Europe and with the technical problems and safety aspects now well proven for service operation the travelling public could expect improved services. Britain's rail transit planning, currently at a standstill, could revolutionise public transport, if allowed, by introducing some tram-train services. Our earlier experience, although now lost, could easily be updated following a technical visit to Europe.

REFERENCES

- 1) Street Cargo - RAILWAY GAZETTE INTERNATIONAL - November 1999.
- 2) River Line opens for service - RAILWAY GAZETTE INTERNATIONAL April 2004.
- 3) Harry Hondius - RAILWAY GAZETTE INTERNATIONAL - pages 585 to 588 - September 2004.

FOOTNOTE

After this discussion document was prepared a three page article appeared in *TRAMWAYS & URBAN TRANSIT* (4) which clearly explained the multi-specification needs for the two categories of urban rail.

A synopsis below describes briefly the two functions

The tram-train and its "cousin" the heavy tram have very similar functions but somewhat different parameters although they both could be described as saviours of the branch line. Tram-trains for instance, often with line-of-sight operation and emergency track brakes, have the ability to operate safely when required on a street track. The heavy tram though, constructed for stronger buffing loads, can when required, operate safely over the main line for access to a workshop. Also illustrated on the front cover of this same *Tramways & Urban Transit* journal was a photograph of a dual-mode tram, presumably in diesel mode outside the bahnhof in Nordhausen.

- 4) Tram-Trains by Andrew Steel - TRAMWAYS & URBAN TRANSIT - pages 408 to 410 November 2004.

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