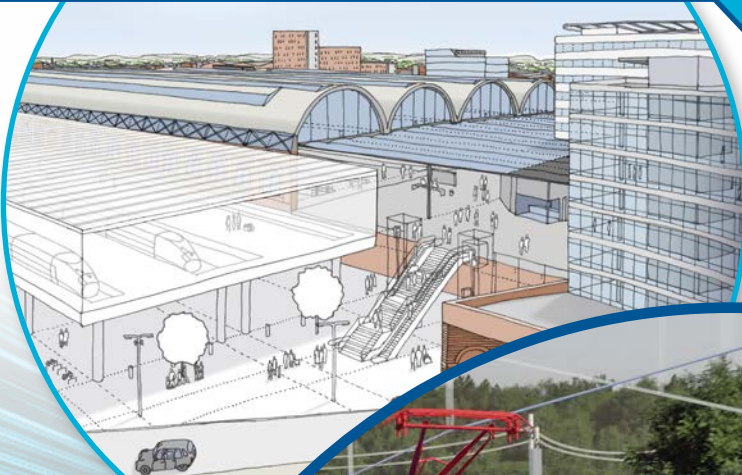


**RAIL**

# HIGH SPEED SPECIAL



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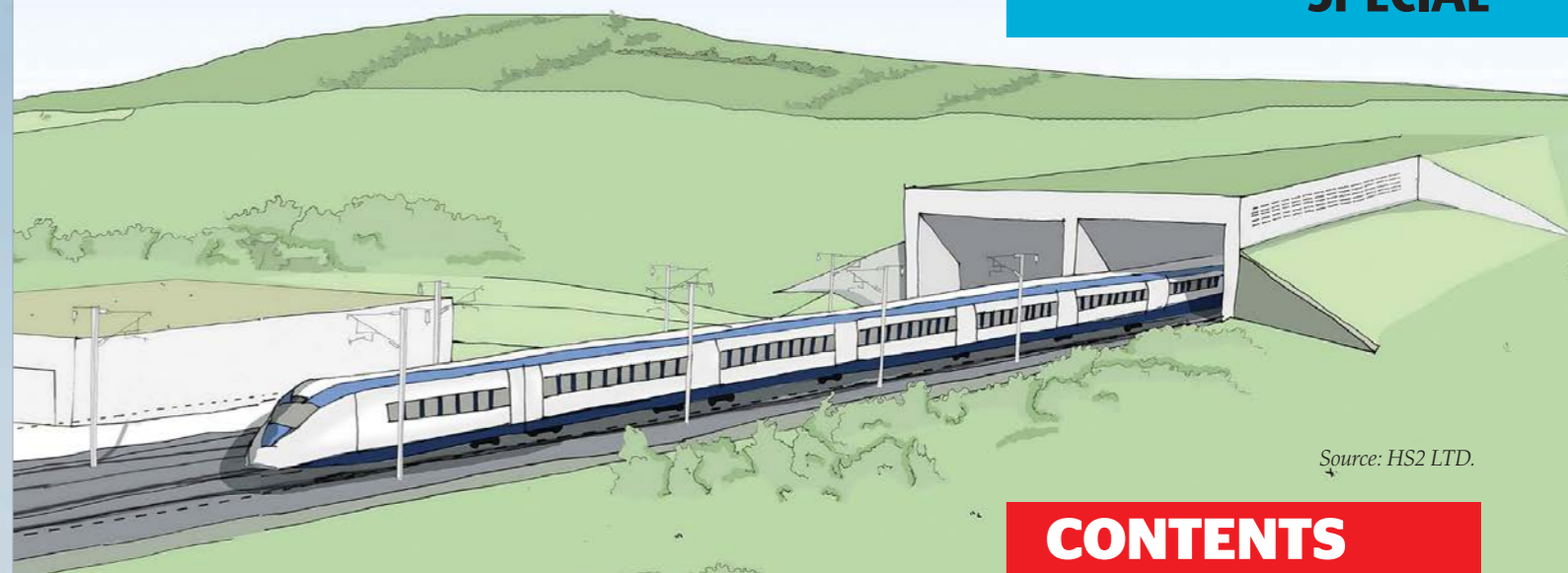
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Source: HS2 LTD.

## Welcome

2017 looks set to be one of the most significant years in the development of high-speed rail in the UK. Building on the success of HS1 - the nation's only purpose-built high-speed railway to date - Royal Assent is expected for HS2 within the next few weeks, paving the way for its long-awaited construction to begin early next year.

The first HS2 trains will begin running between London and Birmingham from 2026, upon completion of Phase 1. When Phase 2 is finished seven years later, they'll be running to Manchester, Sheffield, Leeds and the East Midlands.

In this 32-page special, we look at how Manchester in particular is making advanced preparations for its arrival (p64), and why Colas believes it has the right skillset to contribute to the railway's construction (p58).

Two fleets of trains are expected to be procured for HS2 in a £7.5 billion contract - one for trains running exclusively on high-speed lines, and another of 'classic-compatible' trains gauged to also run on the existing network and beyond the limits of HS2's core routes.

The Invitation to Tender could be issued in the first half of 2017, attracting bids from global manufacturers steeped in experience gained in developing advanced technological solutions.

Few companies possess as much expertise as Alstom, which has been pushing the envelope in high-speed traction since introducing it to Europe in 1981, with the now-famous 200mph TGV in France. Its pioneering use of tilting technology and articulated bogies, plus an already impressive track record in supplying UK rolling stock, could also make it a strong

contender for HS2 contracts (p44).

Accepting this rolling stock will be the new West Coast Partnership franchise, announced by the Government earlier this month, that will merge the management of conventional inter-city services on the West Coast Main Line with those on HS2 for the first three to five years of its existence (p54).

With the intriguing prospect of some trains running on HS2 but also beyond, *RAIL* also analyses how 'classic-compatible' services will bring widespread benefits to the rest of the country away from the core network (p60).

Returning to the theme of rolling stock, *RAIL* experiences Eurostar's next generation of e320 Valero trains (page 48) and tries out its new multimedia passenger experience offering (p70).

Finally, Greengauge 21's Jim Steer wades into the political debate over how much power should be devolved to Transport for the North when it comes to high-speed rail (p52).

**PAUL STEPHEN**  
Assistant Features Editor, *RAIL*

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# THE PRIME MOVER

## Alstom's High Speed Trains Portfolio Director JAIME BORRELL talks to PAUL STEPHEN about the excellent passenger experience delivered by its range of high speed trains

Alstom is certainly no newcomer to high-speed rail, having pioneered its use across Europe and, indeed, the UK with its Class 373 Eurostars, Britain's first very high speed train. With a fleet of around 1,000 high-speed trains operating in 20 different countries and across 16 borders, Alstom Avelia trains carried an estimated four billion passengers during 35 years of frontline service.

Calling on nearly four decades of experience, Alstom has positioned itself as a world leader in innovation. Never has this been more apparent than in the

company's native France, where its first TGV was introduced in 1981, and set again the world speed record on rail 26 years later in co-operation with SNCF. A modified double-deck TGV secured this status by hitting a top speed of 357.2mph under test conditions while running on a newly built but yet-to-be-opened high-speed line between Strasbourg and Paris in 2007.

This test allowed an increase in the TGV's maximum speed in passenger service to 200mph, the first in the world.

Complementing the TGV is the company's AGV trainsets, which entered service in Italy in 2012. Part of the Avelia range, these

trains can reach speeds in commercial service of up to 220mph (360kph). It is also the first train to combine articulated bogies with distributed traction, providing the same ride quality benefits as it does in Alstom's concentrated traction trains. And this concern for passenger experience and comfort also explains the importance of other Alstom technologies such as tilt.

Closer to home and Alstom also supplied some of the UK's most high-profile, high-speed trains, including 56 Class 390 Pendolinos, in service with Virgin Trains on the West Coast Main Line, and 31 Class 373 Eurostars on High Speed 1.

AMTRAK signed a £1.6bn contract with Alstom in August to supply 28 new Avelia Liberty trainsets. They combine high speed with tilting technology, improving the ride quality in tight corners. ALSTOM/MECONOPSIS.

Also part of the Avelia range, the Pendolino heralded the arrival of tilting technology in the UK, developed from British Rail's experimental Advanced Passenger Trains, enabling them to run at up to 125mph on curved conventional track.

**“Tilt and articulation are key technologies that improve the passenger experience.”**

Jaime Borrell,  
High Speed Trains Portfolio Director, ALSTOM



Eurostar 373022 at Paris Gare Du Nord on June 3. The Alstom-built Class 373s were the UK's first very high speed train and have been operating at speeds of up to 186mph on the UK's only designated high-speed railway, HS1, since regular services began in 2007. RICHARD CLINNICK.

Meanwhile, the Eurostars run at speeds of up to 186mph on HS1, which was built to European gauge, and is much straighter.

Alstom's tilting technology has been taken a step further by its Avelia Liberty high-speed train, ordered by Amtrak in August to run on the Northeast Corridor (NEC) line between Boston and Washington DC. Unlike the AGV and the Pendolino, the Avelia Liberty is equipped with contracted traction and is capable of running at 186mph with tilting bogies and at 220mph with standard ones.

The tilting technology is key to delivering a good passenger experience on sinuous rail lines. Much like the West Coast Main Line here in the UK, the NEC has curvy conventional lines that the new train will have to run on. Tilt enables much faster running over these tracks, while delivering excellent rider comfort.

With a well-deserved reputation for delivering high-speed trains to run on both conventional track and designated high-speed lines, Alstom is monitoring developments closely as it awaits next year's announcement of rolling stock specifications for HS2.

Invitations to Tender are expected to be issued in the spring, with Phase

1 of HS2 set for completion in 2026.

“Alstom is the only train manufacturer to have such a wide range of solutions to choose from,” High Speed Trains Portfolio Director Jamie Borrell tells RAIL.

“The passenger is always central to our designs. Tilt and articulation are key technologies that improve the passenger experience and ride quality, and we're the first to fit tilt to very high speed trains. We are very proud of the Amtrak contract, as NEC is a complex line. We are combining high speed with heavy freight traffic, so we needed to find a solution to enhance speed and comfort while running on heavy duty rails.

“But every case is different, and this is the force of the Avelia range. There may be an Alstom tilting design that works in the UK and HS2. Or it could be a very different train, such as double-decker cars, that would run on HS2 but not conventional lines.

“The AGV would also be an



An artist's impression of Alstom's single-deck and double-deck trains, both articulated and with concentrated traction. ALSTOM/DESIGN & STYLING.



► interesting solution. With distributed power and articulated bogies, it gives us other possibilities. Whatever the challenge, Alstom's Avelia range features solutions to suit all scenarios."

Alstom presented its double-decker train concept at the Palace of Westminster on May 24. This Very High Speed train, using

concentrated power, would be available only in European gauge, precluding its use on the conventional national network.

The double-decker trains (which could also be ordered in single-deck version for the conventional network) would be capable of operating at 224mph - the maximum speed currently required by HS2, and a higher

speed than ever before on UK rails.

Like the AGV, they will also be fitted with articulated bogies, which as well as improving comfort, can also enhance safety by improving rigidity of the trainset, reduce costs through fewer components, and save weight - meaning they could cause less wear and tear to the infrastructure.



A Virgin Trains Pendolino, travelling from Euston to Liverpool Lime Street, passes the site of Alstom's new Technology Centre at Widnes, which has been mooted as a potential manufacturing site for HS2 rolling stock, should the company win the contract. ALSTOM/ALEX BURROWS.

## Alstom's range features solutions to suit all scenarios. 77

Jaime Borrell, High Speed Trains Portfolio Director, ALSTOM

at Manchester Longsight Depot to scan Virgin Trains' Pendolino fleet with lasers and cameras. This system captures data about the condition of equipment on passing trains, and makes predictions about remaining service life. The technology not only reduces inspection time but also obviates visual inspection, improves safety, and reduces the possibility of human error. The system then initiates a cycle of predictive maintenance, further reducing the number of interventions by maintenance engineers.

Alstom has also developed its TrackTracer programme for deployment on operational trains, enabling track engineers to monitor the condition of track through telemetry, which could be of particular value to HS2.

Alstom has also given strong indications that it is committed to bringing manufacturing jobs to the UK should its bid for new rolling stock such as New Tube for London be successful. The firm has suggested that it could build trains at its new £22.3m training academy and technology centre, currently under construction near Widnes.

The 300,000 sq ft facility is being built

to provide 15,000 days of training per year to Alstom staff, and those from its supply chain, and to carry out some of the company's UK maintenance and modernisation contracts. First up, and following its opening in May 2017, 80 jobs will be created from a £25.3m contract to repaint Virgin Trains' fleet of 56 Class 390 Pendolinos, with the potential for hundreds more jobs to follow, depending on future workloads.

On October 7, the company held a ceremony to mark the beginning of work on the training facility. There, Alstom MD for the UK & Ireland Nick Crossfield told RAIL: "We are engaged in the development of rolling stock and are actively bidding in this area. If we had a significant amount of rolling stock to deliver (in the UK) then we would do a large part of that in Widnes.

"This is a significant investment in the UK, and it demonstrates Alstom's continued commitment to the UK market."

It's a commitment that will surely grow deeper if Alstom is given the opportunity to build the next generation of high-speed trains for the UK. ■

Speaking at RAIL's National Rail Conference in November 2015, Alstom's HS2 director Henrik Anderberg said: "Our unique articulated train design means each car is supported by the next car through robust articulation, and bogies are placed under the supporting end of each car. We build both articulated and non-articulated trains, but for very high speeds we prefer articulation. While the main reason is safety, it also means a smoother and better ride, less noise for passengers and wider interiors.

"Our articulation allows for fewer bogies, which implies lower maintenance costs for the operator. It also means improved aerodynamics and less weight, resulting in significant energy savings."

At the launch in Westminster, Alstom said that the double-decker trains would offer 40% more capacity than existing, equivalent trains, and that could translate into bigger and better seats for passengers, giving 'business class' levels of comfort. Its lower construction costs could also translate into cheaper fares for passengers.

More seats could also prove attractive, due to HS2's promise to bring two-thirds of the population of northern England (around ten million people) within two hours of the capital.

With any procurement of Alstom rolling stock comes its customisable maintenance programme, called Health Hub. This provides real-time diagnostic information on train performance to ensure maximum availability.

An added option to Health Hub is TrainScanner, which has been installed



Virgin Trains 390148 forms the rear of the 1216 Stockport-Manchester Piccadilly nine-car Pendolino service on October 6. These trains are capable of running at 140mph, but are limited to 125mph by Network Rail's maximum permitted line speeds. PAUL STEPHEN.

# Light at the end of the tunnel



Eurostar's Class 373s aren't that old - so why are most of them being replaced with new trains?  
**RICHARD CLINNICK** examines the newcomers

Side-by-side at St Pancras International on June 14, 374011 (left) and 373231 (right) have crossed the channel from Paris. The '373s' date from the early 1990s and have power cars at each end, while the '374s' were built from 2013 onwards and use distributed power. PAUL BIGLAND.

Eurostar has had a tough year. While passenger numbers were boosted through the summer, thanks to the European Championship football tournament held in France, there was uncertainty caused by the Brexit referendum on June 23, and the UK's subsequent decision to leave the European Union.

Before that there were the terrorist attacks on Paris in November 2015, and Brussels in March. These events caused a drop in international traffic, as passengers from America and Japan decided against travelling to Europe, with the United States advising its citizens not to travel to the French capital. Eurostar's profits are down, and two of the consequences are a round of redundancies and an 8% reduction in services.

It's a rather gloomy picture, so the introduction of the new e320 Velaro trains

couldn't have come at a better time.

Back in the early 1990s, Eurostar had to operate on Southern Region infrastructure. High Speed 1 wasn't due to even begin opening until 2003, so this new service would require trains suitable for cross-Channel journeys, but built in accordance with the UK's smaller loading gauge, including the long, narrow, winding Penge Tunnel. There were no off-the-shelf solutions - something new was needed. And so the '373' was born.

But things have changed. HS1 is open fully to London, and UK gauge restraints are no longer a factor. And this opened the door to the use of European designs. The ICE3 family of trains, in use in Spain, China and Russia, was an obvious candidate.

The cross-Channel operator ordered ten Velaros in October 2010 (RAIL 655). They are the first passenger trains to operate in

the UK built to European gauge, and offer a significant capacity increase on the trains that they are, largely, replacing.

Launched at St Pancras International in November 2014 (RAIL 762), the first trains entered traffic one year later, a month earlier than planned.

The Class 374s, to use their UK designation, are built by Siemens in Krefeld, Germany. Following testing in Wildenrath, they are tested on the French and UK high speed lines. They have been as far as Belgium, but have yet to run to Brussels.

Each train consists of 16 vehicles, comprising three business class/standard premier vehicles at each end, and ten Standard Class vehicles in between; cars 8 and 9 offer buffet facilities. At 25 metres, the cars carry more passengers than the '373s' - which should make up for some of that 8% reduction in services.

Capable of 250mph, they are limited to running at 200mph. Eurostar investigated the market, and selected the Velaros as being the best-fit option. Eurostar tells RAIL: "The Velaro was the best fit with our specification and aspirations. From a technical point of view, the Velaro was the most established product platform."

The design is a development from the ICE3 design used across Europe, but whereas that train is built by both Siemens and Bombardier, the '374' is purely a Siemens product, with the manufacturer using the parts to which it held the rights, and redeveloping the other components.

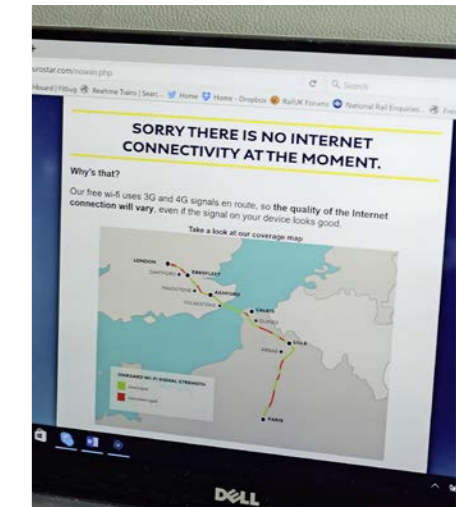
Originally, 20 half-sets were ordered. These comprised eight vehicles, and were formed into ten 16-car trains. At the November 2014 launch, it was confirmed that a follow-on order for 14 half-sets had been made, forming a further seven trains. The first of these (374021/022) is already in traffic.

What was the rationale for the new trains? Surely, the Class 373s are relatively new, in terms of train fleets, especially when you consider that some High Speed Trains operating in Britain today are twice their age?

"Those 20 years have been quite hard on them," says a Eurostar spokesman. "For most of that time they've been operating at high speed. And we want to reduce maintenance costs, increase efficiency and and improve capacity.

"The reliability of the '373s' is good, but it's not going to get any better. We knew that they would only be viable for so long. So, rather than modifying the old trains with expensive equipment updates to make them compatible with new signalling

“ The reliability of the '373s' is good, but it's not going to get any better. ”



Connectivity on Eurostar is being improved.  
PAUL BIGLAND.

systems, there was a general consensus that if possible, we should look at whether we could justify new trains. After analysis, we concluded that we could."

The reason for the follow-on order was because Eurostar was initially unsure of how good the trains would actually be. Each train, for example, has capacity for 150 more passengers than the older trains, and their reliability is much higher (as you would expect). By mid-summer, the new trains had proved their reliability.

Eurostar says component redundancy is key to achieving such a low failure rate. Essentially, if a component fails, power can still be fed through the trains.

Unlike the Class 373s, the e320s use distributed power. "Nearly every new train



The interior of Coach 1 on a '374' on June 14. PAUL BIGLAND.

coming onto the market features distributed power - the Pendolinos, for instance," the company explains.

It takes up less space, and means more passenger capacity. Power systems can be moved underneath the cars, or placed on the roof. And it's one of the ways the company has been able to add an extra 150 seats on each train.

The '373s' had power cars at each end, but the first third of each trailer vehicle also contained power equipment. So on an 18-car 'Three Capitals' set, two and two-thirds vehicles were unavailable for passenger use. On a 16-car Class 374, every vehicle carries passengers. All but the first foot of the vehicle behind the cab is used for a technical area for the signalling systems and equipment for the train safety functions.

"When the '373s' entered service, things such as electrical cables running down

➔ the length of trains going through tunnels wasn't allowed. But modern cable insulation is much better - nobody worries about that sort of thing any more. Changing rules and advances in technology have made

“ Changing rules and advances in technology have made distributed power the preferred option.”

Eurostar

distributed power the preferred option.”

Distributed power was being used back in the early 1960s. As an aside, a 16-vehicle e320 has eight pantographs. Four are for DC operation only, on 3kV and 1,500V, in France and Holland.

When operating on 1,500V, all four DC

pantographs are used, while when running on 3kV a '374' uses just two, with a cable through. The other two can then be used as back-up. The other four pantographs offer a similar arrangement for AC operation, at 25kV.

Eurostar had already committed to refurbishing the older fleet by the time it placed the order. It had already committed to the refurbishment. The design for the refurbishment had preceded the new trains. However, all but eight of the '373s' will be removed from traffic.

Being built to European UIC gauge, the '374s' are more spacious, although not every seat in Standard Class lines up with a window.

There is more luggage space on the trains, a direct result of Eurostar's decision to order UIC-gauge trains. It also means that the luggage areas fitted to the '373s' have been lost, which releases almost a quarter of a vehicle for passenger space, while luggage is now closer to the passengers.

Information screens are fitted to keep passengers informed on the journey's

### E320 SPECIFICATIONS

- Maximum permitted operating speed: 320kmh (200mph)
- Train length: 400m
- Voltage system: 25kV AC and 1.5/3kV DC
- Distributed traction power: 16,000kW
- Brake systems: Regenerative, rheostatic, pneumatic
- Number of axles: 64 (32 driven)
- Wheel arrangement:

- 2 x Bo-Bo+2'2'+Bo-Bo+2'2'+Bo-Bo+2'2'+Bo-Bo
- Number of bogies: 32
- Maximum axle load: 17 tonnes
- Number of cars per train: 16x25m
- Number of seats: 900
- Operating temperature range: -25C to +40C
- Signalling systems: ETCS (Level 2 compatible), KVB, TVM, RPS, TBL, MEMOR, ATB.



Two different generations of Eurostar at Paris Gare du Nord on June 14. On the left is 373232, while on the right is 374012. All but eight of the '373s' are being withdrawn while the '374s' currently only serve Paris but with plans to run them to Brussels and Holland. PAUL BIGLAND.



The e320s are built to European-UIC gauge so there is more luggage space. PAUL BIGLAND.

progress, as well as information related to the location of items in the saloon. The screens are on angled mounts in the ceiling, but do not impinge on headroom.

Because of their UIC-gauge design, the '374s' are taller than conventional UK loading-gauge trains, which adds to the feeling of space.

Passenger feedback to Eurostar has highlighted that the lighting on-board the '374s' is perhaps a little too bright for people's tastes, so the operator is toning that down slightly. This will be achieved using filters which will reduce the 'harsh' feeling mentioned by passengers.

For the current markets, the e320s run only to Paris Gare Du Nord. They are booked to run on the busiest trains between

London and Paris, due to their additional capacity, with Eurostar keen to fill those extra seats.

There are plans to run them to Brussels, but not until the first or second quarter of 2017, which will be before Eurostar starts serving Amsterdam.

Performance-wise, the '374s' have a better acceleration than the '373s', but Eurostar says that, unlike a commuter service, this isn't such a factor as there are long journeys between stops. For a high speed train, overall power is what makes the big difference, and the '374' outputs 16kW, as opposed to the '372s' 12kW output.

More Class 374s are to be rolled out over the coming months as Eurostar continues modernising its fleets. A lot of people will be watching to see how they perform. As the first UIC-gauge trains built for the UK passenger market, and the first such trains built for a UK high-speed route, they will almost certainly be considered as candidates for this country's other upcoming high-speed projects. ■

## RAIL Promotion: Ask the Experts

### Siemens pioneering high speed innovations

HS2 is the most hotly anticipated infrastructure development in the UK for generations. It offers an unprecedented opportunity for the UK rail industry to make a step change in its practices through the latest innovations.

Across the world Siemens is innovating to create the next generation of high speed rail. With six international rolling stock customers running high speed operations spanning nine countries, Siemens can harness its significant experience and cutting edge innovations to benefit HS2. These innovations include using data monitoring and analytics additive manufacturing and even augmented reality technologies to improve rolling stock maintenance.



Jo Hensher, Bid Director, HS2 Rolling Stock, Siemens plc

### Data Monitoring & Analytics

The digitalisation of rail is accelerating. Data monitoring, analysis and diagnostics mean we can increase the reliability and availability of trains by identifying potential faults early, enabling maintenance technicians to proactively resolve and even prevent problems - often remotely. This helps rail operators reduce lifecycle costs.

The Siemens Velaro E fleet in Spain is a case in point. Every one of the 26 high speed trains are monitored. Operating speeds of up to 300kph (187mph) mean that mechanical wear and tear is unavoidable. However, thanks to predictive maintenance, only one train on the Madrid-Barcelona route has departed with a delay of more than 15 minutes from a total of 2,300 journeys due to a technical failure. That's a rate of 0.004%.

### Additive Manufacturing

Additive Manufacturing, such as laser printing, offers rolling stock maintenance teams greater flexibility and the ability to reduce inventory. More than 50% of all spare parts are ordered only once during their lifecycle. Maintaining that inventory is costly and, given advances in materials technology, can mean certain components become out of date. Conventional remanufacturing is rarely economical whereas additive manufacturing can speed up maintenance and ensure these new trends are addressed cost-effectively.

A motor terminal box which protects the engine cables against adverse conditions below the floor of a high-speed train is exactly the kind of component which benefits from additive manufacture. Last year Siemens printed a motor terminal box using the selective laser melting process and initial feedback suggests that these printed components are of higher quality than those traditionally manufactured. Siemens is now working with Deutsche Bahn AG to test the terminal box in day-to-day operation.

### Augmented Reality

Siemens is researching how augmented reality can help its maintenance teams manage and access the information they need quickly and efficiently.

Siemens is trialling the use of augmented reality in rolling stock maintenance at remote locations. As part of the trial our technicians have 'point and click' functionality to undertake diagnostic tasks and routine checks. Directing a tablet's camera at the bogie, for example, could allow the technicians to retrieve a CAD drawing of the wheelset and instructions on how to adjust or remove a yaw damper.

Possible benefits include shorter downtimes through quick fault recovery, improved support of our maintenance staff, quality assurance through standardised processes and paperless documentation.

If the UK rail industry is to seize the opportunity that HS2 offers, then it will need to embrace the kind of innovations which Siemens is pioneering in high speed rail technology across the world.



# Deciding what's best for the North

Greengauge 21 founder **JIM STEER** recommends that Transport for the North is given the final say on crucial aspects of HS2

Transport for the North (TfN) looks set to become England's first sub-national statutory transport body from next year, once the formal devolution proposals currently under consideration by Secretary of State for Transport Chris Grayling are approved.

If given the go-ahead by Grayling and then both houses of Parliament, it will herald the transfer of key powers away from the Department for Transport (DfT), including greater control over spending and full management of the Northern and trans-Pennine franchises, after TfN completes its planned merger with Rail North in 2017.

Although it would be a highly significant step in the North's devolution journey, the deal would not give TfN any greater influence over High Speed 2 or what route it will take once the line reaches northern cities in 2033. Those decisions remain firmly within the remit of the DfT and HS2 Ltd.

Subject to a few final negotiations, the routes have already been confirmed for Phase 1 (London-Birmingham) and Phase 2a (Birmingham-Crewe); construction begins next year, and the routes will be open by 2027.

The Government's preferred route for Phase 2b was announced on November 15 - this concerns the two arms of HS2 where it diverges north near Birmingham, to Manchester in the west and to Leeds in the east (see pages 12-13).

It's important to note that TfN did have limited input in these discussions as a result of the National Infrastructure Commission's

report, entitled *High Speed North*. Published in March, it recommended that HS2 Ltd and TfN should collaborate together on the northern reaches of HS2 in optimising its connections to what has been dubbed 'Northern Powerhouse Rail', or High Speed 3.

TfN will also play a leading role in the

development of HS3, which promises to improve east-west links between the North's major cities by enhancing the existing network and perhaps building new lines. Former chancellor George Osborne allocated £60 million in the budget earlier this year for that very purpose. TfN is due to report its findings by the end of 2017, in conjunction with Network Rail and the DfT, for delivery in the first half of the next decade.

But Steer argues that the two should not be mutually exclusive, and that TfN is best placed not only to determine the route that HS3 should take across the Pennines, but also HS2 and where they overlap. This is

because they must complement each other in order to maximise the transformative effect on the northern economy, rather than any potential gains being stymied by planning decisions for HS3 being made in the wake of unsatisfactory HS2 verdicts, and made in isolation from a London-centric DfT.

Speaking to delegates at RAIL's National Rail Conference at Manchester's Midland Hotel on November 1, Steer said that TfN should be given a leading role for HS3 and the remaining route determinations for HS2. The North will then be free to decide priorities for connectivity and how best to allocate funds.



Greengauge21 founder Jim Steer addresses delegates at RAIL's National Rail Conference in Manchester on November 1. PAUL BIGLAND/RAIL.

**“HS2 will have multiple functions once you get north of Birmingham Interchange. It will not just be a link to London.”**

Jim Steer, Founder, Greengauge 21

**“HS2 provides some of the inter-city connectivity that TfN is all about, and is therefore inseparable from TfN's wider remit.”**

Jim Steer, Founder, Greengauge 21

“If you're going to fashion it (HS3) with this huge impending project called HS2, then you want to tie them together,” he says. “HS2 provides some of the inter-city connectivity that TfN is all about, and is therefore inseparable from TfN's wider remit.”

“HS2 will have multiple functions once you get north of Birmingham Interchange. It will not just be a link to London, and the trains will be running to many destinations in the north, so I believe the [design] work should be done by a single body that knows what it's trying to achieve. Then you can ask how much of the North's economy, on the back of HS2, can you get within two hours of London - which the evidence suggests are the timings of most value.”

“That's going to be a tough decision for government to make, and it won't happen until TfN becomes a sub-national body, but I think those decisions should be made by TfN.”

According to Steer, handing TfN the HS2 Phase 2b development budget as part of its overall devolution package is the only way to get efficient decisions made on integrating HS2 and HS3, based on supporting the region's wider industrial strategy and economic plans - the Northern Transport Strategy.

He adds: “This isn't about taking money from the Treasury. It's about trusting the empowered authority to make the right decisions that will achieve the goals for this part of the country to secure the wider benefits of HS2.”

“Decisions for Phase 2b really need to be taken by TfN, moving on from the

custodianship of the DfT.”

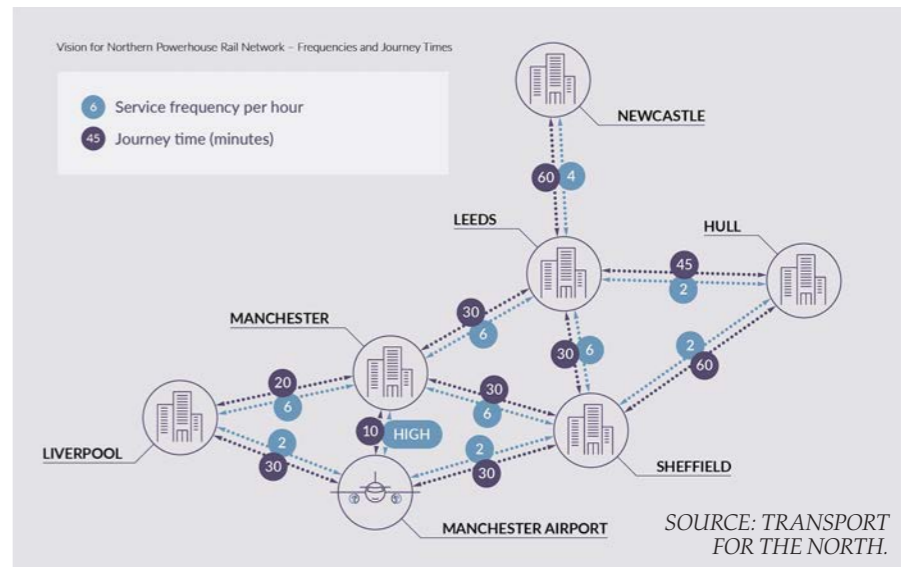
Focusing squarely on HS3, Steer warned against the temptation for planners to concentrate too much on speed, at the expense of equally important factors in stitching together the North's complex commuter flows.

Given the Government's commitment to spending over £50 billion on HS2, Steer suggested that meeting further multi-billion pound obligations, such as HS3, would be made more likely if TfN gave equal prominence to what could be achieved with the extra capacity. TfN would need to demonstrate what kind of frequency and timetable it would implement well before putting the first spades in the ground, rather than allowing this to become an afterthought.

He adds: “I don't think there will be a business case for what people happily call HS3 without looking at all the factors. You have to think about released capacity, freight and what happens in the city regions.”

“If you just looked at the inter-city benefits and, for example, getting to Manchester 15 minutes quicker, then you will not make a viable business case, given the scale of investment involved in a new-build railway.”

“If you want value for money, you've also got to think about service plans and then infrastructure. We're not very good at doing that and we need to get much better at it. We seem reluctant to even think about it and all too often say 'well, we don't have to design the train timetable for 2027, because that's ten years away'. I say we need to think about that now, because it will affect the business plan.” ■



Although it is planned to yield impressive reductions in journey times, Steer urges HS3 planners to think about power more than speed.

# High Speed 2 gathers pace



Virgin Trains Pendolino 390016 powers through Cathiron (near Rugby) on September 14 with the 1040 Glasgow-Euston. PAUL BIGGS.

Long before HS2 opens, a new franchise will be created to usher in the new railway. **RICHARD CLINNICK** examines what this 'shadow operator' will be expected to do

November 4 was a significant day for high-speed rail in the UK, as the Government announced the West Coast Partnership (WCP), which brings together the operation of the Intercity West Coast (ICWC) franchise services (currently run by Virgin Trains West Coast) and the design, mobilisation and initial operation of High Speed 2 (HS2) passenger services.

Currently, ICWC operates Pendolinos from London Euston to the West Midlands, the North West and Scotland, and diesels to North Wales.

The current ICWC franchise will be replaced by the WCP, which will run services on the West Coast Main Line, as it does now. The new franchisee - 'the shadow operator' - will also design and run the initial services on HS2 Phase One between London and Birmingham, when it opens in 2026.

Royal Assent is expected early next year for HS2, with construction also starting next year.

The WCP franchise will run for the first three to five years of HS2 operation. In its announcement, the Government stated it was "the first step in attracting a world-class bidding group to develop and enhance the

## HS2 OPERATIONS

Initially it's likely that the West Coast Partnership operator will run both West Coast Main Line and HS2 services.

This is designed to provide operational stability and establish a trading history before the services are re-tendered.

service for West Coast passengers, and pave the way for the introduction of HS2 services in the future." When HS2 opens, the number of seats at rush hour will almost treble, from current figures of 11,000, to around 30,000.

Transport Minister Andrew Jones said: "We are embarking on a new chapter in the modernisation of our railways and we need the best expertise to deliver it."

He adds that HS2 will be the backbone of Britain's railways. It will be about capacity, he argues, stating that seats will be freed up on the WCML. It's worth remembering that the railway south of Rugby is the busiest in Europe, and so trying to add any sort of capacity there is nigh on impossible.

Jones explains the situation: "By combining the franchises we are ensuring we get the right people on board at an early stage to design and manage the running of both services in the transition stage. The new

franchise will attract highly experienced companies, who have the right experience, which ultimately means a better deal for passengers - both now and in the future."

HS2 is about reducing overcrowding on the existing railway. Passenger numbers have more than doubled - in 1995 the network carried 800 million people. This

## HOW WILL THE SHADOW OPERATOR WORK?

The Government will develop specifications for the 'shadow operator' element of the franchise in the Expression of Interest to be published next month, as well as in the Invitation to Tender.

However, the Government expects candidates to be willing to meet the

## WHAT THEY SAID



■ Rail Minister Paul Maynard: "I want to be very clear that this is a new type of franchise, requiring a new kind of approach to bidding. "A unique feature of this competition is that the winning bidding group will have superior transformational expertise across all rail operational and customer service disciplines."



■ Patrick McCall, co-chairman of Virgin Trains: "There are huge advantages in having continuity of service during HS2's critical enabling works - both up to the start of the new franchise in 2019 and beyond.

"We firmly believe the franchise system has brought unparalleled success to the UK rail industry, with public-private partnerships between government and franchisees like Virgin Trains delivering success, innovation and growth that would simply never have happened under public ownership."



■ Rail Delivery Group Chief Executive Paul Plummer: "The rail industry is working hard to ensure HS2 is seamlessly integrated with the existing network as one railway, and this decision is crucial to enabling that. It also signals a smooth transition when the new line opens in 2026.

"HS2 will become a very important part of Britain's railway for decades to come, and will play a huge part in managing the capacity challenge that we face. Rail companies are investing more than £50bn as part of the Railway Upgrade Plan to build the bigger, better, more modern railway that Britain needs to carry even more people and freight safely, quickly, reliably and efficiently. That work will continue while we build HS2".

year, it's estimated it will have carried 1.7 billion. This is on a largely Victorian network and so space, and therefore capacity, is at a premium.

But HS2 is about more than just capacity; it is about generating economic growth up and down the country.

Chairman of HS2 Ltd Sir David Higgins says: "This is a real opportunity to ensure HS2 services complement and enhance existing ones. I have always been clear that HS2 will not be a standalone railway but fully integrated with the wider network. It will provide a new backbone for our railways, modernising services to better serve towns and cities up and down the country."

Higgins states that by introducing the WCP franchise, it will enable a strong private sector partner to work with Government. Higgins believes that the partner must: "combine experience of delivering both conventional and high-speed railway operations, and transform customer service through the use of new technology."

It also planned that the WCP franchise will introduce new technologies on the WCML operations before HS2 opens.

When it does, the majority of the WCP intercity trains will run on the new railway, which will, in turn, enable more commuter trains to run on the WCML.

WCP's operator must work with local transport authorities, as well as Transport Scotland and the Welsh Government, to ensure that service level requirements are met.

The next stage now involves companies registering formal expressions of interest (EoI) for WCP. Who these companies are will be announced in December, followed by the publication of the Invitation to Tender (ITT), which the Government expects to issue in October or November next year. The new franchise is scheduled to start on April 1 2019.

However, a new short-term, 12-month contract of work will also be required for the interim operation of ICWC services, as the current franchise ends in March 2018.

In the longer term, it is expected that the WCP franchisee will operate integrated ICWC and HS2 services for around four years on an incentivised management contract basis. ■

■ There will be collaboration with Network Rail and HS2 Ltd to develop the organisational model for the delivery of services on HS2.

Already it is recognised that the role is expected to evolve over time, and the new franchise has a certain amount of flexibility to accommodate this.



# Alstom steps up

High Speed 2 must live up to its name if it is to compete with airlines and realise its full potential, says **HENRIK ANDERBERG** of Alstom UK

Alstom UK's HS2 Director Henrik Anderberg is quite upbeat about the prospect of building a new railway in the UK: "High Speed 2 is a good thing," he told delegates at the National Rail Conference (organised by RAIL and held at the Midland Hotel in Manchester) on November 1.

Alstom recently won a major contract in the United States, where it is supplying new trains for Amtrak, and where there's a growing awareness of the prosperity high-speed rail can bring; Alstom is in a buoyant mood.

Elsewhere, countries in North Africa are beginning to wake up to the benefits of high-speed rail, and Alstom is involved in those developments. The company is building trains for the Tangier to Kenitra HS line in Morocco due to open in 2018. It will be the first long-distance line on the continent, and the first part of what will eventually become a vast intercontinental network, linking with Russia and China. Alstom's knowhow will be vital for projects of such magnitude.

Closer to home, Anderberg upholds the success of France's high-speed rail developments as something that could be achieved here.

He says at the NRC: "Travel times really do matter."

"HS2 needs to compete with the airlines, particularly when it comes to journeys of three hours or less, which 70-80% of people will choose to travel by train."

This is a crucial point in the argument for high-speed rail, says Anderberg. The current minimum journey time from London to Glasgow is four and a half hours, and while this is planned to be cut by half an hour, Anderberg, says it's not good enough. "It needs to be three hours," he says.

"By driving down journey times, the railway becomes more competitive. In Italy, private companies have started running trains. The competition has driven down fares and increased rail travel's market share," he explains.

Alstom believes that 900 kilometers (559 miles) is the maximum distance at which rail can compete with air travel.

Anderberg goes on: "France's Alstom/SNCF is the first high-speed line. It opened in 1981 and 'shrank the country' considerably."

"France benefitted immensely, and we hope we can repeat that in the UK."

In France, Anderberg says, Lyon grew considerably as a city, and that was all down to the high-speed railway. It had such an impact that a second two-track line is being planned between Lyon and Paris. This is an example of the long-term socio-economic benefits and regional developments which occur as a result, he says.

Anderberg also claims that projects such as this can help catalyse a country's economy. High-speed rail lines typically demand innovation and result in a highly skilled workforce.

And they attract massive investment. All these benefits, says Anderberg, underline the importance of investing in infrastructure.

What Alstom offers, he says, is a formidable package of innovation and experience. The company has more than 40 years of designing and building high-speed products in 20 countries. It works with 21 operators and its first products entered service 35 years ago. Since then, 3.5 billion people have travelled for 5.6bn kilometres on Alstom products.

Alstom has been maintaining high-speed lines and trains for more than 20 years and has contracts that go back 30 years.

In terms of research and development, Alstom has carried out more than 2,000 kilometres of test runs above 400kph (249mph). In April 2007, an Alstom train broke the speed record of the time with a 574.8kph (357mph) run.

Alstom believes that for HS2, a range

of trains is needed. Its new Avelia range features the Euroduplex articulated double-deck trains, which use concentrated traction. Then there are the Liberty, AGV and Pendolino models. The former is concentrated traction too, while the others are distributed. Only the Pendolino is non-articulated, while the Liberty and Pendolinos offer tilt.

The Pendolino, Alstom says, can run at up to 250kph, and it's the first train in the market offering high speed and tilting technology. Alstom claims it can offer speeds gains of up to 35%.

Alstom's AGV offers increased capacity but in a single-deck platform, and is conceived for international operation.

A set is 70 tons lighter than its main competitors, and brings energy savings of 10-30% versus non-articulated alternatives. It also reduces maintenance costs by 10-15%, meaning lower expenditure across the

lifecycle of the train.

The Euroduplex offers between 20% and 40% higher capacity, along with lower energy and maintenance costs. Alstom says it's the best option for a TOC that wishes to offer more affordable travel.

"We believe that a range of trains is

needed for HS2," says Anderberg.

All of Alstom's trains can be configured for different routes and in cross-border platforms. He explains: "We work in all gauges and standards, and we can offer non-tilt options."

Is Anderberg hinting that one solution to boosting capacity is double-deck trains? On the national network it would surely be an expensive option because of the need for infrastructure changes and the limitations of the UK loading gauge. But HS2 won't have those issues, as it is being constructed to UIC gauge.

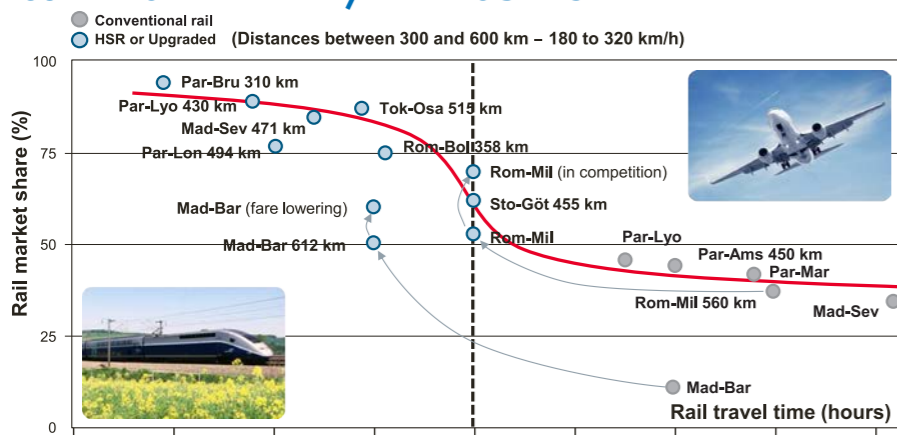
Anderberg jokes: "Everyone loves double-decker buses, and everyone wants to sit on the top deck! But we do have that option with HS2 - who knows what HS2 will look like?"

With Alstom's vast experience and technical expertise, it's quite likely that Alstom already has a pretty good idea. ■



559 miles is the maximum distance over which rail can compete with air travel, says Alstom UK's Henrik Anderberg. PAUL BIGLAND/RAIL

## CURVE OF THE RAIL/AIR MODEL SPLIT



Source: Alstom elaboration data from UIC, SNCF, NTV and others.

“ HS2 needs to compete with the airlines, particularly when it comes to journeys of three hours or less. ”

Henrik Anderberg, HS2 Director, Alstom UK



# A FINE TRACK RECORD

The ongoing installation of Long Welded Rail on the Nimes-Montpellier high-speed line. COLAS RAIL.

## Colas Rail is a well-known name on the UK's railways, but you may not be aware of the scale of its achievements, particularly in high speed rail. RICHARD CLINNICK finds out more from Executive Development Director IAIN ANDERSON

Colas Rail was formed when Seco Rail and AMEC Spie Rail were merged in January 2008. This brought the skills and expertise of what were already two top engineering companies into one body. Prior to that, Seco Rail was a leader in track maintenance and renewal, line construction, and urban transport which had been bought by Colas in 2000. After the merger, and the subsequent acquisition of Pullman Rail in 2012, Colas Rail has provided a broad range of specialist services to the UK rail industry, including:

- High output and conventional track renewals
- Multi-disciplinary rail systems project delivery
- In-house rail systems design capability
- Asset management & maintenance
- High speed rail capability
- Light rail and Metro development
- Freight operations
- Operating and maintaining the largest

fleet of On-Track Plant (OTP) in the UK

■ Rolling stock refurbishment  
Colas Rail has grown its UK rail market share significantly in recent years and was recently identified as one of Network Rail's five largest contractors. In the UK alone, Colas Rail employs in excess of 1,500 people, including the largest market share in track renewals through the S&C Southern Alliance and two 'plain-line' contracts in Anglia and the South East.

The company also operates the UK's largest fleet of On-Track Plant with many of the engineering trains delivering commodities such as ballast, sleepers and rail to enhance the national rail infrastructure. In addition Colas Rail operates and maintains Network Rail's fleet of infrastructure monitoring and maintenance trains, high output plant and rail grinding contracts.

Having invested in excess of £80 million on new plant and equipment, the company has grown to become the fourth largest rail

freight operator in the UK, with a series of long-term major contracts with clients such as Network Rail, Tarmac and Total. It also refurbishes rolling stock through its subsidiary, Pullman Rail, based in Cardiff.

However, as Executive Development Director Iain Anderson points out, this is a company that does much more than rebuild and run on the UK's railway in a transactional manner - it seeks to build long-term, collaborative relationships with its clients and partners, to the benefit of all concerned. And in addition to the long-term framework contracts for its plant, these credentials are further underlined by its unique position as a contractor on three UK major Rail Infrastructure Alliances:

As a leading member of the £400m Wessex Capacity Alliance (also including AECOM, Mott MacDonald, Network Rail and Skanska), it is currently undertaking the remodelling of Europe's busiest station - London Waterloo - which handles more than 99 million passengers per year. This work will include the revitalisation of the Waterloo International Terminal that has sat dormant since the switch of the Eurostar to St Pancras.

In the West Midlands, again in a collaborative relationship as part of the Midland Metro Alliance, it is at the heart of delivering a ten-year £1 billion-plus light rail enhancement programme for Transport for West Midlands. This is set to revolutionise urban transportation in this part of the world, and is closely interacting with traditional rail enhancements such as the remodelling of

Wolverhampton station on the West Coast Main Line and the forthcoming terminus for HS2 at Curzon Street.

Alongside these projects, Colas Rail is delivering the £500m, S&C Southern Track Alliance with Network Rail and AECOM, where it is responsible for delivering complex track renewal and enhancements. This work currently includes major junction remodelling and the modification of the lines into Euston station to allow for the future arrival of HS2.

Through these three major UK Alliances, Colas Rail is delivering more than £2bn worth of rail infrastructure enhancements. Even more noteworthy is the company's track record in the delivery of high-speed lines - two of the three UK Alliances are led by Colas Rail individuals with significant high-speed experience gained through building schemes on the continent.

Colas Rail can boast a host of achievements in high speed rail, having delivered in excess of 3,500km (2,175 miles) of high-speed railways across Africa, Asia and Europe. To put that into global perspective, the company believes it is second only to China in terms of the amount of high-speed track built.

"We are capable, and we have the skills to do what is required for high speed in the UK," says Anderson. "As far as having the necessary experience and resource to build HS2 is concerned, it is worth

remembering that we are currently working on three high-speed lines in Europe and North Africa."

Colas Rail was heavily involved in the construction of the only current high-speed line in the UK, HS1. Formerly known as the Channel Tunnel Rail Link (CTRL), it was the first major line built in this country since 1899. It opened in stages - the first phase in 2003 and the second in 2007 - and Colas Rail was the firm behind the detailed design, supply and installation of the 46 miles of track, overhead line electrification and mechanical systems on the first phase of the line.

In France Colas Rail is a member of the Oc'via consortium delivering all aspects of track and catenary on the 80km Contournement Nimes-Montpellier (CNM) bypass, which is due to open in October next year. This has been procured through a 25-year PPP, so ensuring high quality delivery is paramount, to ensure good track access and low maintenance requirements.

On the 182km Rennes-Le Mans line (PBL) in northern France, it recently installed all the catenary along with several sections of track in providing technical support and capability to the main contractors.

In Morocco, it is currently delivering the 183km of track and catenary for the first high-speed line in the north of the continent from Tangier to Kenitra. This scheme, due to be commissioned in 2018, has taken advantage of many of the lessons learned in the recent work both at CNM and BPL (as further outlined below).

When it comes to bidding for HS2 rail systems contracts, with its global high-speed multi-disciplinary experience and its position as the leading track contractor in the UK Colas Rail will be able to demonstrate both its UK credentials and a track record across a number of overlapping technical areas.

"We innovate," says Anderson. "That ability was recently brought to bear both in the CNM and Morocco projects. We used road-laying technology in CNM, which has really improved the delivery of the project. The subsequent use of road laying techniques to install the bottom ballast allowed the use of more efficient road-based plant and significantly reduced the need for intermediate tamping - thus speeding up the overall process."

The long-term effects are impressive, too. The technique involves applying a layer of energy-absorbing asphalt to the formation layer first, before the ballast. The asphalt layer absorbs energy that would otherwise cause wear and tear to the rails and overhead catenary, which means considerably reduced

costs over the lifetime of the track. This innovative solution has led to track outputs doubling to 2km per day. This method has also been applied to both the Moroccan and CNM lines, with construction all but completed as this issue of RAIL went to press.

The Moroccan project is currently ahead of schedule. It's a joint venture contract and includes a design-build component for a double-track, high-speed line. Both preliminary studies and construction are included, as are peripheral elements such as installation of the overhead catenary, work site facilities, supply of materials and facility construction. The line is scheduled to open in the first half of next year, and follows a number of other high-profile Colas Rail projects in the country (mostly tram systems).

Colas Rail can call on its specialist disciplines within these schemes, including trackwork, overhead line equipment (OLE) installation, and maintenance.

The CNM project forms part of a much wider high-speed network that will eventually reduce journey times between Paris and the south of France to a mere three hours. Colas' involvement in the overall project is two-fold, with the installation of both track and OLE. It has previously laid track between Valence and Bollene (200km), installed 49 switches and crossings, and completed 340km of electrification.

Crucially, while it can call on support from the global business, Colas Rail Ltd is UK-based with a head office in central London. It is a firm supporter of using staff trained and experienced in the UK's railways, and its commitment to training and development was recognised earlier this year with the award of the Graduate Scheme of the Year at the Rail Industry Awards.

Individuals from this scheme are themselves responsible for overseeing significant programmes of work while receiving strategic support and direction from leaders with relevant experience in delivering large and complex projects. Nowhere is this more applicable than in the field of high speed rail.

Colas Rail already has two Project Directors with international high speed rail experience leading major Alliances in the UK, and with the three high-speed lines shortly coming to a successful conclusion it has access to a vast amount of high speed rail experience, both at a corporate and individual level, which it is keen to reinvest into the UK's own network.

Anderson explains why this is important: "High speed rail is different, and experience is fundamental to success. It's something

money can't buy so these people's skillsets are a critical factor. When those three other high-speed lines are complete, we will be in a position to blend our UK resources alongside experienced high speed staff which we believe has the potential to be of enormous benefit to HS2." ■

**“ We have the skills to do what is required for high speed in the UK. ”**

**Iain Anderson, Executive Development Director, Colas Rail**



# Ripple effects

**PAUL STEPHEN** examines the latest report from HS2 Ltd that shines a light on how the line's arrival will benefit areas away from its core route



"HS2 isn't just acting as a catalyst for change at a national level but also - and perhaps even more so - at a regional and local level."

These are the words of HS2 Ltd Chairman Sir David Higgins, in the foreword to the most recent report published by HS2 Ltd on October 31.

*Changing Britain: HS2 Taking Root* isn't just another document arguing the case for improved north-south connectivity. Instead, it focuses on the considerable fringe benefits to the towns and cities peripheral to the route, and how HS2 will be a key part of future plans and strategies for localised economic growth.

While much stock has been placed in how the new line will affect London, Birmingham, Manchester and the other cities located on the core network, this report highlights what is being done in nine other areas, which are readying themselves for the arrival of HS2 trains that will run on HS2 metals and then on to the classic network.

A trebling of seats available from Euston during peak hours from 2033, and the consequent freeing up of capacity on the classic network for additional passenger and freight paths makes HS2 an appealing prospect for all areas of the UK, opening up new regional markets and making HS2

a key strategic element of the Northern Powerhouse and Midlands Engine agendas.

In some cases, the benefits of HS2 will be felt at several peripheral locations, even before parts of the core network come online. Both Stafford and Crewe could be welcoming high-speed services accessing the West Coast Main Line beyond the physical limits of phases 1 and 2a of HS2 once they are built in 2027 - a full six years before they will be able to serve Nottingham, Sheffield or Leeds on Phase 2b.

That fact makes it even more critical to consider how HS2 will affect the periphery, in addition to the better-understood impacts on the core.

Says Higgins: "Now we are beginning to see it [HS2 acting as a catalyst for change] in

**“ We are beginning to see HS2 acting as a catalyst in areas which will not be directly on the newly built railway line. ”**

**Sir David Higgins, Chairman, HS2 Ltd**

**Sir David Higgins: "The regional voice of Britain is making itself heard again."** HS2 LTD.

those areas which will not be directly on the newly built railway line, but will be served by HS2 trains. These will run on to the classic network to areas such as Newcastle, York and Darlington in the east and Liverpool, Stafford, Warrington, Preston, Wigan and Carlisle in the west.

"As the examples in this report amply illustrate (see overleaf), these areas too are making HS2 an integral part of their plans for the future. As they do so, three themes are strongly emerging."

From the evidence presented in the report, it states that the first theme is a valuable lesson learned from the construction of HS1 in Kent - that it is key to plan for high-speed services as soon as possible, and to be proactive rather than reactive in forming co-ordinated responses and action plans.

Secondly, the benefits of HS2 are as much a result of improved connectivity between the regions than any gain in journey times to London. Local leaders in the nine areas covered by the report have described how they are beginning to think about new ways of trading with each other to rival the talent and innovation of London, in addition to simply tapping into what the capital can offer.

Finally, the strategic response to HS2

services is being 'driven from the bottom up, rather than the top down', and regions are identifying local strengths and how they themselves can take them to a higher level, rather than relying on centralised and remote forms of planning.

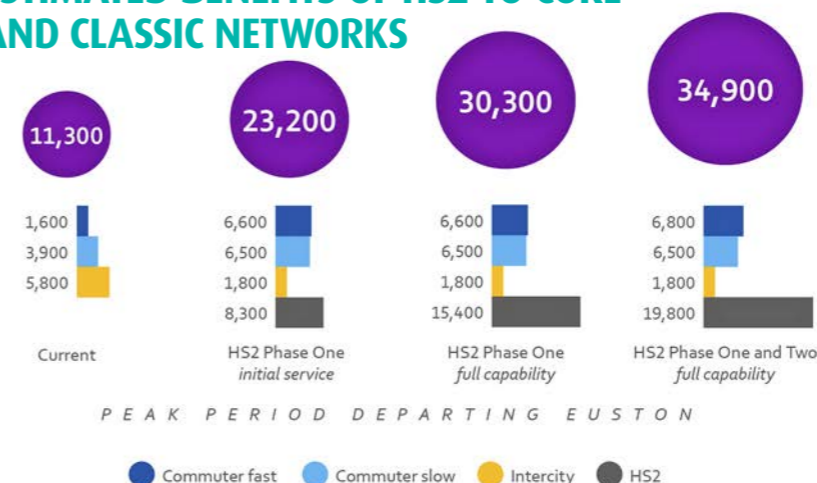
"The regional voice of Britain - so strong in the Victorian era when the original railways were born - is making itself heard again," Higgins concludes.

"The next challenge will be to join up and integrate those local economic strategies into a truly national picture - not just for transport but for the economy as a whole."

Away from the key focus of the report and back on the core network, Higgins and

HS2 Ltd's team of researchers also provide an update on the HS2 Growth Strategies that are still in development for Phase 2b stations; with Phase 1 stations having already completed this process. It develops the initial proposals set out in February's *Changing Britain* report and summaries are provided (right) for planned Phase 2b stations in the East Midlands, Leeds, Manchester and the Northern Gateway Partnership (Staffordshire & Cheshire). Sheffield is not covered, however, and it must wait until route plans have been finalised following the alternative recommendations for stations and the route in South Yorkshire that were set out by Higgins in July. ➔

## ESTIMATED BENEFITS OF HS2 TO CORE AND CLASSIC NETWORKS



**Over 300,000 passengers**  
a day on HS2 services, with connections to the rest of the rail network

**13 extra trains**  
Potential increase in London Midland commuter services during morning peak due to HS2 Phase One

**800 lorries**  
off the road, on average, each day

**2 extra lines**  
for Manchester Piccadilly freeing up space for local services

**Up to 40 freight trains**  
extra per day to support industry and business

**100 towns and cities**  
could benefit from new or improved rail connections

SOURCE: HS2 LTD.

## PHASE 2B STATIONS EAST MIDLANDS

An HS2 Growth Strategy for the East Midlands will complement the wider project being undertaken by the Midlands Connect Partnership to ensure the region is ready for the arrival of a station between Nottingham and Derby at Toton, and infrastructure maintenance depot at Staveley, near Chesterfield. Proposals include linking the station to the motorway network and classic rail and tram networks to secure journey times of just ten minutes to their respective city centres.

### LEEDS

Leeds Chamber of Commerce sees HS2 as a 'once in a lifetime' opportunity to redevelop the city's station, already the busiest in northern England, into an integrated hub for HS2. The adjacent Southbank regeneration initiative will double the size of Leeds city centre, and is expected to provide 35,000 jobs across key sectors and 4,000 new homes. Leeds City Council is consulting on its plans for South Bank and will report its conclusions in 2017.

### THE NORTHERN GATEWAY DEVELOPMENT ZONE

The Growth Strategy for the NGDZ in Staffordshire and Cheshire will be underpinned by separate work being done in Crewe, Stoke-on-Trent and Stafford (see overleaf), plus the Weaver towns of Winsford, Northwich and Middlewich. An integrated HS2 station in Crewe could also provide greater connectivity to North Wales and the Mersey Dee region, supporting that region's ambition to expand the size of its economy to £50 billion and create 70,000 new jobs. Growth Track 360 has been established to advance this ambition.

### MANCHESTER

The Greater Manchester Combined Authority estimates that HS2 will make Greater Manchester an even more attractive business location, creating up to 180,000 jobs by 2040 and adding £1.3bn to the region's economy. The Strategic Regeneration Framework for Piccadilly (see pages 64-67) anticipates 4,500 new homes and over 700,000 square metres of retail space being built in the immediate area surrounding the city's main station.

Meanwhile, the planned HS2 station at Manchester Airport will complement its investment programme in Terminal 2, and enhance the economic impacts of Airport City - an Enterprise Zone expected to attract international businesses and create 35,000 new jobs.

# INTEGRATED HIGH SPEED STATIONS

## NEWCASTLE

With HS2 trains due to run to both Newcastle and Durham, the North East Local Enterprise Partnership (NELEP) has outlined a vision to create 100,000 new jobs in the region and raise productivity from the anticipated improvement in connectivity. The region has historically been a strong base for manufacturing and engineering. Nissan is a key employer at its factory in Sunderland, and it stands to benefit from any increased capacity for freight.

Meanwhile, the North East Combined Authority (NECA) has developed a manifesto to fully exploit the high-speed services and will work with Network Rail on options to improve local services and frequency on the East Coast Main Line. Durham County Council hopes to double employment in its already successful tourism sector and attract new enterprises to the new business quarter, located by the city's main station.

## YORK

York is already a key hub on the existing network and 10% of jobs in the UK rail industry are based there. Its railway heritage is also unparalleled as it's home to the National Railway Museum.

But York City Council's eyes are set firmly on the future as its new high-speed services will connect it, via HS2's eastern arm, with East Midlands and Birmingham airports, bringing them both less than 90 minutes away. With two universities and many national training and research facilities, it is hoped that York can attract more international high-value businesses to the area.

HS2 will also provide a boost to its tourism sector, already worth some £600m per year.

York City Council is also heavily engaged with Network Rail, the National Railway Museum and The Homes and Communities Agency to develop York Central – a project to regenerate land next to the city's main line station for commercial and residential units.

The council will finance around £80m worth of infrastructure improvements before the arrival of HS2 using the York Central site's status as an enterprise zone, while the station itself is due to be remodelled to be HS2-ready.



SOURCE: HS2 LTD.

## DARLINGTON

Darlington welcomed the first passenger railway in Britain in 1825, and is still at the forefront of railway technology two centuries later, with its ambitious plans for HS2 services that will call here from 2033.

A partnership formed of Darlington Borough Council, Tees Valley Combined Authority, the Local Enterprise Partnership, TfN and NR has developed a masterplan called the Darlington HS2 Growth Hub, which has earmarked £100m worth of improvements for the town's station. Over 59,000 square metres of new business space will be created, along with 1,500 homes, while the station will be physically connected to Central Park Enterprise Zone and the Market Hall area.

The HS2 Growth Hub, and a reduction in journey times to London to less than two hours, is estimated to be worth up to 3,000 new jobs and £130m a year in economic growth to the Tees Valley region.

## CARLISLE

As the gateway to Glasgow and much of the rest of Scotland via the West Coast Main Line, an integrated high-speed station at Carlisle will be an important asset to the local economy. Faster journey times will support a growth in employment opportunities, but also the tourism sector by making the Border City and Lake District National Park (which already attracts more than 40 million annual visitors) more accessible. The City Council is actively working on a regeneration plan, including the Carlisle Station Gateway Plan, that is expected to make the most of the historic and imposing Citadel adjacent to the station in any remodelling required for HS2.

## PRESTON

Preston already has the busiest station in the North West outside Manchester and Liverpool - a status that will only be strengthened by the arrival of high-speed services. They will also help sustain Lancashire's position as one of the world's largest aerospace clusters, and an energy sector that employs 37,000 people, including workers at Heysham nuclear power station.

The Lancashire Local Enterprise Partnership estimates that HS2 could provide a boost of £600m and an additional 3,000 jobs in Preston and South Ribble. It also expects anything up to 75,000 extra visitors to the city a year, adding £3.3m to its economy. A new business district next to the station could also provide 7,500 new jobs.

## WIGAN

Under current plans, the HS2 tracks will join the WCML just 2.5 miles south of Wigan. Wigan Council believes an integrated high-speed station would make Wigan a pivotal place to do business, located equidistant from the economies of Liverpool and Manchester. Journey times to Birmingham would fall to just 35 minutes, while London would be 80 minutes away, offering improved access to the town for potential employers in what has traditionally been seen as an area that suffers from higher-than-average unemployment.

Wigan Council is working with Transport for Greater Manchester to improve links between Wigan North Western and Wallgate stations, to improve interconnectivity between north-south and east-west routes through the town. Refurbishment of the town's bus station will begin in 2017, and £1.3m is being invested in the Market Place.

## LIVERPOOL

The Liverpool City Region has not given up hopes of a dedicated spur built from HS2, but even under current plans both Lime Street and Runcorn stations stand to benefit from HS2 trains running onto the WCML at Crewe, slashing journey times to Merseyside.

The Liverpool City Region has a population of over 1.5m people and an annual economy worth £28bn. That's in addition to its new Deep Water superport - which can only stand to benefit from extra freight paths potentially released on the conventional network by HS2.

Liverpool City Region has released a *Long Term Rail Strategy* with a 30-year planning horizon to capitalise on HS2 and develop local transport connections, and is closely involved with TfN in integrating HS2 with HS3 to bring the widest benefits to connectivity across the entire north of England.

## WARRINGTON

With its journey time to London cut to just over an hour, an integrated high-speed station at Warrington Bank Quay will become an even more attractive proposition to the three million people who live within 30 minutes driving time of the town, giving it one of the largest workforce catchment areas outside of London.

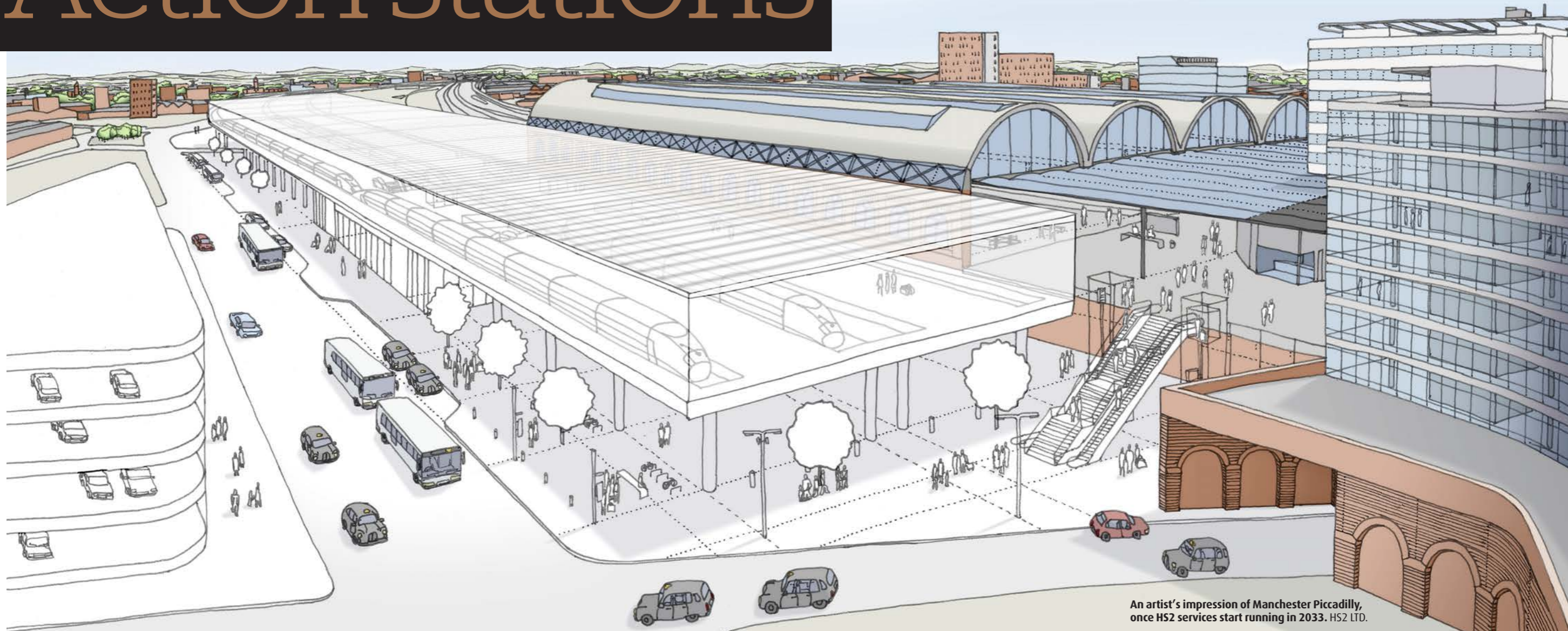
With this in mind, Warrington Borough Council updated its 2013 *Warrington Means Business* economic growth strategy. The £1bn Omega business park is already up and running, and work has started on the £107m Time Square redevelopment in the town centre. The council is also negotiating a growth deal with the Government to embark on the Warrington New City programme, structured to deliver 26,000 new homes and 24,000 new jobs in the town by 2040. It's also working on proposals to redevelop Warrington Bank Quay station, which it regards as a potential TransNorth Hub between HS2 and HS3.

## STAFFORD

Stafford is ideally situated to take advantage of HS2 services as an important junction between existing WCML services to Birmingham, Liverpool and Manchester. Regeneration projects already under way include a £1.2bn investment in new shops, businesses and industrial expansion. Stafford Borough Council also has plans for 10,000 new homes, predicated on the boost to transport links created by the link between HS2 and the WCML being built at nearby Handsacre, in the Trent Valley.

The council, in collaboration with seven other local councils and two local economic partnerships, has devised a growth strategy for the Northern Gateway Development Zone - spanning Cheshire and northern Staffordshire - and sees HS2 'supercharging' the delivery of 100,000 new homes and 120,000 jobs across the area by 2040.

# Action stations



An artist's impression of Manchester Piccadilly, once HS2 services start running in 2033. HS2 LTD.

The planned construction of High Speed 2 (HS2) provides an exciting and important development in the history of rail travel in the UK.

While the arguments for and against the building of the route have been extensively covered within the pages of *RAIL* over the past few years, it cannot be denied that the building of HS2 will be a huge economic boost to the cities served by the line, as well as helping to keep the UK at the forefront of modern railway development.

One of the key northern cities that will benefit from the arrival of HS2 is Manchester, which is within the Phase 2 section development of the new high-speed line. The city has undergone massive regeneration and growth, especially over the past two decades, and the establishment

## ANDY COWARD reports on how Manchester is preparing itself for the arrival of HS2's Phase 2

of a high-speed rail route to Manchester is seen as an important aspect in assisting the city to continue its aims of being a major and thriving part of the UK economy.

Phase 1 of the new route will run from London to Birmingham, and it is hoped that it will be completed in 2026. HS2 Phase 2 forms a 'Y' shape, from the West Midlands up towards Manchester and the North West with proposed stations at Manchester Airport and Manchester Piccadilly, and up towards Leeds and the North East with proposed stations in Leeds, the East Midlands and Sheffield Meadowhall.

While no earth has yet been broken

(indeed, it is not expected that Phase Two of HS2 will be open for passenger services until 2033), plans for the arrival of HS2 are now at an advanced stage, with the route and infrastructure now largely agreed. It's a massive project that will transform many areas of the UK, but the importance of the new line cannot be underestimated.

The proposed HS2 station for the Manchester terminus will be constructed alongside Manchester Piccadilly station, adjacent to Platform 1. The HS2 station will feature four platforms which will be elevated, with concourse facilities located at ground level beneath the platforms, providing a

range of retail units and other passenger facilities. The station will be housed beneath an overall roof designed to complement the listed station roof over NR's adjacent Piccadilly station, which is also expected to be further improved in preparation for the arrival of the high-speed trains.

It is hoped that the new Piccadilly station and facilities will become as successful as those at the current High Speed 1 terminus at London St Pancras, where the station has become a destination in itself.

The Piccadilly area of Manchester is very close to the city centre and has good road and public transport links. These will be further enhanced with the HS2 development to cope with predicted demands on the road and rail network in the area.

A lot of work has been carried out over the

past few years to regenerate the Manchester area, but there is still much scope for improvement to the area that surrounds Piccadilly. The arrival of HS2 will help to kick-start the widespread regeneration of this area of the city.

The site of the HS2 station, alongside Piccadilly, is an obvious choice. The new high-speed line will also feature a station at Manchester Airport, but will approach Manchester via a seven-and-a-half mile tunnel beneath south Manchester, before

“ Optimistic sources predict as many as 45,000 new jobs.”

emerging alongside NR metals at Ardwick for the final approach to Piccadilly.

Piccadilly is the principal main line station in the city, and it was extensively modernised and redeveloped in 2002 to coincide with the city hosting the Commonwealth Games. It currently features 14 platforms, with 12 terminus platforms and two through platforms. Proposals for future expansion of the station include provision for another two through platforms, which will increase the station's capacity.

Beneath Piccadilly station, within the station undercroft, are the two Metrolink tram platforms, which were built within a specially-constructed 'concrete box' in 1991. Since the Metrolink station opened in July 1992, passenger usage of the tram stop has continued to grow. The widespread

➔ expansion of the Metrolink system since 2010 has increased Piccadilly's importance, as more local communities have been able to benefit from a direct link to and from Manchester's principal main line railway station.

Under the HS2 proposals, it is envisaged that the existing Metrolink platforms will need to be redesigned, or even relocated, to accommodate the HS2 station and its associated facilities.

However, the HS2 plans recognise the importance of Metrolink to the communities it serves and the tram facilities at Piccadilly will complement the heavy rail and high-speed services at the station.

**An aerial shot of Manchester Piccadilly looking south-east. HS2 will emerge towards the top of the picture from a 7½-mile tunnel running beneath south Manchester. ALAMY.**



## PROPOSED JOURNEY TIMES ON HS2 FROM MANCHESTER

**Manchester to Manchester Airport: 7 minutes (currently 18 by NR routes)**  
**Manchester to Birmingham: 41 minutes (currently 88 by NR routes)**  
**Manchester to London: 68 minutes (currently 128 by NR routes)**  
**Manchester to Heathrow: 83 minutes (currently 188 by NR routes)**

Source: HS2 Ltd.

Other proposed facilities around the station include a new coach station, enhanced car parking, taxi ranks, bicycle storage and better connections with other public transport operations in the city.

Regeneration of the area around Piccadilly station is also central to the development of HS2. Following the Government's announcement regarding the development of the Phase 2 section of HS2, Manchester City Council and Transport for Greater Manchester appointed architecture firm Bennetts Associates to look into the potential

of the scheme. Their study revealed that construction of HS2 into Manchester could bring about the following benefits in relation to the regeneration of the area surrounding the new station:

- The connectivity associated with a best-in-class multimodal transport hub
- The construction of up to 4,500 new homes
- 625,000 square metres of commercial office space
- 100,000 square metres of retail space
- 1,000 new hotel rooms
- The creation of numerous high-quality public spaces
- A range of cultural and community buildings

These positives should be compared with the negatives - a total of 48 residential properties will need to be demolished. It is also estimated that 1,900 jobs will be displaced from business premises, which will need to be relocated away from the path of the new line. In mitigation, it is also expected that most of the companies and people affected will be able to relocate to other areas of Manchester or the surrounding region.

Economic studies carried out by the Government have estimated that Manchester will benefit from station-supported creation of at least 30,000 jobs, 29,700 of which will be created around Manchester Piccadilly, and the other 300 from the construction of a new station at Manchester Airport, in Phase 2. More optimistic sources predict as many as 45,000 new jobs.

Part of the redevelopment work associated with the preparations for HS2 is the transformation of the Mayfield area of Manchester, which lies on the opposite side of NR's Piccadilly station to the proposed HS2 station.

Manchester's long-closed Mayfield station is located within this area and the station closed to passengers in 1960, but was retained for use by parcels traffic until 1986. Ever since, the station has stood as a decaying reminder of its former role, even



**It is hoped that a redeveloped Manchester Piccadilly can become as successful as St Pancras International's HS1 terminus, now a destination in its own right for the station's shopping and leisure facilities and a multiple award winner for its historically sympathetic redesign. PAUL BIGLAND/RAIL.**

though it is located in an area which has been ripe for redevelopment.

Now owned by London and Continental Railways, Mayfield station and the surrounding area is to be transformed into a mixed-use development for retail, office and entertainment spaces, along with the construction of more than 1,330 new homes, under the Piccadilly Strategic Regeneration Framework.

The commercial aspect of the Piccadilly SRF anticipates that the Mayfield development will also provide over 6,500 new jobs for Manchester, further boosting the local economy of the city.

Construction of the line into Manchester is expected to take nine years to complete, although work on the station itself at Piccadilly should be completed within six. Under current timeframes it is hoped that testing on the route will begin in 2031/32,

with public services starting the following year.

Probably the biggest benefit of HS2, aside from providing much-improved journey times on existing lines, is the increase in capacity the new line will bring to the existing NR network. According to HS2 Ltd, the new line will carry 300,000 people on its services each day, with up to 18 trains an hour departing from London Euston by 2033.

Not all passengers will choose to travel on the HS2 route, but it is anticipated that the completion of the line will free up some capacity on the existing NR network, which will benefit freight traffic. It will also allow for the introduction of new services.

The development of HS2 between London Euston and Manchester Piccadilly should certainly free up some capacity on the heavily-congested West Coast Main Line route.

While the completion date of 2032/33 still seems a long way off, the complicated nature of the line's construction makes it one of the biggest civil engineering projects to have been undertaken in the UK.

The construction of HS2 is one of the most exciting projects in UK railway history, and Manchester is getting itself ready for the wave of prosperity it will bring. ■

### About the author

Andy Coward, Contributing Writer

Andy Coward is a former RAIL News and Features Writer, who has regularly contributed to RAIL since 2007. His main interests are railway architecture, heritage railway operations and UK light rail, and he has written or co-written five books. A former General Manager of the East Lancashire Railway, he now works as an Operations Controller for Metrolink RATP Dev Ltd.



**Mayfield station, on the right, closed to passengers in 1960 and parcels traffic in 1986. It will become a mixed-use development, and forms part of the 4,500 new homes and 625,000 sq ft of office space HS2 is expected to bring to this neglected area of Manchester city centre. ALAMY.**



A green tunnel and a good example of landscape integration on HS1 in Mersham (Kent). Much of the design of HS1 can provide inspiration to the designers and builders on HS2 when it comes to integrating the railway within a local area. HAWK PUBLICATIONS.

# HS2's design ethics

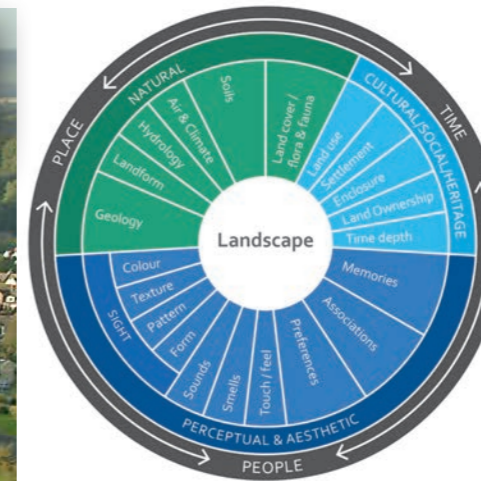
HS2's designers envisage a railway that's sympathetic to its surroundings. But it's not some utopian pipe dream - it's key to the acceptance and long-term success of HS2, explains **STEFANIE BROWNE**

Britain's landscape is diverse, yet distinctive. Each region has its own unique qualities, whether they're hills and forests, coastal cliffs or flat farmland and big skies. But whatever the view from our windows, we're all proud of our country's beauty, and protective of it when anything threatens to change it. But change is inevitable when big infrastructure investment is planned. What isn't inevitable is that the change has to have a negative impact; if enough thought is put into new infrastructure, it can blend seamlessly into its environment. Plenty of rail projects have been developed in this way already - Crossrail stations are each designed in sympathy with their locations. Now, HS2 designers are thinking about the landscape too. In July, HS2 Ltd released a report on the Landscape Design Approach for the new railway, setting out its approach to integrating the new line into its

environment, both aesthetically and sensitively. But what exactly does this mean? Is it merely about planting a few trees to replace the ones cut down to make way for the railway? Or is it about covering all the buildings in grass to make them 'green'? The report explains: "Understanding the diverse character, unique patterns and subtleties of the landscapes through

**“ HS2 needs to have its own strong identity, and provide the communities it passes through with infrastructure that enhances the area.”**

which HS2 is planned is the starting point in developing an effective landscape design for the project. This will require an understanding of landscape in its widest context, including the natural, cultural, social, heritage, perceptual and aesthetic qualities of the landscape." (See diagram, above right.) This type of landscape character assessment is a common method of looking at both the broad similarities of large areas, before drilling down into the finer details that make an area distinctive. One of the benefits of this is an enhanced understanding of the effects of future changes to the landscape. HS2 designers will look at the physical characteristics of the areas that HS2 will pass through and then place this into context with things like the cultural and historical qualities of a particular area, also taking into account how this might change over time. The whole point of the Landscape Design



Note: Diagram based on *An approach to landscape character assessment* - Natural England, 2014. Source: *Landscape Design Approach*, HS2 Ltd, July 2016.

The LDA is clear that this need is what makes landscape design so vital - it acts as the 'glue' to help merge and consolidate other areas of the project, such as engineering, architecture, ecology, noise, highways, recreation, agriculture and heritage. So, measures such as visual screening can be considered in the context of the local roads, noise mitigation and easy maintenance access of the railway itself. Beyond that, HS2's design ethic must also consider other forms of transport, for example integrating footpaths and cycling routes. Considering the landscape that HS2 will pass through is necessary for the construction phase, as well as what it will look like once the railway opens. There will be a long period where areas will be disrupted by the building of the railway, so finding ways to improve the landscape or offer improvements for communities while that happens is just as important. Ideas such as wildflower seeding on temporary soil

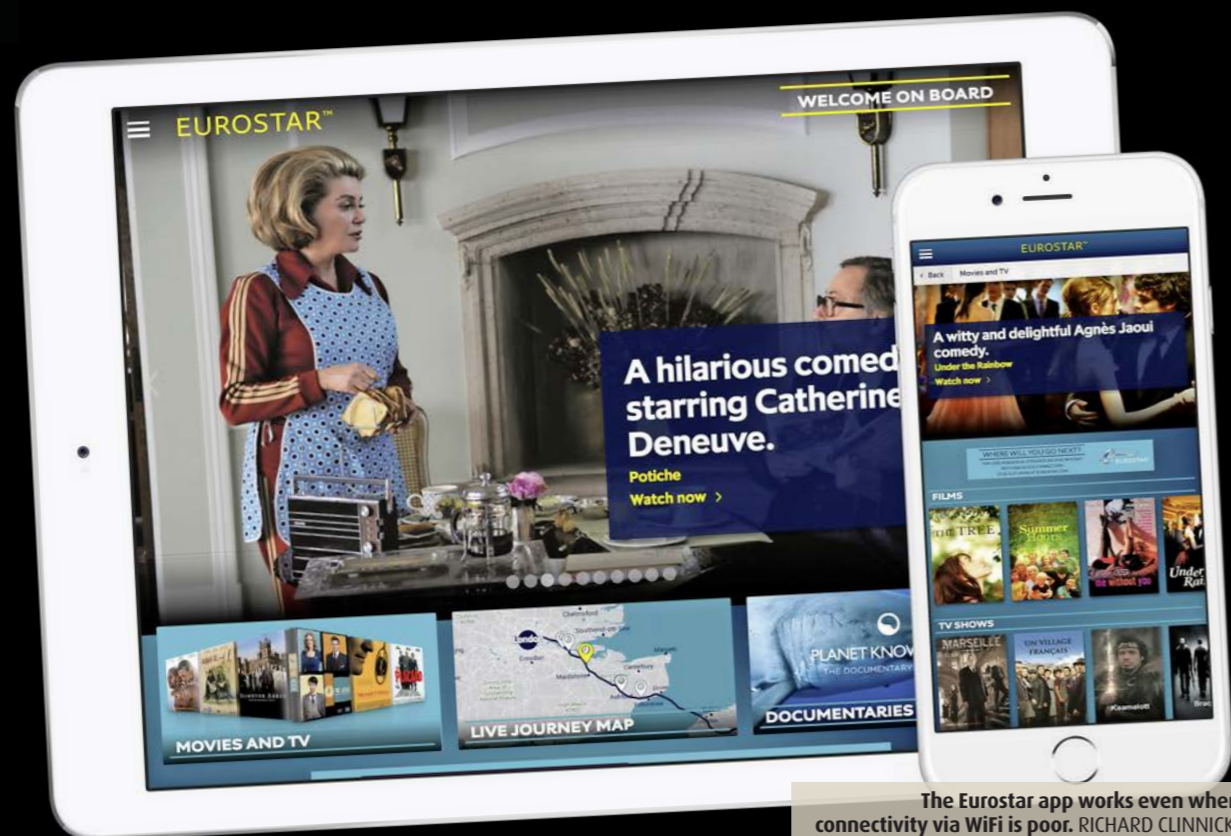
- ### HS2 PROJECT COMPONENTS
- These are the individual areas that require specific design approaches on the project:
- Temporary works
  - Earthworks design
  - Landscape interfaces with buildings and structures
  - Public realm
  - Public open space, recreation and play
  - Highways
  - Accesses
  - Planting
  - Grassland
  - Soil
  - Water
  - Heritage and culture
  - Ecology
  - Environmental barriers
  - Fencing
  - Retaining walls
  - Management

stockpiles, or making artistic features out of temporary earthworks all help to create a more positive environment for communities during construction. Hoardings which hide building sites from residents can be used as educational boards or art displays. Finding ways to make the construction phase of new infrastructure a positive experience can make a huge difference to affected communities. It would be easy to imagine a new railway and see only tracks, trains and station buildings. But the things we love about our current railway were all products of good design - many of the buildings we applaud are masterpieces of Victorian innovation. Equally, the things we loathe were all the result of poor design. If HS2 can get the landscape design right, it will reap the benefits for decades to come. ■



The A21 Lamberhurst Bypass land bridge. This is an example of how integrated design can really work. The landscape acts as a unifying element with the bridge. RICHARD JEVONS/FIRA.

# Media on the move



The Eurostar app works even when connectivity via WiFi is poor. RICHARD CLINNICK.

Long-distance high-speed trains carry a variety of passengers, from business travellers to day-trippers and families. The one thing they do have in common is that most want to use the internet during their journeys. In the UK, Virgin Trains was acutely aware of this issue, and so it joined forces with GoMedia to launch the BEAM app, which enables passengers to stream media to their mobile devices regardless of external signal coverage. On railways, the signal drops a lot, so this innovation is a blessing for both business and leisure travellers.

Connectivity is vital, and it has been for a number of years. Operators aren't oblivious to that fact, but a workable solution has proved elusive.

The issue of connectivity is most acute on a high-speed railway. The tracks might run through long, deep tunnels, rural areas with poor coverage and signal-sapping woodland. Overhead line equipment is also thought to have an impact on the quality of signal.

Speaking in June to *RAIL*, Eurostar admitted that there were 'concerns' regarding mobile network coverage on a large part of its route. It's somewhat puzzling that you can use the internet all the way through the Channel Tunnel, 100 metres below sea level, but have the frustration of

**RICHARD CLINNICK** reports on an innovative system that sidesteps the issues of patchy mobile network coverage on the UK's railways

patchy coverage when racing through Kent or Northern France.

There are plans for investment to counter this problem, but for the time being, coverage remains intermittent at best. To improve this will require more aerials, which would involve making deals with the mobile phone companies.

But there is always room for innovation. Nomad Digital has worked with GoMedia to develop an entertainment app which allows users to enjoy media stored locally on Eurostar trains, offering passengers an alternative to browsing the internet - a bit like an on-train video library.

**“The world has moved on from '2-for-1' deals. Connectivity is king.”**

**Matt Seaman, CEO, GoMedia**

The shows available are from both the UK and France (with subtitles) with the addition of Belgian and Dutch content in the works. The developers monitor what is being watched so they can keep in step with what people watch and change the content accordingly. GoMedia Chief Executive Matt Seaman explains that, on average, a passenger uses the app for 75 minutes. They can also use the app to check on their journey's progress - one of its most popular features.

GoMedia began working on the system in April 2015. Eurostar wanted a premium offering that would lure more people away from airlines and onto the trains. Seaman has been involved in similar developments before, such as for Sky and Freeview projects. He highlights that one of the most-watched shows on Eurostar trains was *Peppa Pig*.

Nomad Digital General Manager Jean-Philippe Tissot, travelling on the train to Paris on October 14, said that one key factor is to keep the contents fresh. "It keeps passengers coming back," he says, and makes the point

that it also drives down mobile data costs; a trainload of passengers streaming content via the trains' WiFi access points is expensive for TOCs, who have to pay for that data, just as you would through your personal phone contract. As far as the actual coverage is concerned, however, that's up to the likes of Vodafone, EE and O2.

Seaman believes that in time "several hundred" passengers will be able to use the app concurrently, all watching locally stored content. That will need further development, which Tissot says Nomad is already working on. "We are monitoring its use at the moment. We need to see how many people are accessing it." At the moment, one issue that skews those figures is a passenger who might be using the app on multiple devices simultaneously, which the system sees as multiple users. But the system has to be able to cope with high demand - if all 900 people on an e320 train were connected to the service, could it cope?

WiFi access points are fitted throughout the train, and Tissot explains that each one can handle between 80 and 90 connections.

Seaman reveals that current figures suggest that there are between 200 and 300 connections through the app per train. "That saves the company a considerable amount in 3G/4G data charges. These would be very high on a Eurostar service," he explains. Virgin Trains - both East and West Coast - have recorded lower data costs as more passengers use the BEAM app to access the on-board entertainment.

Tissot also points out that the system is resilient enough to cope if the WiFi fails in one vehicle, so passengers in the rest of the train will not be cut off.

The system works through a WiFi access point within the carriage (two per carriage). The access points are hard-wired to a mobile network-enabled router, as is the media server that hosts the actual content, in digital format. The high-end routers on

the e320s can be connected to the mobile network through up to eight simultaneous 3G/4G connections, to both UK and French networks.

Seaman explains that the app used by Virgin Trains is purely for entertainment, while the Eurostar system offers much more.

Tissot confirms that there is a fair use policy but it can be used for downloading files, which many TOCs don't allow. Certain types of websites are blocked, such as those which might consume a lot of bandwidth, or those which are 'inappropriate' for viewing on trains.

Tissot compares the system to Netflix, and reckons it will be a 'game-changer' for the railway industry. He confirms that several TOCs have expressed an interest in the system. He also points out that the content can be tailored to the operator's requirements. "For example, on commuter routes, we would cache the latest news on the trains' media servers," he says.

Seaman believes that this will offer

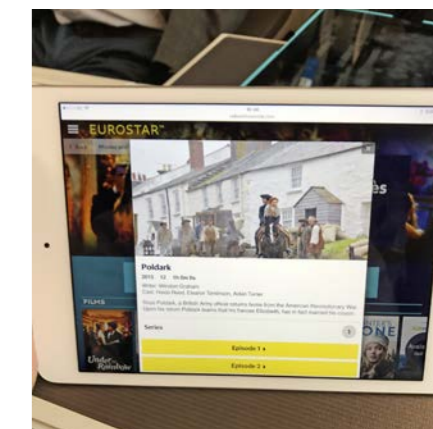
**“It saves the company a considerable amount in 3G/4G data charges.”**

**Jean-Philippe Tissot, General Manager, Nomad Digital**

something new to passengers. It brings rail travel more up to date and creates another reason to travel by train.

"My £4,000 season ticket doesn't even know my name. TOCs need to start thinking about their digital strategies. This system knows more about the passengers than the operator does, but we also need to appreciate what we can do with that data. We've got some catching up to do."

However, he's optimistic about how



Television shows such as *Poldark* are available via the app. RICHARD CLINNICK.

the railways engage with its passengers through the internet. "Over the last couple of years we've noticed people from different backgrounds are being attracted to working in the rail industry. I have seen there is a change in the Chief Information Officers (CIO) joining companies. That the customer should come first has really become the focus, and that is permeating through the business." He says that what passengers want has changed. "The world has moved on from '2-for-1' deals. Connectivity is king.

"A few years ago, mobile operators had no interest in adding masts to cover railway tracks. Now, the likes of EE are investing in it. Orange has struck a deal with SNCF to provide high-quality coverage on France's five main lines."

Tissot believes that the rail industry is around five to ten years behind the aviation industry in terms of its entertainment and internet connectivity, and yet he says: "The UK is fairly advanced as a deregulated market."

High Speed 2 will require high-quality connectivity - much of the route being built in Phase One, between London and Birmingham, will be in tunnels.

For cross-Channel trains, the Channel Tunnel has excellent reception. Tissot says: "There is 4G coverage there because there was a business case for it. Consequently, the investment was made and the necessary equipment installed. This was not done in the St Pancras tunnel." It is thought that there was no business case for this.

"For HS2, you would have to invest in the tunnel," says Tissot. "We would have to do it. Or perhaps a new technology will emerge that makes it more viable. But there will be no miracle solution."

For the time being, Seaman says Eurostar leads the world in terms of its connectivity via the app. It has plans to do even more. One option could be live television, or 'nearly live' content, such as news.

The Eurostar brand is capitalising on these offerings. But in time, it will be commonplace across the UK's rail network. Passengers are set for a step-change in the quality of their journeys. ■



New Eurostar e320 374020 at St Pancras International on June 3, on the rear of the 0831 to Paris Gare Du Nord. RICHARD CLINNICK.





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