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railways

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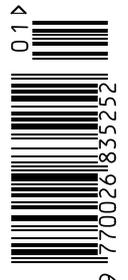


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ON BOARD THE FLYING BANANA

I always look forward to a trip on an HST, but this one is a bit different. Birmingham International is not usually the place you'd find one, and the bright yellow machine emerging from the angry grey skies provokes some surprised looks among passengers on the platform.

This is Network Rail's New Measurement Train, converted from a passenger HST in 2003. While it is the most celebrated train from NR's Infrastructure Monitoring fleet, it is in fact just one part of the company's armoury of 13 trains and 64 vehicles. All have the same purpose of collecting data to provide insight into the state of the infrastructure, helping to move from find and fix to a predict and prevent approach to maintenance.

Each is targeted at a specific niche – the NMT concentrates on high-speed main lines, working on a roughly four-weekly circuit of routes. Across 2,000 recording shifts a year, the infrastructure monitoring fleet accumulates some 750,000 miles of recorded data.

The catalyst for the increased use of this technology was the Hatfield derailment in 2000, found to be the result of gauge corner cracking. In no small part due to the infrastructure monitoring fleet, the number of broken rails each year on the network is just 10% of what it was at the time of Hatfield.

This is a field in which Network Rail is truly leading the way.

I'm on board for a trip to Northampton and then back to Birmingham New Street; on this particular day the NMT has already been on the go for several hours since leaving Derby in the morning. The trip just gives time for Head of Delivery for Data Collection Steve Quinby and NMT Delivery Manager Richard Wilkinson-Ford to demonstrate the technologies used on board the converted HST.

There are two test vehicles on the NMT – the development vehicle and the production vehicle. The development vehicle utilises two main technologies – Plain Line Pattern Recognition (PLPR) and a Fraunhofer Overhead Head Line system.

Development of PLPR began in 2013 and has now become business as usual for the infrastructure monitoring team. The train points high definition cameras at the rail to take a series of photos; its ethos is similar to facial recognition software, as it looks to compare the recorded state of the rail with how it should look. The system spits out candidate faults, which are then scrutinised by the 30-strong inspection team at Derby who process the data. NR has 72 hours to record the data and confirm or send a fault, and its severity will then dictate how soon it is attended to.

Of course, some candidates will not be true faults, and it is the role of the inspection team to identify these.

The Fraunhofer system uses lasers above the train to measure the position of and wear on overhead wires. Being an HST, there is no pantograph – one of the other vehicles in the fleet, MENTOR, has an instrumented pantograph to measure the load on the wire and contact forces.

On the return trip from Northampton it is time to visit the production vehicle. Here there are 47 different types of sensors used to measure track geometry; this started out as a way of improving passenger comfort but is now safety critical. Again, analysis is carried out at Network Rail's Milton Keynes headquarters once the train has finished its journey, with data sent back within 12 hours. But in the case of a particularly severe fault the NMT itself will be stopped and a team dispatched to check the line. Thankfully, this is rare – a once or twice a year event.

Mr Wilkinson-Ford highlights an interesting point – some of the kit fitted to the NMT is now 10 years old and would look archaic even in your own home. But it is the combined effect of the technologies on-board which provides the NMT's value.

Where disruption is inconvenient for passengers, it is equally so for

the NMT. With each shift planned up to two years in advance, any deviation from the planned route means a section of track is missed and the train will have to return to it later. If a section is missed twice in a row, a temporary speed restriction is the result, with its consequent knock-on effect on all services.

The holy grail is fitting infrastructure monitoring equipment to vehicles in passenger service, which would vastly increase the amount of data that can be gathered. Perpetuum has fitted vibration sensors to service trains which can monitor the infrastructure, but in terms of the equipment Network Rail uses there are significant challenges to overcome. Also a challenge is the age of some of the infrastructure monitoring vehicles, both in terms of reliability and their performance, which makes fitting their operation into a modern timetable challenging.

But with the infrastructure monitoring service now a critical part of Network Rail's armoury, there is clearly a strong case to be made. And with the renewed focus on day-to-day maintenance in Control Period 6, the infrastructure monitoring fleet will surely become even more important. 

Philip Sherratt
Assistant Editor



Flying banana: power car No 43013 *Mark Carne CBE* leads the New Measurement Train past Attenborough Nature Reserve with the 1Q49 09.37 Derby R.T.C. to Derby R.T.C (via Skegness) circuit on 26 October 2018. No 43062 *John Armitt* was on the rear. Steve Donald

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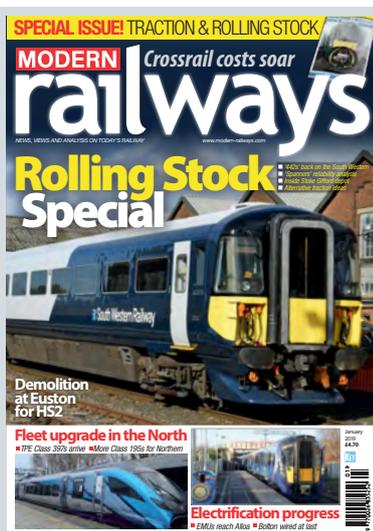
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Cover: SWR unit Nos 442404/408 at Eastleigh works. Carl Watson



2019

A HAPPY NEW YEAR?

'2018 is set to be a momentous year for Britain's railway', we wrote on this page 12 months ago. Arguably, this phrase has proved truer than any of us could have expected, but sadly not for the right reasons.

The well-documented timetable collapse in May exposed, as the House of Commons Transport Committee described in its recent report, 'the astonishing complexity of a disaggregated railway'. The report by Office of Rail and Road Chair Stephen Glaister has called for a change in culture, to a situation where 'everyone needs to be willing to give and receive bad news'.

We have reported on these pages numerous times about 'press on-itis' –

the phenomenon of delusory belief that the undeliverable is in fact still deliverable against all evidence. So it was with the Bolton line electrification, which wrecked Northern's May timetable plans; happily, that is at last delivering as the wires finally go live on a project running several years late. So it was with the planning of driver rosters for Govia Thameslink Railway's May timetable. Even now there is a reluctance to fess up about when the Great Western Electrification Programme will finally deliver wires through to Cardiff; the latest update of Network Rail's Enhancements Delivery Plan from September suggests it will be January 2020 before a train running

on electric power carries passengers through the Severn Tunnel.

Sighs of relief must have pervaded railway operating rooms up and down the country when the new timetable introduction on 9 December passed off quietly. As it should have done, given the de-scoping of changes across the network – a prudent move in the circumstances.

But just a day later, on the first working day of the new timetable, the final nail was truly driven into the 2018 coffin. Transport for London's latest announcement about Crossrail (p8) confirmed that the project appears to be yet another victim of corporate self-delusion. Now, the vague

'autumn 2019' opening espoused as recently as August is no longer a committed opening date. And the money has gone through the roof.

From still being publicly committed only six months earlier to its funding envelope of £14.8 billion, set in the 2010 Comprehensive Spending Review, Crossrail's funding envelope has escalated to £17.6 billion. With KPMG's review yet to formally report, the exact scale of the damage is unclear, but at least an agreement has been put in place to see the troubled project across the line.

SLIPPING

With the project in deep trouble, on 5 December Crossrail Chair Sir Terry Morgan resigned from both that role and his equivalent position at High Speed Two. An unseemly spat had developed between Sir Terry and London mayor Sadiq Khan about just who knew what about the slippage, and when. Following the criticism, Mr Khan made a commitment to transparency, hailing the release on 10 December of over 100 documents relating to the Crossrail project. The release was accompanied by a detailed timeline of events, clearly intended to back up the Mayor's claim about when he was told of a delay.

Mileage accumulation run: Elizabeth Line unit No 345044 at Lichfield Trent Valley on 30 July 2018 en route from Crewe to Wembley. John Whitehouse



For us in the railway press, the political arguments are of less significance than the actual delivery of the project. Our Crossrail columnist Dan Harvey has been reporting on and questioning for months Crossrail's repeated mantra that the project was 'on time and on budget'. From the documents released in the quest for transparency, there are signs that the self-delusion phenomenon appears to have gripped Crossrail in an alarming way.

Take the weekly update to the Mayor dated 12 July 2018. These weekly updates included RAG ratings relating to all elements of Crossrail's Master Operational Handover Schedule (MOHS), in which elements each received a categorisation of red, amber or green (RAG), indicating whether they were on track. The 12 July update included three red and a number of amber ratings, but crucially the 9 December central section opening was rated green, indicating it was 'on track'.

Readers will note that the Thameslink Industry Readiness Board had a similar RAG scheme and the report for the final meeting before the May timetable change was a sea of green.

The weekly updates then disappear for a few weeks, but the documents released include an update to the Deputy Mayor for

Transport and Mayor's Chief of Staff dated 20 July. This paints a quite different picture, suggesting (subject to confirmation from Crossrail Ltd) the assumed opening sequence would see the central section delayed until June 2019, with subsequent stages following by the end of the year. Even that plan has a 'medium' risk rating.

An update to a Mayoral meeting on 26 July suggests the stage three opening date in December 2018 'is at high risk' and indicates two options for partial or sectional opening in December have been analysed but judged as 'not feasible'. This came just two days after the Ministerial Statement from Jo Johnson confirming for the first time that Crossrail had exceeded its funding envelope.

On 7 August the weekly Mayoral updates returned, but without the RAG ratings. Here it was confirmed that a proposed revised delivery schedule would be discussed with the Crossrail board on 29 August, which of course led to the announcement with which we are now familiar.

Even after this point, there are worrying signs. Take the Independent Crossrail Schedule Assurance Review by John Boss Consulting, dated 21 November. Its headline message was that 'there is confidence in the project organisations that an opening in the autumn of 2019 is achievable,

a view which is supported by this report', albeit with the caveat that an exact date could not be determined but that this should become apparent two months into dynamic testing. Once again the parallel with Thameslink and its Independent Assurance Panel is worryingly close.

Perhaps not coincidentally, the report is dated just two days after Crossrail's third Chief Executive of 2018, Mark Wild, took over the reins, having been parachuted in from his role as London Underground Managing Director. Less than three weeks later, Mr Wild said the autumn 2019 date was no longer a commitment, and we are now left wondering when the Elizabeth Line will actually open.

This forensic detail highlights the goings on behind the scenes of a major project such as this, with a recurring theme of the railway insisting on continuing to make promises it can't deliver. Professor Glaister's edict that 'everyone needs to be willing to give and receive bad news' seems to be a lesson applicable not just to timetable planning.

The public bickering that has taken place does the industry's reputation no favours, and hopefully the coming months will see heat turn to light. The Mayor had been summoned to appear before the London Assembly Transport

Committee on 21 December, after this issue went to press. The National Audit Office has begun its own investigation, to which the Mayor has pledged his full support.

TIME TO DELIVER

What might the wider implications be? At a time when it is a struggle to find any railway project delivering to its committed schedule, that Crossrail, a poster child for timely delivery, should have gone so badly wrong presents worrying portents for other major projects.

As for TfL, the organisation finds itself facing major challenges. In an update to its Draft Business Plan, presented to its Finance Committee on 13 December, a 'cautious planning assumption' is made that the Elizabeth Line delay will hit revenues by around £600 million over the five-year plan period to 2023-24. Plans to achieve an operational surplus are pushed a further year down the line.

The latest victim of TfL's purge on costs is new signalling systems for four tube lines as part of the Deep Tube Upgrade Programme. While a contract for new trains for the Piccadilly Line has finally been signed with Siemens (p10), TfL's updated business plan confirms it has abandoned the already protracted signalling procurement due to uncertainty of capital funding beyond 2020.

And what of Crossrail 2? In its release of 10 December, TfL confirms that the new financing arrangements to cover the overspend on Crossrail 1 involve a loan to be repaid from the Business Rate Supplement and Mayoral Community Infrastructure Levy. In another potential sting in the tail, a seemingly innocent line at the end of the release confirms these both formed part of London's proposal to meet the Government's challenge that the capital must fund 50% of the cost of Crossrail 2. Could yet another major scheme be in jeopardy?

But with the track record of the last 12 months, who could blame politicians for being hesitant about committing more funds to the railway? And the challenges are set to continue coming, with thousands of new carriages to commission over the coming years, with their associated subsequent timetable enhancements to manage, not to mention the uncertainty surrounding franchising and the distraction of a Rail Review.

One thing is for sure. With the railway having comprehensively failed to deliver on its promises in 2018, in the next 12 months we must do better. 





More in hope than anticipation? Counter at Farringdon, 24 November 2017. Keith Fender

CROSSRAIL CAN'T COMMIT TO AUTUMN OPENING

FURTHER ELIZABETH LINE DELAY AND UP TO £1.7 BILLION MORE FUNDING NEEDED

THE REVISED autumn 2019 opening date for the central section of the Elizabeth Line can 'no longer be committed to at this stage', Transport for London has said.

On 31 August 2018 Crossrail Ltd announced the central tunnelled section of the Elizabeth Line would not open as planned in December 2018, giving the revised date (p10, October 2018 issue).

Now Crossrail Chief Executive Mark Wild, the company's third in 2018, is reported to be 'working on a robust and deliverable schedule'.

Explaining the further delay, TfL says 'It has now become clear that more work is required than had been envisaged to complete the infrastructure and then commence the extensive testing necessary to ensure the railway opens safely and reliably'.

Assessing the state of the project, Mr Wild said: 'It is evident that there is a huge amount still to do. Stations are in varying stages of completion and we need time to test the complex railway systems.'

This means that I cannot at this stage commit to an autumn 2019 opening date. My team and I are working to establish a robust and deliverable schedule in order to give Londoners a credible plan to open the railway and provide a safe and reliable service. Once that work is completed we will then be in a position to confirm a new opening date.'

COUNTING THE COST

On top of this, TfL says that 'core elements of the infrastructure being delivered by Crossrail Ltd, including

the stations and the fit out of the tunnels, are at varying stages of completion and more funding is therefore required to complete it, as well as the extensive safety and reliability testing needed for the new railway systems'. The first announcement of additional funding came in July 2018, when joint sponsors TfL and the Department for Transport each contributed half of the £300 million allocated towards the central section.

After the delayed opening was announced in August, Mayor of

London Sadiq Khan asked TfL to commission independent reviews into Crossrail Ltd's financing and governance arrangements. KPMG was appointed to do this, and on 10 December TfL said these reports were nearing completion.

The emerging findings of the review have allowed the Mayor and the Government to agree a financing package to cover the predicted overspend. KPMG suggests the likely capital cost impact of the delay announced in August could be in the region of between

THE FALLING AND RISING COST OF CROSSRAIL

2007	£15.9 billion estimate
2009	Increased to £17.8 billion
2010	Reduced to £14.8 billion by Coalition Government following Comprehensive Spending Review
July 2018	Additional £590 million of funding confirmed – £300 million to Crossrail Ltd for central section (jointly funded by Government and TfL) and £290 million for Network Rail works
October 2018	£350 million of short-term repayable financing made available to the Mayor of London to continue work on the project
December 2018	Estimated impact of delay on capital cost confirmed as being between £1.6 and £2 billion, partially covered by July 2018 allocation of £300 million. Overall funding envelope rises to £17.6 billion. Financing package agreed to cover the overspend, replacing the short-term repayable financing previously announced

£1.6 billion and £2 billion. Subtract the £300 million already committed, and there is a shortfall of between £1.3 billion and £1.7 billion.

The package agreed replaces the £350 million interim financing package offered by the Government in October (p95, last month). The Greater London Authority will borrow up to £1.3 billion from DfT, and will repay this loan from the existing Business Rate Supplement (BRS) and Mayoral Community Infrastructure Levy (MCIL). The GLA will also provide a £100 million cash contribution, taking its total contribution to £1.4 billion, which it will provide as a grant to TfL for the Crossrail project.

But with the final costs yet to be confirmed, further contingency is already in place. A loan facility from DfT of up to £750 million can be called upon should the higher end of the estimate be realised. Altogether, the overall funding envelope for Crossrail is now £17.6 billion.

There is another potential sting in the tail – the delays and budget overruns could impact London's hopes for Crossrail 2. With Government having stated that London must fund 50% of the cost of a second new line, TfL has noted that both the BRS and MCIL funding streams, from which the £1.3 billion loan from DfT will be repaid, form part of London's proposal to meet this challenge. TfL says the Mayor 'remains fully committed to the Crossrail 2 project', adding that further discussions will be needed once a route option has been agreed and there is a known cost for the scheme, in advance of the Government's Comprehensive Spending Review.

Meanwhile, a revised draft of TfL's five-year business plan through to 2023-24 now incorporates an estimate around the potential loss of revenue from the delayed opening. A 'cautious planning assumption' in the plan is that revenue will be reduced by around £600 million, which TfL says will be offset by continuing savings and revenue growth programmes and by allocating a small proportion of business rates funding to operating account. TfL also says it is exploring with DfT the possibility of beginning to operate Reading to Paddington services ahead of the completion of the Elizabeth Line to help provide a boost in revenue.

MORGAN OUT, MEGGS IN

Less than a week before TfL announced the further delay and cost increase, Crossrail Ltd Chairman Sir Terry Morgan resigned. TfL has confirmed that, subject to ratification

by the Crossrail Ltd board, his replacement will be Tony Meggs.

The announcement of Sir Terry's resignation on 5 December followed a radio interview the weekend before when Sir Terry said he expected to lose his job because the Crossrail sponsors – the Department for Transport and Transport for London – were unhappy with delays to the project.

Seventy-year old Sir Terry Morgan has been a constant presence during construction of the Elizabeth Line, having worked on the project for nearly a decade. Like former Crossrail Chief Executive Andrew Wolstenholme, with whom he worked for more than six years, Sir Terry will not see the programme through to completion following the revelations that the project will not be completed on schedule or budget.

Sir Terry had told the London Assembly of his intention to stay with the scheme, despite its difficulties, but in recent weeks his relationship with Mayor of London Sadiq Khan has appeared strained with conflicting accounts of when the Mayor was made aware of the delay facing Crossrail. Mr Khan says he first knew that Crossrail would be delayed on 29 August, but on BBC Radio 4 Sir Terry said he was clear that he informed the Mayor that the Elizabeth Line would not be ready before 2019 on 26 July.

Responding to the news of the potential further delay, the Mayor was clear about his dissatisfaction with the leadership of Crossrail Ltd. 'I haven't hidden my anger and frustration about the Crossrail project being delayed' he said. 'This has a knock-on consequence of significant additional cost to the project. It has been increasingly clear that the

CROSSRAIL: WHO PAYS FOR WHAT?

The agreed funding dating from the Comprehensive Spending Review in 2010 breaks down as follows:

- £12.5 billion for the central section, allocated to Crossrail Ltd. This is jointly funded by DfT (£5.4 billion) and TfL/GLA (£7.1 billion).
- £2.3 billion for delivery of surface works by Network Rail, which also finances them.

Crossrail Ltd is responsible for the delivery of the end-to-end railway, including rolling stock, signalling and systems integration, as set out in the Crossrail Delivery Strategy and the Project Delivery Agreement. The estimated capital cost impact confirmed on 10 December is between £1.6 billion and £2 billion and takes the total cost for the central section works to between £14.1 and £14.5 billion. The surface network works were subject to a £290 million increase, announced in July 2018.

In addition, the new trains and depot cost £1.1 billion, financed by TfL.

previous Crossrail Ltd leadership painted a far too optimistic picture of the project's status.'

The Mayor added that he had 'ordered the release of all Crossrail board minutes in the last five years to provide transparency to Londoners on their decision making', while highlighting that a new leadership team had been brought in.

Sir Terry's replacement, Tony Meggs, will step down from his role

as CEO of the Infrastructure and Projects Authority (IPA) to oversee the final stages of delivering the Crossrail project. TfL highlights his wealth of experience at the IPA and in leadership positions in the private sector. It says the Crossrail Ltd board will be further strengthened by the nomination of former MP Nick Raynsford as Deputy Chair; Mr Raynsford served as Minister for London on two occasions between 1997 and 2003.

SALE AND LEASEBACK FOR '345s'

On 13 December, after this issue went to press, TfL's Finance Committee was expected to approve a sale and leaseback arrangement for the Elizabeth Line fleet of 70 Class 345 trains.

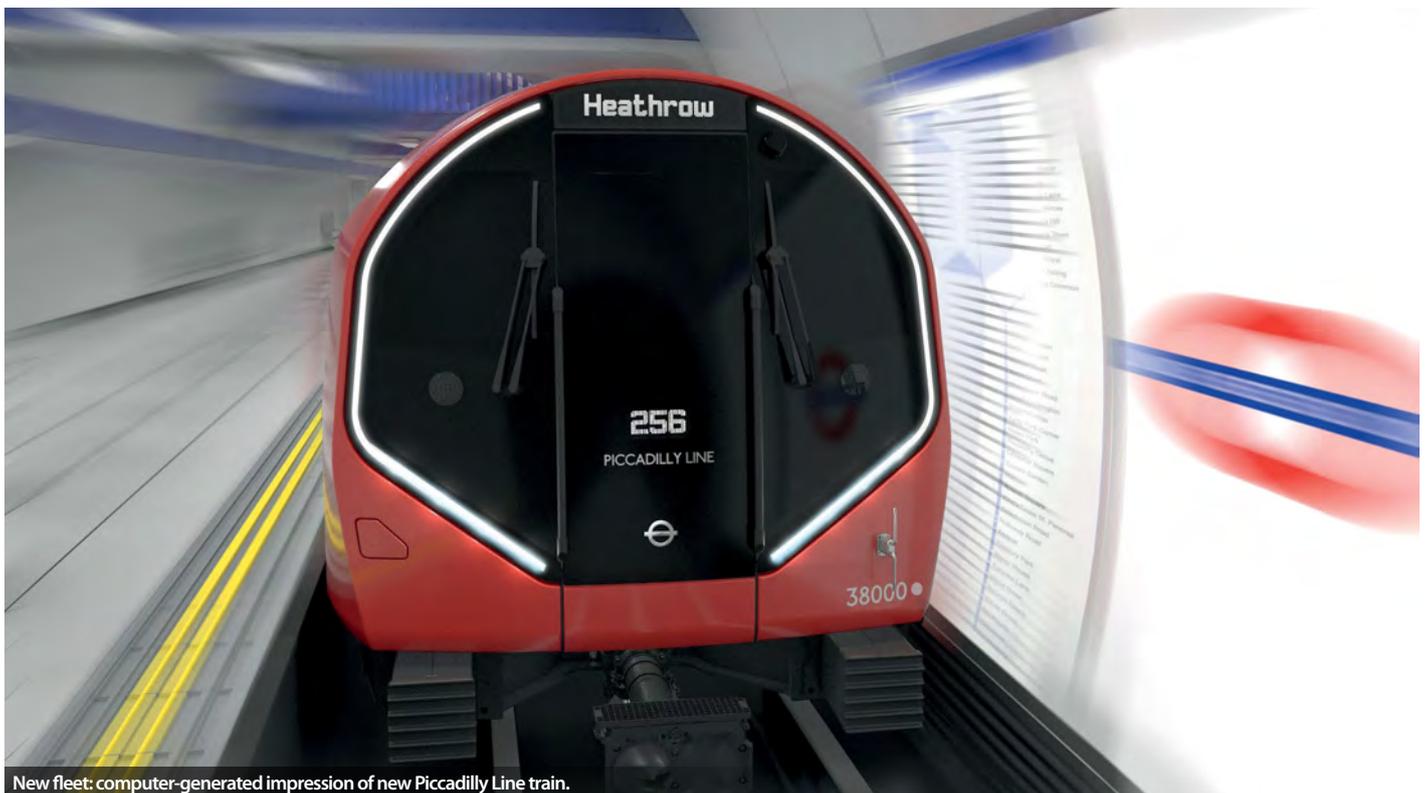
The plan emerged in January 2018 as a means of helping fund a new fleet of trains for the Piccadilly Line (to be built by Siemens). TfL received round one offers from five bidders on 5 October 2018, before selecting the three most economically advantageous bidders for a second

round, and these submitted bids on 23 November.

The arrangement envisaged was a lease of the new fleet of trains for a minimum period of 20 years from the date of financial close (January 2019), but encouraged bidders to offer additional flexibility in the form of options either to acquire the fleet at the end of the lease or otherwise continue leasing the units. TfL expects, subject to necessary approvals and complete of documentation, to conclude the leasing arrangement in late January.



Fit out underway: Farringdon Crossrail platform on 24 November 2017. Keith Fender



New fleet: computer-generated impression of new Piccadilly Line train.

SIEMENS AND TFL SIGN TUBE CONTRACT BUT PICCADILLY RESIGNALING PUT ON HOLD

LONDON UNDERGROUND has signed a contract with Siemens to build 94 new trains for the Piccadilly Line, but strained finances at Transport for London have led to resignalling of the line being put on hold. TfL said: 'We remain committed to delivering new signalling on the Piccadilly line, as well as the other deep tube lines, but without confirmed capital funding beyond 2020, we have decided to work with our suppliers to review the programme so that it delivers in the most efficient way. We will therefore be discontinuing the current procurement to allow it to reflect our latest thinking in the future.' Alstom, Siemens and Thales had been shortlisted as bidders.

As for the 94 new trains, the fleet will replace the current 1973 stock, with Transport for London saying current estimates indicate the first trains will enter passenger service in 2024. TfL announced its intention to award the contract in June, but the signing was delayed by legal challenges from losing bidders Alstom, Bombardier and Hitachi.

The trains have been ordered under TfL's Deep Tube programme, which envisages a single design of train replacing current fleets on the Bakerloo, Central and Waterloo & City Lines, as well as the Piccadilly. The programme also envisaged procuring a single new signalling system to replace the current equipment across the four lines.

TfL plans to increase frequencies on the Piccadilly Line from 24 to 27 trains per hour (tph) at peak times by the end of 2026, once the new fleet is in service. However, further increases up to 33tph or 36tph in future years, which would have required extra trains, are contingent on the renewal of the signalling equipment.

The signing of the contract for the new fleet is described as 'a significant step' towards Siemens' plans to build a new factory in Goole, East Yorkshire, and the companies say they will work together 'to maximise the number of Piccadilly Line trains being built at this facility', although Siemens says 'extensive testing' will take

place at its Wildenrath test centre in Germany to ensure reliability from the first day of operation.

The Inspiro trains will have a maximum speed of 100km/h, and Siemens says they will offer a significant weight reduction compared to the current fleet. Each will have a capacity of 1,433 passengers, along with wider doors and walk-through, fully air-conditioned carriages and in-train information systems to help passengers plan onward journeys.

A 40-year Fleet Services Agreement covers the supply of spares and whole life technical support, with the combined contract valued at around £1.5 billion. Siemens will also be offering a range of added value digital services using its Railigent asset management suite of applications.

South Eastern award in New Year NLE may miss 2020 opening

RAIL MINISTER Andrew Jones has announced that the award of the new South Eastern franchise has been deferred until the New Year.

Addressing a debate in the House of Commons on 27 November, Mr Jones said 'I will keep all colleagues who are served by the franchise posted on the timing. The reason for the delay is that the evaluation of the agreement for the next franchise has taken longer than anticipated because we wanted

to ensure that passengers get the best deal possible.'

Incumbent operator Govia confirmed in May 2018 a 12-week extension to its contract had been activated, with a new deal planned to begin on 1 April 2019. It is bidding for the new franchise in competition with a joint bid from Stagecoach and Alstom and a consortium of Abellio, East Japan Railway and Mitsui & Co. The winning bidder had been due to be announced during autumn 2018.

TRANSPORT FOR London

is reviewing its proposed December 2020 opening date for the Northern Line Extension from Kennington to Battersea Power Station.

The potential delay, reported to TfL's Programmes and Investment Committee, surrounds changes to the oversite development at Battersea Power Station, the line's terminus. In April 2014 TfL entered into a suite of agreements with Battersea Power Station and its associated companies,

but the oversite development scheme has subsequently been changed, requiring a rework of the original designs and adaptations to the construction programme. A new opening date has not yet been announced.

Elsewhere in the report to the committee, reported progress includes completion of final fit out at Kennington following construction of four new cross passages and completion of track installation from Nine Elms to Battersea Power Station.

TFL CONSIDERS TRAMS TO SUTTON

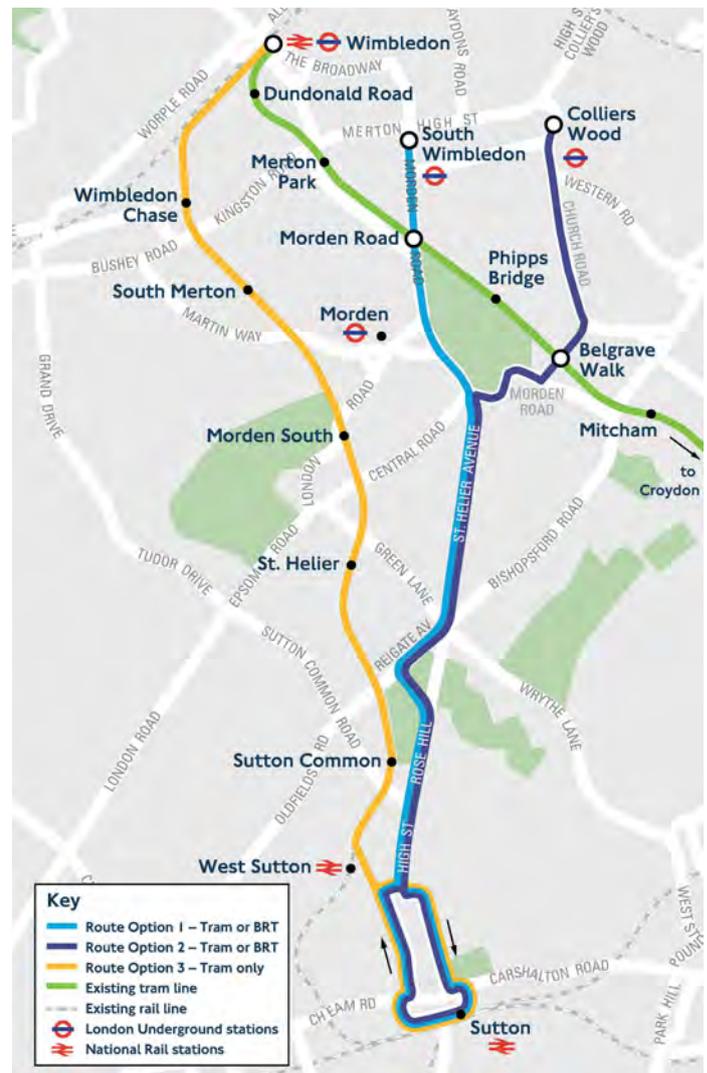
TRANSPORT FOR London is consulting on plans for a new link between Sutton and Merton in south London. Either trams or segregated bus rapid transit (BRT) are proposed, with three routes under consideration.

The consultation follows a request from Mayor of London Sadiq Khan to explore opportunities for an extension of the London Trams network to Sutton. Two on-street options are being considered – one from South Wimbledon to Sutton town centre via Morden and Rosehill, with interchanges with the existing tram network at the Morden Road stop and with the Northern Line at South Wimbledon and Morden, and a second from Colliers Wood to Sutton town centre via Rosehill, interchanging with trams at Belgrave Walk and with the Northern Line at Colliers Wood. Both options would have an estimated cost of around £425 million if delivered as a light rail solution, or £275 million for BRT, although the cost of operating and maintaining a BRT service is expected to be higher than for a tram service.

A third option could see the Sutton loop heavy rail link between Wimbledon and Sutton converted to tram operation; this would not be suitable for BRT. TfL says that, based on work so far, this latter option is least effective at achieving the project's aims of improving public transport in Merton and Sutton and would need to be closely co-ordinated with the proposed Crossrail 2 station at Wimbledon, potentially delaying the project to coincide with the Crossrail 2 construction programme. The Sutton loop option has a lower estimated cost, at around £300 million.

Should light rail be preferred, additional trams would be purchased that would be compatible with the existing tram network and additional depot facilities would be needed.

Following the selection of a preferred route and confirmation of the preferred choice of mode, TfL expects to consult again in 2019. An application for planning consent is proposed for submission in 2020, with the earliest date construction could start being 2022 and services commencing not sooner than 2025.



NEW ENTRANCE AT BANK



Easy access to the Drain: the new Walbrook entrance to Bank tube station opened on 1 December 2018 in the basement of the new Bloomberg office building close to Cannon Street station. This heavily-delayed project, which improves the approach to the Waterloo & City Line, is separate from the ongoing larger Bank station upgrade slated to complete in 2022. Kim Rennie

4LM seeks 2020 uplift

TRANSPORT FOR London's Four Lines Modernisation (4LM) programme for resignalling is targeting an early timetable uplift in March 2020, 21 months ahead of schedule.

A report to TfL's Programmes and Investment Committee meeting on 11 December says the aim is to commission new Thales Communications Based Train Control (CBTC) signalling on the Circle Line by the end of 2019. The programme covers the modernisation of the four sub-surface lines with new signalling equipment.

A planned go-live date for the signalling system on the first stretch of the Hammersmith branch has been deferred to the first quarter of 2019 following a signalling software issue identified in summer 2018. TfL also reports the Thales Automatic Train Control (ATC) equipment has been fitted to enough of the 'S' stock trains to support this.



New home for Windsor line services: a brace of Class 458s bound for Windsor & Eton Riverside (right) stand alongside Class 707s on Reading duties in the trainshed of the former Waterloo International station on 12 December 2018. Jamie Squibbs

WATERLOO INTERNATIONAL REOPENS FOR SWR

THE FORMER Eurostar platforms at Waterloo reopened on 10 December as part of the project to increase capacity on the South Western Railway network.

The platforms were used by Eurostar services until 2007, when these relocated to St Pancras.

Although used temporarily during summer 2017 while major work took place at London Bridge, platforms 20 to 22 are now open on a permanent basis for SWR services on the Windsor lines. Network Rail says platforms 23 and 24 will come into use in May as part of the next timetable change,

with direct access to the London Underground in early 2019. SWR planned a major overhaul of its timetable in December, but this was largely deferred as part of the network-wide moratorium on timetable changes. Construction of a new concourse beneath the

platforms will not be completed until 2021. Developer LCR will begin work in 2019 to create what Network Rail describes as 'a new retail, leisure and cultural destination', offering a mix of independent, high street and national stores along with new food and drink outlets.

FILTON BANK FOUR TRACKING COMPLETE BUT ELECTRIC TIMETABLE DEFERRED BY A YEAR

ON 3 December Network Rail completed installation of two additional tracks between Filton Abbey Wood and Bristol Temple Meads. The project doubles the number of lines on the Filton bank, creating capacity for an extra four trains per hour in each direction.

The £130 million scheme began in 2015 and culminated in a three-week blockade of Filton bank in the autumn to complete the project, which included the installation of 10 miles of new plain line track and 12 new switch and crossing units. The completion is a success story, in line with Sir Peter Hendy's 2016 review, which scheduled passenger use

of the new capacity as 'Early CP6', ie from April 2019 onwards.

Use of the new capacity includes planned new services from Temple Meads to London Paddington via Bristol Parkway, but introduction by Great Western Railway of these additional services has been deferred until the end of 2019, when the main timetable enhancement for long-distance services to Bristol and South Wales is now scheduled to take place. The latest update of Network Rail's Enhancements Delivery Plan in September 2018 gave the date for overhead electrification from Bristol Parkway to Cardiff Central as being authorised in November 2019 and seeing its first use in passenger

service in January 2020. This is a year behind the 'Hendy' date, already a reset on an earlier missed target.

Network Rail held a 'Swindon goes electric' event on 1 November 2018, marking the beginning of passenger train use of the wires between Didcot and Swindon, but work remains to be done to reach Cardiff on electric power.

Reading to Newbury was set to go electric using Class 387s in January 2019, in line with the Hendy review dates. However, introduction of GWR's Hitachi-built IET trains on services from Paddington to Bedwyn has been delayed. Five-car Class 800 and 802 sets were due to take over from Class 165 'Turbo' units on

Bedwyn services in January 2019, using the new wires to Newbury and then running on to Bedwyn on diesel power, where they would turn back using a lengthened siding to the west of the station. Through services to the capital using the new trains were a commitment made by Devizes MP and former rail minister Claire Perry, resulting in GWR ordering additional IET sets.

A Hitachi spokesperson told *Modern Railways*: 'Work is currently ongoing across IEP partners to meet the operational and contractual requirements to use Bedwyn as a turnaround station. In the meantime, we are regularly testing our trains at Bedwyn station to ensure they are ready for new services as soon as possible.'

SUPPORT FOR HEATHROW WESTERN LINK

72% OF people responding to a consultation from Network Rail supported plans for the Western Rail Link to Heathrow (WRLTH).

The link would leave the Great Western main line between Langley and Iwer via a short stretch of open railway before entering a 5km tunnel, passing under Richings Park and Colnbrook and

joining existing underground rail lines at Heathrow Terminal 5.

Journey times from Reading to the airport would be reduced to 26 minutes, and Slough to the airport to just seven minutes. 1,333 responses were received to the consultation.

The consultation revealed a preference for a route which would

enable trains to run to Terminal 5, through to Terminals 2 and 3 and on to London Paddington. This would remove the section of track required to allow trains to turn back, shortening the tunnel by 100 metres and reducing the construction impact and costs. Network Rail says this option will now form part of its final proposals.

Finalised plans will be published prior to the submission of a Development Consent Order application to the Planning Inspectorate in summer 2019. Subject to approval from the Secretary of State for Transport, work would start in 2021-22 and be completed in 2027, with passenger services starting in 2028.

Open access costs for CP6

NEW OPEN access operators from April 2019 will make a bigger contribution to the cost of running the railway by paying an infrastructure cost charge, the Office of Rail and Road has confirmed.

Existing open access operators will have relief from increases in charges for the whole of Control Period 6, but this will not be granted if an operator substantially modifies its service. ORR defines a substantial modification as an increase in frequency, changes to the numbers of stops or addition of station stops.

In its Final Determination ahead of the start of Control Period 6, ORR confirmed it would levy infrastructure cost charges (ICCs) to recover some of Network Rail's fixed network costs from all types of operators, including open access operators which are currently excluded from paying these charges. ICCs will be levied at a rate of £4 per train mile within the interurban market. New entrant open access operators will bear no ICCs for the first two years, will pay 25% in year three, 50% in year four and the full amount in year five of operation.

ORR says the ICC would be taken into account when assessing applications, increasing the likelihood a proposal is granted access rights. The regulator has launched a consultation seeking to find 'a balance between the greater cost that some open access services will bear and the greater likelihood of open access operators being granted access rights.'

ICC charges will be levied on services ORR defines as 'interurban'.

The regulator suggests this will cover services between major urban areas ('major inter-city') or between London and more developed urban centres around London ('long-distance commuter'), which are likely to be able to bear a charge. Services defined as 'rural' or 'suburban' would be excluded. The exact definition will be based on the scale of underlying market demand and the geography of the passenger movements served.

ORR is also introducing the 'Economic Equilibrium' (EE) test, which is the subject of a European Union implementing regulation applicable from the start of 2019. The regulation dictates that, at the request of a relevant party, ORR must assess whether a new service would compromise the economic equilibrium of an existing public service contract (PSC).

When carrying out the EE test, which will cover applications for services starting from December 2020, ORR plans to consider the impact on profitability of services operated under the PSC, impact on net cost for the authority awarding the PSC, its existing Not Primarily Abstractive (NPA) test which measures wider benefits, and other factors including the impact on performance and quality of rail services. ORR says it has tried to keep its policy and procedure for the EE test as close as possible to the NPA test, which usually requires 30% of revenue from a service to be newly generated rather than abstracted from other operators; ORR says it does not plan to adjust this threshold.



Alloa goes electric: EMU No 385109 arrives at Alloa at 11.05 on the first day of the new timetable, 9 December 2018. Ian Lothian

SDA GOES ELECTRIC

THE FIRST electric test train operated on newly electrified lines to Dunblane and Alloa on the night of Tuesday 27 November.

Electric passenger services began on 9 December, with ScotRail

introducing Class 365 and 385 EMUs in lieu of diesel units. The 50km route has been electrified over the last two years in a project that has seen more than 300km of overhead wires installed.



All change at Dunblane: the 09.25 Aberdeen to Queen Street service calls at platform 1 at Dunblane on the first day of the new timetable. Formerly a Turbostar working, this is now HST-operated – but delays in refurbishing the trains mean several HSTs now in use, including the one pictured here, still have slam doors and dump toilets. At left, No 365525 is waiting in platform 3 ready to take advantage of newly-commissioned overhead wires on a service to Edinburgh. Ian Lothian



'170' AT HULL

Preparing for May: on 7 December 2018, Class 170 No 170478 stands in the sidings at the rear of Hull Paragon station in readiness for conductor and driver training. The three-car sets are to be used on the Sheffield-Bridlington services from May. Ian Lyall

Bolton wires go live at last

AFTER MANY delays, the overhead electrification of the route between Manchester and Preston was fully energised over the weekend of 8-9 December 2018. This successful operation enabled full load testing to begin the same week, with runs of Class 390 Pendolino EMUs planned for 12-13 December as *Modern Railways* closed for press. Whilst Northern will officially delay the introduction of EMUs over the route until the May timetable change, it is understood that as crews are trained over the route electric trains can be used on diagrams which allow this in order to free up diesel sets for strengthening elsewhere. Tony Miles



Bid to improve reliability: one change included in the new TransPennine Express timetable which came into effect on 9 December sees the former Leeds to Manchester Piccadilly 'all stations' service split into two separate diagrammed portions; Leeds-Huddersfield and Huddersfield-Manchester Piccadilly. Here a service from Manchester is seen on termination at Huddersfield on the first day of the new timetable. Russell Wykes

ORR calls for cultural change on timetabling

THE OFFICE of Rail and Road's final report on the May 2018 timetable issues has suggested changes in culture are needed within the industry to ensure there is no repeat of the disruption. Writing in the foreword to the report, ORR Chair Stephen Glaister said 'everyone needs to be willing to give and receive bad news' and called for clarity on who is responsible for making timely decisions.

ORR released its Phase One report in September 2018, setting out the key causes of the crisis, which particularly affected Govia Thameslink Railway and Northern services. The Phase Two report follows up on this with recommendations.

The report highlights the creation by Network Rail of a Programme Management Office to manage risks to timetables up to December 2019 as a means of short-term mitigation to disruption.

ORR calls for passenger impact to be assessed throughout development of major rail schemes, with sponsors seeking assurance that this impact has been assessed at investment decision points.

On the timetabling process itself, ORR notes the System Operator function within Network Rail is best placed to review arrangements. Increased funding for the SO in Control Period 6 (2019-24) provides an opportunity 'to review industry collaboration and the use of technology to support the accuracy and efficiency of the timetabling process', the report suggests. ORR calls for the SO to report by the start of CP6 on 1 April on the progress of strengthening timetable technology capability and to create an industry timetabling technology strategy to improve the timetabling process.

A trial with ScotRail to provide greater

access to the planning system should be rolled out more widely where benefits exist, says ORR.

Discussing the Thameslink Industry Readiness Board (IRB), ORR suggests a strengthened

IRB model would be of benefit to other rail delivery programmes, allowing operational teams from across multiple organisations to be aligned in the monitoring, management and mitigation of risk.

COMMITTEE CRITICISES GRAYLING

The May 2018 timetabling crisis was 'in part a consequence of the astonishing complexity of a disaggregated railway', according to the House of Commons Transport Committee. The committee endorses ORR's finding in its separate report that 'no one took charge', calling this 'extraordinary and totally unacceptable'. However, the committee suggests that while governance and decision-making structures overseen by the Secretary of State and DfT were inadequate, it is 'not reasonable for the Secretary

of State to absolve himself of all responsibility', suggesting Chris Grayling 'should have been more proactive'.

The committee recommends that going forward 'an independent system operator needs to take charge'. It says it is content in the short term for that person to be Network Rail Chief Executive Andrew Haines but suggests the Secretary of State must 'make clear the extent of Mr Haines' decision-making power over whether and when the next timetable change goes ahead'.

GTR ALLOWED TO KEEP FRANCHISE

BUT PROFITS WILL BE CAPPED

TRANSPORT SECRETARY

Chris Grayling has announced the Government is holding Govia Thameslink Railway to account for its role in the unacceptable performance following the introduction of new timetables in May 2018. However, he said the Department for Transport had concluded that terminating the franchise 'would cause further and undue disruption for passengers and is not an appropriate course of action'.

GTR experienced significant disruption due to the late finalisation of the timetable and subsequent late planning of driver rosters. In a written statement to the House of Commons, Mr Grayling said DfT had completed its analysis of events and had concluded the disruption was 'caused by a series of mistakes and complex issues across the rail industry'.

GTR will make no profit from its franchise in this financial year, and its profit in future years

to the end of the franchise in September 2021 will be capped, Mr Grayling announced. Go-Ahead, the majority shareholder in Govia, says a profit-sharing mechanism will be introduced over the remainder of the franchise, reducing the expected margin to between 0.75% and 1%. The company confirms the agreement has brought to a close discussions around 'other outstanding contractual variations'.

The operator will also contribute £15 million towards 'tangible improvements for passengers',

in addition to a contribution of the same amount towards compensation. The company will work with the rail user groups representing passengers of Thameslink, Southern and Great Northern, who will determine what improvements this package will fund.

Mr Grayling added that DfT will continue to 'monitor closely the performance of GTR', and that the measures taken 'do not make GTR immune from further sanctions in the event of any subsequent failure to perform'.

SPOTLIGHT ON POOR PERFORMANCE

ORR SAYS NR NEEDS TO UP ITS PERFORMANCE MANAGEMENT GAME

THE OFFICE of Rail and Road has ruled that Network Rail has breached its licence following declining performance during Control Period 5 (2014-19).

Releasing its half-yearly monitor of NR, ORR says punctuality and reliability are at their lowest levels since CP5 began. Citing a number of reviews, including Chris Gibb's report into the Govia Thameslink Railway franchise, Nick Donovan's performance review in Scotland and Michael Holden's review of the South Western, as well as its own reviews of South East and Wessex Routes, ORR considers there is now sufficient evidence pointing to weaknesses in NR's underlying performance management capability. The regulator considers these must be addressed as a matter of urgency ahead of the introduction of a new regulatory framework for CP6 (2019-24).

In particular, ORR highlights issues in relation to NR's approach and commitment to performance planning and the capability to

recover service from incidents on the network. It has ruled that NR is contravening Condition 1 of its network licence due to the weaknesses in its performance management capabilities.

A provisional order issued by ORR requires NR to step up engagement and work with operators to develop actions to address the underlying causes of a decline in performance. NR must deliver a report to ORR by 15 February setting out how it is identifying the common underlying issues relating to performance planning and its capability to recover service from incidents on its network. The regulator also asks for regular updates on progress in delivering the report.

In England and Wales, the Public Performance Measure (PPM) Moving Annual Average (MAA) declined to 85.6% in the first seven periods of 2018-19. This is 3.4% below NR's year-end internal target and 6.9% below the regulatory target set at the start of CP5. The Cancellations and

Significant Lateness (CaSL) MAA worsened to 4.7%, 1.4% behind NR's internal target and 2.5% behind the regulatory target. ORR says no operator's performance is ahead of targets locally agreed with NR at the start of 2018-19. Performance in Scotland is also behind target, with PPM MAA at 87.5% at the end of period 7, against a year-end regulatory target of 92.5%.

BETTER PREPARED FOR CP6

ORR has praised Network Rail's preparedness for CP6, while cautioning that there is still more to do before the new Control Period begins.

The regulator reports NR has made progress establishing workbanks, securing access to the railway for planned disruptive engineering and building up maintenance resources. ORR reports NR is in a better state of readiness for CP6 than it was at the equivalent point before CP5 started.

However, it notes initiatives to deliver efficiency savings

across CP6 are less advanced, although again the regulator says the company is better prepared than it was at the same point prior to CP5. NR has committed to deliver £2.6 billion of net efficiency savings (£3.1 billion gross efficiencies offset by £0.5 billion of headwinds). The £2.7 billion figure is £0.4 billion higher than set out in NR's strategic business plans, following a challenge from ORR to go further in delivering efficiencies. ORR reports NR has yet to identify how £0.1 billion of these will be delivered.

NR plans to deliver efficiencies through improved contracting strategies (£0.6 billion); LEAN (a business approach which looks to eliminate waste, £0.3 billion); new technologies reducing scope (led by Anglia Route, £0.3 billion); optimisation of access (£0.3 billion); early contractor involvement (£0.3 billion); improved workbank stability to help reduce supply chain costs (£0.2 billion); and other (£0.7 billion).



Retro livery: loco No 91119 has been turned out in these InterCity swallow colours and is seen at King's Cross on 28 November 2018. Along with many other routes, the East Coast has suffered performance problems. Andrew Overton



Community Railway: the guard on No 153305 operating the 18.06 Liskeard to Looe service on 13 June 2017 takes the single-line token to the driver at Coombe Junction. Ken Brunt

A NEW DIRECTION FOR COMMUNITY RAIL

DFT RAIL Minister Andrew Jones has launched the long-awaited revised Community Rail Development Strategy following a consultation on how community rail could improve journeys, improve accessibility, use local resources effectively and improve the way the network is run.

The new strategy recognises that the Community Rail movement has expanded hugely since the previous strategy was published over a decade ago and now embraces some 60 Community Rail Partnerships and 400 Station Adoption Groups on lines which carry more than 40 million passengers each year and are supported by over 30,000 volunteers.

Whilst acknowledging that the imperative of attracting new ridership to local lines remains key, the new strategy appears to seek to move away from the original purposes of boosting revenue, reducing costs and involvement in the way the network is run, instead emphasising a 'more community facing role'.

It proposes that community rail should concentrate on:

- providing a voice for the community;
- promoting sustainable, healthy and accessible travel;
- bringing communities together and supporting diversity and inclusion; and

- supporting social and economic development.

DfT recognises that the current system of designation of individual Community Rail Partnerships 'bestowed the status of being formally recognised by Government, which has been welcomed by CRPs. Nevertheless, it proposes that designation be abolished and replaced in 2019 by an accreditation scheme, to be renewed annually. Perhaps of greater concern to CRPs is that this task will now be delegated to the recently much enlarged Association of Community Rail Partnerships, because there are fears

that this new accreditation role may be the source of some conflict within this membership-supported and part-funded advisory organisation.

The Department emphasises the independence of CRPs and asks that in future supporters adopt the role of 'voice of their local community', acting as 'independent critical friends to the rail industry' and informing train operating companies and Network Rail of 'problems and potential issues. Many activists will claim they already do this, but that the railway industry often fails to engage or respond and will note that there is no obligation from DfT for them to do so. *Alan Williams*

DRIVER TRAINING FOR HALTON CURVE SERVICE

DRIVER TRAINING has commenced for the new service over the reinstated Halton Curve, using Class 175 units. The hourly service between Chester and Liverpool Lime Street was originally planned to start in December 2018 but then was

deferred to May 2019 due to a shortage of rolling stock (p17, October 2018 issue).

The operator intends to deploy Class 150 units on the new service from May, by which time Class 769s are expected to have replaced some of the Class 150s

on Valley Lines duties in South Wales. Class 175 units have been used for route learning runs to Liverpool on Sundays because TfW Rail Services has a spare Class 175 available on Sundays.

TfW aims to operate a service from Wrexham General to Liverpool

in the early morning on weekdays and Saturdays, with a working from Liverpool to Wrexham and return in mid-evening. This is subject to confirmation in the timetabling process. All workings will turn around at Chester on Sundays. *Rhodri Clark*

TRAM-TRAIN CONSIDERED FOR METROWEST

AUTHORITIES IN the West of England have engaged the team which worked on the Sheffield tram-train project to investigate whether a similar solution would be suitable for the Portishead line in Somerset.

Reopening of the Portishead line forms part of the MetroWest programme, which includes enhancements to rail services across the Bristol conurbation. Phase 1A includes the introduction of half-hourly services on the Severn Beach line and to Westbury via Bath, with Phase 1B involving reopening the line to Portishead, including upgrading of 9km of the Portbury freight line and reinstating 5km of the disused railway between Pill and Portishead.

Phase One of the scheme faces a £46.9 million funding shortfall, which authorities are now seeking to address. A letter from Transport Secretary Chris Grayling, dated 2 October 2018, urges the West of England Combined Authority and North Somerset Council to press on with the Development Consent Order (DCO) application for the Portishead line, but seeks



Portbury freight line: loco No 57305 arrives at the former Ashton Gate platform on 15 November 2018 with the sixth TransPennine Express Mk 5A set to arrive by sea from Spain. This set was the first to be wrapped in plastic, believed to be on account of paintwork damage to earlier sets from vegetation on the branch. Richard Giles

reassurance that consideration has been given to light rail and tram-train options. The study from the Sheffield tram-train team is due to be completed by February; the proposed date for DCO submission for the Portishead line is April 2019.

The estimated cost for Phase One is currently £116.4 million.

The Portishead scheme was reduced in scope after Network Rail's GRIP3 (option selection) cost estimate was higher than anticipated, resulting in the proposed frequency being reduced from half-hourly to hourly.

Completion of Phase 1A is now projected for 2021 or 2022

and can be undertaken through existing permitted development orders. A report to the West of England Joint Committee meeting on 30 November sets out two potential delivery schedules, contingent on whether the improvements are dependent on the upgrade of Bristol East Junction. These works are currently due to be completed by September 2021, dependent on funding from the Department for Transport. Without these works being necessary it is estimated Phase 1A improvements could be delivered in December 2021, but if the junction work is required the additional signalling interactions will push this date back to May 2022. The programme for Phase 1B will be reviewed when the DCO application is submitted, but completion is currently anticipated in late 2022.

Phase 2 of MetroWest involves reopening the Henbury line with new stations at North Filton and Henbury, a new station at Ashley Down on the Filton Bank and a half-hourly service to Yate, with possible extensions to Gloucester.

GEL BLAMED FOR WELSH WHEEL FLATS

TRANSPORT FOR Wales has suggested that a product applied by Rail Head Treatment Trains (RHTTs) may have exacerbated the problem of wheel flats in Wales this autumn.

TfW Rail Services instituted an amended timetable in mid-November because so many units were out of service, including 23 out of 36 Class 150/2 Sprinter units. The Conwy Valley service was suspended for several weeks and the Wrexham – Bidston line had a two-hourly service, supplemented in the intervening hours by a bus, which took approximately twice as long to complete the journey as the train.

Valley Lines services, including the Cardiff Bay shuttle, were largely protected from cancellations, but short formations resulted in TfW Rail Services providing supplementary buses from stations in Cardiff's suburbs. Approximately a quarter of the Wales and Borders fleet remained out of service by early December. The fleet's units of Classes 150, 142 and 143 do not have Wheel Slide Protection (WSP).

TfW chief executive James Price told a Welsh Assembly committee on 29 November: 'There have



Class 50 on the leaves: the North Wales coast RHTT had a Class 50 up front on 8 December. Behind No 50050 was Colas Rail's No 56094, with No 56087 bringing up the rear; the ensemble is seen here passing Llandudno Junction in driving rain. Rhodri Clark

been... innovations across the UK in the way that tracks are cleaned. Some of those innovations, which for the rest of the UK have been really positive, exactly correlate with it getting worse in Wales, and the difference is they've got wheel-slip protection, we haven't. So one of

the suggestions is that a significant causal factor is something that has been good for the UK as a whole – because the UK as a whole has got modern technology – has been significantly negative for Wales.'

TfW explained to *Modern Railways* that the innovation to

which Mr Price referred was the switch from sandite to traction gel applicators. Network Rail explains that its RHTTs clean the railheads with water jets and then apply a sand-based gel to help trains grip the rails.

Welsh transport secretary Ken Skates subsequently told the committee that WSP kits 'will be installed on all of the trains for next autumn'. This is likely to exclude Pacers, which will still be in service next autumn, but have not suffered from the problem so much due to their lighter weight.

To reduce autumn performance difficulties in future years, TfW aims to apply vegetation management methods from Welsh trunk roads to the Core Valley Lines (CVL), which are due to transfer to Welsh Government ownership in September. Mr Price told *Modern Railways*: 'The approaches to vegetation management on the rail network feel quite different to those used on the trunk road network. It's a good opportunity for us to learn how we can share best practice across different modes of transport.' Rhodri Clark

TERMINAL PREPARES FOR HS2 USE



New use for white elephant: the former Euroterminal alongside the West Coast main line at Willesden is to become a construction site for HS2 (p110). The terminal never became the busy interchange that was hoped in the 1990s; it became a stabling point for high output track renewal equipment after Continental workings ceased. The long-idle cranes dwarf No 56106 standing in Acton Lane reception sidings prior to propelling box wagons to sidings near Wembley in this photo taken on 18 September 2018. Steve Stubbs

EXPRESS FREIGHT TO EUSTON?

THE PLANNING Inspectorate has accepted for scrutiny a proposal for a new Strategic Rail Freight Interchange (SRFI) at Blisworth in Northamptonshire that would incorporate an express freight terminal. The deadline for public comments is 15 January 2019.

Ashfield Land's Rail Central terminal would be sited in the 'V' where the Northampton loop diverges from the West Coast main line. The main connection would be to the Northampton loop, with up to three gantry cranes and sidings capable of taking trains of 775 metres in length. There would also be a direct connection to the West Coast main line for an express freight terminal capable of accommodating trains up to 240 metres in length.

The Inspectorate already has under consideration another SRFI nearby: Roxhill's Northampton Gateway proposal would be located south of Northampton and near to Junction 15 of the M1.

Rail Freight Group

Freight must feature in trans-Pennine Upgrade

Rail freight has always had its heart in the north of England, be that in its industrial past, or in the modern mix of containers and bulk products moved to, from and through the region today. Even with the decline of coal, the northern economy still benefits significantly from rail freight, with figures from the Rail Delivery Group showing an annual contribution in excess of £750 million per annum.

Yet despite this, some parts of the region remain poorly served. Manchester, for example, has far fewer rail freight interchanges than the West Midlands, and penetration of construction materials is below that of London and the South East. And although much freight is moved north – south on the key trunk corridors of the West and East Coast main lines, much

less moves east – west across the region, particularly on the north trans-Pennine routes.

We have been trying to change that and make the case for a compelling vision for rail freight on that corridor and in the current upgrade. Early on we pressed for an hourly freight path, with suitable gauge, to be included in the project, and were successful in this being added to the initial 'passenger only' remit. For the past two years we have supported the development meetings with Network Rail and acted to refine and develop the options for the scheme at a detailed level.

Meanwhile, working with our members in the region, we have also supported the development of a business case for freight, identifying the potential for 20 to 30 trains

which could start operating with the infrastructure in place. This includes intermodal services, as well as bulk and conventional freight, with the large ports at Liverpool, Tees and the Humber all contributing to the work. This has been worked through in detail by the Department for Transport and we understand that the Department has concluded a positive business case for freight.

FREIGHT STRUCK OFF

It was therefore both surprising and deeply disappointing to learn that at the most recent meeting of the DfT's Board Investment and Commercial Committee the decision was taken to remove freight from the scope of work completely and permanently. No explanation has been offered to the industry, other than some vague promises

that they may come back to it at a later date in Control Period 7, and we are left in the dark over their intentions or reasoning.

Certainly, this decision appears to be at odds with the stated position of Transport for the North, which made its position clear in a September announcement, stating that the upgrade should deliver 'Provision for freight, with the option to transport containers by rail (which is not currently possible)'. The absence of freight on the corridor must therefore be a blow to the organisation's ambitions, and to its authority.

Freight, it seems, is not the only part of the scheme that DfT's committee has 'trimmed', with the decision finally confirming that the central core of the route will not be electrified. Although this was largely expected following political announcements on the issue, the final decision confirms the case, leaving the route reliant on bi-modes for the long term (and this over its steepest gradients) and with it a further likely degradation of journey time improvement.

GBRF'S LOCOS GET CONNECTED

GB RAILFREIGHT has teamed up with technology company 3Squared to help eliminate avoidable locomotive failures. The new system is also helping to establish a revised train driver review process.

The Remote Data Download application (RDD) will stream in near real time from each locomotive, yielding data such as fuel and coolant levels and train performance details such as speed and braking.

The data will be fed into 3Squared's RailSmart fleet defect reporting and corrective action program.

Analysis of the data will allow GBRf to identify and deal proactively with any issue likely to cause a problem with the locomotive fleet before it happens. This preventative maintenance approach will reduce asset downtime and increase fleet utilisation.

DRIVER REVIEW

The data is also to be used by GBRf in a ground-breaking review of train driver performance.

Currently all drivers must undergo a review with an assessor each week, month or quarter. Assessors travel out to a locomotive, download data provided by the on-train monitoring recorder, take it back to the office and then review with the driver.

The RDD system turns this model on its head.

Now data is sent electronically in real time to the freight operator's systems and is checked by the system for any irregularity such as speeding or excessive braking. This allows GBRf assessors to focus on the drivers that require support the most.

GBRf's Class 66 locomotives were due to be fitted with RDD technology by the end of 2018, with the rest of the company's fleet following in the new year.



BIOMASS EMPTIES

Snaking alongside the water: No 66060 makes a fine sight as it works the 4R50 10.31 Drax to Immingham biomass empties through Crowle on 30 November 2018. Jamie Squibbs

Despite these reductions in output there is no apparent reduction in cost, with DfT still committed to the full allocation. Worse still, with the infrastructure scope over the core of the route reduced through excluding freight, there has to be a real concern that the resulting network will not be able to accommodate even the new passenger services at anything like their expected levels of performance. There has as yet been no conclusion to the requested follow-on assessment to ascertain how high levels of performance can be established for freight and passenger trains sharing the route through judicious infrastructure intervention. It seems surprising that these questions are not being asked of Network Rail by Government ahead of firm commitments being made.

We all want the railways in the North to be successful and the north trans-Pennine upgrade is a hugely important project. Yet in constrained times, we must be certain that every penny invested



Trans-Pennine freight: loco No 66082 takes a Knowsley to Wilton binliner working through Mytholmroyd on 4 October 2016. Paul Bigland

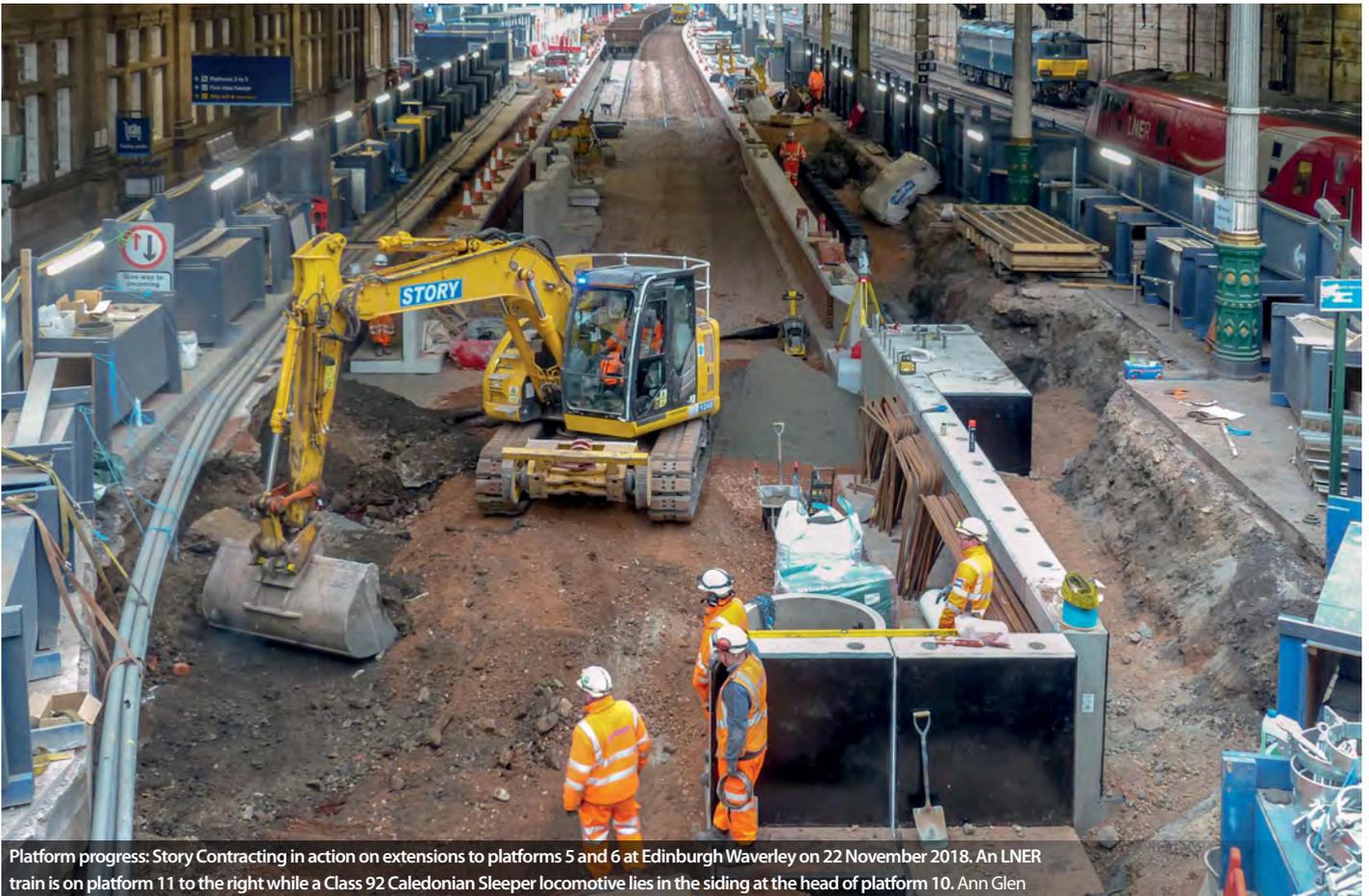
is really delivering for the region. As a comparator, £2.9 billion keeps the Greater Manchester Police Force going for 5½ years; there are many other calls on Government money too. How will Network Rail and the DfT justify that this is

money well spent if key outputs cannot be delivered at all, or with any degree of certainty?

We would like to see the scheme urgently reviewed, and a renewed commitment from all to deliver both for freight and also for the

wider northern communities that the railways are there to serve. Our members and stakeholders will continue to press for nothing less.

An opinion column of the Rail Freight Group, www.rfg.org.uk



Platform progress: Story Contracting in action on extensions to platforms 5 and 6 at Edinburgh Waverley on 22 November 2018. An LNER train is on platform 11 to the right while a Class 92 Caledonian Sleeper locomotive lies in the siding at the head of platform 10. Ann Glen

STORY KICKS OFF FOR CP6

IP LETS FIRST CONTRACTS FOR NEW PERIOD

NETWORK RAIL has announced the award of the first multi-million-pound contracts for Control Period 6 (2019-24), worth a combined £645 million. The contracts have been let by Infrastructure Projects (IP), Network Rail's delivery arm for renewals and projects, which organises itself into four regional areas – Scotland North East, Central, Southern and Western and Wales – and national programmes for Signalling, Track and the pan regional Northern Programme.

Story Contracting has acquired 'Lot 2' covering renewals and enhancements work in Scotland valued at around £135 million,

while AmcoGiffen has secured 'Lot 3' to deliver work on the London North East route valued at around

£190 million. The framework will complete a wide range of projects including replacing and refurbishing

structures across the route and delivering improvements at stations.

The remaining and most significant work-bank in the Scotland and North East (SNE) renewals and enhancements framework, 'Lot 1', will be announced soon and is valued at a further £320 million. In addition to the framework covering renewals and enhancements, SNE was also set to announce an award of its £147 million Geotech framework.

The awards are the first of Network Rail's CP6 contracts to be let following the Office of Rail and Road's final determination, which confirmed £35 billion of funding for rail maintenance and renewals.

WHAT THE FRAMEWORKS COVER

STRUCTURES:

- Underbridge renewal
- Underbridge refurbishment
- Overbridge renewal
- Overbridge refurbishment
- Scour remediation
- Coastal defences
- Retaining walls
- Footbridge renewal / removal
- Footbridge refurbishment
- Tunnel works
- Culvert works

BUILDING AND ENHANCEMENT:

- New station buildings
- Modifications to existing station buildings
- Refurbishment of station buildings
- Platform works
- New under / overbridges
- Level crossing works
- New depots
- Modifications to existing depots
- Refurbishment of depots

Source: Network Rail

WHERRY LINES RESIGNALLING DELAYED

THE INSTALLATION of new signalling equipment on the Wherry lines between Norwich, Great Yarmouth and Lowestoft will not be completed by the planned date of 31 March 2019, Network Rail has announced. In a statement, NR says 'it has become

clear that we need to allow more time for further development and safety testing'. A new commissioning date has not yet been confirmed.

The project began in October with a nine-day blockade of the lines. However, the Berney Arms

branch from Reedham to Great Yarmouth remains closed due to remodelling of the junction at Reedham. NR says it will not reopen until the new signalling equipment is commissioned, although it adds that it is in discussions with Greater Anglia

to see if options are available to operate services in full or in part ahead of this date.

NR awarded the contract for the work to Atkins, which is replacing the existing mechanical interlocking with ElectroLogIXS equipment, made by Alstom.

ETCS ON NORTH TRANS-PENNINE ROUTES

A **SIGNALLING** system that is European Train Control System (ETCS)-ready is to be designed for the north trans-Pennine route between Stalybridge and Cottingley.

In developing the project, Network Rail is working closely with contractors involved in the wider Trans-Pennine Route Upgrade (TRU). In April 2017 NR awarded an alliancing contract to 'Transpire', an

alliance of BAM Nuttall, Amey and Ove Arup and Partners, covering the west of Leeds element of the TRU. A contract notice published by NR on 3 November notes the TRU includes increased capacity and journey time improvements between Manchester and York. While electrification of the route was included in the original TRU, recent political announcements suggest only parts of the route

will now be electrified, with the Stalybridge to Huddersfield core section through Standedge Tunnel omitted from the wiring plans (p18).

Alongside the ETCS-ready solution, Transpire must produce an output requirements specification to enable a future ETCS contractor to integrate seamlessly with the alliance works, 'as it is now intended that ETCS will be

deployed concurrently to the delivery of the alliance works'. The appointment of the ETCS contractor will be subject to a separate procurement carried out by NR.

The alliance may be instructed to construct and deploy some of the trackside digital equipment such as ETCS marker boards and balises to support delivery of ETCS by the ETCS contractor.

Second entrance at Coventry approved

COVENTRY CITY Council has approved plans to construct a new station building to provide a second entrance to Coventry station.

The plans involve enhancing the station's existing facilities as part of a wider masterplan for the area, which includes a new

bus interchange. Work planned at the station also includes a new bay platform to serve the Nuneaton to Leamington line.

The new entrance on Warwick Road would be on two levels, with a platform level concourse adjacent to platform 1 and a second entrance at bridge

level, providing direct access to all platforms via a second gateline. The entrance would be connected to the Warwick Road tunnel, providing a direct link to the new bus interchange. Five retail units would also be provided, along with a 634-space multi-storey car park.

COLAS TO OPERATE GRINDERS

NETWORK RAIL has awarded a contract to Colas Rail for the operation and maintenance of its fleet of plain line rail grinding trains.

The contract will run for an initial three-year period, with options to extend for further periods of up to two years. Colas will deliver operation and maintenance of the rail profile treatment service, including planned preventative maintenance, repair work and overhauls to the plant and will manage, support, train and develop operations and maintenance staff.

WOLVERHAMPTON STATION PROGRESS

WORK HAS begun to put in place foundations for the first section of the new station building at Wolverhampton.

Demolition works have been completed at the site, including the former British Transport Police

building and a small section of the current station building next to platform 1. Contractor Galliford Try has moved piling machinery into place to begin the next stage of works.

The first section of the new station building is expected to become

operational in autumn 2019, when phase two of the programme – bringing down the remainder of the current station building and completing the new build – will also start. The new building is due to be fully open in summer 2020.

EAST YORKSHIRE BEGINS TO ROC

THE MAINLY semaphore signalling on the Hull lines between Howden, Goole and Hessle was replaced in early December by an Ansaldo-led consortium. The mechanical signal boxes at Saltmarsh, Gilberdyke Junction, Broomfleet, Crabley Creek, Brough East and Melton Lane (Ferriby) were closed, together with four gate boxes, almost all over 100 years old. Eleven level crossings were to be upgraded to Manually Controlled Barriers (MCB) and equipped with Obstacle Detection equipment. The new light-emitting diode (LED) signalling is mainly four-aspect, all supervised from a single 'Brough' workstation in the new York Rail Operating Centre (ROC). Train detection by axle counters replaces that by track circuit.

Unlike the most recent West Yorkshire schemes (overleaf), which replaced signalling dependent on colour light signals and mainly track circuit block working, the East Yorkshire scheme almost entirely replaces semaphore signalling and



Autumn for semaphores: with just two weeks left to go for the old manual signalling on the route leading into Hull, No 185105 passes Melton Lane signal box with a Hull to Manchester working on 10 November 2018. Rob France

absolute block working. Also unlike the West Yorkshire resignalling it is, for the moment, an isolated area of control at York ROC, with the new

Brough workstation fringing with existing earlier signalling at Hessle and Selby signal boxes, both of which had previously been equipped

with NX panels, and with the listed Goole Bridge signal box which, as its name implies, continues to control the swing bridge there. Alan Williams

Halifax box: now redundant. A Grand Central Class 180 passes on a brilliant autumn day, 18 October 2018. Alan Williams



YORK TAKES COMMAND

ALAN WILLIAMS describes two very different approaches to the recent Huddersfield and Bradford resignalling schemes

FOR THE last two decades, much of the signalling in West Yorkshire has been controlled from York Integrated Electronic Control Centre (IECC), first opened in 1989 and substantially extended between 2000 and 2002 to take control of much of the railway in West Yorkshire, including the entire Greater Leeds area.

But still further west in Yorkshire, two areas of existing signalling remained, the north trans-Pennine route controlled by Healey Mills and Huddersfield signal boxes, and the even more northerly Calder Valley route via Bradford, controlled by Mill Lane Junction, Halifax, Milner Royd Junction and Hebden Bridge signal boxes. Both routes were resignalled by Siemens Mobility during 2018 in the two-stage £50 million Huddersfield – Bradford scheme. The solutions chosen for the two stages were, however, very different, essentially two separate schemes.

NORTH TRANS-PENNINE

Stage 1, the north trans-Pennine route, was completed in January 2018. Huddersfield signal box, which then closed, was a BR design dating from 1958 but

had been re-equipped with an entrance-exit (NX) panel with solid state interlocking (SSI) in 1993, while Healey Mills also had an NX panel dating from 2003 but with route relay interlocking and was housed in the by-then-disused 1963 control tower of Healey Mills yard.

As much of the lineside equipment – points, signals, etc – was not yet life-expired, and given that this route is slated to be transformed in the near future with digital signalling as part of the promised Trans-Pennine Route Upgrade (TRU), it was decided to retain much of the existing equipment, including the colour light signals activated by track circuits, but to recontrol it from the new York ROC. Because it was a recontrol of existing equipment, no track alterations were carried out in Stage 1, although the opportunity was taken to rationalise the Healey Mills yard area and recover redundant equipment.

The lines previously controlled from Huddersfield and Healey Mills signal boxes are now supervised by the 'Huddersfield' workstation in York ROC, fringing with Diggle Junction box just west of Standedge Tunnel, with Barnsley on the single track

Penistone line in the south, with the Leeds West workstation between Ravensthorpe and Dewsbury, with Horbury Junction on the line towards Wakefield, and with the new Halifax workstation just beyond Greetland Junction. Control from York ROC is by Siemens Controlguide Westcad to renewed remote interlockings at Healey Mills, Thornhill LNW, Heaton Lodge, Greetland and Huddersfield, and will in due course be enabled with Automatic Route Setting (ARS).

CALDER VALLEY

In contrast, in Stage 2, completed in October 2018, the generally much older equipment on the Calder Valley route has been completely replaced and the entire route resignalled.

Of the four signal boxes now closed, Milner Royd Junction and Hebden Bridge were ex-Lancashire and Yorkshire Railway mechanical boxes dating from 1874 and 1891 respectively. Both retained full sized levers but latterly controlled colour light signals with electro-mechanical interlocking. Halifax and Mill Lane Junction (Bradford) boxes were also of L&Y origin, both dating from 1884, but both were re-equipped

with Independent Function Switch (IFS) panels in 1970 and 1973 respectively, with relay interlocking.

Now the single 'Halifax' workstation in York ROC fringes with the Todmorden interlocking of Preston power box just west of Hebden Bridge, from which point it supervises the line through Halifax to Bradford Interchange, and then the line from there on towards Leeds as far as Bramley. It also supervises the line from Milner Royd Junction towards Greetland Junction, where it fringes with the Huddersfield workstation provided for Stage 1, and the spur from here through the Salterhebble Tunnels back to the Halifax line at Dryclough Junction forming the third side of the triangle. Again in contrast to Stage 1, all train detection is now by Frauscher axle counters. Two new crossovers have been provided on the approach to Bradford Interchange station to allow more parallel moves to and from the Halifax line from platforms 1 and 2.

On the line from Bradford Interchange towards Leeds, the Hammerton Street loop has been abolished, although the separate siding connection to European Metal Recycling has been maintained. The up line from Bradford as far as Hammerton Street Junction is now reversible, further enabling

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parallel moves into the station from the Leeds direction.

To allow for an increase in the number of services, and in anticipation of the use of the Calder Valley line as a diversionary route for TransPennine services when work on the route upgrade gets under way, the new signals have been spaced to allow trains to run at a closer four-minute headway throughout the newly resignalled area, and there are a substantial number of linespeed improvements. The previous overall maximum speed limit was generally 60mph, but the engineer has now approved higher differential limits of up to 80mph for lighter weight multiple-unit trains, as allowed elsewhere for 'Sprinter' (SP) trains, while locomotive-hauled trains remain limited to 60mph.

The higher limits are shown as 'MU', although it should be noted that TransPennine Class 185 units are not allowed this dispensation because of their weight, nor presumably will TPE's new 'Nova 3' trains because of their Class 68 locomotive traction.

Hot Axle Box Detectors (HABD) have been provided on both up and down lines at Mytholmroyd.

In contrast to the remote interlockings employed for Stage 1, control from York is by Westcad

through a Westlock installation in the ROC. It is anticipated that the Halifax workstation will be ARS-enabled in February 2019.

The topography of the Calder Valley route is challenging, with a dozen tunnels in total on the two resignalled sections, together with steep embankments and cuttings, so access can be difficult. With weekday night actual working time reduced to some 3½ hours, as part of the scheme Siemens installed Train Activated Warning Systems (TAWs) at several locations to alert staff working on or by the track of the approach of a train, thus enabling greater access during the day when trains are still running.

Some 60 signalling technicians in the Leeds maintenance team normally used to working with earlier generations of mechanical and relay-based interlockings needed to be familiarised with the new equipment, so rather than attempting this piecemeal along the route, Siemens set up a 'Training REB' – a temporary building incorporating the latest equipment at a single location. No affected signalling staff have been made redundant, all either taking early retirement or having found posts elsewhere.

Hebden Bridge signal box is listed, and is to be retained on its present

site complete with its lever frame and other equipment, with its ongoing care hopefully passing to the Friends of Hebden Bridge Station.

Over the two stages, the 40 miles of resignalling have accounted for 408 Signalling Equivalent Units, requiring 95 new signals and 185 new axle counters.

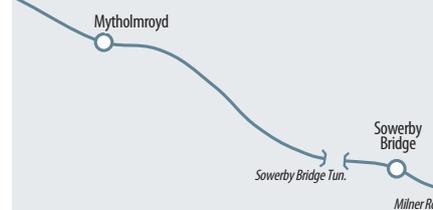
WHAT NEXT?

After Christmas, as a result of this work, coupled with the migration of all control from York IECC over the festive period (see box below), almost all the huge complex of lines across West Yorkshire, bounded by the Pennine summits in the west and the East Coast main line from Doncaster in the south to Northallerton in the north, will be controlled from workstations in the new York ROC.

Resignalling of the approaches to Leeds together with an additional west-facing bay platform are planned, while two lines almost literally on the doorstep of the ROC, from York through Harrogate to Leeds, and from York to Scarborough and then down the coast to Hull, remain the preserve of some 20 mechanical signal boxes, mostly with semaphore signalling and Absolute Block or Key Token single line working. There is still more work to be done! 

WEST YORKSHIRE

Extract from OPC's Rail Atlas of Great Britain and Ireland.



YORK MOVES ON A GENERATION

The York area has always been in the van of signalling development. In 1903, an electro-pneumatic box was introduced at the then Severus Junction, just north of York, and in the early 1930s the London & North Eastern Railway introduced a pioneering route-setting installation just a little further north at Thirsk. Then, in 1936, with plans to provide additional platforms – the present platforms 10 and 11 – new signalling through York station was required and the total replacement of the semaphore signalling with an ambitious new power signalling scheme was proposed with colour light signals throughout. World War 2 delayed progress, but in 1951 a new power box with route relay interlocking was commissioned, replacing seven mechanical boxes. The two new platforms were finally opened.

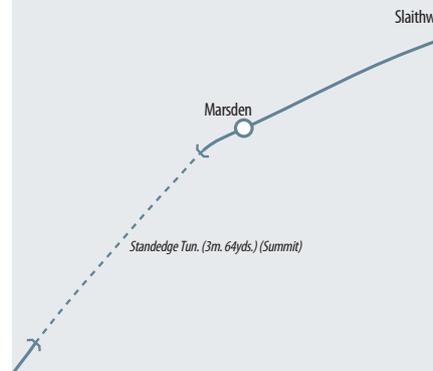
The now familiar panel including track circuit indications was arranged in four sections in a horseshoe, with individual route setting switches on the console below. Other novel features included train describers from the six adjacent fringe boxes which enabled descriptions to

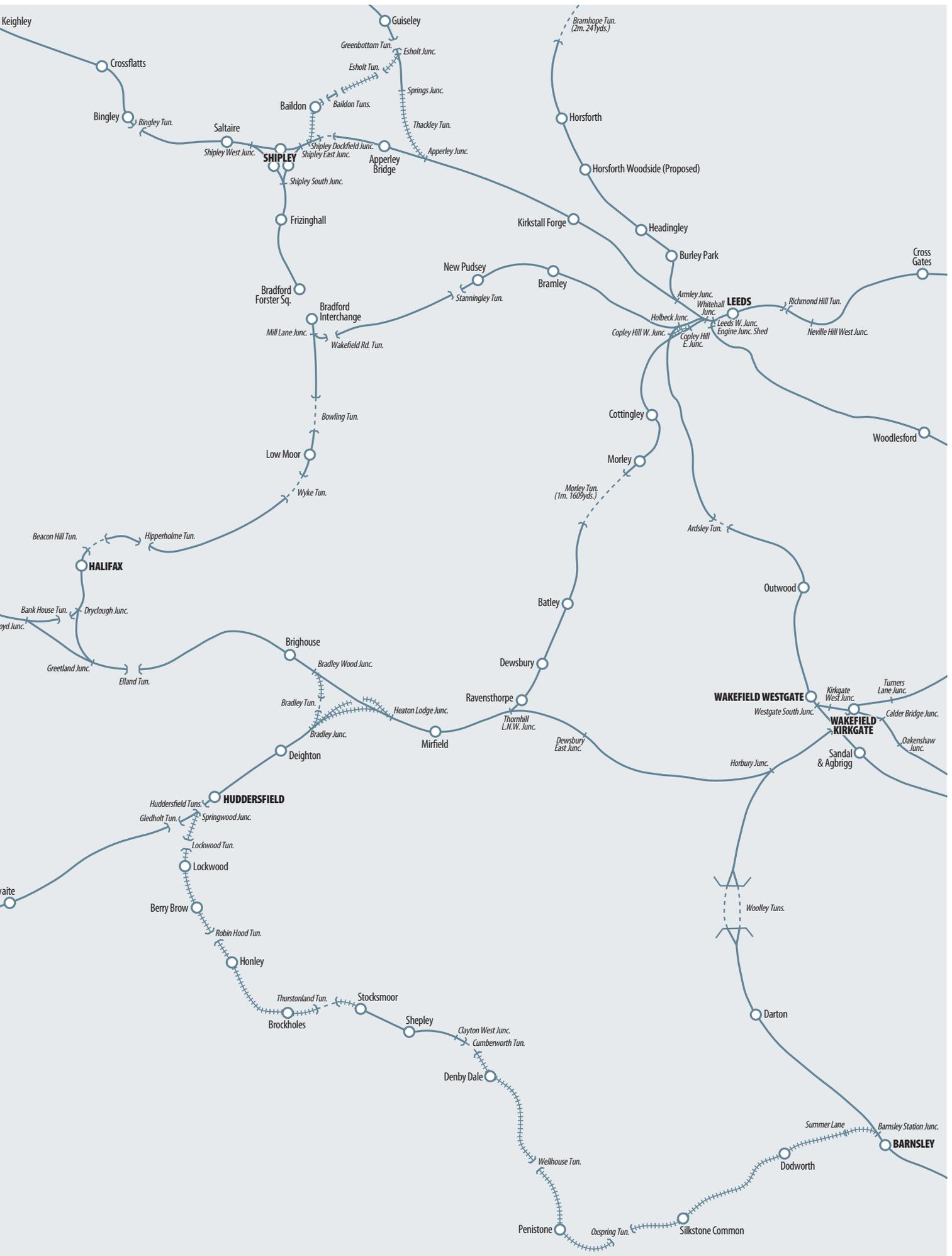
step forward with the passage of a train – and the ability of signalmen to work while seated! The area covered just 18 miles of running line and was modest compared to later installations, but at the time York was claimed to be the largest route relay interlocking in the world, enabling 828 separate routes to be set up, and proved to be the precursor of many more panel box schemes over the next two decades. The total cost of the 1951 resignalling was reported to have been £562,000, just over £18 million today.

In 1960, British Railways proposed a new Centralised Traffic Control (CTC) system, an innovation in the UK, for the line between York and Beverley, to be controlled from a new panel in York power box. It involved singling most of the 30-mile line, with the installation of automatic level crossings, also an innovation at the time. It was to be a pilot scheme for introduction of CTC elsewhere in the country as part of the BR Modernisation Plan. The contract was let and significant amounts of material delivered but instead, as part of the Beeching Plan restructuring, the line was closed in 1965.

The next major alterations came with the rationalisation of the approaches and the layout through the platforms at York in connection with the East Coast electrification. The 1951 power box was closed and a new Integrated Electronic Control Centre (IECC) was provided, with just two workstations, York North and York South, controlling SSI interlockings and essentially covering an extended area of the 1951 scheme. The IECC was then greatly further extended from 2000, with additional workstations covering the greater Leeds area including the lines out to Skipton, Ilkley and Wakefield Westgate.

Control of all these areas was due to be transferred to the adjacent York Regional Operating Centre (ROC) over the Christmas period to join the two new schemes described here, and the IECC closed. Ironically, if current proposals come to fruition, some 70 years after its predecessor was commissioned to provide extra platforms, the IECC building may be demolished to enable yet further platforms to be provided to the west of the existing station.







SIEMENS TO ENTER UK TM MARKET

Meanwhile, should we rename ARS?

For some reason, some sections of the signalling establishment have been ambivalent about the role of Automatic Route Setting (ARS) in the Digital Railway spectrum. Indeed, there was a quite ferocious spat (by learned institution standards) over the issue within the normally sober Institution of Railway Signal Engineers back in 2013 ('Informed Sources', December 2013).

A past President of the IRSE had written: 'The existing traffic management systems used in Great Britain contain little real "intelligence". ARS is provided in all modern control centres which provides functionality to set routes in accordance to

timetable requirements – but it cannot do much more than that.'

Various engineers involved in the development of ARS at British Rail Research responded vigorously in the correspondence columns, pointing out that ARS was really quite smart. Not for the first time with BR Research, part of the misperception lay with the original choice of terminology. 'Automatic' has overtones of an automaton, going through pre-programmed paces. As we shall see later, Siemens has come up with a much better nomenclature.

An unfortunate confirmation that ARS was an early form of Artificial Intelligence, rather than

a dumb implementer of the timetable, emerged in the hearings of the inquiry into the Ladbroke Grove collision. Discussing the relative inexperience of the driver involved, it was pointed out that ARS could make life difficult for drivers at Paddington by the sheer ingenuity of its route setting.

For an inexperienced driver, or even a veteran, being signalled over an unexpected route through a busy station throat could be disconcerting. Signallers, too, have in the past complained that ARS does not do what they would have done in the same situation. But it could be argued that if ARS cannot make better decisions than a human operator under pressure, then it is not doing its job.

TM'S SERVANT

Of course we now have Traffic Management (TM), which is really clever and can identify and resolve potential conflicts and enable controllers to plan and re-plan services. So far, with the exception of the only TM system currently working, the Resonate Luminate Integrated system at Swindon and Didcot ('Informed Sources', October 2018), proprietary TM systems have been mixed and matched with proprietary control systems.

While these control systems, such as Siemens WestCad, can run a third party ARS, with the current TM systems a limited route setting facility is used to run the timetable downloaded by the TM until it receives an updated version.



Britain's busy railway: this is Wandsworth Road on 8 December 2018 with (left to right) a London Overground Class 378 bound for Clapham Junction, a Networker from Bromley South and a '375' on a Dover Priory service. Graham Nuttall

Thus at Three Bridges, the Hitachi Tranista TM will be interfaced with the Siemens WestCad-e work station controlling the Thameslink central core. WestCad-e incorporates a facility called 'Immediate Route Setting' (IRS).

When there are changes to the service, the Tranista TM sends an updated version of the timetable to the WestCad IRS to run. However, there is a caveat.

Changes Tranista makes to the timetable cannot be implemented in the rolling five-minute 'window' ahead of actual time. Just to clarify, if it is 17.00, the TM can't update the IRS for services between 17.00 and 17.05. Similarly, with the aborted Integrated TM at Romford Rail Operating Centre (ROC), the Thales ARAMIS-D TM would have been restricted to setting routes at least five minutes before implementation.

I appreciate that my technical writing skills are struggling with this 'window' concept a bit. So here's another explanation.

Although the 'I' in IRS stands for 'Immediate', the overall specification says that TM can't, to paraphrase Veruca Salt, 'Change it NOW'. It can upload only changes that come into effect beyond the forward five-minute window.



Not so simple: the Central Line at North Acton on 7 December 2018, with greasy rails in evidence and the railhead treatment train on the right awaiting a path as a service train makes towards Epping. Ken Brunt

Now on a busy railway, five minutes is a very long time. For example, a lot can change in five minutes on either side of the Thameslink central core, especially at peak 24 trains per hour (tph) throughput.

FRUSTRATION

With a train having to arrive on time every 2.5 minutes, you can see a situation where Tranista's Conflict Detection system can see the service going pear-shaped, but is left hopping up and down in frustration because the five-minute window rule prevents it taking prompt corrective actions (*Isn't this taking anthropomorphism to a new level – Ed?*).

There have been suggestions that Resonate is somehow 'cheating' because Luminate sits on top of the company's Scalable control system, which incorporates the company's Enhanced-ARS (EARS). Well, vertical integration clearly has its advantages, but, as I found out during my visit to Swindon, the real benefit is the pairing of Integrated TM with the intelligent EARS.

Where ARAMIS-D and Tranista are frustrated onlookers when they can see trouble looming, Luminate can, as it was put at Swindon, revise the plan and throw it at EARS and leave it to iron out any minor inconsistencies.

There was an excellent article in praise of ARS by my old chums Malcolm Savage and Mike McGuire of consultant Savoir Ltd in the October 2018 *IRSE News*. This included an illustration

of the potential problems caused by the five-minute window, which I will borrow.

For northbound services, the Thameslink challenge will be presenting trains at Blackfriars Junction. These trains can arrive from either London Bridge or Elephant & Castle. Running times between these stations and the junction are four minutes from London Bridge and three minutes from Elephant & Castle.

If a train's station dwell time at Elephant & Castle is extended significantly there is just three minutes for the decision to be taken to let the following northbound London Bridge service proceed into the central core and maintain the flow of traffic. Tranista will detect this, but the five-minute window means that it cannot give the IRS the necessary revised plan.

Instead, the signaller will be expected to note the extended station stop and manually give the next London Bridge train priority. Mind you, rather like the way drivers observe signals with a reliability that exceeds human factors predictions, signallers' Mk 1 human wetware is pretty efficient.

A chum was recently shown round Three Bridges ROC. After the visit he e-mailed me, incredulous that this busy service was still being run with manual route setting and no ARS.

UNDERGROUND

I had been pondering the conflicting views on the role of ARS within TM for some time when in July 2018 the

Institution of Mechanical Engineers, in conjunction with IRSE, ran a conference on traffic management. One of the papers was presented by Ivan Curties, late of Thales and now Principal Project Engineer (Control & Information), Transport for London.

My immediate reaction was whether an urban railway, mostly made up of end-to-end lines with few if any junctions, would contribute much of relevance to my preoccupation with TM on the main line. How wrong I was! Mr Curties' presentation clarified the TM/ARS relationship.

Mr Curties played to my expectation in his introduction, pointing out that compared with the main line, the Underground is a closed system, trains stop at every station and the only exit and entry point is the depot. Trains don't split and join up and there is a single operator.

But after that self-deprecatory start, he introduced us to the demanding work of LU operation, where preventing overcrowding at small platforms means that 'maintaining headway is everything'. 'If we are putting in a 33tph signalling system, we run it at 33tph with no contingency. If the shit hits the fan, it hits it hard and fast'. This means that the operators need tools to handle perturbation quickly.

Within the system, running the service safely is down to Automatic Train Protection (ATP). Automatic Train Operation (ATO) is the key to tight headways. 'It drives the trains really, really well and brakes perfectly.'





Manchester ROC: Siemens has switched on its first Dynamic Route Setting function here. The photo shows Sir Richard Leese (second from right), leader of Manchester City Council, touring the Centre in July 2014. Courtesy Network Rail

SUPERVISION AND REGULATION

Above that in the control hierarchy there is Automatic Train Supervision (ATS), which runs trains to the timetable. And on top of that Automatic Train Regulation (ATR).

ATS is the LU analogue of Network Rail TM. It handles traffic through what junctions there are, with a choice of three modes, and it enables the operators to edit the timetable.

In particular, ATS provides automated editing. On the Central Line, for example, this includes extending trains or diverting them between West Ruislip or Hainault. Another facility is auto-reverse, if the line ahead is blocked. And trains can be cancelled.

As Ivan Curties emphasised, these facilities automatically edit the timetable, reducing the workload on the operator.

SUBTLE

Which brings us to ATR, which has the job of smoothing the gaps between trains. It makes multiple minor changes simultaneously in such a way that, in Ivan Curties' words, 'it is almost impossible for a human operator to understand what it is doing'. This echoes experience with ARS at Paddington already mentioned.

Initial experience with ATR on the Jubilee Line was not positive, because operators were unhappy seeing trains being held for no apparent reason. A second attempt on the Central Line ran into the dual problem of testing

the algorithms and then getting staff to accept it. However, it was third time lucky on the Victoria Line, where ATR is in successful operation.

ENTER SIEMENS

Ivan Curties' paper convinced me that that you need smart tactical intelligence to complement the wider role of TM. So when I met Siemens' Mark Ferrer, Operations Director – Digital Railway, and Mike Lewis, Control Systems Director, in October, I asked them what their company was doing about TM.

Siemens wasn't involved in Network Rail's original TMS procurement, which, in retrospect, was no great loss. But now that new Network Rail Chief Executive Andrew Haines is reported to see TM as having equal status to the roll-out of the European Train Control System (ETCS), there is the prospect of serious business to be won.

And Siemens is adding facilities to its WestCad, as opposed to WestCad-e, control system, to provide Integrated Traffic Management. What's more, the company is going down the TM+ARS route, although, of course, the abbreviations are different.

Instead of TM, Siemens refers to Digital Conflict Resolution (DRC). And when the conflict has been resolved, the revised timetable is sent to the Dynamic Route Setting (DRS) function, which, I have to say, sounds more 21st century than ARS.

On the day of the meeting Siemens had switched on the first DRS. This covered Preston-Blackpool, controlled from Manchester Rail Operating Centre (ROC). Another milestone mentioned during the session was that the Derby resignalling saw the 100th WestCad workstation installed.

LEGACY

In parallel with this development Siemens has also been working on the need to provide the option of ARS where legacy Route Relay Interlockings have been relocked to a WestCad control system. These interlockings don't incorporate train-operated route release (TORR), nor do they have track circuit 'anti-bobbing' protection.

Siemens' solution has been to incorporate the necessary data for these features into its Westronic Time Division Multiplex (TDM) remote control system linking the WestCad with the interlockings. As a result, the control centre equipment sees these electro-mechanical interlockings as if they were equipped with TORR and anti-bobbing and are thus compatible with ARS.

A further benefit is that it avoids work on the interlockings themselves. This is a good thing, given the condition of the older relay rooms.

VERTICAL KNOWLEDGE

Mark Ferrer noted that these innovations emphasise that to get the automation at the top layer,

you need a deep understanding of the development of UK signalling and its various systems down to interlocking level. And that all these developments come from Chippenham, which us older hands still think of as Westinghouse.

Mike Lewis, who has been associated with WestCad from the start, added that all his software team are at Chippenham, together with the data people: production of the hardware platforms and the Westronic communications systems is all UK-based. Recently Siemens even brought equipment cubicle supply back to a UK supplier.

Mr Lewis also provided an interesting perspective on TM which I suspect is reflected in the relative success of the original TMS first deployment contracts and Resonate's ability to get Integrated TM running at Swindon in a year. 'Once your route setting engines are running, Traffic Management is just IT (information technology) on top. Signalling is the hard part, but somehow industry believes that Traffic Management is difficult and expensive.'

Both Siemens and Resonate are hard-core UK signalling specialists, with in-depth knowledge of systems and equipment. Both WestCad and Resonate's Scalable came into being at the birth of the electronic control centre in the late 1980s and have grown up with its development. Commissioning 100 WestCad workstations gives you corporate memory.

So with TM a Network Rail priority in Control Period 6, Network Rail has two established UK suppliers ready to deliver. But has it learned the lesson of the first deployment schemes that TM is not a 'bolt-on'? Procurement of the East Coast main line resignalling project suggests not.

Currently procurement is based on three framework contracts covering train control: effectively European Train Control System, Traffic Management and a 'Railway Systems Integration Partner (RSIP)', who will work within the Network Rail Route 'to lead industry in the development and deployment of ETCS between King's Cross and just south of Grantham'.

According to Network Rail, the RSIP's responsibilities will include managing integration activities and establishing a collaborative relationship with the Route and its technology partners. It seems to me that we are in danger of repeating the mistake of treating TM as a bolt-on, rather than an integral part of what in Euro-speak is called 'Command and Control' or, in plain English, 'signalling'. 



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SAFETY - RAIB WARNS ON CORPORATE MEMORY LOSS

The RAIB final report into the August 2017 Waterloo collision made chilling reading as the 30th anniversary of the Clapham accident approached

That the price of safety is eternal vigilance is a cliché. But clichés are only clichés because they are true. The February 2018 'Informed Sources' provided a detailed analysis of how, on 15 August 2017, the 05.42 Guildford service off platform 11 at Waterloo could be signalled into the side of a train of hopper wagons parked on an adjacent track. The Rail Accident Investigation Branch (RAIB) final report published on 19 November provided more detail on the human and system errors that made it possible.

The diagrams opposite show how the detection of the set of points where the collision occurred (Points 1524) was configured. As an aid to commissioning, a test desk had been fitted which was connected to the Waterloo interlocking with 664 wires. When in use it enabled signalling inputs to the interlockings to be simulated during commissioning, including Points 1524.

At the start of the test, the testers would remove the fuses from the

points' operational circuits and insert a link from the test desk. Using the desk, testers could send signals simulating the state of Points 1524 to the main interlocking. Figure 7b shows the test desk connected for use.

After the test desk had been installed, the need to move a lineside cubicle associated with Points 1524 resulted in the wiring being updated. 1524C now had its own unique circuit (Figure 7e). This had no effect on safety, as both point detection relays still had to be energised for the route to be set.

However, the test desk had been designed in 2016 and the designers had not subsequently been given updated versions of the interlocking design. They understood there to be no changes to the interlocking that would affect the test desk. But the change meant the desk could no longer simulate the signal to 1524C detection relay.

ASSISTANCE NOT REQUESTED

On 13 August 2017, a Principles Tester at Wimbledon Area Signalling Centre

was testing routes that included inputs from Points 1524. When the C ends of these points were not shown as detected on the Wimbledon signaller's display, the principles tester contacted the Functional Tester in the Waterloo relay room and asked him to resolve the problem.

According to RAIB, the Functional Tester first referred to maintenance copies of design documents available in the relay room and deduced that the problem was likely to be a consequence of wiring changes made during earlier parts of the project. He then asked for testing copies of these documents, which should identify changes made during stages of work. But the documents he received did not cover the equipment in the relay room.

RAIB notes that although the maintenance copies of the documents contained the information needed to develop a correct solution, the functional tester stated that he developed a solution by examining the wiring that had already been installed in

the relay room and did not contact the Tester In Charge or ask for assistance from on-call signalling designers to resolve the problem.

He told RAIB that when developing his solution, he did not realise that the detection circuits for the C ends of Points 1524 had been separated from the circuits for the A and B ends. The solution involved installing four wires. These, like the other test desk connections to the interlocking, were a different colour to the standard black interlocking wiring.

CONFLICTING

As to the actual installation of the additional wiring there is, says RAIB, 'conflicting evidence'. According to the functional tester, he instructed an installer to add blue wiring to the

LACK OF SAFEGUARDS

'The actions of a functional tester were inconsistent with the competence expected of testers. As a consequence, the uncontrolled wiring was added without the safeguards required by Network Rail signalling works testing standards, and remained in place when the line was returned to service.' RAIB Report

Off the track: Class 456 derailed at Waterloo on 15 August 2017. Jamie Squibbs



detection circuits for Points 1524 and label the wires to show their purpose. He added that the installers had not been able to find any labels.

But both installers on site said that they had not installed any blue wires during their work in the relay room. They added that they could not have fitted wires without the labels, because labels would have been needed to identify the connections at each end.

RAIB's examination of the site signing-in and signing-out records, 'despite some omission', showed that one of the installers was off-site when all the Points 1524 relays began working and that they usually took breaks together. RAIB concludes 'it is likely therefore that the installers were not present and were probably on their lunch break, when the uncontrolled wires were fitted'.

Given the evidence, RAIB concludes that 'it is likely that the uncontrolled wiring was installed by the functional tester'.

This temporary wiring was left in place when the railway was handed back on the morning of 14 August. As a result, the signaller was able to set the route for the 05.42 and see it confirmed on the panel and the driver given a green signal despite Points 1524 not being detected. In fact, the points, which, irrespective of additional wiring, should have been secured with scotches and padlocked clips, were lying in an intermediate position. This was spotted by the driver, who applied the brakes.

RAIB notes that drivers are not required, and not expected, to check point positions in these circumstances. 'The driver of train 2D03 is to be commended for noticing that they were lying incorrectly and for his prompt brake application' comments the report. It is worth noting that at the earlier similar incident at Cardiff East the driver spotted that points, which should also have been secured, were set wrongly and stopped.

COMMISSION

While the RAIB report is critical of numerous other failures to follow the correct processes, the proximate cause was the unauthorised changes to the wiring in the Waterloo relay room. There is an obvious parallel with Clapham, but there is also a significant difference.

Clapham was a sin of omission – a technician failed to clip off a redundant wire, but bent it out of the way and failed to wrap the still live bare end in insulating tape.

Waterloo was a sin of commission – unauthorised changes were made

that circumvented the basis of primary safety, the interlocking.

For those engineers and managers who were around at the time of Clapham, and who were involved in the massive restructuring of signalling management and processes that followed Sir Anthony Hidden QC's inquiry, Waterloo and Cardiff East have been deeply worrying. But I am not alone in sensing that because it was 'only' a gently sideswipe and there were no fatalities its seriousness has failed to register.

In its report RAIB expresses this concern when it writes: 'Events at Waterloo and the RAIB's investigation of the serious irregularity at Cardiff East Junction suggest that some in the railway industry are forgetting the lessons learnt from the 1988 Clapham Junction accident in which 35 people died.

THOUGHT SEPARATED FROM DEED

'The vital importance of this concept of absolute safety was acknowledged time and again in the evidence which the Court heard. This was perfectly understandable because it is so self-evident. The problem with such expressions of concern for safety was that the remainder of the evidence demonstrated beyond dispute two things:

(i) there was total sincerity on the part of all who spoke of safety in this way; but, nevertheless

(ii) there was failure to carry those beliefs through from thought into deed... The concern for safety was permitted to co-exist with working practices which... were positively dangerous'. *Sir Anthony Hidden QC, September 1989*

'The major changes to signalling design, installation and testing processes triggered by the Clapham accident remain today, but the RAIB is concerned that the need for rigorous application is being forgotten as people with personal knowledge of this tragedy retire or move away from front line jobs. This deep-seated, tacit knowledge is part of the corporate memory vital to achieve safety. Loss of this type of knowledge as previous

generations leave the industry is a risk which must be addressed by organisations committed to achieving high levels of safety'.

Those who boast that Britain has the safest railway in Europe would do well to read this report and tone down the hubris. And Network Rail might ponder whether safety briefings when you sign in at reception for a head office meeting really contribute to a corporate safety culture. **MR**

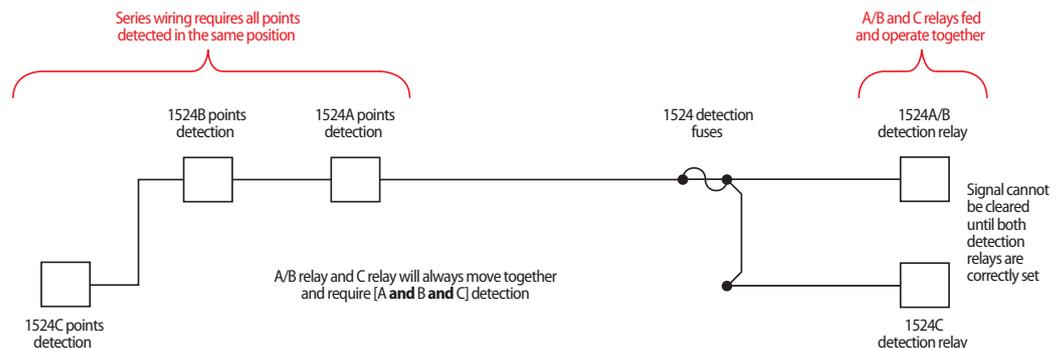


Figure 7a: 1524 points detection wiring as installed before work began

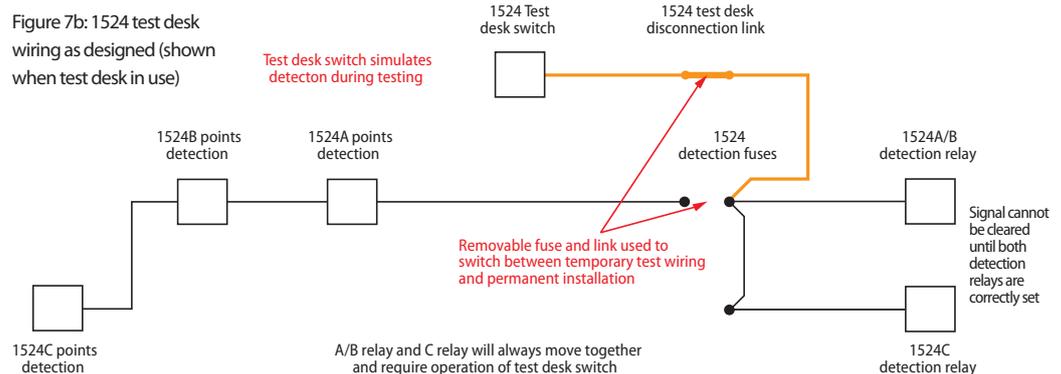


Figure 7b: 1524 test desk wiring as designed (shown when test desk in use)

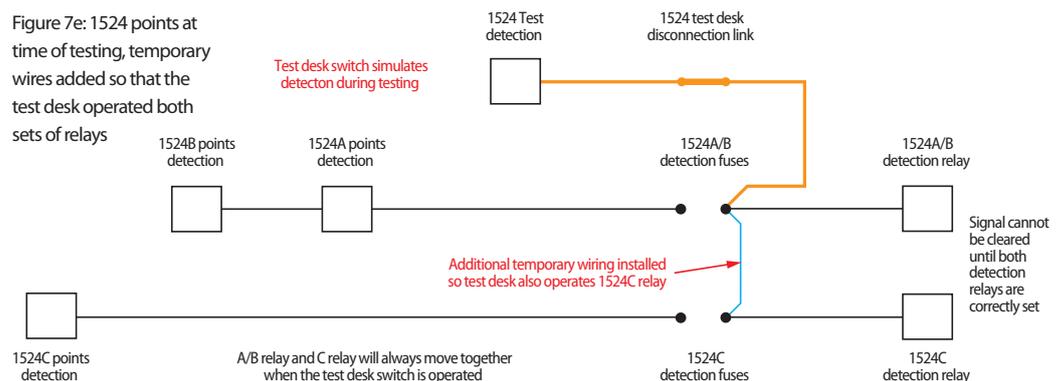


Figure 7c: 1524 points at time of testing, temporary wires added so that the test desk operated both sets of relays



Top of the table: a brace of Class 707 units pass through the disused piers of the former East Putney – Point Pleasant Junction up line flyover while forming the 11.07 Waterloo – Waterloo circular on 14 July 2018. Antony Guppy

Class 707 reliability climbs upwards

A fleet destined to go off-lease soon leads New Train TIN-watch

TIN-watch uses Moving Annual Average Miles per Technical Incident (MTIN MAA) because it smooths the ups and downs of fleet reliability from period to period, due to external vagaries. But with the South Western trains consistently topping the table – and this month over 2,000 MTIN clear of the Yardstick of Derision (the Pacer), I thought it might be of interest to record how Wimbledon depot and Siemens have got to the current reliability level.

Conveniently, all 30 five-car units were in service from Period 1 2018-19, the figures for the two previous periods looking a bit 'cut and paste'. Note that the number of faults per period is trending downwards, over a short timescale in rolling stock reliability growth terms. But in parallel the fleet mileage has dropped.

Finally, the MTIN for the latest Period shows why MTIN MAA is my preferred yardstick for TIN-Watch and

this year's annual Golden Spanners analysis starting on page 54.

In Table 1, with the Class 700 Thameslink fleet at full strength, the drive is on to accelerate reliability growth. MTIN MAA has been inching up by 300-500 miles each period and should overtake the Golden Spanner-winning Northern Class 142 fleet next period. However a breakthrough into five-figure territory is overdue.

Also overdue are more participants. With 31 Hitachi Class 385 electric multiple-units in service with ScotRail for the start of the new timetable, I hope to add them to the table shortly.

AND FINALLY

It's been a turbulent year on pretty well every front and next year seems set to be even bumpier. As ever, through the triumphs and disasters of 2018, the giant jigsaw puzzle which underlies this column has depended

on the multitude of informed sources who have provided the missing pieces enabling me to provide readers with as comprehensive picture of what is happening – or going to happen – as possible.

So please continue to e-mail me with observations, corrections and criticisms. You can follow my,

mostly, inconsequential ramblings on Twitter (@captain_deltic). If you don't yet subscribe to my monthly blog Informed Sources e-Preview, e-mail me (roger@alycidon.com) for an invitation.

But for now may I wish all readers a joyous Christmas and a happy new year.

TABLE 2: CLASS 707 RELIABILITY GROWTH

Period	TIN	Miles	MTIN
10	16	112,568	7,036
11	33	157,399	4,770
12	33	157,399	4,770
13	18	184,038	10,224
1	12	192,268	16,022
2	22	200,442	9,111
3	15	202,801	13,520
4	15	201,140	13,409
5	11	171,084	15,553
6	13	202,801	15,600
7	9	188,787	20,976
8	2	163,527	81,764

TABLE 1: NEW TRAIN RELIABILITY, PERIOD 8 2018-19

TOC	Class	Number of Units/Trainsets	Number of TINs	Unit Miles	MTIN	MTIN MAA
SWR	Class 707	30	2	163,527	81,764	11,395
GTR	Class 700	115	93	1,037,021	11,151	8,672
GWR	Class 800	44	102	689,337	6,758	5,851
GWR	Class 802	10	27	110,132	4,079	5,243
TfL Rail (Crossrail)	Class 345 RLU	15	18	75,308	4,184	2,347
TfL Rail (Crossrail)	Class 345 FLU*	12	0	2,706	2,706	25,244

*Testrunning



First Class 385 trains, with interiors designed by DCA, completed at Newton Aycliffe factory

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A Valenta odyssey

Fast train to slow tracks: 'The Screaming Valentas' railtour

Derby's new platform 6 and 7 is thronged with Anoraks, black rucksacks, the occasional bobble hat and virtually no gender diversity. No train is on the indicator, but if you need to be told where this train will be you probably shouldn't be on it. Welcome to 1Z41, 'The Screaming Valentas', a joint venture by the 125 Group, the Branch Line Society and East Midlands Trains. The route is a testimony to the flexibility of the HST operating it, taking in such joys as Chaddesden curve and various loops, but don't worry, you won't need your highlighter pen for my review.

SMOOTH SEVEN

The HST of choice is one of East Midlands Trains' new '2+6 sets, ex-Grand Central with ex-Great Western buffet cars, still keeping their luxurious grey leather First Class trim. No Valentas here, but bear with me. These sets are a joy as they feature a truly radical feature: a standard class vehicle with 2+1 seating all set

in bays with a window. Keep it to yourself or everyone will want one.

The train comes bowling in on the new track, at a speed we are still getting used to, loads up and off to Chaddesden, beside the A52, although you would never notice the line from the road. The sidings are all relaid with point heaters and new signals, but the big change is the speed into the station, which is increased from 15mph to 30mph. We glide through platform 7 smooth as silk and off to Loughborough, reversing to pick up the branch known as the Great Central Railway (Nottingham). The bridge to link this line to the better known Great Central stands proudly across the main line, but in glorious isolation with no embankments either side of it; it's time will come.

Talking of things whose time will come we pass behind the Brush works, full of Class 319 vehicles being converted to bi-modes. This is where HST power cars were

re-engined, and hundreds of Valentas scrapped, although it would be inappropriate to say in present company that this was indeed the right decision. At the end of the line waits the restored prototype power car, pride of the 125 Group and still with a smoky old Valenta fitted.

COME SHUNTING

Step forward our celebrity shunter for the day, Tim Shoveller, Managing Director of the Rail Group at Stagecoach – yes, a proper railwayman in charge of a railway company. Again: keep it to yourself, or everyone will want one.

I wonder how many other directors would get down on the ballast between vehicles and know what to do when they got there? There's a funny thing with railways as a hobby when you work with them, something I have often come across. Grumpy bosses assume your hobby is taking you away from your day job in some way, yet if you do something

else – play football, restore old cars, go ballroom dancing – whatever – nobody ever says that. Mind you, even with the popularity of railway programmes at the moment, we are unlikely to see 'Strictly Come Shunting' make the schedules. I have always found that weekend railway people are infinitely more knowledgeable than the 'just a job' kind.

SIR KENNETH

I have had space at my table so far, but who should turn up to fill it but Sir Kenneth Grange, the famed designer of the HST front end, not to mention the Kenwood Chef and the Instamatic camera.

He quickly gathers a bunch of Groupies, including our own occasional Superannuated Anorak Alex Wood, clutching a bunch of 125 Group books to sign. Alex's manner is clearly inspired by Basil Fawley greeting Lord Melbury in *Fawley Towers*. Sir Kenneth (as everyone calls him) related a story of how he missed

Front end study: ex-GC power car now operated by EMT (right) alongside the prototype HST power car.



out on designing the front of Eurostar, basically because he did the HST, said so, and was immediately ruled out as they wanted something that was nothing like it. It would be greedy to do two though, wouldn't it? I ask if he still gets trips out from Kenwood Chef; he doesn't, but he has an unrivalled collection of them. It seems that whenever the company is taken over the new management want to disown everything that went before. So there you go, it isn't only railways.

FUNDAMENTALIST BRANCH

Now with real Valenta haulage, we set off to explore goods loops – which are a magnet to Branch Line Society members. There are some fundamentalist members who always want to be in the leading vehicle, and will even get into the cab if allowed, to maximise track chainage. A friend who drives on a heritage line tells me they get stropky if you stop short of the stop block, although I can't see anyone taking a chance on stoving in an HST nose end to satisfy extreme highlighting.

Inevitably the conversation turns to the plight of HSTs on the Midland main line, or what will presumably become the Midland Railway in future if it is to be 'on trend'. Back in April 2017 I wrote about the possibility of using Mk 4 coaches from the East Coast, but some killjoy



Master designer: Sir Kenneth Grange steps away from the prototype HST power car.

wrote in to say they would not fit the gauge on the Midland. A survey has been done and it seems he was right – there is a 'sanding' sign just south of Loughborough that is foul. Shift that and we would be good to go, except that now there are not enough of them available. It seems the door is not fully closed on this idea, but we will see what happens.

CORBY PRESSED

The other big issue on the Midland is the new electric Corby service, which doubles the frequency of trains there in 2020. To say there is a buyer's market for EMUs at the moment is an understatement, as companies are virtually giving them away to avoid storage costs. Even if new trains are chosen the rates will be more competitive than ever. It is almost as if, for the 20 years when there were not enough trains, the ROSCO leasing companies were ripping off the train operating companies. Surely not, but you do get a lot more train for your money these days. Shame the opposite is true of infrastructure.

Of course, yet more trains on the Midland will put further pressure on capacity, yet the 12-car trains I see are pretty empty by the time they get to Bedford in the off-peak. The answer has to be to turn more back before Bedford, as the track capacity could be better used.

A turnback siding for a 12-car set is not a five-minute job, as ideally you need to be able to get off the main line. Luton Airport Parkway, which has a marginally bigger footfall at 3.8 million than Luton itself (3.6 million), could gain a platform in what is now the Hampton Hotel

car park, with the added benefit of being able to stand a train there, Gatwick-style, for easy loading of wheelie-case laden passengers.

The usual pursuit of capacity as the only target has resulted in over-long trains doing over-long diagrams, and laid out to suit only their couple of busy hours in the day. We will have to wait a bit longer to see if Crossrail has the same problem, but hopefully Crossrail 2 will learn some lessons.

WIRES STILL WAITING

In the more obvious infrastructure 'inbox' is the upgrading of the electrification between Bedford and London to support 125mph trains. Surprisingly, this is still being talked about rather than out to tender – but then if you can casually slow trains down these days, who is going to bother?

The work is not renewal but improvement, and it would sweep up some maintenance issues along the way. You would think the time to get this done would be before new services started. Oh no you wouldn't, what am I saying.

A NEW HST DEPOT

Meanwhile 'The Screaming Valentas' trundles for the umpteenth time along the GCRN while people show up with various pictures and books for Sir Kenneth to sign. I pretend to have a Kenwood Chef under the table; he would have signed it, I'm sure.

The 41 raffle prizes (Class 41 – get it?) are announced as the sun is setting over the flat Nottinghamshire countryside. The 125 Group has made a good step forward in its quest to build a depot in which to



Down in the four foot: Stagecoach's Tim Shoveller.

keep a complete, serviceable HST. This project will be a good deal more difficult than just getting hold of another power car, but is essential if the set is going to be kept in good order for the future.

We may see that prototype on the main line one day. And we will almost certainly see a charter HST set; looking at the expertise of the Group members they will have no trouble looking after it, funds permitting. British Rail had a good record of supporting charitable causes, and it is good to see this continue, and indeed increase, with Stagecoach. One South Western employee told me that since Stagecoach shuffled off this mortal franchise, he realises how good it was. TOC nostalgia: it had to come.

Maybe Stagecoach will triumphantly return with the new South Eastern franchise. But the company does have a severe handicap: it knows what it is doing.





Alice in Railwayland

Christmas pantomime fun for all the family. Or at least those with knowledge of *Modern Railways*

Alice held tightly to her Uncle Roger's hand as they made their way through the crowds of waiting passengers staring skyward at the King's Cross departure board. They made their way to Platform 9¾, where Alice snuggled up to tales of Azumas generating harmonies, *Alycidon* and *Digital Railways*, which she didn't understand and thought nobody else did either.

The train slipped into Gasworks Tunnel, when a white rabbit carrying a pocket watch ran through the diesel haze singing 'I'm late, I'm late, for a very important date'. He was wearing an Elizabeth Line hi-vi, and since Uncle Roger was still talking, she upped and followed the rabbit.

The mist cleared as they emerged from the tunnel into a strange new carriage. Alice went to sit in a window seat, only to find it didn't have one. 'You've seen nothing yet' said the white rabbit, as he hopped towards a door.

Alice was fascinated, and knowing Uncle Roger had tracked her iPhone, decided to follow him. The train

stopped but nothing happened. She looked at the white rabbit expectantly. 'We have to wait for the guard to open the doors' and, sure enough, eventually they opened and out they went into a dense, dark wood.

'Where are we?' asked Alice, politely. 'Railwayland' replied the white rabbit. 'The trackside forest.'

As the white rabbit hopped ahead, Alice caught little sound bites through the rustling leaves: 'burrowing for six years... 'I'm late... 'dig that hole... 'forget the software'... 'don't sit down it's time to dig another one'...

Eventually they came to a clearing, this being less believable than what was in it: a caterpillar smoking a hookah pipe, sitting on a mushroom. 'Hi man – what's the rush?' asked the caterpillar. The white rabbit was surprised he hadn't heard, but he said again 'I'm late – etc'.

He turned to Alice: 'You still here?'

'Yes, I'm the central character' she said, 'so you had better explain what is going on'. So he did. Fortunately.

The Railwayland Shrub Stem Butterfly spends all its time

dreaming of the future but never gets there, which is why it remains a caterpillar. 'We call him RSSB, you might have seen his logo.'

The caterpillar suddenly opened his eyes wide, and wheezed 'Hydrogen man, it's, like, the future.'

'Is he putting it in that jar thing?' asked Alice. Rather than reply, the white rabbit shot off.

Alice followed, just before a bright blue flash shot beams of light through the misty forest.

They continued through the dense foliage, coming across the odd signal on the way, on top of which appeared a cat, as if from nowhere, like a profit warning. It was an odd-looking cat, with a beard, a permanent grin, a weird colour scheme and an all-knowing look. It was a tom cat, so naturally the white rabbit knew him as TOC.

Seeing Alice's iPhone he said: 'Have you downloaded our App? Buy your tickets from us – no booking fee.'

'Do I need a ticket?' asked Alice. The fat cat purred contentedly: 'Oh, you always need a ticket, and if it is not quite right you'll need another one.'

Alice looked concerned. 'How do I know if it's right? How much is it?'

'How much do you want it to be?' asked the grinning cat, 'it could be almost anything really'. Alice held her ticket up. 'I've got this to Welwyn Garden City' she said, but the cat was unimpressed. 'Not valid on our services – when are you travelling?'

Alice looked tearful. 'But I... I... I don't know where I am – I wish I'd listened to my Uncle Roger.'

The cat grinned wider. 'You're not the first person to say that. I'll just take that iPhone 10, that should cover an open single'. With that the cat disappeared, so only his grin remained.

Alice protested to the white rabbit: 'Where's my phone?'

'Probably in an off-balance sheet account in the British Virgin Islands by now if I know that cat' he said.

'Has he got a lot of money?' asked Alice. 'Not officially', the white rabbit replied. 'Anyway, come on, I'm late.'

'You say that a lot', said Alice. 'This is a strange place, I don't really understand what's going on.' The

Make-believe: queuing up at Platform 9¾ at King's Cross. John Stretton



white rabbit handed her two small bottles labelled 'Drink me', which she noticed did not have an approved nutrition content label. She trusted the white rabbit though, so she drank them, and asked him what they were. 'Informed Sauces' he replied.

Emerging from the forest and climbing over a huge fence they arrived at a Grand conference room. A tea party was just starting there, presided over by a vulnerable adult hat maker, with his friend the March hare and a sleepy dormouse.

'It's one o'clock and time for lunch, tum te-dom te dum' said the hatter. 'No it's not' said Alice.

'How do you know, you haven't got a phone?' pointed out the hatter, and launched into his spiel. 'Welcome to the Golden Teacups awards, where the numbers decide. First we present the copper teacup for least reliable new electric train – you're here just in time, white rabbit, s'pose it had to happen sometime. Now the Silver Teacup for selling the biggest number of press releases in a magazine (*redacted – Ed*). Finally the Golden Teacup for drinking the most tea instead of doing something useful...'

'It's me!' shouted the dormouse, at which point the hatter walloped him with a brake block. 'No it's not – it's Reggie the regulator.'

'He's not here' said the March hare. 'Of course he isn't' said Alice, who was getting the idea by now. 'Why did he clobber the poor dormouse?' she asked.

The white rabbit pulled her away from the party. 'The dormouse was lucky it wasn't a seat cushion,' he said, then explained: 'he's the 'ead 'titter'.

The cat materialised above the table, offering tickets to the guests. 'I've got no trains' protested the hatter. 'Oh dear,' said the cat, 'where are you going – Gospel Oak?'

'No – Barking of course' said the hatter. The cat disappeared, except for a slightly wider grin.

The Grand Hall had been refurbished using 140 windows the March hare had got cheap from Scotland. Outside Alice noticed two grinning cats had appeared. 'I'll have to charge you for another ticket' they said.

'No you won't' said Alice, who noticed when she got outside there was now only one cat, and when she said 'delay repay' it disappeared again. But as they left the building for the extensive gardens, she saw spots of red paint. In the rose garden packs of season tickets were painting the roses red. 'It's quicker than doing lamp posts,' said an inappropriately named ticket made out to Chris Green.

Down the rabbit hole: entrance to Gasworks Tunnel at King's Cross. Paul Bigland



Alice asked what was wrong with the white roses. Chris trembled. 'It's the Queen – the Queen of Hearts – she hates old, white flowers. Especially ones that fail to see her genius, the greatest since Victorian times. Apparently,' Alice said she didn't sound very nice, and she was right.

'Off with their heads!' came a scream. The white rabbit was about to run for it, but didn't make it.

'Too late' said Alice.

'Don't you start' he said.

But the Queen was on the warpath over the timetable fiasco. 'Where's that cat?' she yelled. 'He didn't train his drivers – off with his head! Timetable planners! Off with their heads!'

'She seems to be blaming everyone but herself' said Alice. 'Who is she anyway, and why does she look like an old, white man?'

The white rabbit whispered in reply. 'Keep your voice down, but she is what we call a pantomime dame, so she really is a man, she just identifies as a Queen.'

Then the Queen noticed Alice. 'And who are you? Are you to blame?' she roared. 'Oh no ma'am, I am just a friend of the white rabbit!'

'Oh really? He's late, he's to blame, off with his head!'

'Thanks for that Alice' said the rabbit, with a Bugs Bunny sideways glance. But Alice stood up for herself: surely the problems go right to the top?

'Where do you get these ideas from, girl?' glowered the Queen.

'Well, my Uncle Roger talks to me a lot. And I mean a lot.'

That was it. The Queen went redder than a Northern balance sheet. She screamed with rage. 'Uncle Roger! UNCLE ROGER! He's the one! He's to blame! Off with his head! Or failing that, off with *your* head!'



Alice in Railwayland. With apologies to Tenniel.

The season tickets surrounded Alice, beech axes held aloft. 'It's not fair!' said Alice, 'why is it the fault of the person who tells the story?'

The white rabbit sighed. 'That's just the way it is. In Railwayland we live by the press release, which is always good news. Nothing bad happens in our land, nobody is responsible. So obviously the one who points the finger is to blame.'

The season tickets raised their bloodied axes. 'Off with her head!'

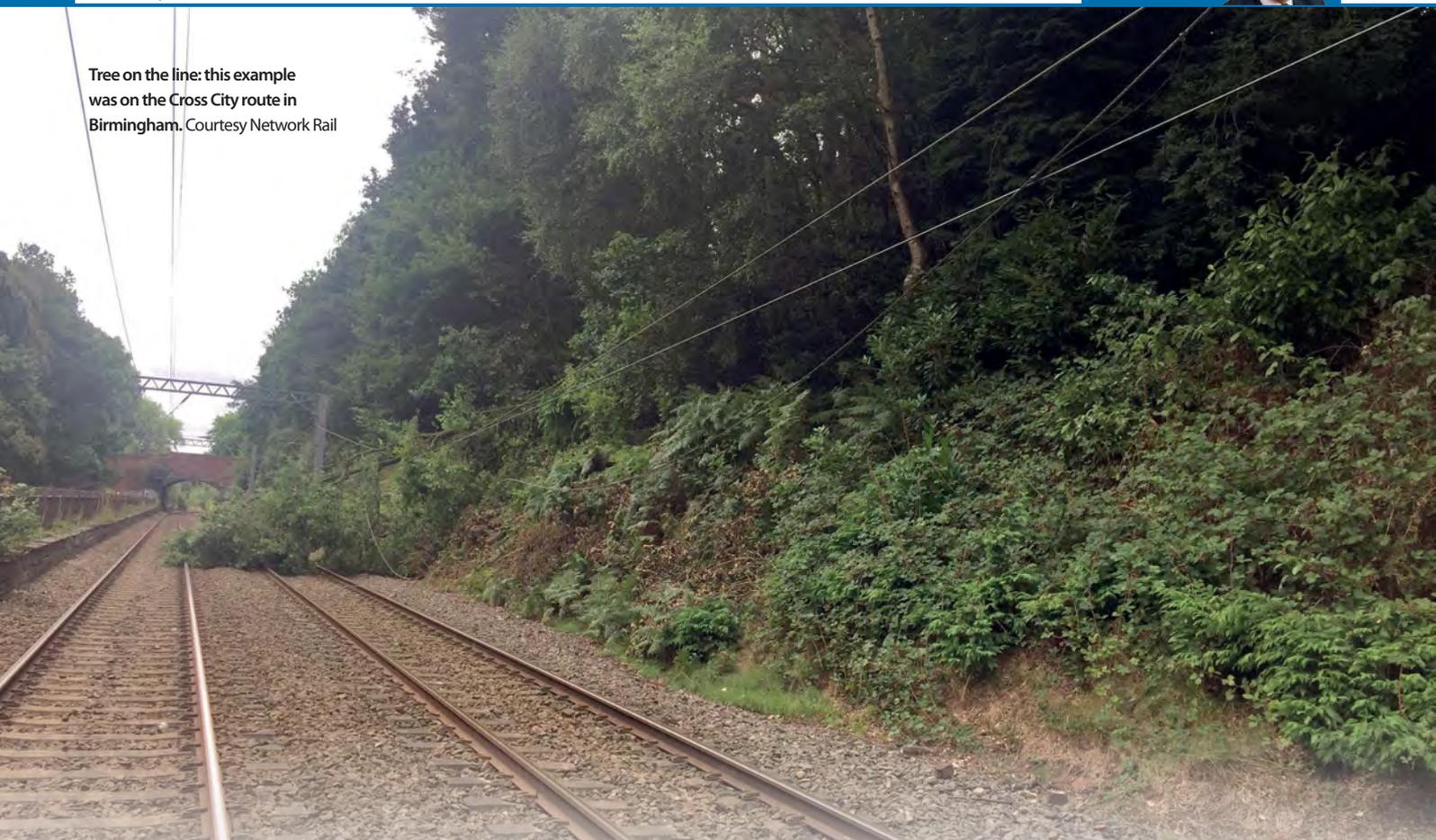
As the axes fell Alice heard a familiar voice 'But for now may I wish all readers a joyous Christmas and a happy new year.'

'Now take that virtual reality headset off' said Uncle Roger. 'This is Welwyn Garden City, please take all your belongings with you and mind the gap between the train and the platform edge. If you see anything suspicious...'

Alice looked around, but could only see a very fat, grinning cat. 



Tree on the line: this example was on the Cross City route in Birmingham. Courtesy Network Rail



HOW GREEN WAS MY VARLEY?

New report forgets what railways are for. Want the wrong answer? Ask the wrong person

The report by John Varley OBETD into lineside vegetation management is the worst report into anything to do with railways I have read in a long time. Laughable, ridiculous, even plain stupid doesn't cover it. Over-reacting? Me?

Let's start with the headline on the Department for Transport website: 'Balance between Safety and Conservation at the heart of tree review.'

Not convinced? OK, try this: 'Vegetation considered to be the poor relation and not treated as an asset in the same way as track and signalling.' What? WHAT?

No. I'm not making this up.

Apparently Network Rail is not there to facilitate the running of trains any more, but to enhance the



Added cost: sandite application to rail head in leaf fall season. Courtesy Network Rail

biodiversity of the planet. The report title is 'Valuing nature – a railway for people and wildlife.' You and I paid for this.

CO-CONSPIRATORS OF SHAME

So having established that railways are not there for moving people and freight about as safely as possible

and that the silver birch, buddleia and brambles are as important as signals and track, who are we listening to here? Well, for a start you might wonder why an expert in land use who normally comments on farming methods was commissioned to look at railway embankments. Would we ask a farmer if airports needed to be kept clear of trees and birds? How about asking a noise campaigner about a Formula One track? Or perhaps CND about siting a nuclear missile silo? I know, let's ask the Tree Council about cutting trees down (proud to have contributed through 'one-to-one conversations with John Varley'). No, bad choice.

However, the review team did comprise no fewer than 15 representatives from RSSB, two from Balfour Beatty (bet they loved

it) and two facilitators from 3KQ. So basically the Rail Safety & Standards Board has underwritten a report that says looking after wood pigeons is more important than trains being able to stop, and drivers being able to drive on windy days without fear of a tree greeting them in the cab at 100mph. Jo Johnson isn't the only one who should have resigned. Paying attention, Williams report team?

MEALY-MOUTHED APOLOGISTS

The new rail minister, Andrew Jones, greeted this rubbish with 'The thousands of miles of vegetation and wildlife on our rail network are valuable assets which need protection because of the environmental benefits they bring'. Andrew Haines, Network Rail chief executive, also welcomed the report as an opportunity for Network Rail 'to develop an ambitious vision for increasing biodiversity on the railway'.

Anyone got the guts to speak the truth here? No? OK, I'll help you. Leaf fall destroys rail services, cancellations inflict misery on travellers who take to the roads, causing more CO₂ emissions and putting themselves at increased risk. Slippery rails mean regenerative braking isolates itself, increasing power consumption and generating more CO₂. Turning out the flats wastes expensive steel with a significant carbon signature. Oh, and by the way RSSB, causes train crashes, either by slipping past signals or crashing into fallen trees.

Even if we accepted the lineside forest as a nature reserve, is it ideal with 125mph trains hurtling through it every few minutes? Do you know what those big red splodges are on the front of trains?

50 YEARS OF NEGLECT

This absurd situation has arisen 50 years after British Rail decided to 'let the lineside grow', not the company's finest hour. Then, just as Network Rail finally found its rusty, cobweb-covered chainsaws, the Guardianistas took up the cause of the lineside tree and the brave minister, Jo Johnson (gone and can't be forgotten quickly enough), commissioned a report giving them an excuse to put them down again.

Look Jo, if you wanted to help the environment, privatising electrification would have been a much better idea. What did you do? Issued a fatuous edict of 'no more diesel-only trains by 2040' and sent all the ROSCOs chasing alternative fuels three or four times the price of diesel, while not bothering to look at why Network Rail screwed up electrification. Clueless.

The report itself makes the point that this new forest is only 50 years old, so how much biodiversity does it support? None. Grey squirrels, rats and rabbits are not of interest to David Attenborough and are, believe it or not, really adept at moving house if need be. I have heard that birds are pretty good at that too.

The complaints usually come from people who suddenly notice they have a railway at the bottom of their garden, when almost always it was there first. If you don't like trains – move. Go to the country and grow your own trees.

TREE-HUGGEST FANTASY

The usual attempts are made to see trees as a good thing for binding together soil embankments, which they do to a limited extent, but not always. This is a complex subject: for example, in the drought last summer, trees were pulling so much water out of the ground that shrinkage was moving track beds and other lineside furniture. It also matters where trees are; for example, if a couple of tonnes of tree is on top of a slope of very wet mud, where is it going to go? Clue: it isn't up.

The report has some real shock conclusions, like trees grow back if you don't keep cutting them. Sorry, there is one real shock, which is a survey of drivers that showed 1% of them think there is too much vegetation removed. I hope they were subsequently drugs and alcohol tested. Why on earth is this up for debate when half the country's rolling stock is queuing up for wheel lathes?

The report is not helped by the little childish illustrations of neat little trains in environments not dissimilar to my granddaughter's storybooks. There is one shot of a poor Network Rail guy/contractor battling with a chain saw in the middle of the night. Carry on mate, you are the only hero in this.

There is surprise that a steady increase in expenditure on vegetation management from £15 million in 2012/13 to around £40 million today has not led to an increase in 'compliance'. This shows a touching naiveté in assuming that just because Network Rail spends more, it gets more for it.

THE RECOMMENDATIONS

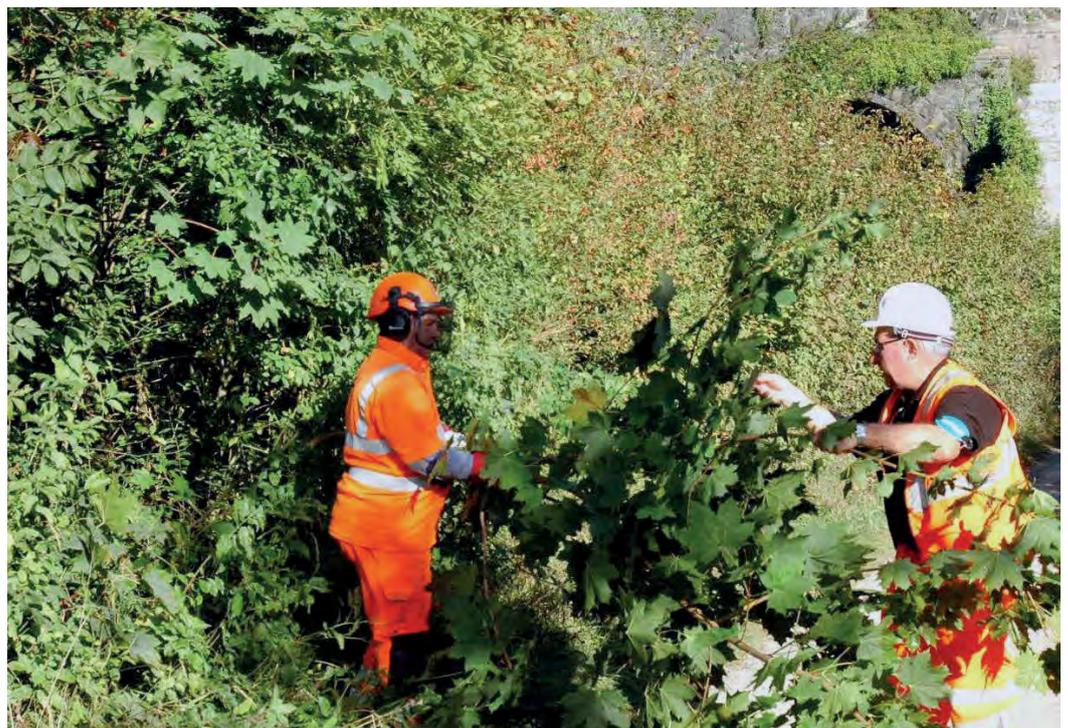
I hesitate to include these as they are the conclusions of people who should never been asked, but I'll have a go at paraphrasing them so you don't have to.

- 1 We need a Government policy to support the 25-year environment plan
- 2 Appropriate Governance at all levels, to avoid the nesting season
- 3 Network Rail to commit to biodiversity gain
- 4 Manage lineside estate as an asset
- 5 More communication
- 6 Cultural change to embed biodiversity 'alongside Safety and Performance'
- 7 Stop fannying around, get the saws out and stop putting passengers, drivers and other railway staff at risk

Actually, there were only six recommendations. I made one up – can you spot it? If so, send it on a manhole cover to Network Rail #spineless. Pan down (let's hope it is not tree down on the line). 



Not much fun for train drivers: tree on the line at Lenzie. Courtesy Network Rail



Heroes of the piece: staff work on vegetation clearance. Courtesy Network Rail

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NATIONALISATION KILLS PEOPLE

I note that Ian Walmsley quotes me in his excellent 'Pan Up' article in December's issue. We know each other well enough for this to be welcome, but an explanation is required. My rather crude phrase 'nationalisation kills people' is not true because it is repeated, nor because it fits my long career experience and interest in railway safety, but because it fits the facts.

There is evidence emerging of long-term trends that support this view, which may be uncomfortable for those who subscribe dogmatically to the idea that all public services should be delivered by state monopolies, albeit (miraculously) acting in the interests of customers.

Three strands of evidence come from comparison with railways in the rest of Europe.

In helping the European Commission prepare the Fourth Railway package during 2015, a respected UK consultancy graded railways by the extent to which in 2010 they had opened their operating market to the private sector, and separated wheel from rail. The three most advanced countries in this analysis (Denmark, Netherlands, UK) are currently in the top tier of comparable safety performers in Europe. This cannot be a coincidence.

The University of Berlin in 2011 in a similar analysis used a 'liberalisation index' based on market opening and separation of the infrastructure. Plotted against the casualty risk for passengers and employees the university concluded: 'while we do not draw a causal link between the two variables, it appears that countries from the advanced (liberalised) group have lower casualty risk than the countries in the other groups.'

Most up-to-date is the evidence from the RSSB Annual Report for 2017/18, which shows that on a direct comparison of the casualty performance for passengers and staff the UK is not only the safest large railway in Europe, but 18 times safer than France and Germany. These two countries are well known for being bastions of integrated

state management. I can remember when our statistics were roughly comparable to theirs over two decades ago, and 10 years ago the margin was a mere factor of 10. So the yawning gap is getting bigger.

My experience and analysis points to some causal links based on hard examples. Nevertheless, the evidence is clear enough to warrant careful examination and honest debate, which your magazine can facilitate. We need to make sure that we do not apply a structure that breaks the links, puts a 'dead hand' in charge of pay and procurement, destroys competition and the commitment to a five-year plan, while replacing business incentives with unmanageable spans of control. Interfaces exist in a modern railway: wishing or hiding them away achieves little. I wish the review well.

CLIFF PERRY MBE FIMECHE FIRO
Wokingham, Berks

CORPORATE AMNESIA

Much has been written recently about loss of corporate memory, but your photograph of inter-car cables on a new Class 800 train on page 34 of the November issue shows just how short term this has become!

When I worked at Southeastern in the team introducing the December 2009 timetable, the backbone of which was the high-speed service



Inter-car cables: our picture from the November issue showing the opportunity for climbing between Class 800 cars. Tony Miles

with Hitachi Class 395s, we identified the ladder for vandals issue before the first train arrived in the UK.

Hitachi came up with a number of different designs that would impede any would-be roof travellers (not really compatible with UK low bridges or HS1 overhead cables) whilst still allowing maintainers access to the various inter-vehicle cables. That's why Class 395s have the 'saw-tooth' rubber mouldings at the end of each interconnecting vehicle.

I do remember asking naively for the Advanced Passenger Train solution fitted by British Rail in the late 1970s (a heavy duty cover with zips) but that would only work on trains with articulated bogies. That's why operators need to find the problems for engineers to fix!

Hitachi was a great supplier to work with so I am surprised by this memory lapse.

RICHARD DEAN
Boston, Massachusetts, USA

BEECH BOYS DEFLATED

I always enjoy Ian Walmsley's articles, but in the November issue he showed why it can be unwise to take an apparent magic bullet at face value when you step outside your normal domain.

The Motts/Moxon laminated wood overhead line electrification (OLE) structure is a single cantilever, supporting one wire over one track. It is the simplest element in the OLE toolbox; sadly it is not possible to build an electric railway using only these.

You also need twin cantilevers – two wires over one track for overlaps and turnouts, twin track cantilevers for restrictive locations, and portals for locations with more than two tracks. All of these structures are more complex, have larger bending moments to resist, and are more challenging in terms of spatial configuration and electrical clearances between the



Wooden cantilever: the Mott MacDonald and Moxon design.

cantilever and live wires. Crucially, it is these complex structures that typically feature in articles as examples of poor OLE aesthetics.

I can understand why designers of aesthetic OLE concepts prefer to focus on the single cantilever: it makes things simpler. But it also creates a false impression that the whole problem is solved, when it isn't. There is no way a wholly laminated portal boom could compete with steel on cost, meaning we'd be back to using steel again.

The use of tapered masts will also add cost. Unless we're on a high-speed line (HSL), contact wire goes up and down in 10mm increments – down to 4.2 metres for bridges, up to six metres for level crossings. So to have a fixed relationship between cantilever fixing and mast top, you need many mast permutations – which will add cost. Uniform mast sections that come in half-metre increments, on the other hand, allow a simple wrap-round fixing with infinite adjustment. Cantilevers have to cater for a range of reaches from 2.5 metres to 4.5 metres to deal with obstructions – this will add further permutations. On a HSL or trunk route you will usually need to support an auto transformer feeder wire above the cantilever. This is notably absent in the proposed design.

I must also correct Mr Walmsley's statement about the purpose of the hinge; it is not for foundation tolerance but to permit along-track movement as the wires expand and contract. In this respect it is no different to other heavy rail cantilevers.

None of this is intended to denigrate the Motts/Moxon work, which is innovative and has some interesting ideas that may help at sensitive locations. But it is not a panacea to our current electrification problems. Given that Ian Walmsley implies that this cantilever is cheaper than current norms – but provides no figures – I look forward to seeing a like-for-like cost comparison, which should include all structure types.

Broadly speaking you can have aesthetically-pleasing OLE, or cheap OLE – but not both. There is a genuine need for an informed agreement on the balance of OLE aesthetics, cost and reliability in the UK, but we seem to have skipped that stage and decided we can have it all.

GARRY KEENOR
(an unapologetic
infrastructure dullard)
Holt, Wiltshire



New route: No 700013 arrives at Rainham, Kent, on a driver training run on 12 March 2018. David Andrews

THE SOUP TEST

Roger Ford's 'Informed Sources' in your November issue on Mk 3 ride (p30/31) reminds me of similar ride issues encountered on the Mk 4 vehicles that might interest readers.

As I was the Project Manager for the constructors (GEC and Metro-Cammell) during the design, manufacture and service entry stage for the IC225 (Mk 4 coaches and Class 91 locomotive), the issues and possible improvements under way on the HST Mk 3s are very familiar.

The well-deserved reputation for good riding quality of the Mk 3 vehicles was not initially replicated on the Mk 4 vehicles. Investigations into Mk 4 ride soon pointed towards several shortcomings:

- Wheel balance: the method mandated in the contract was to measure dynamically the initial out-of-balance of each wheelset on a lathe. Then, balancing was achieved by bolting a weight onto the relevant wheel web. The initial use of Whitworth bolts in this application was replaced by metric thread bolts of the same diameters. Unfortunately, these bolts are heavier than the equivalent Whitworth ones, resulting in the wheelset balance being over-compensated; this resulted in oscillation and consequently out-of-round wheels.

- The ride investigations revealed that the damper ratings within each coach were very variable, so a process of matching pairs of dampers on each coach was undertaken. This applied to all damper positions.

- The lateral damper performance was also degraded by the conclusion that the influence of normal body-bending was aggravating the ride due to the

bogie-mounted yaw dampers pointing up to the body, rather than down to the track. This problem was reduced by reversing all the coach bogies on the fleet (except the driving van trailers, which were shorter and therefore stiffer than the coaches).

- As the inter-car gangways on the Mk 4 allowed a considerable amount of lateral freedom, we decided to constrain this by fitting a car-to-coupler damper at each vehicle end.

Although conditions within the contract for ride quality were consequently met, it was decided that a practical test to determine the eventual results would be helpful. Discussions eventually evolved into a practical test involving a bowl of soup in the restaurant car; the bowl was marked on the inside, with the level of soup deviation experienced. The choice of soup and its initial heat were also variables taken into account. So eventually our protracted improvements were to be measured by a technician observing bowls of soup for four hours between London and Edinburgh!

BILL DEVITT

Roger Ford comments: 'We wrote about this at the time (except the soup) and we published a photo of Ken Cordner pointing at the relevant damper. A great letter!'

THAMESLINK IN KENT

A stranger to Kent reading the article on Govia Thameslink Railway (p68, last month) would be forgiven for thinking that there are no Thameslink trains running in that county. In the panel on signalling (p70), there is no mention of Ashford and Gillingham (Kent) signalling centres, which control the service to Rainham

(Kent). GTR also runs the Blackfriars – Sevenoaks service, which is controlled by Victoria, an assumption based on seeing the VS signal plates.

Whoever thought that it was a good idea to run through Dartford an extra train per hour (tph), rising to 2tph in the December 2018 timetable issued by Network Rail at T-3? Dartford has services via five routes from three London termini. It does not need a Traffic Management System to work out the conflicts that this has introduced. More often than not, the Rainham service is delayed at Slade Green by a late running Victoria – Gravesend service. That causes a conflict outside Gravesend with the down St Pancras service, which is often given priority. There is then a conflict at Rochester with down Victoria services and there is even a conflict at Rainham with an up St Pancras service because the Thameslink train has to cross the up line to reach the new platform. Is it any wonder that trains have to be turned back at Gillingham, giving this service a poor reputation for reliability?

TERRY HACKETT
Rainham

BLEEDING INTERFACES

Ian Walmsley was as thought-provoking as usual in his article on the New Model Railway (p42, last month). Three comments:

- 'Bleeding interfaces': we can quantify this as, in 1993, SDG estimated the impact of interfaces to be £135 million annually.

- 'The majority of people don't travel by train', says Mr Walmsley: actually, one of the key features of the last 25 years has been that, according to the National Travel Survey, the proportion of the public travelling by rail every year has roughly increased from



Windmill Bridge triangle today: view from a drone. Courtesy Network Rail

45% to 65%, which is important in providing political support to get the rail system to perform, because the majority of people now do travel by train.

- 'Commercial drive': although the railways do require a net subsidy, it should not be forgotten that significant sections of several train operating companies (for example, those covering the East and West Coast main lines, and much of the network in the South East) do actually pay for themselves, even in the long-term.

DR NIGEL G. HARRIS

The Railway Consultancy Ltd
London SE19

Ian Walmsley comments: '1993 was a long time ago, interfacing had hardly started – so we can expect it to cost a lot more now. On point two, commuting into London skews the figures: it is a reasonable assumption that the majority either makes no trips, or few enough for it not to change the way they might vote. Rail is increasing its market share of an overall reduction in journeys, but it is still way behind the car anywhere outside London. Point three is a common mistake when assessing railway finances: neglecting the Network Grant. Once this is taken into account, only Virgin Trains East Coast made a positive contribution in 2017-18, which was 1.6p per passenger kilometre, and that company is no longer with us, so I maintain that no franchise really makes any money.'

WINDMILL BRIDGE

I was glad to see plans to improve capacity at Croydon (p64, last month). But surely the last remodelling of the Windmill Bridge/Gloucester Road triangle took place in 1983-84 and not 1978 (p65)? It was covered in the July 1983 *Modern Railways*.

It was notable that even before that work was finished, drivers and guards (including myself) felt it was very short sighted to do all that work and not include the grade separation that last month's article suggests is now being considered. I do not think I can recall a single Up journey from East Croydon to Norwood Junction on the Up Slow line that was not held at red when trying to get to the Up London Bridge Slow to allow a service on the Down Victoria Slow to move through the flat crossing by the bridge over the Up and Down London Bridge Fast lines.

While on the subject of capacity issues on the Brighton line, I also wondered (back in 1984) why the remodelling of Stoa's Nest Junction when Coulsdon North was closed did not include a grade-separated junction between the Quarry and Redhill routes, and I still think it could be a worthwhile change to increase capacity. I always feel that capacity is hampered by the Victoria to Brighton lines being paired as Up and Down Slow and Up and Down Fast, rather than as Down & Down and Up & Up. Before I quit British Rail and moved to the Netherlands, I even worked out an alternative parallel arrangement of the tracks between Three Bridges

and Streatham Junction(s); my thoughts on the subject included a Wimbledon-style flyover within a remodelled Streatham Junction so that the Fast and Slows would remain paired as they are between there and Victoria. Blue sky planning on a cold winter's evening!

JOHN MORRIS

The Hague, the Netherlands

POINTS

The description and diagram of the proposed changes at Werrington Junction on page 25 of the December issue imply that trains travelling south on the East Coast main line and bound for East Anglia will still have to cross the main line on the level just north of Peterborough. As the whole purpose of the new grade-separated junction is to eliminate such dawdling movements across the 100mph+ fast lines, this omission is surprising. Even with all freight diverted to the Joint line (can we be sure of that?), the hourly Liverpool – Norwich passenger train will still have a slow passage through Peterborough. Failure to build a single line to connect the Up Slow on the main line with the new underpass is spoiling the boat for a hap'orth of tar.

DAVID BOSOMWORTH

In 'Infrastructure News' last month, Richard Tuplin clearly describes the works that will take place at Werrington Junction, on the East Coast main line north of Peterborough, to provide a new

dive-under. However, I think his briefing perpetuates an error that has crept into recent reporting of this location. The route that the new works will connect into was, historically, the Great Northern main line to Grimsby via Boston. At Spalding South Junction, the GN&GE Joint line trailed in from March and then left the GN route again at Spalding North Junction heading for Sleaford, Lincoln and Doncaster. The GN&GE Joint line left the East Coast main line at Huntingdon and travelled to March via St Ives, where reversal was necessary.

DAVID MYLES

Matlock, Derbyshire

Interesting point, but 'Joint line' does seem to have taken hold as a descriptor of the route from Werrington – strictly inaccurate though it may be – Ed.

Regarding the piece on page 13 last month about possible new Northern services, you make no mention of the Tyne Valley line. At the moment the last train from Newcastle to Carlisle is at 21.23, far too early to be able to go to a concert at The Sage or to a theatre. The Tyne Valley Rail Users' Group has repeatedly taken this up with Northern, and always gets the answer that Network Rail closes the line after that train for engineering works – what, permanently?

Two other minor points:

- page 14 – that is Frodsham viaduct over the river Weaver, not Penmaenmawr!
- page 50 – the runaway train at Carlisle destroyed the bridge over the river Caldew, not river Petteril, which caused the permanent closure of the Carlisle Goods lines.

IAN K. WATSON

Carlisle

Your 'Highland Splendour' photo feature in the September issue included a fine shot of the 'Royal Scotsman' luxury tour train breasting the summit at Drumochter. 1H89 generally terminates at Boat of Garten, five miles north of Aviemore on the heritage Strathspey Railway, where the guests (maximum 40) spend a quiet night by the river Spey in the Cairngorm National Park. During the Aberdeen to Inverness blockades in the summers of both 2018 and 2019, this train is unable to use the route via Keith and consequently makes up to three overnight visits a week to Boat of Garten, providing the Strathspey Railway's Class 31 locomotive and its volunteer train crews with significant and valuable extra work.

BOB WALTERS

Stationmaster, Boat of Garten

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Innocently waiting: rugby fans crowd the Edinburgh-bound platform at Dunfermline Town on 24 November as loco No 68007 pauses on the opposite platform with 1268, the 11.51 Inverkeithing to Haymarket special via Glenrothes. Ian Lothian

FANS IN A SPIN

WHAT GOES around comes around: that is the essence of a circle. Trouble is, nobody bothered to tell the passengers at Dunfermline Town on 24 November when Scotland was playing rugby against Argentina at Murrayfield. Enterprisingly, ScotRail put on a special round the Fife Circle outer rail using the weekday peak loco-hauled set. But when it paused to call at Dunfermline Town (9 o'clock on the circle) no-one told the rugby fans – many only occasional rail users – that it would be best to join the northbound Mk 2s and travel

via Glenrothes (noon on the circle) rather than trying to go south on regular services via Rosyth (six o'clock on the circle).

Result: chaos. The loco-hauled left virtually empty, then when the two-car 12.04 southbound showed up, already virtually full up, few of the 100 or more fans on the platform were able to join. Instead, they had to take their chances with the following service, a three-car '170' from Cowdenbeath, when they could have taken a ride round the circle in loco-hauled comfort.



You'll be lucky to get on: No 158868 on the 12.04 to Edinburgh at Dunfermline on 24 November. The train was stuck at the station for six minutes while the conductor – subject to a barrage of abuse – tried to persuade passengers to stand away from the doors so that they could be closed. The scene was likely repeated further south. Ian Lothian

REGAL SHENANIGANS

OUR CONTRIBUTOR Theo Steel has been revisiting the 'Signal Box Coming Up, Sir' collection of tales. 'The passing of Baroness Trumpington causes me to put a name to the Peer mentioned in the piece on Two Royal Journeys,' writes Theo. 'She arrived at Harlow and "commanded", in her inimitable style, a special stop, so that she could be in time to be on the royal receiving line. It was granted and added to the delay of the train on which their majesties were travelling!'

Theo notes there was also a good tale from John Cockcroft, one time MP and later a member of the Eastern Board, in *The Sunday Times* on 25 November where he related being phoned up before Bob Reid 1 was appointed Chairman by Margaret Thatcher and asked whether Bob was 'one of us'. Apparently the MP opined that 'he is to the right of Genghis Khan' and Bob (later Sir Bob) was indeed appointed.

SEASONAL FARE

Realtime Trains News Search Apps

1E27 0754 Liverpool Lime Street to Malton
TransPennine Express service departing on 7th November 2018

This service was cancelled between Malton and Scarborough due to it being Autumn (TT).

Schedule Information		Operational Information		Passenger Information	
• WTT schedule UID Y72128, identity 1E27	• Schedule from ITP5	• Retail Service ID TP5	• Seating first & stand	• Reservations availab	• Trolley service
• Runs SSuX between 30/07/2018 to 07/12/2018	• Timed for 100mph max	• Diesel Multiple Unit			
• Service code 21732000, headcode 5212					
• Express Passenger					

Location	Pt	WTT		Ar
		Arr	Dep	
Liverpool Lime Street (LIV)	3		0754	
Crown Street Junction		pass	0756	
Edoal Hill (EDG)	1	pass	0757	

Operating conditions just too difficult? It is alright, just blame it on the seasons (see screenshot). In summer the rails buckle, in autumn there are leaves, in winter snow – and we're sure there's something up with spring. Meanwhile in Wales, one Assembly member has suggested that damage due to autumn conditions needs to be spaced out over a longer period so the operators can keep up with wheel flat repairs...

RDG IN THE THICK OF IT

LLOYD RUSSELL-MOYLE (BRIGHTON, KEMPTOWN):

To ask the Secretary of State for Transport, pursuant to the Answer of 2 November to Question 185132, Railways: Fares, on what date his Department was first notified of the roll-out.

NUSRAT GHANI (WEALDEN):

The Department was notified the day before it was announced publicly.

This seemingly innocent Parliamentary question, concerning the 26-30 Railcard, conceals a maelstrom of political intrigue. The Rail Delivery Group was being leaned on by the Government to produce the railcard, to offset bad news in the Budget. But would the card make money or lose it? Seems it depends who you are (it could be revenue-generative for long-distance operators, while losing cash for commuter companies), but the RDG, keen to

do its master's bidding, decided it would press on anyway. Anxious to blow its own trumpet, the RDG steamed ahead with a press release, announcing three days before the Budget that the card would be available 'across the country before the end of the year'. This blew a hole in the news management plans of the Treasury's Malcolm Tucker, who was said to be less than best pleased: the phone lines, reports go, were blue.

Meanwhile, further evidence emerged of worries about the revenue impact of the new card. In its fares increase announcement on 30 November, the RDG slipped out that the card wouldn't be available by the end of 2018: it would be launched on 2 January. So millennials wouldn't actually be able to buy advance tickets with the card at the old fares. As for anyone turning 31 on new year's day – tough, it's adult fares for you.

NIMBY BATTALIONS FORM UP

NO FEWER than 242 objections have been recorded for the East West Rail project, with the usual suspects lined up with some less expected bedfellows (local authorities that will benefit from the new line finding problems with details of the plans). Our favourite objector is the learned doctor from Bicester who is suggesting that the project shouldn't go ahead, as the money ought to be saved for HS2. First time we've heard somebody from that part of the world arguing money should be taken from the Victorian network and spent on HS2, rather than t'other way around...



Is that right? Inquiry Inspector Martin Whithead consults with Programme Officer Joanne Vincent as the EWR inquiry opens in Milton Keynes on 29 November 2018. Phil Marsh

GOLDEN WHISTLES AWARDS LUNCHEON 2019

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luncheon we hand out Whistles – the totem of successful operating – to the people who have excelled in their fields. Most of our awards are based on the statistical data that operators spend their

working lives observing: right time arrivals, delay minutes and other key indicators. There is no need to put in entries for these awards. However we also celebrate those operating individuals and

teams that have gone the extra half mile with our 'Outstanding Operator' awards – entry forms for these are available here: <http://www.railwayoperators.co.uk/whats-on/title/golden-whistle-awards-2019/>

HAINES TO HEADLINE CONFERENCE

We are delighted to announce that Andrew Haines - who has pledged a fresh emphasis on railway operating during his tenure of the Network Rail Chief Executive's office - will address the Golden Whistles morning conference. This year's conference will focus on the May 2018 Thameslink and Northern timetable introductions and the lessons they teach us: confirmed speakers include GTR Head of Customer Experience Kerri Ricketts and Network Rail Capacity Planning Director Chris Rowley.



AFTER-LUNCH SPEECH:
DYAN CROWTHER
Chief Executive Officer,
High Speed 1

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Transforming Euston

HS2 Ltd's London Programme Director **ROB CARR** updates **PHILIP SHERRATT** on plans for the high-speed route into the capital

At last, construction of HS2 is getting underway. For so long a political debating point and a bill undergoing scrutiny in Parliament, there are now visible signs of work across the route.

Work at the Birmingham end of the route was officially launched by Transport Secretary Chris Grayling and West Midlands Mayor Andy Street back in October. But perhaps most visible are the hoardings appearing in the areas all around Euston station in London.

These have been erected by the joint venture of Costain and Skanska (CSjv) which is carrying out enabling works for 'Area South', covering the first 25.8km out of Euston to the Colne Valley. CSjv has now been at work for over a year on these and is making good progress.

Much of this work involves demolition, for which CSjv has engaged specialist contractors Keltbray and John F Hunt. The former DB Cargo carriage sheds adjacent to the classic lines on the approach to Euston are now but a memory (p19, November issue). These are making way for what will become the site for the portals of the tunnels from Old Oak Common.

Meanwhile, to the west of the existing station, buildings are being swept away to make way for the site where HS2 will build its first tranche of new high-speed platforms. These will stretch as far west as Cobourg Street, with demolition currently centred around buildings such as the former Ibis and Thistle hotels, the old University College London architecture building and the disused former National Temperance Hospital. As is common with structures built 40 or 50 years ago, a major challenge has been management of asbestos, a material used liberally in buildings of this age.

Finishing touches are also being made to a new temporary taxi rank at the front of the classic station. This will allow the two 1970s towers at the front of the station, which sit over the entrance to the current underground taxi rank, to be demolished next year. In the long-term, the taxi rank will be relocated to the east of the site.

HS2's archaeologists are also busy. Part of the site being razed includes the former St James's burial ground. A large tent has been erected so careful exhumation of some 45,000 skeletons can continue, whatever the weather; HS2 has committed that they will all be relocated at a

single location within the M25, with a number of options currently under consideration.

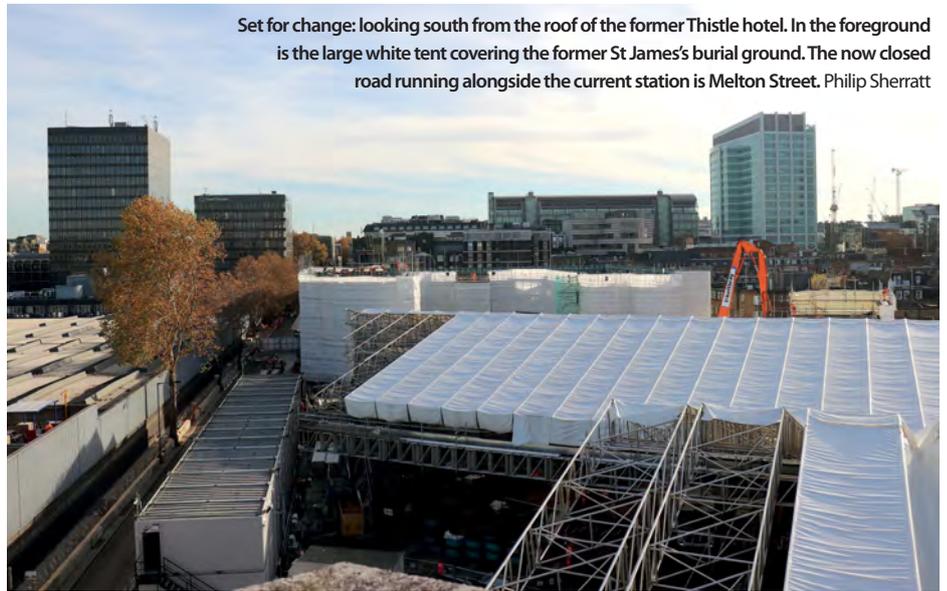
PHASED APPROACH

A phased approach to rebuilding Euston was confirmed as part of the programme in September 2015. Where HS2 originally envisaged building all 11 high-speed platforms simultaneously, it was decided to build six platforms to serve Phase One in 2026 and the remaining five in the following seven years before the full route opens.

This decision was taken in the knowledge that the classic station needs to continue running at current capacity while construction work continues. The so-called Phase A for the building of the first six platforms will see HS2 Ltd take over platforms 17 and 18, at the western edge of the station. London Programme Director Rob Carr explains this step, planned for next May, could also enable HS2 to remove excavated material from the site by rail, keeping lorries off the roads. 'We've worked collaboratively with the train operators so that they can run the existing service from platforms 1 to 16, and a co-acting signal has been installed on platform 11 to allow this' he reports.



Station throat: view from the roof of the former Thistle hotel on 14 November 2018. The off-white building on the left hand side is the current Euston power signal box, which will be demolished; its much smaller replacement is the building covered in blue netting on the opposite side of the tracks. Philip Sherratt



Set for change: looking south from the roof of the former Thistle hotel. In the foreground is the large white tent covering the former St James's burial ground. The now closed road running alongside the current station is Melton Street. Philip Sherratt



Tunnel portal site: trains will emerge from the 7.4km-long tunnels from Old Oak Common at the north of this site, which formerly housed the DB Cargo carriage sheds. Philip Sherratt

Once the Phase One service is up and running in 2026, high-speed trains, each carrying up to 1,000 people, will relieve pressure on classic services, making way for HS2's worksite to spread further into the current station. HS2 will then take over the current platforms 13 to 16 to build the remaining five high-speed platforms; again, the easternmost platform taken out of service is to be used for removing material by rail.

In total, the new station will boast 22 platforms, of which half will be 400m-long HS2 platforms. While this is only four more than at present, the increase in capacity will be far greater; not only will the HS2 platforms be longer, but there will be two new lines into the station, delivering many more train paths.

REDUCING DISRUPTION

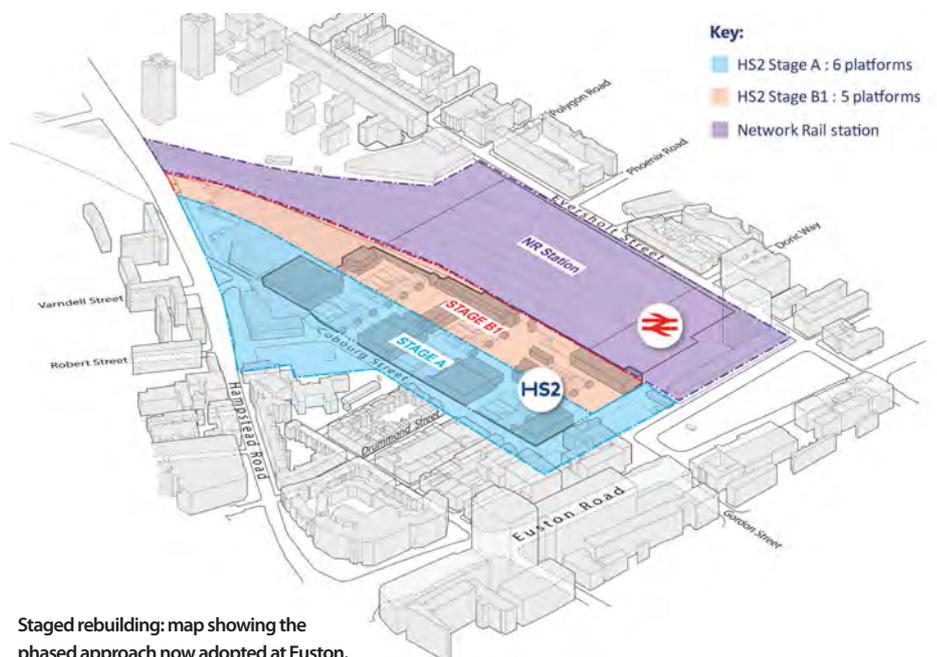
While the phased approach has been formalised for some time, revised proposals to those in the hybrid bill have also sought to reduce disruption both to the local community and to classic services into the station.

These see the tunnel portals moved closer to the station, south of Mornington Street bridge. 'We would have originally built a dive-under, which would have involved closing two of the six approach lines to the classic station, with only one reopening three years later' Rob Carr explains. 'We'd have also needed to put 28 switches and crossings in. The overall effect would have

been to shut Euston every Christmas and bank holiday for seven years, so we realised we had to develop a more efficient way of doing things.'

The revised approach brings the tunnels further south, and according to Mr Carr will reduce disruption to the classic station by

60-70%. One grade separated junction will be located in the tunnel caverns, and the station itself will be at a slightly lower level. 'The local community is happier – there is less demolition, less civils work and less piling needed, although they still have concerns' he notes.



Staged rebuilding: map showing the phased approach now adopted at Euston.



Light and airy: early visual of how the high-speed station at Euston might look; revised designs are expected next year ahead of the submission of a planning application. Courtesy HS2

There will inevitably still be some disruption, 'but it'll be a fraction of what it was' says Mr Carr, adding 'We'll be piggybacking on Network Rail's possessions and are determined to use them frugally and wisely.' In the short-term, work is planned in the station throat over the two-day Network Rail closure on Christmas Day and Boxing Day this year, and next Easter a key possession will see HS2 take over platforms 17 and 18 at the classic station as already described.

ONE EUSTON

The phased rebuilding of Euston station announced in 2015 means HS2 is no longer responsible for rebuilding the classic station – that will fall to Network Rail.

'From an engineering perspective it will be two stations, which means we can insulate the worksites' Mr Carr explains. 'But from a passenger perspective we want it to be one station, so we're collaborating with Network Rail on the interfaces to make sure the designs are joined up.'

In connection with this, Lendlease has been appointed as Master Development Partner for the whole site, stretching from Cobourg Street in the west to Eversholt Street in the east. As well

as helping unite the design vision for Euston, the company will progress plans for growth in the area, delivering new housing and jobs.

Connected with this is the London Borough of Camden's 'One Euston' vision. The current Euston station splits the community in half – along its length there is no way across the site from west to east. Now the council and HS2 have agreed that the rebuilt Euston will have connections from all four points of the compass, including from the north, eliminating this problem.

Over the years the local council has been one of HS2's fiercest challengers, but Rob Carr says the relationship between the organisations has improved significantly. 'We're seeing the hostility turn around – they understand there's an opportunity here to transform Euston as a transport hub. There is a still a constructive tension there, and we welcome that challenge.'

Of course, Rob Carr and his team have one eye on the widely acclaimed redevelopments at St Pancras and King's Cross just a short walk down the Euston Road, which have transformed not only the stations but the surrounding area. 'We want to learn their lessons – for example, at St Pancras taxis queue all the way along the

side of the station, so we're thinking carefully about how to position taxis at Euston so they're away from major roads' says Mr Carr.

And the importance of seamless connections with buses, the London Underground and a future Crossrail 2 route are also at the heart of HS2's thinking here. 'We will beat King's Cross and St Pancras – we have to do something much better at Euston' says Mr Carr.

At the time of writing, construction contractors for both Euston and Old Oak Common stations were expected to be appointed before the end of 2018, and a planning application for Euston is due to be submitted for the high-speed station in mid-2019. Preliminary works such as piling can take place before that receives approval; as Rob Carr notes, the Parliamentary bill gives HS2 the right to build the first six platforms, with the planning application focusing on the detail elements of the station's design.

OLD OAK COMMON

The second high-speed station, at Old Oak Common in west London, is also making progress. In December, Great Western Railway vacated the site of the HST depot, and once Class 387s replace Class 332s on the Heathrow Express by the end of 2019 the site will be fully vacant for HS2 to take over. Liaison will be required with Bombardier, which operates the newly-built Crossrail depot next door.

At Old Oak, CSJv is preparing the ground for the station construction partner. Construction involves building the station box, which will be nearly 1km long, 60 metres wide and 20 metres deep. As well

HS2 CONTRACTORS AT EUSTON

Design	Ove Arup and Partners/Grimshaw
Master Development Partner	Lendlease
Construction (shortlisted bidders)	BAM Nuttall/Ferrovial Agroman; Mace/Dragados; Costain/Skanska
Enabling works – Area South	CSJv (Costain/Skanska joint venture)
Civils works – Area South (Euston Tunnel and Approaches and Northolt Tunnels)	SCS Railways (Skanska/Costain/STRABAG joint venture)



Relocated: temporary taxi rank at the front of the station under construction on 6 October 2018. Courtesy CSjv

railway. As at Euston, a planning application is on track to be submitted during 2019.

CONSTRUCTION

While CSjv is carrying out enabling works in the London area, the same companies joined with Austrian tunnel expert STRABAG to win the contract for the civils works in Area South in a joint venture named SCS Railways. 'We encouraged companies to bring in a European partner, and we've seen a significant reduction in cost' says Mr Carr. 'We're using Costain and Skanska's experience on Crossrail to benchmark tunnelling costs, and we're challenging them to beat those rates.'

An 18-month period of collaborative design and challenge will then lead into the build stage.

SCS Railways will be responsible for procuring TBMs; six are required for the main tunnelling works in Area South, with the Old Oak station box the launch site for four of these. TBMs will be used for the bulk of tunnelling, with the spray concrete lining method used for shorter connecting sections.

For example, west of Old Oak twin-bore spray concrete lined tunnels will connect the station box to the Victoria Road crossover box, from



Demolition: work in progress inside the former Thistle hotel on 14 November 2018. Philip Sherratt

as housing the platforms, the station box will be key during the construction phase as a launch location for Tunnel Boring Machines (TBMs).

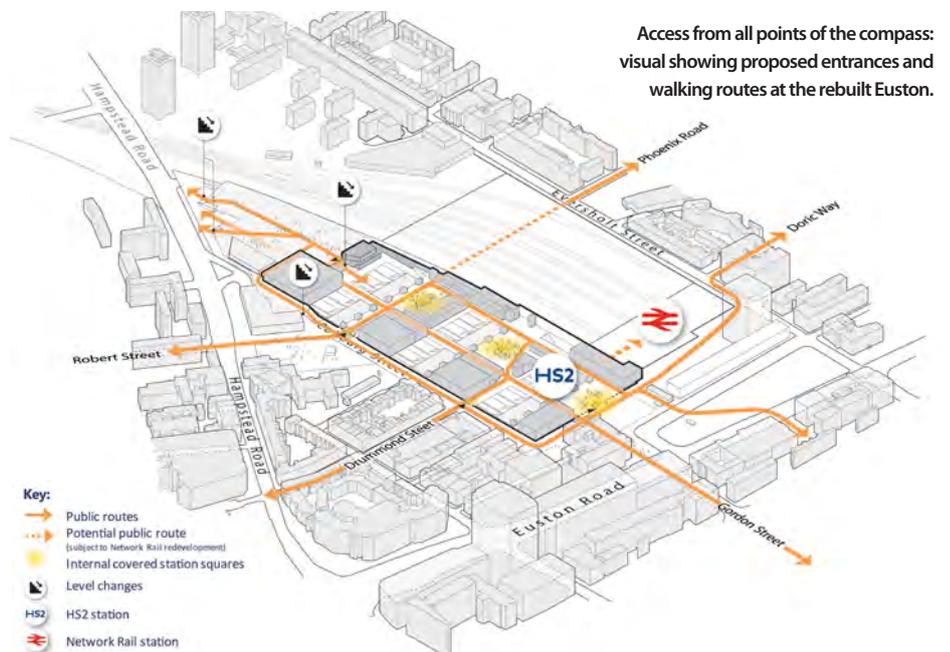
While Lendlease is already developing a vision for the area around Euston, Old Oak Common is a more long-term development opportunity, and the Old Oak and Park Royal Development Corporation (OPDC) has been set up by the Mayor of London to lead on this. Old Oak is set to become one of the biggest transport hubs in the country, with connections to the Great Western main line, the Elizabeth Line and HS2. Rob Carr points out that the station will become the second or third busiest in the UK.

Since the hybrid bill was approved, Chiltern Railways has promoted the idea of its trains running into Old Oak Common, helping both relieve its crowded terminus at Marylebone and provide new journey opportunities. 'We're being asked about this – it's not in our programme to build any platforms for Chiltern, but we'll make sure what we do doesn't preclude it' says Rob Carr, noting that the triangle of land between the Great Western main line and HS2 to the west of the station is currently earmarked to be open to development once construction is finished but could form a suitable site.

Once the depot site is vacated and tracks disconnected, construction at Old Oak is almost entirely away from the existing railway, minimising disruption on the Great Western. The station will have six high-speed platforms, two for the Elizabeth Line and six on the Great Western main line, the last two of which will fringe with the existing

where a pair of TBMs will be launched to start building the 13.5km Northolt tunnel. A second pair of TBMs will be launched from the West Ruislip portal and will head towards Old Oak.

To the east, the station box itself will then be the launch point for a third pair of TBMs, which will build the 7.4km-long tunnels to the portal just north of Euston. A seventh TBM will also create a box at Atlas Road, where a compound will be used to build segments for the main tunnels out of Old Oak. 



Access from all points of the compass: visual showing proposed entrances and walking routes at the rebuilt Euston.

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Top prize second generation EMUs: the Class 379. Here recently delivered No 379005 prepares to perform a *Modern Railways* Fourth Friday Club special service to Stansted Airport from Liverpool Street on 25 March 2011. **TONY MILES**



THE GOLDEN SPANNERS 2018

FLEET RELIABILITY WOBBLES

HAVE WE SEEN 'PEAK RELIABILITY'? **ROGER FORD** REFLECTS ON A YEAR THAT HAS SEEN PERFORMANCE LEVELS OVERALL FAIL TO IMPROVE FOR THE FIRST TIME



TABLE 1: YEAR-ON-YEAR RELIABILITY CHANGE BY CATEGORY

Category	MTIN MAA AT P7		% change
	2017-18	2018-19	
Legacy EMU	17,079	15,004	-12.1
Era 1 EMU	17,917	17,648	-1.5
Era 2 EMU	38,624	30,155	-21.9
Era 3 EMU	10,179	11,681	14.8
Legacy DMU	7,813	7,829	0.2
Era 1 DMU	9,490	8,252	-13.0
Era 2 DMU	16,324	14,725	-9.8
Era 3 DMU	12,729	12,929	1.6
Legacy inter-city traction	10,270	10,098	-1.7
Era 2 inter-city traction	22,543	18,141	-19.5

Table 1 shows the overall picture. The Rail Delivery Group (RDG), which collates the performance of individual fleets for Fleet Challenge within the National Performance Task Force, employs a slightly more granular set of rolling stock categories in its report compared with the Golden Spanner Awards. The overall Miles per Technical Incident Moving Annual Average (MTIN MAA) is calculated separately for each category.

A year-on-year comparison of these overall figures shows that, with the exception of the ex-British Rail diesel multiple-units and the Class 172 fleets in the Era 3 DMU category, reliability has deteriorated by, typically, 10-20%.

MORE AWARDS

Before starting the review, an update on the reclassification that started last year. This split the EMU and DMU fleets ordered after privatisation into two categories, 1st and 2nd New Generation, with the dividing line set at 2010.

As a result, some of the fleets in the newest categories are, in terms of technology, '1st New Generation'. This is intended to provide a known yardstick against which to compare the latest offerings from industry.

For the 2018 Golden Spanners, the reclassification was completed with inter-city now having three categories: Ex-BR, 1st and 2nd New Generation. There were no 2nd generation inter-city

awards as the comparisons run from Period 7 to Period 7 of the accounting year and the Hitachi Class 800 bi-modes did not enter the Fleet Challenge Statistics until Period 8 2017-18. However, some time-shifting has enabled the creation of a virtual analysis for the new fleet - and reveals a virtual award.

PACER PRIDE

Despite their Pacers being derided by politicians, and expected to be heading for the scrapyard in a year's time, Northern and GWR are clearly not going to let their invaluable nodding donkeys go gently into that dark night and are raging very effectively against the dying of the light.

Northern held its own and GWR showed a 1.5% improvement. That may not sound much, but read on to see its significance.

By the time this review was being written, Period 8 results



Maintenance in the 2020s: the keynote address at the 2018 Spanners was delivered by former Southeastern Engineering Director Wayne Jenner, now with his own software house, Danbury Kline. Mr Jenner argued that a change in depot culture is required, contrasting the aviation industry, where the approach is to fix things before they break, with the rail industry, where fire-fighting problems is common. Investment has been made in equipment monitoring devices and reliability-centred maintenance, but a depot night shift manager will often say 'Yes, I'll deal with that next week when things are less busy' - but next week never arrives before the component breaks. 'Millions have been spent in the past 10 years without performance benefits - changing the culture is the challenge.'

RAILWAY children
Charity collection: money raised at this year's Spanners (over £2,000) was given to the Railway Children in remembrance of our late colleague Ken Cordner. Roger Ford marked the donation with a special Spanner for Ken's partner Helen Saaler.



In Ernest Hemingway's novel *The sun also rises*, a character is asked how he went bankrupt. Two ways, he says, 'gradually and then suddenly'.

This seems to sum up this year's rolling stock reliability review and the Golden Spanner Awards. In 2016 and 2017 the colour coding (see box on p56) showed a predominance of red in one or two classes.

Because the phenomenon was not consistent from year-to-year, I assumed that it was down to random issues. Never assume! This year the red tide has spread.

WILD CARD: PACERS

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MTIN MAA P7 2017-18	% CHANGE
Northern	Class 142	13.0	8,252	8,867	8,880	-0.1
Northern	Class 144	11.0	7,938	7,575	7,597	-0.3
GWR	Class 143	7.7	9,156	6,523	6,429	1.5
ATW	Class 142	9.6	5,125	5,324	5,742	-7.3
ATW	Class 143	10.3	4,070	4,718	5,393	-12.5

were available and Northern has raised the bar for all those shiny new 2nd New Generation fleets featured in 'Informed Sources' New Train TIN-watch. Roman generals riding in triumph through the city had a man standing beside them in the chariot. His task was to repeat in the conquering hero's ear: 'Remember you are only a man'.

In TIN-watch, manufacturers are reminded each month: 'Your trains are not as reliable as the best Pacer'.

And in Period 8 2018-19 Northern pushed the Class 142 MTIN MAA to 9,055. This makes a humble Pacer the eighth most reliable ex-BR DMU fleet.

TRIBUTE

After my late colleague Ken Cordner's funeral we were talking to his partner Helen about how we could recognise Ken's behind-the-scenes role in the success of the Spanners awards. Like me, Ken ran a Reliant Scimitar classic car and Helen suggested a spanner for an old fleet that despite its age, like the Scimitar, was still giving valiant service.

As a result, I chose the Pacers for this year's wild card and Helen duly presented the Golden Spanner to Newton Heath and Heaton depots, where the Class 142s are maintained.

Sadly, the two Arriva Trains Wales fleets continued last year's decline. With the arrival of new operator KeolisAmey, can they mount a last hurrah and go out with heads held high?

TABLE 2: EX-BR DMUs

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MTIN MAA P7 2017-18	% CHANGE
South Western	Class 159/0	10.6	34,006	42,835	104,263	-58.9
South Western	Class 159/1	20.8	16,785	36,096	87,460	-58.7
South Western	Class 158	7.0	17,151	26,025	67,623	-61.5
WMT	Class 153	11.3	16,254	16,171	12,871	25.6
EMT	Class 158	21.9	17,447	15,516	14,822	4.7
GWR	Class 153	11.5	51,002	14,347	9,334	53.7
ScotRail	Class 156	11.7	8,931	11,400	10,699	6.6
EMT	Class 153	18.5	17,231	10,869	12,872	-15.6
Northern	Class 156	12.7	12,036	10,319	9,525	8.3
Northern	Class 158	12.0	9,964	10,245	9,713	5.5
EMT	Class 156	20.7	5,506	9,730	8,391	16.0
Greater Anglia	Class 156	15.2	5,306	9,518	8,913	6.8
Northern	Class 153	17.0	10,962	8,927	10,534	-15.3
ScotRail	Class 158	9.4	11,198	8,472	8,328	1.7
Northern	Class 150	14.8	8,020	7,615	6,963	9.4
Greater Anglia	Class 153	11.5	4,652	6,726	10,473	-35.8
ATW	Class 150	12.4	5,515	6,507	6,401	1.7
WMT	Class 150	7.1	13,947	6,192	6,946	-10.9
ATW	Class 158	12.8	6,300	5,783	6,959	-16.9
ATW	Class 153	16.6	8,122	5,275	5,664	-6.9
Northern	Class 155	14.1	6,471	5,041	7,514	-32.9
GWR	Class 158	10.1	5,322	4,845	4,910	-1.3
GWR	Class 158	10.1	5,322	4,845	4,910	-1.3
GWR	Class 150	10.2	3,766	4,357	5,273	-17.4

EX-BR DMUs

This year's Table 2 is similar to that in last year's review in terms of the proportion of fleets showing a fall in reliability. However, in general, the falls are greater and the improvements smaller.

At the top of the table South Western Railway's Salisbury depot continues to set the standard, but at a much lower level. In his report on SWR performance (p10, November 2018 issue), Michael

Holden noted that the levels of MTIN performance under the former South West Trains franchise 'that set them apart from the national picture by some distance', were at least 'partly' a result of the approach the SWT depots took to managing TIN data.

SWT policy was to re-attribute delay incidents from Fleet to other departments if there was evidence that what Sir Michael terms 'down-stream processes'

had failed to mitigate the impact of the incident. His report instanced insufficient fault rectification by operations staff, resulting in an above-threshold incident being attributed to the 'failure' by staff and not the fault on the train.

Of course, the fault could also be caused by incorrect operation, for example when coupling or splitting, and as a one-time traction engineer, I applauded SWT's relentless focus on finding and correcting inherent faults and not resorting to 'No Fault Found'.

Changing to Fault Not Found removes this easy get-out for the depot staff. Woe betide any fitter at Salisbury for a unit that returned with a recurrent fault that had not been identified and rectified.

Michael Holden notes that notwithstanding this aggressive approach to fault attribution, 'it is generally considered that SWT fleet maintenance was managed to a high standard relative to its peer groups'. But before the awards there was speculation that the mighty could be humbled.

Indeed, as reported last year, the 'SWR effect' was already having an impact. The MTIN MAA for two of the three Salisbury fleets had

NUTS AND BOLTS OF THE SPANNERS

GOLD, SILVER AND BRONZE SPANNERS EXPLAINED

Gold spanners - most reliable trains based on Miles Per Technical Incident (MTIN)

Silver spanners - most improved fleet (percentage improvement in MTIN)

Bronze spanners - fastest incident recovery, based on primary Delay minutes Per Incident (DPI)

A technical incident is recorded with a 'TIN' (Technical Incident Number) when a train is stopped for more than 3min.

COLOUR CODING EXPLAINED

In the tables, there is a traffic light system for performance. The awards are based on the Moving Annual Average (MAA) at Period 7, 2017-18 (the four weeks to 14 October).

Moving Annual Averages can be volatile. If an outstandingly good period replaces an absolute disaster a year ago, the MAA will move up and vice versa. To compensate for

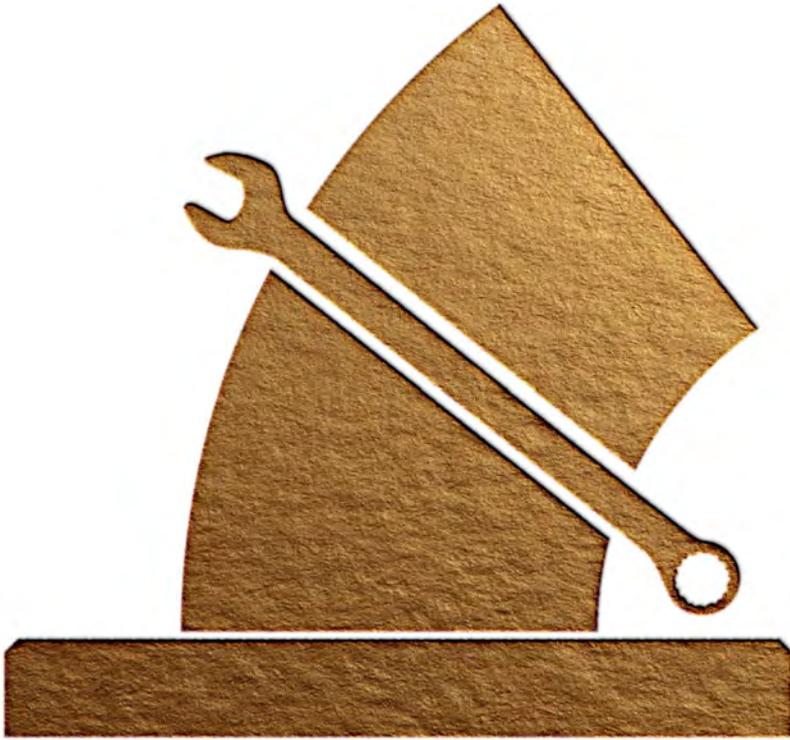
this 'noise' in the statistics, where MTIN has deteriorated by 5% or less compared with Period 7 the previous year, the fleet is colour coded yellow.

TABLE COLOUR CODING:

- Green - improvement on previous year;
- Yellow - fall on previous year by 5% or less;
- Red - fall on previous year by more than 5%.

THE STATISTICS' SOURCE

Source of the statistics on which the Golden Spanners awards are based is the Refocus programme run by the Rail Delivery Group. Initially called the National Fleet Reliability Improvement Programme (NFRIP), the aim of Refocus is to encourage the spread of best practice in train maintenance: the Golden Spanners awards are acknowledged as having made a valuable contribution to this aim.



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Old train meets new: Pacer (left) and newly-delivered Class 195 at Liverpool Lime Street, 15 October 2018. **TONY MILES**

fallen by around 50%. This year all three are down by a further 60% but still lead their peer group by a considerable margin; Salisbury took home the Gold and Bronze Spanners.

SIMPLICITY

At the Waterfront rolling stock procurement forum in November, there was some banter over my use of the Class 142 as the reliability yardstick

in New Train TIN-Watch. Was it fair to compare new eight- and 12-car units with a two-car DMU with much less to go wrong?

Well, it may not be fair; it is, however, a reminder of how

far the new kit has to go. But does that point about short vs long trains help to explain the presence of two Class 153 single-car fleets in the top six in this category - including the Silver Spanner winner?

As noted last year, apart from the Salisbury group, we have a table of two halves, with those at the top mainly continuing to improve while the slide at the bottom continues. Despite this, the yardsticks remain unchanged.

YARDSTICK SUMMARY EX-BR DMUs

Minimum MTIN 7,000 (unchanged)
Expected MTIN 9,000 (unchanged)
Aspirational MTIN 13,000 (unchanged)

EX-BRITISH RAIL EMUs

Last year, these workhorse fleets, on which so many people depend to get to work and play, recorded an exemplary performance. After allowing for the SWR effect, in the 2017 table only two fleets fell by more than 5% and most improvements were in double figures.

This year 10 fleets are 'in the red' with half seeing reliability fall by 25% or more. On the positive side all but one of the 'improvers' recorded gains

TABLE 3: EX-BRITISH RAIL EMUs

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MAA P7 2017-18	% CHANGE
South Western	Class 455	12.7	47,404	32,591	68,516	-52.4
ScotRail	Class 320	12.8	24,210	23,685	19,151	23.7
South Western	Class 456	11.6	17,503	22,275	34,297	-35.1
Greater Anglia	Class 321	12.9	23,149	21,366	33,675	-36.6
TfL Rail	Class 315	6.5	24,005	18,978	21,526	-11.8
GTR	Class 455/8	10.6	19,727	16,356	19,806	-17.4
GTR	Class 313	11.1	14,264	15,100	11,851	27.4
ScotRail	Class 318	10.1	16,623	14,602	17,152	-14.9
Northern	Class 322	21.3	7,999	12,939	10,465	23.6
WMT	Class 319	6.2	10,493	12,932	9,262	39.6
ARL	Class 315	7.6	50,188	12,308	9,001	36.7
Greater Anglia	Class 317/6	14.4	14,832	11,726	11,908	-1.5
GTR (ex Southern)	Class 313	6.3	9,513	11,313	11,748	-3.7
Greater Anglia	Class 317/3/5/7/8	12.2	21,717	11,267	15,113	-25.4
Merseyrail	Class 508	6.0	12,784	9,923	10,779	-7.9
Greater Anglia	Class 321 Rénatus	9.2	12,948	9,872		
Merseyrail	Class 507	5.5	9,081	9,503	12,740	-25.4
Northern	Class 321	13.9	22,064	9,445	9,588	-1.5
ARL	Class 317/7&8	13.9	8,693	9,327	6,069	53.7
Northern	Class 319	18.4	14,788	8,421	8,220	2.5
ScotRail	Class 314	8.1	5,492	7,084	7,511	-5.7

of 25% or more, including a Silver Spanner-winning 53.7% for the Arriva Rail London Class 317/7&8 fleets.

To highlight the swings in reliability, this is close numerically to the 52.4% drop of SWR's Golden Spanner-winning Class 455 fleet. This was retracted with three-phase drives by Kiepe Electric.

Retracting was intended to reduce the maintenance requirements, freeing up capacity at Wimbledon depot. This enabled the Class 707 Siemens Desiro City fleet to be introduced without the cost of building additional depot space.

A new depot would have wrecked the business case of SWT's rolling stock plan to add capacity at Waterloo. Both the Class 455s and 707s are now going to be replaced by a new fleet of Bombardier Aventura units by December 2020.

Drawing lessons from a table with such conflicting performance with massive swings both up and down is probably unwise. However, I would highlight my local Great Northern Class 313 fleet, about to be replaced with new Siemens Class 717 Desiro City units.

These are now 42 years old and you might expect that with all the distractions of new rolling stock being commissioned, Hornsey depot might have gone off the boil. Far from it. After a 4.3% fall in last year's review, they have more than bounced back with a 27.4% gain to a respectable 15,100 MTIN MAA.

Despite the worrying falls in reliability, hope springs eternal. Encouraged by some strong performances in the middle of the table, I think an increase in the Expected MTIN yardstick to 13,500 could be justified.

TABLE 4: EX-BRITISH RAIL INTER-CITY

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MTIN MAA P7 2017-18	% CHANGE
Greater Anglia	Electric-loco Trainset	43.2	62,530	58,323	56,312	3.6
LNER	IC225	21.4	19,067	17,009	14,867	14.4
LNER	HST Set	25.3	22,368	15,509	19,300	-19.6
EMT	HST Set	30.1	25,047	13,297	11,534	15.3
CrossCountry	HST Set	25.9	7,996	10,960	9,380	16.8
GWR	HST Set	10.4	6,463	5,756	6,578	-12.5
Northern	Diesel-loco Trainset	42.7	4,241	5,327	2,611	104.0
GWR	PRM modified 2+4 HST set	30.9	12,659	4,733		
Chiltern	Diesel-loco Trainset	18.3	11,886	4,371	6,864	-36.3
Greater Anglia	Diesel-loco Trainset	12.0	3,155	1,660	2,362	-29.7

YARDSTICK SUMMARY

EX-BR EMUS

Minimum MTIN 9,000 (unchanged)
 Expected MTIN 13,500 (up by 500)
 Aspirational MTIN 19,000 (unchanged)

INTER-CITY

As already mentioned, the inter-city category is no longer a public/private free for all. The ex-BR fleets are now fighting for Spanners among themselves and the post-privatisation fleets are in two categories.

EX-BR INTER-CITY

This is a much easier category to rationalise. Having aced East Midlands Trains' Meridian fleet for the Golden Spanner last year with its Class 90s and Mk 3 stock, Crown Point is another of those depots determined to go out in a blaze of glory, with a further improvement garnering another Golden Spanner for the display cabinet.

While the replacement Stadler inter-city sets won't have been in the system long enough to compete in the 2nd Generation Inter-city trains category next

year, their MTIN MAA figures should be available and will make an interesting comparison with No 90006 and friends. Some loco-hauled sets could still be in service with Greater Anglia, which would give an extra frisson to the 2019 awards.

Well-publicised issues with the LNER IC125 fleet are reflected in the figures, although in Period 8 2018-19 the MTIN MAA had bounced back. Generally the ex-BR heavy metal is doing well.

It is early days for the shortened IC125 sets for GWR and ScotRail. It will be interesting to see how these refurbished units, with their power doors and controlled emission toilets, fare in terms of reliability.

Back in 2016 there was a lively response from readers to the cover photo of the January reliability review issue, which featured a photo of a Class 37 and the headline 'Growler takes Silver Spanner'. Given that the improvement was from 2,424 to 3,315 MTIN MAA, and that the Northern loco-hauled service was in the running only because Crown Point - with

a 98% improvement - had already won Gold and under the rules of the competition was barred from taking Silver as well, it is not surprising that there were mutterings.

Last year reliability of the Class 37 top-and-tailed sets fell to 2,611 MTIN MAA, but this year Northern and its contractor Direct Rail Services are back with a 104% improvement to take the Silver Spanner again! The explanation for this resurgence is the introduction of a DRS Stadler Class 68 locomotive to supplement the vintage Class 37s.

But note that at 5,327 MTIN MAA Northern is nearly 1,000 MTIN better than the Chiltern loco-hauled sets - also with Class 68 haulage. I suspect the answer lies in the rugged Mk 2 coaches with far less to go wrong, but none of the comfort of Chiltern's modernised Mk 3s with their power doors.

1ST GENERATION NEW INTER-CITY

This category is all about the 125mph DMUs plus the West Coast Pendolinos. Despite a 20% fall in

Traction old and new: No 68004 passes No 37424 at Parton on the Cumbrian coast route on 14 April 2018. **JOHN WHITEHOUSE**



SPANNER WINNERS



The thirteenth annual Golden Spanners awards were presented at the Grand Connaught Rooms, London on 23 November 2018.

Awards photography by Tony Miles



Pacer prize: Mick McCormack of Arriva Rail North receives the Ken Cordner 'Reliant' Award from Ken's partner Helen Saaler as colleagues look on.



Ex-BR DMU Gold: South Western's Tony Pidgley (third from left) receives the Spanner from *Modern Railways* columnist Ian Walmsley for Salisbury's Class 159s.



Ex-BR DMU Silver: prize presenter Ian Walmsley hands over the Silver Spanner to GWR's Exeter depot manager Andrew Tyne for the Class 153 reliability improvement.



Ex-BR DMU Bronze: South Western's Jo Archer (in blue) receives the Bronze for the Class 158 from Ian Walmsley.



Virtual Bronze: Hitachi's rapid response team deserves a mention for the emerging '800' DPI figures. Nine-car IET at Paddington, 28 June 2018. **TONY MILES**

reliability the Etches Park Meridians comfortably beat the Central Rivers Voyagers for the Golden Spanner with a still highly-respectable 40,600 MTIN MAA. The Silver Spanner was a walkover for the Virgin West Coast tilting Class 221s, the only fleet in the category to show an improvement.

Meanwhile, at the bottom of the table Class 180 reliability collapsed. I've lost count of the number of times a new operator has promised this small fleet the tender loving care it needs, only for the subsequent improvement in reliability to prove evanescent.

2ND GENERATION NEW INTER-CITY

It seems unfair not to record Hitachi's performance with the Class 800 bi-modes just because they missed entering the Spanners analysis by a single period. To compensate for this, the 2nd Generation New Inter-city Table (overleaf) runs from Period 8 2017-18 to Period 8 2018-19.

Compared with their nearest peers, in the 1st Generation New Inter-city Category, this performance would have taken

Silver and Bronze. Each year I make a point of explaining that while Bronze applies to third place at the Olympics, in the Spanners it is the award which matters most to passengers and highlights the unsung role of train crew, travelling Technical Inspectors, depot support staff and Control in getting a train moving again after a Technical Incident.

True, the Train Management Systems (TMS) of modern stock potentially make fault finding and rectification easier. But that depends on the training to handle the 'switchology', plus strong technical support to take train crew into the more recherché levels of the TMS display.

GWR has always been strong in this area. Hitachi has a technical team embedded with GWR's Swindon Control plus a team of travelling technicians with vans able to reach remote locations by road. The 12 minutes Delay Per Incident MAA for the Class 800s merits a virtual Bronze Spanner.

1ST GENERATION NEW DMUs

Although I added the Class 16X Networker Turbos into this

category to provide a yardstick, under the new classification this is essentially Turbostar territory, apart from Siemens muscling in on the act to take the top award. In fact, the Class 185s created a slight problem this year.

Northern took the top spot, but that company sub-leases its three Class 185s from main fleet operator TransPennine Express. So to keep things uncomplicated, and because the Spanner goes to the depot, we made it a joint award.

Last year, this category was a table of two halves, with the top six all improving and seven of the remaining nine less reliable year-on-year. This year only five improved.

As in other categories, some fleets continue to shine among the general gloom. GTR's Selhurst depot, a serial Spanner winner, not only pulled out a creditable 14% improvement but took another Bronze Spanner home with the Delay Per Incident of only 4.7 minutes being the lowest overall.

Illustrating the fragility of current performance is the lone Class 175 fleet. Last year

TABLE 5: 1ST GENERATION NEW INTER-CITY

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MTIN MAA P7 2017-18	% CHANGE
EMT	Class 222	48.6	39,665	40,647	50,589	-19.7
CrossCountry	Class 221	19.1	39,355	24,260	25,392	-4.5
CrossCountry	Class 220	18.5	28,547	20,768	30,433	-31.8
VTWC	Class 221	20.6	29,826	18,242	16,818	8.5
VTWC	Class 390	21.3	19,150	16,127	21,404	-24.7
Hull Trains	Class 180	27.2	3,906	7,528	14,665	-48.7
Grand Central	Class 180	23.3	5,594	6,679	10,392	-35.7



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SPANNER WINNERS (CONTINUED)



Ex-BR EMU Gold: South Western's Class 455. Wimbledon's Bruce van Schalkwyk holds the award as prize presenter Wayne Jenner (far right) looks on.



Ex-BR EMU Silver: Hugh Garrett-Allen from Angel holds the award for the Arriva Rail London Class 317/7&8 fleet; at right is prize presenter Wayne Jenner.



Ex-BR EMU Bronze: Ian Taylor from Stadler's Birkenhead North depot holds the award for the Class 507 fleet; he is flanked by Harry Bird of Angel (left) and prize presenter Wayne Jenner.



Ex-BR Inter-city Gold: it's Crown Point again for the Class 90 + Mk 3 combos. Greater Anglia's Stuart Lawler (third from left) receives the award from prize presenter Chris Leah, former Network Rail Safety & Compliance Director.



Bound for the West Midlands: LOROL's Class 172s will leave London with a Silver Spanner under their solebar. The crew change ends at Gospel Oak, 8 May 2012. **TONY MILES**

TABLE 6: 2ND GENERATION NEW INTER-CITY

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P8 2018-19	MTIN MAA P8 2018-19	MTIN MAA P8 2017-18	% CHANGE
GWR	Class 800	12.0	6,758	5,851	2,862	104.5
GWR	Class 802	18.6	4,079	5,243		

it improved by 14.1% from 15,459 to 17,634 MTIN MAA. But that was followed by a 41% slump to only 10,286 MTIN MAA.

It seems to me that Fleet Challenge needs to invest in a forensic analysis to determine why we are seeing such massive swings in reliability from previously well-performing fleets.

YARDSTICK SUMMARY

1ST GENERATION NEW DMUs
Minimum MTIN 11,000 (down 1,000)
Expected MTIN 15,000 (unchanged)

Aspirational MTIN 20,000 (unchanged)

1ST GENERATION NEW EMUs

What is one to make of a category where last year's Gold Spanner-winning Siemens Desiro Class 350/2 fleet plunges by 36% into second place while the Siemens Desiro Class 350/3 - same manufacturer, same operator, same maintainer - improves by 78% to take Gold?

Even worse, when you get past the three West Midlands

Trains fleets at the top of the table, it is not until 12th place that the GTR Class 365 fleet shows an improvement. Overall, 17 out of 31 fleets in this category have become significantly less reliable and these are modern trains that should be ticking along nicely at the bottom of the reliability 'bathtub curve'.

Clearly many of these falls over the past year are from a high standard and half the fleets are over last year's aspirational target of 20,000 MTIN. On the other hand, the overall Delay Minutes

TABLE 7: 1ST GENERATION NEW DMUs

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MTIN MAA P7 2017-18	% CHANGE
Northern	Class 185	27.7	15,992	46,791	26,344	77.6
TPE	Class 185	24.9	29,358	27,491	26,684	3.0
WMT	Class 170	10.3	33,865	19,665	20,270	-3.0
WMT	Class 172	10.5	20,935	18,906	19,893	-5.0
Greater Anglia	Class 170	16.4	21,457	16,068	20,286	-20.8
GTR	Class 171	4.7	19,395	15,467	13,535	14.3
CrossCountry	Class 170	13.6	28,429	14,849	17,535	-15.3
Chiltern	Class 168	11.1	24,405	14,779	10,379	42.4
ScotRail	Class 170	9.3	19,042	10,889	13,319	-18.2
ATW	Class 175	16.7	10,778	10,286	17,634	-41.7
Chiltern	Class 165/0	8.5	7,967	7,770	8,916	-12.9
ARL	Class 172	20.6	11,534	7,220	3,705	94.9
Chiltern	Class 172	10.3	6,595	6,934	9,543	-27.3
GWR	Class 165/1	7.5	6,145	6,007	8,051	-25.4
GWR	Class 166	10.8	4,131	3,306	5,849	-43.5
Northern	Class 170	11.0	4,965	2,944		

TABLE 8: 1ST GENERATION NEW EMUs

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN P7 2018-19	MTIN MAA P7 2018-19	MAA P7 2917-18	% CHANGE
WMT	Class 350/3	23.3	61,059	138,579	77,491	78.8
WMT	Class 350/2	27.4	392,999	105,155	164,481	-36.1
WMT	Class 350/1	25.1	102,983	85,492	74,543	14.7
Greater Anglia	Class 360/1	59.3	64,303	77,644	99,154	-21.7
TPE	Class 350/4	33.3	32,400	50,538	75,512	-33.1
Southeastern	Class 375/8&9	9.5	43,198	42,876	50,343	-14.8
South Western	Class 450	16.6	78,963	42,525	90,336	-52.9
Southeastern	Class 395	10.2	38,920	41,181	47,037	-12.4
South Western	Class 444	22.0	40,525	35,825	99,333	-63.9
c2c	Class 357	14.2	51,510	35,220	52,788	-33.3
Southeastern	Class 375/3,6&7	13.3	44,009	31,642	37,079	-14.7
GTR	Class 365	18.7	48,901	31,195	28,905	7.9
GTR (ex Southern)	Class 377/1-4	9.7	27,979	26,445	27,523	-3.9
GTR (ex Southern)	Class 377/6-7	8.3	16,865	22,792	26,230	-13.1
ScotRail	Class 365	5.6	124,956	22,447		
Southeastern	Class 376	10.2	52,409	21,587	22,562	-4.3
Southeastern	Class 377	11.6	25,642	19,793	19,612	0.9
ARL	Class 378/1	15.6	19,161	19,743	14,925	32.3
South Western	Class 458/5	10.3	90,262	19,625	36,970	-46.9
ARL	Class 378/2	22.0	29,262	19,489	14,991	30.0
Southeastern	Class 466	16.3	33,571	19,215	15,532	23.7
Southeastern	Class 465/1	12.7	17,568	18,592	19,842	-6.3
Northern	Class 323	10.5	23,466	18,142	16,178	12.1
Northern	Class 333	23.7	15,386	17,362	21,272	-18.4
Southeastern	Class 465/0	11.9	29,314	16,667	14,566	14.4
ScotRail	Class 334	6.5	15,339	16,270	20,236	-19.6
Southeastern	Class 465/9	13.6	19,129	15,898	17,654	-9.9
WMT	Class 323	7.5	13,137	15,892	13,265	19.8
Heathrow Connect	Class 360/2	10.0	0	11,830	16,655	-29.0
Southeastern	Class 465/2	19.8	5,201	8,660	12,666	-31.6
TfL Rail	Class 360	8.3	4,208	3,870		

Per Incident is higher than that of the ex-BR legacy EMUs.

This category also provides sufficient peer-fleet data to take a stab at estimating the impact of the SWR adoption of 'normal reporting'. It appears to have added around 20% on top of the general fall in MTIN MAA.

DELAYS

For this category I analysed the change in DPI MAA. Just over half have seen a worsening, in other words more time taken to recover from an incident.

However, DPI MAA statistics should be treated with caution. A single major incident in one Period can distort a normally good performance. But given that these fleets operate on the busiest commuter services, any increase in DPI is concerning.

However, it is worth noting that ScotRail, having introduced 10 Class 365 units pending delivery of all its Hitachi Class 385 units, produced the best DPI

MAA in the category with this small fleet. This suggests that the conversion courses for the train crews were well planned.

Not having run for the full year, the 'Happy Trains' were not eligible for the Bronze Spanner. However there was poetic justice as the next best performer was ScotRail's Class 334 fleet with a DPI MAA of 6.5 minutes.

**YARDSTICK SUMMARY
1ST GENERATION NEW EMUs**

Minimum MTIN 20,000 (unchanged)
Expected MTIN 35,000 (down 2,500)
Aspirational MTIN 90,000 (unchanged)

2ND GENERATION NEW EMUs

Finally we come to the new bright hopes in the form of the first of the 2nd Generation New EMUs. Once again, the post-2010 rule applies and we have the last of the Electrostars and

Desiros to provide peer group comparators. Effectively these are halfway between the first and second generations.

Despite a 17% fall from last year's 93,000 MTIN MAA, the Greater Anglia Class 379 fleet, soon to be replaced under the first of the 'mass extinction' franchise agreements, still achieved 76,898 MTIN MAA, which puts it in fifth place and the first Bombardier fleet in the Top 10 EMUs.

While the TfL Rail Crossrail Class 345 nine-car Full Length Units (FLU) were best of the genuine 'newbies', these 10 sets are mainly used on test running. The seven-car Reduced Length Units (RLU) are in the hurly burly of revenue services, with all that means in terms of systems to go wrong as passengers get involved.

You have to admire the honesty of Transport for London in putting their statistics in the Fleet Challenge system. Virtue has been rewarded with a Bronze Spanner.



**SPANNER WINNERS
(CONTINUED)**



Ex-BR Inter-city Silver: Growlers pick up another Spanner. Arriva Rail Northern's Chris Robinson (second from left) picks up the Silver from Chris Leah.



Ex-BR Inter-city Bronze: Laura's HSTs go out in a blaze of glory. Porterbrook's Liz Lockwood (second from left) receives the award from Chris Leah.



1st Generation Inter-city Gold: Gareth Race of EMT holds the Spanner for Etches Park's Class 222s. To his left is prize presenter Haydn Abbott, former MD of Angel Trains.



1st Generation Inter-city Silver: Virgin's Hayley Farrer receives the prize from Haydn Abbott for the Super Voyagers.

SPANNER WINNERS (CONTINUED)



1st Generation Inter-city Bronze: CrossCountry's Class 220s were best on incident recovery in this category. The company's Richard Morris picks up the award from Haydn Abbott.



1st Generation New DMU Gold: prize presenter Tom Lee, Director of Standards at RSSB (purple tie), presents the Gold Spanner to Simon Wildgoose, Siemens' Fleet Delivery Manager for the Class 185s.



1st Generation New DMU Silver: Arriva Rail London's Tony Bobbin holds the award for the GOBLIN's soon-to-depart Class 172s after receiving it from Tom Lee.



1st Generation New DMU Bronze: the pride of Selhurst is on display as Peter Bringlow of Porterbrook holds the trophy received from Tom Lee for the Class 171s.



1st Generation New EMU Gold: West Midlands Trains' Class 350/3 is the most reliable train in the UK. Holding the Gold Spanner is Siemens' Paul Ryan. At far right is prize presenter Michael Mitton, CEO of Spanners sponsor Houghton International.

TABLE 9: 2ND GENERATION NEW EMUs

OPERATOR	CLASS	PRIMARY DPI MAA	MTIN	MTIN MAA P7 2018-19	MAA P7 2917-18	% CHANGE
Greater Anglia	Class 379	32.6	62,087	76,898	93,329	-17.6
c2c	Class 387	66.0	22,731	69,669	21,471	224.5
GTR	Class 387/2	11.0	43,239	49,468	55,979	-11.6
ScotRail	Class 380	15.8	37,151	41,657	39,879	4.5
GTR	Class 387/1	22.9	123,190	33,717	24,989	34.9
TfL Rail	Class 345 FLU	8.0	4,683	22,538		
South Western	Class 707	14.2	20,976	10,549		
GWR	Class 387	8.7	19,301	9,766	9,706	0.6
GTR	Class 700	12.5	11,283	8,308	4,210	97.3
TfL Rail	Class 345 RLU	5.8	5,509	2,093	498	320.7

Meanwhile, the monthly progress of all the 2nd Generation newcomers is being followed in New Train TIN-Watch in 'Informed Sources'. Over the past year this has been the equivalent of watching paint dry in terms of dramatic changes.

What has become clear is that these software-enabled trains with their ethernet spinal cord represent an entirely new challenge to commissioning staff. For example, with the first-generation processor-controlled traction systems, the software code was contained in Electrically Erasable Programmable Read Only Memory (EEPROM). To change the software you 'blew' the EEPROMs in a fleet.

There was a potential long-term problem. Manufacturers tended to use common printed circuit 'cards' for generic control functions. These would then be modified for specific applications.

Back in the day I was being shown round Bounds Green depot, where Alstom had been brought in to help sort issues with the Class 91 locomotive fleet. Among those I met was an Alstom engineer with a card reader in the process of going through a box of printed circuit boards (PCB).

With one system, the Class 91 shared a PCB with the Class 365. It turned out that when the cards were sent away for rectification, Bounds Green was getting back a

generic replacement rather than the Class 91 optimised version.

Anyway, today we have trains with much more intelligence, but they can be idiots savant. For example, braking has been an issue with several new fleets.

Integration with lineside systems is another problem. As you can read elsewhere in this issue (p74), the obsolescent, if not obsolete, Great Western Automatic Train Protraction (ATP) system is responsible for almost a third of the Class 800 fleet's TINs.

Similarly, the Bombardier Class 710 Aventura EMUs for TfL's Gospel Oak - Barking services have been delayed by the need for additional testing. They have a different software specification

Britain's most reliable train: the Class 350/3. No 350372 at Atherstone on a Crewe - Euston working on 14 November 2018. **JOHN WHITEHOUSE**



TABLE 10: TOP 10 EMUs 2018

OPERATOR	CLASS	MTIN MAA	MANUFACTURER
West Midlands Trains	Class 350/3	138,579	Siemens
West Midlands Trains	Class 350/2	105,155	Siemens
West Midlands Trains	Class 350/1	85,492	Siemens
Greater Anglia	Class 360/1	77,644	Siemens
Greater Anglia	Class 379	76,898	Bombardier
c2c	Class 387	69,669	Bombardier
TransPennine Express	Class 350/4	50,538	Siemens
Govia Thameslink Railway	Class 387/2	49,468	Bombardier
Southeastern	Class 375/8&9	42,876	Bombardier
South Western	Class 450	42,525	Siemens

to the Class 345 Aventras, which are also having problems talking to signalling and control systems.

Overlay such issues with the regular software drops, rather like the automatic upgrades which can wipe out data on your smartphone or tablet, and I can't see the new fleets matching current reliability levels for some time.

SPECIAL MENTIONS

Just how far standards have fallen can be seen in Table 10. Traditionally the top 10 EMUs have represented the crème de la crème, but now the Greater Anglia loco-hauled sets would occupy seventh place, with the TPE Class 185s in 10th spot.

Even worse is the Golden Spanners Club, where the elite meets and greets. Over the decade from 2006 to 2016, qualification for membership rose from 25,000 Miles per 5-Minute Delay (MP5MD) to 70,000 MTIN, noting that a TIN is registered after just three minutes' delay.

Last year, in a fit of hubris, I upped the entry qualification to 95,000 MTIN. So what to do this year?

To get three members would mean dropping back to the 85,000 Club. Even really slumping it and making it the 75K Club would only increase the membership to five.

So, what the hell, this year it's the 100K Club. However, I fear that next year the Club Secretary will be announcing less rigorous standards for entry. The way things are going we could be back to 2016, or even 2015, to restore the bar and restaurant receipts.

TABLE 11: 100K CLUB 2018

OPERATOR	CLASS	MTIN MAA	MANUFACTURER
WMT	Class 350/3	138,579	Siemens
WMT	Class 350/2	105,155	Siemens



SPANNER WINNERS (CONTINUED)



1st Generation New EMU Silver: New Cross Gate's Class 378/1s were most improved. Gordon Thomas of London Overground holds the award; at far right is prize presenter Michael Mitton.



1st Generation New EMU Bronze: Syeda Ghufuran of ScotRail holds the Spanner for the '334s'. At far right is prize presenter Michael Mitton.



2nd Generation New EMU Gold: Greater Anglia picked up the prize for the Class 379 fleet. GA's Dave Pearce holds the trophy; prize presenter Steve White, COO of GTR, is second from right.



2nd Generation New EMU Silver: Phil Commander of Bombardier holds the Silver Spanner for the c2c Class 387 fleet. At far right is prize presenter Steve White.



2nd Generation New EMU Bronze: Chris Temper of Bombardier holds the Spanner for the Aventra's incident recovery capacity. Second from right is prize presenter Steve White.

CAUSE AND EFFECT

With clear signs of falling reliability, the next challenge is to find the cause. The financial crisis afflicting the passenger operators is clearly affecting rolling stock maintenance. According to an informed source, at one depot the £15,000 needed to repair a lifting jack has meant that stock is having to be sent to another depot for bogie changes.

Discussing the fall-off with the Rail Delivery Group's Head of Engineering Mark Molyneux, he suggested that another contributing factor could be that the cadre of experienced rolling stock engineers was being spread too thinly. In particular, the best people are being allocated to commissioning the new fleets, which are taking priority. Add in retirements and corporate memory is being lost across the piece - something that applies to the other engineering and operating disciplines.

Corporate memory loss applies equally to the rolling stock manufacturers. And it is not just Tier 1 main contractors who are suffering. Modern

rolling stock depends more than ever before on the supply chain, where similar resource considerations apply.

COMPLEXITY

On top of all this, as the 'Informed Sources' New Train TIN-Watch section reminds us every month, the new generation of software-enabled trains with their ethernet spinal cords is not responding to the traditional techniques for building reliability in new trains. Worryingly, brakes are a recurring problem.

One class of EMU had an incident where the driver lost the service brake for 37 seconds. The manufacturer was reported to have argued that this was not a major issue as the driver still had the emergency brake.

Brake blending between friction and electric is clearly a challenge. One class could be caught in Balaam's Ass mode. If the driver applies brake at the changeover speed, the braking system doesn't 'know' whether to apply friction or rheostatic braking, leading to a hesitation.

TABLE 12: PUBLIC PERFORMANCE MEASURE MOVEMENTS

	PPM MAA 2018-19 Q1	COMPARED WITH 2017-18 Q1
National (GB)	86.9%	-1.2 pp
Regional and Scotland	88.3%	-2.9 pp
London and South East	86.4%	0.4 pp
Long Distance	83.4%	-4.1 pp

Pp = percentage points *Source: ORR*

My colleague Ian Walmsley suggests a further consideration. When money is short, funding for reliability improvements is likely to be the first economy, particularly where trains are due to be replaced in a couple of years. Mr W also wonders whether the drive to improve reliability is losing momentum.

As he notes from his own experience, you have to run very hard to stay where you are when it comes to reliability because everything is ageing and age may reveal unexpected weaknesses. And once again, time's winged chariot hurtling towards 1 January 2020 (the disability modifications drop

dead date that will prompt unmodified fleet withdrawals) can't help. Which is why I have highlighted the last hurrahs like the Northern Class 142s.

This collapse of reliability mirrors the fall in service reliability where the National Public Performance Measure for the First Quarter (Q1) of 2018-19 was 87%. This was the worst Q1 PPM since 2005-06.

Given the number of fleets due to be replaced by new rolling stock, involving very high delivery and commissioning rates, I think we may see the last decade as a golden age for rolling stock reliability. Next year's reliability review will reveal all. [m](#)

GOLDEN SPANNERS WINNERS 2018

AWARD	CLASS	MTIN%/ DPI	OPERATOR	DEPOT	MAKER	OWNER
EX-BR EMU						
Gold	455	32,591	South Western Railway	Wimbledon	BREL/Kiepe Electric	Porterbrook
Silver	317/7 & 317/8	32.3	Arriva Rail London	Ilford	BREL/GEC	Angel
Bronze	507	5.5	Merseyrail	Birkenhead	BREL/GEC	Angel
EX-BR DMU						
Gold	159/0	42,835	South Western Railway	Salisbury	BREL/Cummins/Voith	Porterbrook
Silver	153	53.7	Great Western Railway	Exeter	Hunslet Barclay/Cummins	Angel/Porterbrook
Bronze	158	7.0	South Western Railway	Salisbury	BREL/Cummins/Voith	Porterbrook
WILD CARD BEST PACER						
Gold	142	8,867	Northern	Newton Heath/Heaton	BREL/Cummins/Voith	Angel
EX-BR INTERCITY						
Gold	Loco-hauled	58,323	Greater Anglia	Crown Point	BREL/GEC/BR	Porterbrook
Silver	Loco-hauled	104.0	Northern	DRS Carlisle Kingmoor	Stadler/EE/BREL	DRS/JP Morgan Asset Mgt
Bronze	IC125	10.4	Great Western Railway	Laira	BREL/Brush/MTU	Angel/Porterbrook/FirstGroup
1ST GENERATION NEW INTERCITY						
Gold	222	39,665	East Midlands Trains	Etches Park	Bombardier/Cummins	Eversholt
Silver	221	8.5	Virgin Trains West Coast	Central Rivers	Bombardier/Cummins	Beacon Rail
Bronze	220	18.5	Arriva CrossCountry	Central Rivers	Bombardier/Cummins	Beacon Rail
1ST GENERATION NEW DMU						
Gold	185	27,491	Northern/TPE	Ardwick	Siemens/Cummins	Eversholt
Silver	172	94.9	Arriva Rail London	Willesden	Bombardier/MTU	Porterbrook
Bronze	171	4.7	Govia Thameslink Railway	Selhurst	Bombardier/MTU	Porterbrook
1ST GENERATION NEW EMU						
Gold	350/3	138,579	West Midlands Trains	King's Heath	Siemens	Angel
Silver	378/1	32.3	Arriva Rail London	New Cross Gate	Bombardier	QW Rail Leasing
Bronze	334	6.5	ScotRail	Shields	Alstom	Eversholt
2ND GENERATION NEW EMU						
Gold	379	76,898	Greater Anglia	Ilford	Bombardier	Macquarie European Rail
Silver	387	224.5	c2c	East Ham	Bombardier	Porterbrook
Bronze	345	5.8	TfL Rail	Ilford/Old Oak Common	Bombardier	TfL/DfT funded

Protecting your depot's most valuable assets



Zonegreen's SMART DPPS™

Give your rail depot workforce the confidence to work safely & effectively.

Even with all of the expensive infrastructure and equipment present in modern railway depots, the most valuable element of any rail facility will always be its workforce. Zonegreen's SMART Depot Personnel Protection System (DPPS™) protects workers by safely and efficiently controlling train movements within depots. By far the market leader, Zonegreen's DPPS™ has an unrivalled reputation as the most



advanced, high-quality, reliable, proven and widely-installed product of its kind, with installations both across the UK and around the world. The company boasts unparalleled expertise and experience in depot protection systems and employs an array of highly-skilled specialist engineering staff. Zonegreen is also an experienced and trusted provider of depot interlocking solutions.



Angel's HyDrive hybrid

Angel Trains' HyDrive hybrid concept for a Class 165 DMU helps meet the requirements of the four 'Cs' within the Rail Technical Strategy - reduction of cost, increase in capacity, reduction of carbon emissions and improvements to the customer experience.

Brian Reynolds, Product Manager at Angel Trains, told the Golden Spanners conference that the company has a dedicated product team looking at innovation and opportunities for its fleets. Mr Reynolds noted that all rolling stock leasing companies (ROSCOs) are targeting decarbonisation, and all have found different niches as they do so.

The HyDrive concept involves equipping diesel units with traction batteries, modern control electronics and new, powerful traction motors. Angel has partnered with Chiltern Railways and Magtec and intends to introduce the first HyDrive unit into passenger service on a Class 165 in late 2019.

HyDrive involves significant changes beneath the solebar of the vehicle. It requires removal of redundant equipment, including the existing engine, the transmission, the start and auxiliary batteries and the hydrostatic system.

Once this is done, new equipment to be fitted includes compact, efficient engine-generator packs to provide on-board range extending electrical power, either directly



HyDrive testbed: Chiltern Railways unit No 165022 leaves Banbury with the 10.45 service to Marylebone on 3 May 2018. **JOHN WHITEHOUSE**

to the traction motor or to the on-board batteries. Nickel manganese cobalt oxide (NMC) batteries will be fitted, and Mr Reynolds said these should offer a significant range, with the trial targeting running with the diesel engine off through all densely populated areas. The traction batteries will work alongside generators and smaller diesel engines, with a maximum rated capacity 400kW traction motor attached to the power bogie and the exact final drive power output controlled, dependent on the application. The latest controls and remote condition monitoring equipment will also be fitted.

The aim of the project is to deliver technology similar to that in a hybrid-electric road vehicle, although Mr Reynolds noted that

apart from improved acceleration there will be no difference in driver perception. The train can be powered from the battery, engines or both together; a significant amount of energy will be gained from regenerative braking to top up the batteries, and the system installed will ensure optimum energy recovery.

The HyDrive is a series hybrid: there is no mechanical connection between the engine and the wheels, permitting best point running, which helps mitigate the efficiency loss of the electric transmission. The key benefits of the system are minimised moving parts (no gearbox or clutch) for reduced maintenance costs and weight, and the ability to use smaller twin engines for redundancy and lower costs, or alternative power sources.

In addition, passengers will experience reduced noise and vibration and an improved station environment as diesel engines can be switched off. The HyDrive unit will have faster acceleration than a standard diesel engine and will offer reduced emissions. HyDrive enables the railway to be a better neighbour, by allowing engines to be kept switched off for long periods of time during visits to stabling and depot locations. A reduction in operating costs is also possible through reduced fuel usage and optimised maintenance procedures.

While a Chiltern Class 165 will be the proving ground for the HyDrive concept, Mr Reynolds suggested a large proportion of Angel Trains' DMU fleets have the potential to benefit from the technology in future. [mf](#)

HYDROGEN HEADLINES EVERSHOLT RAIL'S PLANS

Plans to develop a hydrogen-powered Class 321 unit with Alstom form just one part of Eversholt Rail's plans to decarbonise the rail industry, the company's Head of External Relations Tim Burleigh told the Golden Spanners conference.

Mr Burleigh noted the corporate experience and engineering skills among the three original rolling stock leasing companies (ROSCOs),

and that each has responded in different ways dependent on the composition of its fleet; for Eversholt Rail, 3,100 of its 3,500 vehicles are electric. Decarbonisation is therefore not just about modifying diesel trains, and Eversholt Rail sees continuous improvement to its fleets as part of the day job.

Mr Burleigh also noted efficiency improvements are not a new concept and are not solely a response to the challenge from

Government early in 2018 to remove all diesel-only trains by 2040. He highlighted projects such as the re-tractioning of Class 321 and Class 465 EMUs as offering efficiency improvements, along with programmes to improve Eversholt Rail's Class 185 and Class 222 diesel fleets. The key here is that there is no single solution across a broad portfolio of rolling stock.

While Eversholt Rail has a largely electric fleet, there

have been well-reported issues with the electrification programme in the UK, meaning self-powered vehicles continue to be in demand. For local lines, Mr Burleigh highlighted Eversholt Rail's participation in the Revolution Very Light Rail consortium, suggesting this concept could offer an environmental benefit compared with using DMUs, as well as encouraging the reopening of lines where a heavy rail business case doesn't stack up.

But a headline project is the plan to work with Alstom to create a

FLEX PROGRESS

Porterbrook's Class 769 FLEX conversion project has been a complex exercise, but the first units are now on test.

Jason Groombridge, the company's Director of Engineering Services, gave an overview of the project at the Golden Spanners conference. FLEX was born out of combination of Porterbrook's desire to find a home for its large fleet of Class 319 EMUs displaced from Thameslink services and the recognition that many services operate on routes which are only partially electrified, making a bi-mode a good solution.

Mr Groombridge began by outlining the difference between a bi-mode and a hybrid train; bi-modes have two separate, independent power sources, whereas hybrids blend power sources, usually with some level of energy storage. When evaluating options for its Class 319 fleet, Porterbrook considered a range of technologies, including batteries, flywheels, supercapacitors, hydrogen fuel cells and diesel engines. A diesel bi-mode was chosen because it offered the best compromise of range, weight, physical size, power density and total cost.

Porterbrook's aim with the project was to create a bi-mode unit that would be attractive to operators. The project was titled 'FLEX' as a suitable description of its ethos of flexibility and innovation. Wabtec Brush was chosen as the partner to develop the bi-mode conversion, which has



FLEX on test: unit No 769434 for Northern at the Great Central Railway on 5 November 2018. **PHILIP SHERRATT**

now become the Class 769. Three orders have been received so far, firstly from Northern for eight units, followed by five units for the Wales and Borders franchise and then 19 for Great Western Railway.

The modification work has involved fitting a MAN diesel engine and ABB alternator pack in a raft beneath each driving vehicle. A new adblue system to meet the latest Stage IIIB standards on emissions has also been fitted, and modifications to the train's control system were needed to interface with the diesel raft.

FLEX has proven to be a complicated upgrade, involving over 45,000 engineering hours and an equally high effort on approvals. However, it is now

bearing fruit; Mr Groombridge told the conference three Class 769 units had been completed and were undergoing testing, with single unit testing completed and dynamic eight-car testing in progress. Wabtec invested in creating a dedicated purpose-built test facility for the FLEX project. Production has also begun on the first tri-mode Class 769 vehicle for Great Western Railway, which in addition to AC overhead and diesel power has retained its third rail capability, requiring design changes.

Mr Groombridge then described Porterbrook's other ongoing projects in the FLEX family, noting that while diesel traction remains optimum for long-distance

non-electrified routes, hydrogen and batteries both have a role to play over shorter distances. Porterbrook has entered into a partnership with the Birmingham Centre for Railway Research and Education at the University of Birmingham to develop a hydrogen demonstrator on a Class 319 unit, dubbed HydroFLEX. It is also developing HybridFLEX, involving the fitment of a diesel battery raft to Turbostar DMUs, and BatteryFLEX, which would see Class 350/2 EMUs turned into battery hybrids. Completing the suite of innovative projects is Porterbrook's on-track innovation hub, with a Class 319 used as a demonstrator space for new technologies from the supply industry. **mf**

Class 321 hydrogen multiple-unit (HMU). Mr Burleigh explained that initial work on choosing a suitable platform for such a project focused on technical characteristics, fleet numbers, availability and longevity. Eversholt Rail also wanted to deliver a fleet without the need for a lengthy demonstrator trial phase, as the experience gained with Alstom's Coradia iLint makes this unnecessary.

So far, concept optimisation studies have been completed, and Eversholt Rail and Alstom have defined the programme going forward. A critical factor will be securing the

necessary approvals, while successful introduction will depend on the reliable and cost-effective supply of hydrogen, a matter on which the companies are engaging with hydrogen providers.

Mr Burleigh highlighted two proven programmes the team is drawing on - Alstom's Coradia iLint hydrogen unit, now in passenger service in Germany, and the Class 321 Renatus conversion for Greater Anglia. Of the 30 units going through the latter programme, 26 have entered service, and all have received new traction equipment. **mf**



Hydrogen potential: Eversholt Rail proposes the 30 Class 321 'Renatus' units for conversion to hydrogen power. Complete from its Renatus overhaul, No 321325 passes Hackney Wick while on delivery from Doncaster to Ilford depot on 1 October 2018. **ANTHONY GUPPY**

Stadler makes an impression

Stadler aims to bring a local focus and get under the skin of all the markets it serves, explained Hein van der Schoot at the Golden Spanners conference. Mr van der Schoot, managing director of Stadler Rail Service UK, was speaking on the theme of impressions of a new entrant.

He began by describing the company's roots in the village of Bussnang in north eastern Switzerland 76 years ago, which is still the site of Stadler's headquarters today. Since then, Stadler's strategy has been to grow steadily. It has achieved this by developing tailor-made vehicles, including the GTW articulated vehicle for the regional market, followed by the Flirt, which opened the company to the inter-regional and inter-city markets. Next came a double-deck solution, dubbed Kiss, and most recently the company has entered the high-speed market with the Smile, which was developed in 23 months and will operate between Switzerland and Italy.

Stadler now employs around 8,000 people, with production sites in Switzerland, Germany, central Europe and Spain, plus a components division and a service division. The company produces many different vehicles in each of its facilities. The new trains it is delivering for Merseyrail feature bogies from Spain and bodysells from Szolnok in Hungary, with assembly split between sites at Altenrhein in Switzerland and Siedlce in Poland.

Stadler is relatively new to the UK, and Hein van der Schoot told the conference that the business has been struck by the



Stadler loco on song: No 68025 *Superb* passes Lichfield Trent Valley hauling a rake of TransPennine Express Mk 5A coaches on a test run, the 3H02 09.29 Bletchley Up & Down Relief 1 - Manchester International Depot working, on 25 October 2018. **JOHN WHITEHOUSE**

unbelievable passion for railways here. As well as the Merseyrail fleet, the company is building trains for the Glasgow Subway and Greater Anglia, and in 2018 it was named the preferred bidder for the new Wales and Borders franchise. Stadler has already delivered light rail vehicles in Croydon and Sheffield and Class 68 and 88 locomotives for Direct Rail Services.

The new trains for Merseyrail will make the rail network on Merseyside one of the most accessible in the UK. This is thanks to one of Stadler's unique selling points, the intelligent sliding step, which uses technology to detect a train's distance from the platform. Creating virtually level access, it will revolutionise travel for people

with disabilities. But the variable platform heights that currently characterise the Merseyrail network mean a programme of infrastructure adjustments is currently taking place.

Other challenges in the UK are the age of the network itself and its intensive use. Mr van der Schoot reminded the audience that the biggest hurdle was getting modern trains to operate on Victorian networks. He conceded that approvals and authorisation processes were not straightforward anywhere, but in the UK there seems to be a considerable number of hoops to jump through and a noticeable emphasis on contracts.

Stadler Service incorporates full overhauls, modernisation, supply of spare parts and

routine repairs. The company undertakes maintenance for 36% of the trains it has built. It has various agreements in place for its UK contracts, including full service agreements for Greater Anglia and Merseyrail, a Train Services Agreement (TSA) for Wales and Borders and a TSSSA (Technical Support and Spares Supply Agreement) for the Glasgow Subway fleet.

The local focus Stadler endeavours to promote is based on four key values: respect for the culture and practices of the staff the company inherits or takes on; acting responsibly as an employer; tolerance - maintaining an open mind to new processes; and nodding to history by introducing Stadler values to its employees. [m](#)

MOBILE MAINTENANCE

'The AA service for rail vehicle wheelset recovery' is how Yellow Rail's Engineering and Technology Director Zeph Grant described the company's RaiLathe.

Addressing the Golden Spanners conference, Mr Grant explained Yellow Rail began working with wagon hire firm VTG around a year ago to

develop a flexible, mobile solution for wheelset maintenance. Current approaches require rail vehicles to be moved to a fixed underfloor lathe facility for tyre-turning, which is costly, time-consuming and reduces vehicle availability.

Yellow Rail's solution is RaiLathe, which can be deployed to provide mobile reprofiling of wheelsets either remotely

or at depot locations. RaiLathe incorporates a mobile CNC lathe capable of storing a range of wheel profiles, a hydraulic powered wheelset friction drive to provide variable speed rotation of the wheelset, auxiliary services to power the system and a mobile jacking system to provide vehicle lift and support for machining.

Deployment options include a fully mobile solution, which

can reach a wide range of geographic locations using a special purpose vehicle. This incorporates aids to help operatives employ the system with ease and enable efficient manual handling. Yellow Rail has signed a long-term agreement with VTG for the provision of the mobile solution. This will be rolled out from the start of 2019; Yellow Rail has agreed

Towards the intelligent bogie

Perpetuum's innovative condition-monitoring technology can help optimise fleet maintenance, Andy Stephens, the company's Sales Manager, told the Golden Spanners conference.

The biggest challenge for operators is the availability of trains, and Perpetuum's technology is focused on avoiding unexpected issues and moving from preventative to condition-based maintenance. Mr Stephens suggested the rail maintenance industry is massively over-maintaining by replacing assets earlier than is necessary.

Perpetuum was born out of the University of Southampton, and its unique selling point is its innovative vibration harvesting system to monitor

asset condition. While the company's systems currently monitor bearings, wheelsets, gearboxes and motors, the company is working towards creating an intelligent bogie, offering operators and owners complete information on the condition of a wheelset.

The advantage of vibration technology is that it gives early signs of a change in condition, typically six to seven months ahead of a failure, allowing time to get the resources in place to deal with the issue. However, Mr Stephens suggested making full use of this technology relies on having an innovative operator and rolling stock leasing company willing to invest in the technology.

Mr Stephens described Perpetuum's partnership with ScotRail, which has seen its

monitoring systems installed on all 40 of the company's Class 334 EMUs used in the central belt, noting the importance of installing the systems on an entire fleet to get a complete picture of how assets are performing.

But it is not just a case of installing equipment - the monitoring system must be calibrated in line with the operator's needs, and the real benefit comes from the operator changing the way it maintains a fleet. Mr Stephens suggested some operators underwrite condition-based maintenance into their safety management system and noted ScotRail is at the forefront of optimising and challenging the existing safety case.

Perpetuum's dashboard system provides a clear overview

of the status of the fleet, with automatic alerting in place. The system can also use information on average temperatures to identify instances such as dragging brakes.

Going forward, Mr Stephens explained the next step is to build on the current information the system generates about wheels and bearings and to interrogate data on bogie stiffness. This is a common factor, and Perpetuum's technology could enable operators to detect hunting, a regular phenomenon affecting wheelsets.

Mr Stephens emphasised that Perpetuum is not just a provider of technology but is a trusted partner, able to provide operators and leasing companies with useful information to assist with maintenance. [mr](#)



Perpetuum system installed: ScotRail unit Nos 334030/029 pass Hillend Loch, between Caldercruix and Blackridge, on 28 September 2017 with the 09.24 Milngavie to Edinburgh Waverley. **IAN LOTHIAN**

a service model with VTG, but the lathe is also available for purchase by other operators.

Other deployment options include semi-static deployment within the confines of a depot or a fixed static deployment, involving a permanent installation. An extensive approvals process was required for RaiLathe, given it is completely new technology.

Mr Grant concluded by outlining the key benefits of RaiLathe. These include a reduction in vehicle downtime

and therefore an increase in availability - this can be as radical as a reduction from weeks or months out of service to a couple of days. RaiLathe also offers the opportunity to proactively manage wheelsets and can be used for economic tyre-turning, reducing costs and extending wheelset life; this means that while there will clearly be a heavy peak in the challenging autumn period, RaiLathe can offer advantages to operators throughout the year. [mr](#)



Flexible solution: Yellow Rail's RaiLathe in action. **COURTESY YELLOW RAIL**

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MAINTAINING THE BI-MODES

KEITH FENDER VISITS HITACHI'S STOKE GIFFORD DEPOT NEAR BRISTOL PARKWAY

Stoke Gifford depot has been open since 2016 and has been maintaining the Great Western Railway Class 800 fleet since it entered passenger service in October 2017. Just over a year after the fleet first entered service *Modern Railways* was given exclusive access to the depot to see how the maintenance regime is planned and carried out.

The fleet of Class 800/802 trains in use with GWR has grown rapidly, with the 50th unit entering daily diagrammed service in late November (out of 62 trains already accepted by GWR for traffic by then - see box).

CENTRAL PLANNING

Hitachi has located its UK central maintenance planning

team at Stoke Gifford. The team covers much more than the Great Western fleets: it has responsibility for all 182 Intercity Express AT300 trains on order for UK operators (GWR, LNER, TransPennine Express and Hull Trains). The ScotRail Class 385 fleet is controlled by a separate team in Scotland.

The Central Planning Cell (CPC), as it is called (and labelled in both English and Japanese), comprises around 20 people: four shifts 24/7 of four engineers and planners. A small number of performance analysts/managers assist the team.

The CPC team is responsible for fleet-wide modifications - planning these as pre-scheduled

campaigns of additional work, normally associated with the longer 10-day interval exams.

Hitachi has recruited a mixture of people for both maintenance and CPC roles: some from the railway industry, some from other sectors. My guide around the depot epitomised this: having begun his career with British Rail in the Bristol area, he left the railway in the 1990s as the outlook seemed bleak. But he has now joined Hitachi to maintain brand new trains only a few miles from where he used to maintain BR diesel locos!

Fleet maintenance and availability planning is undertaken for the UK AT300 fleets using SOROS fleet planning software (produced

by UK firm Danburykline). The SOROS system is used to build an ongoing seven-day maintenance plan and to aid company and AT300 fleet-wide planning.

40,000 DATA POINTS PER TRAIN

Each Class 800/802 is fitted with over 40,000 sensors or monitoring points, and Hitachi is clear that over time the maintenance regime will move from the current time-based system to one of predictive maintenance based on actual performance of trains and subsystems.

The data available from the trains in real time is impressive. The CPC engineers can see on

Inspire the Next: unit Nos 800015 and 800315 at the Hitachi depot at Stoke Gifford.



a map exactly where each train is - and not only what service it is operating, but whether on diesel or electric, along with real-time speed (to four decimal places!) and a whole raft of sensor reporting data.

In addition to technological assistance there is also information from drivers and GWR control. Driver-reported faults, such as door faults, are fixed if possible by riding inspectors under the direction of GWR's Swindon control.

Hitachi's engineers say there has been a major cultural change for drivers. They were used to a warning light in an HST to signify faults; now they are operating a train that has a full on-board management system and huge amounts of potential information.

OLD AND NEW DEPOTS

Whilst some of the depots Hitachi is using for the new train fleets are brand new, like Stoke Gifford (or in the case of North Pole, converted from an unused depot), in other locations Hitachi is taking over management of existing depots. Those at Bounds Green and Craigentenny had transferred to Hitachi earlier in the week



Arrival roads: toilet emptying and diesel refuelling equipment are located here; a Class 165 passes on the adjacent main line.

of my Bristol visit, with existing employees plus responsibility for all the legacy fleets of HSTs and Class 91/Mk 4 trains.

Asked about the delayed introduction of the 'Azuma' fleet on the East Coast main line, Hitachi replied that the intention was to hand over the first train to operator LNER for crew training in early December. The understanding is that LNER intends to start London - Leeds / Hull services in March or April with Azumas. Hitachi



Depot signalling system: movements on the site are controlled from here.

also confirmed that a fix for the electro-magnetic interference problem with the Azumas north of York has been found and will be fitted from late 2018 onwards.

NIGHTLY OPERATION

For maintenance, the depot has four shifts 24/7 with two teams of six technicians/engineers on each shift. Generally, major exams are undertaken in daytime, with the night-time filled with multiple daily inspections. In a typical 24-hour period Stoke Gifford currently undertakes 10 to 11 daily inspections/services and three longer exams.

The depot is designed to receive trains from the GWML and then process them in several stages as required before stabling trains ready for service. Trains are handed over



Poking into the sunlight: Class 800 cab at Stoke Gifford.

from Network Rail to the depot signaller at Bristol Parkway station, entering the depot via roads 1 to 4. Here diesel fuel, water and sand are replenished.

FLEET IN USE

In October 2018 the 62 trains delivered and available for service comprised:

- 34x5-car Class 800/0, normally operated in pairs
- 15x9-car Class 800/3
- 12x5-car Class 802/0
- One nine-car Class 802/1





Roof-mounted extractors: an interlock system prevents trains entering the depot on diesel power unless this is turned on.



Get your essential kit here: tag board at Stoke Gifford.

Easy access to underfloor equipment: Class 800 inside the shed at Stoke Gifford.



Toilet tanks are emptied and the external nose cone of the train is cleaned. While all this is being done, a litter pick is undertaken inside the train to remove waste left behind from its last journey.

The train is then washed in the automatic carriage washer adjacent to the main maintenance shed. While this is done laser and camera-based sensors are used to measure brake pad wear and check the condition of the carbon strips on pantographs. Unless major problems are detected the train is then moved to the stabling sidings where, if it is a pair of units, the units are uncoupled (as each train is tested as a standalone set). Visual and system checks on brakes, doors, cameras and oil levels are undertaken. Assuming no issues are found, the units are then re-coupled and a full clean using vacuum cleaners, including cleaning the windows, is undertaken. Following a final 'walk through' by one of the maintenance team to ensure everything

has been completed, the Train Management System (TMS) is signed off and details of the train inputted into the SOROS system (to show it is available for use).

The depot buildings are not electrified - the trains use diesel power packs to move in and out. A diesel exhaust extraction system has been installed and this is interlocked with the site signalling to prevent trains entering the shed without the extractors working.

The wheel lathe at Stoke Gifford is fully operational.

10-DAY BASIS FOR MAINTENANCE INSPECTIONS

Hitachi has based the maintenance regime around 10-day periods; after nine daily inspections / servicing visits (as described above) a 10-day interval exam is undertaken. Rather than trains being moved from the wash area to the stabling sidings, they are taken inside the shed and subjected to a detailed examination of the underframe and brake pads,

with any faults found then fixed; the bigger exams are normally undertaken in daytime. At its simplest this additional work might only take two hours, but with a programme of fleet engineering changes and fixes for issues such as Automatic Train Protection (ATP) or door problems the opportunity is taken to plan these in alongside the 10-day exam. At 50 days a more intensive exam is performed, after which the cycle restarts. Heavier overhauls are envisaged at around the 950-day mark - but of course so far no train has got anywhere near that yet, so it may change.

SOCKS – PREPARING FOR WINTER

Following the experience of last winter some winterisation of the fleet is planned. The trains all have nose-mounted air horns located not far above rail height; in certain winter conditions these have a propensity to ice up - the low-tech but practical solution tried last winter was putting socks over the horns! Another

low-tech but practical fix: doors that might ice up are treated with Vaseline to ensure they have extra lubrication to keep moving.

TEETHING TROUBLES

The GWR fleet in mid-November was achieving 98-99% availability with 7,500 miles per technical incident (MTIN). The main areas causing technical incidents were the ATP system, braking and door issues, although the lack of electrification progress was causing its own subset of hopefully short-term issues.

ATP problems represent the biggest cause of delay minutes for the IET fleet. Fitted on the GWML in the wake of the 1988 Clapham accident, the ATP came originally from ACEC of Charleroi, Belgium (now part of Alstom); Hitachi engineers describe it as 'life-expired but very bespoke'. But in the light of the 1997 Southall accident (which would most likely have been prevented had the leading power car been using the ATP - or indeed the Automatic Warning System), use of the old system



Shipshape and Bristol fashion: standard class interior on unit No 800028; note the new seat covers, replacing the original flat cloth versions.



2+1 layout: Class 800 first class interior.



is likely to be mandated until it is superseded by European Train Control System.

An engineering fix to recurring ATP problems is in development, with modifications planned across the GW fleet. The GWML legacy ATP system currently accounts for around 28% of all TIN events and around 20% of delay minutes for the GWR IET fleet.

DIESEL-ONLY IETs

Electrification delays, including at Stoke Gifford depot, have led to some Class 800s being restricted to diesel-only operation, due to limited possibilities for testing. Pantograph flashover problems have occurred on several trains and whilst the engineering solution can be undertaken in Bristol, in the autumn trains were having to travel to London for testing prior to use in service.

The Stoke Gifford site did not have live overhead line electrification (OHLE) in mid-November despite all the equipment having been in place for many months; it was due to be switched on in December 2018. The Swansea depot will not be electrified; trains will have to travel east for attention if electric traction faults develop while they are in Wales.

During the depot visit Hitachi confirmed that all the Class 800 trains in service have been 'unmuzzled', so all the MTU power-packs under the GWML fleet are now upgraded from 560kW to 700kW. The Class 802s on West of England services were built to the higher spec.

AUTOMATED DOORS WORKING

The trains are equipped with automatic selective door opening that uses satellite positioning to determine which doors can open at any given platform. GWR spent many months checking and agreeing stop board locations to maximise the number of doors that can be opened. Hitachi reports the system is working well in practice.

As for the balise-based automatic electric to diesel (or vice versa) power changeover system, this is not yet in use, so drivers are required to make the traction change manually.

Walking through a Class 800 set on the depot it is interesting to see how clean and tidy the kitchens are, showing how little use they see. There was no evidence of crumbs inside the toasters!  All photography by Keith Fender.

PLASTIC PIGS COMING BACK HOME

PHILIP SHERRATT REPORTS ON SOUTH WESTERN RAILWAY'S REFURBISHMENT PROGRAMME, INCLUDING THE RETURN OF CLASS 442s AND AN UPGRADE TO ITS DESIRO FLEETS

The Wessex Electrics are coming back to their former stomping ground. Withdrawn from the South Western just over 10 years ago, the Class 442s transferred to the Gatwick Express, before being replaced there during 2016 and 2017 by Class 387 Electrostar EMUs.

In its new franchise, FirstGroup and MTR committed to bring the '442s' back to the South Western to operate on the Portsmouth direct line. Of the 24-strong fleet, SWR is to reintroduce 18 of the five-car sets, with the first pair of units now planned to enter service in January.

SWR Engineering Director Neil Drury explains the move was driven by two key factors - the desire to add capacity quickly and the dislike from passengers on the Portsmouth direct line of the Class 450s with their 3+2 seating. Stakeholders mounted campaigns such as 'no

more blue trains', highlighting their dislike for the '450s' compared with the sister '444' fleet, with its 2+2 layout.

Mr Drury also explains the strategy is part of a wider programme of refurbishment applied to SWR's main line fleets - the '442s', the Class 444 and 450 Desiro fleets and its Class 158 and 159 DMUs. By the end of 2020 all these fleets will have been refurbished; as well as improving the look of the fleets, each type is being reconfigured to provide more standard class seating as part of a drive to increase capacity.

'The aim of the programme is to increase standard class capacity while not changing the layout and comfort of the current accommodation' Mr Drury explains. On the '450s' first class accommodation is being moved from one of the centre vehicles to each end of the unit, while on the other fleets a 2+2

layout in first class will replace 2+1 seating in a smaller area.

'442' OVERHAUL

In October 2017 SWR entered into a contract with Kiepe Electric covering the refurbishment and re-tractioning of the Class 442s. At the time Kiepe Electric was part of Knorr-Bremse, but KB opted to sell the UK arm of the business, a deal which was completed in November 2018 (see box). The sold businesses now come under Gemini Rail Group, with Kiepe Electric now known as Gemini Rail Technology.

There remains a link with KB, however - the new traction equipment comes from Kiepe Electric in Dusseldorf, not part of the UK division that was sold. KB's UK division in Melksham is also supplying new braking equipment for the fleet, enabling regenerative braking to be introduced, both increasing efficiency and providing an environmental benefit.

In addition to the work carried out by Gemini, SWR is carrying out C6 overhauls and repainting of the '442s' at its Bournemouth depot. Mr Drury explains this is due to the condition of the units, some of which had been out of service for some time. Once the '442s' had gone off lease from Gatwick Express duties with Govia Thameslink Railway, SWR was able to choose the units which were in the best condition, although Mr Drury notes this was done without knowledge of the level of corrosion on some of them, especially under driver's cabs. One area receiving specific attention in the C6 overhaul is the doors - door leaves will be either rebuilt or replaced depending on condition, while the door mechanism, although generally reliable, will also receive attention.

The majority of the 18 units are first going to Bournemouth for the C6 overhaul and repainting at the paint shop, but



for three units this process has been reversed and the interior upgrade is taking place first.

RE-TRACTIONING DELAYED

SWR's original plan envisaged the interior refurbishment and re-tractioning taking place simultaneously. When the '442s' were built in the 1980s they reused traction equipment from 4-REP units, dating from the 1960s. To replace this, Gemini will supply new AC traction equipment for the fleet. The company has already installed new traction equipment on SWR's 91 Class 455s and on 30 Greater Anglia Class 321s undergoing Eversholt's 'Renatus' programme.

'We'll be fitting a mix of the equipment used on the "455s" and "321s"' explains Paul Woolley, Sales and Commercial Director at Gemini Rail Technology. 'It will be a blend of the traction package from the "455s" and the motors from the "321s". We're using a proven product which SWR has experience of operating, which removes risk. We specialise in taking work to third party facilities such as Eastleigh.'

However, SWR and Gemini have deferred installation of the new traction equipment, meaning the units will initially enter service with the original 1960s traction equipment. The reason for the deferral of the work concerns the static converters, which date from the 1980s and were not originally slated for replacement.

'When we tested them we found them to be very noisy in electromagnetic terms' Mr Drury explains. 'We underestimated the levels of interference, so we're procuring new static converters to facilitate the re-tractioning. But to ensure we could get the fleet into service earlier we opted to split the programme.'

'Each "442" will undergo 1,500 miles of fault-free running before entering service - we're treating them like a new train' says Mr Drury, noting some of this is being accumulated during driver training runs. 'We want to ensure they're reliable, but a lot of this also concerns the impact on the infrastructure. We're testing them in areas where Network Rail has highlighted a risk to track circuits, especially in the Portsmouth area.'

Once in service, SWR plans the '442s' will always operate in pairs. 'We made a strategic decision - all the traction equipment is beneath one coach, so if this fails we risk a unit being stranded' Mr Drury explains. 'Having another unit attached to it provides some redundancy. Of course, we have a contingency plan in case there is a failure on both units. Obviously this has a capacity benefit as well, as 10-car sets will be required on many journeys.' This will be less of an issue once the new traction equipment is fitted, when there will be two traction control systems on each five-car unit, providing added redundancy.

In addition to the new traction equipment, there will be other benefits in a pure engineering



Stripped for refurbishment: driving vehicle from No 442417. **PHILIP SHERRATT**



Grammar seating: nearly complete interior of one of the vehicles in No 442417. **PHILIP SHERRATT**



First class relocated: partition in place in driving vehicle of No 442417. **PHILIP SHERRATT**



Back on home turf: Nos 442414/442404, the former in full SWR livery, pass Millbrook (Hants) with the 5Q30 10.25 Fratton to Bournemouth driver training/test run on 8 November 2018. **MARK PIKE**

GEMINI RAIL GROUP

In August 2018 Knorr-Bremse confirmed it intended to sell its RailServices businesses (based around the Wolverton and Springburn facilities) and the Kiepe Electric UK division (headquartered in Birmingham) to Mutares, a Germany private equity holding company. The sale was completed in November 2018.

KB has opted to concentrate on supply of systems for new build projects, based out of its existing UK office in Melksham.

Mutares has rebranded the businesses under the name Gemini Rail Group. Kiepe Electric is now known as Gemini Rail Technology, while KBRS goes under the name Gemini Rail Services.

sense. The wheelsets on the '442s', which Mr Drury says were 'stressed to the max', will receive attention, with a new hybrid wheelset on the motor coach, again in the interests of reliability. The hybrid combines the wheel pans of the type from Class 321s and the axles and suspension tubes from '319s'.

SERVICE AND MAINTENANCE

The current plan is to refurbish all 18 units by spring 2019, before sets are then withdrawn for fitting of the new traction equipment, three at a time, in the second half of the year, with the whole project completed by December 2019.

SWR intends to diagram 16 of the 18 '442s' in service, with two maintenance spares. The eight pairs of units will work on Portsmouth fast services alongside some '444s', but in line with stakeholder wishes the '450s' will be confined to stopping services. The Desiros displaced by the '442s' will be used to strengthen services on

other routes. '442s' and '444s' will be able to interwork, with no discernible difference in sectional running times. 'The re-tractioning was never about operational performance - it was always about reliability, although we'll get a minor benefit in terms of acceleration' says Mr Drury. The two types will also have a near identical seating capacity.

Bournemouth will be the main base for the '442s', with Mr Drury noting the site is ramping up to become a maintenance depot rather than just an overhaul facility. However, the bulk of the fleet will stable each night at Fratton; a couple will work up from Bournemouth in the morning in passenger service, while a pair will also stable at the London end of the route.

INTERIOR WORK

Gemini is pressing ahead with the interior refurbishment work on the '442s', which is taking place at Eastleigh. The first completed unit, No 442403, left the site for Bournemouth on 29 November,

and was replaced by 442408, which had undergone its C6 overhaul and repainting. Two other units (Nos 442417/420) were also undergoing work at the Eastleigh site on 30 November, the day *Modern Railways* visited. One unit, No 442402, has been used as a trial unit for the new traction equipment, with the motor coach stripped down and tested at Eastleigh.

Jason Petersen, Depot Manager for Gemini Rail Technology at Eastleigh, explains there is a clear plan for work being carried out each day. Gemini has a team of 50 staff dedicated to the '442s', with day and night shifts working 20 hours a day plus a skeleton team at weekends. Gemini is planning to ramp up refurbishments to a beat rate of one unit a week.

All units are being fully stripped down, with seats removed, before new carpet is laid, dado panels are refreshed and seats are returned. The Grammer seats fitted for Gatwick Express duty are retained, but with new

bases from Transcal. Mr Petersen notes the interior work is also preparing for the re-tractioning, including laying around 30% of the cabling needed.

Many features are common across all SWR's refurbishments, such as the carpet from Axminster and the seats re-covered in SWR colours. All units will receive new first class seats from FISA Italy in a 2+2 layout, replacing the former 2+1 layout, with tables featuring inductive charging supplied by Baker Bellfield. This is a first for the UK network, with a key challenge being the sourcing of a suitable power supply unit to support it. At-seat power will be provided throughout - USB sockets in standard class and full three-pin sockets in first class, in addition to the table-top charging.

On the '442s', first class is being relocated from the centre vehicle, next to the guard's van, to one of the driving vehicles; the former first class area is being turned over to standard

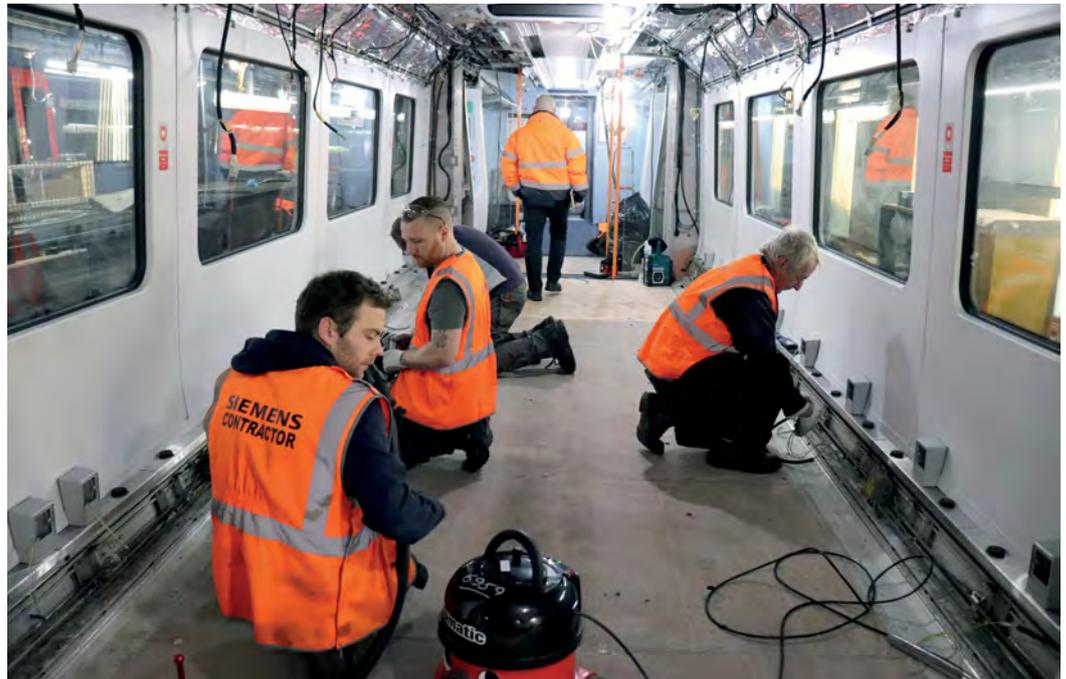
Overhaul by Gemini Rail Technology: partially repainted unit No 442420 in the workshop at Eastleigh; this is the third train to receive the interior work. **PHILIP SHERRATT**



class seating. A new partition framework in the driving vehicle separates the two classes, with passenger information displays in both halves of the vehicle.

Toilets on the '442s' are being stripped, deep cleaned and fitted with a new linoleum floor and vinyls in SWR colours on the back wall. One is being removed completely, to be replaced with an accessible toilet supplied by Birley Manufacturing to meet Persons with Reduced Mobility (PRM) requirements. The old unit is stripped down, a framework is used to strengthen the floor and the toilet is assembled from a kit in three parts.

The '442s' will retain their guard's van in the centre vehicle of the train. SWR will not use it for train dispatch duties due to the safety risk with the slam door and droplight window, but much of the train's control gear runs through the compartment, making it difficult to remove. Mr Drury says it will be sealed off but will house a new cabinet with electrical equipment for the Wi-Fi and CCTV.



Intensive programme: staff from Siemens at work inside unit No 450115. **PHILIP SHERRATT**

Associated with this is the relocation of the bicycle accommodation, originally located in the guard's van. As a temporary measure a pair of seats and a luggage rack will be removed to create a cycle space in the passenger saloon, but in the long-term a toilet will be taken out of use to make space for a cycle rack, at which point the removed seats in the saloon will be returned. This will form part of a later phase of work alongside the re-tractioning.

Of note also is that modifications for Driver Only Operation were made when the '442s' worked on the Gatwick Express; these are now being reversed for two-person operation once more. A refurbishment of the cab desk is taking place; Mr Drury notes many drivers and train crew 'love' the '442s'.

DESIRO REFURBISHMENT

While the '442' programme is extensive, the refresh of SWR's 45 Class 444 and 127 Class 450 Desiro EMUs is a much more intensive programme, due to the size of the fleet.

SWR contracted manufacturer Siemens to carry out the work, also taking place at Eastleigh.

At the end of November, five '450s' and four '444s' had been through the programme of full interior changes at Eastleigh. Richard Carrington, Director of Projects at Siemens, explains the company expected to complete



New-look first class: revised 2+2 layout with leather seating from FISA Italy inside a Class 444. **COURTESY SWR**



First for the UK: first class in the refurbished fleets features inductive charging tables supplied by Baker Bellfield. **COURTESY SWR**

20 units by Christmas, with the target being to complete the full fleet of 172 units (733 vehicles) by the May 2019 timetable change.

The original plan was to complete the full fleet by December 2018; Mr Carrington says the key issues with the

work have been timely delivery of materials and the need for a number of redesigns.

To achieve the challenging schedule, Siemens is working 24 hours a day, seven days a week on the project. It has adopted a 'pit stop' approach to the





programme using up to 250 staff, with the eventual aim that each unit will be turned round in four days, equivalent to one a day. At present, one '444' and three '450s' are at Eastleigh at a time.

In parallel, Siemens is near to completing a planned overhaul of the bushes on the bogies of the '444s', also taking place at Eastleigh and due to end in February. Mr Carrington describes Eastleigh as a 'pop up factory' with a 'pop up workforce'; at the programme's peak up to five Desiros will be at the site undergoing refurbishment.

Such is the need for speed that each unit is removed straight from service at Basingstoke and moved to Eastleigh immediately to enter the programme. Once completed, each train is returned ready for service back to Basingstoke, where it carries passengers again the following morning; Mr Drury notes this logistical exercise requires careful co-ordination with SWR's train planning team.

As units arrive at Eastleigh they are stripped down, with carpets and seats removed; seat bases are sent away to supplier Richmond

for re-foaming. Materials sent away for re-fettling are returned from Cowley in Oxfordshire, where they have been prepared in part of the former BMW car factory, with kits delivered marked against the vehicle and unit number. The limited storage space at Eastleigh mean all materials to be reused must be placed into stillages and stored adjacent to the unit being worked on.

MORE STANDARD CLASS

The Desiro refresh will deliver new carpets, improved seating and charging points (three-pin sockets will be provided throughout - the electrical supply on the Desiros can support these rather than just USBs). But a key aim of the programme is also to provide additional standard class capacity. As such, maintaining a float of seats at Eastleigh to fit to the units is therefore critical to the programme.

On the '444s', the first class area is being reduced in size but fitted with a 2+2 layout using the same FISA Italy seating and inductive charging tables as on the '442s'; the new compartment

will have three fewer seats. In return, each '444' will gain 32 standard class seats, in part from the change to the first class area and also from removal of the buffet and train manager's office (TMO). The buffets are little-used on SWR, while Mr Drury notes guards on the Desiro fleets perform a commercial role, with extra provisions made for them to store equipment in other locations.

Thus the items on the critical path for Mr Carrington and his team are the moving of the partition dividing first and standard class and the removal of the buffet and TMO. For the buffet, a header tank is taken out and the ceiling and luggage racks are redesigned, while the TMO space requires a new ceiling and bodyside rails to be fitted. Under the floor new draw out locks are needed to support the seat pedestals and tables, and Mr Carrington says sourcing these is a challenge.

On the '450s', first class is being relocated from one of the centre vehicles to the ends of the two driving vehicles; each area

will have eight seats, representing an overall reduction in first class provision from 24 seats to 16 on each unit. On the '450s' the first class seats are being supplied by Transcal, again with tables with inductive charging from Baker Bellfield. As on the '444s', the TMO is also being removed.

At present there is a subset of 28 high-capacity '450s' (sub-class '450/5') with fewer seats and more standing room. The current programme will return the fleet to a common layout, with 3+2 seating throughout; thus '450/0s' gain 22 standard class seats and the '450/5s' 41. Mr Drury notes the loss of standing space is compensated for by the additional seats.

So far, 45 Class 450s have already received what SWR and Siemens are dubbing a 'Phase 2' early refresh, with new carpets and seat covers and preparation work for fitting power sockets. Part of the reason for this was to help provide continuity to the programme and for the workforce at Eastleigh; these units will return for the first class area to be moved later in the programme.

Desiro upgrade: No 450100 in the workshop at Eastleigh for refurbishment. **PHILIP SHERRATT**



Siemens is also fitting the switching gear for a 1GB ethernet backbone on the Desiros; as well as improving the Wi-Fi, this will enable provision of media servers for an infotainment system, to be rolled out across SWR's fleets. Mr Drury says this will be fitted in the early part of 2019, although a contractor is yet to be confirmed.

DIESELS TOO

Work on the Class 158 and 159 diesel fleets, based at Salisbury, is also taking place in two phases.

These units are currently visiting Brush Traction at Loughborough for a C6 overhaul and Persons with Reduced Mobility (PRM) modifications, as part of which they are being repainted into SWR's new livery. A second phase, taking place in 2020, will see first class reconfigured to a smaller area in a similar manner to that on the Desiros, with 2+2 leather seating from FISA Italy and inductive charging at tables, again to provide additional standard class seating. As on the '442s', USBs will be fitted in standard class, but the current



Welcoming the upgrade: (from left) SWR Engineering Director Neil Drury and Managing Director Andy Mellors mark the completion of the first refurbished Class 444 with Richard Carrington and Andy Healey from Siemens. **COURTESY SWR**

seats and layout will be retained. Mr Drury says SWR is yet to determine where this second phase of work will take place. With no buffet or TMO to remove or new traction equipment to fit, the reconfiguration of accommodation on the DMUs is the key task, so this should be a simpler refurbishment.

In its franchise agreement SWR committed to examine the possibility of the Salisbury DMU fleet being converted from diesel-hydraulics to diesel-electrics and thence to third rail/diesel bi-mode units. Kiepe Electric (as it was at the time) worked with SWR to carry out a study, and while it was technically feasible a business case could not be made, so the project was not taken forward. Mr Drury notes the SWR DMU fleet is reliable and popular with passengers, so it makes sense to retain it in its current state.

REPAINTING SEPARATE

The refresh being carried out by Siemens on the Desiros does not include a repaint of the units in SWR's new livery. This will be part of a separate exercise beginning in 2019, subject to contract; the preference is that the work will be carried out at Bournemouth depot. Mr Drury says the whole programme for the Desiros will take around three years, as it involves stripping back and respraying the units.

So far, only two Desiros have been repainted; one '444' was treated for the franchise launch event in September 2017, and a '450' was re-liveried



Bright and airy: refurbished standard class saloon in Class 444. **COURTESY SWR**



Reconfiguration: work in progress on No 444010 at Eastleigh. The train manager's office was formerly on the left in this view, and the removed buffet counter was against the blanked out window on the right. **PHILIP SHERRATT**

prior to an appearance on television in *Ant and Dec's Saturday Night Takeaway*.

SWR has now adapted the original livery from the launch unit, which included diagonal stripes pointing in a south-westerly direction, applied using vinyls. Mr Drury says this

was a complex process, and for simplicity's sake the diagonal lines will not feature on the final livery, which will involve a repaint rather than vinyls; more recent examples of DMUs receiving the new livery carry the modified version, while the earlier units treated will return for modification later. **mr**

CYBER SECURITY

SAFETY FUNCTIONS CONSIDERED

KRISHNA PANDIT AND JÜRGEN SEPT OF SIEMENS MOBILITY GMBH DESCRIBE THE SYSTEMATIC TREATMENT OF SAFETY FUNCTIONS IN THE CYBER SECURITY PROCESS OF A RAIL VEHICLE MANUFACTURER

Cyber attacks have increased in frequency in recent years. Those covered in the media include the ransomware Wannacry, the hacking attack on the Ukrainian power grid or the ransomware in San Francisco's public transport system. The lawmakers have reacted with a plethora of laws that have recently been passed or are currently in the making. These include:

- European Network and Information Systems (NIS) directive to protect critical infrastructure;
- the EU Cybersecurity Act;
- the Network and Information Systems Regulation 2018 in the UK.

Legislation generally requires compliance with standards, but in the fairly new field of cyber security for railway systems, the standards are still in the making - for example, CENELEC (the European standardisation body) TC9X WG 26.

What makes rail vehicles unique in the context of cyber security is that different networks are interconnected: the train control network,

the operator network and the passenger entertainment network. A cyber attack on the train control network could have a safety impact, whereas on the operator network it has a financial impact and on the passenger entertainment it only affects comfort.

Hence, rail vehicle manufacturers have to address the topic of cyber security, but there is no clear guidance how to do so. Siemens Mobility GmbH started five years ago to address this topic in the context of the so-called Product and Solution Security (PSS) initiative. Since then, an information security management system (ISMS) has been installed and has been refined, building upon the experience of its application to approximately 30 customer projects.

This process is described in the remainder of this article, with the focus on the systematic treatment of safety functions. It is in principle organised along the lifecycle of a rail vehicle; however, the focus is on those parts of the lifecycle which are relevant for the manufacturer: bid phase, concept

phase, implementation phase, validation phase and, to a limited extent, the operation phase.

BID PHASE

Once there is a decision to bid on a tender, a so-called Product and Solution Security Expert (PSSE) is appointed, who will shepherd the project through all stages of lifecycle where the manufacturer is relevant. The market requires rail vehicle manufacturers to offer a multitude of different solutions, with each one of them having different requirements with regard to cyber security.

Hence, in the bid phase it needs to be determined which PSS activities are required. Further, the project risks need to be identified. This is done in the so-called PSS Classification. It must be done sufficiently late to ensure the scope of supply is known, but still early enough to have a chance to make changes regarding technical or commercial aspects if necessary.

The PSS classification is performed by the PSSE together with the system architect, but also by the project management. Initially an overview over the system is gathered. It may

be structured in different ways: along functions, or components, or networks. The crucial factor is that the 'System under Consideration' (SuC) and the context, the so-called 'intended operational use', are represented to their full extent. This also includes determining which subsystem contains safety functions.

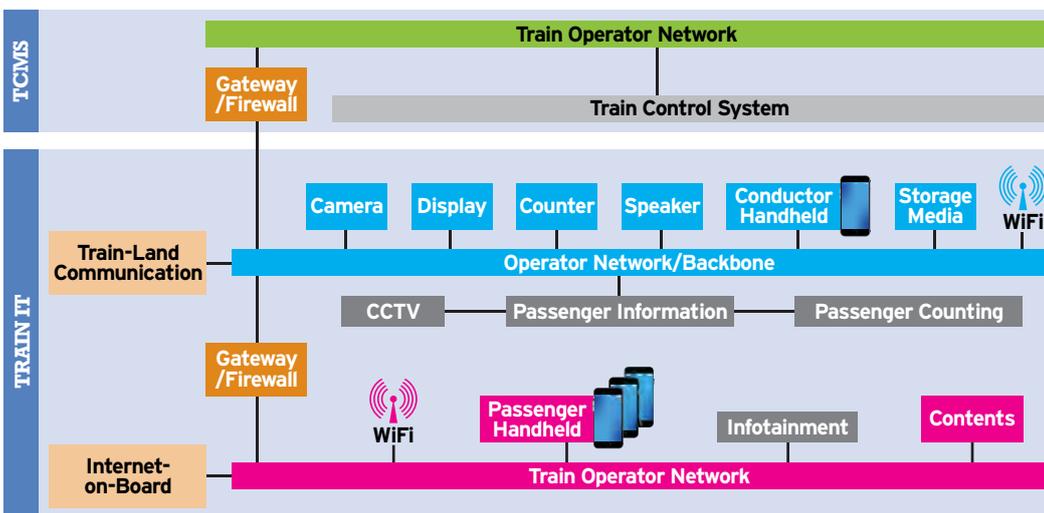
The result of this categorisation determines the PSS activities. Usually, the building blocks described hereafter are used alongside the PSS classification: PSS concept, threat and risk analysis (TRA), security testing and security vulnerability monitoring / incident handling. Furthermore, the project specific cyber security risks are documented for the first time.

The PSS classification supports tailoring of the PSS process so that the procedure fits any kind of project, from new development to replica, and documents any deviations. Hence, a risk-based approach is followed, which ensures that each project is customised such that each PSS activity is gone into with adequate depth.

CONCEPT PHASE

The concept phase starts once the contract is awarded. A PSS concept is created with the goal of detailing the PSS activities in the remainder of the project. The first task is to get a hold of the context of the project and to work out the system overview in detail. The basis for that is the system overview created during the PSS classification. Once a complete overview of the planned system is present, the system is divided into zones. This forms the basis for the following threat and risk analysis. Usually there are three zones, the train control (which holds safety functions), operator network and the passenger entertainment

FIGURE 1: EXAMPLE OF A SYSTEM OVERVIEW



network. An example of an overview can be seen in Figure 1.

However, in this era of digitalisation, obtaining a system overview is not straightforward. For example, in the operator network, displays can be connected to a public cloud to show real-time passenger information. Further, the market demands remote control of certain functions in the train control, such as for shunting a locomotive or pre-heating a train.

At this point a representative from the safety organisation is involved to ensure that all software parts containing safety functions are identified.

IMPLEMENTATION PHASE

The main activity of the implementation phase is the threat and risk analysis (TRA), which is the centrepiece of the entire PSS process. The goal of the TRA is the identification of cyber security risks for the system under consideration.

The first task is to define the potential attackers. In the context of a rail vehicle these may include bored passengers with hacker knowledge or criminals with the intention of blackmailing. The attacker types have an influence on exposure and exploitability of a weakness. The exposure of a weakness indicates which barriers an attacker has to overcome to access the weakness. Exploitability is concerned with the question of how easy it is for an attacker, if he or she has gained access, to use the weakness to achieve his or her goals.

Both exposure and exploitability are ranked on a three-level scale: high, medium, low. From the exposure and exploitability the likelihood is derived. This describes the overall likelihood that an attacker actually abuses the weakness. This is depicted in Figure 2.

To estimate the risk, not only the likelihood but also the impact of a successful attack has to be considered. To evaluate the risk, an impact matrix is created. The columns are the protection goals integrity, availability and confidentiality. At this point we use a four-level scale: disastrous, critical, moderate

und negligible. By this, possible attacks are assigned to their respective pair (protection goal, criticality). The risk is then assessed in accordance to the risk matrix shown in Figure 3.

The evaluation of the risk is done on a four-level scale: major, significant, moderate and minor. Usually a TRA is conducted for each subzone determined in the PSS concept.

Threats to safety functions get special attention. If an attack affects the integrity of software, that contains safety functions, the impact is always rated as disastrous. This is irrespective of whether an actual accident is assumed. For example, if the door control software is classified with a Safety Integrity Level (SIL) greater than 0, then a threat to the integrity of that software is rated with a disastrous impact, even if there is a redundant hardware path that prevents untimely opening of the door. The safety manager takes part in some and reviews all TRAs that address software which contains safety functions.

VALIDATION PHASE

The next step in the PSS process is the verification and validation phase, which is separated into two parts. The first phase consists of the so-called vulnerability tests. For one it verifies that the requirements and measures from the PSS concept and the TRA have been implemented. At the same time, additional vulnerabilities, which have not been identified in the previous phases, are searched. The time at which this phase takes place has to be chosen in such a way that the vehicle is already stable enough so that every functionality can be tested, but there is enough

time left for the implementation of changes if necessary.

In the test all assumptions and all assessed threats from the TRA are validated. This includes the threats affecting safety functions.

The second phase is the validation. Just before the vehicle is delivered to the customer, a test is conducted to ensure that all PSS requirements have been implemented. The findings of the validation phase, but also previous phases, often result in security advisories for the operator. These have to be documented in the operator's manual.

Further, in the context of our Security Management System it has been declared that risks, which have been evaluated to be significant or major by the TRA and tests, need to be mitigated. If a mitigation by the manufacturer is technically or economically not feasible, it has to be discussed with the customer to see if the risk can be mitigated on its side. If this is not possible, the risks must be explicitly transferred into the risk management system of the manufacturing company, which is controlled by its senior management.

OPERATION PHASE

During the entire lifecycle of a vehicle, it is necessary to monitor the announcement of vulnerabilities (Security Vulnerability Monitoring) for the software in use, as well as to have an incident handling (IH) process in place. If there is a vulnerability or incident that affects safety, the problem report process, which is in place to deal with safety-critical issues for fleets in operation, can be used. However, after the end of the warranty, the manufacturer has no access to the rail vehicle any more for the remainder of the operation phase.

INCREASINGLY RELEVANT

Cyber security is a dynamic field that is becoming more and more relevant for railway systems. Since there is no clear guidance from the regulatory and standardisation world, rail vehicle manufacturers are left to define their processes themselves. In this article, the process employed by Siemens Mobility GmbH for the past five years has been described, with a special emphasis on how safety functions are systematically treated. [mr](#)

FIGURE 2: LIKELIHOOD MATRIX

		EXPOSURE RATING		
		Low	Medium	High
EXPLOITABILITY/ SIMPLICITY RATING	Low	Very unlikely	Unlikely	Possible
	Medium	Unlikely	Possible	Likely
	High	Possible	Likely	Very likely

FIGURE 3: RISK MATRIX

		EXPOSURE RATING				
		Very unlikely	Unlikely	Possible	Likely	Very likely
EXPLOITABILITY/ SIMPLICITY RATING	Negligible	Minor	Minor	Minor	Minor	Moderate
	Moderate	Minor	Moderate	Moderate	Moderate	Significant
	Critical	Minor	Moderate	Moderate	Significant	Major
	Disastrous	Moderate	Moderate	Significant	Major	Major

ITALIAN PEDIGREE

BOMBARDIER AND HITACHI RAIL'S JOINT BID TO BUILD TRAINS FOR HS2 IS CALLING ON EXPERIENCE FROM OVERSEAS, AS **PHILIP SHERRATT** RELATES

Joint ventures are all the rage nowadays. No longer do train operating groups typically own 100% of a company - many have partnered to share risk and bring in extra experience. For the West Coast Partnership franchise, to include the initial operation of services on HS2, partnering with a company with experience of high-speed operation was mandated in the tender. So, too, with the construction contracts for HS2, where consortia dominate the lists of bidders.

The move towards joint ventures has also migrated to the rolling stock market. While unusual in the UK (the Siemens/CAF collaboration on the Class 332 and 333 EMUs being an exception), joint ventures are not uncommon on the continent. At the 2018 InnoTrans trade fair in Berlin, for example, Siemens

and Stadler jointly showcased the new train for the Berlin S-Bahn. The same pairing of companies has also been bidding to build new trains for London's Docklands Light Railway.

But in terms of big contracts, Bombardier and Hitachi have now twice joined forces in the UK. First of all, the companies bid together for the Deep Tube contract for new trains for London Underground's Piccadilly Line. Transport for London has awarded this contract to Siemens, although legal challenges from the joint venture as well as the other losing bidder, Alstom, are still ongoing.

In July 2018 Bombardier and Hitachi announced they would renew their partnership in tendering for the first batch of trains for HS2. A fleet of at least 54 conventional-compatible

trains will be introduced from 2026, when the first phase of the high-speed line opens between London and Birmingham, but must also be capable of operating on the classic network to reach other destinations.

Hitachi Rail Managing Director Karen Boswell said the companies aimed to deliver 'a new British icon that will be recognised around the world'. And the joint bidders cited the ETR1000 high-speed train for Trenitalia - the 'Frecciarossa' (or Red Arrow) - as an example of how they form a 'tried and tested high-speed team'.

FRECCIAROSSA

The tender for the 50-strong ETR1000 fleet was awarded to a joint venture of Bombardier and Ansaldo Breda in 2010; Hitachi subsequently took over Ansaldo

Breda's operations in November 2015, including the Pistoia factory at which the trains were built. Pistoia is now best known in the UK as the site where Hitachi is assembling the majority of the Class 802 bi-mode fleets for Great Western Railway, TransPennine Express and Hull Trains.

Construction of the eight-car Frecciarossa trains began in 2012, with the first entering service in 2015 and deliveries subsequently continuing at a rate of two trains per month until the end of the build in 2017. Hitachi has a full service contract to maintain the fleet from a depot in Naples, with overnight servicing also carried out in Milan.

The manufacturing model employed at Pistoia is based on maximum efficiency and was worked up through production of



the ETR1000, a contract which saw production processes at the plant modernised. Each vehicle moves through a series of stations where identical processes are carried out, spending five days at each station before being dropped onto its accommodation bogies and taken for static testing, which lasts about 20 days. The dedicated test facility at Pistoia was built for the ETR1000 project; it has recently been extended to 230 metres in order to accommodate a full nine-car Class 802 unit for GWR. This model of a production line has now been replicated by Hitachi at its Newton Aycliffe plant in the UK.

For the ETR1000, Bombardier was responsible for providing the overall design, based on the Zefiro model (of which significant numbers have been sold in China as the CRH380D and CRH1E), along with the traction equipment, bogies and control systems. Ansaldo and subsequently Hitachi was responsible for the manufacturing at Pistoia, including assembling interiors, heating, ventilation and air conditioning (HVAC) and manufacturing the car bodies themselves.

IN SERVICE

The ETR1000 sets are used by Trenitalia on its core high-speed services connecting Salerno, Naples, Rome, Florence, Bologna, Milan and Turin, but also operate on conventional routes, such as the 200km/h line from Milan to Verona. Here, of course, is an obvious similarity with HS2's requirements for conventional-compatible high-speed trains.

The fleet has been tested at up to 397km/h, but its design speed is lower at 360km/h. In practice, pending linespeed increases on the Italian high-speed network, operation is currently limited in service to 300km/h (and is likely to be for many years as plans to increase linespeeds above 300km/h have recently been cancelled). Some older sections, such as the 1990-built line between Rome and Florence, are further restricted, with the legacy 3kV AC electrification limiting top speed to 250km/h.

Signalling uses European Train Control System (ETCS) on high-speed lines (as planned on HS2), but with the Italian legacy SCMT system retained for conventional routes. The systems are fully integrated on a single driver machine interface display in the cab, with the ability to automatically switch between the two systems, as well as to manage the transition from 25kV to 3kV electrified lines.

The Frecciarossa offers four classes of travel, as Trenitalia seeks to compete with open access operator NTV (which uses Alstom-built AGV trains). These range from executive class, with 1+1 seats and a meeting room, to business (2+1 layout), premium and standard, with a comfortable 2+2 arrangement. Configuration of train interiors on HS2 will be the responsibility of the West Coast Partnership franchisee in its shadow operator role, working in conjunction with the manufacturer and HS2 Ltd.

Marco Sacchi, Head of High Speed and Main Line Engineering for Hitachi in Italy, is clearly proud of the ETR1000, hailing the 'cutting edge technology' it employs. So what were the challenges of building the fastest high-speed train currently in operation in Europe?

'When you run at 360km/h, the level of vibration and noise and the pressure forces are higher, requiring specific



Premium accommodation: 1+1 layout in executive class on the ETR1000. **PHILIP SHERRATT**



Business class: 2+1 layout in the second of four tiers of accommodation. **PHILIP SHERRATT**



2+2 layout: standard class on the Frecciarossa. **PHILIP SHERRATT**

solutions' Mr Sacchi explains. 'Another challenge on the Italian network is the number of tunnels, particularly where there is a short distance between them' he continues, citing the high-speed route between Florence and Bologna as an example. 'We have a predictive system which helps manage the pressure forces at play in that situation.'

PEDIGREE

So turning back to the UK, why did Bombardier and Hitachi opt

to form a joint venture once again? Bombardier's Commercial Director Des McKeon explains 'When we bid a core product such as the Avenra EMU, we wouldn't normally partner with another manufacturer. Although we have the ETR1000 to call on as experience, it's not a core product. The conventional-compatible nature of the tender also means these trains will be very much a one-off - which means a high design cost, so partnering helps us spread cost and risk.'



Italian icon: an ETR1000 set awaits departure from Rome on 22 November 2018 with the 10.05 service to Torino. **PHILIP SHERRATT**



Building for the UK: Class 802 driving vehicles for TransPennine Express (left) and GWR take shape in the production hall at Pistoia on 22 November 2018. **PHILIP SHERRATT**



Cab view: the compact driver's desk on the ETR1000. **PHILIP SHERRATT**



Infrastructure constraint: the high-speed line between Rome and Florence uses the legacy 3kV AC overhead electrification, limiting linespeed to 250km/h, well below the ETR1000's 360km/h design speed. **PHILIP SHERRATT**

'It all comes down to having a more competitive bid' he continues. 'While the ETR1000 showed we could work together, the main driver was the pedigree of the two companies. Hitachi can call on its bullet train experience

in Japan as well as high-speed trains in the UK for HSI and the IEP contract, while at Bombardier we've sold huge numbers of high-speed trains to China.'

Richard Roof, Senior Manufacturing Engineer

for Hitachi, backs up these views. 'We're reuniting the successful team which built the ETR1000, but both companies also have a reputation of building trains for the UK and can meet the challenge of delivering major fleets.'

'Our joint working with Bombardier has gone really well' he continues. 'Clearly it has complications and challenges, but we each understand what the other can offer.'

Mr McKeon highlights the two companies' UK footprint and relationships, noting their experience not just in building but maintaining trains. 'We look at every key system and ask whether we're designing for manufacture or designing for maintenance' he adds.

Mr McKeon reports that the joint venture's concept design is largely complete and in late November the companies were working through their industrial strategy. Bombardier and Hitachi have made clear that, should their bid be successful, both Derby and Newton Aycliffe would be involved in production. 'Both facilities have their strengths and are geared around the models they are building' notes Richard Roof. And while the allocation of responsibilities must clearly remain confidential, the recurring phrase here is 'best for bid'.

MOBILISING

One particular challenge for the winning bidder in the HS2

contract will be mobilising production quickly. The deadline for bids to be received is March 2019, with contract award planned a year later.

'Production would need to start in late 2021 - from award to having the first bodyshell completed is just 17 months' explains Hitachi's Richard Roof. 'This brings challenges not just around getting a production line going but in recruitment and skills. We know the challenges of building a factory and recruiting, having set up the facility at Newton Aycliffe.'

Mr Roof says the experience of assembling high-speed trains at Newton Aycliffe in the shape of the Class 800/801 Intercity Express Programme fleets will be valuable for Hitachi, alongside the experience of Bombardier at its Hennigsdorf factory in Germany and of Hitachi at Pistoia and in Japan.

'The ETR1000 gives us confidence' Mr Roof continues. 'The design has a unique layout and equipment and lends itself to high-tech, efficient manufacturing. We'd look to blend this to the requirements of HS2.'

In terms of a concept, the ETR1000 certainly chimes with many of the requirements in HS2's tender. 'Being able to point to a working train, rather than just a paper concept, is a strong selling point for us' says Bombardier's Des McKeon. 'HS2 wants a low-risk option and our high-speed design ticks all the right boxes - low noise, reliable, energy efficient. The ETR1000 proves we can deliver that as a joint venture.'

Clearly redesign and enhancement would be required - the Frecciarossa is built to the larger continental gauge, but the conventional-compatible trains for HS2 will need to fit the UK gauge to work on classic routes. 'We have all the technology to do this - we can call on the skills and knowledge from IEP and the ETR1000' says Richard Roof. 'But we'll be employing next generation technology - IEP was designed 10 years ago now.'

Marco Sacchi adds his perspective. 'For HS2 the challenges will be similar to the ETR1000' he says. 'But for HS2 we will be facing the technology of 2025, so it will be a next generation train.'



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ZONEGREEN DELIVERS FOR DOHA

DEPOT SAFETY SYSTEM FOR DRIVERLESS METRO

Doha Metro is one of the most prominent transport projects in the Middle East and is joining the growing trend for driverless trains.

Qatar Rail has commissioned 75 highly sophisticated, fully automated trains to run on the network, reaching speeds of 100km/h. These vehicles will be among the fastest of their type in the world and by far the fastest in the region.

Fully automated metro systems offer a plethora of advantages, including improved capacity through tighter scheduling, more predictable running times and automated detection of faults. Alongside their numerous benefits, however, come a whole new set of challenges, not least the hugely complex infrastructure required to retain safety levels and passenger confidence.

DRIVERLESS TRAINS AND DEPOT PROTECTION

Staff at Doha Metro's maintenance depots will be among the safest in the world, thanks to innovative depot protection technology from Zonegreen.

The Sheffield-based safety specialist has been commissioned to install its flagship Depot Personnel Protection System (DPPS™) at all three facilities serving this major Qatari infrastructure project.

Zonegreen is part of an international rollcall of rail experts coming together to create the world-leading metro system. The firm is working with turnkey solution provider Design and Projects International Limited on the installations, having collaborated previously on the Dubai Metro project.

Work on the Al Wakra Heavy Maintenance Depot, which serves the red line, began in 2017 and was completed late in 2018. DPPS™ has been installed across three maintenance buildings, protecting a total of 18 road ends.

A key factor in the growing global popularity of DPPS™ is its decentralised control of safety mechanisms, allowing staff to protect the specific areas in which they wish to work, without disabling the entire depot. Users are issued with personalised data keys to operate the system, ensuring their safety whilst

working in a particular area. Those with higher access levels are able to use their datakeys to authorise vehicle movements into and out of the sheds.

INTERFACING AT AL WAKRA

Zonegreen's ability to interface DPPS™ with other vital depot systems prevents personnel and equipment entering dangerous areas and coming into contact with vehicles and other deadly risks.

Al Wakra is fitted with the industry leading equipment necessary to maintain such ultramodern metro trains and DPPS™ interlocks a wide variety of these systems, allowing the safe and effective movement of vehicles.

Protection is provided to personnel at 13 of the 18 road ends via a signalling interface. If staff are logged onto Zonegreen's control panel, its technology prevents a route being set in the area where work is being carried out. When no personnel are logged on and all the interlocked equipment is in a safe position, the signalling

interface permits trains to enter directly from the main line, improving efficiency by removing the need for multiple stop-starts.

The remaining five road ends are physically protected by Zonegreen's unique powered derailleurs. Audible and visual safety warnings are also provided, in the form of beacons and klaxons to alert staff to vehicle movements.

The wheel lathe and two Bogie Underfloor Equipment Exchange Systems (BUEES) are interlocked electronically with DPPS™, preventing vehicle movements being initiated if the bridging rails are not in place. It ensures vehicles cannot be driven into the BUEES pit for a safer and more effective method of changing the bogie.

Zonegreen is expecting work on phases two and three of this mammoth project to begin this year, with completion on target for 2020, before the metro system opens to commuters. To find out more about its involvement in the Doha Metro or its bespoke depot technology, telephone (0114) 230 0822 or visit www.zonegreen.co.uk.



Ensuring safety at the depot: Zonegreen's derailer and ballast pit, part of its Depot Personnel Protection System.



Preventing accidents: close-up of the derailer.

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TALKING SENSORS

ROWE HANKINS INTRODUCES ITS RANGE OF PRODUCTS TO IMPROVE FLEET RELIABILITY

Rail vehicles have become more complex and more connected every year. Operating a mixed fleet of older vehicles with modern, connected intelligent rolling stock can highlight a gap in the quality and volume of data offered by legacy equipment when required for maintenance optimisation and effective use of maintenance assets.

The need for reliable, bespoke and compact sensors presents design challenges during upgrade of older vehicles when considering the age of legacy equipment to be monitored, level of approval needed, weight and power consumption. Monitoring, recording and reporting individual component performance reduces costs, manages sufficiency and improves safety.

Reliable sensors are vital for providing high quality reliable signals to on-train systems, allowing early detection of faults, resulting in better control of asset utilisation and maintenance scheduling.

Combining, upgrading or connecting conventional sensor technology with modern data transmission requirements is becoming increasingly popular with train operators and owners, presenting some interesting challenges around space envelope, operating environment and compliance.

FAULT DETECTION SOLUTION

To resolve these challenges, Rowe Hankins (RHC) provides integration of its own-designed current, voltage, speed and fault detection sensors with the supply of MIOS train diagnostic, automation and communication systems to refurbishment projects as well as new fleets.

This collaboration enables Rowe Hankins to duplicate or divert existing sensor signals, upgrade on-train monitoring recorders (OTMRs) and crash-proof memory units to

bespoke network-enabled units with programmable protocol converters, implementing network gateway functions from train network, MVB and TCN Gateway, creating a remote real-time condition monitoring and preventive maintenance platform and to develop new wireless technology products.

RHC's extensive in-house design, prototype and test facilities ensure the highest quality own manufactured products. Our trained engineers give the highest possible level of service; having worked in the rail industry for over 30 years, they have the experience to meet the requirements demanded by the global rail market.

FRICTION TECHNOLOGY

Rowe Hankins also continues to work closely with train builders and operators in friction modifier technology. We develop products for both on-board intelligent wheel flange lubrication and top of rail friction modifiers with dynamic brake testing for all braking modes for approval in new fleets, as well as retrofit solutions for legacy fleets in UK, Europe and the USA.

All work is undertaken at Rowe Hankins' UK-based premises in north Manchester and distributed globally. For example, RHC has provided safety critical products to rail projects in Europe,



Australia, Russia and the USA, amongst many other places.

In addition to manufacturing, the company has significant service centre facilities for the re-engineering of circuit breakers, contactors and other electro-mechanical devices to extend their service life. This capability is backed by test facilities, including a high voltage test unit to certify product performance before shipping. 

Improving reliability: Rowe Hankins is a leading supplier of speed sensors.

COMPANY DETAILS

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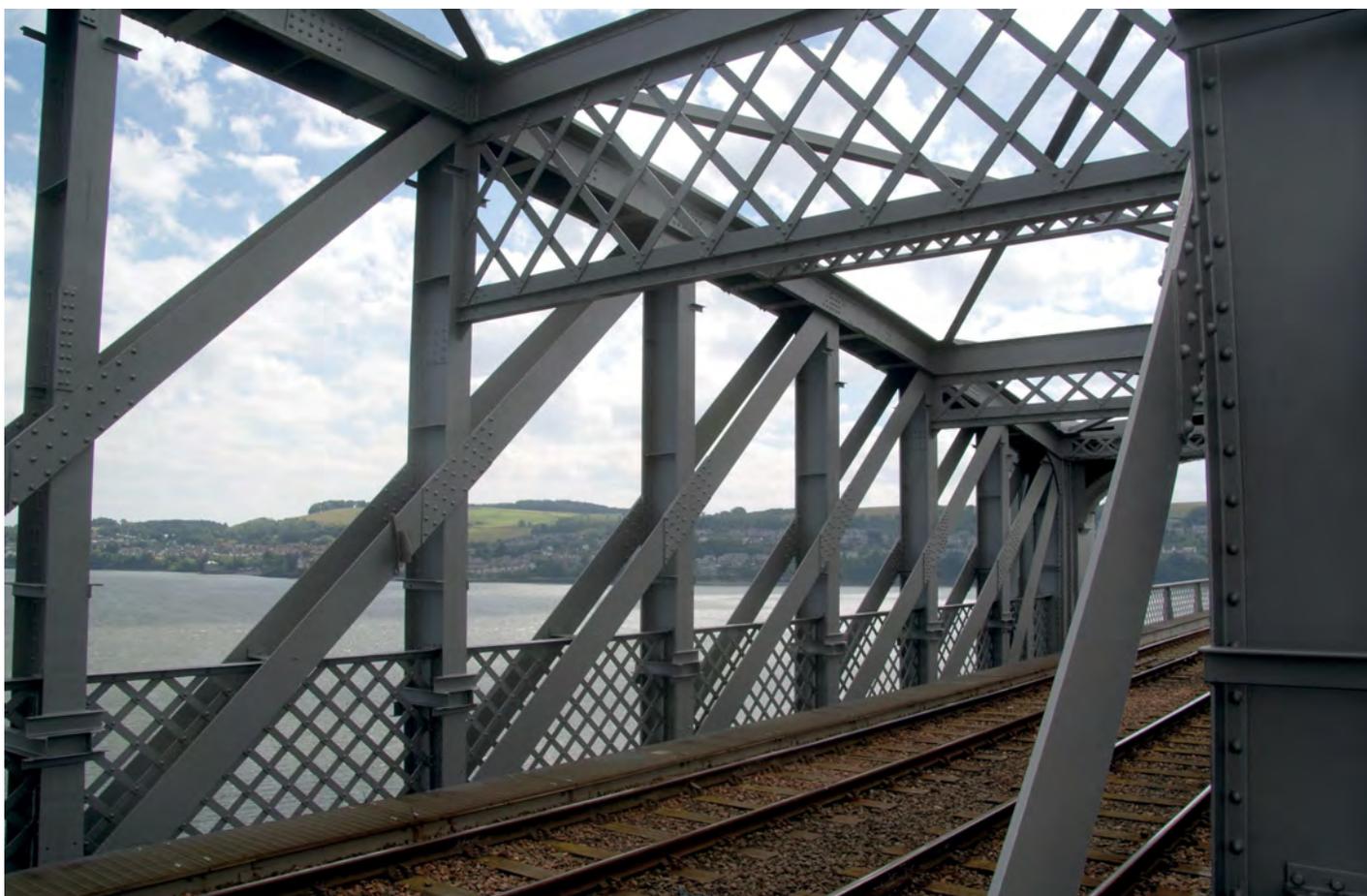
The winners of the 2018 National Railway Heritage Awards were announced in London in December. The Chairman of the Awards' Panel of Adjudicators, **ROBIN LELEUX**, highlights some of the winning entries



Modern material: the restoration of the overall roof at Carlisle used EFTE foil, which is not only much lighter than glass but is easier to install and maintain. Moreover it offers greater light transmission, as the play of shadows shows. The job was completed a month early, to budget and with no reportable accidents: no mean achievement. It won contractor Galliford Try the Bombardier Crossrail Award for Urban Heritage. Robin Leleux



Clock tower restored: 130-odd years of exposure to seaside air took their toll on the tower at Cleethorpes and the whole edifice needed refurbishment. The work involved won Network Rail and Colt Construction Ltd the Great Western Railway Craft Skills Award. Richard Tinker



Spanning the Tay: the 11-year refurbishment of the 110-year old Tay Bridge, over two miles in length, won Network Rail and its contractor, Taziker Industrial, the award for Best Entry 2018. This extensive project was undertaken without disruptive possessions, thanks to innovative tunnel scaffolding for the high spans: the completed work on one of these is illustrated. Edward McGloin



East Coast landmark: a small team of volunteers from Network Rail has restored the metal signs indicating 350 miles to London and 50 miles to Edinburgh, which were originally installed by the publicity-conscious London & North Eastern Railway. The team was rewarded with the Stagecoach Volunteers Award. Entrant



First class job: a new ale house using a design harking back to the late Victorian period has been created out of the former first class ladies waiting room on platform 2 at Durham station. The conversion brought Ouseburn Leisure Group Ltd the new Hendy & Pendle Commercial Restoration Award. Clive Baker



Useful appendage to a listed building: the public drinking fountain at St Pancras International station took the Supporters Award. Set in the Pancras Road outside wall under the clock tower, it was not a part of the initial extensive works at St Pancras, but more recently its condition had given cause for concern. The fountain's cleaning and restoration includes modern inlet and waste piping and a new bronze release button tap, thus allowing full public use. Theo Steel



EUROPE

SLOW PROGRESS WITH 1,520MM GAUGE LINE TO VIENNA

A decade ago politicians and railway managers from Slovakia, Russia and Ukraine met in eastern Slovakia to announce plans to construct a 1,520mm gauge line from eastern Slovakia to Vienna. A 1,520mm gauge line – Širokorozchodná trať (or broad gauge track, abbreviated in Slovak to ŠRT) – already reaches 87.1km into Slovakia from Užhorod in Ukraine. It was built in the early 1960s to provide raw materials for a major new steel works at Haniska, south west of Košice, which was being built at the same time. The ŠRT line opened in May 1966 and was electrified at 3000V DC in the early 1970s. Current traffic consists almost exclusively of iron ore from Ukraine for the steel works, which was privatised in the 1990s and is now owned by U.S. Steel.

During the decade since the first announcement the rail market between the former Soviet Union and the EU has been dramatically changed by growth in 'New Silk Road' rail freight between China and a wide range of EU destinations, including both Madrid and London; in terms of volume flows are greatest to German terminals. Much of the China to EU traffic is currently routed via Belarus after transiting Russia and then crosses into Poland at Terespol, where the extensive Małaszewicze marshalling yards are used for transshipment of containers (as well as more traditional transshipment of non-containerised cargo such as coal). The Małaszewicze yards and the connecting railway west towards Warsaw are congested, handling around 25 China to EU trains a week, although major investment is underway to improve matters and quadruple capacity by 2022.

Whilst the Chinese traffic growth might strengthen the business case for westward expansion of the 1,520mm network (removing the need to tranship containers at the Ukraine/Slovakia border), the political situation has made

the project less probable as relations between Ukraine and Russia have deteriorated badly. However, despite the political situation, the Russian government has continued to push the project and Ukrainian Railways continues to be supportive as a member of the consortium of national rail operators promoting the scheme.

In February 2018 Austrian Federal Railways (ÖBB) and Russian Railways (RZD) signed a new co-operation agreement and specifically announced they wanted to see progress with the project to extend the 1520mm gauge line from Košice in eastern Slovakia to a terminal in Parndorf on the eastern edge of Vienna. Whilst the project has support from the Slovak government, whether it really has Ukrainian support is unclear as cross-border traffic between Ukraine and Russia has since been largely closed by the Ukrainian authorities for national security reasons.

Initial feasibility studies have been completed and planning permission will be sought for some of the Slovak sections of the proposed route in the near future. The cost for the 400km-long single track electrified line from Košice to Parndorf is estimated at €6.5 billion, with over 40km of tunnels and a bridge over the river Danube being required.

EU OBJECTIONS

The European Commission has made plain it does not support the project, citing the fact that it will only benefit the railway operators promoting it and not create new infrastructure that enhances the existing (standard gauge) EU rail network. The EU has made it clear that any project which does not ensure free and equal access to the new infrastructure for all EU companies is not acceptable and against EU railway market policy. The EC has pointed to the technical solutions used elsewhere, for example in Spain, as options to overcome the gauge differences between Ukraine and Slovakia. Without EU support, funding from EU transport and development budgets is unlikely, which may make the project unviable.

ECONOMICALLY VIABLE?

ÖBB concedes the planned new terminal in Parndorf as a western terminal for the 'New Silk Road' will clearly benefit the Austrian economy (some estimates suggest it will create around 127,000 jobs and boost overall GDP by €16 billion). Up to 20 million tonnes of additional freight could be attracted to the terminal by 2030, much of which ÖBB expects to then be distributed around central Europe by rail.

Whether a new broad gauge line from Košice to Vienna would make economic sense depends on several factors, the biggest single one being the continued and growing operation of trains between China and the EU (and vice versa). Whilst these trains have grown in number rapidly in recent years, the long-term economic viability of rail over such distances is unclear. It is known that Chinese state subsidies support most (and possibly all) the rail freight services, but exactly what the subsidy is, how it works, and the long-term availability of such funds is unknown or unclear. In recent months reports have suggested the Chinese government wants to reduce subsidies for rail freight to the EU (perhaps sensibly as much of the money ends up with rail freight operators in Russia and the EU!); it has been reported that only entirely full trains will in future be eligible for financial support. In addition, other transport modes are responding to the rail-based competition and even road-based movement between China and the EU is being trialled, with road operators claiming this can be done 30-50% faster than by rail as there is no need to tranship freight at the Chinese and EU borders.

Whether it is really economically viable or desirable for the container transshipment activity to be moved from relatively low-cost eastern Slovakia, where employment opportunities are limited, to much higher cost Vienna, where the economy is already reliant on people who commute from neighbouring Slovakia and Hungary, is also unclear.

Ukrainian locos in the EU: this photo was taken just a couple of kilometres away from the border at Mat'ovce, Slovakia, where westbound trains are handed over to Slovak electric locos. Ukrainian Railways (UZ) twin electric loco No VL11M 068 leaves Mat'ovce on 5 July 2018 with eastbound empty iron ore wagons bound for Kryvyi Rih in the east of Ukraine. Keith Fender



First day in service: ČD loco No 362 060 leaves the Ejpvovice tunnels' western portal at Plzeň-Doubravka (running wrong line) with Rx774, the 07.03 Praha hlavní to Plzeň on 17 November 2018. This was the first day of full operation through the southern tunnel; the northern bore did not open until 7 December. The first passenger train through the tunnel, a diesel-hauled media special, ran the previous day. Shaun Wallace



CALAIS TO TURIN 'RAIL MOTORWAY' STARTS OPERATION

French Railways owned SNCF Logistics subsidiary VIA launched a fourth 'rail motorway' route on 6 November 2018, using new innovative swing platform wagons made by French intermodal wagon specialist Lohr, between the port of Calais in northern France and Orbassano in the suburbs of Turin in Italy. SNCF forecasts the new route, operated by Fret SNCF in France and Trenitalia freight subsidiary Mercitalia in Italy, will attract 31,000 semi-trailers annually. VIA has also operated a similar shorter 175km-long 'rail motorway' route from Aiton (near Chambéry) to Orbassano (again in conjunction with Mercitalia) since 2003; this runs up to four times daily and carried 35,500 semi-trailers in 2017.

The new route is the second from Calais, both of which primarily aim to serve cross-channel freight operators. The first (1,470km long) to Le Boulou (south of Perpignan, near the Spanish border) began in March 2016, but was then suspended due to migrant related security and safety concerns. It restarted in February 2017, since when it has run up to two train pairs a day, carrying 6,500 semi-trailers during 2017. The route from Calais to Le Boulou followed the successful 1,045km-long service from Bettembourg (south of Luxembourg city) to Le Boulou, which runs three times daily and carried 64,700 semi-trailers in 2017. SNCF says the 'rail motorway' service offers logistics firms a cost saving of a round 15% compared to moving the trailers by road, whilst reducing carbon emissions for the trailers' journey by around 80%.



CZECH REPUBLIC

MAJOR UPGRADE FOR PRAGUE TO PLZEŇ LINE

A new 14.1km double track 160km/h line has been built east of the Czech city of Plzeň to replace a slower, longer and more sinuous

route. The new route to the south of the existing line via Chrášť is 6.1km shorter than the old one, made possible by new twin bore tunnels west of Ejpvovice to Plzeň-Doubravka. The two tunnels, which cost CZK6.8 billion (£240 million), were built by Czech company Metrostav between 2015 and 2017 using a tunnel boring machine supplied by German firm Herrenknecht. At 4.15km (northern bore) and 4.17km (southern bore), they are now the longest tunnels in the Czech Republic, being more than double the length of the next longest.

The new line via the tunnels is the most significant in a series of upgrades in recent years, some also involving new alignments, which have reduced the distance by rail between Prague and Plzeň and increased operating speeds. This enabled journey times between Prague Smichov and Plzeň to be reduced by 12 minutes to 1hr 6min from 9 December 2018, when linespeeds in the new tunnel were increased to 160km/h (from 50km/h during the first few weeks of operation). The new tunnels have been built with slab track for future 200km/h operation.

The western section of the old line between Plzeň-Doubravka and Chrášť has been closed, with demolition beginning as soon as the new route was operational; this section will be converted into a cycle path. Services on the Chrášť to Radnice branch line now start at Ejpvovice on the new line and use the eastern section of the old main line as far as Chrášť.

The new tunnels impose some new operational constraints for Czech operators – the biggest being a restriction on trains not equipped with retention tank toilets (the minority of vehicles, but not unknown on the route); such toilets have to be locked out of use whilst in the tunnels. Czech infrastructure manager SŽDC has imposed a ban on steam traction using the new tunnels, which has been challenged by some of the country's many charter train operators; tests are planned later in 2019 to establish if the route can be used by

steam-hauled trains effectively coasting through the tunnel section. European Train Control System (ETCS) will be fitted on the line as part of plans to equip the entire Prague to Plzeň route from 2021.



GERMANY

FIRST MIREO EMU PRESENTED

Siemens has presented the first of its new Mireo family of regional EMUs designed for the German market. They will be used by operator DB Regio, which has won the contract to operate the fleet of 24 new Class 463 EMUs to provide regional services on the 'Rhine Valley' route between Offenburg and Basel Bad from June 2020. The state of Baden-Württemberg's ROSCO Landesanstalt Schienenfahrzeuge Baden-Württemberg (SFBW) will own the new trains.

Siemens launched the Mireo concept in 2016 after two years of development work; the order for the Rhine Valley contract was announced in January 2017. Siemens has built eight pre-series trains, which will be used for testing to gain EBA (German safety case) approval for use in service during 2019. Dynamic testing began with the first train at Siemens' Wildenrath test centre in November 2018.

The Mireo concept was designed to offer a train with reduced whole life costs, reducing energy, maintenance and track access charge operating costs (partly by weight reduction), but also initial construction costs relative to comparable similar trains from both Siemens and its competitors. Through the use of articulation and longer than industry standard aluminium body shells, the 70-metre Mireo is 20% lighter than the equivalent length Siemens Desiro ML train. This is due to the reduction in bogies (from six to four) plus use of the lighter inside frame bogie design, meaning the weight of traction equipment and bogies is 40% lighter in the Mireo than the equivalent Desiro ML. The weight reduction will result in energy and maintenance cost savings and ensures the train



New design: Siemens Mireo unit No 463 002 was presented to customers and the media at Wildenrath for the first time on 6 December 2018. Keith Fender



does not breach the 20-tonne maximum axle loading for operating on German secondary lines.

The Mireo can be built in lengths varying from two to seven cars and uses articulated vehicles and newly-designed SF7500 inside frame bogies (derived from the SF7000 used under the UK Class 700/707/717 Desiro City trains). The articulation trailer bogie features axles 2.3 metres apart; Siemens has yet to receive an order for Mireos longer than 70 metres but is developing a traction bogie version of the articulation bogie, with traction motors enabling trains longer than four cars to be supplied if required.

Siemens describe the Mireo interior concept as an 'empty tube', allowing customers to decide on layout and interior details. The Rhine Valley Mireo, equipped with on-board CCTV, passenger Wi-Fi and passenger counting technology, has

200 seats and four pairs of doors on each side of the train. A separate order, also from DB for Mireo units for the Rhine-Neckar S-Bahn network serving Mannheim, will have six pairs of doors on each side of the train as the fleet will be used for busy commuter services. The Rhine Valley trains are specially fitted with inter-vehicle fire resistant doors (incorporating roller shutters to be used in emergencies to seal off any fire) to meet the Technical Standard for Interoperability (TSI) for operating in long tunnels (the Offenburg to Basel route includes the 9.4km-long Katzenberg tunnel, which opened in 2012).

Siemens has confirmed design work has also been undertaken for an EMU version with batteries to enable up to 80km of operation away from catenary (known as Mireo Plus B); this will build on the experience gained from the

Desiro ML Cityjet Eco, launched at InnoTrans in September 2018 and due to be trialed in Austria in 2019. Siemens has previously announced the development of a hydrogen fuel cell Mireo prototype (Mireo Plus H) in conjunction with fuel cell manufacturer Ballard and the technical university in Aachen; this train will appear in 2022.



IRELAND

IE FACING GROWTH CHALLENGE

With passenger numbers on Iarnród Éireann (IE) services increasing at 8-10% per year and surpassing previous records, all available rolling stock is now being used as much as possible to combat overcrowding.

IE saw €1 billion invested in new trains between 2000 and 2008, but since then nothing has been added to the fleet thanks to the global financial crisis, which hit the Irish economy particularly hard.

The economic recovery in Ireland resulted in around 45.5 million rail journeys being made in 2017, up from around 37 million in 2012, with the 2018 increases expected to be a further 6%. Use of the new cross-Dublin service via the Phoenix Park tunnel is exceeding all expectations, and services on the route were expanded to operate all day and later into the evening from December 2018. IE did not foresee that the largest growth in recent years would be in inter-city passengers; IE now needs to have 85% of its operational fleet available in service daily but is constrained by the need to keep expenditure within the current annual overhaul and maintenance budget of €80 million.

In 2016 IE conducted a capacity review and considered options to increase fleet capacity.

Now in service: a pair of the new CAF SNG trains arrives at Leiden on 4 December 2018 with the 09.51 Den Haag CS to Haarlem service, with four-car set No 2711 leading three-car unit No 2315. Keith Fender



Proposals were made to reintroduce the stored 2700 Class DMUs (14x2-car), to order 41 new centre cars for the 22000 Class Intercity DMUs and to increase the DART (Dublin Area Rapid Transit) core frequency to six- or eight-car formations every 10 minutes throughout the day, to be achieved with new signalling and current rolling stock.

Initially the National Transport Authority (NTA) didn't support the request for the 41 additional 22000 Class vehicles, but a tender was put out to refurbish the 2700 Class DMUs and the core DART frequency was increased to every 10 minutes. Just one compliant bid was received to refurbish the 2700 Class units, and at a cost of €33 million for core work alone IÉ considers this too expensive and it is now unlikely to happen. The NTA did approve a resubmitted request for 41 22000 Class vehicles in 2018 and procurement from Rotem in South Korea is progressing, with delivery spread over two years starting from March 2021. Separately, the 22000 Class fleet is now undergoing a 'refresh' programme, which will provide new leather seat covers which are easier to maintain plus new wall laminate to replace the tired looking corduroy wall finish, as well as USB sockets and upgraded toilet lighting.

UK DMUs FOR IÉ?

As a potential replacement for the 2700 Class units, which will remain out of use, IÉ has confirmed to *Modern Railways* that it is also currently discussing leasing (and re-gauging to 1,600mm) UK Class 170 or 185 DMUs with UK ROSCOs, which anticipate having these vehicles available in the near future. The IÉ board has decided not to purchase any more 'pure diesel' trains, so in future new stock will be electric or hybrid (or battery);



Highly reliable: 2600 Class DMU No 2602 arrives at Cork Kent from Cobh on 30 August 2017. The semaphore signals in this picture are now history, having been replaced by colour lights in November 2018. Keith Fender

this decision may not preclude leasing existing trains if a suitable leasing deal can be agreed.

IÉ is fortunate that the reliability of its older DMUs is exceptional, with the 25-year-old 2600 Class achieving an incredible 350,000km between 'in service' failures, and '2800s' around 260,000km.

201 CLASS REBUILD NOT PROCEEDING

The IÉ locomotive fleet, all built by General Motors/EMD in the 1980s/1990s, comprises all 18 of the 40-year-old 071 Class, now used for freight and engineering trains. All these have recently been refurbished and repainted to give a further 15 years of service.

The 22 serviceable 201 Class locos, built in 1994/95, are used on the Dublin – Cork route with Mk 4 passenger coaches, and on the Dublin – Belfast 'Enterprise' services (with dedicated push-pull sets), although 12 are stored long-term. The 67 Mk 4 carriages are formed into eight sets (with three spare vehicles), and all sets are now required in service daily. To ease locomotive availability one loco (No 225), which had been stored with collision damage, will be returned to service in 2019.

As previously reported in *Modern Railways*, IÉ has been looking at re-engineering the 201 Class fleet to reduce fuel consumption and emissions and improve reliability, with a multi-engine arrangement proposed as an engineering solution. No compliant bids were received in response to tenders, so this work is now unlikely to proceed; however, IÉ's Inchicore Works will undertake some form of refurbishment work on the operational locos.

IÉ's current strategy is to retain loco-hauled operation for key services, with a new fleet of push-pull stock for the 'Enterprise' by 2025 and new bi-mode locomotives, with the aim of increasing Dublin to Belfast service frequencies to hourly or better. Future electrification to Cork and Limerick (from 2035) would also use loco-hauled push-pull operation.

GREATER DUBLIN STRATEGY

The €2.2 billion DART expansion to Maynooth, Hazelhatch and Drogheda is progressing, with three railway orders planned in 2019, to be submitted separately in case one gets held up! IÉ plans that electrification work will begin from 2024.

A new 480-vehicle DART EMU fleet (to be known as the 8530 Class) is being procured, with a contract to be awarded in early 2020 at an estimated cost of €600 million over a 10-year delivery schedule (which includes replacement of the LHB-built 8100 Class fleet from 2029 onwards). The first batch of 250 vehicles is to be battery/EMU or bi-mode DEMU for operation on non-electrified lines, with later deliveries to be EMU only. The first 8530 Class train is likely to be delivered in 2023. *Tim Casterton*



NETHERLANDS

CAF SPRINTER ENTERS SERVICE

Dutch Railways (NS) introduced the first of 118 new articulated Civity EMUs being built by CAF on 12 November 2018, with two trains initially in use working as a seven-car set on the Den Haag to Haarlem route. NS ordered the Sprinter Nieuwe Generatie (SNG) trains at a cost of approximately €500 million in 2014 for use on its 'core' network. They will operate Sprinter stopping and semi-fast trains, replacing older loco-hauled push-pull trains and Sprinter EMUs, both dating from the 1970s to 1990s.

CAF is building 68 three-car and 50 four-car SNG EMUs at its Spanish factories. The 60-metre-long three-car version has two powered bogies, whilst the 75-metre four-car version has three.

The SNG trains will be introduced in stages. From December 2018 they replaced older Sprinter EMUs on the remaining Den Haag to Haarlem diagrams, and from February they will take over Leiden to Hoorn (via Schiphol airport) services, followed in April by a range of services in the north of the Netherlands. Further batches of new trains will follow later in 2019, enabling a cascade of older trains. This is expected to result in the withdrawal of all Class 1700 loco-hauled push-pull DD-AR sets dating from the mid-1990s early in 2019 (those not converted to new intercity trains were previously withdrawn in mid-2013, only to be reinstated to cope with traffic growth from December 2014). When more of the new SNG trains are in service, withdrawals of earlier 1970s-built Sprinter EMUs are expected; the entire SNG fleet should be in service by March 2020. [inf](#)



FIRST CLASS 397 REACHES UK

THE FIRST of 12 Class 397 EMUs ordered by TransPennine Express from CAF has arrived in the UK.

After being transported by boat to Portbury dock, unit No 397003 was hauled to Crewe on 4 December. Designated by the operator as 'Nova 2' sets, the five-car '397s' will work services from Manchester and Liverpool to Glasgow and Edinburgh via the West Coast main line, replacing the current fleet of 10 Class 350/4 EMUs.

In December, TPE reported that the Class 397 EMU Nova 2 fleet was in 'a good position' on gauge clearance ready for test runs in the New Year, with through running from Manchester and Liverpool via the West Coast main line to Glasgow and Edinburgh already approved, albeit with a few issues to be resolved including a platform at Edinburgh.



Nova 2: TPE Class 397 Civity EMU No 397003 at Stafford while being towed by two Rail Operations Group Class 47s from Portbury Automotive Terminal to Crewe Carriage Sidings as working 5Q32 on 4 December 2018. Simon Poole

NOVA 3 AUTHORISATION

Meanwhile, TPE reports that its new Nova 3 trains (CAF-built Mk 5A coaches powered by Class 68 locomotives) have received authorisation from the Office of Rail and Road, meaning they are compliant with all relevant standards.

Described as a 'key milestone' towards passenger service, the trains now need to complete testing by CAF to ensure the Automatic Selective Door Operation (ASDO) system is working correctly and that it interfaces with the passenger information system. Test runs will

ensure that stopping positions on stations align with assessments made in advance and all on-board databases are correct so that automatic announcements are correct for each station stop.

Fault-free running will be done on all the Nova 3 sets by CAF and its test operator Freightliner, with a higher number of miles required for the first few sets, as any fleet-wide issues are resolved, before a lower number of miles will apply for the remaining sets.

Staff training is also underway, not only with drivers but other on-board crew members and staff from maintenance and servicing partners Alstom in Manchester and Siemens in York.

In terms of route clearance TPE has a statement of compatibility for passenger service for all the routes where it plans to run Nova 3s, with a key tunnel on the Calder Valley line that was causing issues for new and older trains having been resolved

by Network Rail in the last few weeks. That ensures an important diversionary route for TPE is clear.

The Nova 3s are due to be TPE's first new fleet to enter service, followed by the Nova 2s. The third fleet, the Class 802 Nova 1 bi-modes from Hitachi, is also due to follow by the end of 2019. TPE reports the Nova 1 sets are progressing well, with West Coast main line overhead line tests due to take place 'by the end of January'. *Tony Miles*

FIRST FLIRT ARRIVES IN EAST ANGLIA

THE FIRST of Greater Anglia's Stadler 'Flirt' units arrived in the UK on 14 November 2018, reaching Crown Point depot in Norwich the following day. The maiden unit was No 755405, followed on 29 November by No 755407.

GA has ordered 58 trains from Stadler: 20 Class 745 EMUs (10 for Norwich to London inter-city services and 10 for the Stansted Express) and 38 Class 755 BMUs for regional routes (24x4-car and 14x3-car). All GA's Flirts are being financed by Rock Rail.

Testing is already underway at various sites across Europe, and GA says forthcoming tests in the UK will cover the units' pantographs, passenger information system and



Anglian BMU: a passenger waiting for the 06.22 Norwich to Liverpool Street service briefly averts his gaze from his mobile phone as No 66002 hustles Stadler Flirt No 755405 through Colchester on 15 November, while en-route from the Channel Tunnel and HS1 to Crown Point. Antony Guppy

automatic selective door opening. Driver training will then take place ahead of service

introduction, planned to begin in mid-2019. GA has also ordered 111 Class 720 Aventura EMUs

from Bombardier, financed by Angel Trains and built at the company's factory in Derby.



New DMU: No 195001 on the 5Z07 15.36 Warrington Bank Quay to Edge Hill depot run passing Winwick Junction on 21 September 2018. Jamie Squibbs

Temporary Metro depot approved

NORTH EAST Transport Authority Nexus has received approval from North Tyneside Council to build a temporary train maintenance depot for the Tyne & Wear Metro at Howdon, North Tyneside.

The depot, built on a former landfill site, will be used to maintain vehicles from the current Metro fleet while the main depot at South Gosforth is rebuilt. Up to 10 Metro trains will be stabled at the site for overnight maintenance work.

The temporary depot will also be the access point for delivery of new trains in a phased programme. Nexus has shortlisted five bidders to supply a new fleet, with the first train planned to arrive in late 2021.

Three more '195s' for Northern

NORTHERN HAS ordered three additional three-car Class 195 DMUs from manufacturer CAF.

The additional vehicles take the size of the fleet CAF will supply

to 290 vehicles. The Spanish manufacturer is building 43 Class 331 EMUs and 58 Class 195 DMUs for the operator, financed by Eversholt Rail. The three

extra units have been ordered following a decision to use '195s' on services to Windermere, the branch having originally been planned to be electrified.

SIEMENS BOGIE SERVICE CENTRE IN LINCOLN

SIEMENS HAS opened a new £8 million bogie service centre in Lincoln. The site will initially focus on servicing the bogies of the

manufacturer's Class 374 e320 high-speed trains for Eurostar, before moving on to Desiro City bogies. The company says the event marks another

milestone in the expansion of its UK rail footprint and is a sign of the company's commitment to greater localisation following the announcement of plans

to build a new train factory in Goole, East Yorkshire. The bogie service centre is set to create up to 40 skilled jobs by the end of 2019.

LIGHT RAIL

A review of the systems past and present in Britain and Ireland

Docklands Light Railway, Tyne & Wear Metro, South Yorkshire Supertram, Nottingham Express Transit, Manchester Metrolink, London Tramlink (Croydon), Midland Metro, Edinburgh Trams, Glasgow Subway, Blackpool Tramway, Dublin DART, DART Plus, Jersey, Herts Trams, Bedford Park Railway, Merry Hill Monorail, Vale's Electric Railway, Great Ouse Tramway, Swansea & Mumbles Railway, Gt. Central & Ipswich Tramway, Embsay & Alton Links, Airport Links and Mag-Lin, Isle of Man Railways.

A REVIEW OF THE SYSTEMS PAST AND PRESENT IN BRITAIN AND IRELAND

The Light Rail systems in Great Britain and Ireland are often the forgotten public transport systems, but have played a major part in the movement of people for both work and leisure for many years - ranging from the pioneering days of electric propulsion on the Volk's Electric Railway in Brighton to modern specialist tram systems in some of the major towns and cities.

This 132-page special, produced by the team behind Modern Locomotives Illustrated, covers some of the more unusual railway systems.

Feature subjects include:

- Docklands Light Railway
- Edinburgh Trams
- Manchester Metrolink
- Swansea & Mumbles Railway
- London Tramlink (Croydon)
- Isle of Man Railways
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MORE CAF CARRIAGES FOR TRANSLINK

CAF HAS won a £50 million contract to supply 21 new intermediate carriages for Northern Irish operator Translink.

The additional carriages have been procured under the option contained in the original 2009 Class 4000 train contract and will be used to strengthen the current three-car sets. The Northern Irish rail network is now busier than at any time since the formation of Northern Ireland Railways 50 years ago, with 130% growth in the last 12 years and 15 million passengers carried in the last year, resulting in many services being very crowded, particularly at peak times. The extra carriages will provide around 1,400 additional seats.

Delivery is scheduled to commence in 2021, with all the carriages due to be in service by autumn 2022 following commissioning. Funding was provided by the Department for Infrastructure.

To deal with the unprecedented growth in rail use there is a proposal to increase capacity at the centrally located Belfast Great



Intermediate carriages planned: NIR Translink Class 4000 set No 4011 arrives at Sydenham (for Belfast City Airport) on the 09.45 Portadown to Bangor service on 27 April 2016. Tony Miles

Victoria Street station, whilst a new larger station is being provided at Londonderry by reopening

the former Belfast & Northern Counties Railway Waterside station building. Rebuilding at Portrush

station is nearing completion in time for the 2019 Open golf championship. *Tim Casterton*

WSP FOR GREATER ANGLIA '153s'

WHEEL SLIDE Protection equipment has been fitted to Greater Anglia's fleet of five Class 153 DMUs. The work follows the successful installation of WSP on the operator's Class 156 DMUs last year; the project won

the Engineering and Safety prize at the *Modern Railways* Railway Industry Innovation Awards in 2017. The company says the system will help reduce cancellations on rural routes due to wheel flats and means all its

fleets now have WSP equipment. The project has been carried out in partnership with Porterbrook, which owns both GA's '153s' and '156s', along with SNC-Lavalin, Knorr-Bremse RailServices and Loram UK.



Fitted with WSP: unit No 153322 leaves Norwich for Lowestoft on 27 June 2013. Tony Miles

EWR engages on rolling stock

THE EAST West Railway Company held a market engagement event in London on 11 December as part of an exercise to help shape its rolling stock strategy. The event included discussion about EWR's rolling stock requirements. The company confirmed in a Prior Information Notice (PIN) that no direct business would be awarded as a result of the exercise.

'777' BOGIES APPROVED

STADLER HAS received authorisation for the bogies for the new fleet of trains it is building for the Merseyrail network. A total of 267 bogies will be made for the 52x4-car Class 777 units, which are due to enter service in early 2020. Stadler says all bogies are scheduled to be attached to bodysells by August 2020.

Final assembly of the fleet started in October 2018 in Altenrhein, Switzerland, and from April 2019 will also take place in parallel at Stadler's plant at Siedlce in Poland. Stadler says the first train will be ready for testing by the spring.

Lightweight, powerful and underestimated

NEW!

FROM WESTERN REGION TO PRIVATISATION

HYDRAULIC LEGENDS

Lightweight, powerful and underestimated



PLUS Classes 14, 22, 41, 52, DMUs and the preserved survivors



It's hard to believe that it is 41 years since the final Class 52 Westerns were withdrawn from service, a class that was responsible for an upturn in the fortunes of diesel preservation that has since saved hundreds of locos from the scrapman.

In this 100-page special magazine from the team behind *Railways Illustrated* magazine we chart the inspiration, development and careers of some of British Railways' most enigmatic locomotives and investigate the fascinating subject of industrial hydraulics.

Features include:

D800 Warships

The first of the diesel hydraulic Type 4s to be produced were the Warships, built by BR at Swindon and also North British in Glasgow. Weighing just 78 tons, they were a powerful lightweight loco with an impressive performance.

The Western

The ultimate incarnation of the diesel hydraulic concept in the UK was the Class 52 D1000 Western. The charismatic design was immensely popular, powerful and highly capable.

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3M WRAPS FIRST BRANDED TFW TRAINS

TECHNOLOGY COMPANY 3M has supplied non-PVC Envision Print Wrap LX480mC for the first branded Transport for Wales trains.

3M supported Aura Graphics and the main contractor for the project in presenting the environmental benefits of the sustainability-focused film.

The project involved stripping existing signage, full preparation of the underlying surfaces, corrosion treatment and repainting, before applying the digitally-printed wrap and finally dual-language labelling to the cars' exterior. To maintain the best possible appearance

throughout the lifetime, additional 3M Scotchgard 8993 Glossy Overlaminant and 3M Anti-Graffiti Wrap Gloss Overlaminant 8588G provide extra protection for the printed film.

The Aura Graphics team applied the printed films to two-car and three-car Class 175

DMUs along with two Class 143 Pacer units, working at Alstom's Chester depot. The work was co-ordinated with the normal maintenance procedures for the trains, organised as continuous day and night-time shifts over a single weekend for each unit to minimise disruption.



Welsh wrap: TFW Class 175 in 3M vinyl.

Porterbrook signs up to UKRRIN

PORTERBROOK HAS joined the UK Railway Research and Innovation Network (UKRRIN).

Launched in February 2018, UKRRIN is a partnership between the rail industry and nine leading UK universities delivering four centres of excellence. Porterbrook's membership, announced at UKRRIN's annual conference, builds on the company's existing links with the

University of Birmingham, with whom Porterbrook is partnering to develop a prototype hydrogen-powered train through the HydroFlex project.

The annual conference was a first for UKRRIN, bringing together over 240 academics and industry leaders to explore how business and the academic sectors can work together to fast-track innovative products to the market.

Arcadis wins OOC contract

ARCADIS HAS won a contract from Network Rail for design services in relation to the new Old Oak Common station in west London.

The contract, valued at £6.8 million, provides design services for the proposed station, with design integration carried out by HS2 Ltd's design consultant. Services covered include modification of the track layout on the Great Western

main line to support the new station, new overhead lines and modification to existing overhead lines, modifications to traction power supply, signalling power supply, telecommunications, cable systems and the conducting of surveys. Also included is structural assessment of two overbridges and two underbridges on the Great Western main line.

TfL BIDDING FOR BUENOS AIRES SUBWAY

TRANSPORT FOR London (TfL) has confirmed to local media it is bidding to run the Buenos Aires 'Subte' (subway) metro system. TfL is part of a consortium with Keolis and local conglomerate Eurnekian Group (Corporación América, Argentina), which runs airports worldwide and has a range of businesses in Argentina including toll motorway concessions. Competing bids are being prepared by Paris metro operator RATP and Argentine company Gruppo Roggio (majority owner of current concessionaire Metrovías) working with German rail operator Deutsche Bahn. The original timescale for the

'Subte' tender foresaw a contract being awarded in October with operation starting in January 2019, but this timescale has slipped.

The Buenos Aires 'Subte' dates back to 1913; the first line was initially built with funds from European investors utilising trains and trams built in Belgium plus some from United Electric Car in Preston. The system has grown to six lines and has been expanded in recent years with a major city centre extension to the Retiro rail and bus stations currently under construction. Trains operated comprise a mixture of new Alstom and CRRC-built EMUs plus older



TfL target: Alstom-built metro train in Buenos Aires. Dario Saidman

second-hand trains bought from Madrid and Tokyo. Nationalised in 1939, the system has been

operated on a concession basis by private company Metrovías since 1994. *Keith Fender*

Real-time adhesion information

TECHNOLOGY CONSULTANCY

3Squared has developed an Adhesion Digital Solution (ADS) in conjunction with the Met Office and Colas Rail.

ADS will focus on providing drivers with detailed information on the likely adhesion conditions they will experience along a route in real time, allowing them to regulate the train accordingly. Data from the Met Office Low Adhesion model is combined with 'crowd sourced' driver-reported data to give operators up-to-the-minute route relevant adhesion forecasts.

Funding for the project came through RSSB's TOC 17 competition to identify innovative projects that will improve operational performance. ADS will complement existing solutions for tackling low adhesion, including double variable rate sanders and railhead treatment programmes.



Autumn warning: 3Squared screenshot.

The Met Office provides government, the military and road, rail and aviation markets with information about weather and climate and offers the project high spatial and temporal resolution forecasts, training and low adhesion expertise.

Colas Rail will provide locations and key operations personnel across Scotland for trials of the system.

VIRGIN TARGETS THE US

THE LONDON-BASED Virgin group announced in mid-November that it would become an investor in American start-up inter-city passenger operator Brightline, which started operation in Florida in January 2018. The company and its trains will be rebranded as Virgin Trains USA.

On 16 November Virgin Trains USA announced an IPO – an imminent Nasdaq stock market listing with the aim of raising \$100 million to expand the business – with shares to be listed under the identifier 'VTUS'. The draft stock market listing also shows the new Virgin Trains USA company (formerly Brightline) has yet to make any profits; it recorded losses of \$87 million for the first nine months of 2018 and has debts of \$605 million, with plans to invest over \$4 billion in new infrastructure in Florida (West Palm Beach – Tampa via Orlando).

Brightline operates its Florida services using new 125mph Siemens-built Charger diesel

locos and passenger coaches; these will be rebranded as Virgin Trains in 2019 under a licensing agreement that lasts until 2038. Brightline was originally created by freight rail company Florida East Coast in 2012 but retained by Fortress Investments when it sold the rest of Florida East Coast to Mexican investors in June 2017.

Virgin Trains USA is also planning passenger services between Victorville (Los Angeles) and Las Vegas, again with new infrastructure, Brightline having acquired the XpressWest project promoter for this scheme in September 2018. The planned new Los Angeles (Victorville) to Las Vegas line is estimated at around \$4 billion. The draft stock market listing also mentions putative plans to take over some routes currently operated by Amtrak (assuming these are tendered by the US Government in the future). *Keith Fender*



Set to be rebranded as Virgin: the Brightline operation in Florida.

RIA rail fellowships awards

MPs WHO took part in the Railway Industry Association's inaugural Rail Fellowship Programme received awards at a ceremony held at RIA's Parliamentary Reception on 27 November 2018.

The programme aims to showcase the UK rail industry to political decision-makers and influencers by placing them at state-of-the-art rail sites around the UK. Through the Fellowship, MPs were encouraged to learn about the innovation, skills and exports potential of the UK rail sector, and to experience a hands-on day seeing what skilled

professionals in the industry do to keep the rail network running – from changing brake pads to seeing liquid steel being turned into rails.

MPs who took part in the programme and received awards included Wirral South MP Alison McGovern; Plymouth, Sutton & Devonport MP Luke Pollard; Nottingham South MP Lilian Greenwood; Witham MP Priti Patel; Cleethorpes MP Martin Vickers; and Wimbledon MP Stephen Hammond. All received trophies made of rail slices produced by British Steel with metal used on tracks across the UK.

DB's wheelset milestone

DEUTSCHE BAHN'S testing and infrastructure engineering contractor DB Systemtechnik presented its 500th instrumented wheelset in Minden in late November. It says the latest model of an instrumented wheelset is the result of over 40 years of systematic technology development.

The innovative technology allows any wheelsets to be fitted with measuring instruments without any

design modifications. In the past the required instrumented wheelsets had to be modified with a hole to test rail vehicles or railway lines. This was needed to route the signal lines from the sensor to the measurement amplifier. With the latest model this hole can be avoided thanks to the new contactless signal transmission, saving time and money when converting a standard wheelset into an instrumented wheelset.

FORTHCOMING EVENTS

The Direct Rail Services Class 68 and Class 88 Locomotives, lecture, 8 January, Manchester

Details at <http://nearyou.imeche.org/eventdetail?id=15567>

High Speed Rail Project in California, lecture, 9 January, Reading

Details at <http://nearyou.imeche.org/eventdetail?id=15408>

Derby station re-modelling, technical visit, 9 January, Derby

Details at <http://nearyou.imeche.org/eventdetail?id=15586>

TransPennine Express new locomotives, lecture, 10 January, Leeds

Details at <http://nearyou.imeche.org/eventdetail?id=15995>

A Career in Control, lecture, 17 January, Milton Keynes

Details at <http://nearyou.imeche.org/eventdetail?id=15874>

New generation of Deep Tube trains, lecture, 21 January, London

Details at <http://nearyou.imeche.org/eventdetail?id=15619>

London's Newest Trains for Crossrail, lecture, 23 January, Maidstone

Details at <https://www.theiet.org/events/local/257216.cfm>

RAIB – Investigating the Sandilands Tram

Accident, lecture, 24 January, Preston

Details at <http://nearyou.imeche.org/eventdetail?id=15938>

Golden Whistles awards at the Modern Railways Fourth Friday Club, luncheon, 25 January, London

After-lunch speaker: Dyan Crowther, CEO, HS1 Ltd

Details at www.4thfriday.co.uk

Transport Ticketing Global, conference and exhibition, 29-30 January, London

Details at <https://www.transport-ticketing.com>

Digital Railways, lecture, 12 February, Bath

Details at <https://www.theiet.org/events/local/257123.cfm>

Re-engineering of Class 442 trains for Portsmouth line services, lecture, 13 February, Portsmouth

Details at <http://nearyou.imeche.org/eventdetail?id=15409>

Digital Railway – ETCS fitment, lecture, 18 February, Swindon

Details at <http://nearyou.imeche.org/eventdetail?id=15405>

Official publication:
Modern Railways

DRIVER APPRENTICESHIP STANDARD LAUNCHED

AIM IS TO DISCOURAGE POACHING



Having a go: Rail Minister Andrew Jones tries his hand at train driving on the EMT simulator. Tony Miles

As the rail industry gears up to train over 1,000 drivers over the next year, Rail Minister Andrew Jones joined trainee drivers at East Midlands Trains' academy in Derby on 28 November 2018 to mark the launch of the new Level 3 train driver apprenticeship programme. Being pioneered by EMT, the programme forms part of a move to professionalise the train driver role with a new common, industry-wide approach to Part A as part of the Level 3 Apprenticeship Standard. The new Apprenticeship Standard will allow successful trainees to secure a formal certification and has been developed in partnership with the drivers' union ASLEF; the Rail Safety and Standards Board; Rail Delivery Group; the Institution of Railway Operators and the National Skills Academy for Rail. The Apprenticeship Standard will be applicable to all train operators and freight operators in England.

The Minister joined nine new trainee drivers who are the first to test this new common approach where they will complete Part A before moving to Part B, which involves the specific rules and rolling stock used by a particular operator, which in this case is EMT.

The new Level 3 Apprenticeship Standard replaces the Level 2 Rail Services framework, which no longer meets the level of competence required for a train driver in today's world, where the sector has moved



Celebration: Rail Minister Andrew Jones prepares to cut a cake to mark the launch of Level 3. Tony Miles

forward rapidly with developments in security, digital technology and new traction and rolling stock.

At the launch it was explained that 'The train driver apprentices will be able to drive a train safely and competently in accordance with rail rules, regulations and procedures. They will also be taught to memorise different routes and how to react to changing conditions, driving the train safely to its destination within the required timetable. They will also be taught how to work in a range of railway environments, such as depots, sidings or maintenance sheds; and be able to deal with the moving of passengers, goods, and empty coaches and how to give clear and accurate verbal communications and understand how to make instant complex autonomous decisions during incidents and emergency situations. They will learn how to drive

a train in a way that will optimise fuel economy, reduce maintenance costs and minimise financial penalties.'

For the Minister this is seen as an important step towards a more joined-up approach by the industry, where fragmentation has seen different approaches to training adopted by separate companies and a situation where some operators do no training at all, relying solely on recruiting drivers trained at the expense of other operators.

Talking to *Modern Railways* at the event, the Minister stated 'We have got all the train operating companies signed up to this; this is a change from the industry. It has come together to bring more people into the industry, to give them the skills that they need, it's enhancing the professionalism of the drivers.'

Asked to clarify whether this should mean an end to the mindset

which sees 'poaching' from other operators as acceptable, he added 'Yes, that's really reflected in the fact that this programme has two elements to it. Part A is common across the industry and then Part B is tailored to the individual operating company for their specific routes and their rolling stock. This suggests that everybody has come together.'

MORE WOMEN SOUGHT

For EMT, these trainees are the first of between 30 and 40 new drivers that will be required in the next year. The company has recently carried out a major recruitment drive to encourage more female drivers to join the industry, with initiatives such as targeted advertising and anonymous candidate screening helping to double the number of female driver applicants. This approach was praised by the Minister, who commented 'Only 5% of train drivers are women – so I'm very keen to address this in particular. . . We want to cast our net as broadly as possible to bring talent into the industry, and that talent includes every section of our community.'

For EMT this needs to be supplemented by a new approach to driver recruitment where the tendency for applications to come from 'second jobbers', people looking for a career change, should be replaced. The company explained: 'Now we want to go into colleges and schools and start to attract young people into the career, maybe as an alternative to university. We're working with the industry and regulators to overcome age issues; currently you have to be 21 to hold a train driving licence. We're trying to work up a safety case around a rigorous assessment and training processes to ask why it isn't 18. Then maybe we could attract a much more diverse set of people who might be interested in train driving, including women and the ethnic communities.'

The initiative has been welcomed by the drivers' union ASLEF, where General Secretary Mick Whelan commented: 'ASLEF welcomes the development of the Level 3 apprenticeship standard. . . We look forward to all train and freight operators making this standard available to new employees training to be train drivers, and involving our reps in the process.'  Tony Miles

Blanchflower for EWR CEO

THE EAST West Railway Company has appointed Simon Blanchflower as its first CEO. Mr Blanchflower was most recently Network Rail's Programme Director for the Thameslink project, prior to which he worked on Crossrail and the Heathrow Terminal 5 project. At EWR he will lead the company through its next phase of development as it works to deliver a new railway line

between Oxford and Cambridge. The arm's-length body of the Department for Transport was set up by Secretary of State for Transport Chris Grayling in 2017 and will assume full client duties for the project in 2019. The company says it will launch a public consultation on route options for the railway between Bedford and Cambridge in the early part of the year.

Thomas takes over at Wessex

ANDY THOMAS has taken over from Becky Lumlock as Network Rail's Wessex Route Managing Director.

Mr Thomas was previously Route MD for Wales, before moving in 2018 to take up a new role as Managing Director, Strategic Operations. He joined NR in August 2016, and previously worked at



Wessex Route MD:
Andy Thomas.
Courtesy Network Rail

Keolis Group, where he was managing director for Hyderabad Mass Transit Metro in India.

Ms Lumlock also joined NR in 2016 from Shell/BG, where she was managing director of Dragon LNG, one of the major gas import terminals in the UK. She replaced John Halsall, who moved to head up South East Route.

BEARFIELD TO JOIN ROCK RAIL

ROCK RAIL has appointed George Bearfield as its Health & Safety Director covering its asset management activities and other business operations.

Mr Bearfield joins Rock on 2 January from RSSB and will have responsibility for all aspects of the company's Safety Management Systems, including safety assurance responsibilities for all fleets under its management. At RSSB he was Director of System Safety and Health, prior to which he worked as a consultant on safety assurance of complex safety critical systems, following previous roles in the railway supply sector designing rail systems.



Joining Rock Rail: George Bearfield.

JOSEPH TO LEAD UTG STUDY

FORMER CAMPAIGN for Better Transport Chief Executive Stephen Joseph is to investigate the benefits that flow from devolved authorities' involvement in railway stations for a new report for the Urban Transport Group.

The report will form part of UTG's evidence base on the benefits of rail devolution, including its recent reports 'Rail devolution works' and 'Rail cities UK'. It will also be used as part of the organisation's input into the Government's Rail Review (being

carried out by Keith Williams), which, amongst other issues, will evaluate the potential for further devolution of responsibilities over the rail network.

Mr Joseph will look at the record so far of the benefits of devolved authorities' involvement in rail stations – from large regeneration projects such as the recently opened new station at Dundee, through to the transformation of existing stations into wider hubs for transport and community use. The findings are due to be published in early 2019.

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Morgan ousted as Chair

Sir Terry Morgan's short-lived tenure as chairman at HS2 Ltd leaves a vacancy that the Government has quickly filled by appointing Allan Cooke as the new chair.

The Government announced Sir Terry's HS2 appointment this summer shortly before the extent of Crossrail's troubles became clear. In July, Transport Secretary Chris Grayling said: 'Sir Terry's appointment as Chair of HS2 ensures that we will continue to see world-class leadership in an exciting period for one of Europe's most significant infrastructure projects.'

Five months later and Sir Terry Morgan's successor is a chartered engineer who has more than 40 years' international experience in the infrastructure, automotive, aerospace and defence industries. In the rail industry he has been chair of consultant and rail services firm Atkins, a role he started in February 2010 and left in 2017 when Canadian engineering and construction conglomerate SNC-Lavalin bought Atkins.

The DfT says HS2 Ltd continues to work with its supply chain partners ahead of main construction work on Phase One and is working to deliver services from London to Birmingham from 2026 in line with the target delivery date.

CURZON STREET PROCUREMENT STARTS

HS2 Ltd has begun the search for a construction team to build the new Curzon Street station in Birmingham city centre.

The company hopes to shortlist between four and five bidders for a design and build contract with an estimated value of £435 million. The vision for the station includes an arched roof inspired by the city's transport and industrial heritage. The latest images of the proposed designs, by WSP working with Grimshaw Architects and Glenn Howells, were unveiled recently as part of a series of regional community engagement events (p18, November 2018 issue).

HS2's early works contractors are on site, preparing the ground for the start of construction. Main works bidders are expected to be shortlisted in spring 2019 with contracts awarded in 2020. Construction contracts for Birmingham Interchange are due to be put out to tender next year.

Separate contractors, appointed last year, will build the tunnels and viaducts that will carry the new trains into the centre of Birmingham and to the Interchange station near Solihull, the NEC and Birmingham Airport. HS2 Ltd expects to

award construction contracts for the stations at Euston and Old Oak Common imminently.

Work is currently underway to restore and reopen the original Curzon Street Station building, the last remaining part of the original 1838 station, as a visitor and heritage centre.

ARCHAEOLOGY DELAYS HAUL ROAD

In Buckinghamshire preparations are underway to begin building a new access road as soon as a Christmas works 'embargo' ends.

Construction of the temporary haul road – which will link the

existing A413 Great Missenden roundabout to the site of the north portal of the 15.8km Chiltern Tunnel – had been due to start in 2018 (p93, September 2018 issue). However, work has been delayed because of additional archaeological works, with the embargo now pushing a start date into 2019. Preliminary works, such as relocation of power lines and creation of a welfare area, were being undertaken in December to get the project as advanced as possible.

HS2's Area Central enabling works contractor Fusion is responsible for building the haul road.  Dan Harvey

320KM/H MAX?

Addressing the All Party Parliamentary Group on HS2 on 20 November, HS2 Chief Executive Mark Thurston hinted that top speed on HS2 could be reduced from 360km/h to 320km/h and train frequency cut to keep Phase One of the project within the agreed cost ceiling of just over £27 billion. Mr Thurston said that unexpectedly boggy conditions on parts of the route would necessitate more piling and bringing in more fill material than originally anticipated, which would push costs up. Cutting the top speed to 320km/h – a common top speed

on other high-speed systems – would save money as costs go up exponentially at very high speeds. Slower speeds through tunnels in particular 'might be prudent', said Mr Thurston.

The CEO added that a frequency cut below the 18 trains per hour currently planned would also save money. One way of reducing costs would be to cut the amount of slab track, but Mr Thurston said he was keen to retain this between London and Birmingham, limiting cheaper ballasted track to stretches north of Birmingham. *James Abbott*

Ghost of Birkenhead expresses: the diesels fire up on No 165038 at Paddington on 7 December 2018, the final service out of the London terminus to the Chiltern route before HS2 works at Old Oak Common sever the former Great Western direct route to the north. The two-car unit left with 192 passengers on the final day; in the new timetable the 'Parliamentary' service runs from West Ealing. I. C. Scotchman



A DIGEST OF THE MAIN CHANGES ON NETWORK RAIL, LONDON UNDERGROUND AND NORTHERN IRELAND RAILWAYS INFRASTRUCTURE DURING OCTOBER 2018; COMPILED BY MARTYN BRAILSFORD OF THE BRANCH LINE SOCIETY (WWW.BRANCHLINE.UK)

A lot happened in October, with amongst other things a significant number of level crossing upgrades, the usual batch of platform extension works for new passenger stock introduction, three junctions being remodelled, electrification progress on the Western, in the North West and across Cannock Chase, and the re-control of the Calder Valley line in West Yorkshire to York ROC.

ANGLIA

Reedham Junction (2:8)

In connection with the NYL (Norwich/Yarmouth/Lowestoft) re-signalling project all existing points controlled by Reedham Junction Signal Box (12M 28ch) have been removed, as has the Up Siding. Between Reedham station and 12M 49ch (the new location for the actual junction) the former Up & Down Yarmouth single line has become the Down (Lowestoft) line and the former Down line between these points has been abolished. A new point has been installed here which connects to the Yarmouth single line, this has been secured in the reverse position (towards Lowestoft) at this stage. A crossover has also been installed between the Up and (new) Down lines just prior to 12M 49ch, which has been clipped and locked in the normal position, and will eventually enable Up trains from the Yarmouth line to reach the Up line. The Reedham Junction to Yarmouth line is currently out of use.

EAST MIDLANDS

Market Harborough (4:3A)

Both the facing and trailing crossovers between the running lines at Market Harborough Junction (82M 47ch) have been plain lined along with the trailing points on the Up Main leading from Market Harborough Siding. In consequence the siding has been abolished.

Ambergate Junction (4:5)

As part of the works for re-modelling Ambergate Junction, the new trailing crossover between the Up and Down Mains, located at 137M 40ch, has been installed. The crossover will be clipped and padlocked out of use until final commissioning at a later date.

Between Syston East Junction and Melton Mowbray (4:3B)

The Automatic Half Barrier (AHBC) level crossing at Asfordby (111M 40ch) has been renamed to Asfordby (Kirby Bellars).

LONDON NORTH EASTERN

Between Boston and Skegness (2:26D)

Four Automatic Open Crossings (AOCL) have been upgraded to include telephones to their controlling signal boxes. The four crossings are Lymm Bank (1M 48ch) and Brewster Lane (3M 06ch), controlled by Thorpe Culvert signal box, Matt Pitts (3M 62ch), controlled by Wainfleet signal box, and Seacroft (8M 02ch), controlled by Skegness signal box. In addition, the existing 'Another Train Coming' signs at each location have been recovered. *Newark Northgate Area (2:16C)* Whitehouse Lane footpath crossing at 120M 40ch has been closed and fenced off pending recovery of all equipment.

Between Penistone and Denby Dale (2:34C)

The User Worked Crossing (UWC) at Carr House Farm (11M 72ch) has been upgraded with miniature Red/Green lights to become an Overlay Miniature Stop Light (OMSL) crossing. Telephones are provided to the controlling signal box at Barnsley.

Between Thorne South and Crowle (2:32B)

The Automatic Half Barrier crossings (AHBC) at Thorne No 1 (10M 12ch) and Thorne No 2 (10M 35ch) have been upgraded to cope with wrong direction movements and therefore been reclassified as AHBC-X.

Between Nafferton and Bridlington (2:39B)

The User Worked Crossing (UWC) at Thornholme (26M 72ch) has been upgraded with miniature Red/Green lights to become an Overlay Miniature Stop Light (OMSL) crossing which also works with wrong direction movements. Telephones are provided to the controlling signal box at Driffild. *Micklefield (2:36B)*

Platform 1, on the Down Hull, has been reduced in length at the Leeds end of the platform by 12 metres (13 yards), the new operational length now being 78 metres (85 yards).

Bradford Interchange to Hebden Bridge and Bramley (2:37A/41)

The lines formerly controlled by Hebden Bridge (23M 55ch), Milner Royd Junction (29M 55ch), Halifax (32M 28ch) and Mill Lane Junction (39M 79ch) signal boxes, along with the release of Bradford A' Ground Frame, are now all controlled by York ROC (Rail Operating Centre), Halifax



Chase line on the cusp of change: unit No 170634 enters Walsall on a New Street to Rugeley Trent Valley working on 8 November 2018. John Whitehouse

workstation. All the signal boxes named have been abolished. In addition, a small length of line around Bramley (3M 15ch) controlled by York Integrated Electronic Control Centre (IECC) panel has also been transferred. Halifax workstation fringes with Preston PSB at roughly 22M 43ch (Route Boundary, beyond Hebden Bridge), with York ROC, Huddersfield workstation at 30M 20ch (Milner Royd Junction – Greetland Junction) and 0M 04ch (Dryclough Junction – Greetland Junction) and York IECC at 2M 04ch. All the signals in the area have one of the following prefixes: HG – Hall Royd Junction to Greetland Junction, DH – Dryclough Junction to Heaton Lodge Junction, MM – Milner Royd Junction to Mill Lane Junction, or HB – Holbeck Junction to Bradford.

The previously described new crossover between lines serving platforms 1 and 2 at Bradford Interchange and the trailing crossover between the Up and Down lines at Ripley Junction (39M 66ch) have been commissioned (see 'Trackwatch' covering May 2018 for further details). On the line towards Hebden Bridge, in addition to the new Ripley Junction, two more named junctions have been created, Beacon Hill Junction (32M 32ch) and Lilly Lane Junction (32M 15ch), one to name each group of points at either end of Halifax

station. Whilst on the line to Leeds, the crossover at 191M 15ch is now known as Hammerton Street Junction and the scrapyard access at 190M 41ch is now known as Laisterdyke Junction.

A number of line names have changed within the controlled area; the Up Main and Down Main have been renamed to the Up L&Y and Down L&Y between the Route Boundary (beyond Hebden Bridge) and Greetland Junction (already renamed beyond here towards Heaton Lodge Junction). From Milner Royd Junction to Ripley Junction the Up Main and Down Main are now known as the Up Halifax and Down Halifax, whilst the Up Branch and Down Branch from Mill Lane Junction towards Holbeck Junction are now known as the Up Bradford and Down Bradford. Other renames include the run round facility at Bradford Interchange, which is now the Bradford Engine Release line, the Stabling Siding at Bradford Interchange is now the Bradford Wall Siding, the Up Refuse Siding at Hebden Bridge is now the Hebden Bridge Siding, the Down Reversing Siding at Halifax is now the Halifax Siding and MacIntyre's Siding has been renamed as Laisterdyke Siding, with the headshunt there being renamed Laisterdyke Headshunt.

Bi-directional signalling has been introduced on all lines between



Ripley Junction and Bradford Interchange, on the Up Bradford through Mill Lane Junction and Hammerton Street Junction, and between Hammerton Street Junction and Laisterdyke Junction on the Down Bradford to enable access to the scrapyard at Laisterdyke.

Both platforms at Hebden Bridge have been increased in length slightly, with platform 1 now having an operational length of 122 metres (133 yards), whilst platform 2 now has an operational length of 120 metres (131 yards).

Two new Hot Axle Box/Bearing Detectors (HABD) have been provided at 25M 00ch on the Up L&Y and at 25M 71ch on the Down L&Y and are known as Mytholmroyd HABDs.

LONDON NORTH WESTERN

Willesden Euro Terminal (4:1)

As part of the HS2 project, lines 1 to 10 at the terminal have been lifted in readiness for contractors to use the site as a base for construction.

Between Gavray Junction and Claydon L&NE Junction

In connection with the ongoing East West Rail project, the single line between 12M 75ch (near Claydon L&NE Junction) and 18M 48ch (near Gavray Junction) has been taken out of use until 2021 for rebuilding as double track.

Walsall area (4:19)

As part of the Walsall to Rugeley electrification project, the Up and Down Cannock lines between the existing limit of electrification at Rugeley (14M 20ch) and limit of electrification north of Walsall station (6M 54ch), plus the Slow lines between Walsall (6M 29ch) and Pleck Junction (5M 45ch), have had their overhead wires energised at 25kV AC.

Manchester to Preston (4:46A/48A/B)
As part of the North West electrification project, the Up and Down Bolton lines between the existing limit of electrification north of Ordsall Lane Junction (190M 28ch) and the limit of electrification near to Buckshaw Parkway (24M 39ch) via Bolton, plus the Up and Down Salford lines between the existing limit of electrifications at Deal Street Junction (0M 43ch) and Windsor Bridge South Junction (1M 55ch), have had their overhead wires energised at 25kV AC. This includes all through lines and crossovers in the Salford Crescent area, the crossover at Salford West Junction, all platforms and crossovers at Bolton (including to 10M 65ch on the single line towards Blackburn), the crossovers at Buckshaw Parkway Junction and Blackrod Junction and to 14M 14ch on the lines to/from Lostock Junction towards Crows Nest Junction.

Liverpool Lime Street (4:40)

The last platform at Liverpool Lime Street (193M 52ch) has been brought back into operational use. The new platform 1 (formerly platform 2) has an operational length of 220 metres (241 yards); in addition the new platform 2 has had its operational length extended to 221 metres (242 yards).

SCOTLAND

Between Dunblane and Gleneagles (1:15B)

In connection with the provision of a siding on the Up side at Blackford (133M 28ch), the Down Relief siding has been taken out of use.

Arbroath (1:16C)

The Up North Siding at Arbroath has been reopened to traffic.

WESSEX

Millbrook (5:29)

A new facing point (in the Down direction) has been installed in the Down Loop Extension at 79M 76ch and is presently secured out of use. It will eventually provide a connection into the Down Docks Branch.

WESTERN

Paddington (1:1A)

The connection into Paddington New Yard at approximately 1M 29ch has been taken out of use. *Between Reading and Newbury (3:4B/12A)*
As part of the Great Western electrification project, the overhead wires on the Up and Down Westbury lines from Oxford Road Junction (36M 66ch) to the final limit of electrification at 53M 42ch (west of Newbury station) have been energised at 25kV AC. In addition the Down/Up Goods at Theale, the Down Loop at Towney, the Up Newbury Loop, Down Newbury Loop and the Up and Down Basingstoke lines to 38M 07ch have also been energised.

In connection with electrification, specifically because of the provision of the overhead line equipment run-off onto the Basingstoke line, the route boundary between Western and Wessex has been moved from 37M 76ch to 38M 30ch.

In connection with electrification and the introduction of longer trains, Theale (41M 22ch), Aldermaston (44M 63ch) and Thatcham (49M 45ch) have had their platforms extended. At Theale, both platforms now have operational lengths of 168 metres (184 yards). At Aldermaston, platform 2 (Down Westbury) now has an operational length of 105 metres (115 yards), whilst at Thatcham both platforms now have operational lengths of 168 metres (184 yards).

Between Wootton Bassett Junction and Patchway Junction (3:15C/17A)

Further energisation of the overhead wires at 25kV AC on the Great Western route has taken place, including the following: the Up and Down Badminton and the Up and Down Tunnel lines from 83M 37ch to 112M 55ch, including the Up and Down Goods Loops at Hullavington (94M 28ch) and the Up Goods Loop at Chipping Sodbury (approximately 104M 40ch) and all six through lines at Bristol Parkway, a small portion of the Up and Down Charfield lines at Westerleigh Junction to 120M 59ch, a small portion of the Up and Down Filton lines to 112M 23ch including the Down Bristol Parkway Relief line, and Stoke Gifford IET depot, except the lathe road from the building housing the wheel lathe to the buffer stops. *Between Redruth and Camborne (3:11A)*
Dolcoath Automatic Half Barrier Crossing (AHBC) at 312M 62ch has been upgraded to a Manually Controlled Barrier crossing with Obstacle Detection (MCB-OD).

WALES

Craven Arms (3:30A)

A new facing crossover has been installed south of Craven Arms station at the newly named Craven Arms South Junction (20M 05ch) and is secured out of use until commissioning. The access point to the Central Wales line, formerly at 20M 01ch, has been relocated to the south of this new facing crossover and was commissioned immediately.

NORTHERN IRELAND RAILWAYS

Derry/Londonderry (6:20A/B)

As part of the project to build a new transport hub based around the original Belfast and Northern Counties Railway station, all signals at the current Derry/Londonderry station have been taken out of use and all points have been plain lined to allow running into platform 1 only. Platform 2, the Goods Loop and all other sidings have been taken out of use. One Train Working without Staff has been introduced to work trains between here and Bellarena.

Information has been grouped according to the main Network Rail 'Routes' in October 2018. All details can be subject to subsequent amendment. Books and Diagram Reference Numbers (in brackets) relate to the latest relevant Quail Track Diagram books obtainable from Trackmaps at www.trackmaps.co.uk.

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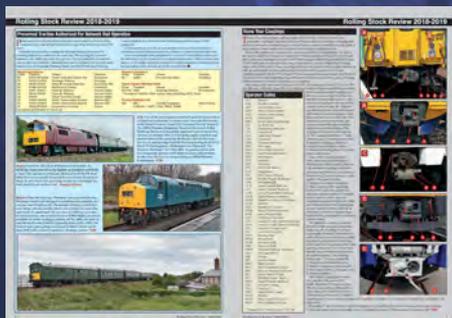


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Birmingham loop service: Super Voyager No 221112 *Ferdinand Magellan* hammers past Carnforth with the 08.51 Edinburgh to London Euston service on 15 March 2018. Tim Squires

Andrew Nock strongly challenged my criticism of DfT's decision to split the Liverpool – Norwich service at Nottingham ('Forum', December issue). I'm sticking to my guns on this, as the change will break a long standing through service, imposing an interchange on over 100,000 passengers a year. Nevertheless, I recognise there is a real tension between the attraction and convenience of through services and the critical importance of delivering punctuality.

Taking the most extreme case, CrossCountry's 08.20 Aberdeen – Penzance train serves a number of different functions during its 774-mile journey. For example, it's part of the regular two trains an hour pattern from York to Birmingham, an important business train in the half-hourly pattern from Birmingham to Bristol, and a key commuter train from Bristol to Taunton. Only a handful of hardy souls ever make the throughout journey all the way, but it's a busy train, sustained by passengers making a myriad of shorter journeys. A key feature of the CrossCountry business is that it's made up of thousands of individual flows; even major flows such as Birmingham – Manchester and Birmingham – Sheffield are a tiny proportion of the total. So breaking up the network, whilst it would improve punctuality, would have a significant revenue impact.

This is certainly not to say that long through services are always a sensible option. One of the most bizarre examples around 25 years ago was an hourly Central Trains service from Manchester Airport via

Crewe, Derby and Nottingham to Skegness, typically operated by a single-car Class 153. The route had tight turnrounds and was chronically unreliable, and a high proportion of trains were turned short at Crewe. Central Trains got a new Managing Director, who promptly withdrew the extension to Manchester Airport, and split the route into three, at Derby and Nottingham. The right answer is probably somewhere between the two: Nottingham – Skegness is fine, but Nottingham – Derby – Crewe – Manchester Airport is much more useful than a Derby – Crewe shuttle, and should be manageable in performance terms.

There are also still potential routes that could be extended or changed to deliver new journey opportunities. For example, the East Suffolk service from Ipswich to Lowestoft might be efficiently integrated with the Lowestoft – Norwich route, providing a direct link to Norwich from stations along the route, and the second TransPennine Express train north of York could be switched to go along the coast through Hartlepool and Sunderland, significantly improving long-distance access to that part of the North East, rather than chasing five other trains an hour to Newcastle via Darlington.

The trick is surely to maintain a balance and mitigate the performance risks, albeit at some cost. For example, the Aberdeen – Penzance train has extended dwell times at a number of stations, including 11 minutes at Edinburgh, nine at Birmingham and six at Bristol. In a perfect world, crewed standby trains could also be provided near key stations, although there would

be practical problems at some locations – there is no way that CrossCountry and West Midlands could each have a standby train permanently occupying a platform at Birmingham New Street – but this would be possible at Derby Etches Park and Northampton. And, of course, turnround times need to be sensible.

Ideally, these issues need to be managed on the basis of quantitative analysis of the impact on revenues, costs and performance, but it's difficult to see where there is a 'directing mind' to do this; currently, the responsibility is split between Network Rail's System Operator role, DfT and franchisees, with the Office of Rail and Road sometimes being called on as a referee. It may be that the Williams review will create clarity on where the buck stops on this and other issues, but I'm not holding my breath, particularly as the review so far seems very light on serious rail industry experience.

One of the ways of mitigating performance issues is to terminate trains short or miss out stops. This is sometimes appropriate, if the overall delay to passengers is minimised, but too often it feels, at least to passengers, that train operating companies are trigger happy with this approach, driven by operational reasons rather than customer care. On the day I'm writing this (3 December), TransPennine Express cancelled no fewer than 17 trains in each direction between Manchester Piccadilly and Manchester Airport, almost 25% of the service. From the December timetable, TPE has

introduced an additional unit into its Manchester Airport workings, with longer layovers at the airport. These changes should improve this dismal record – but the original plan was never going to work reliably.

On the same day, Virgin's 12.52 Edinburgh – Birmingham – Euston and the 14.00 Glasgow – Birmingham – Euston were both seriously late at Crewe, and were then diverted via the Trent Valley, recovering much of the time lost by Euston. But the only passengers to benefit from this were those for Milton Keynes, as the direct Glasgow – Euston trains were on time, and Euston passengers would not choose to use a train which is scheduled to take around 50 minutes longer. The majority of passengers, wanting to travel to the West Midlands, would have been told to change at Crewe, adding insult to injury for a journey that was already seriously delayed.

It may well be that there were compelling operational reasons for this, but if I were a passenger travelling to Birmingham, I'd be spitting blood.

Dwell times remain critical, too. The new TransPennine units provide more seats, but have single end doors. For an operation with high numbers joining and alighting at many stops, dwell times are likely to increase significantly at stations such as Manchester Victoria, Huddersfield, Leeds, Bolton and Preston, chewing up any savings in running times, and exacerbating the problems at platforms 13 and 14 at Manchester Piccadilly. 

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Last month I began with 'enough is enough' in the long-running Rail, Maritime & Transport union dispute about a second member of staff on Northern trains that has destroyed rail services right across the north of England for months and looked set to ruin services every Saturday in the run up to Christmas. I criticised the Department for Transport for not taking any action. And lo, just a week later, new DfT Minister Andrew Jones (he's a northern lad so, unlike his predecessor, probably knows there are railways north of Watford that are not powered by hydrogen!) announced that 'enough is enough' – clearly not an iota of original thought in the speech writing department at the DfT!

In a complete volte-face of previous policy, Mr Jones confirmed that a second person will, after all, be retained on Northern trains. But not necessarily that they will be 'safety trained' as the RMT continues to demand. So pretty much what Merseyrail and ScotRail, two other franchises that border Northern, agreed months ago. Last month I asked what was different about Northern. The answer seems to be that the other two are not beholden to the Department for Transport.

Meanwhile, just to turn the screw on its customers even further, Northern announced that on Saturday strike days during December, trains would cease running at the even earlier time of '5pm' (Northern doesn't seem to have noticed that its timetables use the 24-hour clock), and helpfully listed some of the pre-Christmas events you wouldn't now be able to attend. These posters were plastered all over the Northern network, including the many stations also served by TransPennine and other operators, inevitably causing confusion for those passengers who charmingly believe that we still have one national rail network and not 20 different tribes that don't talk to each other.

Then, in announcing DfT's conclusions on why the May timetable meltdown happened after seven months when most of the railway could have told him in the same number of minutes, Secretary of State Chris Grayling admitted that perhaps he and his Department had not been asking sufficiently searching questions at the time. Since weeks before it was even due to start it had been patently obvious that there would be problems with the new timetables, and given that the Department normally insists on crawling over



Over the river: Guildford-bound Class 455 crosses the Mole at Leatherhead on 1 June 2017. Ken Brunt

everything in excruciating detail, we need to ask why not?

It would now seem that, despite his constant protestations to the contrary, responsibility for both the May timetable shambles and then the summer, autumn and now winter of discontent that has afflicted Northern lies firmly at his door.

And I am not the only one to think so. Speaking at the National Railway Heritage Awards earlier this month, recently retired Network Rail Chief Executive Mark Carne complained that his tenure had been marked by the Secretary of State and his Department 'pulling the strings from behind the curtain'.

As the Northern franchise specifically requires the introduction of one-person operation, DfT will presumably now have to amend it and compensate the company for the additional cost of this climbdown. More money wasted. But what about all those millions of people who have lost out financially and socially for many months past while the Department considered its navel? Who will compensate them? A good piece of PR would have been to reduce fares on the lines affected by 3% next year, not increase them. See that squadron of pigs flying by?

Amere 30 years ago, British Rail produced a map showing the places the proposed 'Thameslink 2000' services would serve. Among them was Guildford, and the new trains would serve good old Effingham Junction on the way. Pretty soon after, Thameslink trains did indeed appear, via West Croydon and Epsom, every half-hour. But only between the morning and evening peaks Monday to Friday, and not at all on Sunday, so Saturday was the only day of the week when trains ran all day. Perhaps good for shopping or attending sporting events, but useless for commuting. During peak hours, a couple of what are now Southern services were provided between

London Bridge and Guildford over the same route, and industrial relations permitting, these still run, with a conductor over the now South Western Railway part of the route.

Promotion of the new Thameslink service was zero, and because it only ran off-peak, and was not exactly quick – except between Effingham and Guildford non-stop, where drivers took full advantage of the more sprightly performance of the then-new Class 319 units – trains were rarely full. After a few years, the service was removed, to be replaced with a similarly off-peak South West Trains service just between Guildford and West Croydon, calling only at major stations en route. That service too enjoyed nil publicity or promotion and was inevitably in due course similarly expunged from the timetable. But the good people of Surrey were promised that, come the day when full Thameslink services were introduced, Guildford would once again be one of the destinations served. And in due course, when the line through Effingham was resignalled, the new signals were planted to allow the platforms to be extended for longer trains – and they have been, if only to provide for now SWR's new 10-car trains out of Waterloo.

More belatedly than the term 'Thameslink 2000' might suggest, the day for full services has finally (well almost!) come. But in the meantime, Guildford has been quietly erased from the Thameslink map, with the result that the south west quadrant of London still has no direct access, unless you count a change onto the 'roundabout' services at Wimbledon, although fast services from Guildford don't stop there.

This is not the only service that has come and gone from Guildford. Virgin CrossCountry's innovative but in the event hopelessly over-optimistic 'Operation Princess' introduced direct services from Portsmouth, Brighton and Gatwick through Guildford

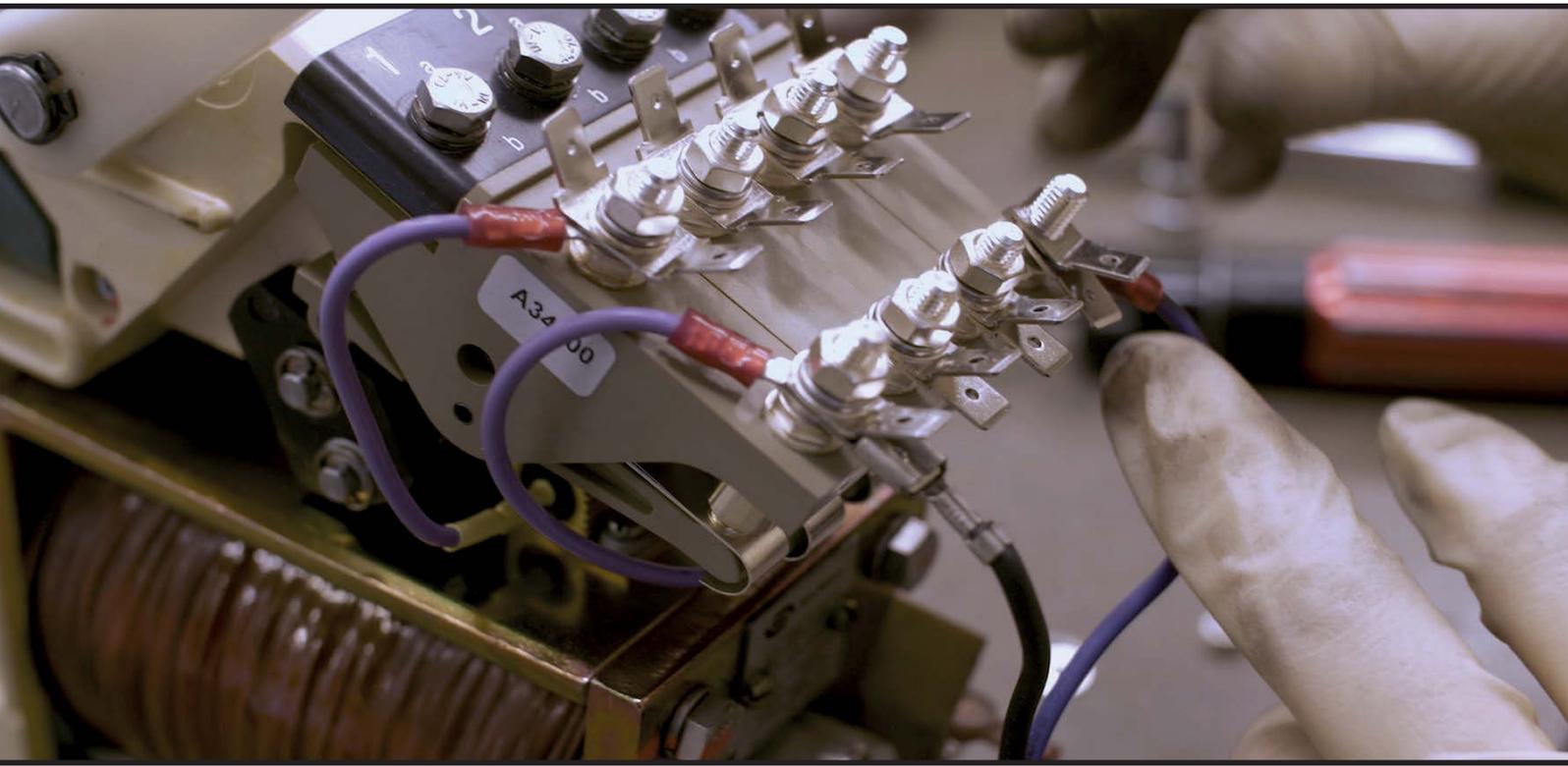
and Reading to a vast number of destinations in the north on both the East and West Coast main lines. As I write, I could still take the truncated remains of the last of these services, the 06.02 from Guildford to Newcastle, and be in Birmingham without a change by 08.12, much quicker and more reliable than via Waterloo with two changes. And I could return at the end of the day, leaving at 16.33 and arrive in Guildford at 18.59. But not for much longer. Even this last valuable link from south west of London was due to go in the December timetable changes; as a result of the timetable change moratorium, the service will now linger on until May. Cessation then will leave Guildford once again with fewer direct destinations than in 1965. So much for DfT's drive for greater 'connectivity'!

Meanwhile, what Guildford really, really needs to relieve its chronic and worsening traffic congestion is the restoration and electrification of the seven-mile line from Guildford to Cranleigh, closed in 1965 but always in the top 10 list of potential re-openings with positive benefit:cost ratios, supported for the last three decades by a whole succession of reports and most recently by the Secretary of State. But the well-heeled residents of Bramley are absolutely opposed to new transport developments of any sort, whether it be rail, guided bus or tram – all of which have been proposed – and continue to believe that opposing reopening will deter further development. But they are out of luck. With the usual total disregard of the lack of anything like adequate public transport connections, planning permission has been given for more than a thousand new homes, with more apparently in the pipeline. Gridlock seems assured. Someone has even suggested reopening the parallel canal. High-speed narrowboats anyone?

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