

RAILWAY STUDY ASSOCIATION

CONVENTION IN GERMANY

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Although the 2009 Railway Study Association Convention was held in the, surprisingly attractive, “Free and Hanseatic” City of Hamburg, the first day was spent in the German capital Berlin. Departing Hamburg Hauptbahnhof at 0806, the first impression of the German ICE trains was highly favourable, especially for a design which is two decades old. Particularly noticeable was the high level of comfort afforded to standard class passengers, especially when compared with the French TGV trains, with a choice of open plan or compartment seating (the latter in a very generous 6 seats to a compartment layout. The food offer in the spacious bistro car included traditional German favourites such as Fleischkäse and Frankfurters and, for the return journey, there was even the option of draught or bottled beer served straight from the keg.

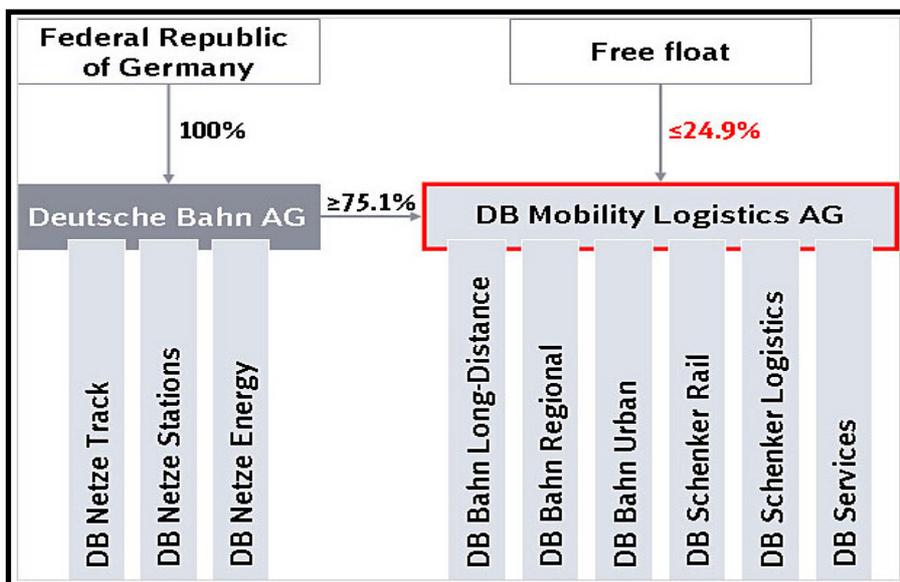
Arriving at Berlin Südkreuz station, we had time to admire the clean functionality of this new interchange before boarding a double deck suburban service for the short journey to Potsdamer Platz. Originally a busy interchange between tram, bus, underground and rail, Potsdamer Platz had a similar iconic status to London’s Piccadilly Circus until the Berlin Wall transformed the square into a symbolic no-man’s land at the heart of a divided Europe. As a result, the U-Bahn line below Potsdamer Platz closed completely whilst the S-Bahn station, located in East Berlin, became one of several “ghost-stations” through which West Berlin suburban trains ran non-stop. Since the fall of the wall the S-Bahn and U-Bahn stations have both reopened and a new regional station has also been constructed. As such, Potsdamer Platz makes an appropriate location for the Headquarters of Deutsche Bahn AG, the reunified state railway company formed as a result of a merger of West German Deutsche Bundesbahn and the East German Deutsche Reichsbahn.

Deutsche Bahn - A Big Railway with Big Ambitions

Claudia Schubert of Deutsche Bahn (DB) provided a detailed overview of the company, starting with DB's mission statement "**to become the world's leading passenger and logistics company**" which left no doubt as to the scope of the company's future ambition. DB aims to realise this vision through: high standards for quality and customer service; providing innovative and customised logistics and passenger transport solutions; and offering a "one-stop shop" for customers. Claudia Schubert summed up this approach in just three words: **Optimise, Integrate, Expand.**

In order to comply with the requirements of EU directive 91/400, the DB structure is split into two core elements:

- **Deutsche Bahn AG**, which maintains and operates the infrastructure, power supplies and stations under the **DB Netze** division.
- **DB Mobility Logistics AG**, which comprises separate Business Units aligned to the different Passenger and Freight transport sectors.



Deutsche Bahn Corporate Structure (DB)

Deutsche Bahn AG is 100% owned by the German Federal Government and has a ¾ majority shareholding in DB Mobility Logistics AG.

Readers in the UK will be most familiar with **DB Regio**, which owns Chiltern Railways and has stake in the LOROL concession and the WSMR open access operation and **DB Schenker** which now owns the former EWS freight company. **DB Urban** operates the S-Bahn systems in Hamburg and Berlin, manages several bus companies and is one of the bidders for the Tyne and Wear Metro concession. DB has a polycentric approach to its constituent parts, meaning that much decision-making is devolved to regional management teams. However, such devolved power comes with an equal measure of responsibility, as evidenced the week prior to the RSA convention when the entire management team of the Berlin S-Bahn was sacked over the ongoing problems with the new train fleet which have devastated local services in the German capital over the summer.

DB's foreign involvement is further evidenced by its leading role in the **Vier-Bahnen** (Four Railways) **Project**, which has seen improved border procedures and increased co-operation between the railways of Germany, Poland, Belarus and Russia, which has reduced transit times between Germany and Moscow down from 21 days to just 3.5 days. Likewise the **Bosporus-Europe Express** scheme aims to reduce transit times between Germany and Istanbul from the current 60 hours down to 25. Even more ambitious are proposals for a **Eurasian Landbridge** to cut the transit times for the 10,000km route between Peking and Hamburg down to 15 days. Given that typical journey by sea from China to Hamburg is around 40 days, the Landbridge concept would appear to have considerable potential.

Berlin Hauptbahnhof

Following lunch and a traditional Berliner Weisse (wheat beer with syrup) at the famous Café Josty, the visit to Berlin concluded with a tour of the impressive new Hauptbahnhof station with its 14 platforms on two different levels. This new transport hub, which incorporates a new north-south heavy rail tunnel through the centre of the city, is served by 1100 long-distance, regional and urban trains daily and has provision for further low level S-Bahn line. Operationally this has been referred to as the “mushroom” concept due to the shape of the new network of services converging on the Hauptbahnhof



The Mushroom service concept realised by the new Berlin Hauptbahnhof (DB)

The unique challenges faced by architects and engineers involved in the project is evidenced by the large number of new patents generated. The low-level platforms have been constructed in a water-tight box, below both the neighbouring River Spree and the general water table level. The track itself is mounted on resilient bearing plates to reduce vibration transmission from passing trains, whilst the high-level roof has cylindrical supports which allow for both lateral and horizontal expansion.

Perhaps the most impressive feature was the construction of the north-south bridge elements over the high-level platforms, which were constructed vertically from either side and then lowered into place in a manner reminiscent of Tower Bridge's roadways descending across the Thames.

The German Approach to High Speed Rail

The following morning there was the opportunity to travel on the newly electrified line from Hamburg to Lübeck or to explore the local public transport network which includes bus, metro, rail and even ferry services. This was followed in the afternoon by a stimulating talk on the German High Speed rail experience by Dr. Philip Nagel whose presentation was based on one recently given by DB to Lord Adonis and the HS2 team.

Germany's approach to high speed rail stems largely from the need to provide capacity relief for the most congested sections of the conventional rail network and the problem of co-ordinating passenger and freight traffic.

The approach follows three basic steps

- 1 Define a market-driven, long-term service concept, using PRIMA network modelling based on current timetable
- 2 Translate the new service concept into a detailed timetable proposal incorporating conflict and bottleneck analysis and assessment of fleet requirements
- 3 Derive parameters for new infrastructure requirements and optimise for cost-efficiency and construction schedule

This methodology has resulted in several, relatively short HSL sections, each having its own characteristics depending on the market role it was designed to fulfil. For example, Cologne – Frankfurt with its steep gradients has been designed for the exclusive use of ICE3 trains providing high speed inter city transport. (Alstom's AGVs with their similarly distributed power would also be suitable for this route). Other HSL sections are restricted to ICE trains, whilst others are used by conventional Inter City, Sleeper and Regional trains and even freight.

Costs for each section have also varied widely, due largely to the differing topography of the routes e.g.

- Karlsruhe - Ingolstadt 22€m per km
- Cologne – Frankfurt €35m per km

In comparison, on the relatively flat north German plain, costs of just €11m per km are achievable.

As each new section has opened so passenger flows have switched from one route to another as comparative journey times have changed.

Looking 50 years ahead in planning terms, DB hopes to have a network of 1300km miles of HSL. 400km of these are already under construction with a further 700km planned.

High Speed Lessons for the UK

In terms of lessons for the UK international market, DB estimates that with rail timings of less than four hours, rail can achieve a 35 to 50 % market share, although this can be even higher e.g. Berlin to Basel has a 50% market share for a 7¼ hour journey. A UK high speed line could theoretically reduce rail's Manchester - Paris journey time to 3hr 45, gaining a potential 35 to 45 % market share and reducing the number of flights (currently 8 daily) on the parallel air route. Similarly Birmingham to Brussels should be achievable in 3 hours, whilst a direct link from High Speed 1 to Heathrow could reduce times to Cologne to 4hr 15.

Whilst acknowledging the potential for links to Heathrow and HS1, Dr Nagel stressed that the key for any UK High Speed 2 route was direct city centre access. The London terminus, in particular, should be in Central London not an interchange in the West London suburbs, although it would make sense for regional services to the continent to stop at Stratford. HS2 could be used for both mid and long distance journeys and night freight (as in Germany) would also be an option providing that costs for incorporating this were not disproportionate

In terms of lessons learned from Europe, Dr Nagel highlighted the following:

- The gradient on north connection on the Madrid - Barcelona HSL had been miscalculated and was now too steep for freight
- Although it should bring benefits in the longer term, ERTMS is expensive to incorporate on existing trains e.g. €900k per ICE train. ICEs equipped with ERTMS use the system for just 40 mins per day in order to traverse the Wienerwald Tunnel route in Austria.
- ERTMS also currently suffers from version creep, which has led to continuing problems with compatibility on the Amsterdam – Brussels HSL.

In terms of future entry to the UK-International market, Dr Nagel stated that unless there was an open bidding process for the UK part of Eurostar, DB would face the significant problem of acquiring a small fleet new build Channel Tunnel compatible trains, which would have a minimum 4 year lead time.

Hannover – Wuerzburg – The First German High Speed Line

Jörg-Peter Rosenfeld then provided a more detailed overview of specific German HSL projects including the first section between Hannover and Wuerzburg. Planning for this 327km north-south HSL began as far back as 1970 although services didn't commence until 1991, by which time the entire geographical, political and economic landscape in Germany had changed following reunification. The construction featured 63 tunnels with slab track, 34 bridges (although in common with other German HSLs, lineside fencing is not a standard requirement) and cost 20.5€m per km. In an apparent technological mismatch, whilst the line was designed for a 250kph service speed, the ICE trains were designed for 280kph and soon set a new rail world record of 406.9 kph. This original HSL would, therefore, need rebuilding if future ambitions for 350 kph travel are to be realised. As the route is used by other traffic, in-cab signalling is used to restrict the ICEs to 200 kph when passing freight trains.

The Berlin – Hamburg Modernisation Project

In contrast, the Berlin - Hamburg Ausbau project entailed a 650€m upgrade of an existing route (similar to a small scale version of the West Coast Route Modernisation) in order to raise speeds from 160 to 230 kph (roughly 100 to 143 mph) on 263 km of conventional railway. This required track replacement, new or upgraded electrification, improvements to curvature and tunnels, abolition of level crossings and installation of the in-cab LZB signalling system. Planning started in 2000 and, in spite of the complexity of the project, it was completed in 2004.

A key issue which had to be tackled was the passenger safety aspect of trains passing station platforms at over 140mph. DB's established "danger zone" for

passengers on the platform extended to 3m from the centre line of the track. Calculations showed that at 143 mph this zone was extended by a further 0.7m. It was also considered that a conventional visual warning, such as the yellow line used on UK platforms, was insufficient for passing speeds in excess of 125mph. A safety concept was therefore developed, which consisted of a combination of warning announcements, signage, visual marking of platforms and partial fencing of the danger zone. This proposal was submitted to and accepted by the German Rail Safety Authority, the EBA and might provide a useful solution for the UK, in the event, for example, that Virgin progresses its ambitions for 135 mph running with Pendolinos.



Additional platform safety features enable trains to pass at speeds of up to 140 mph (DB)

DB in Northern Germany

On Wednesday, Frau Ute Plambeck provided a detailed overview of DB's extensive operations in Northern Germany.

DB Northern Long Distance is responsible for all of the 59 first generation ICE trains (the 60th was destroyed in the Eschede derailment caused by DB's ill-fated attempt to reduce train vibration through use of a rubber damping ring between the trains' wheel and steel tyre – conventional monoblock steel wheels are now used). These are used on services linking Hamburg and Bremen with Berlin and the rest of Germany. Hamburg's Eidelstedt Depot is

also home to the previously unsuccessful ICE-TD (tilting diesel trains). These have been given a new lease of life on the Berlin – Hamburg – Copenhagen/Arhus route, where they are able to take advantage of the absence of rail diesel fuel duty in Denmark. The ICE-TDs have to share space with lorries on the Fehmarn Belt ferry as part of the Vogelfluglinie (best translated as “*the line as the crow flies*”) which, as its name suggests, provides the most direct route to the Danish capital.service.



ICE-TD on the Fehmarn Belt Train Ferry (DB)

All 145 Class 101 electric locomotives are also based in Eidelstedt, in keeping with DB’s policy of concentrating particular types of traction at dedicated depots. 572 conventional long distance coaches are also based in Hamburg. The Northern division’s long distance services operate 80,000 km per day, employing 350 train drivers, 600 attendants and 400 catering staff.

The Northern Regio division is equally impressive comprising 175 multiple units supported by 65 electric and 110 diesel locomotives hauling a fleet of 213 double deck and 454 single deck coaches.

DB also provides services on the Hamburg S-Bahn’s 145km of 6 lines and 68 stations. The S-Bahn employs a further 900 staff, running 10.2m train/km a

year carrying 200 million passengers. The S-Bahn network itself uses a 1200v DC third rail system and, until recently, ran largely on dedicated tracks, although often parallel to the main DB lines. Since December 2007, however, the introduction of dual-voltage, pantograph-fitted trains has enabled the S3 line to be extended over the main 15,000kv AC lines to Stade and such dual system operation may see further extension of the S-Bahn system in future.

The Northern division's **Railion Cargo Centre** deals with 26m tonnes of freight annually (the equivalent of 1.9m TEUs). To put this in perspective the RCC is served by up to 240 trains per day with up to 22 shunting locos operating around the clock.

Local Infrastructure Projects

Looking to the future, DB Northern is considering further infrastructure enhancements. These range from small schemes such as additional crossovers, shorter signalling sections and provision of 21.9km of new acoustic barriers in the Hamburg area (rail noise pollution is a high profile political issue in Germany) to large scale construction projects including:

- Fehmarn Belt Fixed Crossing (bridge or tunnel) 2018
- Upgrade of Lübeck-Puttgarden line plus electrification and track doubling by 2025
- The High Speed "Y link" by 2019 to increase capacity on the Hannover - Bremen/Hamburg corridor (transferring one ICE to the new route releases 2 freight trains paths on the classic route
- A 3rd track between Stella and Luneburg

Economic Recovery Plan

In addition to these enhancements the Federal Government has authorised further investment as part of an Economic Recovery Plan designed to counter the impact of the 2008/9 economic crisis. This national package comprises

€620m for station improvements (including €23.8m for 24 stations in the Hamburg area) such as:

- increased energy efficiency
- improved passenger information (Dynamic Text Displays plus PA incorporating a direct radio link from Control)
- a better passenger environment
- disabled access to all stations with more than 1000 pass/day
- weather protection
- security – improved lighting in subways and CCTV

The plan also includes a further €700m for wider improvements such as the extension of the European Train Control System.

The Role of Regional Government

As elsewhere in the Federal Republic, the interface between the local DB division and the Bundesländer (Regional German States) is key. In 1996 the Bundesländer assumed total responsibility for the organisation and funding of local public transport in their areas. In the Greater Hamburg area, this led to the formation of the Hamburger Verkehrsverbund (HVV) integrated transport authority, which is a partnership of:

- **City of Hamburg (85.5% share of HVV)**

Responsible for local rail services (primarily the S-Bahn) and for bus, U-Bahn and ferry services within the city limits..

- **Schleswig-Holstein (3.0 %) and Niedersachsen (2.0%)**

Responsible for local rail services in their respective Bundesländer

- **The districts of Herzogtum Lauenburg, Pinneberg, Segeberg, Stormarn, Harburg, Lüneburg and Stade (9.5%)**

Responsible for bus services provided in their areas.

In the City of Hamburg, there are 266km of heavy rail lines carrying half a million local passengers a day, with a further 123km in the City of Bremen and 1118km in the Schleswig-Holstein region. The Schleswig-Holstein regional government and the Hamburger Verkehrsverbund (HVV) are responsible for setting local rail fares in their respective areas and also for determining ticket validation and revenue protection protocols (which vary widely in different parts of Germany leading to confusion amongst passengers – and occasionally staff!). Some local authorities also pay for DB to provide free station car and cycle parking. At Hamburg Hauptbahnhof DB, works in partnership with a private parking company and also manages the city's cycle-share scheme.

In Schleswig-Holstein several regional services are now operated by the Metronom rail company, a public private consortium in which Arriva has around a 30% stake through its shareholding in the Osthannoverschen Eisenbahnen AG. These independent rail companies are not required to employ former DB staff at DB rates (whereby more experience and longer service for drivers equates to higher pay) unless assets such as rolling stock are transferred to the new operator, in which case "Betriebsübergang" (a form of TUPE) applies.

S-Bahn Airport Link

The afternoon began with a visit to the Hamburg S-Bahn's new airport link, built at a cost of €280m, and incorporating 3km of double track tunnel. Whilst this facility itself was impressive, perhaps the biggest surprise was the fast and efficient attaching and detaching of line S1 trains at Ohlsdorf station. An S-Bahn train from the Airport would stop in platform followed a couple of minutes later by the train from Poppenbüttel, which would glide straight up to the first train and couple directly to it. The coupling operation itself lasted mere seconds, which certainly gave operators accustomed to UK practice, food for thought.

The day finished with many delegates opting for an early evening boat trip around Lake Alster.

Freight and Logistics

Day four was dedicated to freight operations, starting with a tour of the **Maschen Marshalling Yard**. Built 32 years ago, Maschen is biggest such facility in north Germany, actually consisting of two separate hump-shunted marshalling yards. Viewed from the Control Tower of one yard, the near constant procession of inbound freight services over the humps seemed to belie the apparent economic crisis, although we were assured that the yard would normally have been even busier! For those used to images of small capacity wagons being sorted at now-defunct UK yards such as Tinsley, the Maschen operation, with its swift sorting (using 1970s Siemens computer technology!) of modern container and bulk wagon trains was something of a revelation, as was that fact the trains from here would be despatched not just to all over Germany but to most points in continental Europe. Further investment in new retarders and ramps and a new computer system is proposed for Maschen in the near future.

Following a fine working lunch in Maschen's staff canteen (and a slight delay due to some members of the party getting stranded on the roof of the building!) we departed for a tour of one of Hamburg's container terminals, where once again we were struck, not only by the scale of the operation, but also the huge amount of investment going into the future expansion and modernisation of facilities.

1950's Luxury on the Hanseat Hochbahn

Having immersed ourselves in freight for the day it was time to return to the passenger side of operations with an evening trip around the original Hamburg Hochbahn (now part of a comprehensive U-Bahn system) on its converted 1950s' Hanseat train. Having boarded the special service at the tail end of the evening rush hour, much to the bemusement of seasoned commuters at Hauptbahnhof station, participants were delighted to be presented with a complimentary beverage before settling down to enjoy the

journey. This was helped not just by the luxurious décor and fine views of the city and river from the largely elevated railway, but also the opportunity to see the line from the driver's viewpoint. The Hochbahn staff were the perfect hosts and again demonstrated the difference between UK and German practice as they switched seamlessly between the normally segregated roles of bar staff and train driver.

Hamburg Hochbahn Extension

Appropriately the final day of the convention started with a presentation on the Hamburg Hochbahn and the city's wider public transport system. The Hochbahn has developed from the simple ring around the city centre of 1912 into a 3 line U-Bahn system reaching into the northern and eastern suburbs. The most radical transformation of the system for some years is now taking place, with a new extension being constructed through the old docklands and to the new concert hall development and the Hafencity Universität. This new extension should open in 2012 and will form the focus of a new U4 line linking into the current Hochbahn system at Jungfernstieg before running eastwards via the Hauptbahnhof as far as Billstedt.

Trams Set to Return to Hamburg

Radical developments have also been taking place on the Hochbahn's bus network which operates the busiest single bus route (line 5) in Europe. This high frequency corridor is served by triple-articulated "**XXL**" **Bendybuses**, which at a staggering 25m in length are the longest articulated buses in the world. In September 2008, as a result of the high passenger demand on this and other bus corridors, the City of Hamburg instructed the Hochbahn to plan, build and ultimately operate a new 50 km light rail system, which will re-introduce trams to Hamburg's streets after an absence of over 30 years. Planning consent is expected by 2010 with construction on the first 15 km section from Altona to Bramfeld starting in 2012. This should see the first trams running by 2014, a somewhat quicker timescale than for similar UK light rail schemes!

The Hochbahn Control Centre

The convention concluded with a visit to the Hochbahn's 2007 Control Centre, described by our hosts as the most modern facility of its kind in Europe. The Control Centre brings together the management of both the Hochbahn and bus operations at a single location replacing numerous previously disparate facilities. The Centre also includes CCTV monitoring and significantly enhanced communication links with all parts of the network. Delegates were able to see first hand how incidents on the public transport are managed in real time.



The Integrated Hochbahn Control Centre (Hamburger Hochbahn)

Conclusions

All too soon the week was over. The RSA Convention had covered a huge range of rail-related topics in four and a half days and showcased the different approach to planning and operations, in the largely state-owned and managed German public transport system. The co-ordinated planning approach for large scale public transport projects at both the national (e.g. Berlin Hauptbahnhof) and local level (e.g. Hamburg Hochbahn extensions and light rail proposals), coupled with the apparent availability of funding and speedy implementation, were regarded with slightly envious eyes by some UK delegates but, as the Berlin S-Bahn rolling stock crisis had demonstrated, even the most apparently perfect system is not immune to problems.

The week was not “all work and no play”, however. Many fine meals were enjoyed in the Hotel Alte Wache, the staff of which coped admirably meeting

the needs of our large railway-orientated party. The Stuttgart Wein festival had also set up in the Hauptplatz for the during of our stay, providing many delegates with a heady mix of regional delicacies, music, a wide variety of wine & schnapps and welcome shelter from the more inclement elements of the German summer. An honourable mention should also be made to those hardy souls who braved Hamburg's infamous Reeperbahn district and also to the Brauhaus Johannes Albrecht, which proved that there is more to German beer than just Pilsner and Hefewiezen.

Above all we returned to the UK with a slightly different perspective of how the railway works and can be made to function. Special thanks must go to Ole Kroczeck from DB Schenker who acted as our guide, translator and general Mr Fix-it for most of the week. Finally a big thank you to Tricia Meade and all at the IRO for arranging to sponsor my attendance at this stimulating and highly enjoyable convention.