

## Presentation to ASTT AGM 2017 by Richard Coleby

### A new responsibility for the ASTT?

Following the results of the Fantasy new-build survey on Facebook I was silly enough to rush into print on our website Forum with an opinion that apparently rang some bells with our august Chairman, who immediately spotted an opportunity to fill some time in this afternoon and requested me to further expand my views at this gathering.

He may well come to regret his precipitate action but anyway – here goes!

However - before expanding on the point that I was trying to make in the Forum discussion perhaps just a quick comment on the result of the Fantasy new-build survey. The fact that the Great Bear and the 5AT were the main protagonists is both ironic and yet indicative of the opposing priorities of the Preservationists and the Modernists. If Churchward was alive today I think we all know what **he** would have voted for, for he was the arch modernist of his day and never saw the necessity to build The Bear in the first place! And of course in practice he was proved to be right as the later Castles and Kings proved so dramatically. It was purely a useless publicity stunt to 'keep up with the Jones's' and to build another one today, especially if it were to be a slavish copy, would be a serious indulgence in nostalgia, providing only a visual 'high' for a myopic few.

The 5AT on the other hand it could be argued, with few exceptions, reflects how much of Churchward's pioneering development of the 4-6-0 can be brought to an even higher state of performance. Much of this could, of course, have been possible by the early years of BR, it just needed the later necessity of rolling bearings throughout for reduced maintenance and reliability and improved exhaust designs.

I would say there is much irony in that fact!

Anyway, back to the main message. So, first of all I would like to take a look back to a time around 15 or so years ago and compare briefly the situation vis a vis running mainline specials and excursions around the turn of this century to that which exists in the present day.

Around the year 2000 mainline preservation steam was entering what might be termed its middle age. In the early years of the millennium more restored FGS mainline engines were starting to augment the early renovations and the fraternity were indeed happy to see engines that had previously been running on BR in the 60's return to old stamping grounds as well as make forays to parts of the country that they had never graced before. There was no necessity to look very far into the future. The recently privatised network was not fully into its stride and track occupation was not yet an obstacle for slotting in Specials.

Fifteen years ago a canter down the mainline at 75mph was all that was necessary to stay within your slot. Water and fuel stops could be easily catered for.

Reliability issues were unfortunate but not catastrophic for the operating departments.

Fifteen years ago Tornado, the first FGS new-build, was still some way from completion and there were still doubts as to whether it would actually ever run. The 5AT Group had published the outline details of Wardale's Super Class 5 as a genuine NEW-build but any interest generated was, apart from a few enthusiasts, lukewarm.

It was an era when no one would have predicted that ten years later the paths necessary to run FGS locomotives would become severely limited due to an unprecedented explosion in public use of the railway network.

So today it is a totally different picture. Hopping down the mainline between watering holes is more and more difficult to fit in between the ever more frequent high speed services and the addition of a water carrier, whilst helping to alleviate the problem to some extent, can also reduce the number of paying passengers. Reliability issues on some old Heritage locomotives frequently lead to disappointed passengers and maintenance bills to keep the FGS steam on the road are becoming a serious obstacle requiring longer periods out of action while the money is raised to pay for them.

I would propose to you that this is a situation that can only get worse with the passage of time and, you can call me the arbiter of doom, but in another ten to fifteen years a place may no longer be found for steam on the mainline any more.

The most uncomfortable truth of all is that not even brand new FGS designs such as Tornado and Prince of Wales, even if they carry all the latest equipment deemed necessary by the Network authorities, will be able to find suitable paths to enable them to intermix with the normal programmed running of the railway system even if they are eventually certificated for 90mph running.

Simply put, they will not have the total combination of speed, endurance and reliability essential for the task on a prolonged basis. Even on these newly built engines repair bills due to inbuilt First Generation inadequacies would likely rocket but the real wolf at the door could be the lack of suitable coal or at the very least easy and affordable procurement of same.

I am convinced this will happen – unless action is taken in the immediate future to produce a modern steam locomotive design - and facilitate its build. Given that the gestation period for such a product is going to run into many years we could now, today, be in the 'Last Chance Saloon', for if mainline steam was to be stopped in the interim then the chances of restarting it after a lapse of time would be even more difficult if not altogether impossible. And that would be a tragedy.

## **What can be done?**

That's the bad news. The good news is that technically this is not a hopeless Fantasy at all. Since the end of steam development on a worldwide basis there has been considerable work carried out by Porta, Wardale and indeed many others, of a practical nature, to prove that considerable improvements can be made to the Stephensonian locomotive. But of even more likely benefit to a modern locomotive design has been the greater understanding of thermodynamic principles as so aptly demonstrated by my colleague David Pawson. Coupled to all of this are the better tools, materials and construction techniques that not only ensure longer component life but can predict that life as well, leading to much greater overall reliability.

I would also like to add one other important factor that is easily overlooked and this has been the steady rebuilding of knowledge, skills and facilities within the UK that make it quite possible for a new design to be undertaken with a high degree of confidence that was not around until comparatively recently. We owe this in no small part to Britain's world leading railway preservation industry and all its many tentacles and also let us not forget the huge contribution made by the A1 Trust in carrying through the completion of Tornado.

Of course none of this can happen without finance, which is the surest subject to bring the dreams of engineers down to earth and the everyday realities of life. I am not the person to discourse at length on this subject except to say that there will be no financial backing without enthusiasm, a fact the old 5AT Group are all too well aware of. But circumstances change, and they have changed, and whereas the 5AT was proposed at a time when there were exciting additions being made to the FGS mainline fleet and, as stated before, no one was predicting the rapid rise in intensive use of the modern railway, today at least some people are becoming aware of what the repercussions to this are likely to be.

I therefore put it to you that the ASTT is at least in a position, in fact I would argue it also has a responsibility, to start looking at this situation with a degree of seriousness. Putting a large tender or extra water capacity behind a Heritage engine is not going to be a long term answer to this problem. It needs a root and branch solution that not only answers the engineering challenges, which in some respects are the easy part, but also of necessity informs and enthuses those who will have to subscribe to it.

## **What is required?**

I am sure most of us sitting in this room could come up with a shed load of attributes desirable in a modern locomotive. But the essentials are worth reiterating if only to enforce many of the points made by the previous speaker and their importance.

The modern high speed and intensely programmed railway is a battleground into which to insert a new steam design. In order to survive it will have to aim for the highest degree of ruggedness to minimise non-availability, have good acceleration

and a designed sprint speed of 100mph, quick turnaround and servicing, long non-stop capability and importantly the grunt to be able to haul 12 coach trains. Ease by which daily, weekly and mileage exams can be carried out must be a major consideration at the design stage and extended ring and bearing life essential.

Another fundamental decision will certainly be the fuel. Although suitable coal is still relatively easy to procure there is no guarantee that this will continue in the future in the quantities needed. Added to which environmental considerations will have to be increasingly taken into account. Adaptability for alternative fuels may be required or coal/oil co-firing for high outputs even considered.

The steam engine has one significant advantage over modern motive power in that it is fundamentally a simple machine in essence although in today's world the inclusion of electronics in certain areas is unavoidable. I would suggest to you that the mantra of simplicity in so far as it shuns any unnecessary components that add little to the final performance, should be one of the highest priorities and rigorously maintained throughout the design stage. This is especially important for a brand new design which needs to carve a niche for itself of reliability and high performance and any failure in these respects is likely to become a focus of unwanted attention. Only when this has been achieved can one look perhaps at more adventurous projects to expand the envelope further.

David Wardale designed the 5AT with pretty much the same guidelines as above and the Fundamental Design Calculations showed that the required performance was achievable within the envelope of a two cylinder 4-6-0 arrangement with a narrow firebox boiler, although for the maximum output oil firing would be required.

Over the intervening years there has been a view in some quarters that a Pacific with a wide firebox would be a better design base. In some respects this may well be a valid argument but the big advantage of the 4-6-0 arrangement is that it allows for a longer tender and thus longer range whilst still able to use turntables where they still exist. Further, it could be easily adapted for Heritage line use by substitution of a regular tender, thus profiting from the improved reliability and efficiency of a modern locomotive without the unnecessary burden of the long range tender. The greater route availability of the 4-6-0 as against a Pacific would also be an added bonus for this type of operation.

Of course the turntable argument would disappear if the engine were to be equally capable of being driven in either direction whilst still conforming to riding and driving parameters set out within the Network regulations. There would be several options for such an engine and the Leader and Kitson arrangements spring to mind, but they would all be likely to represent a too fundamental departure from accepted normality and therefore pose difficult initial design and certification problems and extended build time.

In fact I would submit that the consideration of anything deemed radical would be a dangerous road to tread for any group building a new locomotive design until

a healthy provenance had been achieved by means of a previously successful project.

The options, therefore, for a 'first' project would seem to be quite limited with regard to the basic layout of the engine but maybe this is not such a bad thing. Why? Because, not only will it promote a shorter design phase due to familiarity in concept if not in detail, with existing norms, but it would also help greatly in offering a degree of comfort to the regulating authorities who would be dealing with something within their existing knowledge base to a great extent.

So, what does all this boil down to? Well, we have heard what constitutes the ideal steam engine thermodynamically so obviously this must have a major impact on the basic design in order to achieve the performance levels we are aiming for. However, I have already noted that we should not entertain any radical departures from the accepted norms, at least from an engineering viewpoint but there is another reason for this which perhaps surprisingly has absolutely nothing to do with engineering design but everything to do with getting the money together for a new-build engine in the first place. It has to hit a visual nerve that is acceptable to those who might be prepared to put their hands in their pockets.

The problem with this side of the equation is that beauty is in the eye of the beholder and whereas a Heritage new-build will invariably have a degree of acceptance from at least one sector of the community, something new has to establish its own acceptance credentials, a notoriously tricky judgement.

### **The first step?**

The whole purpose behind this presentation is to invite a serious discussion amongst us as to whether it is agreed or disagreed that something needs to be done imminently to start the ball rolling towards a solution that prevents the eventual demise of all mainline steam, something that I personally see as inevitable in the not too distant future. I have deliberately avoided (with some difficulty I might add!) diving into the realms of detail because that is not the first step. If it is agreed that the situation I have outlined does require action, then a body needs to be set up to decide the right way to go about it. If we are to avoid the same fate as the 5AT then a plan has to be evolved that, amongst other matters, will ensure clear and concise communication of what we are setting out to achieve and the reasons we consider it to be a matter of such high importance.

This will need to involve others outside our Trust, who have the skills that we do not currently possess. We will need to search out and find those with a like mind who can help our cause and this will take time and effort and involve us in networking in areas that are quite unfamiliar to us. But it will be worth it and if we can pull it off the ASTT will receive recognition in the future for having the foresight to engineer, in both senses, the future of mainline steam.

Thank you.