All Party Parliamentary
Light Rail Group
House of Commons
London SW1A 0AA
Light Rail & Trams, Affordable & Sustainable Transport

"The past we inherit, the future we build ourselves"

"TramTrain does it Greener and Cheaper on lightly used railway lines and in the streets"

TramTrain Summary September 2016

D H Townsley, Like Trolleybuses, TramTrains have crept into the transport vocabulary in recent years as a panacea, a purveyor of universal remedy to cure all transport problems. The term, synonymous with Rail Buses, has no real value in West Yorkshire, least of all with regard to little used lines and the airport link. There are horses for courses and the TramTrain concept works tolerably well in some mainland European applications where railway conditions vary greatly from those in Britain. By their very nature of operation the Nottingham, Manchester, Birmingham and Croydon trams are technically 'TramTrains' in that they run in part on existing 'heavy rail' (ex BR) tracks and in part on streets and reservations.

Reply, *TramTrains are vehicles ideally suited to street tramway operation with the ability to use the main lines where capacity exists thus connecting the suburbs with the city centre rather than a railway station sometimes quite a distance from the business, commercial or retail areas of the city.*

The TramTrain Concept has worked extremely well in many European Cities such as Karlsruhe, Kassel and Saarbrucken where the growth on some lines has been exceptional. Nottingham, Manchester, Croydon, Sheffield and Midlands Metro are not technically TramTrains as in all cases the mainline element has been converted to tram or metro operation with no interoperation with mainline traffic.

D H Townsley, But, and there is always a but, they do not exhibit the only fundamental attribute for the name 'TramTrain' and this is a feature that Nottingham had in mind at the planning stage but no amount of ingenuity could bring it to fruition. That was the ability to have a fully legally compliant, mobility impaired friendly, vehicle which could trundle round the city centre as a tram and then share tracks with main line trains once out of the city. The shared running had to be abandoned for a number of reasons.

Reply, *All these aspects required testing in the UK rail environment and thus the Sheffield Rotherham TramTrain Pilot is designed determine how this can be done safely.*

D H Townsley, No one has so far fully reconciled the demand for a low floor tram with the stepping distances imposed by the Health and Safety Executive and mandatory Railway Group Standards, and structural integrity (crashworthy-ness) and signalling compatibility difficulties have been brushed aside. The Railway Inspectorate arm of the HSE became responsible to the ORR (Office of Rail and Road in late 2016)

Reply, *This is the focus of the TramTrain Pilot. Most of the required deviations from the Railway Group Standards have been approved by the appropriate Standards Committees and this will be used to set the standards required for future TramTrain Schemes. The ORR RI are supportive of the project and the proposals to address the crashworthiness issues with improved signalling protection. The Project Team are currently determining the stepping distance requirements for the low level platforms and associated safety considerations.*

D H Townsley, To require a TramTrain at all you must have a tramway to run it on. This Leeds does not have – yet. Secondly there must be a lightly used 'heavy rail' section to link the tramway to. This is difficult to achieve in Leeds because most, if not all, Network Rail lines are running at or near to full capacity and injection of the odd TramTrain would reduce line capacity by possibly one or two paths each hour in each direction, thereby being a hindrance rather than a help. Manchester's trams are high floor so they suit disused rail line platforms but impose high platforms on the street sections.

Reply, *The choice of high floor trams for Manchester was consistent with the re-use of the Bury and Altrincham lines with many stations and few city centre stations. Following tram schemes have adopted low floor trams for better integration within the streetscape. Dual height platforms are not new and operate well on Randstad Rail operating out of The Hague in the Netherlands where high floor heavy metro trains inter-run with low floor TramTrains.*

D H Townsley, The demand now is for low floor street level accessible trams, therefore the TramTrain in Sheffield and elsewhere requires low level extensions on existing high level platforms at any Network Rail station. All this is extra expense. TramTrains from LBA to Leeds via the Harrogate line would stunt the projected growth of that line and remove the possibility of an economic 'Circanias' style regular interval suburban service as in Madrid, Barcelona etc serving Leeds -Knaresborough- York- Leeds (via Garforth) with unified rolling stock and would inhibit VETEC Harrogate -Kings Cross Bi-Mode (later electric) services. It would be incompatible with and would ruin Arriva's admirable new enhanced franchise plans.

Reply, *The proposed use of the Leeds to Harrogate line would not have an issue with capacity. Throughout most of the day there is only two services per hour in the working timetable, rising to four in peak times. As some of the proposed TramTrain services could either replace or supplement the existing "Arriva" services, there would not be a Capacity issue. The planning headway on the route is 5 minutes between Armley Junction and Horsforth and 8 minutes to Harrogate. Even taking to account junction margins for joining north of Armley Junction and dwell times at stations, the line is suitable for 6 trains an hour north of Horsforth and 8 between Horsforth and Armley Junction. Accordingly fitting in a service to LBA would be possible without impacting on current plans, especially as the TramTrain Services would not venture into the more congested areas between Leeds Station and Armley Junction.*

D H Townsley, The Sheffield-Rotherham TramTrain trial promoted in 2008 (after abandonment of an earlier and even more abortive Huddersfield-Penistone-Sheffield scheme) and originally scheduled for 2015 but later put back until 2017, and this month again retarded to an unknown date, is to a degree fair enough, if indeed it does go ahead, as it will connect with SuperTram at Meadowhall. The short stretch of Network Rail line through Rotherham Central to Parkgate is partly a disused freight line and partly a short section of the Meadowhall – Rotherham Central – Parkgate line used by very few local services. No long distance trains to trip up. According to makers Vossloh, the 37m-long wheelchair-accessible tram-trains have a seating capacity for 94 people. The price is said to be £4.5million each whereas a standard 42 metre long two car electric multiple unit carrying 154 seated passengers would cost just over £2.25million. The first of the seven TramTrains are already at the Sheffield depot. The delay is already approaching NGT proportions. The trial is a joint exercise between DfT, South Yorkshire Transport, Network Rail, Stagecoach Supertram and Northern Rail and is to last two years. if successful it will run as a local service and be a determining factor in any continuance in Sheffield and any decision on systems elsewhere.

Reply, *The TramTrain Pilot is designed to determine the solutions to introducing TramTrain in the UK where some track and signalling standards are different to those used in Germany. TramTrains are more expensive than Trams or non-street running light rail vehicles as they have to be compatible with both types of system. Their advantage is the ability to take passengers from where they live directly to their city centre destination rather than a distant main line hub. The cost of the Sheffield vehicles is raised by the small order size and the uncertainties of the trial.*

I **D H Townsley,** would not want to commit a City's future on such a slim reed when there is the additional drawback of not yet having a tramway system. Network Rail have not yet started to bring their section of the track into Rotherham up to the required standards.

The Sheffield tram system is electrified at 750 volts DC. Other UK LRT systems are 1500volts DC, the maximum allowed for street operation. Network Rail is electrified at 25 Kv AC (25,000 volts) so the TramTrain has to be arranged with an inverter and associated equipment to provide dual voltage. Further extra expense and extra maintenance.

Reply, *All UK tramways are electrified at 750 V dc except Blackpool which is at 550 V dc. Tyne and War Metro is the only UK system using 1500 V dc. The Sheffield TramTrains are already dual voltage 750 V dc and 25 KV ac but the higher voltage will only be used when the MML Electrification extends onto the route. The mainline section from Meadowhall to Parkgate is currently being electrified at 750 V dc but using overhead line equipment that could be converted in the future. At that point in the future certain bridges will need raising.*

D H Townsley, There are other issues to consider and overcome. The wheel/rail interface (the wheel flange profile axle loading and other factors which affect the ride quality, the wear on wheel flanges and rail head, the resistance to and the propensity of, derailment etc) has to be optimised and in this respect the ORR has a 113 page guidance document. Ride quality differs when transferring from flush inset street track to mainline track with wood or concrete track with ballast.

Reply, *This issue has been addressed by engaging the UK academic and railway experts and a wheel profile has been developed to work well on grooved street track, light ballasted tramway and heavy rail track. Testing and fine tuning this profile is part of the Pilot and the development work for this profile builds on the ORR document quoted.*

D H Townsley, Are drivers of this dual-purpose vehicle Tram drivers or Train drivers, are they members of ASLEF, RMT, Unison, Unite or TGWU? They would have to be trained as a train driver with full knowledge of signalling, route, emergency and rescue procedures and this should incur extra payment. And how many drivers do you train for a minority fleet? And what about the other drivers? Possibility of a long and acrimonious wrangle here. Imagine the poor tram driver being confronted with Wortley Junction with its eight parallel lines, three converging routes, seventeen platforms, a kilometre long 3,000 ton stone train straddling the tracks on its way from Skipton to Neville Hill and two or three Virgin, Cross-country and Transpennine Express trains converging. The British railway system is the safest in Europe, sixteen times safer than Germany and 160 times safer than Spain over the last four year counting period [ref ORR]. Lets keep it that way.

Reply, *As with all rail projects safety is a prime requirement. As train movements are controlled by the signalling system and the driver will have to have appropriate route knowledge, this will not be a particular concern. The experience from Germany is that tram drivers had less difficulty driving on the main line than main line drivers on tramways. Main line drivers are not used to looking out for cars and pedestrians. The Union affiliation is between the operator and the drivers and the extent of main line knowledge can be limited to the needs of the actual route.*

D H Townsley, Taking the Leeds - Harrogate – York line It is difficult to imagine the DfT ever considering granting programme entry status for a scheme as has been publicized in the press over the last two weeks or so and as over 50% of the route is either in the City of York or North Yorkshire there could be some hard words.

The main railway fight in this area has been removal, now approved and underway of the Nodding Donkey 'Pacer' trains and the new Northern franchise suggests new and/or newer trains throughout the franchise area. TramTrain is simply an up to date reincarnation of Rail Bus, a 'solution' tried at intervals since the nineteen thirties and all found lacking in one way or another. Dual purpose vehicles, like dual purpose machines and tools, rarely give first class results in either mode.

Reply, *This is not the experience of European TramTrain operations*

D H Townsley, For comparison purposes the SY test TramTrains have a top speed of 62mph and can carry 88 seated passengers plus 150 standing. (238 total)

A 2car Pacer has a top speed of 75mph and seats for 138 passengers. Using the industry guide line of PIXC (passengers in excess of capacity) of 135% of seating capacity this allows 52 standees giving a total of 190. The three car Pacer had 132 seats and 78 standees giving a total crush laden capacity of 210.

But with the Pacers on the way out present trains on the Harrogate line are usually a 4 car rake of Class 150/2 diesel multiple units with a capacity calculated in the same way as above of 298 seated and 104 standing, a total of 402 passengers. These trains have a top speed of 75mph also. Replacements for the class 150/2 units will be (probably cascaded) more modern or new units of similar capacity but with a top speed of 100mph and eventually standard electric units again with equivalent performance. Over fifty miles on a TramTrain with only 37.5% seating capacity is not a pleasant thought.

In simple terms a four car standard multiple unit (diesel or electric) with a speed capability of 100mph would carry 402 passengers of which a maximum of only104 would need to stand whilst two three unit TramTrains coupled together and with a speed capability of only 62mph would carry 476 passengers but 300 passengers would need to stand. Taking some seats out of the multiple unit would tip the balance to more capacity but more standees. Also the multiple unit would have two toilets, the TramTrain none.

Reply, *The capacity of any train or TramTrain would need to suit the demand and that created by the introduction of new rolling stock with better city centre penetration. The line speed on the Leeds to Harrogate line does not exceed 60 mph and thus the TramTrains are more that capable of keeping up with other services as they also have faster acceleration.*

D H Townsley, How can you upgrade a service by replacing existing vehicles with new vehicles which have at least 60% less seating capacity with 50% more standees and having 13 to 38% less speed capability? And how can you say that this would not impinge on the proposed VTEC Harrogate - Kings Cross trains. Not to mention any effect of extra stops along the way.

Reply, *There is no speed differential between the TramTrains and other trains as the line speed is less than the maximum speed of all stock that use the line. Extra stops are countered by the faster acceleration of the TramTrains there would be a significant advantage with a more frequent service. The VTEC trains, being class 1 services would take priority in timetabling term and thus would not be affected. In whole journey terms, home to destination, TramTrains have proved their worth in Europe and could also do so in the UK.*

Hon Alderman D H Townsley, Chartered Engineer, Member of the Institution of Mechanical Engineers, Member of the Chartered Management Institute

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Reply by Mr Tim Kendell BSc CEng MICE MAPM FPWI, UKTram, TramForward.