

INFORMED SOURCES e-Preview April 2017

A lot going on this month, ranging from an action replay of the 1990s to a major development in Digital Railway and a full report on the Class 230 fire.

Signalling renewals – the boiling frogs are back.
Digital Railway debunks 40% capacity claim
Lessons relearned with Class 230 fire
'Little' impact from GWEP wiring cut-back – DfT

As Railtrack neared its timely end, one indicator that all was not well was the claim that BR style resignalling schemes were unaffordable. Patching up existing equipment had a better Net Present Value.

Network Rail having brought Railtrack out of administration, a Periodic review was needed to reset the funding required. This gave an indication of contemporary signalling costs.

An indicator of value for money is cost per Signalling Equivalent Unit (SEU). An SEU is a signal head or set of points and in 2003 the figure was around £250,000.

For the current Control Period 5, ORR's Final Determination showed the cost per SEU falling from around £274,000 to £252,000 in the final year (2018-19). According to ORR, savings were to be built into Network Rail's framework contracts with its suppliers. In other words price cuts by the suppliers.

In line with ORR's aspirations, Network Rail Routes developing new signalling schemes are being advised by the Centre to budget on the basis of £254,000 per SEU. This sounds roughly in line with the numbers quoted above.

But according to various Informed Sources, commercial reality is proving recalcitrant. One report quotes the Norwich-Lowestoft-Great Yarmouth (NYL) Wherry Lines resignalling at £54 million for 122 SEU, or £440,000 per SEU. Other bids are reported to be coming in from contractors at prices equivalent to around the £400,000 per SEU mark.

As in 1998, these cost increases are being blamed on the contractors. But you can understand that given the current situation, no manufacturer is going to pencil in optimistic assumptions on future workloads when pricing a job.

And with signalling schemes being pushed back signalling contractors own costs are under pressure. Signalling staff are being laid off as schemes are being slid to the right into CP6 (2019-2024) or cancelled to save money. So contractor's unit costs go up. And fingers are also being pointed at Network Rail's management of signalling contracts. Worrying.

40% capacity claim over-optimistic

As you may have noticed, this column was clear from the start that the widely touted claim that 'digital railway' technology would, as if by magic, generate an additional 40% capacity, was away with the fairies. That mystical number emerged from a study of the South West Main Line into Waterloo and the 40% claim soon became a tenet of the Digital Railway cult that sprang up within Network Rail.

One of David Waboso's first actions after joining Network Rail as Director Digital Railway was to set up the Early Contractor Involvement group (ECI). This brought the supply chain into the development of what we should properly call 'command, control & signalling policy'.

With ECI established, seven Work Streams were set up, one of which was created to 'specifically address an often quoted statement that a combination of Digital Railway (DR) products/solutions can improve capacity up to 40%, create better connectivity and deliver better reliability'. The Team with representatives from Alstom, Amey, Hitachi, Indra, Siemens and Thales was posed the question: 'can the Traffic Management System and ETCS suppliers validate the often quoted 40% capacity improvement figure?'

Despite having reservations about the capacity modelling programmes used by Network Rail, the ECI team had a go at assessing potential capacity gains from available technology. Two scenarios were developed starting off with Traffic Management (TM) alone.

A route has a theoretical maximum capacity which is imposed by the constraints of the track topology and the signalling system. One way to overcome these limitations is to de-conflict the current timetable and introduce Interfaced or Integrated TM plus Connected Driver Advisory System (C-DAS).

This scenario 'may provide additional usable capacity in the region of 10%'. But even here, caution reigns, the team noting that there are areas of the network already operating at minimum headways and to the limits of the conventional signalling system. On such lines only civil engineering and signalling intervention can unlock usable capacity.

For the second Scenario, ETCS Level 2 was overlaid on a conventionally signalled railway. Here the extra capacity is achieved by subdividing conventional block sections into ETCS block sections. This is what is being done at stations in the Thameslink Central core and allows an ETCS-fitted train to proceed beyond conventional block sections.

Combining the two scenarios and adding civil engineering and signalling intervention, an overall capacity increase 'in the region of 10% to 20% is possible'. A further 5% to 10% capacity gain may be delivered with the introduction of ATO.

Overall, the ECI study confirms that 'it would be incorrect to state that a 40% increase in capacity can be achieved across the network by only adopting Digital Railway solutions'. Rather Digital Railway solutions are enablers to unlock the maximum potential of network areas.

Even then, where an area of the network is already at, or close to, its maximum physical capacity, 'Digital Railway solutions cannot bring

...about further capacity improvements', although they can provide additional benefits in availability, journey time saving and reliability of the service.

Design issues compounded Class 230 fire

As reported last month, the root cause of the diesel generator set (genset) fire in Vivarail's Class 230 demonstrator was the failure to follow the engine maker's workshop manual after working on the fuel injection system. This resulted in a high pressure spray of fuel from an injector pipe which ignited.

However Vivarail's detailed report into its investigation of the blaze reveals a number of design and construction flaws that, literally, added fuel to the flames. It also highlights those features of the conversion of the D78 Tube Stock vehicles to a Diesel Electric Multiple Unit which got it right.

Critics of the 'technically backward' railway point to specifications which block innovative ideas. I can remember British Rail engineers moaning about the requirement to fit a solid steel plate above engines in the then new DMUs as a fire barrier. This prevented access for maintenance through a panel in the floor to the top of the engine.

In the Class 230 the steel barrier above the genset did its job and there was no sign of the fire inside the vehicle. The only damage was where heat had entered the underfloor wiring loom tray which runs the length of the vehicle. This U-shaped tray has to have ducts to allow wires to reach equipment and heat coming in through these ducts had melted wiring insulation.

So far, so good. But events inside the genset module showed the different mind-set of railway and automotive design. Full details in the column.

But a common theme is the extensive use of flexible hoses and plastics tanks for features like oil reservoirs, which melted in the initial fire releasing further fuel after the engine had shut down.

The report also highlights a 'significant amount' of associated hose and pipework on the underframe with no protection. Running over debris on the track could lead to a significant fuel spillage. The collision between a Super Voyager and a car at Copmanthorpe in 2006 caused damage to fuel tank drain valves that allowed fuel to escape

There is also a classic example of Sodde's Law with the genset's fire extinguisher. With a degree of understatement the report comments. 'the continued presence of fire after the unit had come to a stand suggests that this system was at best only partially successful in extinguishing the fire'.

During the investigation, the genset supplier said that in the most recent modules the fire extinguishant had been changed from gas to dry powder following advice from the supplier that it was more suited to the application. The first four gensets fitted to 230001 were being retrofitted at the first suitable opportunity.

When the train's three undamaged gensets were inspected the extinguishers had indeed been converted to dry powder. But, confirming the power of the Law, when the fourth genset was being worked on in December a gas powder cylinder was ready to be installed only for a quality defect to be spotted as it was being fitted. With pressure to have the train running, the gas bottle was replaced.

So what is being done to prevent a recurrence? Obviously the processes for working on the engines are being reviewed. Following engine work a genset will have a full power run on the load bank to check for leaks.

However, what really matters is 'tractionising', the automotive-based genset and its installation. We have, of course, been through this sort of thing before, albeit a long time ago with the Leyland National Railbus as it evolved into the Pacer.

So a full design review of the genset is underway. This includes the low pressure fuel pipe system, the specification of flexible hoses, positioning and specification of the fuel filter, and the positioning of the manual fuel isolation valve. 'As a minimum', as much fixed metal pipework as possible will be used and any flexible pipework will be to a fire-resistant standard.

In addition to 'significantly enhancing' the effectiveness of the primary fire suppression system, a secondary system will be installed to operate once the train has stopped.

As ever, accidents generally involve a concatenation of failures. In this case the ineffectiveness of the one shot gas fire suppression system, which was due to be replaced, allowed the fire to build. While shutting the engine down stopped the spray, melting pipes fuelled the fire. Hand held extinguishers initially tamed the blaze, but with so much inflammable liquid in the genset, the flames reappeared.

With so many hard core traction engineers involved with the Class 230 design, I find some of the failure points surprising, although it seems that the gensets were bought as a 'black box'.

Does this spell the end of the Vivarail adventure? Not according to Chief Executive Adrian Shooter who in addition to getting 230.001 back on the rails is also looking to extend the range of traction options for the basic concept.

When trial service running restarts perhaps a naming ceremony would be in order. How about 'Phoenix'.

Value for money of electrification challenged

When the National Audit Office (NAO) publishes a report the Parliamentary Public Accounts Committee (PAC) follows up with its own inquiry. On 3 March the PAC published the report on its 'Modernising the Great Western Railway' inquiry which complemented last November's NAO report on the Great Western Route Modernisation.

Since the NAO report covered much the same ground as my feature articles on the Great Western Electrification Programme (GWEP) a few months earlier in the year I decided to spare readers a table-laden action replay. And, anyway there were more important issues to cover,

not least the decision to defer sections of GWEP (Informed Sources December 2016) .

So why does the PAC follow-up now merit space? Because, in its evidence to the PAC the Department for Transport has driven another nail into electrification's coffin.

In an effort to excuse its incompetence, DfT told the PAC with blithe insouciance that its decision to defer around 15% of GWEP's electrified track mileage will have 'little, if any, impact on the benefits of this programme to passengers'. Many of the benefits, such as more trains per hour, journey time savings and more seats, do not depend on electrification, DfT argued.

So what did the PAC make of this exculpatory claim? Well, if it's not going to make that much of a difference why bother to electrify those deferred sections at all? Or, as the PAC recommends, DfT should reassess the case for electrification 'on a section by section' basis.

It gets worse. Getting into its stride the PAC adds that electrification schemes should be funded 'only where worthwhile benefits for passengers could not be achieved otherwise at lower cost'. Indeed, according to the PAC, DfT is already revising the business case for GWEP, due for completion about now.

As part of this review the PAC recommended that DfT should also reassess the extent of electrification within the Great Western Route Modernisation. And while you are at it, please 'look again' at your plans for electrification of the Midland Main Line and TransPennine routes.

Of course, the worm in the bud is IEP. DfT's claim that journey time savings do not depend on electrification assumes that under diesel power a bi-mode Class 800 will be able to take time out of an IC125 schedule. You've seen the sums in this column and it's wishful thinking. And don't forget that a bi-mode has the disadvantages of both modes.

As an electric train it is carrying around 30 tonnes or so of diesel power packs and fuel. As a diesel train it has three out of five cars powered and so lacks the performance of, say, a Voyager with all vehicles powered. Meanwhile, Informed Sources report that trial running with the Class 800 engines at the full 700kW rating is causing them to get a bit hot and bothered.

Roger's Blog

After the last e-Preview went out I had an informal meeting with Network Rail Chief Executive Mark Carne to discuss the policy of devolving power to the routes. This was more of a background chat than a formal interview pending a fully fledged feature article later in the year.

What I was particularly interested in was the dynamics between the Routes and the centre and I came away with a good understanding of what is happening plus some supporting diagrams - you can always tell an engineer - when an explanation gets detailed out comes the pencil and paper.

The following week it was up to London for the George Bradshaw Address, this year given by Chris Burchell in his role of Rail Delivery Group Chairman. Politically, there are limits on what RDG is allowed to say, so the presentation was pretty bland, compared with, say, Michael Holden's presentation at this year's Golden Whistles. However, I did discover that Chris and I have two things in common - we both sang in St Paul's Cathedral as boy choristers and in adult life coached junior rugby.

This coming week there is the Waterfront ERTMS conference and the day after the latest in Virgin Trains' media dinners, this time focusing on the West Coast where we have seen a silent revolution in performance by both operator and Network Rail.

April is pretty quiet, although I am currently setting up interviews for early in the month in the expectation that Network Rail's proposed contract with Resonate to add Traffic Management to the IECC Scaleable at Thames Valley Signalling Control Centre will be signed in time for a full write up before I have to get my copy in early because of Easter. There's a brief report in the column based on Network Rail's OJEU notice stating its intention to award the contract. As I write the deal is being thrashed out. The OJEU gave the week of 3 April for the contract to be finalised and the end of the week is my deadline. Fingers crossed.

Roger