

Getting on Track – High Speed Railways in Japan and the UK

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Abstract

Since the *shinkansen* services started in 1964, Japan has been seen as being the leading country in the provision of high speed inter-city railway services. Britain, on the other hand, it is generally felt, has gone through a period of steady decline, with the steam locomotive *Mallard's* speed record standing for much of the post-war period, and still being one of the highest speeds recorded in the country. At the start of a new century, as the demands of an ever faster world, which continues to at the same time become increasingly concerned about energy consumption and environmental pollution, it seems appropriate to analyse what the *real* state of high-speed railways are in these two countries.

The word 'real' is of particular significance. For the focus of much of my research on the *shinkansen* is on the symbolism of it and the fact that little is actually known about the facts surrounding its development – both in terms of the routes chosen and the technological developments. Although Japanologists are aware that certain routes and stations were chosen as much due to the power of specific politicians rather than for economic reasons, this is not widely known outside Japan. Indeed, stories about the *shinkansen* in the UK are often as misinformed as other stories on Japan, though what is significant is that the stories tend to paint an overly positive picture. The *shinkansen* has become the Holy Grail of high-speed railways. If a true analysis and comparison is to be done, it is essential that such misinformation is got away with.

The common perception is that the UK has much to learn from the *shinkansen* and little to offer in return. How different things are since Britain introduced the first railways to Japan in the nineteenth century. However, as unlikely as it seems in the light of recent train disasters and other problems within the British rail industry, perhaps there are still things that Japan could learn from Britain.

This paper will aim to address these various points – specifically to give information about the real state of the *shinkansen* and to suggest what can be learnt by both countries.

Introduction

The purpose of this paper is to explore the facts about the high speed railway network in Japan and what can be learnt from it. This second aspect will be done particularly from the viewpoint of British railways, though many points are likely to be as valuable for other countries, including those that already operate high speed railways. This article will attempt to demystify the Japanese high speed railways, for although much is assumed about their operation, as with so many matters relating to Japan, some of this is based as much upon stereotypes, myth and misinformation as it is upon fact.

Although the title of this paper includes the phrase 'high speed railways in Japan *and the UK*', due to various limitations, some of which will become clearer below, it is not possible to do a thorough comparison of high speed railways in both Japan and the UK and so this paper concentrates on the situation in Japan.

This article is primarily based on the research I have done to date on high speed railways in Japan. So far this incorporates two research trips to Japan – in January 2001 (when I spent three days with Central Japan Railway Company) and April 2001, interviews with various people connected to the railway industry in Japan, reading available materials on the topic, information gained from a well-informed e-mail discussion group about Japanese trains, and personal observations from extensive

use of Japanese railways over the past twelve years that I have been going to Japan. More information about this is given below.

At this point I would like to thank the help and support of all those involved in the development of this paper and my research to date, in particular the Central Japan Railway Company, Japan Technical Research Institute (JTRI), former Prime Minister Nakasone Yasuhiro, and the Gotoh family. I would also like to thank the Anglo-Japanese Academy for providing me with the opportunity to develop this paper.

This paper begins with some background information about my methodology and research strategy, including a small literature review. After that there is some background and historical information about the high speed railways in Japan. The final part looks at the significance of them and begins to look at the question of what Britain can learn from Japan, and also in what areas, if any, Britain may have things to teach Japan.

Background

I first travelled to and around Japan in July 1989 – the first year of the Heisei period. My first trip was four weeks long and although I have many happy memories of the people and places that I visited, the journey from Tokyo to Osaka was perhaps the one thing that I had looked forward to most. Like many foreigners, when one thinks of Japan, the image that is conjured up is of Mount Fuji with a passing *shinkansen*. However, there are still few that actually get to experience this. As I walked on to the platform on that hot summer's morning with two of my Japanese friends, I remember the anticipation of seeing this great symbol of Japan. Although one of them had specifically booked me on this particular train as it was a new model, coming face-to-face with this sharper design than the one that I had seen in pictures, made the train appear even greater. The journey itself, like most *shinkansen* journeys I have subsequently taken, was uneventful (barely even managing to see Mount Fuji), but relaxing and undoubtedly faster than what I was used to in Britain.

Since that first journey and going on to study Japanese studies at the University of Sheffield, I have always wanted to learn more about these trains. On two occasions I have come close to formally studying them – though both times circumstances meant that I went in another direction (first to study the creation of the J.League and Japan's bid for the 2002 World Cup for my undergraduate dissertation, and then when I chose to study education reform for my doctoral thesis having just completed a year on the JET Programme). Having completed my doctorate and updated this into a book (Hood 2001a), I was ready to embark upon my next piece of research, and I quickly decided to get back to my roots and study the *shinkansen*.

Some people have suggested that this change in focus is a big leap, but I tend to see it more as a natural progression, or rather reversion, to what interests me about Japan. On top of this, the focus of my research on the *shinkansen* also means that there is not as great a gap between my present and previous research as some may assume. For although the topic of my research is the *shinkansen*, the technical and engineering aspects of it make up only one small part of the focus of my research. Indeed, my starting point was the idea that the *shinkansen* – with the image mentioned above – was the symbol of modern Japan, and I wanted to investigate the validity of this idea, how this situation had arisen, and the significance of it. Naturally knowledge of the technical side of the *shinkansen* is also necessary, but the link to my former research was made very clear by a Central Japan Railway Company employee who commented on the fact that the *shinkansen* would not work in the UK as the training and education of railway personnel in the UK was not good enough.¹

¹ Comments made during my research trip in January 2001. Due to the nature of the comments, I have decided that it is best for the person to remain anonymous.

Although I am not an engineer, the technical information continues to interest me and helps to bind my research together. Furthermore, I am all too aware that it is this part of my research that it is of interest to others, as they search for answers to the question of how to improve the British railways. This search was clearly demonstrated by the turnout and comments made at a presentation I made at the Royal Institute of International Affairs in January 2001 (*Biting The Bullet: What We Can Learn From the Shinkansen*).² My research comes at a time when many in Britain are doing a lot of soul searching as a result of continued problems, including fatal accidents, on the British railways. The *shinkansen* appears to be perceived as the Holy Grail of high speed railways. This of course relates back to the other part of my research on the *shinkansen* – the symbolism of it and image that it projects.

It is not uncommon for a major incident on a British railway to be followed by an article in the British press looking at the *shinkansen*. However, although those of us in Japanese studies are used to many articles, particularly in the more populist media, having errors in their reporting of Japan, it is unusual for these errors to either overstate Japan's position or to be highly positive. In this respect, the *shinkansen* is certainly unusual, if not unique. This situation is not limited to the printed media, however. In the past year there has been an advert on television for Anadin (headache pills), which begins with the words 'trains travelling at 300 miles per hour'. The picture shows a *shinkansen*. Although it is uncertain that people would immediately recognise this train as a *shinkansen* – as Mount Fuji does not appear in the background and it is not the round-fronted design that most associate with Japan – the fact that it is obviously not a Eurostar or TGV, would probably lead many to conclude that it was Japanese. However, this model of *shinkansen* cannot even do 300 km/h (187 mph), let alone 480 km/h!

Despite the apparent interest in the *shinkansen*, there is surprisingly little literature on the subject. Peter Semmens's book *High Speed in Japan: Shinkansen – The World's Busiest High-Speed Railway* (1997, second edition in 2000) is the only English-language book specifically about the *shinkansen*. Although it contains a lot of useful information, I think it is fair to say that more work went into the original edition than the up-dated one, and so the data presented in the latter one appears incomplete. Other English-language books that include useful detailed information on aspects of the *shinkansen* are Aoki's *A History of Japanese Railways* (2000), *The Privatisation of Japanese National Railways* by Ishikawa and Imashiro (1998), and *Success Story* by Sumita (2000). All these books have their strengths and their weaknesses, and the aim of my own research is to bring the strengths together, with my own primary research, into a comprehensive up-to-date study of the *shinkansen*. A further book, *Bullet Trains* (Solomon 2001), has recently come out. This book is interesting in that the front cover has a picture of an original style *shinkansen*, but the book also includes chapters on high speed trains in countries other than Japan under the banner of 'bullet trains'.

Although there may not be a great number of books in English, there is no shortage of other resources. To begin with, I do not have a problem using Japanese material, and Suda's *Tōkaidō Shinkansen* (2000) is particularly informative, although it, like many other studies, tends to concentrate on the Tōkaidō line while largely overlooking the rest of the *shinkansen* network. However, there are many other resources. As already mentioned I have been fortunate enough to have been hosted by Central Japan Railway Company (hereafter referred to as JR Tōkai, as it is more commonly known in Japan) and JTRI, who provided a great deal of information – both printed and through interviews. I was also able to make observations on a number of aspects of the *shinkansen* and railway companies which are not normally seen by passengers, for example. I have also managed to find a limited number of articles about *shinkansen* on the internet, both in English and Japanese, though their focus tends to be very narrow and not always as helpful as the title suggests. There is one other great resource – the rail enthusiasts. There are around 200 members of the Japan Railway Society (based in the UK), which has a publication, *Bullet-In*. On top of this there are

² An updated version of this paper is Hood 2001b.

numerous websites, bulletin-boards and even a new English language e-mail discussion group (jtrains@yahoo.com). Hidden within these, enthusiasts are some extremely well-informed people that have a wealth of information, seemingly available for immediate access.

The problem with any of this information is assessing its reliability. It is natural to be careful with information provided by a rail company, for example, as they have a corporate image to protect, and so only certain information is ever likely to be forthcoming. However, even the enthusiasts and ‘independent authors’, such as Peter Semmens, may have a tendency to ignore or overlook any negative aspects of the *shinkansen* due their enthusiasm for the *shinkansen* or out of respect to those that have provided them with the information. This is, of course, a problem that I too could face and I have written before about the sorts of problems that social scientists have to be aware of when researching Japan (see Hood 2001a). Space limitations mean that it is not practical to dwell on this point and how to deal with it here.

As my main research is mostly a study of the *shinkansen*, there has not been much need to study British railways. As a consequence most information provided in this paper on British railways, therefore, is based on general knowledge and experience. However, where necessary, this is supplemented by information gathered from various sources, such as internet sites and books, including the aforementioned *Bullet Trains* as well as *Planning Passenger Railways* by Harris and Godward (eds).

Finally, it should be noted that although the comparison is made between the *shinkansen* and high speed trains in Britain, I personally do not believe such a comparison is truly valid as British ‘high speed’ trains, as things stand, better resemble the service provided by ‘limited express’ (*tokkyū*) trains on most JR (Japan Railways) lines. However, as it is a reliable ‘high speed’ service to which many British companies aspire, the comparison with and study of the *shinkansen* is worthwhile.

Background of the *Shinkansen*

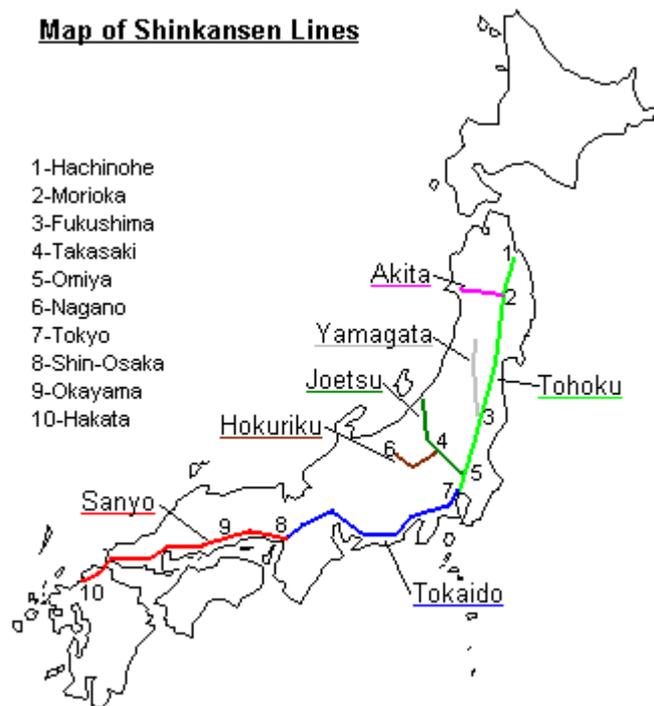
Having set out some of the background to how this research is being conducted, it is now time to look in more detail at the *shinkansen* itself. In this section, I will introduce some of the historical and technical information which will help in developing the final part of this paper.

The *shinkansen* first started in 1964 in time for the Tokyo Olympics. However, its original concept dated back to the Pacific War, when a ‘bullet train’ (*dangan ressha*) was planned between Tokyo and Shimonoseki (from where people and freight – as there were also to be freight trains – could be ferried to the continent) to improve the link between the capital and the expanding empire. As the war began to turn against Japan, so the project was abandoned, but not before some of the land had been bought and some of the significant tunnels had been built. Both of these factors helped speed up the building of the *shinkansen* when the plan was resurrected in the 1950s (Suda 2000: 22-34; Hosokawa 1997: 192; interviews with JR Tōkai officials).

The word *shinkansen* itself refers to the line – literally ‘new main line’ – yet it has also become to refer to the trains as well. For the most part *shinkansen* are dedicated tracks and they are wider than the standard Japanese gauge, but the same width as a standard (British) gauge. Despite this the carriages, are significantly wider, allowing for 3+2 seats in standard accommodation and 2+2 in ‘green cars’ (first class). This point was most clearly demonstrated when a *shinkansen* was taken to the National Railway Museum in York, and for the last part of the journey was put on the main East-coast Mainline, where signals by the side of the line had to be moved due to the train’s extra width.³

³ Information taken from a BBC programme shown (in the North BBC TV region) on 12 July 2001 following the unveiling of the *shinkansen* at the National Railway Museum.

Map of Shinkansen Lines



There are now six lines in operation. The original Tōkaidō line was extended to Okayama and then onto Hakata, with the Shin-Osaka to Hakata stretch – Sanyō *shinkansen* – becoming the second line. The Tōhoku and Jōetsu lines run north to Morioka (Hachinohe from Autumn 2002) and to Niigata. These lines initially started at Ōmiya (in present day Saitama city), but were later extended to Ueno and then to Tokyo station itself. The Hokuriku *shinkansen* runs from Tokyo to Nagano (though will also be extended) – although it covers the same track as the Jōetsu line as far as Takasaki. There are then two ‘mini *shinkansen*’ lines – the Yamagata *shinkansen* that runs from Fukushima (on the Tōhoku line) to Shinjo (originally to Yamagata, but later extended) and the Akita *shinkansen* that runs from Morioka to Akita.

A significant moment in the history of the *shinkansen* occurred in 1987 when Japan National Railways (JNR) was privatised into six regional companies and one nationwide freight company.⁴ The Tōkaidō line was taken over by JR Tōkai; the Sanyō line was taken over by JR West, and the other lines (although the Hokuriku, Yamagata and Akita lines were not built until a later date) are all covered by JR East, the world’s largest railway company.

Perhaps one of the most visible differences of the *shinkansen* in the private era has been the developments in the rolling stock. The original design – now referred to as 0 Series (one of which has now gone on display at the National Railway Museum in York) – was the only design for the first two decades. It was not until the 1980s that it was joined by the 100 Series (on the Tōkaidō and Sanyō lines) and the 200 series on the northern lines. These changes were largely cosmetic and did not greatly alter the performance of the trains (though it should be noted that the Sanyō and northern lines have different speed limits due to improvements in track development compared to the original Tōkaidō line). However, since the mid-1990s there have been a stream of new designs; the 300, 500 and 700 series on the Tōkaidō and Sanyō lines, and the 400 series, E1, E2, E3, and E4 designs on the northern lines. Their shapes are different and each have evolved in some way – in the case of the Tōkaidō/Sanyō *shinkansen*, for example, the 500 series (owned by JR West) is the fastest train in operation at 300 km/h, whereas the 700 series (originally only used by JR Tōkai, but now also

⁴ The six regional companies are JR Hokkaidō, JR East, JR Central (‘JR Tōkai’), JR West, JR Shikoku and JR Kyūshū.

operated by JR West), although introduced later, has a lower top speed (285 km/h) but is more efficient and environmentally friendly (Semmens 2000).

What to Learn from the *Shinkansen*

Having looked at some of the background to the *shinkansen* we can now look at some of the points that are significant about them, with particular reference to the idea of trying to improve British railways.

Although the overriding image of the *shinkansen* is one of speed – I feel it is more appropriate to start with the issue that, based on my observations to date, appears to be of the greatest concern to *shinkansen* operators, which is safety. Ever since the *shinkansen* first began it used the most advanced safety mechanisms available. The system is simple enough to understand. The track is divided into blocks. Only one train can occupy a block. The speed limit for each subsequent block behind a train gradually rises (depending on whether there are any other restrictions, such as sharp corners, etc.). A train cannot go faster than the limit for that block – if it tries, automatic braking procedures are applied. This system is referred to as ATC – Automatic Train Control.

It should be noted at this point that *shinkansen* trains do not operate automatically. The driver has control and decides the operating speed. It is only if the limit is passed that the driver's control is overridden. There can be no doubt that the Japanese driver is highly skilful – especially when one considers the punctuality of trains, as will be discussed below. The idea of a signal being passed while red (commonly known as a SPAD – Signal Passed At Danger – in Britain) is a totally alien concept to most Japanese drivers. The fact that it happens so frequently in the UK points to the lack of professionalism, the arrogance and the incompetence of railway operators in Britain (whether it be the driver for behaving like that, the train company for not training drivers better, the unions for the apparent unquestioning support of drivers much of the time on this issue, or the company that actually allows signals to be passed or be located where they are hard to see). One begins to appreciate the comment by the JR Tōkai official given above in this context. Some of these problems may have their roots, and as a consequence the need for a solution also, outside the railway industry – for example within the education system and society as a whole. After all, many do not think twice about jumping a red light in a car, and problems with poor service are becoming an unfortunately notorious part of British life. However, these areas are beyond the scope of this paper.

Since the *shinkansen* began there have been no derailments. There have been no collisions between *shinkansen*. There have been no fatalities at all on the main *shinkansen* due to such accidents. It is true that there have been accidents on the 'mini-*shinkansen*' (for example, in January 2001, a car driver was killed after apparently becoming confused in snow at a level crossing – of which there are none on main *shinkansen* lines – and colliding with a Yamagata *shinkansen*), and there was also a fatality at Mishima station when a boy was dragged along the platform to his death after his arm was caught in the door. However, this should not detract from the fact that the overall safety performance of the *shinkansen* is exemplary. The companies are not resting on their laurels, however, as all the companies continue to highlight the problems of level-crossings on their local lines and 'mini-*shinkansen*' (where appropriate), which is the most common reason for accidents on normal lines, and barriers and further surveillance cameras (many *shinkansen* are over 400 metres long, making visibility along platforms difficult) have been installed (for example, barriers such as those seen at Shin-Kobe and Shin-Yokohama where through trains run next to the platform edge will be installed at stations such as Kyoto where all trains stop).

From my limited engineering knowledge – gained during the course of my research – the one slight concern is what would happen if a *shinkansen* was to derail. To date that has not been a problem, for example a collision on the Tōkaidō *shinkansen* between a *shinkansen* and maintenance vehicle did not cause a derailment in August 1993 (more details about the resulting chaos caused by this

accident are given below). However, I believe that incident occurred at a relatively low speed. What could potentially happen during a faster accident has been graphically demonstrated recently in the UK, with carriages scattered in many directions. The *shinkansen* use essentially the same system for bogies as British trains – with two sets for each carriage. This is different from those used on the French TGV (and Eurostar, for which the carriage design and manufacturer are the same), whereby one set of bogies overlaps between two carriages. The end effect is that the number of bogies for a train is nearly halved, and it is supposed to provide a smoother ride (not a significant problem on the *shinkansen* in my view) and has proved to help keep the train upright in case of a derailment or collision. However such differences are of course academic if the collisions can be avoided in the first place.

One final point that should be made on the issue of safety is that the *shinkansen* was introduced when public confidence in JNR was extremely low. There had been several large accidents (both on the railways and with also on JNR operated, accounting for over 1,300 lives in three years (Hosokawa 1997: 152, 166)) and some politicians were trying to prevent the introduction of the *shinkansen* over fears about the number of fatalities there would be if such a high speed train were to crash. The fact that there have been no such incidents is not only testament to the great design of the *shinkansen* and its use by the various JR companies (as well as JNR in its day), but also should be a lesson to British railway companies; it is possible to create a new railway ethos from the background of disaster.

With the use of dedicated tracks – something that is operated on many local lines also – the problems of following slower services or having trains crossing over tracks is greatly reduced. This not only improves safety, but also allows for greater speed. In Japan, speed is a consequence of safety as much as a goal in itself. When the service began in 1964 the journey time from Tokyo to Osaka was cut overnight to four hours from six and a half hours. The following year, after the track bed had settled, the times were cut by a further fifty minutes. The top speeds of the trains was an impressive 210 km/h – the fastest in the world (the second fastest was the *Mistral* in France with 160 km/h though in 1964 it had a higher average speed than the *shinkansen* – the following year the *shinkansen*'s average was above the *Mistral*'s top speed!). Unsurprisingly the *shinkansen*'s performance was better than Britain's 126 mph (203 km/h) which was set some *twenty five years earlier* by the *Mallard*, which had not since been improved on (the fastest operating service in 1964 was the *Bristolian* with a top speed of a mere 145 km/h!) (Fossett 2001a). Now, the fastest train in service is the 500 series which has a top speed of 300 km/h, and although the limit on the Tōkaidō line is 270 km/h both the 500 and 700 series can now travel between Tokyo and Osaka in two and a half hours.

Trains do not operate at top speed for the whole journey – the Tōkaidō line in particular has problems due to the large number of trains operating on the line (up to 11 per hour at present, to be raised to 15 when Shinagawa-Shin terminal opens in 2003) and the environmental concerns (noise pollution in particular) as the trains pass through populated areas. There is some spare capacity in the timetable for late trains to make up time (a rare problem, as will be discussed below), but on the Tōkaidō line it is limited. On a trip in March 2000 I was fortunate to travel on a service to Okayama which had started from Tokyo 17 minutes late. The whole of the journey was spent trying to make up lost time – with the conductor making sincere apologies at each stop for any inconvenience caused by the delay. Although we had made up 6 minutes by the time we reached Shin-Osaka (approximately 550 km from Tokyo), we managed to arrive only around 1 minute late (for which there were still apologies) when we reached Okayama terminal only 180 km later.⁵

⁵ The distances printed in timetables tend to use the 'operating' distances rather than the real distances. The 'operating' distances are slightly longer and helps raise some extra revenue due to part of the price of a ticket being based on distance travelled. For a more detailed account of this particular journey see Hood 2000.

This late running – and it should be noted that anything over one minute is officially declared late – is certainly rare. The average delay to the *shinkansen* is an impressive 0.4 minutes – even including delays caused by earthquakes, typhoons, and the like (about which there will be more discussed below) (Central Japan Railway Company 2000b: 7). In January 2001 I travelled in the cab of a 700 series Nozomi service and was amazed at the accuracy of the train as demonstrated by a constant readout on one of the computer screens. For the most part the train was within 15 seconds of schedule, though as we passed official checkpoints (such as stations) the figure tended to read 0! The driver managed this with very subtle – to the point of being totally unnoticeable – adjustments to the speed over a great distance rather than sudden acceleration or braking as we approached the checkpoints.⁶

Of course in order to run such an efficient and effective service requires maintenance. To help in this respect the *shinkansen* services all shut down at midnight and do not resume until six the following morning – allowing for six hours of maintenance every day. Although some major maintenance work was carried out in 1972 which led to the lines being closed until midday, such drastic action has not been necessary since then (Suda 2000: 46). Part of the reason for this is the running of Dr Yellow – a special inspection *shinkansen* that runs along the length of the lines every month checking for any possible defects. I was fortunate enough to be one of the last guests to travel on the old Dr Yellow on the Tōkaidō line before it was replaced by a much newer (and faster) model in 2001.⁷ There have been maintenance problems – the most notable being with the tunnels on the Sanyō *shinkansen*, but these were all quickly dealt with and did not cause the kind of disruption that has recently been seen in the UK with the replacement of worn-out track. Having said this, the condition of the line remains one of the chief concerns of one of the men, Nishio Gentarō, partly responsible for the design of the original *shinkansen* (Nishio, interview, April 2001).

When Mr Nishio and his team began to design the *shinkansen*, the brief was simple – do what you want. It did not even matter whether the train was electric, diesel or even steam powered! What was important was to make the *shinkansen* a pleasurable experience. Windows were provided for all seats so that passengers would have a view (something that does not happen on many British trains or TGV/Eurostar). Seats were relatively spacious (and now have much greater leg room than what those who travel in the UK or on TGV/Eurostar would be used to) and can be turned round so that passengers can face the direction of travel or turn to face friends (though there is no table, which many British passengers apparently like). The train also looked good. The familiar round ‘bullet’ shape was inspired by an American train that Mr Nishio had seen when he had been to New York once, rather than being based on any particular aerodynamic principles. The round lights were actually an after thought – when he first enquired about their design he was told not to bother with them as it would not be possible to have lights that were strong enough to allow the driver to see the length of the train’s braking distance, and with no level crossings there was no need for other people to be able to see the train coming (Nishio, interview, April 2001). This fact was clearly demonstrated to me when I entered the cab one night on the old Dr Yellow (based on a 0 series) during my trip in January 2001. In the end the lights were added as it was felt that passengers would be apprehensive about travelling in the dark without them! (Nishio, interview, April 2001)

Of course another key part of the *shinkansen* is the route. When the Tōkaidō line was planned, the initial idea was to only have station stops in Yokohama, Nagoya, Kyoto and Osaka (Nishio, interview, April 2001). However, political pressure – both from national politicians and more particularly from local communities – meant that additional stations were also constructed (most notably Gifu-Hashima). This outside persuasion has been a notable feature of the continued development of the *shinkansen*. The line to Niigata was in large part due to the efforts of Tanaka Kakuei, a former Prime Minister, who had envisaged the whole Japanese archipelago being linked by *shinkansen* and is well-known for his development of pork barrel politics in Japan. The route

⁶ For more information on this particular journey see Hood 2001c.

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itself went through Takasaki, the home constituency of Nakasone Yasuhiro, who admitted that the two worked closely together to see the successful completion of the line (Nakasone, interview, April 2001). The Tōkaidō/Sanyō *shinkansen* has seen additional stations being built over the years, usually as a result of local community pressure rather than any particular initiative being taken by the rail companies.

One advantage that Japan has over many countries is that due to its shape, much of the population lives on the eastern seaboard. As a consequence a single line can link many of the major cities. Such a line would not be possible in the UK. However, British lines have perhaps over-concentrated on linking terminals while also keeping the construction costs to a minimum. A new high speed line could have better coverage – which of course would mean greater use (and profitability). The best example is perhaps the East Coast mainline between London and Newcastle. At present it goes via towns such as Stevenage, Peterborough, Grantham and Doncaster. A faster service could easily go via larger cities such as Leicester, Nottingham, Sheffield and Leeds and still cut the time between London and Newcastle. This idea can be seen in Japan also, where the planned route for a possible linear *shinkansen* will make a major detour north to Matsumoto rather than taking the most direct route between Tokyo and Nagoya. With trains travelling at up to 500kph, this added distance is relatively insignificant and will still mean the Tokyo-Osaka journey could be completed in an hour! At present the decision as to whether the line will be built has not been made and further studies into improving the trains efficiency, reducing costs (monetary and environmental) are still being made. Ultimately the line will need major financial backing from the government and the present economic climate is such that the government may not be prepared to take such a step. Furthermore, there are no strong/influential politicians in Matsumoto, Nagoya or Nara – which would all be on the route – pushing for its early introduction.

Problems with the *Shinkansen*

The cost of the *shinkansen* is, of course, one of the major concerns with the system. Such huge investment is becoming increasingly unimaginable now. Britain, in particular, would need a change of thinking before a high-speed network could be introduced. Railways do not offer the same quick returns as many other investments – especially when British companies (and the government) have proven to be slow at making decisions, coming forward with investment, and actually getting lines built (for example, the Channel Tunnel Rail Link).⁸

Although there is still a huge dark cloud of debt hanging over the railway companies in Japan, it is not the *shinkansen* that is responsible for this. The Tōkaidō line began to break-even after only two years (Semmens 2000: 19), although the other lines haven't taken longer. Much of the debt is due to the poor way in which JNR was run – particularly during the 1970s, when the ticket prices were continually pushed up, well ahead of inflation, which further discouraged usage of JNR services (particularly when alternatives – such as private railway lines running the same route at sometimes half the ticket price – were available). Make no mistake, JNR, for much of its history, was not well run. In the modern era it is unlikely that such problems would occur again in Japan nor would be repeated in a country such as Britain. Developing a high-speed network may be expensive, but it can be profitable. However, government assistance is essential. Even with the Tōhoku extension to Hachinohe, a system has had to be established whereby the track is leased to JR East, which will eventually own the line once the construction and other costs have been met (Semmens 2000: 69).

There are other areas that could also be improved. The incident in August 1993 mentioned above is a good example. Following the disruption all trains came to a stop. It was around eight hours before the first train got to Nagoya and continued to Osaka. No other trains operated during that time between Nagoya and Osaka. Yet there was rolling stock available, which could have provided a

⁸ For further information see Harris and Godward 1992.

shuttle service between these two large cities. In late 2000 a severe typhoon brought the *shinkansen* to a stop near Nagoya. Passengers were stranded on one train for some 18 hours. Then when a train broke down on the Tōhoku *shinkansen* in July 2001, passengers were trapped on a hot day (the train's electricity was not operating so there was no air-conditioning) for several hours. All of these incidents would suggest that there is an inability to deal with a crisis – something for which Japan is renowned following the 1985 JAL crash, the Great Hanshin Earthquake and the Tōkaimura nuclear accident.

Another concern – in some ways linked to the above – is the way of thinking that can develop in companies that place so much importance on the ways of doing things and certain rules. Perhaps the best example of this occurred in January 2001 when the driver of one *shinkansen* was questioned after his train arrived at Tokyo station from Tokyo sidings over a minute late. It transpired, after he gave a false story originally, that he had left the cab – while the train was running – to go back to a sink in another carriage where he had left his cap, considered to be an important part of the uniform, when he washed his face before starting the journey.⁹ Although there was no danger of an accident, due to the system outlined earlier in this paper, it is still worrying that the driver's appearance was considered *so* important.

As unlikely as it may seem, there are areas which I believe Britain could help Japan to improve the *shinkansen* further. First, with the exception of some of the *shinkansen* on the northern lines, there is little or no room for luggage on the *shinkansen*. For the most part, passengers appear to be expected to be businessmen and for the most part this is true. However, if the *shinkansen* is to help boost domestic travel (which is considered by many as vital for improving the economy), then the interior design of many of the *shinkansen* (as well as other trains) should be reconsidered.

On top of this the provision of smoking carriages and areas should be looked at again. At present for some non-smokers it is necessary to walk through the smoking area on the platform and then smoking carriages on the train if they need to access another part of the train. In Britain smoking cars are placed at the ends of the trains, which overcomes this problem, and on some services (for example the Great Western service between London and South Wales) smoking has been prohibited altogether.

In one other area, namely seat reservations, the two countries have things to learn from each other and could ultimately design a better system. Seat reservations are free in Britain – which can lead to them being made, but not used, which only becomes apparent after the train has left the station and may have caused inconvenience to other users trying to find a seat. Japan gets around this latter problem by allocating some carriages for those with seat reservations and others for those without. However, this can lead to a situation where certain carriages become filled to capacity, while others remain relatively empty. Whereas Britain can get around this system, with reservations having to be made before a train departs from its place of origin, it makes reservations inconvenient. With modern technology it must now be possible for a better system to be developed.

Conclusions

There can be no doubt the *shinkansen* is a great system and that it works well. It is not perfect and it may not be as good as some believe it to be, but I doubt that there is any better system in the world. Countries, such as Britain, that aspire to improve their high speed railways should not be afraid to look to Japan and to aspire to such services. Indeed, at a time when public confidence in the railways in Britain is so low, the operators in Britain may be able to draw some comfort from JNR's history and how the *shinkansen* was born out of such a situation. However, there is no quick fix. There is also no cheap fix. Having said this, the expense of either improving a line or creating new ones may

⁹ Information taken from a variety of news reports.

not be as great as many believe. But it will need government support. The cost of building a new system should also be seen in the context of reducing the environmental costs of more people using cars and the costs to British industry of time lost due to train delays and cancellations. As Harris (1992: 133) points out, when British Rail was carrying 746 million passengers a year, the average delay was estimated to be 2.81 minutes, and this accounted for nearly 400 passenger years!

Back in 1997 Japanese public confidence was at a low following the collapse of Yamaichi securities and the continued economic problems Japan was facing. At the same time JR Tōkai launched an advertising campaign with the slogan '*Nippon-ni, Nozomi ari*' using a pun on the word '*Nozomi*', meaning either 'hope' or the Nozomi service of *shinkansen*, so the phrase read either 'In Japan, we have hope' or 'In Japan, we have the Nozomi'. Furthermore, the *shinkansen* service itself was originally known as '*yume no chōtokkyū*' ('the super limited express of dreams'). In Britain there is a dream for our train services to improve. Hope that this may become a reality, is perhaps limited. But if Britain is to get a true high speed railway on track, then it is time to look to the *shinkansen* as the teacher.

Published as 'Getting on Track: High Speed Railways in Japan and the UK', *Anglo-Japanese Academy Proceedings* (2002) 517-530 ISSN 0910-4169

References

Interviews

- Arie Kiichiro (Chief Assistant, International Department, Corporate Planning Division, Central Japan Railway Company), 9 January 2001.
- Ishizu Kazumasa (Director, Hamamatsu Workshop, Central Japan Railways Company), 9 January 2001.
- Itō Jun'ichi (Chief Engineer, Technical Research & Development Division, Central Japan Railways Company), 11 January 2001.
- Kawano Masatomo (Driver of *Shinkansen*, Central Japan Railway Company), 10 January 2001.
- Kondoh Kunihiro (General Manager, Central Japan Railway Company, London Office), 10 November 2000.
- Kuratsu Jirō (Maintenance Section, *Shinkansen* Operations Division, Central Japan Railways Company), 10 January 2001.
- Morimura Tsutomu (Deputy Director General, Technical Research & Development Division, Central Japan Railways Company), 11 January 2001.
- Nakasone Yasuhiro, 9 April 2001.
- Narita Nobuyuki (Station Master, Nagoya Station, Central Japan Railways Company), 10 January 2001.
- Nishio Gentarō (Honorary member, Japan Railway Engineers' Association), 13 April 2001.
- Ogino Takahiko (General Manager, Information & International Affairs Division, Railway Technical Research Institute), 10 January 2001.
- Okimura Yoshimi (Assistant Manager, International Affairs, Information & International Affairs Division, Railway Technical Research Institute), 10 January 2001.
- Soejima Hiroumi (President, Railway Technical Research Institute), 10 January 2001.
- Tsujimura Kazuto (General Manager, General Control Centre, *Shinkansen* Operations Division, Central Japan Railway Company), 9 January 2001.
- Watanabe Takao (Senior Executive Director, *Shinkansen* Operations Division, Central Japan Railways Company), 11 January 2001.
- Yoshizawa Masakatsu (International Department, Corporate Planning Division, Central Japan Railways Company), 9-11 January, 2001.

Seminars & Presentations

- Hood, Christopher P., 'Biting The Bullet: What We Can Learn From The *Shinkansen*', Royal Institute of International Affairs, 19 January 2001.
- Kondoh Kunihiro (General Manager, Central Japan Railway Company, London Office), 'Integrated Transport Systems from a Railway Perspective', Japan Society Lecture, Oriental Club, London, 4 July 2000.

Books, Articles, etc.

Bullet-In (Japanese Railway Society publication), various dates.
Japan Railways timetables, various dates & publishers.

- Babb, J. (2000) *Tanaka: Profiles in Power*, Essex: Pearson Education Limited.
- Central Japan Railways Company (1999) *Central Japan Railway Company Data Book 1999*.

- (2000a) *Central Japan Railway Company Annual Report 2000*.
- (2000b) *Central Japan Railway Company Data Book 2000*.
- (2001a) ‘*Kōjō gaikyō*’, 2000 edition, paper received from JR Central Hamamatsu Workshop.
- (2001b) ‘A Profile of the Hamamatsu Workshop’, 2000 edition, paper received from JR Central Hamamatsu Workshop (English version of Central Japan Railways Company (2001a).
- (2001c) ‘*Denki Kidō Sōgō Shikensha*’, paper received from Central Japan Railways Company.
- (2001d) ‘*JR Tōkai Nagoya-eki Biru no Anzen-o Mezashite*’, pamphlet received from Central Japan Railways Company.
- (2001e) ‘Series 300 Shinkansen’, pamphlet received from Central Japan Railways Company.
- (2001f) ‘Series 700: New Generation Train’, pamphlet received from Central Japan Railways Company.
- (2001g) ‘300X: Aiming for the Best and Most-Advanced High-Speed Railway System’, pamphlet received from Central Japan Railways Company.
- Delgado, M. (2000) ‘How Japan Got Privatisation Right...’, Evening Standard online (www.thisislondon.com), accessed on 24 November 2000.
- Economist (1997) ‘Failing to Bite The Bullet Train’, 25 January 1997, accessed via www.britannica.com on 18 December 2000.
- Fossett, D. (2001a) ‘World Fastest Train Services in 1964’ accessed via <http://www.h2.dion.ne.jp/~dajf/byunbyun/speeds/1964.htm> on 1 June 2001.
- Harris, N.G. and Godward, E.W. (eds) (1992) *Planning Passenger Railways*, Glossop, Derbyshire: Transport Publishing Company.
- Hood, C.P. (2000) ‘On Top of The World – Reflections on a Recent Trip to Japan’, *Japanese Railway Society Bullet-In*, July-September 2000, pages 25-27.
 - (2001a) *Japanese Education Reform: Nakasone’s Legacy*, London: Routledge.
 - (2001b) ‘Biting The Bullet: What We Can Learn From The Shinkansen’, *Electronic Journal of Contemporary Japanese Studies* (www.japanesestudies.org.uk), Discussion Paper 3.
 - (2001c) ‘Bombing Along the Tōkaidō Shinkansen’, *Japanese Railway Society Bullet-In*, July-September 2001, pages 10-11.
- Hosokawa, B. (1997), *Old Man Thunder: Father of the Bullet Train*, Colorado: Sogo Way.
- Ishikawa T. and Imashiro M. (1998) *The Privatisation of Japanese National Railways: Railway Management, Market and Policy*, London: The Athlone Press.
- Jowit, J. (2000) ‘Rail Chiefs Look to Oriental Expresses’, *Financial Times*, 14/15 October 2000, p. 6.
- JR Central Hamamatsu Workshop (2000a) ‘Hamamatsu Workshop’, pamphlet received from JR Central Hamamatsu Workshop.
 - (2000b) ‘The non-dismantling inspection and maintenance of AC traction motor’, pamphlet received from JR Central Hamamatsu Workshop.
- Kasai Y. (1999) ‘A consideration on the sell-off of JR shares: JNR Reform: a paradox of privatising a public corporation’, unpublished paper received from Central Japan Railway Company.
- Kondoh K. (2000) ‘Integrated Transport System’, *The Japan Society Proceedings*, Number 136 (Winter 2000), 21—29.
- Mizutani F. (1994) *Japanese Urban Railways*, Aldershot, Hampshire: Ashgate Publishing.
- Ogawa K., Inoue H., JRR (1989) *JR no Hon: Yamakei JR Bukkusū 3*, Tokyo: Yamakei.
- Railway Technical Research Institute (2001a) ‘Railway Technical Research Institute’, pamphlet received from Railway Technical Research Institute.
 - (2001b) ‘*Shōrai no Tetsudō to Shakai-o Sōzo Suru*’, pamphlet received from Railway Technical Research Institute.

- (2001c) ‘Yamanashi Maglev Test Line’, pamphlet received from Railway Technical Research Institute.
- (2001d) ‘RTRI’s Large-Scale Low-Noise Wind Tunnel’, pamphlet received from Railway Technical Research Institute.
- (2001e) ‘Gauge Change Train’, pamphlet received from Railway Technical Research Institute.
- Raoul, J. (1997) ‘How High Speed Trains Make Tracks’, *Scientific American*. Online. Available <http://www.sciam.com/1097issue/1097raoul.html> (June 2001).
- Sargent, J. (1973) ‘Remodelling the Japanese Archipelago: The Tanaka Plan’, reprint from *The Geographical Journal*, Vol. 139, Part 3, October 1973.
- Sasaki K., Ohashi T. and Ando A. (1997) ‘High-speed rail transit impact on regional systems: does the *Shinkansen* contribute to dispersion?’, *The Annals of Regional Science*, 31, January 1997, 77—98.
- Semmens, P.W.B. (1997) *High Speed in Japan: Shinkansen – The World’s Busiest High Speed Railway*, Sheffield: Platform 5.
 - (2000) *High Speed in Japan: Shinkansen – The World’s Busiest High Speed Railway*, Second Edition, Sheffield: Platform 5.
- Shinohara T. and Takaguchi H. (1992) *Shinkansen Hatsuansha no Hitorigoto*, Tokyo: Pan Research Publishing.
- Soloman, B. (2001) *Bullet Trains*, Osceola (USA): MBI Publishing.
- Suda H. (2000) *Tōkaidō Shinkansen*, Tokyo: JTB Publishing.
- Sumita S. (2000) *Success Story: The Privatisation of Japanese National Railways*, London: Profile Books.
- Takahashi D. (2000) *Shinkansen-o Tsukutta Otoko: Shima Hideo Monogatari*, Tokyo: Shogakukan.